CITY OF BOULDER
PLANNING BOARD MEETING AGENDA
DATE: April 18, 2013
TIME: 5 p.m.
PLACE: Council Chambers & First Floor Conference Room - 1777 Broadway

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5 p.m. PLANNING BOARD RETREAT (1777 Broadway 1st Floor Conference Room)

1. Overview of the Boulder Valley Comprehensive Plan, Projections and Demographics
2. Joint Meetings with other Boards
3. Planning Board Discussion Protocols

7 p.m. STUDY SESSION (Council Chambers)

Study session to provide background information in preparation for the upcoming public hearings related to the annexation, initial zoning, and site review for the proposed Boulder Creek Commons project located at 5399 Kewanee Drive and 5697 South Boulder Road (a.k.a. the Hogan-Pancost site).

8:30 p.m. – REGULAR BUSINESS MEETING (Council Chambers)

1. **CALL TO ORDER**

2. **APPROVAL OF MINUTES**
   The **February 7** minutes are scheduled for approval.

3. **PUBLIC PARTICIPATION**

4. **DISCUSSION OF DISPOSITIONS, PLANNING BOARD CALL-UPS/CONTINUATIONS**
   - **A.** 4474 Broadway (Violet Crossing) Floodplain Development Permit (LUR2013-00004). This decision may be called up before Planning Board on or before **Apr. 18, 2013**
   - **B.** Wetland Permit (LUR2013-00022) Junction Place Bridge and Depot Square. This decision may be called up before Planning Board on or before **April 19, 2013.**
   - **C.** 4474 Broadway (Violet Crossing) Final Plat. This decision may be called up before Planning Board on or before **Apr. 19, 2013**

5. **PUBLIC HEARING ITEMS**
   - **A.** Critical Facilities Ordinance

6. **MATTERS FROM THE PLANNING BOARD, PLANNING DIRECTOR, AND CITY ATTORNEY**

7. **DEBRIEF MEETING/CALENDAR CHECK**

8. **ADJOURNMENT**

CITY OF BOULDER PLANNING BOARD
MEETING GUIDELINES

CALL TO ORDER
The Board must have a quorum (four members present) before the meeting can be called to order.

AGENDA
The Board may rearrange the order of the Agenda or delete items for good cause. The Board may not add items requiring public notice.

PUBLIC PARTICIPATION
The public is welcome to address the Board (3 minutes* maximum per speaker) during the Public Participation portion of the meeting regarding any item not scheduled for a public hearing. The only items scheduled for a public hearing are those listed under the category PUBLIC HEARING ITEMS on the Agenda. Any exhibits introduced into the record at this time must be provided in quantities of ten (10) to the Board Secretary for distribution to the Board and admission into the record.

DISCUSSION AND STUDY SESSION ITEMS
Discussion and study session items do not require motions of approval or recommendation.

PUBLIC HEARING ITEMS
A Public Hearing item requires a motion and a vote. The general format for hearing of an action item is as follows:

1. Presentations

a. Staff presentation (5 minutes maximum*)
b. Applicant presentation (15 minute maximum*). Any exhibits introduced into the record at this time must be provided in quantities of ten (10) to the Board Secretary for distribution to the Board and admission into the record.
c. Planning Board questioning of staff or applicant for information only.

2. Public Hearing

Each speaker will be allowed an oral presentation (3 minutes maximum*). All speakers wishing to pool their time must be present, and time allotted will be determined by the Chair. No pooled time presentation will be permitted to exceed ten minutes total.

- Time remaining is presented by a Green blinking light that means one minute remains, a Yellow light means 30 seconds remain, and a Red light and beep means time has expired.
- Speakers should introduce themselves, giving name and address. If officially representing a group, homeowners' association, etc., please state that for the record as well.
- Speakers are requested not to repeat items addressed by previous speakers other than to express points of agreement or disagreement. Refrain from reading long documents, and summarize comments wherever possible. Long documents may be submitted and will become a part of the official record.
- Speakers should address the Land Use Regulation criteria and, if possible, reference the rules that the Board uses to decide a case.
- Any exhibits introduced into the record at the hearing must be provided in quantities of ten (10) to the Secretary for distribution to the Board and admission into the record.
- Citizens can send a letter to the Planning staff at 1739 Broadway, Boulder, CO 80302, two weeks before the Planning Board meeting, to be included in the Board packet. Correspondence received after this time will be distributed at the Board meeting.

3. Board Action

d. Board motion. Motions may take any number of forms. With regard to a specific development proposal, the motion generally is to either approve the project (with or without conditions), to deny it, or to continue the matter to a date certain (generally in order to obtain additional information).
e. Board discussion. This is undertaken entirely by members of the Board. The applicant, members of the public or city staff participate only if called upon by the Chair.
f. Board action (the vote). An affirmative vote of at least four members of the Board is required to pass a motion approving any action. If the vote taken results in either a tie, a vote of three to two, or a vote of three to one in favor of approval, the applicant shall be automatically allowed a rehearing upon requesting the same in writing within seven days.

MATTERS FROM THE PLANNING BOARD, DIRECTOR, AND CITY ATTORNEY
Any Planning Board member, the Planning Director, or the City Attorney may introduce before the Board matters which are not included in the formal agenda.

ADJOURNMENT
The Board's goal is that regular meetings adjourn by 10:30 p.m. and that study sessions adjourn by 10:00 p.m. Agenda items will not be commenced after 10:00 p.m. except by majority vote of Board members present.

*The Chair may lengthen or shorten the time allotted as appropriate. If the allotted time is exceeded, the Chair may request that the speaker conclude his or her comments.

C I T Y O F B O U L D E R
MEMORANDUM

TO: Planning Board

FROM: David Driskell, Executive Director of Community Planning and Sustainability
Susan Richstone, Deputy Director of Community Planning & Sustainability
Lesli Ellis, Comprehensive Planning Manager
Jeff Hirt, Planner II
Chris Meschuk, Planner II

RE: Boulder Valley Comprehensive Plan Introduction and Overview, Projections and Demographics

Attached please find the following information for the April 18 Planning Board retreat:

- An overview of the Boulder Valley Comprehensive Plan (BVCP), including the recent 2010 Update and Action Plan.
- A history of planning milestones in Boulder.
- 2013 Community Profile that includes data and projections on Boulder's housing, population, and employment.

At the study session, staff will provide a short introduction and overview of the BVCP and a brief overview of estimated and projected population and employment.

ATTACHMENTS:

1. Overview of the BVCP
2. Planning Milestones
3. 2013 Community Profile

The Boulder Valley Comprehensive Plan

Overview:

Since 1970, the city of Boulder and Boulder County have jointly adopted a comprehensive plan that guides land use decisions in the Boulder Valley. The Boulder Valley Comprehensive Plan (BVCP) seeks to protect the natural environment of the Boulder Valley while fostering a livable, vibrant and sustainable community.

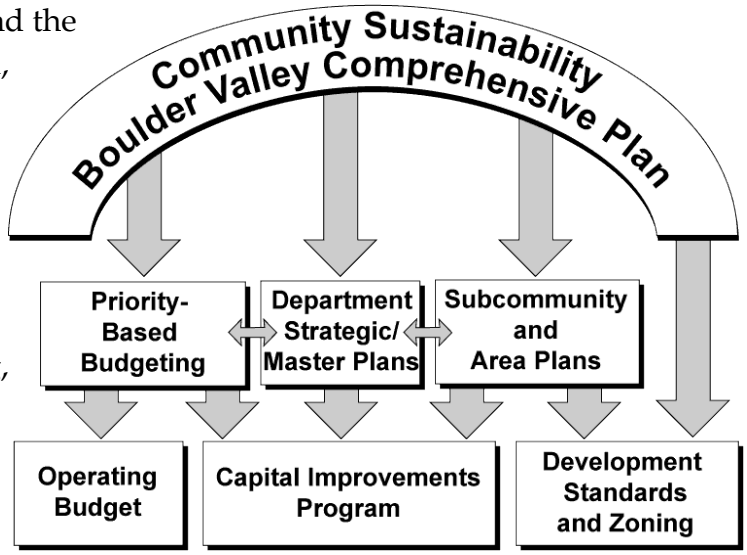
The Boulder Valley Comprehensive Plan provides a general statement of the community's desired future development pattern and sets the city's land use and development policy, guiding day-to-day development review decisions. The principle of sustainability drives the overall framework of the plan. The core components of the plan include:

- *Policies* that guide decisions about growth, development, preservation, environmental protection, economic vitality, affordable housing, culture and the arts, neighborhood character and transportation. The policies also inform decisions about the manner in which services are provided, such as police, fire, emergency medical services, water utilities, flood control and human services.
- *The Comprehensive Plan Future Land Use and Area I, II, III Maps* define the desired future land use pattern for the Boulder Valley regarding location, type and intensity of development.

The plan has a 15 year timeframe, and is updated every five years. As part of each major update, estimates and projections of community trends and demographics are updated, with population and employment projections for the next 20 years.

The plan is jointly adopted by the city and the county. When the plan is being updated, there are four approval bodies – the city planning board, city council, county planning commission, and the board of county commissioners.

The plan provides guidance for area planning, departmental master planning, development standards and zoning decisions, the capital improvements program and other city efforts, as shown in the adjacent graphic.



The plan is available online at www.bouldervalleycompplan.net

The 2010 Major Update

The 2010 Major Update began in January 2010, and the policy, text and map changes were approved by all 4 bodies in May-September 2011. City council will consider adoption of the BVCP by ordinance on May 7. The first reading memo is available online at:
http://www.bouldercolorado.gov/files/City%20Council/Agendas/2013/041613/04.16.13_Final_Agenda_Packet.pdf

The BVCP 2010 Major Update was focused on three areas of focus:

1. Sustainability policy changes and urban form/built environment
2. Land Use and Area I, II, III map changes
3. Process changes to the Area III-Planning Reserve

The process changes to the Area III-Planning Reserve (Service Area expansion process) included clarifying the intent of the Area III-Planning Reserve, improving the process to consider expansion of the service area into the Area III-Planning Reserve, and changing the process from a 4-body review to a 2-body review (City Council and Planning Board) process.

The changes were approved by the city, but not approved by Boulder County. The Boulder County Planning Commission did not support eliminating 4-body review. Since the fall of 2011, the city and county worked with the boards to discuss and review the potential options that would include some portion of the process to include a 4-body review. The City Council expressed support for two of the options in the fall of 2012. In January 2013 presented the proposed language to the Planning Commission, which denied the changes.

The BVCP Action Plan

The Comprehensive Plan Action Plan is one of the implementation tools of the BVCP, and outlines the actions needed to implement policies that are currently not addressed through other plans or programs. The action plan establishes the timing and priorities for new program initiatives, planning projects and regulatory changes.

The action plan focuses only on those actions related to new or changed policies since the update was approved, and does not include ongoing programs or projects, or those related to long standing policies and programs. The BVCP states that the action plan is adopted by City Council. As part of the May 7, 2013 hearing, council will be asked to consider adoption of the 2010 BVCP Action Plan. The action plan (part of the memo for May 7), includes actions proposed and completed since the 2011 adoption of the BVCP and is consistent with the 2013 work program.

BOULDER PLANNING MILESTONES

1858	First permanent settlers (gold prospectors).
1859	Boulder City town company formed - 56 shareholders.
1861	Boulder designated as site of state university.
1872	Immigration society formed - influx of different classes/types of people.
1877	University of Colorado opened.
1882	Boulder declared a city of the second class with 4 alderman and a mayor.
1890	Citizens split - quiet and attractive community vs. large industry.
1898	Began thirty years of park land acquisition. Purchased land for Chautauqua, 80 acres east slope of Flagstaff, through community bond issue. Petitioned the U.S. congress for funds for purchase of additional land.
1899	U.S. grants funds for 3,000 acres bordering city on west (Sunshine Canyon to S. Boulder Peak).
1900	Population increase from 3,000 to 6,150 since 1890. Urban pattern apparent/separation and localization of residential, commercial and industrial districts according to geographic influences.
1903	Boulder City Improvement Association Formed.
1904	Plans by W.W. Parce adopted to beautify slopes of Chautauqua (Texado Park).
1907	City Council votes to limit size of city. Official Park Board appointed to carry on Improvement Association's effort to recommend park acquisition and administer funds budgeted for park maintenance.
1908	City retains Frederick Law Olmsted, Jr. to devise Boulder's first plan. 60 acres donated in Gregory Canyon, the last addition to city until 1941.
1910	First proposal for a charter convention in Boulder defeated.
1912	Highway proposed from Boulder to Denver.
1915	Charter convention defeated again.
1917	Charter approved. Boulder becomes a home rule city. Council-manager form of government. A planning and Parks Commission appointed.
1920	Population increase from 6,150 in 1900 to 11,006 in 1920. Post World War I building boom.

1928 University of Colorado professor recommends Boulder-Denver highway. First official zoning ordinance with map enacted. Boulder was one of the first western cities to have one.

1930 City begins to acquire former railroad land along Boulder Creek and land in north Boulder.

1939 Report prepared by planning consultant S.R. DeBoer. Foresaw increased need for residential land but not need for industrial.

1949 Esquire-Coronet Magazine subscription division (Neodata) moves to Boulder.

1950 City purchases 200 acres south of Boulder and donates land to Federal government for National Bureau of Standards. A regional planning board was created with city, county and School Board participation.

1951 Initial stages of Master Plan for City and fringe area. Regional Planning Board on stand-by basis. Amend City Charter to create a separate Planning Department in City administration and hire a Planning Director. Planning and Parks Commission changed to Planning Board, Parks Board and separate Board of Zoning Adjustment created.

1952 Boulder-Denver toll road opened. Subdivision regulations adopted. City services not extended beyond City limits.

1954 County adopts subdivision regulations.

1955 Boulder Industrial Park established.

1958 "A Guide for Growth" Master Plan adopted.

1959 "A Guide for Growth" outdated. Plan-Boulder, association of Boulder citizens if formed. Blue line charter amendment passed limiting water line extensions on the mountain backdrop. Council appoints Urban Renewal Committee to deal with the core area. Revocable permits issued for out of city water and sewer service.

1960 National Center for Atmospheric Research, Beech Aircraft and Dow Chemical move to Boulder. The expanding university and the National Bureau of Standards give Boulder a reputation for scientific research.

1961 Bond issue to improve water facilities passed (storage, transmission, treatment and distribution). Water services extended outside the city limits. Mayor works with Urban Renewal Committee.

1962 Major revision to the zoning code. Council investigates use of water service to bring orderly development.

1964 Boulder's Fringe Area Objectives study prepared by city and county. Spokes of the Wheel policy , promoting orderly growth by extending city water and sewer services for development along the Diagonal Highway, South Broadway, and East Arapahoe Avenue.

1965 IBM moves to Boulder. Referendum repeals ordinance approving utility extension to 2,500 acre property along South Broadway/ Highway 93, ending “Spokes of the Wheel”

policy.

1966 Committee for the Exploration of the Core Area Potential (CECAP), Boulder Tomorrow, and Public Housing Authority established. Planning Department devises a "Workable Program for Community Improvement." Planned Residential Developments are included as exceptions to zoning ordinance.

1967 "Opinion Boulder" questionnaire sent out by City Planning Department. New Guide to Growth adopted. Open Space tax, the first in the United States, passed by a margin of only 95 votes, creating the Greenbelt Program.

1968 Effort to accomplish unified planning program outside Boulder Municipal corporate limits. Subdivision regulations revised.

1969 Floodplain zoning adopted.

1970 Population increase from 33,718 in 1960 to 66,870 in 1970. Boulder Valley Comprehensive Plan adopted by City and County.

1971 Enrollment cap of 20,000 placed on university. Referendum on 100,000 population cap defeated. Referendum to hold rate of growth below 1960 levels passed. Referendum to adopt a 55 foot height limit passed. Land Use Regulations change to: institute special review and divide city into zones according to developing, established or redeveloping.

1972 Citizen Commission, City Council and County Board of Commissioners determine optimum population and growth rate for Boulder Valley. Interim Growth Policies enacted.

1973 Citizen Commission Report - Greater intergovernmental cooperation in enforcement and 3% growth rate.

1974 Historic Preservation Ordinance adopted.

1976 Robinson vs. City of Boulder questions City's ability to limit growth outside of boundary. Passage of "Danish Plan" growth management system, which limits number of residential permits issued each year. Growth rate set at maximum of 2%.

1977 Major revision of Comprehensive Plan. Policies, detailed capital budgets, future growth plans included. Implementation of "Danish Plan" limits growth by limiting residential building permits; permits awarded based on project merit. Downtown Boulder Mall ribbon cutting. Floral Park Historic District designated.

1978 Chautauqua Historic District designated.

1980 City population at 76,685; employment at 41,817. City condemns and purchases as open space the 475-acre Systems Development Corporation (SDC) property three miles south of the city along Highway 93 to preclude annexation by Superior and development as corporate headquarters.

City initiates a review of the 2 percent growth limitation ordinance (Danish Plan)

1981	Council revises Growth Management System. Permits issued pro rata, not merit.
1982	Solar Access Ordinance adopted.
1983	Boulder Valley Comprehensive Plan updated and incorporates new policies for energy, housing, and human services.
1984	Expanded Crossroads Mall (BURA) opens. Mapleton Hill Historic District designated.
1985	Boulder Creek Corridor park and bike path construction begins. University-City memorandum of understanding on the University Research Park is adopted.
1986	Downtown Design Guidelines adopted, establishes the Downtown Design Advisory Board to review projects downtown (mandatory review, non-mandatory compliance).
1987	First Transportation Master Plan is adopted. Cost recovery system for new development, the Development Excise Tax, is enacted.
1990	City population at 83,300; employment at 76,800. Ten-year update of Boulder Valley Comprehensive Plan approved.
1992	Area III Planning Study identifies a substantial part of Area III land as unsuitable for future service area expansion due to environmental constraints or presence of prime agricultural land (rural preserve). Identifies one area, called the Area III Planning Reserve, as suitable for possible future expansion of the city. Wetlands Protection Ordinance adopted.
1993	Integrated Planning Project (IPP), a community visioning process, focuses on "what's best for what's left," as the amount of vacant land in the city diminishes. Goals adopted to reduce projected build-out to a population of 103,000 and jobs-housing ratio of .8:1.
1994- 95	North Boulder Subcommunity Plan adopted. West Pearl and Chamberlain Historic Districts designated. City-County Transfer of Development Rights agreement is approved. Residential growth rate reduced to 1%; Commercial/ Industrial growth rate limit is adopted. Review of demolitions of buildings over 50 years old adopted.
1996	City purchases the 100+ acre Valmont City Park. City Council adopts resolution directing that actions be taken to reduce projected new employment by 15,000 jobs as a result of community concerns about rapid employment growth, the city's increasing jobs-housing imbalance, and the resultant increases in traffic.
1997	Comprehensive Rezoning Project completed. The city reduces projected future job growth through a combination of land purchases and rezonings. The project results in the implementation of IPP goals and creation of several new mixed-use zone districts, rezoning of the downtown, and a revamping of the industrial zones. Commercial/ Industrial growth rate limit is rescinded.
1999	Downtown Historic District designated. City revises Residential Growth Management System by establishing inclusionary zoning requirement (20% of new residential units

must be permanently affordable to low and moderate income households) and streamlining permit allocation system. City and county initiate major update to the Boulder Valley Comprehensive Plan focusing on increasing affordable housing opportunities and encouraging mixed-use development in the city's commercial areas.

2000 Population in the city increases from 83,300 in 1990 to 96,100 in 2000. Employment increases from 76,800 in 1990 to 98,860 in 2000. Major update to Boulder Valley Comprehensive Plan results in changes promoting additional housing and mixed use including: reducing size of Planning Reserve, moving properties from Area II to the Area III – Rural Preservation Area, and land use changes adding approximately 1500 residential units and reducing future employment growth by approximately 4000. Application for a new homeless shelter denied leading to formation of a citizen working group to establish new land use regulations for homeless shelters in the city.

2001 Hillside Historic District designated.

2002 The Jobs: Housing Project results in a list of action items aimed at increasing mixed use development, increasing the overall amount of housing, preserving service commercial uses, and converting industrial uses to residential or mixed use in appropriate locations.

2004 General Rezoning, New Service Commercial, and HR1-X Zone District implement Comprehensive Plan land use changes and Jobs:Housing action items. Gunbarrel Community Center Plan adopted.

2005 Highland Lawn Historic District designated. City and county complete Major Update to the Boulder Valley Comprehensive Plan that results in policy changes in the areas of urban design, regionalism, and environmental, economic, and social sustainability.

2006 University Place and 16th Street Historic Districts designated. Chautauqua Park designated National Historic Landmark. Land Use Code Simplification Project completed. New Twenty Ninth Street retail district opens on site of former Crossroads Mall. Voters approved Climate Action Plan tax, the first of its kind in the United States.

2007 Transit Village Area Plan adopted. Plan addresses land use and transportation connections in the area surrounding the future location for bus rapid transit and commuter rail stations.

2009 Completed the Compatible Development in Single Family Neighborhoods project and revised zoning to regulate overall housing mass and form. Completed the Junior Academy Area Plan. Changed Development Excise Taxes and implemented Development Impact Fees. Adopted comprehensive revisions to the Wetlands Protection ordinance.

2010 Population increases to 98,000, and employment estimated at 96,800. Major Update to the Comprehensive Plan that results in new policies and sections related to sustainable urban form and community design, and sustainability policies encompassing social equity, environmental health and economic vitality. New sections on Energy and Climate, Local food and agriculture, and Community well-being.

Employment

102,350

Jobs in Service Area*

Top 10 Employers (2011)

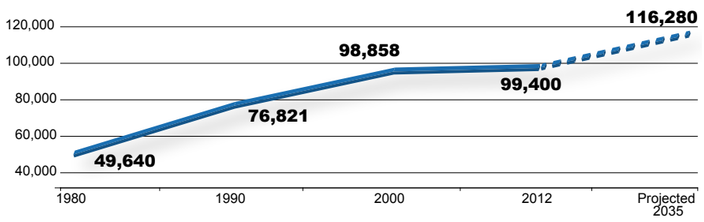
(listed in alphabetical order)

- Ball Aerospace
- Boulder Community Hospital
- Boulder County
- Boulder Valley School District
- City of Boulder
- Covidien
- IBM
- Micro Motion/Emerson
- UCAR/NCAR
- University of Colorado Boulder

New Square Footage Constructed 2008 -2012

Commercial	322,575
Industrial	135,773
Medical	43,862
Office	212,894
Other	48,051
Restaurant	24,633
Grand Total	**787,788**

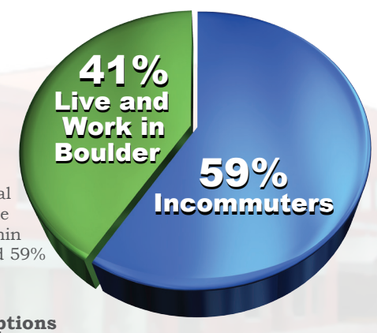
Employment Trends



Vacancy Rate***

Retail	3.6%
Office	10.1%
Warehouse	4.6%
R&D/Flex	5.6%

Boulder Employment Incommuting**



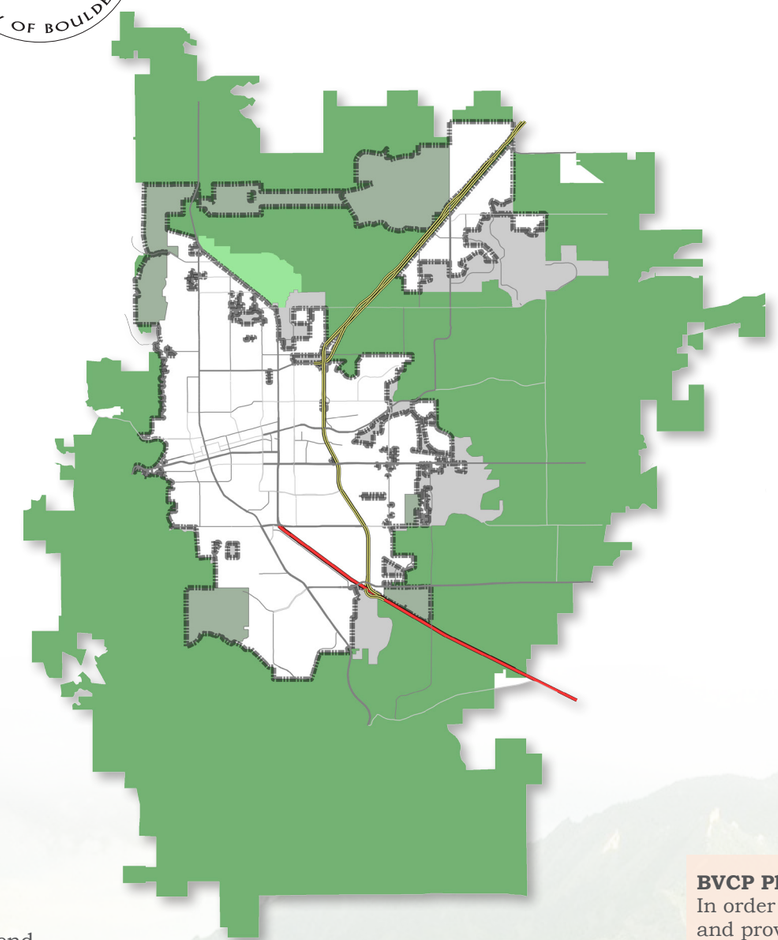
Of the 99,400 total employment in the city, 41% live within the city limits and 59% commute in.

Employment Estimates & Projections: Methodology & Assumptions

The City of Boulder employment projections are developed in conjunction with DRCOG. Existing jobs are based primarily on data collected by the federal government from employers. Projections are based on development and redevelopment potential in commercial and industrial areas. Existing and projected job estimates count jobs, not individuals. Full, shift, and part-time jobs are counted separately.

Sources: City of Boulder, US Census, Boulder Economic Council Estimates * 2013 Estimate ** Source: City of Boulder, 2011 Community Survey, State Department of Labor. *** Source: Boulder Economic Council Market Profile (Jan. 2013)

2013 Community Profile



1859
founded

25.48
square miles

99,716
population*

98,800
jobs**

Legend
- Area I Boulder City Limits*
- Area III Rural Preservation Area
- Area III Planning Reserve
- Area II Service Area*
- Area III Annexed

Area I & II = Service Area

BVCP Planning Areas

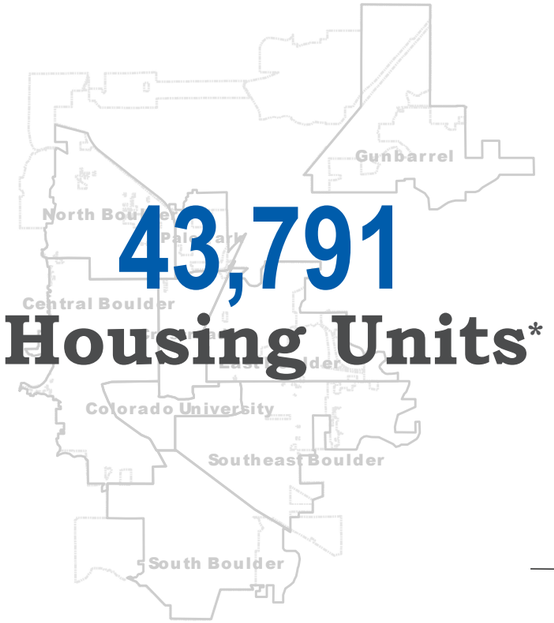
In order to manage growth of the city and provide urban services efficiently, the Boulder Valley Comprehensive Plan (BVCP) designates three areas for long-term planning purposes:

- **Area I:** Land within the City of Boulder limits, provided with city urban services.
- **Area II:** Unincorporated land in Boulder County, eligible for annexation and provision of urban services within the 15 year planning period of the BVCP.
- **Area III:** Unincorporated land in Boulder County outside the Service Area, intended to remain rural in land use and character.

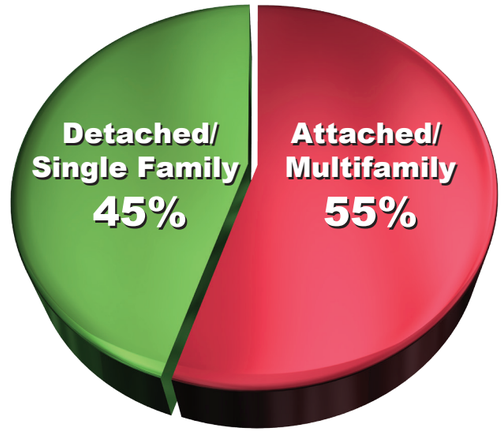
Housing PAGE 2
Population PAGE 3
Employment PAGE 4

*2013 Estimate **2012 Estimate
Sources: City of Boulder

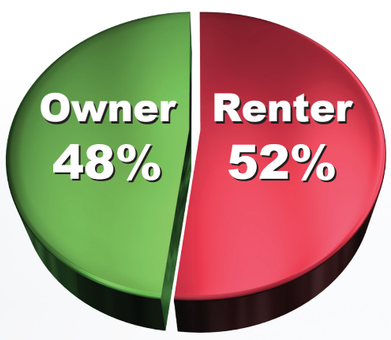
Housing



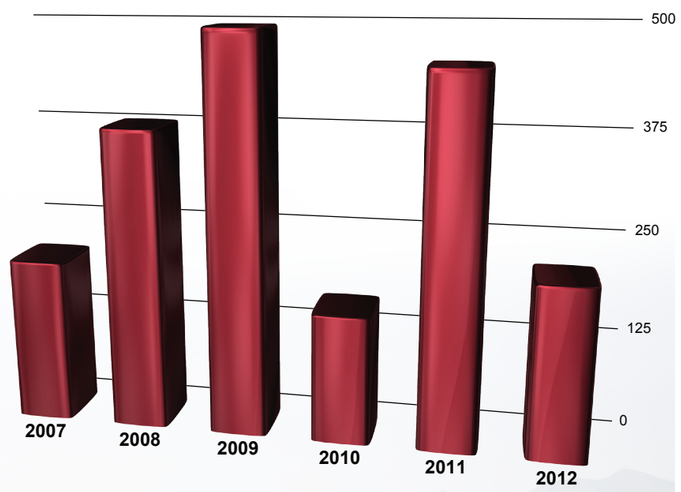
43,791
Housing Units*



Types of Housing Units**



Rental vs Owner Occupied Housing Units



New Housing Units

Based on the number of certificates of occupancy issued for new housing units. There are approximately 1,500 new housing units under construction or approved for the next three years.

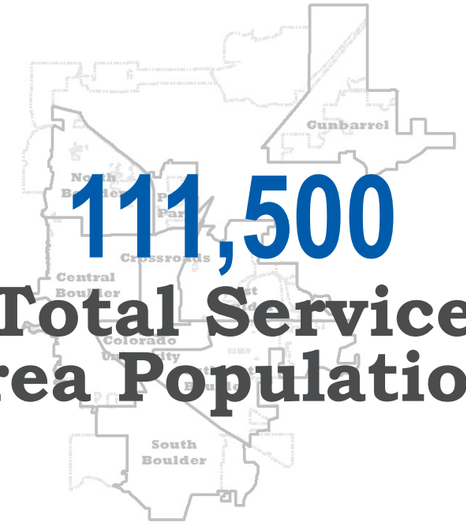
Population Estimates & Projections: Methodology & Assumptions
The City of Boulder population estimates and projections are developed in conjunction with the Denver Regional Council of Governments (DRCOG). Existing estimates are developed using the United States Decennial Census numbers as a baseline and are projected forward using certificates of occupancy for completed housing units and an average person per unit multiplier. An area-wide vacancy rate is applied to the unit counts to arrive at an estimated population. Projections of population are developed from the assumed buildout potential of the city based on the BVCP land use map and zoning map.

Sources: City of Boulder, US Census
* 2013 estimate ** 2012 Estimate

Population

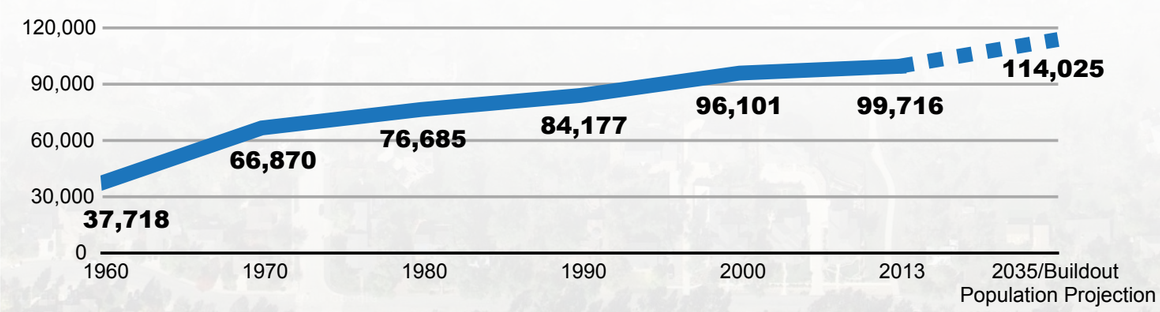
Total Population by Subcommunity

Central Boulder	28,578
Colorado University	8,685
Crossroads	7,760
East Boulder	2,874
Gunbarrel	1,488
North Boulder	11,569
Palo Park	2,027
South Boulder	14,928
Southeast Boulder	21,161



111,500
Total Service Area Population*

City Population Trends



Population Estimates & Projections: Methodology & Assumptions
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Sources: City of Boulder, US Census
*2013 estimate

C I T Y O F B O U L D E R
PLANNING BOARD AGENDA ITEM

MEETING DATE: April 18, 2013

AGENDA TITLE:
Study session in preparation for the upcoming public hearings to consider applications for Annexation and Initial Zoning and Site Review for the proposed Boulder Creek Commons project located at 5399 Kewanee Drive and 5697 South Boulder Road (a.k.a. the Hogan-Pancost site):

1. General area context;

2. Comprehensive planning and land use application review history;

3. Pending applications and Planning Board's role in the review of each; and

4. Key issues for consideration of Planning Board at the time of public hearing.

Two Planning Board public hearings on the project are tentatively scheduled for the Boulder Creek Commons project on April 24th and 25th. No Planning Board action or recommendations are necessary as part of this study session.

REQUESTING DEPARTMENT:
Community Planning & Sustainability
David Driskell, Executive Director
Susan Richstone, Deputy Director
Charles Ferro, Development Review Manager
Karl Guiler, Planner II/Code Amendment Specialist

Public Works
Maureen Rait, Executive Director
Heidi Schum, Public Works Development Review Manager
Scott Kuhna, Public Works Development Review Supervisor
Katie Knapp, Floodplain/Wetlands Administrator
David Thompson, Transportation Engineer

Division of Housing
Jeff Yegian, Acting Housing Division Manager
Michelle Allen, Senior Housing Planner

OBJECTIVES:
1. Hear staff presentations.
2. Planning Board discussion, including questions of staff and consultants.
3. No action or recommendation required as part of the study session.

PROJECT SUMMARY:

Proposal:	Annexation and Initial Zoning to annex an approximately 22 acre site and Site Review to develop 121 attached and detached units (5.5 du/ac) on the site. Proposal also includes the environmental preservation of the east parcel.
Project Name:	Boulder Creek Commons
Location:	5399 Kewanee Drive & 5697 South Boulder Road
Size of Tract:	Approximately 22 acres
City Zoning:	To be determined (RL-2, Residential Low – 2 proposed)
Comprehensive Plan:	Low Density Residential and Environmental Protection

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I. GENERAL AREA CONTEXT

The roughly 22-acre vacant site, known as the Hogan-Pancost property (see Figures 1 and 2 below) is located at 5399 Kewanee Drive and 5697 South Boulder Road in east Boulder near the East Boulder Recreation Center. The site can be accessed from 55th Street from South Boulder Road to the south of the site or from 55th Street from the north by way of the East Boulder Recreation Center.

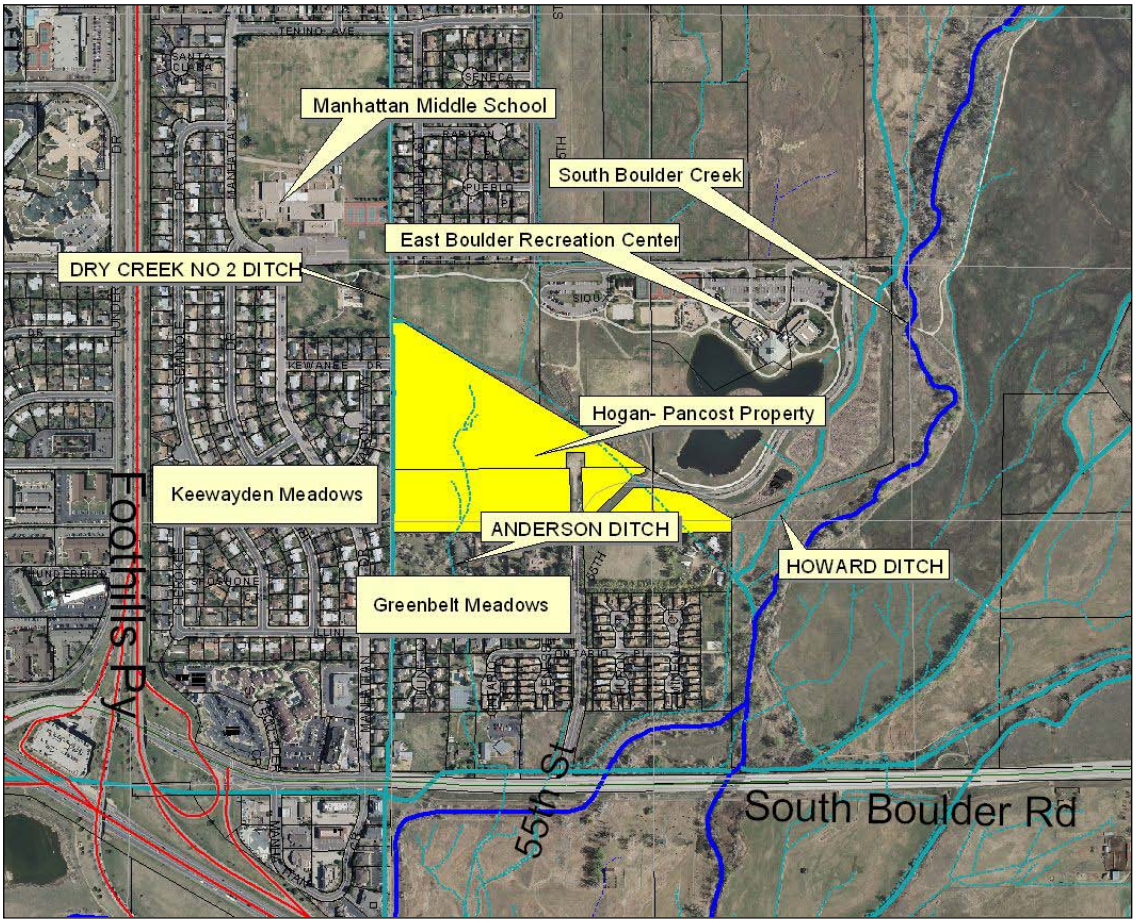


Figure 1- Vicinity map and context.

The Hogan-Pancost properties have been historically used for grazing and agricultural purposes and are within Boulder County; however, as shown in Figure 2 as follows, almost the entirety of the site is surrounded by city annexed land – namely the single-family residential developments of Keewayden Meadows to the west, Greenbelt Meadows to the south, and the East Boulder Recreation Center to the northeast.

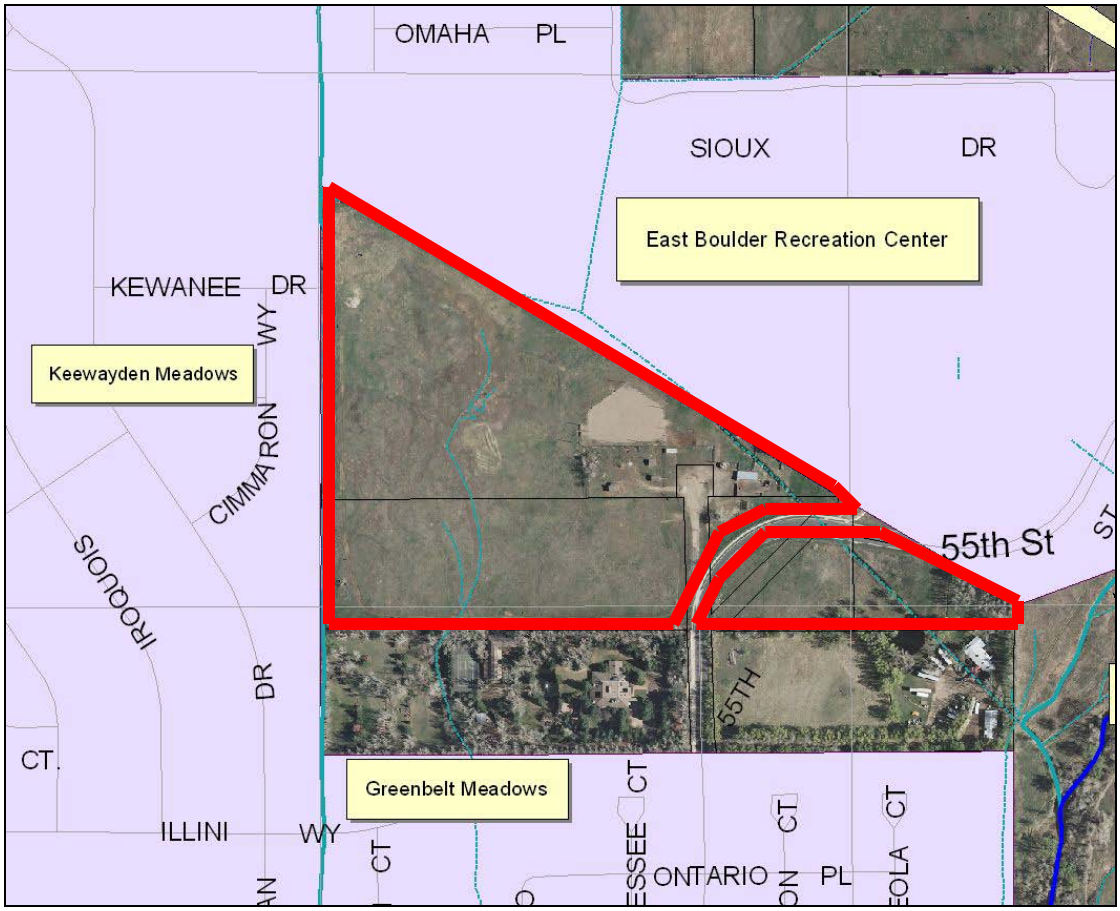
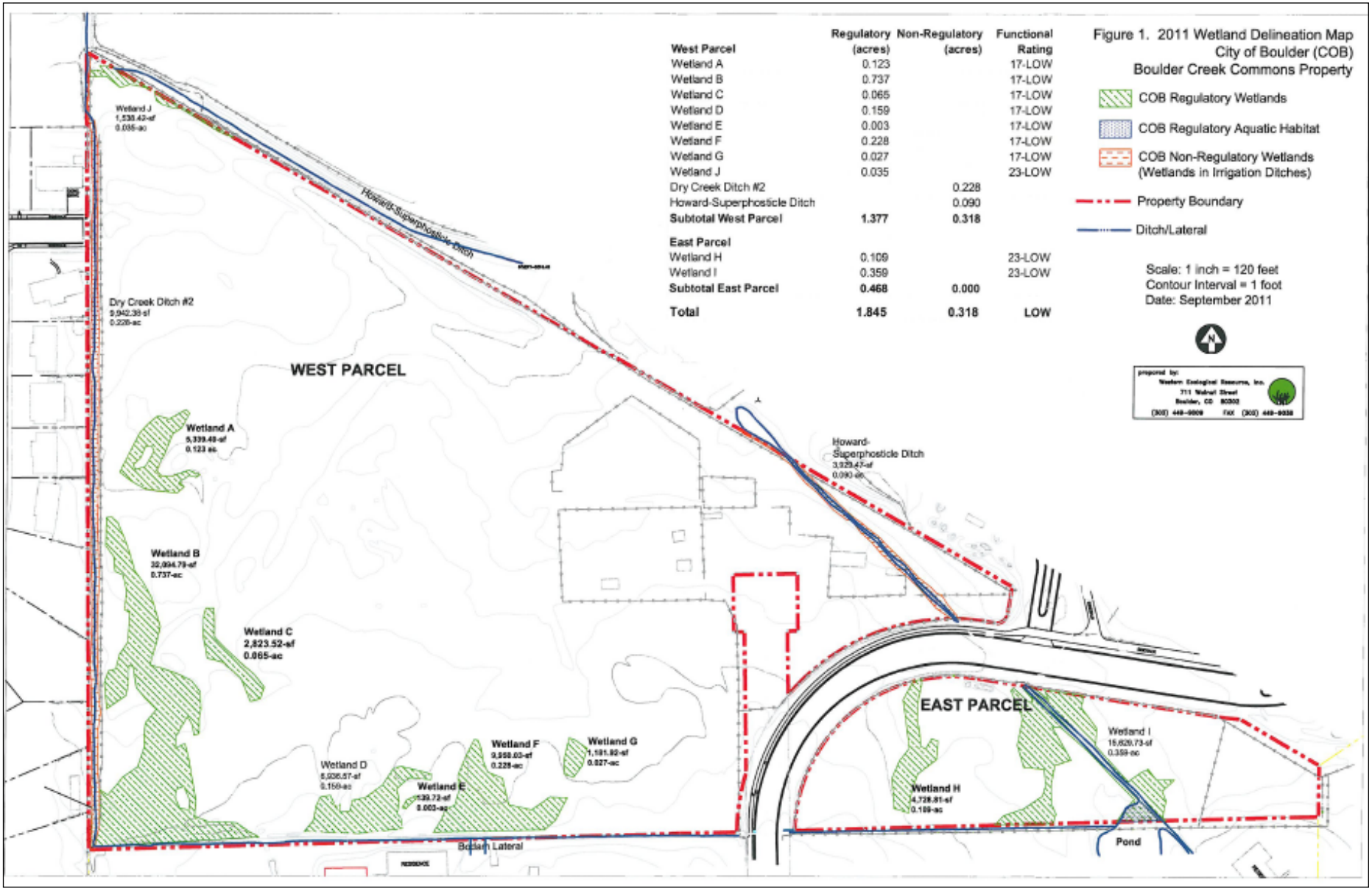


Figure 2- site respective to city limits shown shaded.

As shown in Figure 3, there are existing wetland areas on the site. There has been environmental concern from the community related to development upon wetlands and the impact to wildlife on the site, including but not limited to prairie dogs and Preble mice.

Environmental studies have indicated that the wetland areas are a result of seepage from unlined ditches that run through the site and that the property does not contain suitable habitat for Preble mice. Extensive environmental studies have been conducted on the site and conclusions have indicated that permanent impacts to wetland areas on the western parcel can be mitigated at a 2:1 ratio by creating additional wetland areas on the eastern parcel. The wetlands and natural areas on the eastern parcel would be preserved and enhanced. No development is proposed for the eastern parcel.



West Parcel	Regulatory (acres)	Non-Regulatory (acres)	Functional Rating
Wetland A	0.123		17-LOW
Wetland B	0.737		17-LOW
Wetland C	0.065		17-LOW
Wetland D	0.159		17-LOW
Wetland E	0.003		17-LOW
Wetland F	0.228		17-LOW
Wetland G	0.027		17-LOW
Wetland J	0.035		23-LOW
Dry Creek Ditch #2		0.228	
Howard-Superphosticle Ditch		0.090	
Subtotal West Parcel	**1.377**	**0.318**	
East Parcel			
Wetland H	0.109		23-LOW
Wetland I	0.359		23-LOW
Subtotal East Parcel	**0.468**	**0.000**	
Total	**1.845**	**0.318**	**LOW**

Figure 3- Wetland areas.

The site also contains 100-year and 500-year floodplain areas as shown on Figure 4. The majority of the 100-year floodplain areas is on the eastern parcel and would be preserved as a wetland area. Any development within the 100-year floodplain would require a floodplain development permit. Residential structures within the 100-year floodplain are required to have the lowest floor level elevated to the flood protection elevation (two-feet above the base flood elevation). There are limited areas of 100-year flood plain on the west side of the property. Most of these areas are proposed to be preserved within open space; however, there may be several homes that must meet the flood protection elevation. The City of Boulder does not currently have any regulations for the 500-year floodplain, but is in the process of developing regulations for critical facilities and lodging facilities within the 500-year floodplain. It is not anticipated that the proposed regulations would impact this development other than a possible need to floodproof the proposed congregate care facility and develop an emergency management plan.

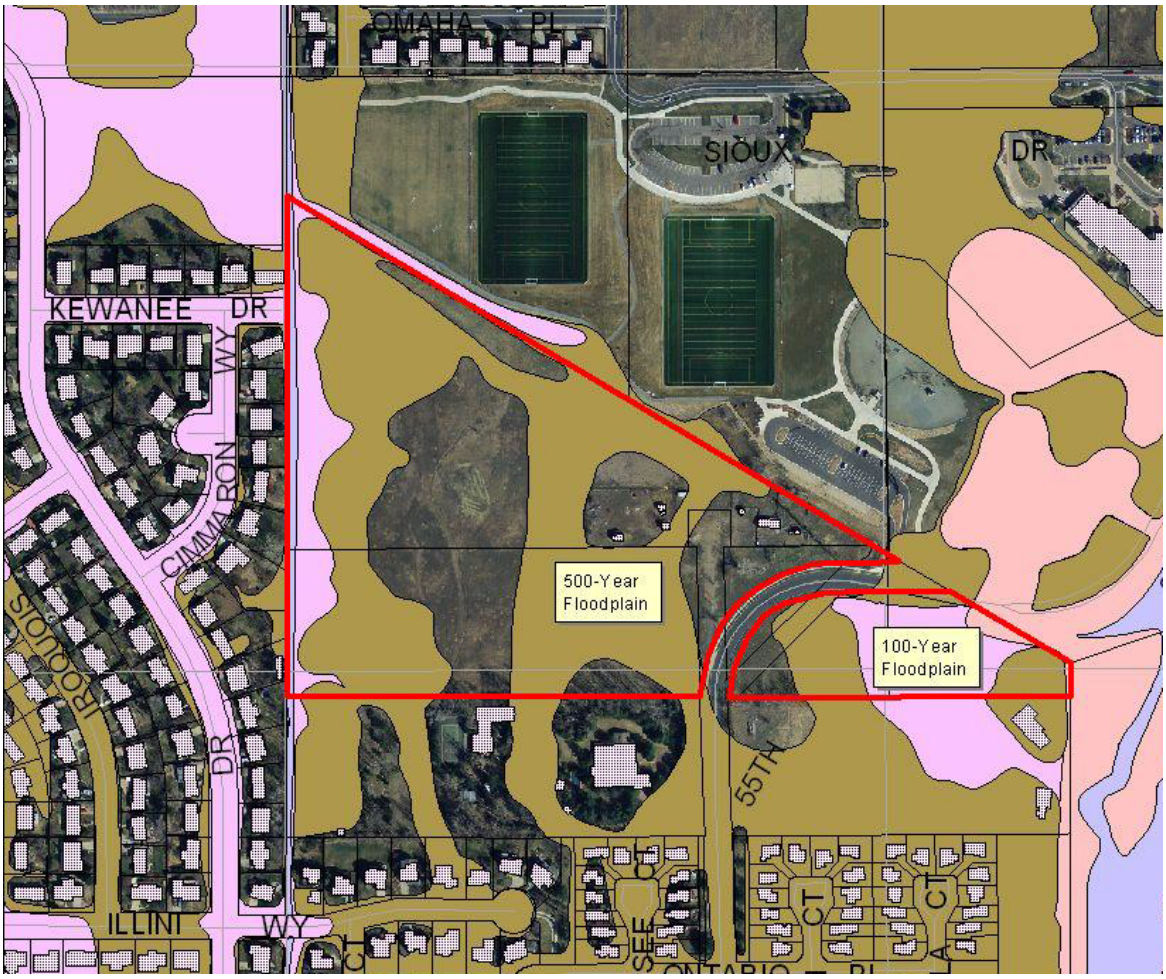


Figure 4- Floodplain Map

II. COMPREHENSIVE PLANNING AND LAND USE APPLICATION REVIEW HISTORY

The properties are currently part of Boulder County. Like properties within the City of Boulder and those within Boulder Valley portions of Boulder County, the property is subject to the Boulder Valley Comprehensive Plan (BVCP). The BVCP is the overarching policy document that establishes the vision and policies that guide land use and development within the Boulder Valley. It is a jointly adopted plan between the City of Boulder and Boulder County and includes community adopted policies ranging from community design and community services to energy and the environment. The official BVCP land use map informs how properties will be zoned and informs city decisions on zoning and other community matters. Zoning and development in general is required to be consistent with the BVCP. The BVCP can be reviewed at the following web link:

Boulder Valley Comprehensive Plan

The BVCP also three specific "Planning Areas", where urban development is allowed (Area I), areas where future development may occur contingent on eventual annexation (Area II), and areas that are not intended for urban development (Area III- Rural Preservation). See Attachment A for the Planning Area map. The line separating Area II lands from Area III lands is effectively the urban growth boundary for the City of Boulder. The subject property is designated Planning Area II making it eligible for annexation into the city.

As Figure 5 below shows, the BVCP land use map designates the site as Low Density Residential on the parcel west of 55th Street and Environmental Protection on the parcel east of 55th Street. Low Density Residential land use permits two to six dwelling units per acre.

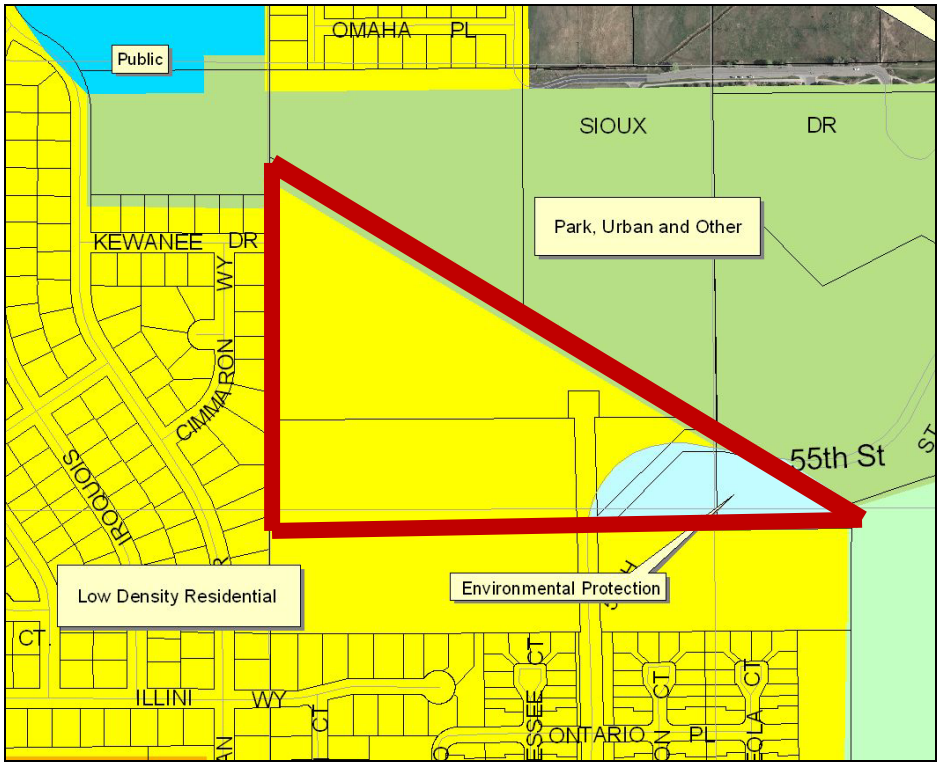


Figure 5- BVCP land use designations on and around the site.

The potential development of the Hogan-Pancost site has been a prominent discussion topic for several years. The topic of the property's eventual development, or likelihood of development, has spanned from earlier than the 1980s, and before consideration of the East Boulder Community Park, to updates to the Boulder Valley Comprehensive Plan (BVCP) in the 1990s and 2000s where the site's Low Density Residential land use designation has been continually analyzed. Three Concept Plans have been reviewed in the last 10 years relative for this site. A comprehensive environmental study of wetlands, flood, groundwater, wildlife, and other environmental issues was undertaken by the applicant's consultants at the recommendation of city staff following review of the 2007 Concept Plan review to address the site's general suitability for development. The site's complex history is discussed below.

East Boulder Community Park master plan

During the 1980s, there was extensive public involvement in the Department of Parks and Recreation's preparation of a master plan for the East Boulder Community Park, where access to the park was a primary issue of discussion. Neighborhood concerns related to the extension of 55th Street north from South Boulder Road to connect to 55th Street north of the subject site and potential connections of Kewanee Drive from the adjacent Keewayden Meadows to the west to 55th Street.

The East Boulder Community Park master plan was approved in 1986, which included the extension of 55th Street (as it exists today) to provide park access and access to what would become the East Boulder Recreation Center. In order to address neighborhood concerns, the connection was designed in a manner that was circuitous to provide access, but discourage through traffic. Further, the Department of Parks and Recreation committed to not extending Kewanee Drive for access to the park. A 1992 memorandum (see Attachment B) from Parks and Recreation indicates that, "*during discussions on the future of traffic circulation in this area (related to the development of the park), staff and Planning Board made assurances to the neighborhood on Manhattan Drive that this connection would not be made in the future*." This is reflected in the master plan, which shows Kewanee Drive as a cul-de-sac (within Attachment C).

Additional memoranda from the time indicate that the Planning Board reviewed the Kewanee Drive connection issue and concluded that the board would evaluate such a connection as part of any future development plans (see Attachment C which includes a plan from the East Boulder Community Park showing Kewanee Drive terminating within the subject site). Based on the attached 1986 memoranda, future consideration of a connection as part of a development plan was not specifically ruled out.

BVCP Updates and Land Use Analyses

A land use analysis that included the subject property was conducted in the 1990s when a Community Review Group, composed of neighborhood residents and a Staff Review Group, was created to evaluate the area and identify issues related to future development. The analysis is included in Attachment D. Since 2000, three requests as part of the BVCP updates that have been made by the Southeast Boulder Neighborhood Association to change the BVCP Planning Area from Area IIA to Area III-Rural Preservation. As part of the Year 2000 major update to the BVCP, the city and county reviewed a land use suitability study of undeveloped Area II properties to determine their suitability for urban development as part of the consideration to change the

Planning Area to Area III-Rural Preservation for the Hogan-Pancost site.

As part of that study, it was concluded by City Council that the west portion of the Hogan-Pancost site was appropriate for residential development while the portion east of 55th Street would be more appropriate for environmental preservation. Consequently, the city and the county kept the site in Area II, changed the land use designation on the eastern portion of the site to Environmental Protection, and retained the existing Low Density Residential designation on the remaining portion of the site. Low Density Residential land use permits two to six dwelling units per acre.

In regard to the most recent request to change the BVCP land use designation, which occurred in 2010, staff recommended against a change to Area III-Rural Preservation pending the results of environmental studies discussed below and also to allow the review of the development applications currently under review. Ultimately if Planning Board and City Council did not agree with the proposed plans to develop the property, reconsideration of the Planning Area change to Area III-Rural Preservation would be appropriate. Staff presented this option to City Council as part of the 2010 BVCP Major Update and the council agreed.

Environmental Study and Concept Plans

The current applicant has been involved in the potential development of the site since the early 2000s. The applicant has been involved in several Pre-Application reviews and has applied for Concept Plan reviews in 2003 and 2007. The applicant also submitted their Annexation and Initial Zoning application in 2006 (#LUR2006-00099) and this application is included in this review. During these reviews, the applicant conducted a number of neighborhood meetings to solicit public input on the proposals where neighbors expressed concerns related to wetlands, ground water, flood and wildlife habitat as well as potential impacts to the surrounding neighborhood from additional density and traffic. Based on these concerns and the South Boulder Creek flood study, the applicant withdrew the 2007 application to further refine the proposal.

As part of a Concept Plan review application in 2007 (which did not proceed to Planning Board for review and was subsequently withdrawn as noted above), the property owners agreed that prior to the submittal and review of a subsequent Concept Plan application, the property owners would provide staff with more detailed environmental analyses for the property to determine whether the property could support any type of development. This is not a typical requirement of land use review, particularly during the Concept Plan review stage, but considering the concerns of neighbors and the history of the site, these comprehensive environmental analyses were completed by the applicant's consultants and were submitted to the city and city-contracted third party review consultants for analysis in 2010.

The studies were distributed to the neighborhood for review and were presented to the Planning Board at a public hearing on Jan. 6, 2011. To assist the board, staff retained an engineering consultant who prepared a "Groundwater 101" presentation to help inform the board about the complex groundwater issues in Boulder that would relate to the subject site. At the Jan. 6th public hearing, Planning Board found that the studies affirmed that the site could support residential development. The discussion from that meeting and all other relevant materials can be found at the following weblink:

Jan. 6, 2011 Planning Board packet including detailed environmental studies

Staff and the city's independent third party consultants concluded that the environmental studies affirm that the site would be suitable for development. Their analyses concluded the following:

- Stormwater management facilities designed to support the proposed development will not be adversely affected, and in some cases may improve, conditions on the surrounding properties and facilities,
- development of the site will decrease the overall recharge to groundwater by eliminating pasture irrigation and ditch leakage, which in turn will lower the groundwater elevation,
- existing soil conditions were shown to be able to support spread footings,
- there are no natural communities, rare plants, riparian corridors, or critical wildlife habitat as identified by the Boulder County Comprehensive Plan on the Hogan-Pancost property,
- all existing wetland areas on site will have to be maintained or mitigated per the Boulder Revised Code (1981), and
- the Traffic Impact Feasibility Study demonstrated that the existing street network will be able to accommodate the expected Hogan-Pancost traffic.

Based on the results, the board noted that a specific Concept Plan detailing proposed land use, density, site and building design etc. could be submitted for evaluation.

<u>2012 Concept Plan</u>
Planning Board reviewed the following Concept Plan on Jan. 19, 2012.

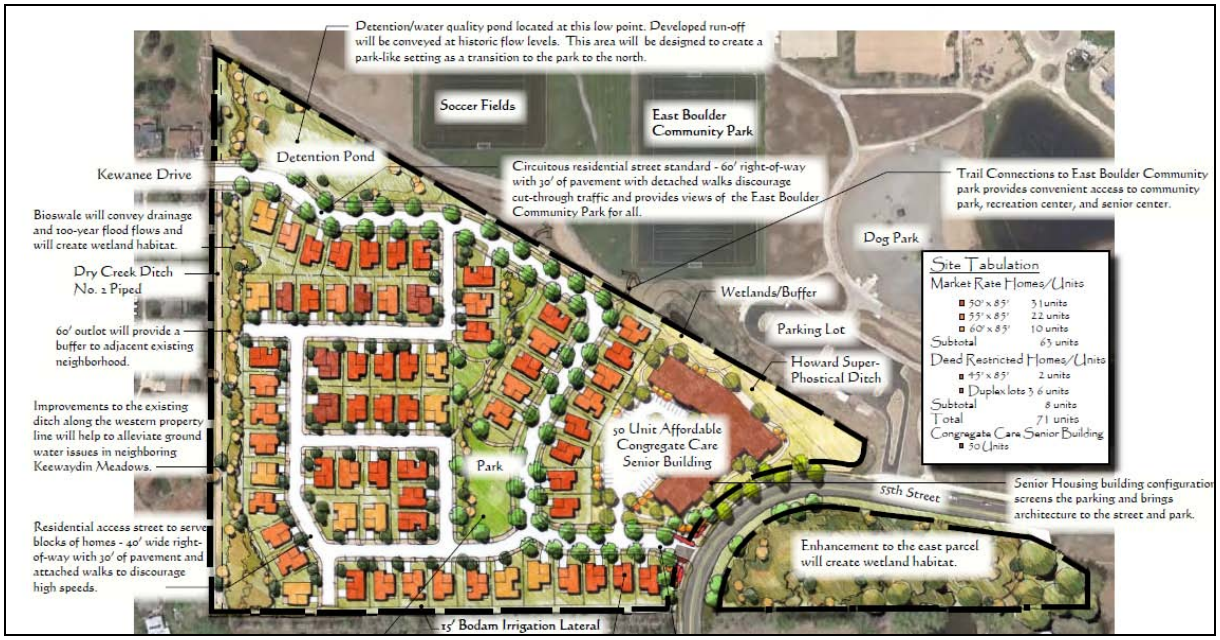


Figure 4- 2012 Concept Plan

A web link to the staff memorandum and materials is provided below followed by a summary of the board's analysis:

Jan. 19, 2012 Planning Board packet and Concept Plan materials

In summary, the board ranged on agreement on the appropriateness of development on the site due to the information provided by the Concept Plan and public information provided. At the Concept Plan hearing, members of the public provided information on groundwater and flooding that conflicted with the engineering reports and analysis provided by the applicant's consultants. The board agreed that it would like to see more scientific information at the Site Review stage to evaluate the conflicting information that was presented at the public hearing. The chair recommended that all scientific information be provided in advance of any public hearings so that such technical and complicated information can be reviewed and analyzed by all parties in preparation for the public hearing. This would also allow staff to provide an overview in the memo and attach the information to the memo giving board members the opportunity to review such technical information in preparation for the hearing. This recommendation has guided staff's review of the current application. As part of that review, staff has retained a 4th party review consultant to review materials. Additional information on the role of the 4th party reviewer is included later in this memo. Staff has been working with the neighborhood throughout the process to answer questions and review the neighborhood studies prepared related to the project.

The following other points were discussed by the board on January 19, 2012:

- ⇨ *Land Use - RL2 zoning:* The majority of the board felt the proposed land use and incorporation of senior housing was appropriate. One board member felt the land uses were not appropriate and the site should be designated Area III, Rural Preservation, due to the lack of availability of services and transit.

- ⇨ *Community Benefit:* As discussed within this memorandum, a finding of community benefit is a requirement for properties proposed for annexation with additional development potential. This was preliminarily discussed at the Concept Plan level where some board members found the affordable housing benefit and the annexation acceptable. There was some concern that more senior affordable units would be preferable to the proposed eight middle income single family homes. Another board member felt it may not be acceptable to place 50 senior units in the 500 year floodplain.

- ⇨ *General Design*: The board agreed that the design needed to be simplified to be more gridded and with open space provided throughout the site. For the open space, the board acknowledged the area has a large city park next door, so the board wanted to see a more creative use of the open space and have it flow better through the project and be more consistent with wildlife corridors ("fingers of open space"). Regarding the grid, the board would like to see a simpler plan that is easier to navigate and provides a better connection to the north. It was suggested to take advantage of the open space by having the homes on it instead of the roads.

- ⇨ *Kewanee Drive connection:* The board felt that from a city connection standpoint it makes sense to connect Kewanee to 55th Street to balance the traffic on 55th.

Proposed Resolution

At the Jan. 19th hearing, the board expressed concern about the conflicting environmental and engineering information as presented by the neighborhood and the applicant's consultants and asked that the applicant and neighborhood should share such technical information well in advance of public hearings to allow all parties and the board sufficient time to review such information so it can be adequately considered by the board. In response to this request, staff proposed that the board adopt a resolution encouraging cooperation and timely sharing of information among all parties. The proposed resolution was not acted upon based on lack of support of the neighborhood and the applicant. The staff memorandum is found in the following web link:

Aug. 16, 2012 Planning Board packet relative to the proposed resolution

2013 Open House

Staff held an open house on the project on January 30, 2013. The purpose of the open house was to provide an opportunity for neighbors and other interested parties to view the proposed plans and ask questions of city staff about review process and standards and the applicant's consultants about the proposed plans. The open house was well attended and public comments were received. These comments will be attached to the packet included with the upcoming public hearing.

III. PENDING APPLICATIONS AND PLANNING BOARD'S ROLE IN THE REVIEW OF EACH

For the site to be developed, city approval of the land use review applications listed below would be necessary. After each is a description of the application, the specific proposal to be considered, the criteria for evaluation and the board's role:

Annexation and Initial Zoning:

- *Description*: In order to develop the site as proposed, annexation to the City of Boulder is required. This requires an analysis of whether the site is eligible for annexation pursuant to state statutes and whether the proposed annexation is consistent with the BVCP. For instance, the property must have 1/6th contiguity with the boundaries of the City of Boulder, should be able to readily connect to city utilities and there must be mutual interest between the annexation authority and the owner to annex. As part of the annexation process, the appropriate city zoning must be determined and any zoning district and resultant proposal must be found consistent with BVCP polices and the land use map.

- *Applicant's specific proposal*: Proposal to annex roughly 22 acres into the City of Boulder with RL-2, Residential Low - 2 zoning.

- *Applicable criteria:* As stated above, proposals to annex must be found to be consistent with BVCP policies and the land use map. At time of public hearing, staff will present the relevant BVCP policies to the project and an assessment of whether the project meets or does not meet the policies. Of particular importance, is BVCP Policy 1.24, Annexation, which sets the expectations for properties proposed for annexation. Effectively, the more development potential that a property has by annexing to the city, the more community benefit that is expected by the city to offset any negative impacts of development.

  Policy 1.24 specifies that permanently affordable housing, environmental protection and/or other special uses of community need are important considerations for determining community benefit. Staff will also present BVCP policies related to community design, the natural environment and housing.

  As permanently affordable housing is an important consideration, the specifics are listed below.

  The 58 permanently affordable deed restricted units equal 48 percent of the total number of units proposed for the development (i.e., 121 total units as discussed below). Of these, 50 (86 percent) are small apartment style attached congregate care units affordable to lower income seniors, six (ten percent) are three bedroom duplexes affordable to middle income households and two (three percent) are three bedroom single family homes affordable to middle income households. One hundred percent of the market units are single family homes.

  The applicant has agreed to construct the senior congregate care building as soon as possible from the date of annexation approval utilizing 4% low income housing

tax credits and will sign an Affordable Housing Agreement to that effect prior to first reading of the annexation ordinance. The Agreement will include a phasing plan for the issuance of the market single family building permits based on the completion of the eight non-senior affordable units and demonstrable progress towards construction of the senior building. A number of market single family permits will be held until the senior building and other affordable units are complete.

- *The board's role:* Annexation and Initial Zoning applications require two body review, whereby both the Planning Board and City Council must act on the applications. The BVCP serves as the primary determining factor of whether the aspects of the project, including but not limited to general site design and affordable housing issues discussed above, are consistent with city polices. Ultimately, Planning Board's recommendation on the Annexation and Initial Zoning will be forwarded to the City Council with council being the final decision authority on the applications.

Site Review:

- *Description*: Because the proposal is on a property greater than 3 acres and includes more than 18 dwelling units (see Table 2-2 of section 9-2-14, B.R.C. 1981 for RL-2 zoning), a Site Review application is required. The purpose of Site Review is to allow flexibility and encourage innovation in land use development. Detailed site plans and building elevations are reviewed for compliance with the land use code as part of Site Review applications. Certain development standards that are specifically listed in section 9-2-14(c), B.R.C. 1981, may be modified in Site Review if the board finds that the project meets all applicable site review criteria.

- *Applicant's specific proposal*: Development of the property would include a total of 121 attached and detached dwelling units distributed as follows:

  ⇒ 50 attached congregate care deed restricted permanently affordable rental units within one three-story building on the east side of the parcel west of 55th. These units will be one and two bedroom ranging in size from 625 to 825 square feet. These units would be affordable to very low and low and moderate income seniors.6 deed restricted permanently affordable 3 bedroom ownership duplex units affordable to middle income households;
  ⇒ 2 deed restricted permanently affordable 3 bedroom ownership single-family homes affordable to middle income households; and
  ⇒ 63 market rate single-family homes.

  All units would be served by new public rights-of-way, including a new connection between Kewanee Drive and 55th Street.

  Open space would be provided within the development in the following forms:

  ⇒ Protected open space/wetland mitigation area provided on 2.73 acre parcel east of 55th Street and restored wetlands on the west parcel.

- ⇒ A 60 foot landscape buffer along the west lot line including Dry Creek Ditch No. 2 within pipe and adjacent path.
- ⇒ Curvilinear open spaces of varying widths (40 to 50 feet) behind most residences with associated trails, swales, and water quality areas.
- ⇒ A pocket park and open space patios and landscape areas in the vicinity of the congregate care building.
- ⇒ Private open spaces and patios on individual lots.

o *Applicable criteria:* Site Review's can only be approved if it is found that the detailed review criteria of section 9-2-14(h), B.R.C. 1981 are met.

Site Review criteria

The Site Review criteria require compliance with the BVCP as well as design excellence in site design, building design, open space, landscaping, circulation, parking etc. At the time of public hearing, staff will present a detailed analysis of its assessment of how the project rates against the criteria.

The board's role: Generally, Site Review applications can either be approved at the staff level with potential for citizen or board call up or by Planning Board. In this case, the proposal does not necessarily require Planning Board approval (e.g., no height modification proposed), but as it is associated with an annexation application it is being referred to the board for review. As the Site Review is intrinsically tied to the proposed annexation, which requires City Council decision, the annexation agreement would give City Council decision authority on the Site Review application. Therefore, Planning Board's action on the Site Review application will be a recommendation to City Council to either approve, approve with conditions, or deny the Site Review application.

Structure of the public hearing

In light of the complexity of the project and the anticipated volume of public participation during the public hearing, staff has scheduled two meetings for the Board's consideration of this application on consecutive evenings:

1. Staff presentation followed by clarifying questions from the board to staff and associated consultants;

2. Applicant presentation following by clarifying question from the board of the applicant and associated consultants;

3. Public comments whereby each member of the public may speak for up to three minutes or pool time with other members for no more than 10 minutes to the chosen speaker. If there are a significant number of speakers, the board may opt to restrict each comment to two minutes in the interest of time.

4. Planning Board discussion (generally following the identified key issues discussed below) and additional questioning;

5. Planning Board decision on the annexation and initial zoning applications and recommendation to City Council on the Site Review and request to vacate right-of-way applications.

Staff expects the staff/consultant presentations and public comment would occur on the public meeting on the first night and the Planning Board deliberation and action at the public meeting on the second night.

IV. KEY ISSUES FOR CONSIDERATION OF PLANNING BOARD AT TIME OF PUBLIC HEARING

The following key issues have been identified and will be the general framework of the upcoming public hearing memorandum to the Planning Board:

Annexation:

- Would annexation be consistent with the Boulder Valley Comprehensive Plan (BVCP) policies and the land use designation? In particular, would the annexation be consistent with BVCP policies on:

  a. Community benefit (*See BVCP Policy 1.24, Annexation*)?
  b. The Built Environment (*section* 2) [*e.g., community design, neighborhood compatibility*]?
  c. The Natural Environment (section 3) [e.g., *wetlands, floodplains, and groundwater etc*.]?

Initial Zoning:

- Will the proposed project and zoning (Residential Low – 2; RL-2) be consistent with the BVCP land use designation?

Site Review:

- Is the proposal consistent with the Site Review criteria with respect to site design and open space, including but not limited to general quality and preservation of sensitive natural features?

- Is the proposal consistent with the Site Review criteria with respect to building design and accommodating pedestrians?

- Will traffic impacts be compatible with the surrounding neighborhoods?

Staff intends to structure the public hearing review of the project based on how the project meets BVCP policies and the Site Review criteria (section 9-2-14(h), B.R.C. 1981) discussed above.

To give the board a better understanding of the detailed review that has occurred on the engineering issues the following section focuses on how the city regulates groundwater, flood, wetlands and traffic impacts.

Groundwater

- *City Regulations:* Policy 4.32 in the Boulder Valley Comprehensive Plan (BVCP) states that "*The city and county will continue to evaluate aquifers, groundwater recharge and discharge areas, and sources of groundwater pollution within the Boulder Creek watersheds and formulate appropriate pollution and source protection programs. Impacts to groundwater will be considered in land use planning, development review and public land management practices*." In line with the BVCP, Section 9-2-14(d)(17) of the Boulder

Revised Code 1981 (BRC) calls for the "*preservation of natural features existing on the site or plans for mitigation of adverse impacts to natural features*" and includes ground and surface water on the list of natural features. The BRC also contains regulations in Section 11-5-7 regarding the quality of groundwater discharge d to the city's storm sewer system. The City of Boulder Design and Construction Standards (DCS) does not contain specific regulations for the dewatering of property or impacts on groundwater levels. A high groundwater table is typical throughout the City of Boulder. It is also typical for geotechnical engineers to recommend the installation of underdrain systems to control the moisture content of soils below the foundations/slabs and protect any below grade space.

- *Approach for this project:* It has been communicated by the neighbors that groundwater and increased basement sump pumping is of concern. A groundwater report was submitted by the applicant in 2010 with the Concept Plan and also in 2012 with the Site Review as directed by Planning Board. A geotechnical analysis was submitted by the applicant at the time of Site Review. Exact characteristics of the underground aquifer are unknown and difficult to predict. Since the city does not staff a groundwater expert, a 3rd party consultant was retained to review the 2010 Groundwater Report at the time of Concept Plan review and a 4th party consultant was retained to review the 2012 Groundwater Report at the time of Site Review.

<u>Flood:</u>

- *City Regulations:* Where improvements are proposed within a designated 100-year floodplain, as defined on the current FEMA Flood Insurance Rate Map (FIRM) or floodplain mapping adopted by the City, an applicant for construction approval must satisfy and comply with all applicable regulations and requirements as set forth in Chapter 9-3-2, "Floodplains," B.R.C. 1981. The City of Boulder does not currently have any regulations for the 500-year floodplain, but is in the process of developing regulations for critical facilities and lodging facilities within the 500-year floodplain. It is not anticipated that the proposed regulations would impact this development other than a possible need to floodproof the proposed congregate care facility.

- *Approach for this project:* A portion of the property is located within a regulatory FEMA floodplain, Zone AE (Base Flood Elevations Determined) for South Boulder Creek as shown on the Flood Insurance Rate Map. The most recent floodplain mapping, dated December 2012, shows that the majority of the site is in Zone X (500-year floodplain) or not in a floodplain. The areas of Zone AE (100-year floodplain) include the areas in immediate proximity to Dry Creek Ditch No. 2 along the western property line and the area east of 55th Street. Any development within the 100-year floodplain will need to meet the requirements prescribed by the city of Boulder Floodplain Regulations (Chapter 9-3, B.R.C. 1981). These requirements include, but not limited to:

    - Elevating all proposed residential structures so that the lowest finished floor elevation is a minimum of two feet above the base flood elevation;

- Limiting floodwater depths within the subdivision's roadways to allow for emergency access during the event of a flood;
- Restricting basement construction; and,
- Floodproofing proposed utility systems.

Wetlands:

- *City Regulations:* Where improvements are proposed within a delineated wetland or wetland buffer area, as defined under the City's wetland protection ordinance, an applicant for construction approval must satisfy and comply with all applicable regulations and requirements as set forth in Chapter 9-3-9, "Stream, Wetlands and Water Body Protection," B.R.C. 1981, including any necessary identification, analyses, avoidance and mitigation measures.

- *Approach for this project:* The applicant has proposed to mitigate for the impacted wetlands on site at a 2:1 ratio. A wetland mitigation plan has been submitted with the Site Review.

Traffic:

- *City Regulations:* A Trip Generation Letter or Traffic Assessment is required to be submitted by the applicant at the time of Concept Plan review. The purpose of this assessment is to determine the amount of vehicular trips anticipated to be generated by a proposed development as well as the assignment of these trips to the adjacent street network. Trip generation is obtained using the procedures outlined in the Trip Generation Manual of the Institute of Transportation Engineers (ITE). If a proposed residential development is shown to generate 20 or more vehicular trips during the peak hour of the adjacent street, a full Traffic Impact Study is required to be submitted at the time of Site Review. The Traffic Impact Study must assess roadway and intersection traffic volumes that are existing, at project completion, and at a 20 year buildout horizon, with or without the addition of project traffic. A Transportation Demand Management (TDM) Plan is also required to be submitted by the applicant at the time of Site review. This TDM Plan outlines strategies to reduce single-occupant vehicles trips.

- *Approach for this project:* At the request of Planning Board, an Environmental and Feasibility Study was completed in June of 2010 that included a Transportation Impact Feasibility Study. This Study included a Traffic Impact Study that demonstrated that traffic impacts from the proposed development could be accommodated by the adjacent street infrastructure. A subsequent Trip Generation Analysis was submitted in October, 2011 in association with the Concept Plan review. A full Traffic Impact Study was submitted in June of 2012, in October of 2012, and in December of 2012 as a part of the Site Review process. A TDM plan was also submitted at the time of Site Review that outlines strategies to reduce single-occupant vehicles trips by 15%. These strategies include providing pedestrian and bicycle connections to the existing multi-modal network and by providing transit passes.

Due to the complex nature of the engineering concerns on this site, staff has contracted with outside consultants who serve as experts in their respective fields. The following information details each consultant that was contracted, what they did, and who they represent:

- CH2MHill – In response to the 2010 Environmental and Feasibility Study, CH2MHill was contracted by the city to review the study in the specific areas of stormwater design, floodplain mitigation and design, and groundwater issues.

- Land Stewardship Consulting, Inc. – Also in response to the Environmental & Engineering Assessment & Feasibility Study, the city contracted with Land Stewardship to review the portions of the study relating to wetland delineation, vegetation and wildlife habitat existing conditions, species of special concern, and wetland mitigation and enhancement.

- Fox Tuttle Transportation Group – Bill Fox has been retained by the city on an ongoing basis to review submitted Transportation Impact Studies for proposed developments as well as serve as an expert on the subject during public meetings and hearings. Bill reviewed the Traffic Impact Study for this project during the early stages of Site Review.

- Anderson Consulting Engineers, Inc. – Anderson was retained by the city during the latest Site Review process to review the submitted materials pertaining to groundwater as well as address many of the concerns and questions from the neighborhood.

V. ATTACHMENTS

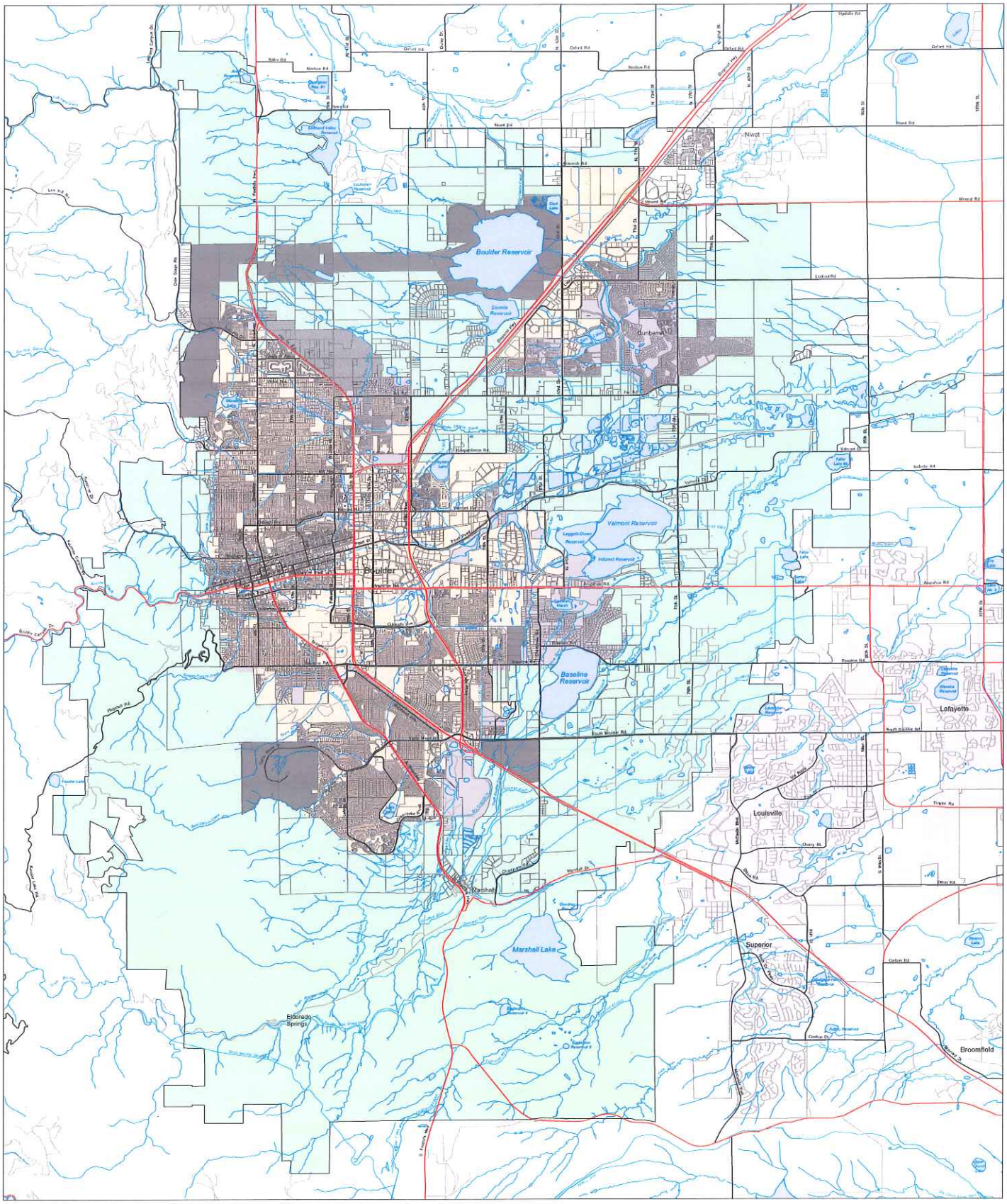
A: Planning Area map

B: Memorandum related to Hogan-Pancost property dated Jan. 23, 1992.

C: Parks and Recreation memoranda related to Hogan-Pancost property dated April and July 1986.

D: Memorandum related to Hogan-Pancost property and surroundings dated Aug. 17, 1995 (also includes July 18th memo as an attachment).

Boulder Valley Comprehensive Plan Area I, Area II, Area III Map



Legend

Area I

Area I - Boulder City Limits

Area II - Service Area

Area II

Area III

Area III - BVCP Planning Area Boundary

Area III - Rural Preservation Area

Area III - Planning Reserve

Area III - Annexed

Creek
Intermittent Creek
Ditch
Lakes

Highway
Arterial Street
Local Street

N
W E
S

1:25,000

0 0.5 1 2 Miles

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SUBJECT TO REVISION

All rights reserved. The map information contained hereon is intended for the sole use of the purchaser and may not be copied, duplicated or redistributed in any way, in whole or in part, without the expressed written consent of the City of Boulder.

The information depicted is provided as a graphical representation only. While source documents were developed in compliance with National Map Accuracy Standards, the City of Boulder provides no guarantee, express or implied, as to the accuracy and/or completeness of the information contained hereon.

Map produced by the City of Boulder Planning and Development Services Information Resources Group

Attachment D

CITY OF BOULDER PLANNING 3054413241 P.01

TO: Kate Bernhardt, Parks + Rec. FAX #: 441-4419	FROM: Linda MacIntyre, Public Works FAX #: PHONE #: X3240	DATE: 1/24/92 PAGES INCLUDING THIS PAGE. 4

MEMORANDUM

TO: Kate Bernhardt, Parks and Recreation

FROM: Linda MacIntyre, Public Works

SUBJECT: Hogan-Pancost property

DATE: January 23, 1992

On January 14, several staff members met in the City Attorney's office to discuss issues related to the Hogan-Pancost property, which abuts the East Boulder Community Park property to the south. Jane Greenfield provided a list of questions, which included the following three related to transportation:

1) Were the per linear foot construction costs for a local street 28 or 32 feet in width, including curb, gutter and sidewalk?

Based on information from the Transportation Projects staff, these estimates were for a 28 foot wide street. The $220 per lineal foot estimate does include curb, gutter and sidewalk.

2) What is the value of the former right-of-way for 55th St. (which ran north-south through the Hogan Pancost property)?

I am unable to obtain the exact width or length of the right-of-way. Based on the information in Mapping and Records, the right-of-way appears to be 40 feet wide and 950 feet long (a copy of the available information in Mapping and Records is attached). Staff members in Real Estate and Open Space should be able to calculate an appropriate cost for this land.

3) The Hogan-Pancost property owners are interested in extending Kewanee to the east. Is there a transportation or safety related reason (as opposed to a political reason) why this connection should not go through?

There is no transportation or safety reason why Kewanee should not be connected to future development on the Hogan-Pancost property. From a strictly transportation perspective, this connection is in fact desirable. However, during discussions on the future of traffic circulation in this area (related to the development of the park), staff and Planning Board made assurances to the neighborhood on Manhattan Dr. that this connection would not be made in the future.

In addition to the meeting on January 14, you and I met on January 17 to discuss additional transportation issues related to this property.

4) What percent of park-related traffic would travel on the proposed street abutting the park property to the south (as opposed to residential traffic). This street would provide direct access to a designated picnic area for the park.

Good information on trip generation rates for city parks is not available from the Institute of Traffic Engineers' Fifth Edition, **Trip Generation** volume. Only four studies of trip generation from city park sites have been done nationwide. Therefore, only a very rough estimate of the possible trip generation to the southern picnic site is possible.

I estimate that between 10% and 20% of the total trips to the park each day will be diverted to the southern picnic site.

52.8 park acres X 2.23 trips per acre per day = 117.7 park trips per day to the East Boulder park

10% of 117.7 trips per day = 11.7 trips on southern road
20% of 117.7 trips per day = 23.5 trips on southern road

Based on these calculations, between 12 and 24 trips per day will use the southern picnic site and street. This volume is insignificant compared to the trips which will be generated by the proposed number of single family homes on the Hogan-Pancost property. The plan from May 13, 1991 shows 87 single family homes on this site:

87 homes X 10 trips per day per household = 870 trips

If 50% of these trips would use the proposed street along the southern perimeter of the park, then a total of 459 trips per day (870/2 + 24 = 459) would travel on the perimeter road. The 24 trips per day to the picnic site would be 19% of the total daily traffic volume on the perimeter road.

I hope this adequately addressesPlease call me at 441-3240 if you need further information or clarification on any of the above material.

Attachments (2)

PARKS PLANNING AND CONSTRUCTION DIVISION
PARKS AND RECREATION DEPARTMENT

MEMORANDUM

TO: Parks and Recreation Advisory Board

FROM: Kate Bernhardt, Associate Parks Planner

DATE: April 22, 1986

RE: Item for Information - East Boulder Community Park Master Plan

---

On April 17, the Planning Board approved the 55th Street alignment along the eastern edge of East Boulder Community Park. Based on the mutual support of staff, neighborhood representatives, the Parks and Recreation Advisory Board, and Planning Board, the staff will proceed to refine the master plan which will be presented for your approval on June 23. The master plan presentation will include a suggested development plan and schedule for the western 8 acres of the site.

The Planning Board also reviewed the neighborhood concerns (please see attached memorandum) with primary focus on Kewanee Drive. The Board decided to evaluate the extension of Kewanee Drive when development plans for this area are submitted.

MEMORANDUM

April 10, 1986

TO: Planning Board

FROM: Susan Osborne, Planning
Gary Kretschmer, Planning

SUBJECT: 55th Street Alignment

Requested Action:

As this is an informational item, no formal action is required. Staff requests that the Board endorse an alignment for 55th Street that runs along the eastern edge of the proposed East Boulder Community Park.

Background:

At its December 1985 public hearing on the matter, the Planning Board recommended that 55th Street between Baseline and South Boulder Road be retained as a collector street on the Boulder Valley Comprehensive Plan. At that time, the Board directed the staff to work with the neighborhood to select one of two options for road alignment. The two options were a land swap which would have relocated the park entirely on the east side of 55th or a peripheral alignment in which 55th Street would border the park on the park's easternmost boundary.

On March 24, the Parks and Recreation Advisory Board endorsed the peripheral alignment. For park planning purposes, a road alignment which does not separate park activity areas is preferable.

On March 26, the Planning Department, with cooperation and assistance of the Transportation Division and Parks Department, held a neighborhood meeting to discuss the final options. The meeting was advertised and neighbors who had spoken at earlier meetings received a notice of the meeting. The staff presented the pros and cons of both alignments. After considerable comments and questions by the neighborhood, a significant majority chose the peripheral route.

The Proposal

The attendees (list attached) agreed that the peripheral route for 55th Street along the east boundary of the East Boulder Community Park was the preferred alignment. However, the group gave support on three conditions. The conditions and a staff position on each condition follow:

Condition 1

Kewanee should remain a neighborhood street and not be directly connected through to 55th. Many attendees felt that Kewanee should ultimately be a cul-de-sac and provide bicycle and pedestrian park access only.

PARKS PLANNING AND CONSTRUCTION DIVISION
BOULDER PARKS AND RECREATION

MEMORANDUM

TO: Parks and Recreation Advisory Board
FROM: Kate Bernhardt, Associate Parks Planner
DATE: July 24, 1986
RE: East Boulder Community Park

A revised East Boulder Community Park Master Plan will be presented for your approval. The original Master Plan was approved by the Board on March 25, 1986 subject to Planning Board approval of the proposed 55th Street alignment. After extensive public review and input, the 55th Street alignment was changed from that shown on the Boulder Valley Comprehensive Plan to a more easterly alignment around the park, which was approved by the Planning Board (May, 1986).

The major changes from the approved original plans are as follows:

1. 55th Street will traverse the easternmost section of the park and will be constructed as a collector status street with two 12 foot wide travel lanes, one four to eight foot wide median, and one ten foot wide bike lane located west of the street. The street will be designed to accommodate a 25 mile per hour travel speed.

2. Approximately 12.3 acres east of the lake will be designated and developed as wetlands to offset park construction of existing wetlands.

3. The Recreation Center, Racquet Court Complex, and adjacent parking areas have been redesigned to provide a more direct access to these facilities from 55th, and to insure that the Recreation Center will be located beyond the South Boulder Creek Floodplain.

4. The Recreation Center has a 40,000 square foot footprint, which will accommodate a potential addition of 9,000 square foot branch library on the second floor.

5. In response to neighborhood concerns (see attached letter dated June 9), the plan indicates a preferred alignment of Keewanee Drive which would preclude direct access to the park via Keewanee and Manhattan Drives. The alignment for a shared residential/park road along the south property line is also proposed which will allow a more effective buffer for future homeowners from the park activities as well as access to head-in parking lots. Final alignment of these roads will be negotiated with the developers at time of development.

June 9, 1986

TO: James W. Piper
COPIES: Ken Ramsey
Bob Whitson
Gary Krutchmer
SUBJECT: East Boulder park master plan

Issues surrounding the proposed East Boulder park and the alignment of 55th street between Baseline and South Boulder road have been debated at numerous public hearings over the past two years. However, the issue of increased traffic on Manhattan Drive that will result from the development of the park and surrounding residential areas remains unresolved.

Now that an eastward circuitous route has been chosen for the 55th street alignment, park and residential traffic will be encouraged to use streets in the established neighborhoods to the West, specifically Manhattan Dr, which has been operating beyond its design capacity for some time. The only way to prevent a serious traffic increase on Manhattan is to cul-de-sac Kewanee drive so that it cannot be used as a connector between the new developments surrounding the East Boulder park and the established residential area served by Manhattan to the West.

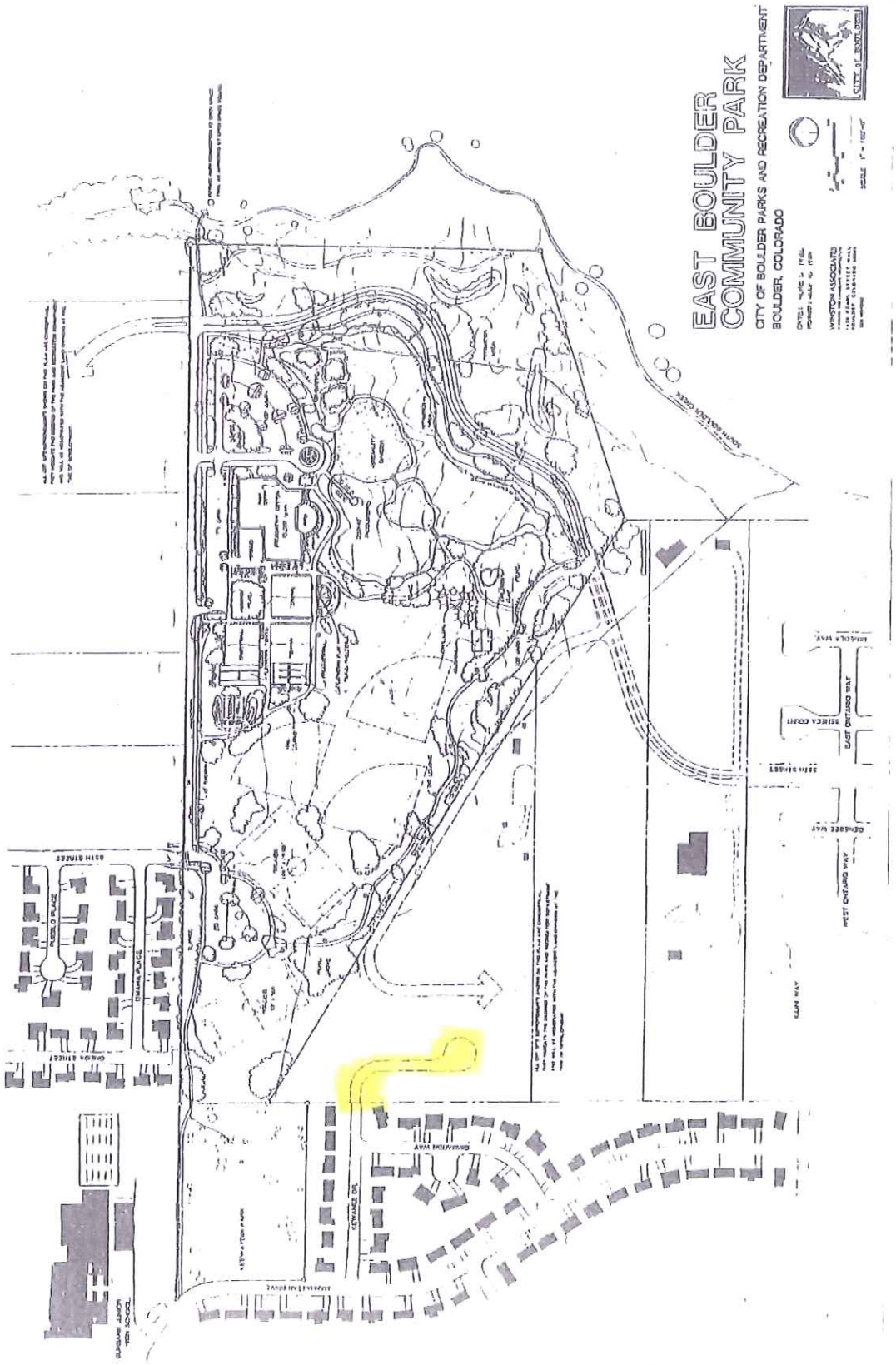
The Kewanee cul-de-sac proposal has been presented to Ken Ramsey, Bob Whitson and Gary Krutchmer. All three agreed with the benefits of the proposal and indicated their support. Our concern is that unless this obvious solution is incorporated into the park master plan, future city administrations and/or developers might overlook this when planning the new park and its surrounding residential areas.

As a result of the new 55th street alignment, there are three other design features that should be incorporated conceptually into the park master plan. These are;

A) Continuation of a spur off of 55th northward to the southern park boundary, offering direct access to the central portion of the park from the south.

B) A parking lot in the southwestern part of the park to service the soccer fields which are planned for construction later this year and the play fields which will be added later.

C) A frontage road along the southern park boundary, connecting directly to 55th street, and providing access along the full southern part of the park.


EAST BOULDER
COMMUNITY PARK
CITY OF BOULDER PARKS AND RECREATION DEPARTMENT
BOULDER, COLORADO
WINSTON ASSOCIATES
SCALE
CITY OF BOULDER
SOUTH BOULDER CREEK
PUEBLO PLACE
OHIOWA PLACE
ASH STREET
OAKS STREET
CENTRAL PARK
CENTRAL WAY
CENTRAGE DR.
TANNER HILL ROAD
BASEBALL FIELD
SOCCER FIELD
SERENA COURT
EAST ONTARIO WAY
WEST ONTARIO WAY
CLAIR WAY
ELM STREET
CEDAR STREET
SERENA WAY

Attachment E 156 PA

August 17, 1995

TO: Members of the Planning Board

FROM: Will Fleissig, Planning Director
Robert Cole, Director, PRNA Division
Members of the Staff Review Group
Alice Rouyer, Case Manager

SUBJECT: **Issue Identification Summary:**
Pancost Property Major Site Review
West of 55th Street and southwest of East Boulder Community Center (see Attachment A of main memo for vicinity map).
This summary is subject to a two week call up period by Planning Board, the applicant or an interested person.

CRG Members: Gordon Riggle, Chair
John Kottke
David Kahl
Donna Hopkins
Linda Tipton
Peter Barden

The Community Review Group (CRG) held a public hearing on August 2, 1995 for Issue Identification on the above referenced property. Approximately 35-40 people from the general public attended the hearing with 14 citizens addressing the CRG about their issues of concern. Joining the CRG as a project specific member was Peter Barden, a resident of the Keewaydin Meadows East neighborhood immediately west of the subject property. Issues identified by the public and CRG at the August 2, 1995 are included in the attached CRG memo (Section III). The issues identified by the Staff Review Group (SRG) are summarized in Section II of the CRG memo. **General direction to the applicant includes all of the issues below and in the CRG memo.** The applicant must consider the written comments contained in the attachments.

Below is a summary of key issues identified in the attached memo:

<u>Community Design</u>

- Proposed development of the site must provide a significant community benefit, consistent with City Council Resolution 705.

- The City is currently considering proposed BVCP Land Use Designation Revisions. The subject property has been identified as a possible TDR (Transfer of Development Rights) receiving site and Natural Ecosystem Area.

Environmental

- The area is known habitat for two species of concern in the Boulder Valley. Large populations of Ute ladies' tresses orchid (Spiranthes diluvialis) have been found throughout the wet meadows associated with this segment of the creek. This orchid is officially listed as threatened under the Endangered Species Act. The applicant is advised that an official survey for this plant species must be conducted on this site by a qualified biologist. Preble's meadow jumping mouse is a County species of concern and a candidate for federal endangered species listing. This species has been found in nearby Open Space property. The applicant is advised to employ a qualified biologist to conduct a survey for this species as well.

- In November 1994, fill material was placed on the site. The fill material may have been placed over wetland areas. The placement, location and location of the fill material on the site is an issue that must be addressed prior to any annexation of the subject property.

- Due to the high groundwater in this area, staff expects that underground construction (basements) on this site and subsequent dewatering could create impacts to adjacent residential and open space properties.

- The last wetland delineation and evaluation on this site was conducted in 1992. The applicant is advised to provide an updated wetland survey during Step 2--Concept Plan.

Transportation

- The applicant is required to provide a Traffic Impact Analysis as part of the "Step 2 - Concept Review". *In particular, the analysis should address traffic impacts on Keewaydin, Manhattan and 55th that might result from development of the site.*

- Travel Demand Management and Traffic mitigation options shall be evaluated to encourage alternative transportation and mitigate traffic impacts.

Housing

- Given the site's proximity to the East Boulder Community and Senior Center as well as the Meadows shopping center, *this site is well-suited* for low through middle income, family and senior oriented housing, especially affordable single family detached units. Staff recognizes the possibility for utilizing this site as a TDR receiving site. One of the long-standing city policies is to distribute a range of housing types and sales/rent ranges throughout the community.

Other Issues

Flood Control/Utilities

- Several properties abutting this site's western boundary have reported experiencing basement flooding since 1990, indicating a recent change in the groundwater flow patterns in this area. Prior to development of this site, an analysis of groundwater conditions should be performed, to determine depths, extent, a potential solutions.

Parks & Recreation

- The Parks and Recreation Department purchased the right-of-way property (by condemnation) and constructed 55th Street across this property for public and emergency access to the East Boulder Community Center. Prior to any annexation approval, the applicant is required to pay the City of Boulder Parks and Recreation Department for all costs associated with the purchase and construction of 55th Street across this property including utilities.

- A large portion of the East Boulder Community Park remains undeveloped at this time due to lack of funding. Should the Hogan/Pancost site be annexed, the $283,802. obtained as reimbursement for the construction of 55th Street would be used for further park development, pending approval of the Parks and Recreation Advisory Board. Annexation of the subject property could result in an enhancement of the park. This might be considered as a community benefit resulting from annexation of the property.

Summary of the Issue Identification step is subject to call up by the Planning Board. The call up period expires: August 31, 1995.

CC: Members of the Community Review Group (minus the March 10, 1995 memo)

ATTACHMENT A: CRG MEMORANDUM, July 18, 1995

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MEMORANDUM

July 18, 1995
(Meeting Date: August 2, 1995)

(Note: This memo was amended on 8/10/95 to clarify information presented at the CRG hearing. Amended text from is shown in italics.)

TO: Planning Board

FROM: Community Review Group & Staff Review Group (SRG)

SUBJECT: Supplemental Information: Pancost/Hogan Property

I. BACKGROUND INFORMATION

Application Type:	Issues Identification
Applicant:	Charles P. Pancost; Drexel-Barrel agent
Location:	West of 55th Street and southwest of East Boulder Community Center (see Attachment A for reference map)
Size:	23.6 acres
Zoning:	County zoning; SR (Suburban Residential)
Comprehensive Plan:	Area 2A; Low Density Residential (2-6 Dwelling Units/Acre Density)
Existing Uses:	Majority of site is vacant; horse/livestock corral and stable

II. EXECUTIVE SUMMARY OF STAFF IDENTIFIED ISSUES:

More detailed descriptions of the staff-identified issues and city-provided background information are listed in Sections III and IV below respectively. These issues should be studied, evaluated, and addressed in the upcoming Concept Plan submittal:

Community/Site Design Issues

- Last year, the City Council passed a resolution (#705, see Attachment B) concerning future annexations to the City. In essence, the resolution states that the City will only annex sparingly and only in cases where a clear benefit to the community is demonstrated or in order to resolve an issue of public health. Proposed development

- Preble's mea. v jumping mouse is a County species . :oncern and a candidate for federal endangered species listing. This species has been found in nearby Open Space property. The applicant is advised to employ a qualified biologist to conduct a survey for this species as well. Please contact the City of Boulder Open Space Department for more information about this species.

- This property is adjacent to Open Space and the broad riparian corridor of South Boulder Creek which contains some of the most sensitive and important habitat in the Boulder Valley. The applicant is advised that potential impacts to this habitat could result from groundwater alteration, and any routing of surface runoff onto Open Space property. Staff are also concerned about impacts from uncontrolled access from residential properties onto the site. The applicant must coordinate with Open Space staff in any proposed routing of trails onto Open Space land.

- *In November 1994, fill material was placed on the site. The fill material may have been placed over wetland areas. The placement, location and location of the fill material on the site is an issue that must be addressed prior to any annexation of the subject property.*

- The wetland mapping submitted by the applicant is not consistent with records on file with the City. Although City mapping may be outdated, a cursory overview of the site shows evidence of more wetlands than are noted on the plans submitted by the applicant. In particular, City records show a large wetland on the eastern portion of the property (east of 55th Street). One wetland on this site was shown as being fed by a ditch running north-south along the west end of the property. In any event, this entire area is part of the historic South Boulder Creek floodplain likely supported a wet meadow in the past.

- Due to the high groundwater in this area, staff expects that underground construction (basements) on this site and subsequent dewatering could create impacts to adjacent residential and open space properties.

Transportation Issues

The applicant is required to provide a Traffic Impact Analysis as part of the "Step 2 - Concept Review". *In particular, the analysis should address traffic impacts on Keewaydin, Manhattan and 55th that might result from development of the site.* The following primary issues must be addressed:

- An evaluation of connectivity, circulation and access needs for all modes of travel (automobile, transit, bicycle and pedestrian) between this site and adjacent areas.

- Access to the property in accordance with City of Boulder Design Criteria and Standard Specifications.

- Level of Service Analysis for intersections that may be impacted by site development.

approval, the applicant is required to pay the City of Boulder Parks and Recreation Department for all costs associated with the purchase and construction of 55th Street across this property including utilities.

- *A large portion of the East Boulder Community Park remains undeveloped at this time due to lack of funding. Should the Hogan/Pancost site be annexed, the $283,802. obtained as reimbursement for the construction of 55th Street would be used for further park development, pending approval of the Parks and Recreation Advisory Board. Annexation of the subject property could result in an enhancement of the park. This might be considered as a community benefit resulting from annexation of the property.*

- The approved East Boulder Community Park Master Plan has identified the right-of-way that extends to the north of the existing 55th alignment for future use as southern access to the park and associated parking lots. This is also a desirable access point to any development that may occur on the site (see Attachment D). This plan could preclude the applicant's desire to vacate this existing right-of-way.

- This site is adequately served by Keewaydin Meadows Neighborhood Park and East Boulder Community Park. It is recommended that the developer provide safe pedestrian and bicycle access to these parks.

III. SUMMARY OF ISSUES IDENTIFIED AT APRIL 5, 1995 PUBLIC HEARING

The following issues were raised at the April 5, 1995 CRG public hearing. The applicant must respond to these issues at the Concept Plan step in addition to all other issues raised in this memorandum:

Growth. Many public hearing participants cited the City's recent efforts to evaluate growth limitations through the Integrated Planning Project (IPP) and possible Commercial/Industrial growth restrictions. In consideration of all of those efforts, many questioned the merits of this annexation proposal and were concerned about impacts associated with growth in South Boulder and the larger community. This issue should be considered part of the larger question: In consideration of Resolution #705, does the proposal offer a community benefit?

No Action Alternative. CRG members and participants requested that the City and the applicant consider the implications of a "no action alternative" on the site. What types of issues would Southeast Boulder encounter if the city elected not to annex the subject property? How would County by-right development impact transportation, adjacent open space properties, and neighboring residents?

Access/Traffic Impact Analysis. Concerns about safety and increased traffic volumes on 55th through Green Belt Meadows, Kewannee Drive and Manhattan Drive. East Boulder Community Park Master Plan conceptually shows Kewannee entering the property and ending as a culdesac with 55th providing a southern park entrance and serving as the main entry to the subject property. Some residents preferred this plan, while others were concerned about impacts associated with using 55th as the main property access point.

Nearby employm .. centers include all of the shopping .. .. office service areas listed above. In addition, many South and Southeast Boulder residents are employed at the CU Research Park, National Center for Atmospheric Research (NCAR) and National Oceanic and Atmospheric Administration/National Institute of Standards and Technology (NOAA/NIST) facilities to the northwest, southwest, and west southwest of the site respectively.

Trails/Streets/Transit

Manhattan Drive, to the west, serves as the north/south bicycle route for neighborhoods south of Baseline, and east of Foothills Parkway. An east/west multi-use path through the East Boulder Community Park and Keewaydin Meadows Neighborhood Park provides access from the subject property to Manhattan Drive. Access to the Open Space Bobolink Trail along the South Boulder Creek corridor is available to the east of East Boulder Community Center.

Local bus service is available at the East Boulder Community Center via route 203 which provides service to the University and downtown. Route 206 is available at Manhattan Drive and provides service to Fairview High School, Table Mesa Shopping Center, and Crossroads Mall. The Table Mesa Park & Ride, approximately 1¼ mile to the southwest offers access to most regional RTD routes to Denver.

Automobile access to the property may be available via 55th Street or Kewanee Drive. Kewanee Drive currently ends near the northwest corner of the site. Kewanee Drive provides direct access to Manhattan Drive, the major north/south auto and bicycle route between Baseline and South Boulder Road.

Public Facilities

As noted above, the East Boulder Community Park and Keewaydin facility offers pedestrian/bicycle trails both to the recreation center and Manhattan Drive. Facilities in both parks include soccer fields, children's play equipment, tennis courts, volleyball, outdoor handball, and large grassy play fields. The East Boulder Community Center offers a Senior Center/community meeting space, swimming/lap pool facilities, weight room, dance studio, climbing wall, and gym.

The City owns and maintains several acres of open space to the east and south of the subject property along the South Boulder Creek corridor and extending to Cherryvale Road. These include the Gebhard, Mary Clynoke and Van Vleet open space sites. Local pedestrian access to the Bobolink/South Boulder Creek trail is focused at an entry along the east side of the East Boulder Community Center.

Burbank Middle School is located within ¼ mile to the northwest of the site. Eisenhower Elementary School is located approximately 1¼ miles to the north, while Aurora 7 Elementary School is approximately 2 miles to the northwest of the site. The Meadows branch library, in the Meadows Shopping Center, is 1 mile to the northwest near Baseline and Foothills Parkway.

- Concurrent ,or Site Review/Annexation Proces As noted above, the City Council passed a resolution (#705, see Attachment B) last year concerning future annexations to the City. In essence, the resolution states that the City will only annex sparingly and only in cases where a clear benefit to the community is demonstrated or in order to resolve an issue of public health. The best way to demonstrate public benefit is through completion of the Major Site Review Issues Identification and Concept Review steps (which is required for parcels of this size anyway). The Major Site Review process will allow staff, CRG members, and the community to evaluate the proposal for consistency with City policies and goals. Therefore, staff will require that the applicant successfully complete the first two steps of Major Site Review prior to proceeding further with the annexation request.

Housing

Site is located in the Southeast Subcommunity, where 65% of the units are attached and 35% detached. There are 76 assisted units, comprising approximately 1% of the total units located in the subcommunity. The City has a goal to have at least five percent of the housing stock as assisted units.

Boulder Valley School District

The information in the following tables is provided to establish baseline figures for local schools in the area of the development proposal. These figures can be used to estimate potential impacts to area schools.

ATTENDANCE AT AREA SCHOOLS

Schools	'94 Enrollment	'95 Projected	Capacity	
Aurora 7 Elementary	292	292*	402	
Eisenhower Elementary	547	542*	600	
Burbank Middle School	401	457*	587	
Fairview High	1,697	1,725	1,813	1,873

(Source: BVSD, July 1995)

Environment

Land. The area is known habitat for two species of concern in the Boulder Valley. Large populations of Ute ladies' tresses orchid (Spiranthes diluvialis) have been found throughout the wet meadows associated with this segment of the creek. This orchid is officially listed as threatened under the Endangered Species Act. The applicant is advised that an official survey for this plant species by a qualified biologist must be conducted on this site. The optimal time period for the survey is between July 20 and August 31 when the plant is in bloom. Unless a survey is completed within six weeks of these comments, the applicant will need to wait until July of next year to obtain adequate survey information. *Checklist item a-1*

Preble's meadow jumping mouse is a County species of concern and a candidate for federal endangered species listing. This species has been found in nearby Open Space property. The applicant is highly advised to employ a qualified biologist to conduct a survey for this species as well. Please contact the City of Boulder Open Space Department for more information about this species. *Checklist item a-1*

Open Space adjacency. This property is adjacent to Open Space and the broad riparian corridor of South Boulder Creek which contains some of the most sensitive and important habitat in the Boulder Valley. The applicant is advised that potential impacts to this habitat could result from groundwater alteration, and any routing of surface runoff onto Open Space property. Staff are also concerned about impacts from uncontrolled access from residential properties onto the site. The applicant is advised to coordinate with Open Space staff in any proposed routing of trails onto Open Space. Trails access to Open Space in this area are east of the East Boulder Community Center and east of Greenbelt Meadows subdivision. No other access points are planned for this area at this time. Gates or other access from the development onto Open Space must be approved by the Open Space Board of Trustees and in accordance with the gate policies of the department.

Water Rights. As a condition of any annexation approval, any water rights associated with the property must be offered to the City for purchase. Any easements for ditches or ditch laterals across the property for use or maintenance must be respected and preserved.

Landscaping. The applicant should seek to use native and low-water-consuming vegetation in landscaping done on the site, to minimize hydrologic alteration and potential for increased sedimentation in the ditch lateral, and to minimize use of chemical pesticides. *Checklist items under a-1(B)*

Construction impacts. Construction impacts to land should be addressed. *Checklist item a-3*

Water/Wetlands. According to recent site visits and conversations with adjacent property owners in November 1994, it appears that off-site fill-material has been placed over existing wetlands on the site. Has the applicant received the proper permits or authorization from the U.S. Army Corps of Engineers for this activity? In addition, the wetland mapping submitted by the applicant is not consistent with records on file with

staff prior to its ..riation. In addition to satisfying all the requirements outlined in the Traffic Impact Analysis Format, the TIA must include the following information:

- An evaluation of connectivity, circulation and access needs for all modes of travel (automobile, transit, bicycle and pedestrian) between this site and adjacent areas.
- Access to the site.

- Background (existing) and projected traffic volumes based on the Boulder Valley Comprehensive Plan, and proposed site development (including both 1995 and 2020 conditions).

- Level of Service Analysis for intersections that may be impacted by site development, including but not limited to the following intersections:
  Unsignalized intersections:
  -connection to 55th Street
  -55th Street and South Boulder Road

- Evaluation and provision of Travel Demand Management (TDM) and traffic mitigation measures, to encourage alternate transportation use and effectiveness for users of the development.

- Evaluation of appropriate and necessary trail connections across and within the site to provide direct alternate mode travel routes.

- Evaluation of emergency access needs.

- Evaluation of potential off-site transportation improvements, necessary to mitigate increased traffic impacts. This may include financial participation in pedestrian, bicycle and road improvements necessary to mitigate traffic impacts.

- The need for new or upgraded traffic control devices pursuant to the Manual on Uniform Traffic control Devices based on impacts of the proposed development.

- Recommendations based upon the findings of the analysis.

- Bus routes through or adjacent to this property as well as additional stops.

- The applicant shall pay any outstanding assessments for roadway improvement for 55th Street. Staff is currently researching the actual amounts due and will report the finding as they become available.

- Evaluation of traffic impacts generated from development to existing residential areas, Keewaydin Meadows and Greenbelt Meadows, and recommendations for mitigation.

<u>Access</u>.

- Access points are to be located in accordance with the City of Boulder Transportation Master Plan, and City of Boulder Design Criteria and Standard Specifications for access standards.

Other Issues:

Floodplain Management. A portion of this property, lying east and south of 55th Street, is located within the 100-year Floodplain for South Boulder Creek. The applicant shall be required to delineate the High Hazard Zone associated with the Floodplain and provide this data to the City. Any development proposed within the floodplain and the newly defined High Hazard Zone shall require a Floodplain Development Permit.

Site Drainage. This property is located primarily within the Dry Creek No. II Drainage Basin. Site runoff, resulting from any development on the site, shall be conveyed within the boundaries of the basin to a positive outfall at a major storm drainage system. Please contact the Development Review staff to discuss specific issues associated with storm drainage system design. Drainage plans and reports in accordance with the City of Boulder Design Criteria and Standard Specifications must be provided by the applicant at the time of "Step 3 - Site Review Application". The required report and plans shall address the following issues identified for this location:

- Grading plans in accordance with the natural topography to eliminate large areas of cut and fill on the property.
- On site detention to provide release at the historic release rates for the property.
- Water quality for surface runoff using a "best management practice" water quality system.
- Erosion control during construction activities.
- Cross basin flows are to be eliminated. Contact Development Review Staff to discuss the technical issues associated with storm water runoff prior to preparation of drainage plans and the drainage report.

Groundwater. Groundwater issues must be evaluated to determine the extent of subsurface grade structures, if any, that should be allowed on this property and the extent of any on-site contamination that exists.

Several properties abutting this site's western boundary have reported experiencing basement flooding since 1990, indicating a recent change in the groundwater flow patterns in this area. Prior to development of this site, an analysis of groundwater conditions should be performed, to determine depths, extent, a potential solutions.

Noise Attenuation. Noise attenuation alternatives for traffic along U.S. 36 should be evaluated as part of site development, and may include buffer zones, earth berming or landscaping. A significant buffer of up to 200', along with earthen berming adjacent to the roadway. Berming as noise attenuation, since the highway is significantly elevated along this stretch, may require an increased buffer distance to reduce noise impacts in this reach.

Irrigation Ditches and Water Rights. The ditches must be maintained as part of the development. Any change in alignment, or crossing, of the existing ditches must meet

CITY OF BOULDER
PLANNING BOARD ACTION MINUTES
February 7, 2013
1777 Broadway, Council Chambers

A permanent set of these minutes and a tape recording (maintained for a period of seven years) are retained in Central Records (telephone: 303-441-3043). Minutes and streaming audio are also available on the web at: http://www.bouldercolorado.gov/

PLANNING BOARD MEMBERS PRESENT:
Aaron Brockett
Bill Holicky, Chair
Bryan Bowen
Leonard May
Danica Powell
Mary Young, Vice-Chair
Sam Weaver

PLANNING BOARD MEMBERS ABSENT:

STAFF PRESENT:
David Driskell, Executive Director of Planning & Sustainability
David Gehr, Assistant City Attorney
Charles Ferro, Development Review Manager for CP&S
Heidi Schum, Development Review Manager for PW
Chris Meschuk, Planner II
Sam Assefa, Senior Urban Designer
Jessica Stevens, Civil Engineer II
Chandler VanSchaack, Associate Planner
Susan Meissner Administrative Specialist III

1. **CALL TO ORDER**
   Chair, **B. Holicky**, declared a quorum at 5:03 p.m. and the following business was conducted.

2. **APPROVAL OF MINUTES**
   There were no minutes scheduled for approval.

3. **PUBLIC PARTICIPATION**
   No one from the public spoke.

4. **DISCUSSION OF DISPOSITIONS, PLANNING BOARD CALL-UPS**
   A. **3015 Kalmia Avenue; FINAL PLAT # TEC2012-00007: Final plat to subdivide an existing approximately 9.7 acre site into 38 lots, ranging from 4,321 square feet to 19,200 square feet, and five outlots. The plat also includes new public right-of-way and alleys to serve the lots and connect to adjacent development.**

   This item was not called up.

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B. **Administrative SITE REVIEW: SITE REVIEW AND PRELIMINARY PLAT: Site review with a conditional height modification up to 45-feet for a 93,000 s.f. addition to office building at 3333 Walnut and Preliminary Plat to join the two properties addressed as 3333 Walnut and 3625 Walnut into one lot.**

This item was not called up.

5. **PUBLIC HEARING ITEMS**

A. **Public hearing to consider Concept Plan, no. LUR2012-00079, for the construction of a 49-unit townhome style residential development on an approximately five-acre site located at the northeast corner of Kalmia Avenue and 28th Street. The development proposal includes one and two- story buildings with parking primarily provided as surface parking. The site is zoned Residential Medium-1.**

Applicant/Property Owner: WCT, LLC.

Staff Presentation
C. Ferro introduced the item.
J. Vaughn presented the item to the board.

Board Questions

Applicant Presentation
Stephen Sparn, the architect, presented to the board.

Board Questions

Public Hearing

1. **Michael Rechcygiel, 2858 Loma Place** pointed out that the original approved density for the site was substantially lower than what is proposed. He also noted that the land felt unstable and was prone to flooding.
2. **Barbara Rechcygiel, 2858 Loma Place** said that the neighbors are not opposed to building in the area, but want a lower density.
3. **Barbara Steinmetz, 2920 Island Drive,** agreed with the previous speakers and gave her time to Fred Gluck.
4. **Fred Gluck, 2845 Links Drive,** thought that density is the major concern of the neighborhood and asked the developer to cut the number of units in half. He was concerned with the amount of parking. Street parking will cause traffic congestion. The open space does not face or contribute to the neighborhood.
5. **Ted Ross, 2855 Links Drive,** expressed concern over the proposed high intensity adjacent to the neighborhood.
6. **Terrell Minton, 3722 Monterey Place,** expressed concern that the units will be rentals and marketed toward a young demographic. She would like to see an access point off of Kalmia. She thought the design looked commercial and cold.
7. **David Turner, 2860 Links Drive,** noted that the neighborhood has seen large amounts of growth and thought that road infrastructure needed to be improved to solve growing traffic problems.
8. **Jonathan Goldman, 2862 Loma Drive,** expressed concern over the loss of views and density. He would like to see a reduction in density to 25 units.

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9. **Andrea Goldman, 2862 Loma Place,** thought that the density will have unintended consequences. Though the site has 5 acres, only 3 are buildable. She was concerned about potential domestic violence associated with higher density and thought that there need to be additional entry points. She thought there is a great deal of water under the site.
10. **Ed Shapiro, 2868 Loma Place,** noted that there are many people in the neighborhood in wheelchairs who need safe streets. He did not want congestion and street parking.
11. **Amy Strombotne, 8502 Stirrip CourtPatty Ross, 2855 Links Drive,** expressed concern that the city is being filled too densly. Citizens want open space.
12. **Patty Ross, 2855 Links Drive,** moved to Boulder for the open space. She did not like the design and thought it looked like a low income development. People tend to use cars over mass transit.
13. **Jennifer Christensen, 2865 Links Drive,** didn't think that the traffic study would be valid if it were conducted over the holiday break. She thought it naive to expect people to use public transportation.
14. **Ray Drzymala, 2958 Loma Place,** expressed concerned that this project began with the best of intentions but that that the end result will not be desirable for the neighborhood.
15. **Dan Fraenkel, 2925 Island Drive,** was concerned that the proposed development would inhibit the wildlife use of the trail/corridor.

Board Questions
D. Thompson answered the board's questions.
H. Schum answered the board's questions.
Kurt Parker, the site engineer, answered the Board's questions.

Board Discussion

<u>Density</u>
M. Young preferred the original proposed site. It included the adjacent property and multigenerational development with green spaces and more woonerf-like streets. It felt more compatible with the adjacent land uses and could have achieved a greater density over more space. Of the leftover five acres, only three acres are now buildable. She thought that the new proposed site plan was too intense and had a sea of parking.

L. May read an excerpt from the BVCP pertaining to allowed densities in that area. He thought this design felt too parking-centric. The parking lots in the center of the site create an unpleasant environment. The original 36 multigenerational plan was more compatible with the contiguous areas and more aligned with the BVCP.

B. Bowen thought the applicant had a design opportunity to change the character of the proposed parking lot from a blank lot to a pleasant alley with incidental cars. He recommended a higher density along the bike path and that the corner be left woodsy and undeveloped. The street frontage along 28th Street should have a strong landscape buffer while the residential street frontage could use boxy shrubs to mask parking. Create view corridors to the mountains from the residential street.

A. Brockett noted that the site is challenging due to its transitional location between single family residences to the west and higher densities to the south. The proposed medium density matches the other adjacent corners along 28th Street. He found it appropriate but thought units could be moved to flank the bike path and density reduced along Paseo del Prado. Though the

SW corner is buildable, he thought it would be better left unoccupied. He agreed that the design is too parking-focused. He sees this as an opportunity for workforce and affordable housing and noted that many younger people are not as car dependent. The path system with underpasses will encourage bike and pedestrian use.

D. Powell thought that the medium density zoning was appropriate but agreed that the higher density would be more appropriate closer to the path, graduating to a lower density adjacent to the existing neighborhood. She would prefer to see something active on the corner of 28th Street such as a community garden, play area, etc. It is a gateway to the neighborhood in a family-oriented area. She would like to see the two halves of the site to be better connected.

S. Weaver noted that this is a challenging site. He would normally support a parking reduction but did not think that it was appropriate in this case. He liked elements of the pervious woonerf plan and wanted to make this site a more natural transition between low and more urban densities. The corner of 28th Street should be an active amenity while maintaining a natural element. Workforce housing and higher densities are important in making Boulder a more sustainable place.

B. Holicky agreed that this site is complicated and thought that the transition was more important than the proposed density. He cautioned against breaking a zone on a street; it is jarring and uncomfortable. The street should not seem to fundamentally change with this development. Much of this can be remedied by the site plan. Higher densities should be located closer to 28th Street. The bike path and drainage area is currently divorced from the site.

<u>Site Plan</u>

B. Holicky wanted to see more space between buildings, fewer units per building, a better transition between the neighborhood and urban area, more connections between the multi-use path and the existing neighborhood, and a second entrance from the road. The current site plan has little occupyable outdoor space. Convert a path into a park space. Buildings along 28th Street would be appropriate but if that area is not developed, it should be left natural.

B. Bowen agreed with **B. Holicky** not to break the zoning at the street. He recommended maintaining the rhythm, bulk and scale of the neighborhood to the north along the street by grouping buildings to emulate the mass of adjacent homes.

A. Brockett agreed with **B. Bowen** and **B. Holicky**. He liked the applicant's idea to move the multi-use path to the east side but thought that there should be other points of access from the street. He liked the idea of breaking the massing of buildings with green, park like corridors and also allowing for mountain views from Paseo del Prado. Keep the massing similar to the surrounding streets with lower densities on Paseo del Prado and higher densities along the Wonderland Creek path.

L. May agreed with the previous comments. The transition to the neighborhood, creation of quality spaces within the development and access through the space are of key importance.

M. Young noted that an urban layout within a suburban context is difficult. The interface between development and its context is more important than the density. Locate higher densities along the bike path and provide more access between the development and path. If not developed, the corner should be left natural. She asked for more bike parking and amenities.

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D. Powell saw this as a suburban product aimed at a more urban demographic. She did not like the combination of carports and garages and preferred to separate the cars from living spaces. She recommended creating more opportunities for gathering and community via appropriate amenities for the target demographics. She requested a more informal path through the wetland area, if allowable by the city. Use the drainage as an asset for the people living in the area.

A. Brockett would like to see a path across the wetland buffer. He would also like to see protected bike parking.

B. Holicky noted that this is an excellent area for biking and supports creating connections across the wetland drainage area. He thought this reads as an auto dominated site and recommended the applicant improve crossings, paving, etc.

L. May liked the sense of enclosure created by the Woonerf-plan with buildings at either end.

B. Bowen noted that the proposed buildings do not have a back. He recommended developing both the sides that face the street and the parking. Change the parking lot to a space where the community can gather with kitchen windows looking out onto that community space.

Access

S. Weaver noted the fire access was closed off. Making a one-way loop with two access points could reduce traffic.

B. Bowen recommended that one access point be a left-only exist to facilitate traffic movement.

B. Holicky suggested breaking the project in half and to having a couple of entrances.

Parking reductions

D. Powell thought there could be a cross-parking access easement with Manor Care for guests. One and a half spaces per two bedroom unit could be insufficient given guest parking needs. She would not support a parking reduction in this instance. Parking needs to be managed and sensitive. If a parking reduction were considered, she recommended providing Eco-Passes to tenants.

M. Young would consider a parking reduction if spots were decoupled. She would like to see a shared parking situation with Manor Care.

A. Brockett agreed with **M. Young** but cautioned the applicant to not create a burden for the neighborhood. He recommended decoupling parking, charging extra for parking, getting rid of garages, and sharing parking with Manor Care.

L. May noted that the residents might not work in Boulder and may need to drive. Requiring zoned parking permits could protect the neighborhood. He would support a parking reduction.

S. Weaver would support a parking reduction if efforts were made to mitigate the neighborhood impact. He recommended getting rid of garages, charging for parking passes, creating zoned parking in the adjacent neighborhoods, and providing residents with Eco-Passes.

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B. Bowen would not support a parking reduction out of respect for the neighbors who voiced concerns. He would like to see improved circulation and implementation of strategies to mitigate the neighbors' traffic concerns.

B. Holicky asked staff to create a neighborhood parking plan.

Architecture
S. Weaver thought that three layers of architectural design ranging from suburban adjacent to the neighborhood to urban closer to 28th Street would be appropriate.

L. May did not think that the pallette of materials should be limited. He recommended that the architect look at porches to create texture and transitional space.

A. Brockett liked the contemporary design approach.

B. Holicky encouraged the architect to reach a level of richess of Broadway North. The transistion could be more difficult here because the style of the neighborhood is different.

M. Young encouraged the architect to make the design warmer and more livable.

D. Powell agreed with what had been said. She encouraged the architect to design two-sided architecture with front and back porches, planters and flowers. The lower profile and flat roofs in defference to the neighborhood is good. Work with the neighborhood to select complimentary materials, colors, etc.

The board thanked the applicant and neighbors for their participation and requested that the two groups meet to work through details as much as possible prior to site review.

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B. Public hearing and consideration of Annexation and Initial Zoning (case no. LUR2012-00097) for the property located at 2156 Tamarack Ave. The proposal includes a request for annexation with an initial zoning of Residential Estate (RE).

Property Owner/Applicant: Dennis and Tracey Beck.

Staff Presentation
C. Ferro introduced the item.
J. Vaughn presented the item to the board.

Board Questions

Public Hearing
No one from the public spoke.

Board Discussion
There was no discussion from the board.

On a motion by **A. Brockett**, seconded by **D. Powell**, the board approved 7-0 to recommend that the City Council approve the proposed annexation with an initial zoning of Residential Estate (RE) pertaining to request #LUR2012-00097, incorporating the staff memorandum as findings of fact and subject to the recommended conditions of approval for annexation found in our packet.

C. Public hearing to consider Concept Plan, no. LUR2012-00095, for the redevelopment of a 2.275 acre site located at the intersection of Foothills Parkway and Diagonal Highway with a new 4,958 square foot convenience store and 10-pump fueling station. The site is zoned Business Transitional -1 (BT-1).

Applicant: Ryan Halder for Kum & Go, L.C.
Property Owner: 3365 Diagonal, LLC.

Staff Presentation
C. Ferro introduced the item.
C. VanSchaack presented the item to the board.

Board Questions

Applicant Presentation

Public Hearing
No one from the public spoke.

Board Discussion

M. Young appreciated the applicants' willingness to address staff comments. She would like to see 16 parking spaces as well as bicycle amenities since this is on a cycling circuit.

S. Weaver thought this was a good start. The proposed building at the end of the site coud provide a good added amenity and recommended that the applicant look at the new fueling station at El Dorado Springs as an example of good design. He would like to see alternative fuels at this site.

A. Brockett appreciated the applicant's response to staff comments and encouraged incorporating additional uses, keeping the parking count low, adding full landscaping and making the design unique. He thought this would be a good location for a gas station.

B. Holicky noted that this as a gateway site; it is one of the first things seen upon arrival and departure from Boulder. This is an opportunity to make something sculptural and interesting to vehicular traffic such as the nearby fire building. Make this a different gas station, include alternative energy, incorporate as many trees as possible and don't design too much for pedestrian traffic since there is little in the area. He thought it was a good use of the site.

L. May echoed **B. Holicky** and thought that a unique building would enhance business. Pursue good architecture.

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D. Powell thought that this could be a unique opportunity and could be very busy. There are a lot of trips by that location due to the soccer fields, traffic and cyclists on the weekends that could support picnic areas or other places for people to pick up a pizza. She encouraged the applicant to be bold, use good materials, and pay close attention to access. She thought the lighting would be important since this is a dark part of town. There are no competing lights from other businesses so subtlety would be preferable and sensitive to the night sky.

D. Public hearing to consider extending the Site and Use Review approval of the Washington Village II project, located at 1215 Cedar Avenue, which permitted 33 dwelling units and 2,950 square feet of office/commercial space on the ground floor of a new building along Broadway and community facilities on the 3-acre site. Case #LUR2008-00083 was approved on Feb. 25, 2009 and requires Planning Board extension pursuant to section 9-2-12(b)(2), B.R.C. 1981.(#LUR2012-00102).

Applicant/Property Owner: Wonderland Hill Development Company.

Staff Presentation
C. Ferro introduced the item.
K. Guiler presented the item to the board.

Board Questions

Applicant Presentation
Jim Leach, the developer, presented to the board.

Public Hearing

1. **Joan Brody, 2950 Broadway**, had her niece speak on her behalf. She is concerned that the proposed plan will block her solar access and generate greater foot and vehicular traffic. She would like the developer to construct a fence or wall and add landscaping between her property and the development for privacy and safety.
2. **David Carson, 3085 6th Street,** spoke on behalf of the cohousing community. He expressed concern that delays would cause undue financial hardships for the future residents who are getting ready to sell their current homes and move.
3. **Stan Kyed**, **2945 13th Street,** is a neighbor to the north of the site. It would be helpful if the developer built a fence on the north of the property now rather than later. He asked the contractor to mitigate dust and implement the pocket park now.
4. **Darrell Icenogle, 2905 13th Street,** a resident of Washington Village spoke in favor of the project.
5. **Lynn Segal**, **Dewey Street**, would like the applicant to meet the additional conditions described in staff's presentation.

Board Discussion

L. May was not inclined to impose any new conditions. The remainder of the board agreed.

B. Holicky informally requested that the fence be constructed soon to mitigate impacts on the neighbors.

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On a motion by **A. Brocket**, seconded by **S. Weaver**, the board approved 6-0 (**B. Bowen** abstained) the extension for a period of three years subject to the previously approved conditions of approval found in Attachment C to the staff memorandum and incorporating the staff memorandum as findings of fact.

E. MATTERS FROM THE PLANNING BOARD, PLANNING DIRECTOR, AND CITY ATTORNEY

The March 7th meeting will be cancelled. The majority of staff will be at a conference.

M. Young inquired about submitting an abridged version of the Planning Board's letter to Council in the newspaper. The board decided not to publish the letter per Council's guidelines.

Planning Board applications are due Tuesday. Appointments will occur March 15. New members will begin immediately.

Staff had a good open house for the Hogan-Pancost project. All consultants and staff involved were present.

F. DEBRIEF/AGENDA CHECK

G. ADJOURNMENT

The Planning Board adjourned the meeting at 9:50 p.m.

APPROVED BY

_____

Board Chair

_____

DATE

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M E M O R A N D U M

TO: Planning Board

FROM: Katie Knapp, Floodplain and Wetland Administrator

DATE: April 5, 2013

SUBJECT: **Call Up Item:** 4474 Broadway (Violet Crossing)
Floodplain Development Permit (LUR2013-00004)
This decision may be called up before Planning Board on or before **Apr. 18, 2013**

A Floodplain Development Permit was approved by Public Works, Development Review staff on Apr. 3, 2013. The project involves construction of a bridge for a multi-use path across Fourmile Canyon Creek and site grading for the proposed Violet Crossing development.

The proposed Violet Crossing development project received site review approval (LUR2010-00048) in November, 2010. The project includes construction of a proposed bridge for a multi-use path and site grading within the flood conveyance zone of Fourmile Canyon Creek. The proposed bridge would be constructed above the predicted 100-year flood water elevation. The applicant has demonstrated that the project will not adversely impact the floodplain and will be in compliance with the city's floodplain regulations. A copy of the floodplain development permit is attached.

This floodplain development permit was approved by Public Works, Development Review staff on Apr. 3, 2013, and the decision may be called up before Planning Board on or before Apr. 18, 2013. There is one Planning Board meeting scheduled within the required 14-day call-up period on **Apr. 18, 2013**. Questions regarding this floodplain development permit should be directed to Katie Knapp in Public Works, Development Review at 303-441-3273 or knappk@bouldercolorado.gov.

Attachments:

A. Floodplain Development Permit

CITY OF BOULDER
Planning and Development Services

1739 Broadway, Third Floor • P.O. Box 791, Boulder, CO 80306-0791
phone 303-441-1880 • fax 303-441-4241 • web boulderplandevelop.net

Land Use Review Floodplain Development Permit

Date Issued: April 3, 2013

Expiration Date: April 3, 2016
(Pursuant to Subsection 9-3-6(e), B.R.C. 1981)

Permit Number: LUR2013-00004

Contact Information

NORTH BROADWAY CENTER LLC
2775 IRIS AV
BOULDER, CO 80304

Project Information

Location: 4474 BROADWAY

Legal Description: TR 2318 & TR 2411 18-1N-70 PER DEED 901095-96 02/02/88BCR LE SS 250.5 SQ FT TO CITY R/W PER REC 1088233 2/19/91 3 IMPS AK A N BOULDER MHP

Description of Work: FLOODPLAIN DEVELOPMENT PERMIT: Construction of a pedestrian bridge, multi-use path, street, driveway, sidewalks, and water quality ponds.

Type of Floodplain Permit: Floodplain Review W/ Analysis

Creek Name: Fourmile Canyon

Flood Protection Elevation: Not applicable

Conditions of Approval

- The proposed project/activity is approved on the basis that it satisfies applicable requirements of Chapter 9-3-3, "Floodplain Regulations," Boulder Revised Code 1981. Other floodplain requirements as set forth in Chapter 9-3-3 which are not specifically outlined in the conditions of approval below remain applicable to this project/activity.
- The applicant shall obtain a site inspection and approval from the City of Boulder Floodplain and WetlandsAdministrator upon completion of the projects.
- Certification by a Colorado Registered Professional Engineer that the development has been completed in compliance with the approved floodplain development permit application and that all conditions have been fulfilled must be submitted to the city of Boulder prior to scheduling final inspections. No Certificate of Occupancy will be issued for any structure where this provision has not been satisfied.
- Prior to scheduling the final inspection, the applicant must submit to the City, final as-built survey information that matches the proposed design. The survey shall be prepared by a Colorado licensed land surveyor and reviewed by a Colorado registered professional engineer to certify compliance with the floodplain development permit.

Inspections

To schedule an inspection, call 303-441-3280 and refer to your permit number (LUR2013-00004).

- Final Floodplain Inspection

M E M O R A N D U M

TO: Planning Board

FROM: Katie Knapp, Floodplain and Wetlands Administrator

DATE: April 5, 2013

SUBJECT: **Call Up Item:** Wetland Permit (LUR2013-00022)
Junction Place Bridge and Depot Square

This decision may be called up before Planning Board on or before **April 19, 2013.**

A wetland permit was approved by Public Works Development Review staff on April 5, 2013 for construction of a roadway bridge over Goose Creek, and additional site improvements related to the Depot Square project.

The proposed Depot Square and Junction Place Bridge improvements are located at Goose Creek between 30th St. and Foothills Pkwy. The proposed improvements include the construction of a roadway bridge, a multi-use trail, a pocket park, retaining walls and site grading. The project will result in direct permanent impacts to 144 square feet of wetlands and 1,099 square feet of buffer areas. The permanent impacts will be mitigated on-site by creating an additional 150 square feet of wetland areas and providing 3,318 square feet of buffer area enhancements using native plants. The applicant has demonstrated that wetland impacts have been minimized and the project meets the requirements of the city's Stream, Wetlands and Water Body Protection ordinance.

The wetland permit was approved by Public Works Development Review staff on April 5, 2013 and the decision may be called up before Planning Board on or before April 19, 2013. There is one Planning Board meeting within the 14 day call up period on **April 18, 2013**. A copy of the wetland permit is attached.

Questions about the project should be directed to the Floodplain and Wetlands Administrator, Katie Knapp at 303-441-3273 or by e-mail at knappk@bouldercolorado.gov.

Attachments:

A. Wetland Permit

CITY OF BOULDER
Planning and Development Services

1739 Broadway, Third Floor • P.O. Box 791, Boulder, CO 80306-0791
phone 303-441-1880 • fax 303-441-4241 • web boulderplandevelop.net

Wetland Permit

Date Issued: 4/5/2013

Expiration Date: April 4, 2016
(Pursuant to Subsection 9-3-9(k), B.R.C. 1981)

Permit Number: LUR2013-00022

Contact Information

DAVID STEINMANN

Project Information

Location: 3001 PEARL ST

Legal Description: LOT 1 BOULDER TRANSIT VILLAGE SUBDIVISION

Description of Work: Wetland permit application for Boulder Junction and Depot Square.

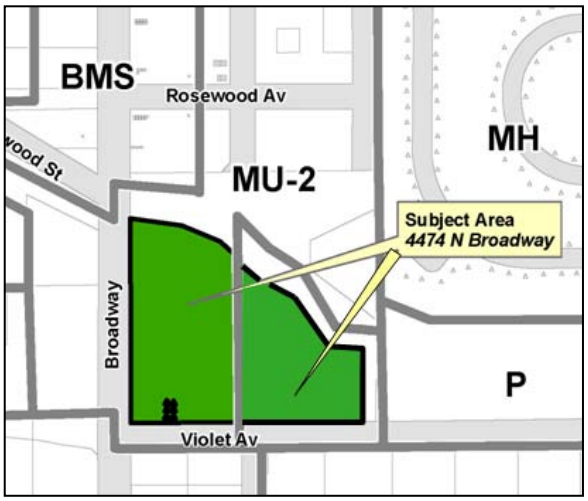
Conditions of Approval

- The proposed project/activity is approved on the basis that it satisfies applicable requirements of Chapter 9-3-9, "Wetlands Protection," Boulder Revised Code 1981. Other wetland requirements as set forth in Chapter 9-3-9 which are not specifically outlined in the conditions of approval below remain applicable to this project/activity.
- The applicant shall obtain a site inspection and approval from the City of Boulder Floodplain and Wetlands Administratorr upon completion of the projects.
- Best management practices shall be applied to all phases of the project and shall conform to the requirements of the "City of Boulder Wetlands Protection Program: Best Management Practices" adopted July, 1995; and "City of Boulder Wetlands Protection Program: Best Management Practices - Revegetation Rules" adopted July, 1998.
- The mitigation site shall be monitored annually for three years. Monitoring reports shall be submitted to the city of Boulder Planning and Development Services prior to September 1st of each year. If it is determined that the restoration is not successful, then corrective measures will need to be established and implemented to ensure a successful project.
- The project shall be completed in accordance with the wetland permit application materials prepared by Professional Wetlands Consulting, Inc., dated March 18, 2013.

Inspections

To schedule an inspection, call 303-441-3280 and refer to your permit number (LUR2013-00022).

- Wetland Mitigation Inspection
- Wetland Mitigation 2nd Year
- Wetland Mitigation 3rd Year
- Final Wetland Mitigation Insp



MEMORANDUM

TO: Planning Board

FROM: Elaine McLaughlin, Senior Planner

DATE: April 5, 2013

SUBJECT: Call Up Item: 4474 Broadway Final Plat
TECHNICAL DOCUMENT REVIEW: Final Plat for the Violet Crossing Subdivision call-up on or before April 19, 2013.

Attached is the disposition for the conditional approval of a Final Plat for Violet Crossing Subdivision.
On April 5, 2013, staff approved the Final Plat application for the subject property located at the northeast corner of Broadway and Violet in north Boulder, for a project named Violet Crossing. A separate application for Technical Document Review included final architecture, landscape architecture and final engineering plans. Only the final plat is subject to potential call-up by the Planning Board.

Violet Crossing is a 98-unit attached residential development (including 20 permanently affordable units) for which the Site Review was unanimously approved by the Planning Board on Nov. 4, 2010. The site review included plans for the units, along with a linear parkway along Four Mile Canyon Creek, a multi-use path, and a new bicycle/pedestrian bridge over the creek. Completion of the final plat will allow conclusion of the building permit applications and will allow the applicant to break ground on the property and proceed with the redevelopment.

Proposed Subdivision:
The Violet Crossing property at 4474 Broadway is 4.657 acres in size. The final plat illustrates a subdivision of the lot into two lots, one outlot and dedicated right of way, as summarized below:

Lot 1 Residential Use	Lot 2 Residential Use	Outlot A: Public Access, Utilities, Bike Paths, Pedestrian Pathways, trails, parks, drainage, flood control	Dedicated Right of way
3.317 acres	0.548 acres	0.668 acres	0.124 acres

Conclusion:
Staff finds that this application meets the Final Plat for Subdivision criteria set forth in Subsection 9-12-8(b), B.R.C. 1981 and the lot standard criteria set forth in Subsection 9-12-12(a)(1), B.R.C. 1981 "Standards for Lots and Public Improvements." Therefore, the final plat was approved by Planning and Development Services staff on April 5, 2013, and the decision may be called up before Planning Board on or before April 19, 2013. There is one Planning Board meeting within the 14-day call up period on April 18, 2013. Questions about the project or decision should be directed to Elaine McLaughlin at (303) 441-4130 or mclaughline@bouldercolorado.gov.

Attachments:
- A: City of Boulder Planning Department Notice of Disposition
- B: Final Plat

CITY OF BOULDER
Planning and Development Services

1739 Broadway, Third Floor • P.O. Box 791, Boulder, CO 80306-0791
phone 303-441-1880 • fax 303-441-3241 • web boulderplandevelop.net

CITY OF BOULDER PLANNING DEPARTMENT
NOTICE OF DISPOSITION

You are hereby advised that the following action was taken by the Planning Department based on the standards and criteria of the Land Use Regulations as set forth in Chapter 9-12, B.R.C. 1981, as applied to the proposed development.

DECISION:	**APPROVED**
PROJECT NAME:	**Violet Crossing Subdivision**
DESCRIPTION:	**Subdivision of one lot into two lots along with Outlot A, and Dedicated Right-of-Way.**
LOCATION:	**4474 Broadway**
COOR:	**N10E03**
LEGAL DESCRIPTION:	**See attached Exhibit A**
APPLICANT:	**Terry Palmos**
OWNER:	**North Broadway Center LLC**
APPLICATION:	**Final Plat**
ZONING:	**MU-2 and RM-2**
CASE MANAGER:	**Elaine McLaughlin**

THIS IS NOT A SITE SPECIFIC DEVELOPMENT PLAN APPROVAL AND NO VESTED PROPERTY RIGHT IS CREATED BY THIS APPROVAL.

Approved On: 4.5.13
Date

By:

This decision may be appealed to the Planning Board by filing an appeal letter with the Planning Department within two weeks of the decision date. If no such appeal is filed, the decision shall be deemed final fourteen days after the date above mentioned.

Appeal to Planning Board expires: 4/19/13

CONDITIONS OF APPROVAL

1. The subdivision is approved subject to the terms of the Subdivision Agreement.

Exhibit A

A TRACT OF LAND LOCATED IN THE NW1/4 OF SECTION 18, T1N, R70W OF THE 6TH P.M., CITY OF BOULDER, COUNTY OF BOULDER, STATE OF COLORADO. BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, THENCE N00°09'00"W, 526.85 FEET ALONG THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18; THENCE S83°29'00"E, 40.78 FEET TO A POINT ON THE EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, SAID POINT ALSO BEING THE **TRUE POINT OF BEGINNING.**

THENCE S83°29'00"E, 128.96 FEET;

THENCE S67°07'00"E, 97.72 FEET;

THENCE S46°44'00"E, 133.39 FEET;

THENCE S64°35'00"E, 95.37 FEET;

THENCE S33°40'00"E, 142.15 FEET;

THENCE S85°42'00"E, 81.11 FEET TO A POINT 30.00 FEET WEST OF THE EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S00°07'00"E, 178.37 FEET ALONG A LINE 30.00 FEET WEST OF AND PARALLEL WITH SAID EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON THE NORTHERLY LINE OF VIOLET AVENUE, SAID POINT BEING 30.00 FEET NORTH OF THE SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S89°34'26"W, 560.21 FEET ALONG SAID NORTHERLY LINE OF VIOLET AVENUE AND ALONG A LINE 30.00 FEET NORTH OF AND PARALLEL WITH SAID SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON SAID EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18;

THENCE N00°09'00"W, 491.92 FEET ALONG SAID EASTERLY LINE OF NORTH BROADWAY AVENUE AND ALONG A LINE 40.50 FEET EAST OF AND PARALLEL WITH SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO THE **TRUE POINT OF BEGINNING.**

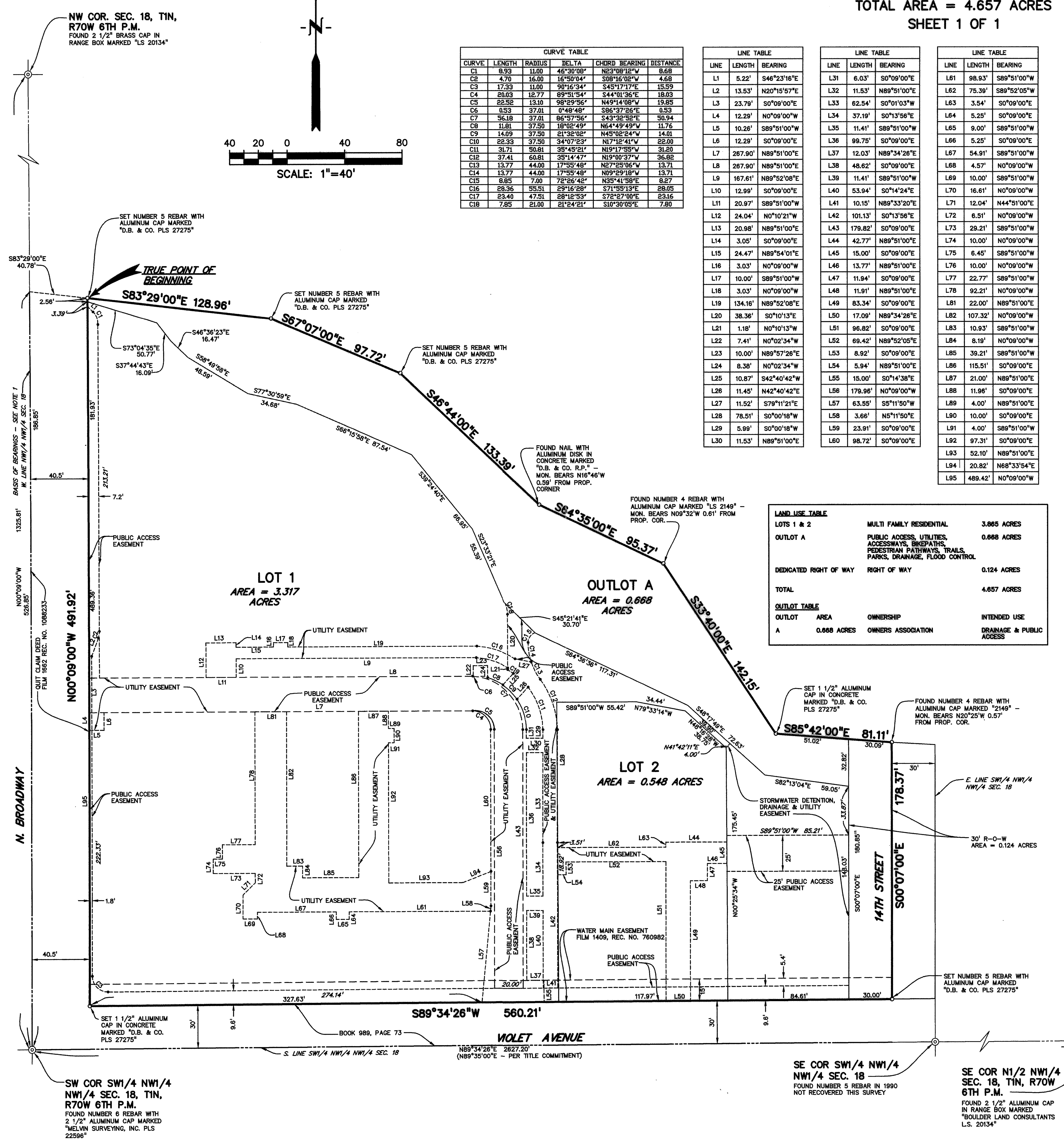
FINAL PLAT

VIOLET CROSSING SUBDIVISION

LOCATED IN THE NW1/4 OF THE NW1/4 OF SECTION 18, T1N, R70W OF THE 6TH P.M., CITY OF BOULDER, COUNTY OF BOULDER, STATE OF COLORADO

TOTAL AREA = 4.657 ACRES

SHEET 1 OF 1



CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	DISTANCE
C1	8.93	11.00	46°30'08"	N23°08'12"W	8.68
C2	4.70	16.00	16°50'04"	S08°16'02"W	4.68
C3	17.33	11.00	90°16'34"	S45°17'17"E	15.59
C4	20.03	12.77	89°51'54"	S44°01'36"E	18.03
C5	22.52	13.10	98°29'56"	N49°14'08"W	19.85
C6	0.53	37.01	0°48'48"	S86°37'26"E	0.53
C7	56.18	37.01	86°57'56"	S43°32'52"E	50.94
C8	11.81	37.50	18°02'49"	N64°49'49"W	11.76
C9	14.09	37.50	21°32'02"	N45°02'24"W	14.01
C10	22.33	37.50	34°07'23"	N17°12'41"W	22.00
C11	31.71	50.81	35°45'21"	N19°17'55"W	31.20
C12	37.41	60.81	35°14'47"	N19°00'37"W	36.82
C13	13.77	44.00	17°55'48"	N27°25'06"W	13.71
C14	13.77	44.00	17°55'48"	N09°29'18"W	13.71
C15	8.85	7.00	72°26'42"	N35°41'58"E	8.27
C16	28.36	55.51	29°16'28"	S71°55'13"E	28.05
C17	23.40	47.51	28°12'53"	S72°27'00"E	23.16
C18	7.85	21.00	21°24'21"	S10°30'05"E	7.80

LINE TABLE

LINE	LENGTH	BEARING
L1	5.22'	S46°23'16"E
L2	13.53'	N20°15'57"E
L3	23.79'	S0°09'00"E
L4	12.29'	N0°09'00"W
L5	10.26'	S89°51'00"W
L6	12.29'	S0°09'00"E
L7	267.90'	N89°51'00"E
L8	267.90'	N89°51'00"E
L9	167.61'	N89°52'08"E
L10	12.99'	S0°09'00"E
L11	20.97'	S89°51'00"W
L12	24.04'	N0°10'21"W
L13	20.98'	N89°51'00"E
L14	3.05'	S0°09'00"E
L15	24.47'	N89°54'01"E
L16	3.03'	N0°09'00"W
L17	10.00'	S89°51'00"W
L18	3.03'	N0°09'00"W
L19	134.16'	N89°52'08"E
L20	38.36'	S0°10'13"E
L21	1.18'	N0°10'13"W
L22	7.41'	N0°02'34"W
L23	10.00'	N89°57'26"E
L24	8.38'	N0°02'34"W
L25	10.87'	S42°40'42"W
L26	11.45'	N42°40'42"E
L27	11.52'	S79°11'21"E
L28	78.51'	S0°00'18"W
L29	5.99'	S0°00'18"W
L30	11.53'	N89°51'00"E

LINE TABLE

LINE	LENGTH	BEARING
L31	6.03'	S0°09'00"E
L32	11.53'	N89°51'00"E
L33	62.54'	S0°01'03"W
L34	37.19'	S0°13'56"E
L35	11.41'	S89°51'00"W
L36	99.75'	S0°09'00"E
L37	12.03'	N89°34'26"E
L38	48.62'	S0°09'00"E
L39	11.41'	S89°51'00"W
L40	53.94'	S0°14'24"E
L41	10.15'	N89°33'20"E
L42	101.13'	S0°13'56"E
L43	179.82'	S0°09'00"E
L44	42.77'	N89°51'00"E
L45	15.00'	S0°09'00"E
L46	13.77'	N89°51'00"E
L47	11.94'	S0°09'00"E
L48	11.91'	N89°51'00"E
L49	83.34'	S0°09'00"E
L50	17.09'	N89°34'26"E
L51	96.82'	S0°09'00"E
L52	69.42'	N89°52'05"E
L53	8.92'	S0°09'00"E
L54	5.94'	N89°51'00"E
L55	15.00'	S0°14'38"E
L56	179.96'	N0°09'00"W
L57	63.55'	S5°11'50"W
L58	3.66'	N5°11'50"E
L59	23.91'	S0°09'00"E
L60	98.72'	S0°09'00"E

LINE TABLE

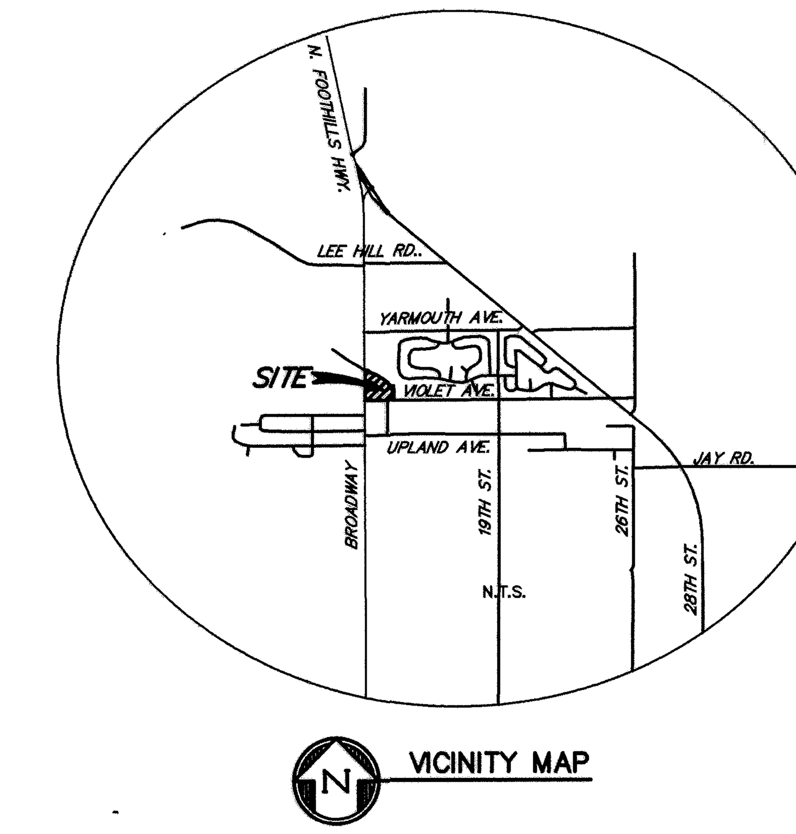
LINE	LENGTH	BEARING
L61	98.93'	S89°51'00"W
L62	75.39'	S89°52'05"W
L63	3.54'	S0°09'00"E
L64	5.25'	S0°09'00"E
L65	9.00'	S89°51'00"W
L66	5.25'	S0°09'00"E
L67	54.91'	S89°51'00"W
L68	4.57'	N0°09'00"W
L69	10.00'	S89°51'00"W
L70	16.61'	N0°09'00"W
L71	12.04'	N44°51'00"E
L72	6.51'	N0°09'00"W
L73	29.21'	S89°51'00"W
L74	10.00'	N0°09'00"W
L75	6.45'	S89°51'00"W
L76	10.00'	N0°09'00"W
L77	22.77'	S89°51'00"W
L78	92.21'	N0°09'00"W
L81	22.00'	N89°51'00"E
L82	107.32'	N0°09'00"W
L83	10.93'	S89°51'00"W
L84	8.19'	N0°09'00"W
L85	39.21'	S89°51'00"W
L86	115.51'	S0°09'00"E
L87	21.00'	N89°51'00"E
L88	11.96'	S0°09'00"E
L89	4.00'	N89°51'00"E
L90	10.00'	S0°09'00"E
L91	4.00'	S89°51'00"W
L92	97.31'	S0°09'00"E
L93	52.10'	N89°51'00"E
L94	20.82'	N68°33'54"E
L95	489.42'	N0°09'00"W

LAND USE TABLE

LOTS 1 & 2	MULTI FAMILY RESIDENTIAL		3.865 ACRES
OUTLOT A	PUBLIC ACCESS, UTILITIES, ACCESSWAYS, BIKEPATHS, PEDESTRIAN PATHWAYS, TRAILS, PARKS, DRAINAGE, FLOOD CONTROL		0.668 ACRES
DEDICATED RIGHT OF WAY	RIGHT OF WAY		0.124 ACRES
TOTAL			4.657 ACRES

OUTLOT TABLE

OUTLOT	AREA	OWNERSHIP	INTENDED USE
A	0.668 ACRES	OWNERS ASSOCIATION	DRAINAGE & PUBLIC ACCESS



VICINITY MAP

GENERAL NOTES

1. THE BASIS OF BEARINGS IS THE WEST LINE OF THE NW1/4 OF THE NW1/4 SECTION 18, TIN, R70W OF THE 6TH P.M., BEING MONUMENTED AS SHOWN HEREON, WITH THE LINE ASSUMED TO BEAR N00°09'00-W.
2. FOUND 1 1/2" ALUMINUM CAPS STAMPED ÐB & CO. LS 28657" AT ALL EXTERIOR BOUNDARY CORNERS OF THE SUBJECT PROPERTY UNLESS OTHERWISE NOTED.
3. DREXEL BARRELL & CO. RELIED UPON TITLE COMMITMENT NO. WCB0030212-2, ISSUED BY LAND TITLE GUARANTEE COMPANY, WITH AN EFFECTIVE DATE OF AUGUST 7, 2009 FOR ALL INFORMATION REGARDING THE LEGAL DESCRIPTION, EASEMENTS AND RIGHTS-OF-WAY.
4. THE ENTIRE SUBJECT PROPERTY IS WITHIN FLOOD ZONE AE PER LOMR 06-08-B289P, EFFECTIVE MARCH 28, 2007 AND IS SUBJECT TO CHANGE.

BASE FLOOD ELEVATIONS & ESTIMATED FLOW RATES

FOURMILE CANYON CREEK (2007 STUDY)		
CROSS-SECTION	WSEL (NAVD 88)	Q_{100} (cfs)
440.3	5526.16	3581
440.21	5525.86	3581
440.1	5525.52	3581
440	5523.53	3581
439	5520.78	3581
438.5	5516.07	3581
438	5513.61	3581
437.7	5511.56	3581
437.5	5510.22	3581

5. ALL REFERENCES TO BOOKS, PAGES, MAPS AND RECEPTION NUMBERS ARE PUBLIC DOCUMENTS ON FILE WITH THE CLERK AND RECORDER OF BOULDER COUNTY, STATE OF COLORADO.
6. THE LINEAL UNITS SHOWN HEREON ARE US SURVEY FEET.
7. THE LAST FIELD INSPECTION OF THE SITE WAS ON MARCH 20, 2012.
8. THE CITY OF BOULDER HAS DICTATED THAT EASEMENTS GRANTED TO PUBLIC SERVICE COMPANY AS RECORDED AS RECEPTION NO. 3215051 IN THE BOULDER COUNTY RECORDS NOT BE SHOWN HEREON. THESE EASEMENTS DO ENCUMBER THIS PROPERTY – SEE THE RECORDED DOCUMENT FOR THE LOCATIONS OF THESE EASEMENTS.

LENDER'S CONSENT AND SUBORDINATION

THE UNDERSIGNED, A BENEFICIARY UNDER A CERTAIN DEED OF TRUST ENCUMBERING THE PROPERTY, HEREBY EXPRESSLY CONSENTS TO AND JOINS IN THE EXECUTION AND RECORDING OF THIS SUBDIVISION PLAT, DEDICATION AND EASEMENTS SHOWN HEREON AND MAKES THE DEED OF TRUST SUBORDINATE HERETO. THE UNDERSIGNED REPRESENTS THAT HE OR SHE HAS FULL POWER AND AUTHORITY TO EXECUTE THIS LENDER'S CONSENT AND SUBORDINATION ON BEHALF OF THE LENDER STATED BELOW.

WELLS FARGO BANK, NATIONAL ASSOCIATION

BY: *Robert B. St. Cyr*
AUTHORIZED REPRESENTATIVE

ACKNOWLEDGMENT

STATE OF COLORADO)
COUNTY OF *Boulder*) SS

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFOR *Nov* 2012, BY *Robert B. St. Cyr* AS *[illegible]* WELLS FARGO BANK, NATIONAL ASSOCIATION.

WITNESS MY HAND AND OFFICIAL SEAL
MY COMMISSION EXPIRES *1-29-2014*

[signature]
NOTARY PUBLIC

SURVEYOR'S CERTIFICATE

I, MATHEW E. SELDERS, A DULY REGISTERED PROFESSION... THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS ... REFLECTS THE RESULTS OF A SURVEY MADE UNDER MY DIR... RESPONSIBILITY, SUPERVISION AND CHECKING IN ACCORDAN... REQUIREMENTS OF SECTION 38-51-106, C.R.S., AS AMENDE... AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIE...

MATHEW E. SELDERS
COLORADO LICENSED PROFESSI...
LAND SURVEYOR NO. 27275

DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT THE UNDERSIGNED, BEING THE OWNER OF THAT REAL PROPERTY SITUATED IN THE NORTHWEST QUARTER OF SECTION 18, TOWNSHIP 1 NORTH, RANGE 70 WEST OF THE 6TH P.M., IN THE COUNTY OF BOULDER, STATE OF COLORADO, DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, THENCE N00°09'00"W, 526.85 FEET ALONG THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18; THENCE S83°29'00"E, 40.78 FEET TO A POINT ON THE EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, SAID POINT ALSO BEING THE <u>TRUE POINT OF BEGINNING.</u>

THENCE S83°29'00"E, 128.96 FEET;

THENCE S67°07'00"E, 97.72 FEET;

THENCE S46°44'00"E, 133.39 FEET;

THENCE S64°35'00"E, 95.37 FEET;

THENCE S33°40'00"E, 142.15 FEET;

THENCE S85°42'00"E, 81.11 FEET TO A POINT 30.00 FEET WEST OF THE EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S00°07'00"E, 178.37 FEET ALONG A LINE 30.00 FEET WEST OF AND PARALLEL WITH SAID EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON THE NORTHERLY LINE OF VIOLET AVENUE, SAID POINT BEING 30.00 FEET NORTH OF THE SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S89°34'26"W, 560.21 FEET ALONG SAID NORTHERLY LINE OF VIOLET AVENUE AND ALONG A LINE 30.00 FEET NORTH OF AND PARALLEL WITH SAID SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON SAID EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18;

THENCE N00°09'00"W, 491.92 FEET ALONG SAID EASTERLY LINE OF NORTH BROADWAY AVENUE AND ALONG A LINE 40.50 FEET EAST OF AND PARALLEL WITH SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO THE <u>TRUE POINT OF BEGINNING.</u>

HAS CAUSED SAID PROPERTY TO BE LAID OUT, SURVEYED, SUBDIVIDED AND PLATTED UNDER THE NAME OF "VIOLET CROSSING SUBDIVISION", A SUBDIVISION IN THE CITY OF BOULDER, COUNTY OF BOULDER, STATE OF COLORADO, AND BY THESE PRESENTS DOES HEREBY GRANT, IN FEE, TO THE CITY OF BOULDER, FOR ITS USE AND THE USE OF THE PUBLIC FOREVER, THOSE PORTIONS OF SAID REAL PROPERTY DESIGNATED AS "14TH STREET" AS PUBLIC RIGHT-OF-WAY, AS SHOWN ON THE ACCOMPANYING PLAT. THE UNDERSIGNED DOES FURTHER GRANT TO THE CITY OF BOULDER THAT REAL PROPERTY DESIGNATED AS "UTILITY EASEMENT" ON THE ACCOMPANYING PLAT AS AN EASEMENT FOR THE CONSTRUCTION, INSTALLATION, OPERATION, MAINTENANCE, REPAIR AND REPLACEMENT FOR ALL SERVICES, INCLUDING WITHOUT LIMITING THE GENERALITY OF THE FOREGOING: TELEPHONE AND ELECTRIC LINES, WORKS, POLES, UNDERGROUND CABLES, GAS PIPELINES, WATER PIPELINES, SANITARY SEWER LINES, STREET LIGHTS, CULVERTS, HYDRANTS, DRAINAGE DITCHES AND DRAINS AND ALL APPURTENANCES THERETO. IT IS EXPRESSLY UNDERSTOOD AND AGREED BY THE UNDERSIGNED THAT ALL EXPENSES AND COSTS INVOLVED IN CONSTRUCTING AND INSTALLING WATER, PIPELINES AND APPURTENANCES, SANITARY SEWER WORKS AND LINES, GAS SERVICE LINES, ELECTRICAL SERVICE WORKS AND LINES, STORM SEWERS AND DRAINS, STREET LIGHTING, GRADING AND LANDSCAPING, CURBS, GUTTERS, STREET PAVEMENT, SIDEWALKS, AND OTHER SUCH UTILITIES AND SERVICES SHALL BE GUARANTEED AND PAID FOR BY THE SUBDIVIDER OR ARRANGEMENTS MADE BY THE SUBDIVIDER THEREFOR WHICH ARE APPROVED BY THE CITY OF BOULDER, AND SUCH SUMS SHALL NOT BE PAID BY THE CITY OF BOULDER, COLORADO, AND THAT ANY ITEM SO CONSTRUCTED OR INSTALLED AND ACCEPTED BY THE CITY OF BOULDER, COLORADO, SHALL BECOME THE SOLE PROPERTY OF THE CITY OF BOULDER, EXCEPT ITEMS OWNED BY MUNICIPALLY FRANCHISED OR PERMITTED UTILITIES, WHICH ITEMS, WHEN CONSTRUCTED OR INSTALLED, SHALL REMAIN THE PROPERTY OF THE OWNER OR THE PUBLIC UTILITY, AND SHALL NOT BECOME THE PROPERTY OF THE CITY OF BOULDER. THE UNDERSIGNED DOES FURTHER GRANT TO THE CITY OF BOULDER THAT REAL PROPERTY DESIGNATED AS "PUBLIC ACCESS EASEMENT" ON THE ACCOMPANYING PLAT AS AN EASEMENT FOR PUBLIC INGRESS AND EGRESS, AND FOR THE CONSTRUCTION, INSTALLATION, OPERATION, MAINTENANCE, REPAIR AND REPLACEMENT OF TRANSPORTATION IMPROVEMENTS AND LANDSCAPING AND APPURTENANCES THERETO. IT IS EXPRESSLY UNDERSTOOD AND AGREED BY THE UNDERSIGNED THAT ALL EXPENSES AND COSTS INVOLVED IN CONSTRUCTING AND INSTALLING SAID IMPROVEMENTS SHALL BE GUARANTEED AND PAID FOR BY THE SUBDIVIDER OR ARRANGEMENTS MADE BY THE SUBDIVIDER THEREFORE WHICH ARE APPROVED BY THE CITY OF BOULDER, AND SUCH SUMS SHALL NOT BE PAID BY THE CITY OF BOULDER, COLORADO, AND THAT ANY ITEM SO CONSTRUCTED OR INSTALLED AND ACCEPTED BY THE CITY OF BOULDER, COLORADO, SHALL BE BECOME THE SOLE PROPERTY OF THE CITY OF BOULDER.

THE UNDERSIGNED DOES FURTHER GRANT TO THE CITY OF BOULDER THAT REAL PROPERTY DESIGNATED AS "STORMWATER DETENTION, DRAINAGE AND UTILITY EASEMENT" ON THE ACCOMPANYING PLAT AS EASEMENT FOR STRUCTURES TO CONTAIN STORM RUN-OFF FROM THE SUBDIVISION AND VEHICULAR ACCESS BY CITY VEHICLES AND EQUIPMENT FOR INSPECTION AND CONSTRUCTION FOR STORMWATER IMPROVEMENTS AND FOR CONSTRUCTION AND GRADING ACTIVITIES ASSOCIATED WITH CITY'S CONSTRUCTION, MAINTENANCE AND RECONSTRUCTION OF 14TH STREET.

THE UNDERSIGNED DOES FURTHER GRANT TO THE CITY OF BOULDER THAT REAL PROPERTY DESIGNATED AS "OUTLOT A" ON THE ACCOMPANYING PLAT AS AN EASEMENT FOR A PUBLIC USE EASEMENT FOR ANY PUBLIC PURPOSE INCLUDING, BUT NOT LIMITED TO, AN EASEMENT FOR PUBLIC ACCESS PURPOSES, FOR PURPOSES OF INGRESS AND EGRESS, FOR PRESERVING, CONTROLLING AND PROTECTING OPEN SPACE AND SCENIC CONDITION, FOR THE PURPOSE OF THE INSTALLATION, CONSTRUCTION, REPAIR, MAINTENANCE, RECONSTRUCTION AND OPERATION OF UTILITIES, ACCESSWAYS, BIKEPATHS, PEDESTRIAN PATHWAYS, TRAILS, PARKS, DRAINAGE, FLOOD CONTROL CHANNEL, AND APPURTENANCE THERETO, TOGETHER WITH ALL RIGHTS AND PRIVILEGES AS ARE NECESSARY OR INCIDENTAL TO THE REASONABLE AND PROPER USE OF SUCH EASEMENT IN AND TO, OVER, UNDER AND ACROSS THE PROPERTY THAT IS DESCRIBED IN.

FOR THE APPROVAL OF "VIOLET CROSSING SUBDIVISIO... APPLY THERETO THIS_____DAY OF_____________,

NORTH BROADWAY CENTER, LLC,
A COLORADO LIMITED LIABILITY COMPANY

BY: *[signature]*
SOTERIOS PALMOS, AGENT

ACKNOWLEDGMENT

STATE OF COLORADO)
COUNTY OF *BOULDER*) SS

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFOR... 2012, BY SOTERIOS PALMOS, AS AGENT OF NORTH BROA... LIABILITY COMPANY.

WITNESS MY HAND AND OFFICIAL SEAL
MY COMMISSION EXPIRES *6/14/15*.

Evelyn Patricia Bowen
NOTARY PUBLIC

APPROVALS

[signature]
DIRECTOR OF PLANNING

[signature]
DIRECTOR OF PUBLIC WORKS AND UTILITIES

CITY MANAGER'S CERTIFICATE

IN WITNESS WHEREOF, THE SAID CITY OF BOULDER HAS CAUSED ITS SEAL TO BE HEREUNTO AFFIXED BY ITS CITY MANAGER THIS_____DAY OF_______________A.D. 2012.

ATTEST:

CITY CLERK　　　　CITY MANAGER

CLERK AND RECORDER'S CERTIFICATE

(ATE OF COLORADO)
) SS
(OUNTY OF BOULDER)

HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED IN MY OFFICE AT____O'CLOCK ____M., THIS_______DAY OF_______________, 2012, AND IS RECORDED AT ECEPTION #______________
EES PAID: $__________

LERK AND RECORDER　　　　DEPUTY

S:\S0419-8\Drawings\04198PL01.dwg, 11/7/2012 1:54:56 PM

CITY OF BOULDER
Planning and Development Services

1739 Broadway, Third Floor • P.O. Box 791, Boulder, CO 80306-0791
phone 303-441-1880 • fax 303-441-3241 • web boulderplandevelop.net

CITY OF BOULDER PLANNING DEPARTMENT
NOTICE OF DISPOSITION

You are hereby advised that the following action was taken by the Planning Department based on the standards and criteria of the Land Use Regulations as set forth in Chapter 9-12, B.R.C. 1981, as applied to the proposed development.

DECISION:	**APPROVED**
PROJECT NAME:	**Violet Crossing Subdivision**
DESCRIPTION:	**Subdivision of one lot into two lots along with Outlot A, and Dedicated Right-of-Way.**
LOCATION:	**4474 Broadway**
COOR:	**N10E03**
LEGAL DESCRIPTION:	**See attached Exhibit A**
APPLICANT:	**Terry Palmos**
OWNER:	**North Broadway Center LLC**
APPLICATION:	**Final Plat**
ZONING:	**MU-2 and RM-2**
CASE MANAGER:	**Elaine McLaughlin**

THIS IS NOT A SITE SPECIFIC DEVELOPMENT PLAN APPROVAL AND NO VESTED PROPERTY RIGHT IS CREATED BY THIS APPROVAL.

Approved On: APRIL 5, 2013
Date

By:

This decision may be appealed to the Planning Board by filing an appeal letter with the Planning Department within two weeks of the decision date. If no such appeal is filed, the decision shall be deemed final fourteen days after the date above mentioned.

Appeal to Planning Board expires: APRIL 19, 2013

CONDITIONS OF APPROVAL

1. The subdivision is approved subject to the terms of the Subdivision Agreement.

Exhibit A

A TRACT OF LAND LOCATED IN THE NW1/4 OF SECTION 18, T1N, R70W OF THE 6TH P.M., CITY OF BOULDER, COUNTY OF BOULDER, STATE OF COLORADO. BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, THENCE N00°09'00"W, 526.85 FEET ALONG THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18; THENCE S83°29'00"E, 40.78 FEET TO A POINT ON THE EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF THE WEST LINE OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18, SAID POINT ALSO BEING THE **TRUE POINT OF BEGINNING.**

THENCE S83°29'00"E, 128.96 FEET;

THENCE S67°07'00"E, 97.72 FEET;

THENCE S46°44'00"E, 133.39 FEET;

THENCE S64°35'00"E, 95.37 FEET;

THENCE S33°40'00"E, 142.15 FEET;

THENCE S85°42'00"E, 81.11 FEET TO A POINT 30.00 FEET WEST OF THE EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S00°07'00"E, 178.37 FEET ALONG A LINE 30.00 FEET WEST OF AND PARALLEL WITH SAID EAST LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON THE NORTHERLY LINE OF VIOLET AVENUE, SAID POINT BEING 30.00 FEET NORTH OF THE SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SAID SECTION 18;

THENCE S89°34'26"W, 560.21 FEET ALONG SAID NORTHERLY LINE OF VIOLET AVENUE AND ALONG A LINE 30.00 FEET NORTH OF AND PARALLEL WITH SAID SOUTH LINE OF THE SW1/4 OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO A POINT ON SAID EASTERLY LINE OF NORTH BROADWAY AVENUE, SAID POINT BEING 40.50 FEET EAST OF SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18;

THENCE N00°09'00"W, 491.92 FEET ALONG SAID EASTERLY LINE OF NORTH BROADWAY AVENUE AND ALONG A LINE 40.50 FEET EAST OF AND PARALLEL WITH SAID WEST LINE OF THE NW1/4 OF THE NW1/4 OF SECTION 18 TO THE **TRUE POINT OF BEGINNING.**

Address: 4474 Broadway

C I T Y O F B O U L D E R
PLANNING BOARD AGENDA ITEM

MEETING DATE: April 18, 2013

AGENDA TITLE: Public Hearing and Consideration of a Recommendation to City Council Regarding the Adoption of an Ordinance Amending Chapter 9-3 "Overlay Districts"; Chapter 9-9 "Development Standards"; and Section 9-16-1 "Definitions," B.R.C. 1981, to Protect Critical Facilities and Minimize Impacts to Lodging Facilities Located in the 500- and 100-year Floodplains

REQUESTING DEPARTMENT:
Public Works
Maureen Rait, Executive Director of Public Works
Jeff Arthur, Director of Public Works for Utilities
Bob Harberg, Utilities Engineering Project Management Coordinator
Heidi Schum, Public Works Development Review Manager
Annie Noble, Greenways Coordinator
Katie Knapp, Floodplain and Wetlands Administrator
Christie Coleman, Engineering Project Manager

OBJECTIVES:
1. Hear staff presentation
2. Hold public hearing
3. Planning Board discussion
4. Make a recommendation on the ordinance

SUMMARY

The risk of flash flooding is an important issue for the City of Boulder primarily due to its location at the mouth of Boulder Canyon and other canyon creeks. The city is affected by 15 drainageways and associated floodplains that cover approximately 25 percent of the city's area. The canyon creeks provide minimal warning time and therefore flash flooding creates a significant risk to life safety and property damage for the city. As a component of its comprehensive floodplain management program, the city is proposing a Critical Facilities Ordinance to develop emergency management plans and implement flood protection measures to help protect critical infrastructure and those people most vulnerable to flood hazards including the sick, elderly, and children. A map of the 500- and 100-year floodplains is included as **Attachment A**.

The following facility types are included in the proposed ordinance:

- Essential Service Facilities: examples include police stations, fire stations, hospitals, and utility plants
- At-risk Population Facilities: examples include nursing homes, schools, and daycares
- Hazardous Material Facilities: facilities with significant amounts of hazardous substances
- Hotels, motels, dormitories, bed and breakfasts, and hostels (Lodging Facilities)

The proposed Critical Facilities Ordinance requires that over time:

a) Lodging facility managers prepare and maintain emergency management plans, in consultation with a professional engineer or architect, which detail flood response procedures for guests that may be unaware of their potential risk and actions they need to take in an event.
b) Critical facility managers both prepare and maintain emergency management plans, in consultation with a professional engineer or architect, and implement flood protection measures for their buildings in order to help mitigate the impact from a flood event on their ability to continue operations and/or protect the population and environment from hazardous material spills.

Emergency management plans will be required when facilities request modifications requiring a floodplain permit or within a 10 year compliance window. These plans will be updated if a facility is changed or modified in association with a request for a floodplain permit. Flood protection measures for critical facilities will be required when the structure is expanded, when a new structure is built, or when an improvement increases the value of a structure by more than 50 percent. Hazardous material facilities will also implement flood protection measures when requesting a modification requiring a floodplain permit or within a 10 year compliance window.

Under the proposed ordinance, approximately 80 existing facilities will need to develop emergency management plans. Of those 80 facilities, approximately 40 critical facilities would also need to implement flood protection measures. A list of impacted facilities is included as **Attachment B**.

In 2011, the Water Resources Advisory Board (WRAB) and the Planning Board reviewed and considered a previous version of a Critical Facilities Ordinance and voted to recommend approval to City Council. City Council raised concerns mainly about the ordinance's potential impact on the business community. Since then, the following amendments have been made to address feedback from City Council and the public:

- Restaurants, theaters, and all assembly group uses have been removed from the ordinance requirements.
- Flexibility in flood protection methods was expanded by allowing structural floodproofing of residential facilities in the 500-year floodplain.

- The ordinance was restructured to better communicate its focus.
- A two-year compliance timeframe was added for completing levee modifications.

The purpose of this agenda item is for the Planning Board to consider a revised Critical Facilities Ordinance and to provide a recommendation to City Council. The proposed ordinance, shown in **Attachment C**, will revise the regulations under portions of the following sections of the B.R.C. 1981:

- Chapter 9-3 "Overlay Districts"
- Chapter 9-9 "Development Standards"
- Section 9-16-1 "Definitions"

BACKGROUND

Recent and historical flood events across the globe have demonstrated that flooding of critical infrastructure (such as fire stations and major utility installations) disrupts needed services, increases costs, and delays economic recovery. These situations have also highlighted the vulnerability of certain populations including the sick, elderly, and children who pose unique challenges for safe evacuation or shelter in place care. Another unique group of people who pose a special challenge to emergency managers are visitors who are likely unprepared and unaware of the best ways to react during a flood emergency.

The issue of additional protection standards for critical facilities has been discussed for over a decade by city officials, advisory boards, and City Council. The Colorado Water Conservation Board recently adopted floodplain regulations that encourage local communities to protect critical facilities in the 500-year floodplain and, which require communities to protect critical facilities to a higher standard than other structures in the 100-year floodplain in a manner consistence with the city's existing regulations. The National Flood Insurance Program (NFIP), through its Community Rating System (CRS), also lowers the cost of flood insurance for communities that proactively adopt and enforce floodplain ordinances, such as the proposed critical facilities ordinance, that reduce future flood damage. This cost reduction will be increasingly beneficial for Boulder flood insurance policy holders as the NFIP moves to an actuarially sound rate structure. Although the city has developed comprehensive floodplain regulations for general development, critical facilities and vulnerable populations deserve special consideration and regulation. Precedent for such consideration and regulation is available from the municipalities of Ann Arbor, Michigan, and Fort Collins, Colorado, among others.

The ideas and intentions behind the critical facilities ordinance have been articulated in several city planning documents including the Comprehensive Flood and Stormwater Master Plan, the Multi-hazard Mitigation Plan, and the Boulder Valley Comprehensive Plan (BVCP). More specifically, the BVCP states in Section 3.23 - Larger Flooding Events:

The city recognizes that floods larger then the 100-year event will occur resulting in greater risks and flood damage that will affect even improvements constructed with standard flood protection measures. The city will seek to better understand the impact of larger flood events and consider necessary floodplain management strategies including the protection of critical facilities.

The Boulder Office of Emergency Management (OEM) also supports the adoption of the critical facilities ordinance. Boulder County and the City of Boulder proactively relocated the Emergency Operations Center out of the floodplain in recognition of its importance as a critical facility. The availability of other critical facilities such as dispatch centers and fire stations is also important. Boulder OEM emphasizes that an effective emergency management program best serves a public that understands the local risks & vulnerabilities, knows how to identify when hazardous situations are developing, and can take appropriate protective actions in an emergency situation. Therefore, unique consideration of and protection measures for critical facilities, vulnerable populations, and visitors is recommended by implementing an ordinance that mitigates risk and requires appropriate emergency planning.

PUBLIC COMMENT AND PROCESS

The draft Critical Facilities Ordinance has been developed through a multiple-year public process and the ordinance has been modified in 2012-2013 to address feedback from the public and City Council. Care is being taken to ensure that outreach to the public and facility managers is completed as part of the development of the proposed ordinance. Impacted facility managers have been mailed notifications of the proposed ordinance and invited to attend a project open house and public hearings to provide feedback.

Initial Draft Ordinance:
The initial ordinance included a requirement for emergency management plans for mobile population facilities, like restaurants, hotels/motels, theaters, and other entertainment venues. This requirement was modified in response to City Council Feedback.

An open house was held on Aug. 24, 2010, to discuss ordinance options with the public and was attended by approximately 25 impacted facility managers. Three potential management options, ranging from requiring elevation for all critical facilities in the 500- and 100-year floodplain to allowing floodproofing or elevation of these facilities, were presented for feedback. Most comments focused on understanding the options and providing feedback on which option provided the best solution for the city. The option that received the most support was incorporated into the ordinance. Since the open house, staff continued to engage stakeholders through a variety of methods including:

- A presentation to the Boulder Chamber Community Affairs Council in October 2010
- A February 2011 spot on Channel 8's "Controversy and Consensus" show
- Project public hearing invitations sent to impacted facility managers from

2011 to the present
- A project website detailing ordinance information and meeting dates
- E-mail updates to interested members of the public
- Articles in the Boulder Daily Camera

Proposed Ordinance:
At a May 29, 2012, flood study session, City Council expressed support for continuing development of the ordinance but raised concerns mainly regarding the ordinance's potential impact on the business community. City Council provided the following feedback:

- Minimize impacts to nonprofits and small businesses
- Avoid conflicts between height restrictions and elevation requirements
- Structure ordinance to clearly reflect the impacted uses

The ordinance has since been updated, as noted in the Analysis section below. Since May 2012, key stakeholders and facility managers have been notified of ordinance changes and public hearing opportunities. In addition, the following meetings have since occurred:

- A presentation to the Planning and Development Services Advisors Group in October 2012
- A presentation to the Boulder Hotel Association in November 2012
- WRAB meeting discussions in December 2012 and March 2013

There was no public feedback at the December 2012 or March 2013 WRAB meetings.

RTD, Boulder County, and CU have also been informed of the ordinance, and they have been invited to provide feedback and attend public hearings. Additionally, staff is meeting with these groups to discuss the proposed ordinance and gain feedback. The feedback received to date has focused on understanding which of their facilities may be impacted, the proposed ordinance amendments, and the requirements and compliance triggers. Staff continues to coordinate with the Boulder Chamber and Boulder Hotel Association staff to inform organization members of the ordinance, public hearings, and ways to provide feedback.

Staff has also met with the city's Facilities and Fleet Manager to discuss the proposed ordinance amendments and requirements for city facilities. If adopted, the provisions of the ordinance will be incorporated into the Boulder Civic Area project. The Facilities and Asset Management Master Plan will also be updated to include the essential services facilities definition, and future facility improvements will incorporate the requirements of the proposed ordinance.

Two members of the public have expressed concern over the cost of developing emergency management evacuation plans. To address this issue, an evacuation plan template is being developed in order to convey the required elements, streamline the

development process, and reduce costs. Additional cost reduction measures will be reviewed during the project's implementation window.

ANALYSIS OF KEY ISSUES

Modifications to address City Council's feedback included the following:

- Impacts to nonprofits and small businesses were reduced by removing restaurants, theaters, and all assembly group uses, previously defined as Mobile Population Facilities, from the ordinance. The subset of Mobile Population Facilities still included in the ordinance has been renamed and now makes up the "Lodging Facilities" category. This subset was kept in the ordinance because it was deemed important to include emergency plans for people sheltering overnight in lodging facilities who may be unaware of the flood risk in Boulder.

- Potential conflicts between height restrictions and elevation requirements are avoided by allowing floodproofing for all facilities in the 500-year floodplain. Floodproofing is a series of modifications to a structure that make it more water tight in order to reduce or eliminate water infiltration and damage. Floodproofing does not require the elevation of buildings or additions. Without this amendment, residential facilities would have been required to provide flood protection through elevating buildings or additions. In some instances, this elevation could cause a building or addition to exceed the city's height restrictions, which could have required a reduction in the proposed number of floors.

- The ordinance was restructured to better communicate its focus. The previous versions of the ordinance added regulations governing the 500-year floodplain. While only a narrow list of regulated uses was identified, the structure of the ordinance created some perceptions that it had broad impacts. In the new draft ordinance, most critical facilities-related requirements have been moved to the "Development Standards" section of the B.R.C., 1981. The intent of this change is to clearly indicate the ordinance's narrow focus on specific critical uses as opposed to being a broad set of 500-year floodplain regulations.

An additional modification to the proposed ordinance was made at the request of a facility manager. The proposed ordinance was amended to allow critical facilities protected by 500-year floodplain levees and impacted by flood mapping changes to expand or be modified during a two-year compliance timeframe in which levee improvements are planned and constructed. Without this provision, flood protection measures would be required at the time of a building permit application for any expansion or modification. This requested modification was considered appropriate because of the substantial time required to design, permit, and construct levee improvements in response to flood mapping changes.

The revised ordinance proposes the following two requirements:

Flood Protection Requirements in the 500-year Floodplain

Facility Type	Protection Method	Compliance Triggers
• Essential Service • At-risk Population	Floodproof or elevate	New buildings, additions, substantial improvements[1] or modifications[2]
• Hazardous Material	Floodproof or elevate or contain chemicals[3]	Development requiring a floodplain permit or compliance within 10 years

1. Substantial improvements are improvements which equal or exceed 50 percent of the building's value.
2. Substantial modifications are expansions which equal or exceed 50 percent of the building's floor area.
3. Contain chemicals means securing hazardous materials in a manner that will prevent release during a flood.

Emergency Management Plan Requirements in the 500- and 100-year Floodplains

Facility Type	Strategy	Compliance Triggers
• Essential Service • At-risk Population • Hazardous Material • Lodging	Emergency Management Plan, including a shelter-in-place or evacuation plan, that meets certain requirements	Development requiring a floodplain permit or compliance within 10 years

Emergency Management Plans will be required to be developed in consultation with a professional engineer or architect and will detail evacuation routes to locations outside of the 500-year floodplain or methods of sheltering-in-place. Plans that focus on a shelter-in-place action, will be required to include a structural analysis to ensure the building can withstand floodwaters.

In the 100-year floodplain, facilities also still need to comply with existing flood protection requirements for all structure types. There are no existing requirements for emergency management plans in the 500- or 100-year floodplains.

Impacted Facilities:
The ordinance requirements would be processed through floodplain permit applications either as part of a requested facility modification or during a 10 year compliance window. Under the proposed ordinance, approximately 80 existing facilities are identified as needing emergency management plans. Of those 80 facilities, approximately 40 critical facilities would also need flood protection measures. A list of impacted facilities is included as **Attachment B.** The State of Colorado does not require flood protection of critical facilities in the 500-year floodplain for its agencies such as the University of Colorado or the Boulder Valley School District. The State of Colorado will have

discretion on the enforcement of the proposed ordinance for those facilities, but staff will work with facility mangers to seek voluntary compliance. Federal government agencies are directed to either avoid building in the 500-year floodplain or protect federal facilities to the 500-year water surface level, which is consistent with the proposed ordinance.

Most emergency management plans and flood protection measures will be implemented in association with expansions or modifications to the facility. Under this scenario, the cost of compliance will represent an incremental increase in already planned permitting and construction costs. An analysis of the costs of complying with the proposed ordinance has been developed and is presented in **Attachment D**. The proposed ordinance requires that evacuation plans be development by a professional engineer or architect who can provide the expertise needed to identify evacuation routes out of buildings and flood-prone areas. Those who choose to develop a shelter-in-place plan, will need to also provide a structural analysis conducted by a professional engineer. Costs for hiring professional engineers or architects to develop emergency management plans are expected to range from $3,325 for evacuation plans to $13,075 for shelter in place plans. Most facilities will complete evacuation plans; the exceptions likely being facilities in areas of deep and swift floods waters or facilities with populations that cannot evacuate quickly. Costs of flood protection measures are expected to range between $1.2 per square foot and $10 per square foot for raising the elevation of buildings. Costs will range between $4.5 per square foot and $85 per square foot for floodproofing. Flood protection measures are anticipated to cost $12 per square foot or less for most facilities.

Ordinance Effective Date:
Staff recommends that a six-month implementation window be added between the ordinance adoption date and the start of regulation, during which application processes will be updated and staff will continue to explore additional methods to reduce emergency management evacuation plan development costs for businesses and nonprofits. Some options being considered include grant assistance funding for small businesses and nonprofits or completing multiple evacuation plans at one time to get better unit costs.

STAFF RECOMMENDATION

Staff recommends that the Planning Board recommends to City Council adoption of an ordinance amending Chapter 9-3 “Overlay Districts”; Chapter 9-9 “Development Standards”; and Section 9-16-1 “Definitions,” B.R.C. 1981, to protect critical facilities and lodging facilities located in the 500- and 100-year floodplains against risk of flooding substantially as proposed in **Attachment C** to the staff memo.

NEXT STEPS

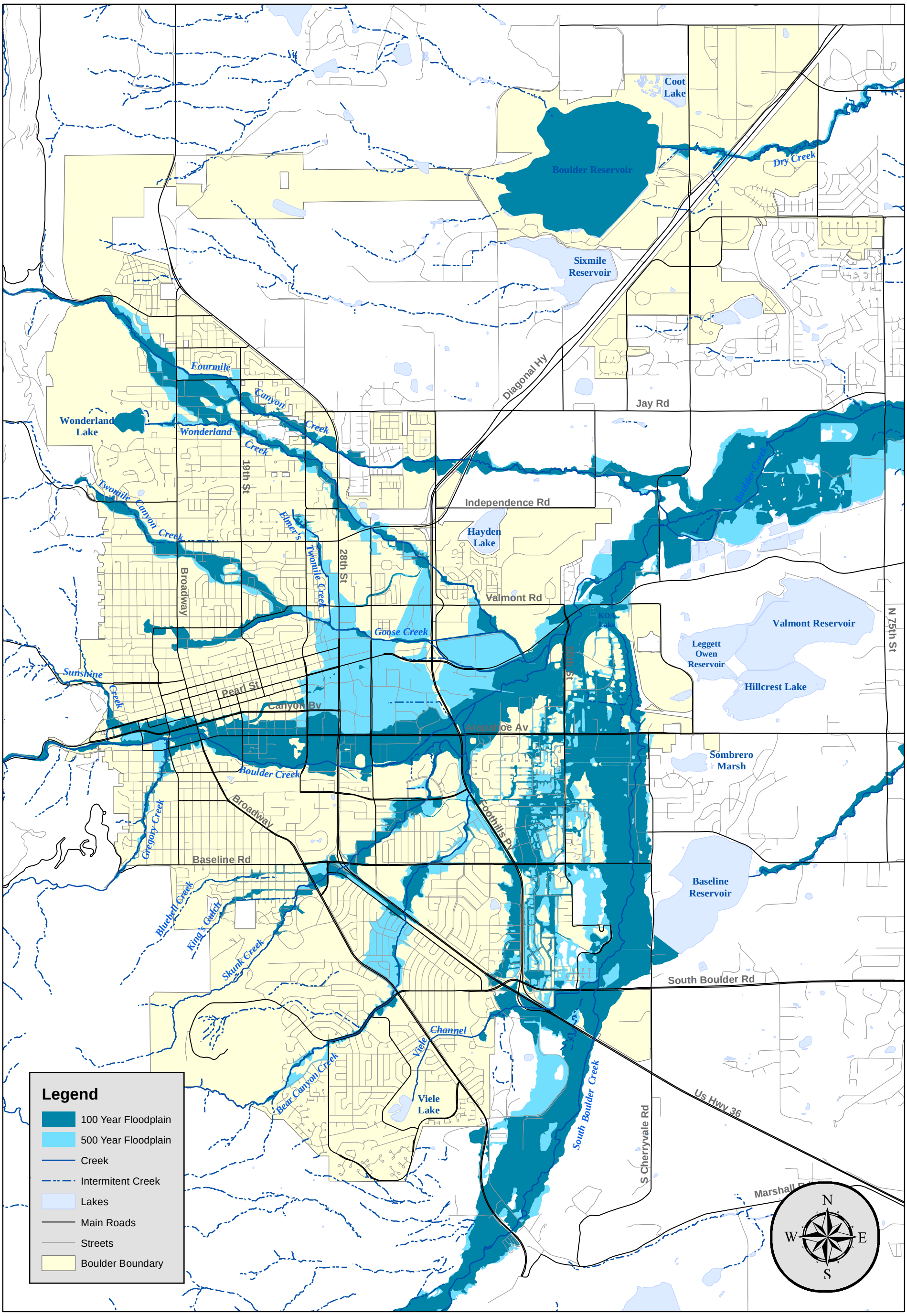
Pending the Planning Board’s recommendation, the ordinance is scheduled to be presented to City Council in June 2013.

If the ordinance is approved, the city’s Facilities and Asset Management Master Plan will

be updated to include the essential service facilities definition and methods to reduce the costs of emergency management evacuation plans will be reviewed. Staff will also work, in conjunction with the Office of Emergency Management, to provide education to facility managers on the requirements and implementation dates of the ordinance.

ATTACHMENTS

Attachment A: 500- and 100-year Floodplain Map
Attachment B: List of Existing Critical Facilities and Lodging Facilities
Attachment C: Critical Facilities and Lodging Facilities Ordinance
Attachment D: Cost Analysis



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City Of Boulder

100 & 500 Year Floodplains

List of Existing Critical Facilities and Lodging Facilities

500-year Floodplain

Name	Address	Facility Type	Creek
Boulder County Justice Center	1777 6th St	Essential Service	Boulder
Boulder Fire Station 7	1380 55th St	Essential Service	South Boulder
Police Annex	1500 Pearl St	Essential Service	Boulder
US West Communications	1545 Walnut St	Essential Service	Boulder
American Medical Response	3800 Pearl St	Essential Service	Goose
Boulder Community Foothills Hospital	4747 Arapahoe Ave	Essential Service	Boulder
Boulder County Clerk and Recorder	1750 33rd St	Essential Service	Boulder
Boulder Fire Station 5	4365 19th St	Essential Service	Fourmile Canyon
Boulder Sheriff	5600 Flatiron Parkway	Essential Service	Boulder
Public Safety Building	1805 33rd St	Essential Service	Boulder
Regional Transportation District	1707 Exposition Dr	Essential Service	Boulder
Municipal Service Center	5050 Pearl St	Essential Service	Goose
Xcel Boulder Terminal	2500 28th St	Essential Service	Goose
75th St Wastewater Treatment Facility	4049 N 75th St	Essential Service	Boulder
Eisenhower Elementary School	1220 Eisenhower Dr	At-risk Population	South Boulder
First Presbyterian Church	1820 15th St	At-risk Population	Boulder
September School	1902 Walnut St	At-risk Population	Boulder
September School (auditorium)	1833 19th St	At-risk Population	Boulder
Alterra Villas at the Atrium	3350 30th St	At-risk Population	Wonderland
Boulder County Head Start	2675 Mapleton Ave	At-risk Population	Goose
Boulder County Head Start (Martin Park)	3650 Martin Dr	At-risk Population	Bear Canyon
Canyon Pointe Housing	700 Walnut St	At-risk Population	Boulder
Columbine Elementary School	3130 Repplier St	At-risk Population	Twomile Canyon
Homestar Child Development Center	3280 Dartmouth Ave	At-risk Population	Bear Canyon
McGregor's Garden Preschool	3535 Eastman Ave	At-risk Population	Bear Canyon
Montessori Education Center of the Rockies	4745 Walnut St	At-risk Population	Boulder
Mountain Morning Preschool	1286 Sumac Ave	At-risk Population	Wonderland
New Horizons Cooperative Preschool	1825 Upland Ave	At-risk Population	Fourmile Canyon
Rallysport Health Club Day Care	2727 29th St	At-risk Population	Elmers Twomile
Shining Mountain Waldorf School	1179 Union Ave	At-risk Population	Fourmile Canyon
Sunflower Preschool	3340 Dartmouth	At-risk Population	Bear Canyon
Tiny Minders Day Care	3685 Martin Dr	At-risk Population	Bear Canyon
Comcast	3250 Walnut St	Hazardous Material	Boulder
Corden Pharma	2075 55th St	Hazardous Material	South Boulder
The Bradley Boulder Inn	2040 16th St	Lodging	Boulder
Boulder Best Western	770 28th St	Lodging	Skunk
Golden Buff Motel	1725 28th St	Lodging	Boulder
Residence Inn	3030 Center Green Dr.	Lodging	Wonderland
The Village Marriott	2660 Canyon Blvd	Lodging	Boulder

Notes:

1. New flood protection measures are required for listed essential service, at-risk population, and hazardous material facilities in the 500-year floodplain.
2. Emergency management plans are required for all listed facilities in the 500-year floodplain.
3. Blue fill denotes government facilities.

100-year Floodplain

Name	Address	Facility Type	Creek
Regional Transportation District	4920 Table Mesa Dr	Essential Service	South Boulder
Regional Transportation District Terminal	1800 14th St	Essential Service	Boulder
Atrium Building	1300 Canyon Blvd	Essential Service	Boulder
Boulder Building Maintenance	1720 13th St	Essential Service	Boulder
Boulder Community Hospital	1100 Balsam Ave	Essential Service	Goose
Boulder Fire Station 3	1585 30th St	Essential Service	Boulder
Boulder Medical Center	2750 Broadway	Essential Service	Goose
Boulder Municipal Building	1777 Broadway	Essential Service	Boulder
CU Research Center	3300 Marine St	Essential Service	Boulder
FBI	1050 Walnut #219	Essential Service	Boulder
New Britain Building	1101 Arapahoe Ave	Essential Service	Boulder
Park Central Building	1739 Broadway	Essential Service	Boulder
Countryside Montessori Preschool	5524 Baseline Rd	At-risk Population	South Boulder
Friend's School	5465 Pennsylvania Ave	At-risk Population	South Boulder
Take a Break at Frasier Meadows	4950 Thunderbird Dr	At-risk Population	South Boulder
Boulder Good Samaritan Center	2525 Taft Dr	At-risk Population	Boulder
Boulder High School	1604 Arapahoe Ave	At-risk Population	Boulder
Boulder Presbyterian Manor	1050 Arapahoe Ave	At-risk Population	Gregory Canyon
Boulder Waldorf Kindergarten	4072 N 19th	At-risk Population	Wonderland
City Assisted Housing on Arapahoe	951-53 Arapahoe Ave	At-risk Population	Gregory Canyon
Cottage School	805 30th St	At-risk Population	Skunk
Cottage School North	1301 North St	At-risk Population	Goose
Crest View Elementary School	1897 Sumac Ave	At-risk Population	Fourmile Canyon
CU Children's Center	2202 Arapahoe Ave	At-risk Population	Boulder
Dream Makers Preschool	1345 28th St	At-risk Population	Boulder
Flatirons Elementary School	1150 7th St	At-risk Population	Gregory Canyon
Foothills Elementary School	1001 Hawthorn Ave	At-risk Population	Twomile Canyon
Living School	1852 Arapahoe Ave	At-risk Population	Boulder
Patience Montessori	3600 Hazelwood Ct	At-risk Population	Wonderland
Shining Mountain Waldorf School	999 Violet Ave	At-risk Population	Fourmile Canyon
The Elm Tree	1330 Alpine Ave	At-risk Population	Goose
Wynwood at Ridge Point	3375 34th St	At-risk Population	Wonderland
Ball Aerospace	1600 Commerce St	Hazardous Material	Boulder
Athens Court Family Housing	2010 Athens St	Lodging	Boulder
Boulder University Inn	1632 Broadway St	Lodging	Boulder
Briar Rose Bed & Breakfast	2151 Arapahoe Ave	Lodging	Boulder
Homewood Suites	4950 Baseline Rd	Lodging	South Boulder
Marine Court Family Housing	1350 20th St	Lodging	Boulder
Millennium Harvest House	1345 28th St	Lodging	Boulder
Newton Court Family Housing	1475 Folsom St	Lodging	Boulder
Quality Inn & Suites Boulder Creek	2020 Arapahoe Ave	Lodging	Boulder
St. Julien Hotel	900 Walnut St	Lodging	Boulder

Notes:

1. Emergency management plans are required for all listed facilities in the 100-year floodplain.
2. Blue fill denotes government facilities.

ORDINANCE NO. _____

AN ORDINANCE AMENDING FLOODPLAIN REGULATIONS AND DEVELOPMENT STANDARDS IN ORDER TO PROTECT CRITICAL FACILITIES AND LODGING FACILITIES IN THE FIVE HUNDRED-YEAR FLOODPLAIN INCLUDING CHAPTER 9-3, "OVERLAY DISTRICTS," CHAPTER 9-9, "DEVELOPMENT STANDARDS," AND SECTION 9-16-1 "DEFINITIONS," B.R.C. 1981; AND SETTING FORTH RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Section 9-3-2, B.R.C. 1981 is amended to read:

9-3-2 Floodplains.

(a) Legislative Intent: The purpose of this section is to regulate certain areas of the city subject to flooding in order to protect the public health, safety, and welfare by:

(1) Restricting or prohibiting certain uses that are hazardous to life or property in time of flood;

(2) Restricting the location of structures intended for human occupancy and regulating the manner in which such structures may be built in order to minimize danger to human life within and around such structures;

(3) Requiring that those structures allowed in the floodplain be expanded or enlarged, and equipment and fixtures be installed or replaced, in a manner designed to prevent their being washed away and to assure their protection from severe damage;

(4) Regulating the method of construction and replacement of water supply and sanitation systems in order to prevent disease, contamination, and unsanitary conditions;

(5) Maintaining for public inspection available maps delineating areas subject to such provisions in order to protect individuals from purchasing or using lands for purposes that are not suitable[1];

(6) Protecting and preserving the water-carrying and water-retention characteristics and capacities of watercourses used for conveying and retaining floodwaters; and

(7) Obtaining and maintaining the benefits to the community of participating in the National Flood Insurance Program.

[1]The maps maintained by the city shall also delineate the five hundred-year floodplain for purposes of section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981.

(b) Flooding May Occur: The degree of flood protection provided by the terms of this section has been determined to be reasonable for regulatory purposes. Floods of greater magnitude will occur, and flood heights may be increased as a result of natural or human-made causes. The provisions of this section do not imply that areas outside of the floodplain or land uses permitted within the floodplain are free from flooding, flood hazard, or flood damages. A grant or approval by the city under the requirements of this section does not constitute a representation, guarantee, or warranty of any kind or nature by the city or any city official or employee of the practicability or safety of any structure or proposed use, and it creates no liability to or cause of action against the city or any city official or employee for any damages from flood or otherwise that may result from such structure or use.

(c) Scope and Application:

(1) The requirements of this section supplement those imposed on the same lands by any underlying zoning provisions of this code or other ordinance of the city. The city has also adopted development standards for critical facilities and lodging facilities located within the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981. If there is a conflict between such requirements, the more restrictive controls.

(2) If a lot or parcel of land lies partly within the high hazard zone or the conveyance zone, ~~or the flood fringe area~~ or the one hundred-year floodplain, the part(s) of such lot or parcel lying within such area or areas shall meet all the standards and requirements of such respective area as prescribed by this section. For the purposes of new construction, if any portion of a structure lies partly within the high hazard zone, ~~or~~ the conveyance zone~~,~~ or the one hundred-year floodplain~~or the flood fringe area~~, all the standards and requirements of this section shall apply to the entire structure.

(3) If lands located outside the city limits are included within the one hundred-year floodplain~~, the flood fringe~~, the conveyance zone or the high hazard zone, the requirements of this section shall apply to such lands upon annexation.

(d) Administration: The city manager shall administer the requirements of this section and shall:

(1) Determine that the requirements of this section have been met before issuing any permit for development in the floodplain;

(2) Obtain and maintain for public inspection any certificates of floodproofing required by this section, and any information on the elevation (in relation to mean sea level) of the level of the lowest floor (including basement) of all new or substantially improved structures, and information specifying whether or not such structures contain a basement, and if the structure has been floodproofed, the elevation (in relation to mean sea level) to which the structure was floodproofed;

(3) Notify Boulder County and the Colorado Water Conservation Board before permitting any change in a watercourse and submit evidence of such notice to FEMA;

(4) Adopt rules interpreting and implementing the requirements of this section including, without limitation, application procedures for floodplain development permits and specifications for the floodproofing of structures, substantial improvements, and utilities;

(5) Assure that the Boulder Valley Comprehensive Plan is consistent with the floodplain management objectives of this section and the regulations of FEMA;

(6) Make necessary interpretations of the exact location of the boundaries of the floodplain, ~~the flood fringe,~~ the conveyance zone and the high hazard zone;

(7) Amend the boundaries of the high hazard zone and the conveyance zone pursuant to subsection (f) of this section;

(8) Determine that all necessary permits have been obtained from state, federal, or local agencies the approval of which is required before issuing any permit for development in the floodplain;

(9) Require that persons changing a watercourse maintain the watercourse so that its flood carrying capacity is not diminished;

(10) Require that new and replacement water supply systems in the floodplain be designed to minimize or eliminate infiltration of floodwaters into the systems;

(11) Require that new and replacement sanitary sewage systems within the floodplain be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters;

(12) Require that on-site waste disposal systems be located to avoid impairment to them or contamination from them during flooding; and

(13) Obtain, review, and reasonably utilize any ~~base~~ flood elevation and floodway data available from federal, state, and other sources, including data developed pursuant to chapter 9-12, "Subdivision," B.R.C. 1981, as criteria for requiring that all new development meet the requirements of this section.

(e) Appeals: Any person contesting the city manager's interpretation of a boundary location under paragraph (d)(6) of this section, or any person aggrieved by the granting or denial of a floodplain development permit, may appeal such determination to the planning board through the process described in section 9-4-4, "Appeals, Call-Ups And Public Hearings," B.R.C. 1981. The request shall set forth the reason and basis for the appeal and such other information as the manager may prescribe by rule.

(f) Map Amendments: As watercourse or flood channel improvements or mapping corrections are made, the city manager may amend the flood regulatory area maps to recognize the changed conditions produced by such improvements or corrections provided that no such amendments or corrections may change a FEMA "area of special flood hazard" or "regulatory floodway" unless the city is in receipt of a letter of map amendment or a letter of map revision issued by FEMA.

(g) Flood Regulatory Areas:

(1) The provisions of this section apply to the area shown as floodplain on the most recent maps adopted by the city council, as amended from time to time by the city manager pursuant to subsections (d), (e), and (f) of this section. The regulatory floodplain encompasses the one hundred-year floodplain, ~~the flood fringe,~~ the conveyance zone, and the high hazard zone. The following regulations governing each portion of the floodplain are cumulative and not exclusive.

(2) In addition to the regulatory areas identified in paragraph (g)(1) of this section, the city has adopted the areas of special flood hazard identified in the Flood Insurance Study for Boulder County, effective December 18, 2012, and delineated on the Flood Insurance Rate Map for Boulder County and the City of Boulder as adopted by the city in compliance with 44 C.F.R. chapter 1. In no event will the regulations contained in this section be interpreted to permit any action not permitted under those regulations promulgated by FEMA for the regulation of areas of special flood hazard and regulatory floodways.

(3) The city has also adopted development standards for critical facilities and lodging facilities located within the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981. The regulations governing critical facilities and lodging facilities are supplemental to the following requirements in the flood regulatory areas.

Section 2. Section 9-3-3, B.R.C. 1981 is amended to read:

9-3-3 Regulations Governing the Floodplain.

(a) General Provisions: In the entire one hundred-year floodplain, the following standards apply:

(1) Floodplain Development Permit: Except as specified in subsection 9-3-6(a), "Activities Exempt From A Floodplain Development Permit," B.R.C. 1981, ~~paragraph (a)(1)(A),~~ no development in the floodplain may occur prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

~~(A) Activities exempt from a floodplain development permit: The following activities are allowed within the flood regulatory area and do not require a floodplain development permit:~~

~~(i) "Maintenance" as defined in chapter 9-16 "Definitions" that do not constitute a substantial improvement and do not affect the efficiency or capacity of the conveyance zone or high hazard zone.~~

~~(ii) Sidewalks, concrete, asphalt or stone flatwork that does not result in the establishment or expansion of parking areas and does not modify existing grade by more than six inches.~~

~~(iii) Underground utilities that do not modify existing grade.~~

~~(iv) Poles, lines, cables, sign posts, landscaping and artwork that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.~~

~~(v) Temporary facilities that are not permanently attached to the ground such as tents, traffic control devices and lawn furniture provided that they will not affect the efficiency or capacity of the conveyance zone or high hazard zone, or they will remain in place for no more than 30 days.~~

(2) Anchoring:

(A) All new construction and substantial improvements or substantial modifications shall be anchored to prevent flotation, collapse, or lateral movement of the structure and be capable of resisting the hydrostatic and hydrodynamic loads.

(B) All manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement and capable of resisting the hydrostatic and hydrodynamic loads. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties connecting to permanent ground anchors, in addition to any anchoring requirements for resisting wind forces and any tie-down requirements of chapter 10-12, "Mobile Homes," B.R.C. 1981. Requirements shall include, without limitation, the following:

(i) Over-the-top ties shall be provided at each of the four corners of the manufactured homes. For manufactured homes fifty feet or longer, two additional ties per side are required at intermediate locations. For manufactured homes less than fifty feet long, one additional tie per side is required;

(ii) Frame ties shall be provided at each of the four corners of the manufactured homes. For manufactured homes fifty feet or longer, five additional ties per side are required at intermediate points. For manufactured homes less than fifty feet long, four additional ties per side are required;

(iii) All components of the anchoring system shall be capable of carrying a force of four thousand eight hundred pounds; and

(iv) Any additions to manufactured homes shall be similarly anchored.

(3) Construction Materials and Methods:

(A) All new construction, substantial improvements, and substantial modifications shall be constructed with materials and utility equipment resistant to flood damage as outlined in the most current FEMA Technical Document on ~~2-93,~~ Flood-Resistant Materials Requirements.

(B) All new construction, substantial improvements, and substantial modifications shall be constructed using methods and practices that minimize flood damage.

(C) All new construction, substantial improvements and substantial modifications shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and located (by elevating or floodproofing the components) so as to prevent water from entering or accumulating within the components during flooding conditions.

(4) Utilities:

(A) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.

(B) All new and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters.

(C) On-site waste disposal systems shall be located to avoid impairment or contamination during flooding.

(5) Subdivision Proposals:

(A) All subdivision proposals shall demonstrate efforts to minimize flood damage.

(B) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.

(C) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.

(D) Base flood elevation data shall be provided for subdivision proposals and other proposed development.

(E) No subdivision proposal shall create a lot which is unbuildable pursuant to this section.

~~(6) Floodproofing: Whenever this section requires a building or structure to be floodproofed, the following standards shall be met:~~

~~(A) Such building or structure shall be floodproofed in accordance with any rules for floodproofing promulgated by the city manager pursuant to chapter 1-4, "Rulemaking," B.R.C. 1981, and with current FEMA National Flood Insurance Program (NFIP) Technical Bulletins;~~

~~(B) Such building or structure shall be floodproofed to the flood protection elevation in such a manner that the building or structure is watertight with walls substantially impermeable to the passage of water and in a manner requiring no human intervention;~~

~~(C) uch building or structure shall have structural components capable of resisting projected hydrostatic and hydrodynamic loads and the effects of buoyancy; and~~

~~(D) Such floodproofing shall be certified by a Colorado registered professional engineer or registered architect to comply with this paragraph. Such certifications shall be provided to the city manager as set forth in paragraph 9-3-2(d)(2), B.R.C. 1981.~~

(6~~7~~) Hazardous Materials: No person shall store a hazardous substance at or below the flood protection elevation for the area of the floodplain in which it is located, except for the storage of fuel~~gasoline~~ in existing and replacement underground tanks in existing ~~gasoline~~ fueling service stations and service garages, which tanks are designed to prevent infiltration and discharge into floodwaters and which are adequately anchored and shielded against rupture. For purposes of this paragraph, "existing" means in place and in use on January 1, 1989.

(7~~8~~) Automobile Parking: Notwithstanding other provisions of this title, no person shall establish an area for automobile parking in any portion of the floodplain where flood depths exceed eighteen inches.

(8~~9~~) Flood Warning System: No owner of a hotel, a motel, a dormitory, a rooming house, a hostel, a school, a bed and breakfast, a daycare center, a group home, or a residential or congregate care facility located in the Boulder Creek floodplain shall fail to provide a flood warning system approved by the city manager that is connected to a point of central communication in the building with twenty-four-hour monitoring. No such person shall fail to maintain such a flood warning system.

(9~~10~~) Rental Property: No owner of property that is located in ~~a~~the floodplain and subject to a city rental license under chapter 10-3, "Rental Licenses," B.R.C. 1981, shall fail to post on the exterior of the premises at the entrance a sign approved by the city manager stating that the property is subject to flood hazard and containing such further information and posted at such other locations inside the building as the city manager may require.

(10~~1~~) Manufactured Housing: All manufactured homes placed in the city after July 1, 1989, and all manufactured homes which are substantially improved or substantially modified shall be elevated on a permanent foundation so that the lowest floor of the manufactured home is at or above the flood protection elevation and is securely anchored to an adequately anchored foundation system, and shall meet the anchorage and tie-down requirements of paragraph (a)(2) of this section.

(11~~2~~) Recreational Vehicles: In order to reduce debris and hazard potential, recreational vehicles shall either: a) be in the floodplain for fewer than one hundred eighty consecutive days, b) be fully licensed and ready for highway use, or c) meet the permit requirements and elevation and anchoring requirements for manufactured homes.

(12~~3~~) Structure Orientation: In order to minimize the obstruction to flow caused by buildings, to the extent consistent with other city policies regarding solar access, new structures shall be placed with their longitudinal axes parallel to the predicted direction of flow of floodwaters or be placed so that their longitudinal axes are on lines parallel to those of adjoining structures.

(13~~4~~) Existing Uses: The use of any land or structure that was lawful before the application of this section or any amendment thereto but that does not conform to the requirements of this section may be continued subject to the requirements of this section. If such a use not conforming to the requirements of this section is discontinued for twelve consecutive months, no person shall use the land or structure thereafter unless such use conforms to the requirements of this section.

(14~~5~~) New Uses: All uses allowed by the underlying zoning district may be established, subject to the requirements of this section, except for the outdoor or uncontained storage of moveable objects below the flood protection elevation.

(15~~6~~) Existing Structures: Any structure in existence before the enactment of this section or any amendment thereto that does not conform to the requirements of this section may remain or may undergo rehabilitation subject to the requirements of this section. Further, any such structure may be otherwise improved as follows:

(A) Any person making an expansion or an enlargement to an existing residential structure shall elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation.

(B) Any person making an expansion or an enlargement to an existing nonresidential structure shall floodproof or elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation.

(C) Any person making a substantial modification or a substantial improvement to any existing nonresidential structure shall floodproof or elevate the lowest floor, including the basement, of the substantially modified or improved portion to or above the flood protection elevation and shall floodproof the remainder of the existing structure.

(D) Any person making a substantial modification or a substantial improvement to any existing residential structure shall elevate the lowest floor, including the basement, of the entire residential structure to or above the flood protection elevation.

(16~~7~~) New Structures: Construction of new structures shall meet the following requirements:

(A) Any person constructing a new residential structure shall elevate the lowest floor, including the basement, to or above the flood protection elevation;

(B) Any person constructing a new nonresidential structure shall floodproof in a manner requiring no human intervention or elevate the lowest floor, including the basement, to or above the flood protection elevation with the following exceptions:

(i) Open air carwashes;

(ii) Unheated pavilions;

(iii) Unfinished or flood resistant building entryways or access areas;

(iv) Garden storage sheds;

(v) Sidewalks, paving, or asphalt, concrete, or stone flatwork;

(vi) Fences; and

(vii) Poles, lines, cables, or other transmission or distribution facilities of public utilities.

(C) Any person constructing a new structure on a property removed from the one hundred-year floodplain through a FEMA Letter of Map Revision Based on Fill (LOMR-F) shall protect the lowest floor, including the basement, to or above the flood protection elevation that existed before placement of fill, as follows:

(i) Residential structures: by elevating the structure; or

(ii) Non-residential structures: by elevating or floodproofing the structure.

Solely for the purposes of this subparagraph (a)(17)(C), previously designated floodplain areas that have been removed from the one hundred-year floodplain through a LOMR-F shall be considered to be within the floodplain. No person shall construct a new structure subject to this subparagraph (a)(17)(C) prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

(17~~8~~) Enclosures: Enclosures below the lowest floor that are unfinished or flood resistant, usable solely for parking of vehicles, crawl spaces, building access or storage, in an area that is not a basement, and that are not floodproofed as set forth in this section shall meet the following requirements:

(A) Compliance with the provisions of paragraphs (a)(2), (a)(3), and (a)(4) of this section; and

(B) Design and construction that automatically equalizes hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

(i) Designs for meeting this requirement shall meet or exceed the following minimum criteria: a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(ii) Any designs not in conformance with subparagraph (a)(18)(B)(i) of this section, shall be sealed and certified by a registered professional engineer or licensed architect and shall conform with

the most current FEMA Technical Bulletin on~~1-93,~~ Openings in Foundation Walls.

(C) Fully enclosed areas below the lowest floor subject to this provision include the following:

(i) Residential garages placed at or above grade;

(ii) Enclosures or vestibules that are attached to structures and that are utilized for storage or entryways;

(iii) Crawl spaces; and

(iii) Outdoor pavilions and patio enclosures with removable walls not located in the high hazard zone.

(18~~9~~) Below Grade Crawl Space Construction: New construction, expansion or enlargement, substantial improvement and substantial modification of any below grade crawl space shall meet the following requirements:

(A) Interior grade elevation that is below the base flood elevation shall be no lower than two feet below the lowest adjacent grade;

(B) The height of the below grade crawl space measured from the interior grade of the crawl space to the top of the foundation wall shall not exceed four feet at any point;

(C) Adequate drainage systems shall allow floodwaters to drain from the interior area of the crawl space following a flood; and

(D) The provisions of paragraphs (a)(2), (a)(3), (a)(4) and (a)(1~~8~~7) of this section shall be complied with.

Section 3. Section 9-3-4, B.R.C. 1981 is amended to read:

9-3-4 Regulations Governing the Conveyance Zone.

In the conveyance zone, the following standards apply:

(a) The provisions of section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981.

(b) The provisions of section 9-3-5, "Regulations Governing the High Hazard Zone," B.R.C. 1981, if the land is also located in the high hazard zone.

(c) All uses allowed under the provisions of section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981, if they are not prohibited by the underlying zoning district or any ordinance of this city, may be established except that no person shall establish or change any use that results in a rise in the elevation of the one hundred-year flood.

(d) All structures allowed under section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981, may be established except that no person shall:

(1) Place any structure in the conveyance zone that will result in any rise in the elevation of the one hundred-year flood; or

(2) Place any obstruction in the conveyance zone, except a device reasonably necessary for flood management if the device is designed and constructed to minimize the potential hazards to life and property.

(e) No person shall carry out any other development that results in a rise in the elevation of the one hundred-year flood.

(f) Localized rises within flood channels or on a specific parcel that is being developed are permissible, if there is no adverse impact on nearby properties and there is no increase in the average water surface elevations along the cross sections of the floodplain.

(g) Localized rises on land owned or controlled by a government, or governmental subdivision or agency or within public drainage or flood control easements are permissible, if the following requirements have been satisfied:

(1) The applicant has necessary property interests or permission to use land to allow the increase in any water surface elevation or there is no adverse impact to such land;

(2) There are no insurable structures under the FEMA National Flood Insurance Program affected by the localized rise;

(3) The applicant minimizes the amount of the localized rise in a flood elevation; and

(4) The applicant complies with all necessary FEMA requirements, including without limitation, obtaining a Conditional Letter of Map Revision (CLOMR) prior to development and a Letter of Map Revision (LOMR) upon completion of a project causing a localized rise in a flood elevation.

Section 4. Section 9-3-5, B.R.C. 1981 is amended to read:

9-3-5 Regulations Governing the High Hazard Zone.

In the high hazard zone of the floodplain, the following standards apply:

(a) The provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981.

(b) The provisions of section 9-3-4, "Regulations Governing The Conveyance Zone," B.R.C. 1981, if the land is also located in the conveyance zone.

(c) All uses allowed under the provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981, if they are not prohibited by the underlying zoning district or any other ordinance of the city, may be established, except that no person shall:

(1) Change the use of an existing structure intended for human occupancy from a nonresidential use to a residential use or use as a school, daycare center, group home, residential care facility, or congregate care facility.

(2) Establish any new parking lot for motor vehicles.

(3) Establish any campground.

(d) All structures allowed under the provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981, may be established, except that no person shall:

(1) Construct or place any new structure intended for human occupancy.

(2) Expand, enlarge, or make a substantial modification or substantial improvement to any existing structure intended for human occupancy. Notwithstanding this provision, a person may reconstruct a non-flood-damaged structure or portion thereof, which otherwise does constitute a substantial improvement, under the provisions of subparagraphs 9-3-3(a)(1~~6~~5)(C) and (a)(1~~6~~5)(D), B.R.C. 1981.

(e) Unconditioned, unenclosed building elements such as balconies, awnings, and roof overhangs may extend up to four feet into the high hazard zone if completely located above the flood protection elevation and the remainder of the structure complies with this chapter.

Section 5. Section 9-3-6, B.R.C. 1981 is amended to read:

9-3-6 Floodplain Development Permits.

(a) Activities Exempt from a Floodplain Development Permit: The following activities are allowed within the flood regulatory areas and do not require a floodplain development permit:

(1) "Maintenance" as defined in chapter 9-16, "Definitions," B.R.C. 1981 that do not constitute a substantial improvement, or a modification to an existing hazardous material facility that exceeds 25 percent market value of the existing structure before the start of construction, and that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.

(2) Sidewalks, concrete, asphalt or stone flatwork that does not result in the establishment or expansion of parking areas and does not modify existing grade by more than six inches.

(3) Underground utilities that do not modify existing grade.

(4) Poles, lines, cables, sign posts, landscaping and artwork that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.

(5) Temporary facilities that are not permanently attached to the ground such as tents, traffic control devices and lawn furniture provided that they will not affect the efficiency or capacity of the conveyance zone or high hazard zone, or they will remain in place for no more than 30 days.

~~(a)~~(b) An applicant for a floodplain development permit shall pay the fee prescribed by section 4-20-44, "Floodplain Development Permits And Flood Control Variance Fees," B.R.C. 1981, and shall complete an application form provided by the city manager that shall include, without limitation, the following:

(1) The written consent of the owners of all property subject to the development request;

(2) A written statement addressing the criteria for approval;

(3) ~~A surface view plan showing elevations and contours of the ground; pertinent structures, fill, and storage elevations; sizes, locations, and spatial arrangements of all proposed, anticipated, and existing structures on the site; location and elevations of streets, water supplies and sanitary facilities; and soil types; and~~

An applicant for a critical facility pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, shall indicate whether the facility will contain hazardous material. If the facility will contain hazardous material, the application must include information on the location of the hazardous material and how the hazardous material will be secured to prevent its release during a five hundred-year flood event.

(4) ~~Specifications for building construction and materials, filling, dredging, grading, channel improvements and changes, storage of materials, water supply, and sanitary facilities.~~ An applicant for a critical facility or lodging facility in the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, shall provide a copy of the emergency management plan for the facility meeting the requirements of section 9-9-23(d).

(c~~b~~) The manager may require the applicant to furnish additional information and details deemed necessary to evaluate the effects of the proposed construction upon the floodplain, including, without limitation:

(1) A surface view plan showing elevations and contours of the ground; pertinent structures, fill, and storage elevations; sizes, locations, and spatial arrangements of all proposed, anticipated, and existing structures on the site; location and elevations of streets, water supplies and sanitary facilities; and soil types; and

(2) Specifications for proposed building construction and materials, filling, dredging, grading, channel improvements and changes, storage of materials, water supply, and sanitary facilities.

(3)~~(1)~~ Valley cross sections showing the floodplain surrounding the watercourse, cross sections of the area to be occupied by the proposed development, and one hundred-year flood maximum water surface elevation information; and for critical facilities and lodging facilities, the five hundred-year maximum water surface elevation information pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981;

(4~~2~~) A profile showing the slope of the bottom of the channel or thalweg of the watercourse;

(5~~3~~) A floodplain analysis by a Colorado registered professional engineer of the flood profile, elevation, and velocity, using methodology acceptable to FEMA, including existing and anticipated uses and making a determination that the

proposed construction or development will not cause a rise in the elevation of the water surface of a one hundred-year flood;

(6~~4~~) A structural analysis by a Colorado registered professional engineer showing that any proposed structures will be adequately designed and constructed to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy and scouring.

(d~~c~~) When reviewing an application for a permit, the city manager shall determine which portion or portions of the floodplain are affected by the particular development request and shall then apply the provisions of sections 9-3-2, "Floodplains," 9-3-3, "Regulations Governing The Floodplain," 9-3-4, "Regulations Governing the Conveyance Zone," ~~and~~ 9-3-5, "Regulations Governing the High Hazard Zone," and 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, as applicable. The manager also shall determine whether the application meets the intent of this chapter prescribed by subsection 9-3-2(a)~~, B.R.C. 1981~~, and the intent of section 9-9-23 as prescribed by subsection 9-9-23(a), B.R.C. 1981, after considering the following factors:

(1) The effects upon the efficiency or capacity of the conveyance zone and high hazard zone;

(2) The effects upon lands upstream, downstream, and in the immediate vicinity;

(3) The effects upon the one hundred-year flood profile;

(4) The effects upon any tributaries to the main stream, drainage ditches, and any other drainage facilities or systems;

(5) Whether additional public expenditures for flood protection or prevention will be required;

(6) Whether the proposed use is for human occupancy;

(7) The potential danger to persons upstream, downstream, and in the immediate vicinity;

(8) Whether any proposed changes in a watercourse will have an adverse environmental effect on the watercourse, including, without limitation, stream banks and streamside trees and vegetation;

(9) Whether any proposed water supply and sanitation systems and other utility systems can prevent disease, contamination, and unsanitary or hazardous conditions during a flood;

(10) Whether any proposed facility and its contents will be susceptible to flood damage and the effect of such damage;

(11) The relationship of the proposed development to the Boulder Valley Comprehensive Plan and any applicable floodplain management programs;

(12) Whether safe access is available to the property in times of flood for ordinary and emergency vehicles;

(13) Whether the applicant will provide flood warning systems to notify floodplain occupants of impending floods;

(14) Whether the cumulative effect of the proposed development with other existing and anticipated uses will increase flood heights; and

(15) Whether the expected heights, velocities, duration, rate of rise, and sediment transport of the floodwaters expected at the site will adversely affect the development or surrounding property.

(e~~d~~) If the city manager determines that the applicant meets the purposes and requirements of this chapter, the manager shall issue the permit and may attach such conditions as deemed necessary to further the purposes of this chapter.

(f~~e~~) A permit issued on or after April 7, 1985, expires three years after its date of issuance, if the permittee has not commenced construction under the permit. The term "commenced construction" shall mean the first placement of permanent construction of a structure on a site, such as the pouring of slabs or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation; but does not include land preparation, grading and filling, or installation of streets or sidewalks.

(g~~f~~) No person who has obtained a permit shall fail to construct in accordance with their approved application and design.

(h~~g~~) Floodplain development permits that allow for development in the conveyance zone or the high hazard zone, or which will involve a change of watercourse, shall be decided by the city manager. The decision of the city manager shall be subject to call-up by the planning board, or appeal by any aggrieved party to the planning board, subject to the call-up and appeal procedure of section 9-4-4, "Appeals, Call-Ups And Public Hearings," B.R.C. 1981.

(i~~h~~) A floodplain development permit for any of the following items is effective upon the date of its issuance:

(1) Sidewalks, parking lots, or other concrete, asphalt, or stone flatwork that do not modify existing grade;

(2) Uninhabited overhead structural projections, no portion of which extends below the flood protection elevation; or

(3) Rehabilitation of an existing structure in accordance with the definitions in chapter 9-16, "Definitions," B.R.C. 1981. In addition, for properties in the high hazard zone, the rehabilitation shall not result in a prohibited change in use as set forth in subsection 9-3-5(c), B.R.C. 1981.

(j~~i~~) No person shall initiate any use after obtaining a permit under this section without first submitting to the city manager a sealed certification by a Colorado registered professional engineer that the development has been completed in compliance with the approved permit application and that all conditions have been fulfilled.

(k) Floodplain Development Permit Requirements for Critical Facilities Protected by Levee Systems.

(1) An applicant for a floodplain development permit for a critical facility protected by a levee system shall pay the fee prescribed by section 4-20-44, "Floodplain Development Permits and Flood Control Variance Fees," B.R.C. 1981, and shall complete an application form provided by the city manager that shall include, without limitation, the following:

(A) A written statement demonstrating compliance with subsection 9-9-23(f), sealed and certified by a Colorado registered professional engineer; and

(B) Any additional information and details deemed necessary by the city manager to evaluate the permit application.

(2) The city manager shall evaluate a floodplain development permit application for a critical facility protected by a levee system pursuant to the requirements in this subsection (k) and subsection 9-9-23(f), "Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(3) A floodplain development permit for a critical facility protected by a levee system shall be issued only upon a finding by the city manager that, based on a Colorado registered professional engineer's sealed certification, the levee system is in compliance with the requirements of subsection 9-9-23(f), "Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(4) A floodplain development permit issued for a critical facility protected by a levee system is not subject to the call-up and appeal procedures set forth in subsubsection 9-3-6(h).

(5) At least once every three years, the owner or operator of the critical facility protected by a levee system shall file with the city manager a determination from the appropriate federal or state agency, or a sealed and certified determination from a Colorado registered professional engineer, that the levee system meets the minimum freeboard criteria as set forth in subsection 9-9-23(f) and appears, on visual inspection, to be structurally sound and adequately maintained. The city manager may require the owner or operator to submit such certification more frequently than once every three years if warranted by recent flood conditions or circumstances that may lead to changes in the levee system at the critical facility. The permit shall lapse if the required determination is not filed.

~~(1)~~(6) Once a floodplain development permit has been issued for a critical facility protected by a levee system, future development on the land protected by the levee system shall not require a floodplain development permit so long as the requirements of this subsection (k) and subsection 9-9-23(f) are satisfied.

Section 6. Section 9-3-6, B.R.C. 1981 is amended to add a new section 9-3-6.5, B.R.C. 1981 to read:

9-3-6.5 Floodproofing Standards.

(a) Floodproofing: Whenever this chapter or section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, require floodproofing a building or structure, the following standards shall apply:

(1) Floodproofing shall comply with any rules prescribed by the city manager for floodproofing and current FEMA National Flood Insurance Program (NFIP) Technical Bulletins;

(2) The manner of floodproofing shall, without requiring any human intervention, make the building or structure watertight to the flood protection elevation, with walls substantially impermeable to the passage of water;

(3) The building or structure shall have structural components capable of resisting projected hydrostatic and hydrodynamic loads and the effects of buoyancy; and

(4) The applicant shall provide a sealed certification in a form acceptable to the city manager from a Colorado registered professional engineer or licensed architect certifying that the floodproofing measures comply with this chapter or section 9-9-23, as applicable.

Section 7. Section 9-3-7, B.R.C. 1981 is amended to read:

9-3-7 Variances.

(a) A person wishing to develop in a manner~~expand or enlarge an existing structure~~ that does not conform to the requirements of this chapter and cannot be made to conform without unreasonable expense or unreasonable impact on the existing structure may apply to the city manager for a variance from the requirements of subparagraphs 9-3-3(a)(15~~6~~)(C) and (a)(15~~6~~)(D), B.R.C. 1981, except that no variance shall be granted for expansion or enlargement of any structure constructed after July 12, 1978, unless such expansion or enlargement conforms to the flood protection elevation requirement in effect at the time of the original construction.

…

Section 8. Chapter 9-9, B.R.C. 1981 is amended to add a new section 9-9-23 to read:

9-9-23 Regulations Governing Critical Facilities and Lodging Facilities

(a) Purpose: The purpose of this section is to regulate the development of critical facilities in the five hundred-year floodplain in order to minimize the hazards to public health and safety and the interruption of essential service and operations for the community at any time before, during, or after a flood; and to require the development of emergency management plans for all critical facilities and lodging facilities in order to promote an effective and organized flood response.

(b) Scope and Application:

(1) The following development standards apply to critical facilities and lodging facilities located within the five hundred-year floodplain as shown on the most recent maps adopted by the city council, as amended from time to time by the city manager pursuant to subsections (d), (e) and (f) of section 9-3-2, "Floodplains," B.R.C. 1981. If any portion of a structure lies partly within the five hundred-year floodplain, all the requirements of this section shall apply to the entire structure.

(2) The standards governing the development of critical facilities and lodging facilities in this section are in addition to the floodplain regulations of sections 9-3-3, "Regulations Governing the Floodplain," 9-3-4, "Regulations Governing the Conveyance Zone," and 9-3-5, "Regulations Governing the High Hazard Zone," B.R.C. 1981, if the critical facility or lodging facility is also located in the one hundred-year floodplain, the high hazard zone or the conveyance zone.

(3) The city manager shall administer the requirements of this section and may adopt rules interpreting and implementing the requirements of this section, and shall make necessary interpretations of the exact location of the boundaries of the five hundred-year floodplain.

(4) Where the water surface elevation of the five hundred-year flood has not been established or is determined by the city manager to be inconsistent with other available topographic or hydraulic data, the city manager may establish a flood protection elevation based on data sources described in subsection 9-3-2(d).

(5) Existing Uses: The use of any land or structure that was lawful before the application of this section or any amendment thereto but that does not conform to the requirements of this section may be continued subject to the requirements of this section. If such a use not conforming to the requirements of this section is discontinued for 12 consecutive months, no person shall use the land or structure thereafter unless such use conforms to the requirements of this section.

(c) Floodplain Development Permit Required. Except as specified in subsection 9-3-6(a), "Activities Exempt From a Floodplain Development Permit," B.R.C. 1981, no development of a critical facility or lodging facility in the five hundred-year floodplain may occur prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

(d) Emergency Management Plan Required. Owners or operators of a critical facility or lodging facility within the five hundred-year floodplain shall develop an emergency management plan meeting the requirements of this section by January 1, 2023.

(1) Emergency management plans shall include either an evacuation plan or a shelter in place plan.

(A) Evacuation plans shall be sealed and certified by a Colorado registered professional engineer or licensed architect, and shall provide a means for safely evacuating occupants to a location outside of the five hundred-year floodplain.

(B) Shelter in place plans shall be sealed and certified by a Colorado registered professional engineer and shall demonstrate that the structure will be safe to occupy during a five hundred-year flood event.

(2) Emergency management plans shall be posted on the inside of each doorway leading to a separate unit in a lodging facility and displayed in a prominent location or a location designed to provide information to persons within the critical facility that is approved by the city manager.

(3) Emergency management plans shall be completed prior to issuance of a floodplain development permit.

(e) Construction Requirements for Critical Facilities in the Five Hundred-Year Floodplain. The following requirements apply to critical facilities located within the five hundred-year floodplain. The floodproofing standards applicable to this subsection (e) are set forth in section 9-3-6.5, "Floodproofing Standards," B.R.C. 1981.

(1) No owner or operator of a critical facility shall construct or modify, or cause to be constructed or modified, a critical facility within the five hundred-year floodplain except in compliance with the requirements of this section;

(2) Any person making an expansion or an enlargement to an existing at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation;

(3) Any person making a substantial modification or a substantial improvement to any existing at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, of the substantially modified or improved portion to or above the flood protection elevation and shall floodproof or elevate the remainder of the existing structure to or above the flood protection elevation;

(4) Any person constructing a new at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, to or above the flood protection elevation;

(5) Any person constructing a new hazardous material facility shall secure all hazardous materials from flooding and from being released during a five hundred-year flood event or shall floodproof the facility. Any person making a development to an existing hazardous material facility that requires a floodplain development permit shall secure all hazardous materials from flooding and from being released during a five hundred-year flood event in the structure or portion of the facility being modified, or shall floodproof the structure or portion of the facility being modified.

(A) The owner or operator of the hazardous material facility shall demonstrate compliance with this standard by providing a sealed certification from a registered professional engineer documenting that due to the flood threat and hazardous material storage conditions, hazardous material will not be released at or from the facility during a five hundred-year flood event.

(B) No person owning, operating, or otherwise using a hazardous material facility shall fail to bring the entire facility into compliance with this subsection (5) by January 1, 2023.

(f) Critical Facilities Protected by Levee Systems. Critical facilities protected by levee systems within the five hundred-year floodplain are exempt from the requirements of subsections (d), and (e) of this section 9-9-23 provided that the following requirements are satisfied:

(1) Floodplain Development Permit Required. No person shall construct or use a new or existing critical facility protected by a levee system under this subsection 9-9-23(f) prior to the issuance of a floodplain development permit pursuant to section 9-3-6(k), "Floodplain Development Permit Requirements for Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(2) The owner or operator of a new or existing critical facility located landward of a levee system, outside the one hundred-year floodplain but within the five hundred-year floodplain, shall demonstrate that the levee system provides protection against a five hundred-year flood event by meeting the following requirements:

(A) Design criteria consistent with 44 CFR § 65.10, except that the minimum riverine levee freeboard criterion shall be one foot above the water surface elevation of a five hundred-year flood, rather than three; and

(B) Operation and maintenance standards (including an operating and maintenance manual and periodic freeboard and visual inspections) that ensure continuing proper function of the levee system, consistent with Rule 10 of the Colorado Rules and Regulations for Regulatory Floodplains in Colorado. (2 CCR 408-1:10, Criteria for Determining Effects of Levees on Regulatory Floodplains).

(3) The owner or operator of a new or existing critical facility located landward of an accredited levee or a provisionally accredited levee within areas mapped Zone X (shaded) shall demonstrate that the levee system meets the design criteria of 44 CFR § 65.10 and Rule 10 of the Colorado Rules and Regulations for Regulatory Floodplains in Colorado (2 CCR 408-1:10, Criteria for Determining Effects of Levees on Regulatory Floodplains).

(4) The owner or operator of a critical facility must secure an agreement, meeting the requirements of subparagraphs 9-9-23(f)(2) and (3) as applicable, with the levee owner and/or operator for continued operation and maintenance of the levee system in order to be recognized as protected by a levee system.

(5) If a levee system protecting an existing critical facility fails to meet the freeboard criterion of subparagraph (f)(2)(A) of this section because FEMA revises a FIRM, construction and use of that critical facility may occur for two years after the revision, but only while the levee owner or operator actively and diligently pursues levee improvements to comply with this subsection (f). The requirements of section 9-3-3 will apply in the one hundred-year floodplain.

Section 9. Section 9-16-1, B.R.C. 1981 is amended to read:

9-16-1 General Definitions.

(a) The definitions contained in chapter 1-2, "Definitions," B.R.C. 1981, apply to this title unless a term is defined differently in this chapter.

(b) Terms identified with the references shown below after the definition are limited to those specific sections or chapters of this title:

(1) Airport influence zone (AIZ).

(2) Floodplain regulations (Floodplain).

(3) Historic preservation (Historic).

(4) Inclusionary housing (Inclusionary Housing).

(5) Residential growth management system (RGMS).

(6) Solar access (Solar).

(7) Wetlands Protection (Wetlands).

(8) Signs (Signs).

(9) Critical Facilities and Lodging Facilities (Critical Facilities).

(c) The following terms as used in this title have the following meanings unless the context clearly indicates otherwise:

…

"Accredited levee or provisionally accredited levee" means a system of artificial embankment(s) or flood control structure(s) used for property protection, flood control, and flood hazard mitigation accredited or provisionally accredited and mapped Zone X (shaded) by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). (Floodplain and Critical Facilities)

…

"Area of special flood hazard" means the land in the floodplain subject to a one percent or greater chance of flooding in any given year. Such areas may be designated as Zones A, AO, AH, AE and A1-30 on the FIRM for the City of Boulder. (Floodplain)

"At-risk population facility" means a pre-school, public or private primary or secondary school, before and after school care center with twelve or more students, daycare center with twelve or more children, group home, or residential or congregate care facility with twelve or more

residents. At-risk population facility is also included in the definition of "critical facility." (Floodplain and Critical Facilities)

...

"Base flood elevation" means the computed elevation to which floodwater is anticipated to rise during the one hundred-year flood. (Floodplain)

"Basement" means any enclosed area of a building having its lowest floor a minimum of two feet below grade level on all sides. (Floodplain and Critical Facilities)

...

"Conveyance zone" means those portions of the floodplain required for the passage or conveyance of the one hundred-year flood. The conveyance zone is delineated based on an equal encroachment methodology (measured in volume of water), which is applied to the floodplain from the edges of the flood channel to a point where the one hundred-year flood profile will be raised no more than six inches, after considering a reasonable expectation of blockage at bridges and other obstructions by flood borne debris. The city may, in its discretion, delineate the conveyance zone on city owned land or right of way based on unequal encroachment to minimize delineation on other properties. The conveyance zone is equivalent to a floodway delineation based on a six inch rise. (Floodplain and Critical Facilities)

...

"Critical facility" means any structure or related -infrastructure, the loss of which may result in severe hazards to public health and safety or may interrupt essential service and operations for the community at any time before, during, and after a flood. Critical facilities are classified as follows: (1) essential service facility, (2) hazardous material facility, and (3) at-risk population facility. (Floodplain and Critical Facilities)

...

"Development" means any change to improved or unimproved real estate, including, without limitation, constructing, relocating, rehabilitating, reconstructing or expanding or enlarging (but not maintaining) a building or other structure or portion thereof, or establishing or changing a use, or mining, dredging, filling, grading, paving, or excavation. (Floodplain and Critical Facilities)

"Essential service facility" means any facility providing essential service that, if flooded, may result in severe hazards to public health and safety or interrupt essential service and operations for the community at any time before, during, or after a flood. Examples of essential service~~s~~ facilities include without limitation the following:

(1) Public safety facilities such as police stations, fire and rescue stations, and emergency operation centers;

(2) Emergency response facilities, such as emergency vehicle and equipment storage, and essential governmental work centers for continuity of government operations;

(3) Emergency medical facilities, such as hospitals, emergency care, urgent care, and ambulance services but excluding clinics, doctors offices, and non-urgent care medical facilities;

(4) Shelters designated by the city manager that will be used during or after a flood for displaced persons;

(5) Communication facilities, such as main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems, but excluding towers, poles, lines, cables, and conduits;

(6) Public utility plant facilities and essential equipment for treatment, generation, storage, pumping, and distribution such as hubs for water, wastewater, power, and gas but excluding hydro electric facilities, towers, poles, power lines, buried pipelines, transmission lines, distribution lines, and service lines;

(7) Essential governmental facilities including, without limitation, facilities where permanent records, as defined by an agency's data retention policy, are stored, courts, jails, building permitting and inspection services, departments that manage utilities and transportation systems, information technology departments, finance departments, health departments, the county commissioner's office, the city manager's office, and maintenance and equipment centers; and

(8) Air transportation lifelines, such as an airport or heliport, and structures serving emergency functions, and associated infrastructure such as ~~(~~aviation control towers, air traffic control centers, and emergency equipment aircraft hangars).

Essential service facility is also included in the definition of "critical facility." (Floodplain and Critical Facilities)

...

"Expansion or enlargement of a structure" means any addition of an exterior wall to the structure or any addition to the floor area of the structure, whether under, at, or above grade, and whether or not the external dimensions of the structure are changed, or the reconstruction of a flood-damaged portion of a structure, so long as such expansion, enlargement or reconstruction does not constitute a "substantial modification" or a "substantial improvement." (Floodplain and Critical Facilities)

...

"FEMA" means the Federal Emergency Management Agency. (Floodplain and Critical Facilities)

...

"Five hundred-year flood" means a flood having a 0.2 percent chance of occurring in any year. (Floodplain and Critical Facilities)

"Flood" or "flooding" means a general or temporary condition of partial or complete inundation of normally dry land areas from a watercourse that temporarily overflows the boundaries within which it is ordinarily confined or from the rapid accumulation of runoff of surface water caused by rain, snow melt, flow blockage, or any other source. (Floodplain and Critical Facilities)

…

~~"Flood fringe" means those portions of the floodplain that are not in the conveyance zone or in the high hazard zone. (Floodplain)~~

"Flood Insurance Rate Map (FIRM)" means the official map on which FEMA has delineated both the areas of special flood hazard and the risk premium zones applicable to the community. (Floodplain and Critical Facilities)

…

"Flood protection elevation" means the following ~~an elevation of~~:

(1) In the one hundred-year floodplain, an elevation of:

~~1~~A) T~~t~~wo feet above the elevation of the water surface of a one hundred-year flood as determined pursuant to sections 9-3-2 through 9-3-8, B.R.C. 1981, or, if no such elevation is determined, two feet above the highest grade adjacent to a structure;~~,~~ or

~~2~~B) T~~t~~wo feet above the base flood elevation in AE zones or two feet above the flood depth number indicated for AO zones on the FIRM for the City of Boulder, whichever is higher.

(2) In the five hundred-year floodplain, the lower of the following elevations:

A) One foot above the water surface of a five hundred-year flood under the standards in section 9-3-2 through 9-3-8, and section 9-9-23 B.R.C., 1981; or

B) The one hundred-year flood protection elevation (Floodplain and Critical Facilities)

"Floodplain" means the area that is susceptible to being inundated by a flood. Unless the context clearly indicates otherwise, "floodplain" refers to the one hundred-year floodplain. (Floodplain).

"Floodplain development permit" means any permit granted under the terms and conditions of sections 9-3-2 through 9-3-8, and section 9-9-23, B.R.C. 1981, for development on land in a floodplain. (Floodplain and Critical Facilities)

"Floodplain, five hundred-year" means the area inundated by a flood having a 0.2 percent or greater chance of occurring in any given year. (Floodplain and Critical Facilities)

"Floodplain, one hundred-year" means the area inundated by a flood having a one percent or greater chance of occurring in any given year. (Floodplain)

"Floodproofing" means any combination of structural and nonstructural changes, modifications, or adjustments to structures or real property which reduce or eliminate flood damage to improved or unimproved real property, water and sanitary facilities, structures and their contents. (Floodplain and Critical Facilities)

...

"Hazardous material" means any material used, generated, or stored at a facility of a type and in a quantity that would classify the facility as a hazardous materials facility. (Floodplain and Critical Facilities)

"Hazardous material facility" means a structure (or group of structures) that is:

(1) subject to Section 303 of the Emergency Planning and Community Right-to-Know Act, 42 USC §11003, because it has an "Extremely Hazardous Substance" on site in quantities that meet or exceed the "Threshold Planning Quantities" established by the United States Environmental Protection Agency and listed at 40 CFR Part 355, Appendix A and Appendix B;~~.~~

(2) unless covered by subpart (1) above, storing hazardous material as defined by Department of Transportation regulations at 49 CFR Parts 171-180 but only to the extent that the facility is storing the hazardous material in the "Bulk Packaging" container in which it was delivered as that term is defined at 49 CFR 171.8;~~.~~

(3) storing a hazardous substance of the type and quantity listed by §29-22-107,C.R.S; or~~.~~

(4) regulated as a transfer facility under Colorado hazardous waste regulations at 6 CCR 1007-3, Part 263.

Hazardous material facility is also included in the definition of "critical facility."

(Floodplain and Critical Facilities)

...

"High hazard zone" means those portions of the floodplain where an unacceptably high hazard to human safety exists defined as those areas where the product number of flow velocity (measured in ft./sec.) times flow depth (measured in feet) equals or exceeds four, or where flow depths equal or exceed four feet. (Floodplain and Critical Facilities)

...

Lodging facility" means a hotel, motel, dormitory, bed and breakfast, or hostel, as defined in the Boulder Revised Code. (Floodplain and Critical Facilities)

...

"Lowest floor" means the lowest floor of the lowest enclosed area (including basement or crawl space). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable design requirements of sections 9-3-2 through 9-3-8, and section 9-9-23, B.R.C. 1981. (Floodplain and Critical Facilities)

...

"Maintenance" means any activity undertaken to repair or prevent the deterioration, impairment or failure of any stream, previously constructed improvement or structure including, without limitation: the removal of sediment and debris, installation of erosion and sediment control devices and the replacement of structural components. Maintenance does not include substantial modifications, substantial improvements, total replacement of existing facilities or total reconstruction of a facility. (Floodplain and Critical Facilities)

...

"New construction" means structures for which the "start of construction" commenced on or after July 12, 1978, and includes any subsequent improvements to such structures. (Floodplain and Critical Facilities)

...

"One hundred-year flood" means a flood having a one percent chance of occurring in any year. (Floodplain and Critical Facilities)

...

"Reconstruction" means exact replacement of an existing structure or portion thereof or exact structural repair of a damaged structure. (Floodplain and Critical Facilities)

...

"Start of construction" means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within one hundred eighty days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of

excavation; or the placement of a manufactured home on a foundation. (Floodplain and Critical Facilities)

...

"Structure" means a building or other roofed construction, a basement, a wall, a fence, a manufactured home, or a storage tank. (Floodplain and Critical Facilities)

...

"Substantial improvement" means any repair, reconstruction, rehabilitation, addition, or improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either: 1) any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or 2) any alteration of a structure listed on the National Register of Historic Places or the Colorado Inventory of Historic Places or designated as an individual landmark under section 9-11-2, "City Council May Designate Or Amend Landmarks And Historic Districts," B.R.C. 1981. (Floodplain and Critical Facilities)

...

"Substantial modification" means any expansion or enlargement of a structure which equals or exceeds fifty percent of the floor area of the structure intended for human occupancy, considered cumulatively, commencing July 12, 1978. (Floodplain and Critical Facilities)

...

Section 10. This ordinance shall become effective on January 1, 2014 after its final passage by the City Council. This ordinance shall apply to all permits and development applications submitted to the city after the effective date of its passage.

Section 11. This ordinance is necessary to protect the public health, safety, and welfare of the residents of the city, and covers matters of local concern.

Section 12. The City Council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this 4th day of June, 2013.

.

_____
Mayor

Attest:

_____
City Clerk on behalf of the
Director of Finance and Record

READ ON SECOND READING, PASSED, ADOPTED, AND ORDERED PUBLISHED BY TITLE ONLY this _____ day of _____, 20__.

.

_____
Mayor

Attest:

_____
City Clerk on behalf of the
Director of Finance and Record

CITY OF BOULDER
CRITICAL FACILITIES AND LODGING FACILITIES ORDINANCE
COST ANALYSIS

Prepared
For

CITY OF BOULDER
DEPARTMENT OF PUBLIC WORKS

Boulder, Colorado
Contact: Ms. Christie Coleman, P.E., CFM

March 15, 2011
Updated April, 2013

Prepared By:
The Sanitas Group, LLC
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PROPOSED FLOODPLAIN ORDINANCE REVISIONS
COST ANALYSIS
Boulder, Colorado

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1.0 INTRODUCTION

The City of "Boulder is the #1 flash flood risk community in Colorado"[1]. Because of this elevated risk the city must diligently evaluate ways to reduce damages to property and injuries resulting from flooding. Flood protection regulations increase public safety and reduce potential damages from flood waters. Under current flood protection regulations, two segments of the community are particularly vulnerable during a flood: Lodging Facilities and Critical Facilities. Occupants of Lodging Facilities often are unfamiliar with their location and lack flood risk awareness, which causes an increased need for flood emergency plans to improve public health and safety during a flood. Critical Facilities warrant both flood protection measures and emergency management plans to ensure needed services remain uninterrupted or, if flooded, a facility does not pose a risk to public health and safety.

In 2002, the City Council supported developing additional flood protection regulations for Critical Facilities. City Staff, with input from the Boulder Chamber of Commerce, the Local Emergency Planning Committee, Colorado Water Conservation Board, City of Boulder first responders, local business owners, and members of the public, drafted additional flood protection regulations. Initially, the proposed regulations covered Critical Facilities and what was defined as Mobile Populations. Throughout the review process, the Mobile Populations portion was revised to include only Lodging Facilities. This revised report was amended to include Lodging Facilities rather than all Mobile Population facilities, as well as the expansion of the emergency management plan requirement for Critical Facilities as well as Lodging Facilities.

Under the proposed flood protection regulations, Lodging and Critical Facilities within the 100-year or 500-year floodplains will be required to prepare a flood Emergency Management Plan. Critical Facilities within the 500-year floodplain will be required to provide flood protection in the form of dry floodproofing, elevation, constructing floodwalls, or constructing other equivalent protection measures to the 500-year water surface elevation plus one foot of freeboard. The proposed flood protection regulations will not be enacted retroactively and will apply to future activities requiring a City Floodplain Development Permit. Hazardous materials containment and emergency management plan development will occur within a 10-yr implementation window.

Purpose

City Staff is currently studying the potential impacts of the proposed flood protection regulations. As part of their due diligence, City Staff engaged The Sanitas Group to quantify potential specific cost impacts to land owners and facility operators directly resulting from the proposed flood protection regulations. This report addresses the cost of preparing a flood Emergency Management Plan (shelter-in-place or evacuation options) and any added floodplain development permitting costs for both Lodging Facilities and Critical Facilities located within the 100-year or 500-year floodplain areas. For 500-year floodplain Critical Facilities flood protection, this report addresses the costs associated with engineering services needed to design the flood proofing measures, construction costs to build the flood proofing measures, and floodplain development permitting costs.

[1] www.BoulderFloodInfo.net

The following report summarizes the potential cost impacts to land owners and facility operators directly resulting from the proposed flood protection regulations. The report includes background data and lists the assumptions used to develop this cost impact analysis. The cost opinions stated in this report are at a feasibility level study, meaning they are meant to address overall characteristics and patterns of the subject properties. Potentially impacted facilities were not analyzed on a case by case basis. Cost data was obtained through previous project experience, discussions with local contractors and design professionals, RS Means Costworks data, and CDOT cost data.

Proposed New Regulations

This analysis will look at two different parts of the proposed regulations. The first part involves the requirement for Critical Facilities and Lodging Facilities within the 100-year and 500-year floodplain to prepare flood Emergency Management Plans. Lodging Facilities consist of facilities such as hotels, motels, dormitories, bed and breakfasts, and hostels. Critical Facilities are defined as:

> *"Critical facility" means any structure or related infrastructure, the loss of which may result in severe hazards to public health and safety or may interrupt essential services and operations for the community at any time before, during, and after a flood. Critical facilities are classified as follows: (1) Essential Services Facility, (2) Hazardous Material Facility, and (3) At-risk Populations Facility. (Floodplain and Critical Facilities)."*

With the proposed new regulations, facilities meeting the above descriptions located within the 100-year or 500-year floodplain will prepare an Emergency Management Plan for flooding scenarios. The intent of these plans is to make sure that staff and occupants are aware of the flooding potential and have information they need to keep themselves safe. The City has prepared an emergency planning document (see Appendix B) to assist property owners/managers in preparing plans, and this document outlines both "shelter in place" and "evacuation" options. Facilities will prepare plans when they request modifications requiring a floodplain permit or within 10 years. The City is also developing an emergency management evacuation plan template to assist owners in preparing Emergency Management Plans.

The second part of the new regulations is in regard to the flood protection of Critical Facilities. Under the proposed regulation, new or substantially improved/modified at-risk population and essential service facilities will protect buildings through floodproofing, floodwalls, elevation or other equivalent measures to the 500-year water surface elevation plus one foot of freeboard. In instances where the standard 100-year flood protection elevation (100-year water surface elevation plus two feet) is lower than the 500-year water surface elevation plus one foot, the 100-year flood protection elevation may be used. For additions to existing critical facilities that are smaller than these limits, the new construction will be protected to the 500-year water surface elevation plus one foot of freeboard or 100-year flood protection elevation. Hazardous materials facilities will be required to secure their hazardous materials from flooding during a 500-year flood event upon new use or modification requiring a building permit.

Additional discussion of the proposed new regulations is included in the detailed analysis.

2.0 BACKGROUND

Why Higher Regulation Standards?

Historically, the original approach to mitigating the effects of flooding was construction of flood mitigation projects such as channelizing the watercourse and construction of flood levees. However, these projects did nothing to prevent development in floodplains, and as a result, flood damage and risk for flood damage actually increased. In response to continually increasing flood recovery costs, regulations have evolved to provide rules on how to develop in the 100-year floodplain. The National Flood Insurance Program (NFIP) was started in 1968. This program provides minimum regulations for communities which promote safer development in the floodplain, and makes flood insurance available for all residential and non-residential buildings.

Even with these efforts to minimize flood impacts, damages due to flooding in the United States, both in terms of human safety and economic recovery costs, continue to rise. Additionally, flooding of a subset of critical uses has been shown to be a barrier to the recovery of communities from the economic and social impacts resulting from floods. In response, the National Flood Insurance Program has developed the Community Rating System and the Community Rating System Coordinators Manual, which promotes research on additional flood protection measure local governments can adopt including the development of 500-year protection standards for critical land uses.

Nationally, the concept of promoting additional protection to critical facilities beyond the standard 100-year flood event is not a new one. In 1977, through Executive Order 11988 (which is implemented through Title 18, Chapter VI, Part 725 of the Code of Federal Regulations and the U.S. Water Resources Council's Floodplain Management Guidelines for Implementing Executive Order 11988) federal critical facilities are directed to either avoid the 500-year flood plain or protect federal facilities to the 500-year water surface level. This is in order to insure that during a major flood event, critical government operations sustain the least structural and economic damage and inflict the least environmental damage possible.

Nationally, there is a renewed interest in providing a higher level of protection, specifically for critical facilities. In November 2010, the Association of State Floodplain Managers (ASFPM) published a white paper called "Critical Facilities and Flood Risk" (see appendix E). The paper specifically called for states to adopt rules protecting critical facilities from the 500-year flood event. Additionally, FEMA has been encouraging communities to adopt higher standards and is currently working on updating the NFIP to try and strengthen the rules regarding critical facilities.

Because flood risk is very much an economic risk, it is prudent that we take a commonsense approach to examining the rules and regulations that have been followed by floodplain managers for the last 40-years. For the most part, the current approach to floodplain management deals primarily with how to build in a floodplain; not how to minimize future damages and create a sustainable environment. The basis of sustainability mandates that we simply cannot continue to do the same things as we have done in the past.

According to ASFPM publication "Floodplain Management 2003: State and Local Programs", at that time a total of six states required critical facilities to be protected from the 500-year flood event. These states are Alabama, Illinois, Michigan, Mississippi, North Carolina, and Ohio. At the local level, the City of Fort Collins has also adopted critical facilities regulations for their 100 and 500-year floodplains. In 2010, the State of Colorado, through the Colorado Water Conservation Board (CWCB), proposed new "Rules and Regulations for Regulatory Floodplains in Colorado". Rule 6 of this document defined critical facilities and set higher protection standards for those facilities. Although the rules do not require that critical facilities be protected outside of the 100-year floodplain, the document recommends that local communities use the 500-year floodplain in their critical facilities planning.

Why the City of Boulder

As previously stated, the City of Boulder is the #1 flash flood risk community in the Front Range of Colorado, and the City has historically had stricter flood protection regulations than the NFIP and the State of Colorado's Colorado Water Conservation Board. This is due to the fact that the City is located at the base of the foothills, with a number of creek drainages coming directly into the City. Because of this flood risk, the complications to flood recovery that damaged critical facilities present, and the current exposure of many critical facilities to flood damage; in 2002 the City Council endorsed the investigation and development of additional protection measures that will help protect critical facilities serving the City. This guidance was later incorporated in the Comprehensive Flood and Stormwater Master Plan in 2004. This master plan directs city staff to review and update the floodplain regulations occasionally in order to reflect the ever changing needs of the community. In 2008, the City of Boulder's Multi-Hazard Mitigation Plan was adopted. This plan calls for the development of an ordinance that will regulate critical facilities located in the 500-year floodplain as a top priority. City Council reiterated their support for such an ordinance in April 2009.

When new flood protection regulations are proposed for Boulder, many people ask "Why?" pointing out that Boulder is not in the southeast where flooding can occur over days or even weeks in the spring or can result from hurricanes such as along the gulf coast. They are correct in that Boulder is not subject to the long-term flooding that impacts some portions of the country. But Boulder has a high risk of flash flooding in many areas, and although the duration of the flooding is shorter, that does not mean the impacts are not significant. During a flash flood, water levels rise very quickly, often with little or no warning giving little time to implement flood protection measures or evacuate. Combine this with the city's steep gradient streams which will exhibit high water velocities and rapid increases in flow depth, the danger to public safety is significant. Additionally, during a flood it does not matter if you have water in your living room or mechanical room for 2 hours or 2 weeks, the structure and contents will still be significantly damaged. When this damage occurs to critical facilities it impedes flood response and the time necessary for community recovery.

It should be pointed out that loss of function impacts associated with flooded critical facilities are sometimes as important as or even more important than the direct physical damages. For example, the loss of function of a hospital, fire station, or other facility critical to the emergency response and recovery during and immediately after a disaster may have a much greater impact on the community than simply the repair costs for the physical damages. Similarly, loss of utility services (water, power, and sanitary sewer) has a much

larger economic impact on a community than simply the costs to repair damage to the utility system.

The positive side to Boulder's flood situation is that there are many relatively low cost solutions that when properly thought out and implemented, can have significant impacts on minimizing damages during a flood. By requiring operators of lodging critical facilities to prepare a flood Emergency Management Plan, public safety can be significantly increased for a relatively low cost. By educating the operators of such facilities of the flood risks, having a warning system to notify of a flood warning or watch in place, and having a chain of command and procedures to follow can greatly reduce the risk of injury or death. By making sure groups of people are either evacuated from the flood zone or in a safe shelter from the flood, emergency services can focus on those less fortunate. This sort of planning can help educate the community of Boulder's flood risk and reduce injuries or even deaths during flooding.

Protecting Critical Facilities in Boulder from the 500-year flood event can also be a cost effective solution. The majority of areas subject to 500-year flooding in the City are subject to depths 2' or less. Constructing floodwalls, importing fill to raise the building site, or floodproofing to these smaller depths can be done in a cost effective manner in many cases. Due to the flash flooding nature of the creeks in the area, flood levels go down quickly, allowing roads and access to Critical Facilities to be reopened quickly. Having these facilities operational and ready for service immediately means the downtime of City services is greatly reduced, increasing human safety and minimizing the economic impacts from a flood.

Additional discussion of the benefits and impacts resulting from the proposed regulations is included in the detailed analysis below.

3.0 EMERGENCY MANAGEMENT PLAN PREPARATION ANALYSIS

Methodology and Assumptions

The proposed regulations will require facilities classified as Lodging and Critical Facilities by the City to prepare a flood Emergency Management Plan. The City has prepared a guideline and checklist to assist facility owners/operators as well as engineers and architects in preparing plans. A copy of this document is included in Appendix A for reference. For this analysis, The Sanitas Group was tasked with analyzing the direct costs of preparing the required flood Emergency Management Plans. This includes the cost to review the City requirements, discuss plan options with pertinent parties, and prepare the final plan for review and approval by City staff. The analysis will analyze direct costs to prepare a plan. Costs associated with community benefits, like reduced deaths and injuries and avoided emergency management costs, were not analyzed, although these impacts are discussed in a qualitative manner.

After review of the City database of Lodging and Critical Facilities and their locations throughout the City, it was determined that evacuation based plans would be the most common for existing facilities. This is due to the fact that in order to shelter in place, a structural engineer will need to verify that the existing structure can withstand the hydrodynamic forces generated from flood waters. Additionally, a shelter in place plan requires that any necessary supplies, including water, food, bedding, etc. be stored on site

for any potential occupants during a flood. All of these items have costs and coordination/upkeep time associated with them. Therefore, it is reasonable to expect that when possible, facility owners will prefer to utilize an evacuation plan. Shelter in place plans will most likely only be utilized in areas of high hazard flooding, excessive flood depths, large evacuation distance to non-flooded areas, or areas of high velocity flood waters. Based on a review of facility types and locations, it is expected that approximately 10% of existing facilities classified as Lodging and Critical Facilities will shelter in place.

For evacuation and shelter in place plans, simple and complex scenarios were reviewed. A summary of plan assumptions follows:

Simple Evacuation Plan
Facilities that fall under this designation may consist of:

- Smaller to mid-size facilities with one main gathering area or a limited number of rooms that are in close proximity to each other.
- Facilities that do not provide overnight housing, temporary or permanent.
- Areas of shallow flooding with direct evacuation routes to higher elevations.
- Evacuated persons will not necessarily need housing/long term shelter once evacuated if facility is damaged/inaccessible.

Complex Evacuation Plan
Facilities that fall under this designation may consist of:

- More complicated facilities such as hotels, dormitories, etc. that occupants will be spread out in and will take more advanced planning and staff to assure everyone is accounted for and safely evacuated.
- Facilities that have temporary or permanent residents that may require housing/shelter once they have been evacuated.

Simple Shelter in Place Plan
Facilities that fall under this designation may consist of:

- Designations similar to that of the simple evacuation plan facilities.
- New facilities where the structural analysis and necessary components to deal with flood waters have been previously incorporated into the design.
- Existing facilities with flood depths and foundation/structural components that will allow for a structural engineer to do a basic review and analysis of the structure and approve for sheltering in place.
- Facilities without occupants that would require planning for storage of medical supplies beyond those included in a basic first aid kit.

Complex Shelter in Place Plan
Facilities that fall under this designation may consist of:

- Facilities with a large number of occupants that require advanced staff planning to track and account for.
- Facilities that will require a high level of structural analysis by a structural engineer to determine if flood waters can be supported.

Analysis Results

In order to review costs of the different levels of flood Emergency Management Plans, spreadsheets were created for the different scenarios. The spreadsheets broke down basic tasks associated with preparing the plan and a preparation time estimate was applied. For this analysis, an average consulting/preparation fee of $105 per hour was used. The spreadsheets are included in Appendix A for reference. A summary of results is below:

	Evacuation Based		Shelter in Place Based		Shelter in Place – New Construction
	Simple	**Complex**	**Simple**	**Complex**	
Approximate Number of Existing Facilities Impacted	36	36	3	5	N/A
Estimated Plan Prep Costs	$2,625	3,780	$5,675	$11,675	$3,675
City Fees	$700	$700	$1,400	$1,400	$1,400
Total Costs	$3,325	$4,480	$7,075	$13,075	$5,075

See Appendix A for detailed calculations.

Emergency Management Plan Regulations Conclusions

Based on the results of the analysis, it is expected that approximately 90% of facilities classified as Lodging and Critical Facilities which will require a flood Emergency Management Plan will fall under the evacuation plan category. For these facilities the process for completing plans and gaining city approval involves the development of site specific plans and flood education.

The City is also developing a template for evacuation based plans in order to assist facility operators/owners. The template will provide a format and list of questions to be answered that should reduce the time to both prepare as well as review the documents. We anticipate that the template will reduce the cost to prepare an evacuation based Emergency Management Plan, as shown above, by 10% to 15% on average. Smaller facilities with plans that can follow the template closely may see even higher cost savings.

For facilities requiring a shelter in place plan, the structural evaluation for sheltering in the building during a flood event may call for structural improvements. The costs for the shelter in place plans include an estimated structural engineering analysis fee, but due to the number of different construction types and facility sizes in the City, the associated fee can vary greatly. Due to this, actual construction costs of structural improvements that may be implemented are not included as part of this analysis. It is expected that the number of facilities who chose to shelter in place and require building improvements after structural review will be limited and the improvements will vary on a case by case basis.

Emergency Management Plans will develop the most practical solution that can be implemented properly and safely. One of the benefits to requiring these plans is the increase in knowledge about flood situations and how they are going to affect certain areas. The plans will promote situational awareness, and monitoring of the weather for flood warnings and watches. The increase in public safety resulting from having a plan before the flood hits can be significant. This analysis does not apply a monetary value to increased public safety, but we do feel its benefit is important to note.

4.0 CRITICAL FACILTIY FLOOD PROTECTION ANALYSIS

Proposed Rules

The proposed ordinance will require Critical Facilities within the 500-year floodplain to provide flood protection. As stated previously, a Critical Facility is defined as follows:

> *"Critical facility" means any structure or related infrastructure, the loss of which may result in severe hazards to public health and safety or may interrupt essential services and operations for the community at any time before, during, and after a flood. Critical facilities are classified as follows: (1) Essential Services Facility, (2) Hazardous Material Facility, and (3) At-risk Populations Facility. (Floodplain and Critical Facilities)."*

- *"Essential Services" means any facility providing essential services that, if flooded, may result in severe hazards to public health and safety or interrupt essential services and operations for the community at any time before, during, or after a flood. Examples of essential services facilities include without limitation the following:*

  (1) Public safety facilities such as police stations, fire and rescue stations, and emergency operation centers;
  (2) Emergency response facilities, such as emergency vehicle and equipment storage, and essential governmental work centers for continuity of government operations;
  (3) Emergency medical facilities, such as hospitals, emergency care, urgent care, and ambulance services but excluding clinics, doctors offices, and non-urgent care medical facilities;
  (4) Shelters designated by the city manager that will be used during or after a flood for displaced persons;
  (5) Communication facilities, such as main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems, but excluding towers, poles, lines, cables, and conduits;
  (6) Public utility plant facilities and essential equipment for treatment, generation, storage, pumping, and distribution such as hubs for water, wastewater, power, and gas but excluding hydro electric facilities, towers, poles, power lines, buried pipelines, transmission lines, distribution lines, and service lines;
  (7) Essential governmental facilities including, without limitation, facilities where permanent records, as defined by an agency's data retention policy, are stored, courts, jails, building permitting and inspection services, departments that manage utilities and transportation systems, information technology departments, finance departments, health departments, the county commissioner's office, the city manager's office, and maintenance and equipment centers); and
  (8) Air transportation lifelines, such as an airport or heliport, and structures serving emergency functions, and associated infrastructure such as (aviation control towers, air traffic control centers, and emergency equipment aircraft hangars).

- *"Hazardous Materials Facilities" means a structure or group of structures that is:*
  (1) subject to Section 303 of the Emergency Planning and Community Right-to-Know Act, 42 USC §11003, because it has—an "Extremely Hazardous Substance" on site in quantities that meet or exceed the "Threshold Planning Quantities" established by the United States Environmental Protection Agency and listed at 40 CFR Part 355, Appendix A and Appendix B;.
  (2) - unless covered by subpart (1) above, storing hazardous material as defined by Department of Transportation regulations at 49 CFR Parts 171-180 but only to the extent that the facility is storing the hazardous material in the "Bulk Packaging" container in which it was delivered as that term is defined at 49 CFR 171.8;.
  (3) storing a hazardous substance of the type and quantity listed by §22-107,C.R.S; or.
  (4) regulated as a transfer facility under Colorado hazardous waste regulations at 6 CCR 1007-3, Part 263.

- *"At-risk Population Facilities" means a pre-school, public and private primary or secondary school, before and after school care center with 12 or more students, daycare center with 12 or more children, group home, or residential congregate care facilities with 12 or more residents.*

Extent of Impact on Critical Facilities

The City has researched business and government operations that have the potential to be classified as a Critical Facility under the new ordinance. This list was used as a dataset from which attributes of average facility types, construction methods, flood depths, and locations were developed. The subsequent analysis represents average compliance cost representing the types of facilities and characteristics of flooding expected. Any facilities that are non representative (for either having less than average cost of compliance or more than average cost of compliance) are not explicitly analyzed. For the purpose of this analysis, existing buildings that have the potential to be considered critical were used to develop costs of compliance. Any future Critical Facilities that chose to construct in the 500-year floodplain can reasonably be expected to be of similar sizes and types.

For operators of Critical Facilities that wish to make improvements, there are a number of ways they can protect their property from flood waters, including importing fill, elevating the first floor via structural improvements, construction of flood walls, and floodproofing. The two most common and economical forms of flood protection for individual properties in Colorado are importing fill in order to raise the building site, and floodproofing the building. This analysis has been tasked with reviewing these two most common flood protection approaches specific to the City of Boulder. For the purposes of this analysis, new facilities are assumed to utilize a fill based flood protection approach, and be of similar type and size as existing Critical Facilities within the City of Boulder. A Detailed discussion of both approaches and their associated benefits and impacts is presented below.

What about Hazardous Materials Facilities?

The proposed ordinance will require facilities that store hazardous materials to protect those materials from being released during the 100 and 500-year flood events. Many types of hazardous materials are required to be stored in a water tight manner by existing EPA regulations, and most are stored inside an existing structure or with permanently mounted tanks adjacent to the building. Based on these types of best management practices, it is anticipated that the majority of hazardous materials facilities will choose to obtain an engineer's certification that the hazardous materials will be secure during a flood instead of floodproofing or elevating the facility. Protecting materials from release would require confirming that they are stored in watertight containers, which is very common, and cannot float away, which is also common as most hazardous materials are stored inside a building or a secure facility.

Other economical solutions may involve certifying that hazardous materials are stored in an elevated location protected from flood waters; this can be accomplished with shelves or similar means. In cases where a facility may have a permanent tank storing hazardous materials, the tank will need to be elevated or evaluated to confirm it cannot float away during a flood. If flooding is a concern, additional mounting supports may be required. All of these solutions would be of significantly lower cost than floodproofing the entire structure. Applying the above techniques to the construction of a new facility would have a negligible impact on the overall construction cost of the project. In the rare case an entire hazardous materials facility needs to be elevated or floodproofed, the results of the cost analysis for at-risk and essential services facilities would apply.

4.1 FILL BASED FLOOD PROTECTION ANALYSIS

Methodology and Assumptions

When importing fill to raise a building site, the key factors are the size of the building footprint and depth of fill required to raise the site to the desired grade. After reviewing City data regarding potential Critical Facilities, it was determined that two building footprints would provide a representative sample for this part of the analysis. A 6,000 square foot footprint represents the approximate average building footprint of the smaller facilities, and a 58,000 square foot footprint represents the approximate average of the mid-size to larger facilities. These two footprints were utilized in the fill analysis. The full list of 500-year floodplain Critical Facilities was used in this portion of the analysis to get a representative assessment of "typical" critical facilities. A summary the existing structure sizes is included in the appendices.

Based on a review of the City data on existing Critical Facilities, the approximate depths of flood water during the 500-year event for the impacted facilities were reviewed. It was determined that the average water depth of 2.0 feet would be used. For this analysis, three water depths would provide a representative sample size, with additional water depths of 0.5 foot and 3.5 feet. With the required 1-foot of freeboard included, the final depths of fill used in this analysis were 1.5 feet, 3.0 feet, and 4.5 feet.

For a typical fill section, it was assumed that the area under the building footprint would require structural fill. All other areas of the property would utilize a lower cost non-structural fill material. For earthwork volume determination, it was assumed than an

average tie in slope of 20:1 horizontal to vertical (5%) from the building limits to existing grade would be reasonable. Slopes steeper than this are difficult to provide ADA access and parking on. The unit costs for fill are "in-place", meaning the final cost includes the purchase of the material, delivery, and fill placement in compliance with necessary compaction requirements. Fine grading costs are excluded, as the developer would be required to do fine grading on the site with or without the fill requirements of the proposed ordinance.

Analysis Results

The results of the fill analysis showed fill costs per square foot of building footprint ranging from $1.21 to $10.04. The resulting percentage increase in building costs per square foot ranges from approximately 1% to 6%, with the majority between 1% and 3%. These results are based on single story construction in order to look at worst case scenarios, and an initial per square foot construction cost of $160 per square foot for smaller facilities and $135 per square foot for larger facilities. See Floodproofing Assumptions in Appendix C for details on base cost determination. In the case of a multi-story facility, the amount of fill required per square foot of building is less than for a single story structure of similar footprint; therefore the percent increase in construction costs per overall building square footage would be lower.

A summary of results is presented below:

	Building Footprint					
	6,000 Square Feet			**58,000 Square Feet**		
Depth of Fill Required (ft)	1.5	3.0	4.5	1.5	3.0	4.5
Fill Quantity (CY)	658	2,233	5,124	4,092	10,190	18,692
Fill Cost per Building SqFt	$1.60	$4.72	$10.04	$1.21	$2.76	$4.72
Orig. Assumed Const. Cost	$160	$160	$160	$135	$135	$135
Adjusted Construction Cost	$161.60	$164.72	$170.04	$136.21	$137.76	$139.72
% Increase	0.99%	2.87%	5.90%	0.89%	2.00%	3.38%

See Appendix C for detailed calculations.

Importing fill as a means of flood protection is an effective solution for protecting Critical Facilities, especially on new large scale projects. In the 500-year floodplain the water depths and velocities are typically lower than in the 100-year, meaning the average depth of fill required on most sites is less than 100-year areas, Additionally, there are no FEMA flood permitting requirements for 500-year flood areas, reducing the costs and timeframe compared to 100-year flood areas. This method of flood protection is expected to be most commonly used on new construction, and is limited to properties that have adequate space to raise the building and still provide adequate access from adjacent roads, etc. See the Critical Facilities Conclusions section for additional discussion.

4.2 FLOODPROOFING BASED FLOOD PROTECTION ANALYSIS

Methodology and Assumptions

The costs associated with dry floodproofing a structure can vary significantly depending on the building construction type and size, the depth of the floodwaters, and the number of doors, windows, and other openings. Because of this, standardized cost data for floodproofing is limited. The cost data that is available is related to the 100-year floodplain, and includes a wide range of building types including wood frame residential structures, which because of the relatively weak timber structural components typically have a higher

floodproofing costs. The proposed ordinance will only impact facilities containing critical land uses located in the 500-year floodplain.

A review of the potential Critical Facilities identified by the City of Boulder as being essential services or containing at-risk populations showed that the typical construction type for these facilities involves either brick, masonry, or similar type water resistant construction. Additionally, large storefronts or similar types of construction that include large expanses of windows or similar wall openings that go low to the ground are not common.

The current 500-year flood depths were reviewed at each site, and it was determined that 28% of the potential at-risk population or essential service facilities currently have main level finish floors located greater than 1-foot above the 500-year floodplain, and therefore would not require floodproofing. In order to have an accurate representation of required floodproofing depths, these facilities were excluded from that analysis. The remaining facilities were used as a sample set for the floodproofing analysis.

When floodproofing an existing structure, there are two main types of floodproofing often utilized. The first involves providing a waterproof barrier that uses the existing walls for support. This approach can only be used for lower flood depths, as the existing wall structure can only resist a certain amount of load. Based on a review of FEMA design guidelines, as well as discussions with local design professionals, existing structures can typically resist water depths of 1 to 3 feet, depending on the existing structural design. Doors and other openings are typically protected by reinforced floodproof doors, and floodgates. For structures where the existing wall systems cannot resist the forces from the flood waters, it is typically most cost effective to install a ringwall around the structure to provide flood protection. Access openings in the ringwall are typically protected by a floodgate or similar device that remains open until flood waters come up. In some cases, the ringwall is tied into the existing structure at doors, and a floodproof door installed. This analysis included costs for floodgates.

The cost-impact analysis results are broken into two groups, one for facilities with 500-year flood depths of 2 feet or less (flood protection depth of 3 ft), which are assumed to be able to utilize the existing wall structure to resist flood forces, and a second group consisting of flood depths greater than 2 feet where a concrete ringwall is utilized for flood protection.

Flood Depth 0-2 feet Analysis Results

A review of City data finds that 72% of the proposed at-risk population and essential service facilities in the 500-year floodplain will require floodproofing. Of the facilities that will require floodproofing, approximately 66% will have flood depth in the range of 0-2 feet. The main level building footprints of these sites were reviewed and two representative building sizes were chosen for the analysis, 4,000 square feet and 34,400 square feet. The average 500-year flood depth for these 14 facilities is 0.8 feet.

	Floodproofing – Facilities with Flood Depths to 2 Feet	
	4,000 Square Feet	**34,400 Square Feet**
Floodproofing Depth (FT)	0-3	0-3
Estimated Average Cost	$28,210	$122,970
Contingency (20%)	20%	20%
Total Estimated Average Cost	$33,852	$147,564
Estimated Cost per S.F.	$8.50	$4.50

See Appendix C for detailed calculations.

Based on the results presented above, it is estimated that floodproofing existing structures where the existing structure can resist the forces from flood waters will cost between $4.50 and $8.50 per square foot. Roughly, one half of the proposed at-risk population and essential service facilities located in the 500-year floodplain are anticipated to be able to floodproof in this manner. Existing facility sizes included in this portion of the analysis range in size from approximately 1,200 square feet to over 65,000 square feet. The results are based on a single story facility. In cases where a multi-level facility is involved, the cost per total square footage would be reduced significantly.

To determine base substantial improvement or modification costs two alternative trigger points were analyzed. The first, substantial improvements, requires the owner to improve the existing structure more than 50% of its current building value. For substantial improvements, the proposed facilities for which Assessor's building value information was available were averaged and multiplied by one-half. A resulting baseline remodel cost per overall building square foot of approximately $38 per square foot to trigger the need for floodproofing was determined. This is an average of varying building types and sizes, therefore actual numbers will vary and this is only the average minimum. A full remodel project will cost significantly more per square foot. The second trigger point, substantial modifications, applies if the existing building square footage is increased more than 50% via an addition. For this, an average of the base construction costs used in the fill analysis ($135/SF and $160/SF) was used, resulting in $148 per square foot as a baseline construction cost that would trigger floodproofing. Under the minimum substantial modification threshold up to three feet of building could be protected for one foot of addition resulting in a worst case base cost per square foot of $49/SF. The average of the substantial improvement or modification costs is $44 per square foot.

Flood Depth 2+ feet Analysis Results

A review of City data estimates that 33% of proposed at-risk population and essential service facilities that require floodproofing will have flood depths greater than 2 feet. The main level building footprints of potential sites were reviewed and two representative building sizes were chosen for the analysis, 2,700 square feet and 64,000 square feet. In order to provide a conservative estimate on cost of compliance, existing facilities with flood depths greater than 2 feet are assumed to utilize a ringwall for flood protection. This is a worst-case analysis, as existing structures utilizing masonry block or concrete construction may be able to resist higher flood depths than the three foot design threshold used here.

	Floodproofing – Facilities with Flood Depths Greater than 2 Feet	
	2,700 Square Feet	**64,000 Square Feet**
Average Flood Depth (FT)	3.5	3.5
Flood Protection Depth (FT)	4.5	4.5
Estimated Cost per S.F.	$85	$12

See Appendix C for detailed calculations.

The resulting costs can range from $12/SF to $85/SF plus for small single level facilities. Ringwalls are a cost effective solution for large or multi-level structures in areas of relatively deep flooding. For small existing structures, compliance with the proposed ordinance is required only for additions or remodels exceeding 50% of the value of the structure. For small buildings, such a large improvement will most likely include such a significant change to the structure involving structural improvements. In this situation additional evaluation to include dry floodproofing measures will be more cost effective than installing a ringwall. This approach is site and building specific, therefore the worst case scenario of installing a ringwall was assumed for this analysis. It should be noted that only 2 facilities impacted by the ordinance have a footprint of less than 10,000 square feet and flood depths greater than 2 feet, and both of those are preschools/day care centers located in single family home structures. The single family structures could still be used as a single family home and therefore another cost effective alternative may be to relocate the facility to another single family home outside of the 500-year floodplain. The anticipated cost impacts for the remaining 5 larger structures in this category ranges from less than $12/SF to roughly $40/SF. This is a conservative analysis assuming none of the structures would be able to utilize the existing structure for flood protection.

Using the same data as discussed previously for the 0 to 2 foot flood depth analysis, the average baseline cost for substantial improvement or modification average costs is $44 per square foot.

4.3 CRITICAL FACILITIES FLOOD PROTECTION CONCLUSIONS

Of the potential at-risk populations and essential service facilities located in the 500-year floodplain, 28% are potentially located above the 500-year water surface elevation, 48% have flooding depth of zero to two feet and 24% have flooding depths greater than 2 feet. The cost associated with providing flood protection to these facilities is dependent on the depth of flooding and existing structural configuration of the facility.

When the extensive flood risk in the City of Boulder is coupled with the limited future development space, it is likely that new critical facilities will be constructed in the 500-year floodplain. Importing fill to elevate the building is a cost effective approach to provide flood protection in 500-year flood areas. The flooding depths and velocities are typically lower than in the 100-year floodplain. Additionally, permitting requirements for importing fill in the 500-year floodplain are less than in the 100-year, as there are no FEMA approvals necessary, reducing costs and timeframe impacts.

It should also be noted that Boulder Valley School District (BVSD) facilities, Federal Facilities, State of Colorado Facilities and facilities operated by the University of Colorado have no requirement to comply with the City of Boulder critical facilities and lodging facilities ordinance. Critical facilities and lodging facilities operated by these entities are

included in this analysis, as the City will encourage all critical land uses and lodging facilities to comply with the proposed ordinance.

5.0 FINAL CONCLUSIONS

Protecting Critical Facilities and Lodging Facilities from flooding is important for a number of reasons, whether it be reducing the economic impact of flooding, protecting public health or reducing risk to life and safety. When a Critical Facility is damaged from flood waters, the damage extends well beyond the limits of the facility itself and includes loss of everyday services that can have severe economic impacts to a community, which can cause delays to the economic and social recovery of the community. Protecting Lodging and Critical Facilities through Emergency Management Plans will promote effective responses to flooding.

Providing 500-year flood protection to Critical Facilities will increase public safety, reduce the impact of flooding, and increase the communities' sustainability and ability to recover and thrive after a major flood.

In summary:

1. Educating the public on the risks associated with flooding is one of the best ways to reduce injuries and loss of human life. Requiring operators of Lodging and Critical Facilities to have a flood Emergency Management Plan in place will increase public knowledge and planning.
2. The City of Boulder is working to reduce the time involved for facility operators to prepare Emergency Management Plans, as well as to create a standardized set of criteria for such plans. This will reduce the cost of preparing Emergency Management Plans, as well as make the anticipated reactions during a flood event more standardized, hopefully decreasing the risk to public safety.
3. Providing flood protection to Critical Facilities protects the overall community population, not just the public within a defined floodplain.
4. Providing flood protection to a Critical Facility limits the interruption of response and service to the public during a flood event.
5. Providing flood protection to Critical Facilities helps control costly repairs to public or private infrastructure facilities, which are extended to the overall community.

The intent of this analysis is to provide a feasibility level opinion of probable cost impacts associated with the proposed ordinance. A list of assumptions is included in the appendices for reference. Facility specific costs were not part of this analysis, and actual bid costs for construction will vary depending on actual site conditions, economic conditions, and extent of work proposed on the facility.

6.0 REFERENCES

- "*Critical Facilities and Flood Risk*" prepared by Association of State Floodplain Managers, Inc., November 2010.
- *"Rules and Regulations for Regulatory Floodplains in Colorado"* prepared by the Colorado Water Conservation Board, November 17, 2010.
- "*2010 Proposed Rules and Regulations for Regulatory Floodplains in Colorado – Cost, Benefit, and Regulatory Analysis"* prepared by Icon Engineering and Colorado Water Conservation Boars, October 14, 2010.
- *"Cost, Benefit, and Regulatory Analysis – Addendum 1",* Colorado Water Conservation Board, November 1, 2010.
- *"CDOT Construction Cost Data 2012",* Colorado Department of Transportation.
- *"RS Means CostWorks",* online construction cost database, RS Means.

APPENDIX A

EMERGENCY MANAGEMENT PLAN

ANALYSIS CALCULATIONS

Summary

FOR:

Preparation of Flood Emergency Management Plans

100-year & 500-year Floodplain Areas

	Evacuation Based		Shelter-in-Place - Existing Facilities		Shelter-in-Place - New Facility
	Simple	Complex	Simple	Complex	
Approximate Number of Existing Facilties Impacted	36	36	3	5	N/A
Plan Prep Costs	$2,625	$3,780	$5,675	$11,675	$3,675
City Fees	$700	$700	$1,400	$1,400	$1,400
Total Costs	$3,325	$4,480	$7,075	$13,075	$5,075

Simple Evacuation Plans consist of:

>Smaller to mid-size facilities that typically consist of one main gathering area or a limited number of rooms that are in close proximity to each other.

>Facilities that do not have temporary or permanent residents.

>Are in areas of shallow flooding with direct evacuation routes to higher elevation locations

>Evacuated persons will not necessarily need housing/long term shelter once evacuated.

Complex Evacuation Plans consist of:

>More complicated/larger facilties such as hotels, dormitories, etc. that have multiple gathering spaces/spread out occupants that will require more advanced planning and additional staff to safely evacuate.

>Facilities that consist of permanent or temporary residents that may require housing/shelter once they have been evacuated.

Shelter-in-Place Cost Notes

>The final fee for shelter-in-place projects that require a structural analysis may vary significantly due to the different construction types and facility sizes. For a "simple" plan, a fee of $2,000 for strucutural analysis was used. For the "complex" plan, a estimated fee of $8,000 was used for a strucutural engineer to complete a full structural analysis of an existing structure.

Flood Emergency Evacuation Plan
Estimated Consulting Fees
<u>Simple Evacuation Based Plan</u>

	SPECIFIC TASK	ESTIMATED HOURS
1	Review city requirments (Planning Guide, Submittal Requirments, etc.)	4
2	Review floodplain information regarding subject property.	1
3	Discuss requirments with client/owner and determine planning approach.	2
4	Prepare outline of report covering planned approach.	2
5	Discuss planned approach with City staff. Contact Boulder County	2
6	Prepare draft of Flood Emergency Management Plan	6
7	Client review and plan edits.	4
8	Submit to City and respond to City comments/edits.	4
	Total Estimated Hours	25

Estimated Associated Consulting Costs $2,625
(Based on average hourly rate of $105/hour)

Flood Emergency Evacuation Plan
Estimated Consulting Fees
Complex Evacuation Based Plan

	SPECIFIC TASK	ESTIMATED HOURS
1	Review city requirments (Planning Guide, Submittal Requirments, etc.)	4
2	Review floodplain information regarding subject property.	2
3	Discuss requirments with client/owner and determine planning approach.	3
4	Prepare outline of report covering planned approach.	2
5	Discuss planned approach with City staff. Contact Boulder County	4
6	Prepare draft of Flood Emergency Management Plan	10
7	Client review and plan edits.	6
8	Submit to City and respond to City comments/edits.	5
	Total Estimated Hours	36

Estimated Associated Consulting Costs $3,780
(Based on average hourly rate of $105/hour)

Flood Emergency Evacuation Plan
Estimated Consulting Fees
Shelter In Place

	SPECIFIC TASK	ESTIMATED HOURS
1	Review city requirments (Planning Guide, Submittal Requirments, etc.)	4
2	Review floodplain information regarding subject property.	2
3	Discuss requirments with client/owner and determine planning approach.	2
4	Prepare outline of report covering planned approach.	2
5	Discuss planned approach with City staff. Contact Boulder County	6
6	Prepare draft of Flood Emergency Management Plan	10
7	Client review and plan edits.	5
8	Submit to City and respond to City comments/edits.	4
	Total Estimated Hours	35
	Estimated Associated Consulting Costs	$3,675
	(Based on average hourly rate of $105/hour)	
	Additional Items	
1	Strucutral Analysis of Existing Structure - Simple	$2,000
2	Strucutral Analysis of Existing Structure - Complex	$8,000

APPENDIX B

CITY OF BOULDER EMERGENCY PLANNING FOR FLOODING/FLASH FLOODING EVACUATION AND SHELTER IN PLACE GUIDELINES

Emergency Planning for Flooding /Flash Flooding
Evacuation and Shelter-in-place

Purpose: This document is being provided to entities whose facilities are subject or may be subject to flooding and /or flash flooding to utilize in the preparation of evacuation and /or shelter-in-place plans. This document is intended for use by entities such as: long term care facilities, hotels, motels, day care facilities, schools, dormitories, and high occupancy areas, etc in creation of their flood response plan. Entities should utilize this document as ***guidance for preparing a written plan.*** This document is also being utilized by City of Boulder planning staff to review the plans prepared.

Background: The City of Boulder is the #1 flash flood risk in the State of Colorado. This is due to the city's location at the mouth of the Boulder Canyon and the number of people who live and work in the floodplain. An emergency action plan can help with preparing for this natural disaster. This document was created in conjunction with the development of a critical facilities ordinance for the City of Boulder. For more information concerning this document or the ordinance, please contact the City of Boulder's Planning and Development Services Center at (303)441-1880 or plandevelop@bouldercolorado.gov

NOTE: Emergency management plans must include either an evacuation plan (certified by a registered architect or Colorado registered professional engineer) or a shelter-in-place plan (certified by a Colorado registered professional structural engineer).

Planning Element	**Planning Criteria / Questions** (For use by those **preparing** plans)	**Plan Review Guidelines** (For use by those **reviewing** plans.)	
General Planning Considerations			
Situational Awareness	• How does your facility monitor severe weather situations? During off hours? • Who has responsibility for monitoring severe weather? • What is the step-by-step response plan for flood watches, flood warnings? • How and when is the staff informed of changing weather situations?	A section regarding monitoring of severe weather situations should be included in the plan. This section should detail a plan for keeping staff informed of potential issues related to severe weather.	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
Plan Activation Decisions	• Is a decision tree or other schema available to assist managers in making decisions? • Is there sufficient time to organize a safe evacuation? • Is the likelihood of harm to persons more if they stay in place, or more if they evacuate? • Is there sufficient staff to safely evacuate? If not, how quickly can staff be called in to assist? • Is there a place that will be adequate for shelter-in-place? Are there upper floors? • Is back-up power available? • Are there adequate supplies to shelter for up to 48 hours without outside assistance?	The plan should be specific as to how decisions to shelter-in-place and/or evacuate are made. The plan should list who is authorized to make evacuation decisions. Note: the plan may include several types of evacuations and no one method is preferred. The choice of evacuation versus shelter-in-place will be situation dependent. Often a flow chart is included, but it isn't necessary if the decision-making criteria are clear and apparent to the reader.	☐ Met ☐ NOT Met
Notifications	• Plans should include a section showing who will be notified once the decision to shelter-in-place or evacuate has been made by your facility. • Contact information should be included and up to date. • Notifications should be made to: family members, emergency management, staff, persons affected by the evacuation and potentially local law enforcement and EMS resources if needed to assist with the evacuation. • Notifications should include information	A list of those persons /entities to be notified should be included in the plan. At a minimum, the list should include: • Emergency Management • Alternate locations for evacuation • Family Members • Staff being called back	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	regarding: where persons are being evacuated to, locations of any family assistance centers, expected duration of the evacuation, etc. • Does your facility have a plan for updating the contact information at least annually?		
Communications Protocols	• The most efficient, effective means of communication should be considered. This should be based on the number and type of persons occupying the building. • Time is also a consideration in your communications protocol. Do you have time to call the families of 500 school children? Would notification by e-mail be more efficient? Could the press be enlisted to assist with communications? • What method will you use to let hotel guests know that they need to evacuate the building? How will you let them know where the nearest shelter is located? • Do you have contact information for everyone you may need to contact? This might include: transportation resources, additional staff members, alternate site managers, suppliers of food and medical supplies, etc. • What methods will be used to communicate in the event of primary phone line failure? Redundant	The plan should include a procedure for communicating the facility's intentions regarding shelter-in-place or evacuation. This may require several methods in order to be effective and efficient depending on the number of persons housed at the facility. For example, a school may use electronic notifications to parents, while a small long-term care facility may use a calling tree to notify family members. A redundant communications system should be described.	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	communications systems should be established.		
Public Information	• This is a consideration for facilities that have large numbers of occupants whose families may need to be notified of plans for evacuation or shelter-in-place. • Do you have contact information for media? • Do you have pre-prepared messages that can be given out as to where the evacuated persons will be housed? How family members should go about getting together with loved ones?	Depending on the type and size of facility, a section about public information regarding evacuation and family reunification may be included.	☐ Met ☐ NOT Met ☐ N/A
Staff Availability	• Determine the number of staff members needed to supervise persons evacuated or sheltered. Because evacuation and shelter-in-place are not familiar things for people to do, additional staff may be necessary to prevent panic among evacuees. • If persons being evacuated have special needs such as mobility issues more staff or specialized staff or specialized equipment WILL BE NEEDED to evacuate safely. Plans should address these needs. • Will it be necessary to call staff in to assure the safety of persons during the evacuation?	In order for a response to be effective, an adequate number of staff members to provide direction and supervision must be available. The facility's plan should describe the minimum number of persons needed to assist with an evacuation and/or shelter-in-place. This number will not be standardized across plans, but will change with the type and number of persons being evacuated or sheltered. For example, a school may have a sufficient number of teachers during school hours to manage an evacuation, while a long-term care facility may need additional staff to safely evacuate residents.	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
Roles and Responsibilities	• Who is responsible for implementing the plan? • Who is responsible for making notifications to families? • Who is responsible for arranging transportation? • Who is responsible for assuring the safety of the evacuees during the evacuation process? • Who is responsible for securing the facility and turning off utilities? • Who is responsible for taking needed supplies /equipment to the alternate site?	Significant roles and responsibilities during the incident should be detailed. Names are not necessary in the plan, responsibilities by position are usually sufficient.	☐ Met ☐ NOT Met
Identification of Special Needs Populations	• Special needs populations are defined as those persons who may need additional assistance during an emergency. The following functional needs should be considered: communication, medical care, maintaining independence, supervision, transportation, institutionalized populations, non–English speaking, transportation disadvantaged, and those with chronic medical disorders and /or pharmacological dependence. • Do your have persons in your facility that will not be able to walk? That will need special equipment or medications? That will need extra supervision outside of the facility setting? • Plans should pre-determine the list of	Each plan should take into account any special needs populations likely to be present at the facility. The plan should take into account: • Children, elderly, medically fragile, those needing supervision such as mentally handicapped or patients with Alzheimer's • The ability of the special population to follow the plan with available supervision. • The amount of additional supervision (staff) that might be necessary to accomplish an evacuation safely. • Any specialized transportation	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	special needs categories and assure planning is adequate to address those needs prior to evacuation or shelter-in-place. • Are there pets or service animals that must be evacuated? • Are there patients /residents that will need to remain in isolation because of their illness?	needs of the special population. • Any medications or specialized equipment needs of the special population.	
Recordkeeping	• What records will you need to take with you to the evacuation site or to the shelter-in-place location since you won't be able to go back to locate them later? • Do you have printed contact lists for staff and families? Will you be taking electronic records on a laptop? • Do you have phone numbers for those agencies who can assist you? Emergency Management, Insurance Agencies, etc • What method will you use to document the event? • For health care facilities, how will patient status changes be documented? • Where are copies of important documents being kept? Copies should be kept off-site in a secure, non-floodprone location. • A copy of your emergency management plan MUST be available for use on the inside of each doorway leading to a	A list of important documents to be taken to the evacuation or shelter-in-place site should be listed in the plan. At a minimum, the following documents should be included: • Staff Contact List • Evacuee List • Emergency Phone Numbers • Map of the Facility For long-term care facilities, a minimal patient record should be identified as a critical record. For schools and day care facilities, parent contact information should be identified as a critical record.	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	separate hotel, motel, dormitory, rooming house, hostel unit and displayed in a prominent location in any room with an occupancy limit above 50 persons.		
Memorandums of Agreement	• Do you have Memorandums of Agreement with the owners of the facilities to which you intend to evacuate? • Do you have Memorandums of Agreement with transportation resources that might be needed? • Will you need other services such as a generator and fuel if you intend to shelter-in-place? There must be agreements for these services in place in advance of the emergency. • For long term housing or medical populations, sheltering agreements must specify that the agreement is in force until the original structure is declared safe to re-occupy.	The plan should list any Memorandums of Agreement the facility has with other facilities and transportation entities to support the plan for evacuation and /or shelter-in-place. For example, if the facility is planning to evacuate to a nearby building on higher ground, they should have a written agreement with the facility that details when and how the facility is accessed. The same is true for transportation resources.	☐ Met ☐ NOT Met ☐ N/A
Training and Exercise of Plan	• How will staff learn about their responsibilities in the plan? • How will you coordinate with partner agencies for training on the plan? • How often will you provide training to the staff? • How will training be documented? • At a minimum training should be provided annually to employees and upon hire for new employees.	Although few will have exercised their plan, there should be, at a minimum, a process for training staff (and potentially persons affected by the plan) regarding the evacuation and shelter-in-place plans.	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
Demobilization	• If you evacuated your facility, who is responsible for determining when the facility is again safe to occupy? • What is your plan if the facility is too damaged to re-occupy? • What mechanism will be used to get persons back in the facility? This will be especially important for medically fragile persons. Will EMS be needed? • How will family members and others be notified of your intention to move back to your own facility? • Health Department and Building Department approvals may be necessary before the building can be re-occupied.	The plan should include a section that details when and how persons will again be allowed to re-occupy the facility. It should be clearly defined in the plan who can authorize re-entry into the building or evacuated areas of the building.	☐ Met ☐ NOT Met
References	• References should be included as a part of the plan if needed. • Is the plan for evacuation / shelter-in-place a part of a larger Emergency Response Plan that should be referenced?	Some plans may contain this section.	
Shelter-in-place Planning Considerations			
Sheltered Persons / Staff Ratio	Sheltering in place within your own building will place a large stress on persons being sheltered. Consideration should be given to the number of additional staff members that will be needed to gather supplies, assist persons in the move, and maintain order and calm during the sheltering.	The plan should include information about the number of staff members that will be needed to accomplish the sheltering. A shelter-in-place plan should be prepared for no less than 24 hours.	☐ Met ☐ NOT Met ☐ N/A
Sheltered Persons	• Do you know who is in your facility at any	The plan should provide details	☐ Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
Accountability	given moment? Including visitors and staff? • How will you assure that each person has been moved to the shelter-in-place area? • How often will you account for persons? • How will you track if/when additional persons arrive or persons leave? Remember you may not be able to keep all persons at your facility, even if it is in their best interest.	about how the facility will keep track each person being sheltered. This might be as simple as a roll call process for small daycares to an electronic system for large facilities. Some facilities such as hotels / motels will have difficulty in tracking who is present in the building when the disaster occurs. Consideration should be given to staff accountability and newly arriving family members, etc as well.	☐ NOT Met
Identification of Shelter Area(s)	• Have shelter locations within your building been pre-identified? • Consideration should be given to: number of persons to be sheltered, amount of space needed for each person, toilet facilities, electric power, water availability, and special needs of those being sheltered. • Have emergency responders and emergency management agencies been notified of your intended shelter areas? • Plans will need to be certified by a structural engineer that the facility can provide shelter during the flood.	Each plan should pre-identify a shelter-in-place location. The location should be safe from flooding, and be appropriate for the number and type of persons being sheltered.	☐ Met ☐ NOT Met
Equipment	Ready.gov at http://www.ready.gov/ offers many helpful suggestions for businesses regarding the types of equipment that may be needed in order to shelter-in-place. Depending on the length of time you	The plan should include a list of equipment that will be needed. The list should be specific as to type and quantity of item needed and based on the length of the anticipated	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	anticipate sheltering, you should consider: bed linens, chairs, entertainment items, radios, flashlights, first aid supplies, medical equipment, garbage bags, whistles, towels, sanitation items, weather radios, etc. It will be important to have recordkeeping materials and communications tools such as cell phones with you at the shelter area. The needed equipment must be moved to the shelter area – you can't go back into dangerous areas and get equipment later.	shelter-in-place and the type of persons being sheltered. For example, long term care residents may need beds (or to have their beds moved) whereas school children could do with bed linens /sleeping bags.	
Supplies	Ready.gov at http://www.ready.gov/ offers many helpful suggestions for businesses regarding the types of supplies that may be needed in order to shelter-in-place. Depending on the length of time you anticipate sheltering, you should consider: food, water, paper towels, toilet paper, etc. You should calculate how much food and water each person will need for the shelter period. A buffer of 5-10% is usually added for unanticipated persons or an unusually lengthy stay. The needed supplies must be moved to the shelter area – you can't go back into dangerous areas and get supplies later.	The plan should include a list of supplies that will be needed. The list should be specific as to type and quantity of item needed and based on the length of the anticipated shelter-in-place and the type of persons being sheltered. For example, day care facilities will need to have supplies of different sized diapers moved to the shelter area. Food and water are the first priority for supplies. Plans that do not discuss at least food, water, and sanitary supplies would not be considered adequate.	☐ Met ☐ NOT Met
Pharmaceuticals	• All facilities should assure that a basic first aid kit is available at the shelter site. • Facilities that have individuals needing medication on a routine basis should plan accordingly and assure that an adequate	The plan should discuss the type of persons at the facility and typical needs. It not necessary to list medications specifically, since this will change with the population at the	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	supply of pharmaceuticals and appropriate storage are available in the shelter area. Depending upon the type of medication, refrigeration may be necessary. • Schools and day cares should plan to move any student /child medications to the shelter site.	facility, and may change from day to day. A plan for safe storage and monitored distribution of these medications should be included in the plan.	
Evacuation Planning Considerations			
Evacuee / Staff Ratios	Consideration should be given to the number of additional staff members that will be needed to gather supplies, assist persons in evacuating, and maintain order and calm during the sheltering. Special needs persons such as those with limited mobility may need one-to-one assistance with the evacuation.	The plan should include information about the number of staff members that will be needed to accomplish the evacuation. A list of agencies that could be used to assist in the evacuation could also be included in the plan. First responders will be overwhelmed and may not be able to respond.	☐ Met ☐ NOT Met
Special Needs during Evacuation	• Does your facility have persons with special needs that will be evacuated? • How will special needs be met? • Long-term care facilities should plan for residents that are bedfast or have mobility issues and for residents with cognitive dysfunction that may impair their ability to follow instructions.	The plan should discuss the types of special needs that will need to be met during the evacuation. These may include: • Mobility issues • Cognitive limitations • Age • Language	☐ Met ☐ NOT Met ☐ N/A
Facilities Considerations	• What is the plan for leaving the building? • Will utilities be turned off or left on? • How will the facility be secured? • What will be necessary to assure that the	The plan should address issues related to the facility that is being evacuated.	☐ Met ☐ NOT Met

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	facility can be re-occupied in a timely fashion once the flood waters have subsided?		
Evacuation Routes and Times	Planning evacuation routes is a complex process and planners should consider: • The physical and cognitive limitations of those being evacuated. Can patients with mobility issues realistically be expected to walk a ½ mile route to safety? • The length of time available to evacuate • The number of staff members that are available to assist with the evacuation. • The amount of resources, such as vans and other transportation that is available. • The location to which persons are being evacuated. • The amount of space available in each shelter.	Evacuation routes and times will vary widely with the type of facility and number of persons to be evacuated. The most reasonable route should be used. In general the shortest route should be used. The Agency for Healthcare Research and Quality has an evacuation calculator that may be of use in determining reasonableness of the evacuation routes and times in the plan. The calculator can be found at: http://massevacmodel.ahrq.gov/	☐ Met ☐ NOT Met
Transportation resources	Transportation resources will be key to a successful evacuation. It is important to note that other facilities may be competing for the same resources during the disaster or impending disaster. Redundancy is key. Another key criteria to consider is how many trips will be necessary. It is likely that there will not be sufficient EMS resources to move residents/patients in a single wave and a staging process will be needed. EMS may be unavailable during the incident. • How will you prioritize who gets	Again, the number and type of resources needed will be dependent on: • Number of persons to be evacuated • Special needs • Locations of shelters for evacuees The plan should have a comprehensive step-by-step plan for evacuation. Generally, this works like medical triage. Those that can	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	evacuated? • What MOA do you have with transportation providers?	evacuate themselves without assistance are evacuated first followed by those who need assistance. In large facilities, and especially in medical care facilities, a prioritization process will be needed. The plan must address methods to evacuate everyone. Facilities must be able to accomplish full evacuation and the plan must be sufficiently detailed to address that requirement.	
Evacuee Accountability	• Do you know who is in your facility at any given moment? Including visitors and staff? • How will you assure that each person has been evacuated? • How often will you account for persons?	The plan should provide details about how the facility will keep track of each person being evacuated. This might be as simple as a roll call process for small daycares to an electronic system for large facilities. Some facilities such as hotels / motels will have difficulty in tracking who is present in the building when the disaster occurs. This tracking will be especially important for facilities with large numbers of persons being evacuated or persons being evacuated to multiple locations.	☐ Met ☐ NOT Met ☐ N/A
Equipment	Ready.gov at http://www.ready.gov/ offers many helpful suggestions for businesses regarding the types of supplies that may be needed when evacuating. Depending upon the length of time you anticipate it taking to	The plan should include a list of supplies that will be needed. The list should be specific as to type and quantity of item that will be taken as the facility evacuates. Plans should	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	evacuate the facility, you should consider: water, wheelchairs, other assistive devices. Planners should also consider what types of items will be available at the evacuation site and what equipment should be taken along. The evacuation route may also dictate what equipment is needed. Will persons be walking long distances? Over rough terrain? Will persons be transported by vehicle? .	be specific as to what equipment will need to be acquired from other sources for the move. For example, a long term care facility may not have enough wheelchairs to transport residents in the amount of time available for the evacuation. .	
Supplies	Ready.gov at http://www.ready.gov/ offers many helpful suggestions for businesses regarding the types of supplies that may be needed during an evacuation process. Depending on the length of time you anticipate evacuation will take, you should consider the food and water needs of those being evacuated. It is generally not necessary to take along significant quantities of supplies during an evacuation if you have chosen the site you are evacuating to carefully and provided the proper notifications to those agencies will be assisting with the process. .	The plan should include a list of supplies that will be needed. The list should be specific as to type and quantity of item needed. If the plan is to evacuate persons to a pre-planned shelter run by an agency that typically shelters persons, only a limited number of items are needed. Hotels, for example will likely be notifying persons to evacuate, rather than actually physically assisting guests to another location.	☐ Met ☐ NOT Met ☐ N/A
Pharmaceuticals	• All facilities should assure that a basic first aid kit is available during the evacuation. • Facilities that have individuals needing medication on a routine basis should plan accordingly and assure that an adequate supply of pharmaceuticals and	The plan should discuss the type of persons at the facility and typical needs. It not necessary to list medications specifically, since this will change with the population at the facility, and may change from day to day. A plan for safe storage and	☐ Met ☐ NOT Met ☐ N/A

Planning Element	Planning Criteria / Questions (For use by those **preparing** plans)	Plan Review Guidelines (For use by those **reviewing** plans.)	
	appropriate storage are available for transfer to the evacuation area. . • How will these medications be transported and controlled during the evacuation? • Depending on the type of persons being moved, it may be necessary to pre-medicate evacuees. For example, patients with pain management issues may need medication prior to being transported over rough ground. • Facilities may wish to consider how safe medications will be after the facility is evacuated. Will pharmacy areas be locked, etc?	monitored distribution of these medications should be included in the plan.	

APPENDIX C

CRITICAL FACILTIES

FLOOD PROTECTION ANALYSIS

CALCULATIONS

Flood Protection Analysis Assumptions

- The dataset of existing facilities used in this analysis is based City of Boulder GIS data and associated database information provided by the City of Boulder.

- This analysis is a feasibility level study, utilizing a review of City data, FEMA and related documentation, previous project experience, and discussions with local design and construction professionals. Cost ranges provided are for planning purposes only, and specific construction estimates may vary significantly depending on actual facility type and size.

- Baseline construction costs were determined by reviewing RS Means online CostWorks construction data for 2010. Similar facility types as the critical facilities in the City of Boulder were reviewed and a representative average determined.

- For the Fill Analysis, Colorado Department of Transportation 2012 Cost Data book, as well as previous project experience in the area, we utilized to determine base costs for structural and standard fill materials.

- For the Floodproofing Analysis, a cost for a floodproof door entry was obtained from a local supplier. The assumed size was a 12'x9' opening with double swinging doors and glass on each side. The estimated cost was roughly $8,500. For the analysis, it was assumed that most properties would utilize a brick or similar material on each side of the doors up to the flood protection elevation, instead of waterproof glass. This is the most common method used in the City of Boulder; therefore an adjusted cost per main entry of $7,500 was used in the analysis.

- For critical facilities with flood depths less than 2 feet, it was assumed that the existing structure would be able to resist flood waters. Based on the typical construction type of many critical facilities (brick or masonry), it was assumed for this analysis that a watertight veneer wall around the structure would not be needed. Only existing openings and wall penetrations would need to be protected. See the detailed spreadsheets for assumed number of openings, etc.

- Critical facilities with flood depths great then 2 feet were assumed to all utilize a 10" thick concrete ringwall around the structure. A 4 foot offset was assumed from the existing structure, with a 30" deep footing.

Existing Facility Analysis - Overall
FOR:
Critical Facilities Flood Ordinance

500-year Floodplain Areas

Existing Critical Facilities:	63
Located within 500-year	31
Used in Analysis	29

Note: Excludes Hazardous Materials Sites

			All Critical Facilities in 500-Year Floodplain	
Site	Address	Type	Main Level Footprint (SF)	500-Year Flood Depth (FT)
American Medical Response	3800 Pearl St.	Essential Services	6,480	1.0
Boulder Fire Station 5	4365 19th St.	Essential Services	3,745	-2.3
Public Safety Building	1805 33rd St	Essential Services	62,926	4.3
Xcel Boulder Terminal	2500 28th St	Essential Services	1,899	-3.1
Yards / Parks and Rec Maint	5050 Pearl St	Essential Services	120,700	-2.2
Boulder County Clerk and Recorder	1750 33rd St	Essential Services	35,986	3.7
U.S. West Communications (QWEST)	1545 Walnut St	Essential Services	19,334	2.5
Boulder Fire Station 7	1380 55th St	Essential Services	5,163	1.0
Columbine Elementary School	3130 Repplier St	At-risk Population	53,594	1.4
Boulder County Head Start	2675 Mapleton Ave	At-risk Population	3,594	1.0
Sunflower Preschool	3340 Dartmouth	At-risk Population	2,292	4.2
Homestar Child Development Center	3280 Dartmouth Ave	At-risk Population	3,000	4.2
New Horizons Cooperative Preschool	1825 Upland Ave	At-risk Population	5,452	-7.2
Alterra Villas at the Atrium	3350 30th St.	At-risk Population	26,898	-0.5
Mountain Morning Preschool	1286 Sumac Ave	At-risk Population	884	-1.5
McGregor's Garden Preschool	3535 Eastman Ave	At-risk Population	1,204	0.2
Tiny Minders Day Care	3685 Martin Dr	At-risk Population	2800	-4.7
Canyon Pointe Housing	700 Walnut St	At-risk Population	17,010	1.3
Eisenhower Elementary School	1220 Eisenhower Dr	At-risk Population	66,675	0.4
Boulder County Head Start (Martin Park)	3650 Martin Dr	At-risk Population	4,400	1.8
Shining Mountain Waldorf School	1179 UNION AV	At-risk Population	10,650	2.3
Montessori Education of the Rockies	4745 Walnut St	At-risk Population	20,445	0.7
September School	1902 WALNUT ST	At-risk Population	3,480	-2.0
September School (Auditorium)	1833 19TH ST	At-risk Population	1,263	-1
Boulder County Justice Center (CJC)	1777 6th St	Essential Services	191,430	4.5
Rallysport Health Club Day Care	2727 29th St	At-risk Population	30,388	0.5
Police Annex	1500 Pearl St.	Essential Services	37,069	1.8
Boulder Sheriff	5600 Flatiron Parkway	Essential Services	41,200	0.5
First Presbyterian Church	1820 15th St.	At-risk Population	16,190	0.5
Boulder Community Foothills Hospital	4747 Arapahoe Ave.	Essential Services	n/a	n/a
Regional Transportation District	1707 Exposition Dr	Essential Services	164,704	6.1

(RTD Facility & BCH Foothills excluded from analysis, as these are unique faciltites and not representative of typcial examples for analysis purposes)

Average Footprint (SF)	
27,453	
Average - Under 20,000 SF	
6,047	6,000 SF Used in Fill Analysis
Average - Over 20,000 SF	
57,816	58,000 SF Used in Fill

Existing Facility Analysis - Detail

FOR:

Critical Facilities Flood Ordinance

500-year Floodplain Areas

	Exist. Facilities that would require floodproofing	
Type	Main Level Footprint (SF)	500-Year Flood Depth (FT)
Essential Services	6,480	1.0
Essential Services	62,926	4.3
Essential Services	35,986	3.7
Essential Services	19,334	2.5
Essential Services	5,163	1.0
At-risk Population	53,594	1.4
At-risk Population	3,594	1.0
At-risk Population	2,292	4.2
At-risk Population	3,000	4.2
At-risk Population	26,898	-0.5
At-risk Population	1204	0.2
At-risk Population	17,010	1.3
At-risk Population	66,675	0.4
At-risk Population	4,400	1.8
At-risk Population	10,650	2.3
At-risk Population	20,445	0.7
Essential Services	191,430	4.5
At-risk Population	30,388	0.5
Essential Services	37,069	1.8
Essential Services	41,200	0.5
At-risk Population	16,190	0.5

		Average Depth (FT)	
	Number Facilities	1.8	2.0 FT used for fill analysis
2 FT or Less Depth:	14	0.8	
2+ FT Depth:	7	3.7	

Existing Facility Analysis - Detail

FOR:

Critical Facilities Flood Ordinance

500-year Floodplain Areas

Facilities that would require floodproofing up to 3 FT
(500-YR Flood Depths Less than 2 FT)

Type	Main Level Footprint (SF)	500-Year Flood Depth (FT)	
Essential Services	6480	1.0	
Essential Services	5,163	1.0	
At-risk Population	53,594	1.4	
At-risk Population	26,898	-0.5	
At-risk Population	1,204	0.2	
At-risk Population	17,010	1.3	
At-risk Population	66,675	0.4	
At-risk Population	4,400	1.8	
At-risk Population	20,445	0.7	
At-risk Population	3,594	1.0	
At-risk Population	30,388	0.5	
Essential Services	37,069	1.8	
Essential Services	41,200	0.5	
At-risk Population	16,190	0.5	
Average Building Size	23,594	0.8	
Small Size Average	4,168	1.0	4,000 SF used for Analysis
Large Average	34,385	0.7	34,400 SF used for Analysis

Facilities assumed to require floodproofing via ringwall
(500-YR Flood Depths Greater than 2 FT)

Type	Main Level Footprint (SF)	500-Year Flood Depth (FT)	
Essential Services	62,926	4.3	
Essential Services	35,986	3.7	
Essential Services	19,334	2.5	
At-risk Population	2,292	4.2	
At-risk Population	3,000	4.2	
At-risk Population	10,650	2.3	
Essential Services	191,430	4.5	
Average Building Size	46,517	3.7	3.5 Feet used for Analysis
Small Size Average	2,646	4.2	2,700 SF used for Analysis
Large Average	64,065	3.5	64,000 SF used for Analysis

Fill Import Cost Analysis - Small Facility

FOR:

Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Square Ft:	6,000
Assumed Construction Cost:	$160
Structural Fill Cost (per CY)	$19
Standard Fill Cost (per CY)	$10

3.0 Ft Average = 2.0 Ft Water Depth + 1.0 Ft Freeboard

Required Fill Depth (ft)	1.5	3.0	4.5
Total Fill Amount (CY)	658	2233	5124
Strutural Fill Amount (CY)	333	667	1,000
Standard Fill Amount (CY)	325	1,566	4,124
Fill Cost	$9,580	$28,330	$60,240

Fill cost per building square footage	$1.60	$4.72	$10.04
Adjusted Construction Cost	$161.60	$164.72	$170.04
% Increase	0.99%	2.87%	5.90%

Notes:

>Fill costs include import and placement of fill, including compaction. Fine grading costs are not included, as this work is always required even when fill is needed.

>Required fill depth assumes depth to bring project site to 1-foot above the 500-year water surface elevation.

>Required fill volumes have been calculated using Autodesk Civil 3D software utilizing 3D grading models and tin-based earthwork quantity analysis.

Fill Import Cost Analysis - Large Facility

FOR:

Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Square Ft:	58,000
Assumed Construction Cost:	$135
Structural Fill Cost (per CY)	$19
Standard Fill Cost (per CY)	$10

Average = 2.0 Ft Water Depth + 1.0 Ft Freeboard

Required Fill Depth (ft)	1.5	3.0	4.5
Total Fill Amount (CY)	4,092	10,190	18,692
Strutural Fill Amount (CY)	3,222	6,444	9,667
Standard Fill Amount (CY)	870	3,746	9,025
Fill Cost	$69,920	$159,900	$273,920

Fill cost per building square footage	$1.21	$2.76	$4.72
Adjusted Construction Cost	$136.21	$137.76	$139.72
% Increase	0.89%	2.00%	3.38%

Notes:

>Fill costs include import and placement of fill, including compaction. Fine grading costs are not included, as this work is always required even when fill is needed.

>Required fill depth assumes depth to bring project site to 1-foot above the 500-year water surface elevation.

>Required fill volumes have been calculated using Autodesk Civil 3D software utilizing 3D grading models and tin-based earthwork quantity analysis.

Floodproofing Analysis
0-2 Ft Depths - Small Facility
FOR:
Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Footprint (SF): 4,000

Flood Depth: Up to 2 FT
Flood Protection Elevation: 0-3 FT

Note: It is assumed that for facilities with flood protection heights of 3 FT (flood depths of 2Ft or less) or less, the existing walls will be able to resist the flood loads. The majority of existing critical facilties consist of brick and/or masory exteriors, therefore additional veneer is not required in order to provide a waterproof exterior. Doorways and any other entries will require floodproofing, as well as utility openings and any other wall penetrations.

Building Perimeter (LF): 253
Number of Entries: 2 Doorways - 1 main and 1 secondary

Floodproofing Items	Approximate Unit Cost	Approximate Cost	
3'-6" Secondary Entry	$4,000	$4,000	
6' Main Entry	$7,500	$7,500	
Sewer Backflow Preventer	$1,300	$1,300	
Sealing of Minor Wall Penetrations	$1,200	$1,200	
Incidentals, etc.	$2,800	$2,800	
Construction Sub-Total		**$16,800**	
	Structural Analysis	$3,000	
	Civil and Architectural	$4,000	
	Permit Costs	$4,410	$3,675 Initial fee + 20%
	Overall Sub-Total	**$28,210**	
	Contingency (20%)	$5,642	
	Total	**$33,852**	
	Cost per Square Foot	$8.46	

Assumed Average Cost/SF for Small Facilties in Boulder: $8.50/SF

Floodproofing Analysis
0-2 Ft Depths - Large Facility
FOR:
Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Footprint (SF): 34,400

Flood Depth: Up to 2 FT
Flood Protection Elevation: 0-3 FT

Note: It is assumed that for facilities with flood protection heights of 3 FT (flood depths of 2Ft or less) or less, the existing walls will be able to resist the flood loads. The majority of existing critical facilties consist of brick and/or masory exteriors, therefore additional veneer is not required in order to provide a waterproof exterior. Doorways and any other entries will require floodproofing, as well as utility openings and any other wall penetrations.

Building Perimeter (LF): 742
Number of Entries: 4 Doorways - 1 main and 3 secondary
1 garage/service entry - 12 FT wide

Floodproofing Items	Approximate Unit Cost	Approximate Total Cost	
3'-6" Secondary Entry	$4,000	$12,000	(3 Total)
6' Main Entry	$7,500	$7,500	
Floodgate - 14' wide	$63,000	$63,000	
Sewer Backflow Preventer	$1,300	$1,300	
Sealing of Minor Wall Penetrations	$2,500	$2,500	
Incidentals, etc. (20%)	20%	$17,260	
	Construction Sub-Total	**$103,560**	
	Structural Analysis	$7,500	
	Civil and Architectural	$7,500	
	Permit Costs	$4,410	($3,675 initial fee + 20%)
	Overall Sub-Total	**$122,970**	
	General Conditions/Contingency (20%)	$24,594	
	Total	**$147,564**	
	Cost per Square Foot	$4.29	
Assumed Average Cost/SF for Large Facilties in Boulder:		**$4.50/SF**	

Floodproofing Analysis
2+ Ft Depths - Small Facility
FOR:
Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Footprint (SF): 2,700

Flood Depth: Greater Than 2 FT
Flood Protection Elevation: 3+ FT

Note: It is assumed that facilities with flood protection heights greater than 3 Ft (flood depths greater than 2 FT) that the existing walls will not be able to resist the flood waters. Therefore, typically the most cost effective manner of flood proofing is to install a concrete ring wall around the structure. Existing entries are assumed to require a floodgate for protection, as existing door frames cannot resist flood forces without significant modification.

Building Perimeter (LF): 208
Number of Entries: 2 Doorways - 1 main and 2 secondary
Ringwall Perimeter (4' offset): 240

Design Floodproofing Depth for Ringwall: 3.5 FT + 1 FT Freeboard = 4.5 FT

Floodproofing Items	Approximate Unit Cost	4.5 Ft Depth	
Concrete Ringwall (8" thick)	$48	$80,640	Assume 2.5' deep footing
Floodgates (48" wide)	$21,000	$21,000	Secondary Entry
Floodgates (8' wide)	$47,000	$47,000	Main Entry
Sewer Backflow Preventer	$1,300	$1,300	
Incidentals, etc.	20%	$29,988	
	Construction Sub-Total	**$179,928**	
	Structural Analysis	$3,000	
	Civil and Architectural	$4,000	
	Permit Costs	$4,410	($3,675 initial fee + 25%)
	Overall Sub-Total	**$191,338**	
	General Conditions/Contingency (20%)	$38,268	
	Total	**$229,606**	
	Cost per Square Foot	$85.04	

Assumed Average Cost/SF for Small Facilties in Boulder: $85/SF

Floodproofing Analysis
2+ Ft Depths - Large Facility
FOR:
Critical Facilities Flood Ordinance

500-year Floodplain Areas

Building Footprint (SF): 64,000

Flood Depth: Greater Than 2 FT
Flood Protection Elevation: 3+ FT

Note: It is assumed that facilities with flood protection heights greater than 3 Ft (flood depths greater than 2 FT) that the existing walls will not be able to resist the flood waters. Therefore, typically the most cost effective manner of flood proofing is to install a concrete ring wall around the structure. Existing entries are assumed to require a floodgate for protection, as existing door frames cannot resist flood forces without significant modification.

Building Perimeter (LF): 1,012
Number of Entries: 4 Doorways - 1 main and 3 secondary
1 garage/service entry - 12 FT wide

Ringwall Perimeter (4' offset): 1,044 Design Floodproofing Depth for Ringwall: 3.5 FT + 1 FT Freeboard = 4.5 FT

Floodproofing Items	Approximate Unit Cost	4.5 Ft Depth Cost	
Concrete Ringwall (8" thick - per SF))	$48	$350,784	Assume 2.5' deep footing
Floodgates (48" wide)	$21,000	$42,000	2 Secondary Entries
Floodgate (14' wide)	$63,000	$126,000	Main Entry and Service Entry
Sewer Backflow Preventer	$1,300	$1,300	
Incidentals, etc.	20%	$104,017	
	Sub-Total	**$624,101**	
	Structural Analysis	$7,500	
	Civil and Architectural	$7,500	
	Permit Costs	$4,410	($3,675 initial fee + 25%)
	Overall Sub-total	**$643,511**	
	General Conditions/Contingency (20%)	$128,702	
	Total	**$772,213**	
	Cost per Square Foot	$12.07	

Assumed Average Cost/SF for Large Facilties in Boulder: $12/SF

APPENDIX D

CITY OF BOULDER

DRAFT CRITICAL FACILITIES ORDINANCE

ORDINANCE NO. _____

AN ORDINANCE AMENDING FLOODPLAIN REGULATIONS AND DEVELOPMENT STANDARDS IN ORDER TO PROTECT CRITICAL FACILITIES AND LODGING FACILITIES IN THE FIVE HUNDRED-YEAR FLOODPLAIN INCLUDING CHAPTER 9-3, "OVERLAY DISTRICTS," CHAPTER 9-9, "DEVELOPMENT STANDARDS," AND SECTION 9-16-1 "DEFINITIONS," B.R.C. 1981; AND SETTING FORTH RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Section 9-3-2, B.R.C. 1981 is amended to read:

9-3-2 Floodplains.

(a) Legislative Intent: The purpose of this section is to regulate certain areas of the city subject to flooding in order to protect the public health, safety, and welfare by:

(1) Restricting or prohibiting certain uses that are hazardous to life or property in time of flood;

(2) Restricting the location of structures intended for human occupancy and regulating the manner in which such structures may be built in order to minimize danger to human life within and around such structures;

(3) Requiring that those structures allowed in the floodplain be expanded or enlarged, and equipment and fixtures be installed or replaced, in a manner designed to prevent their being washed away and to assure their protection from severe damage;

(4) Regulating the method of construction and replacement of water supply and sanitation systems in order to prevent disease, contamination, and unsanitary conditions;

(5) Maintaining for public inspection available maps delineating areas subject to such provisions in order to protect individuals from purchasing or using lands for purposes that are not suitable[1];

(6) Protecting and preserving the water-carrying and water-retention characteristics and capacities of watercourses used for conveying and retaining floodwaters; and

(7) Obtaining and maintaining the benefits to the community of participating in the National Flood Insurance Program.

[1]The maps maintained by the city shall also delineate the five hundred-year floodplain for purposes of section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981.

(b) Flooding May Occur: The degree of flood protection provided by the terms of this section has been determined to be reasonable for regulatory purposes. Floods of greater magnitude will occur, and flood heights may be increased as a result of natural or human-made causes. The provisions of this section do not imply that areas outside of the floodplain or land uses permitted within the floodplain are free from flooding, flood hazard, or flood damages. A grant or approval by the city under the requirements of this section does not constitute a representation, guarantee, or warranty of any kind or nature by the city or any city official or employee of the practicability or safety of any structure or proposed use, and it creates no liability to or cause of action against the city or any city official or employee for any damages from flood or otherwise that may result from such structure or use.

(c) Scope and Application:

(1) The requirements of this section supplement those imposed on the same lands by any underlying zoning provisions of this code or other ordinance of the city. The city has also adopted development standards for critical facilities and lodging facilities located within the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981. If there is a conflict between such requirements, the more restrictive controls.

(2) If a lot or parcel of land lies partly within the high hazard zone or the conveyance zone, ~~or the flood fringe area~~ or the one hundred-year floodplain, the part(s) of such lot or parcel lying within such area or areas shall meet all the standards and requirements of such respective area as prescribed by this section. For the purposes of new construction, if any portion of a structure lies partly within the high hazard zone, ~~or~~ the conveyance zone~~,~~ or the one hundred-year floodplain~~or the flood fringe area~~, all the standards and requirements of this section shall apply to the entire structure.

(3) If lands located outside the city limits are included within the one hundred-year floodplain~~, the flood fringe~~, the conveyance zone or the high hazard zone, the requirements of this section shall apply to such lands upon annexation.

(d) Administration: The city manager shall administer the requirements of this section and shall:

(1) Determine that the requirements of this section have been met before issuing any permit for development in the floodplain;

(2) Obtain and maintain for public inspection any certificates of floodproofing required by this section, and any information on the elevation (in relation to mean sea level) of the level of the lowest floor (including basement) of all new or substantially improved structures, and information specifying whether or not such structures contain a basement, and if the structure has been floodproofed, the elevation (in relation to mean sea level) to which the structure was floodproofed;

(3) Notify Boulder County and the Colorado Water Conservation Board before permitting any change in a watercourse and submit evidence of such notice to FEMA;

(4) Adopt rules interpreting and implementing the requirements of this section including, without limitation, application procedures for floodplain development permits and specifications for the floodproofing of structures, substantial improvements, and utilities;

(5) Assure that the Boulder Valley Comprehensive Plan is consistent with the floodplain management objectives of this section and the regulations of FEMA;

(6) Make necessary interpretations of the exact location of the boundaries of the floodplain, ~~the flood fringe,~~ the conveyance zone and the high hazard zone;

(7) Amend the boundaries of the high hazard zone and the conveyance zone pursuant to subsection (f) of this section;

(8) Determine that all necessary permits have been obtained from state, federal, or local agencies the approval of which is required before issuing any permit for development in the floodplain;

(9) Require that persons changing a watercourse maintain the watercourse so that its flood carrying capacity is not diminished;

(10) Require that new and replacement water supply systems in the floodplain be designed to minimize or eliminate infiltration of floodwaters into the systems;

(11) Require that new and replacement sanitary sewage systems within the floodplain be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters;

(12) Require that on-site waste disposal systems be located to avoid impairment to them or contamination from them during flooding; and

(13) Obtain, review, and reasonably utilize any ~~base~~ flood elevation and floodway data available from federal, state, and other sources, including data developed pursuant to chapter 9-12, "Subdivision," B.R.C. 1981, as criteria for requiring that all new development meet the requirements of this section.

(e) Appeals: Any person contesting the city manager's interpretation of a boundary location under paragraph (d)(6) of this section, or any person aggrieved by the granting or denial of a floodplain development permit, may appeal such determination to the planning board through the process described in section 9-4-4, "Appeals, Call-Ups And Public Hearings," B.R.C. 1981. The request shall set forth the reason and basis for the appeal and such other information as the manager may prescribe by rule.

(f) Map Amendments: As watercourse or flood channel improvements or mapping corrections are made, the city manager may amend the flood regulatory area maps to recognize the changed conditions produced by such improvements or corrections provided that no such amendments or corrections may change a FEMA "area of special flood hazard" or "regulatory floodway" unless the city is in receipt of a letter of map amendment or a letter of map revision issued by FEMA.

(g) Flood Regulatory Areas:

(1) The provisions of this section apply to the area shown as floodplain on the most recent maps adopted by the city council, as amended from time to time by the city manager pursuant to subsections (d), (e), and (f) of this section. The regulatory floodplain encompasses the one hundred-year floodplain, ~~the flood fringe,~~ the conveyance zone, and the high hazard zone. The following regulations governing each portion of the floodplain are cumulative and not exclusive.

(2) In addition to the regulatory areas identified in paragraph (g)(1) of this section, the city has adopted the areas of special flood hazard identified in the Flood Insurance Study for Boulder County, effective December 18, 2012, and delineated on the Flood Insurance Rate Map for Boulder County and the City of Boulder as adopted by the city in compliance with 44 C.F.R. chapter 1. In no event will the regulations contained in this section be interpreted to permit any action not permitted under those regulations promulgated by FEMA for the regulation of areas of special flood hazard and regulatory floodways.

(3) The city has also adopted development standards for critical facilities and lodging facilities located within the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981. The regulations governing critical facilities and lodging facilities are supplemental to the following requirements in the flood regulatory areas.

Section 2. Section 9-3-3, B.R.C. 1981 is amended to read:

9-3-3 Regulations Governing the Floodplain.

(a) General Provisions: In the entire one hundred-year floodplain, the following standards apply:

(1) Floodplain Development Permit: Except as specified in section 9-3-6(a), "Activities Exempt From A Floodplain Development Permit," B.R.C. 1981, ~~paragraph (a)(1)(A),~~ no development in the floodplain may occur prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

~~(A) Activities exempt from a floodplain development permit: The following activities are allowed within the flood regulatory area and do not require a floodplain development permit:~~

~~(i) "Maintenance" as defined in chapter 9-16 "Definitions" that do not constitute a substantial improvement and do not affect the efficiency or capacity of the conveyance zone or high hazard zone.~~

~~(ii) Sidewalks, concrete, asphalt or stone flatwork that does not result in the establishment or expansion of parking areas and does not modify existing grade by more than six inches.~~

~~(iii) Underground utilities that do not modify existing grade.~~

~~(iv) Poles, lines, cables, sign posts, landscaping and artwork that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.~~

~~(v) Temporary facilities that are not permanently attached to the ground such as tents, traffic control devices and lawn furniture provided that they will not affect the efficiency or capacity of the conveyance zone or high hazard zone, or they will remain in place for no more than 30 days.~~

(2) Anchoring:

(A) All new construction and substantial improvements or substantial modifications shall be anchored to prevent flotation, collapse, or lateral movement of the structure and be capable of resisting the hydrostatic and hydrodynamic loads.

(B) All manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement and capable of resisting the hydrostatic and hydrodynamic loads. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties connecting to permanent ground anchors, in addition to any anchoring requirements for resisting wind forces and any tie-down requirements of chapter 10-12, "Mobile Homes," B.R.C. 1981. Requirements shall include, without limitation, the following:

(i) Over-the-top ties shall be provided at each of the four corners of the manufactured homes. For manufactured homes fifty feet or longer, two additional ties per side are required at intermediate locations. For manufactured homes less than fifty feet long, one additional tie per side is required;

(ii) Frame ties shall be provided at each of the four corners of the manufactured homes. For manufactured homes fifty feet or longer, five additional ties per side are required at intermediate points. For manufactured homes less than fifty feet long, four additional ties per side are required;

(iii) All components of the anchoring system shall be capable of carrying a force of four thousand eight hundred pounds; and

(iv) Any additions to manufactured homes shall be similarly anchored.

(3) Construction Materials and Methods:

(A) All new construction, substantial improvements, and substantial modifications shall be constructed with materials and utility equipment resistant to flood damage as outlined in the most current FEMA Technical Document on ~~2-93,~~ Flood-Resistant Materials Requirements.

(B) All new construction, substantial improvements, and substantial modifications shall be constructed using methods and practices that minimize flood damage.

(C) All new construction, substantial improvements and substantial modifications shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and located (by elevating or floodproofing the components) so as to prevent water from entering or accumulating within the components during flooding conditions.

(4) Utilities:

(A) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.

(B) All new and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters.

(C) On-site waste disposal systems shall be located to avoid impairment or contamination during flooding.

(5) Subdivision Proposals:

(A) All subdivision proposals shall demonstrate efforts to minimize flood damage.

(B) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.

(C) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.

(D) Base flood elevation data shall be provided for subdivision proposals and other proposed development.

(E) No subdivision proposal shall create a lot which is unbuildable pursuant to this section.

~~(6) Floodproofing: Whenever this section requires a building or structure to be floodproofed, the following standards shall be met:~~

~~(A) Such building or structure shall be floodproofed in accordance with any rules for floodproofing promulgated by the city manager pursuant to chapter 1-4, "Rulemaking," B.R.C. 1981, and with current FEMA National Flood Insurance Program (NFIP) Technical Bulletins;~~

~~(B) Such building or structure shall be floodproofed to the flood protection elevation in such a manner that the building or structure is watertight with walls substantially impermeable to the passage of water and in a manner requiring no human intervention;~~

~~(C) uch building or structure shall have structural components capable of resisting projected hydrostatic and hydrodynamic loads and the effects of buoyancy; and~~

~~(D) Such floodproofing shall be certified by a Colorado registered professional engineer or registered architect to comply with this paragraph. Such certifications shall be provided to the city manager as set forth in paragraph 9-3-2(d)(2), B.R.C. 1981.~~

(6~~7~~) Hazardous Materials: No person shall store a hazardous substance at or below the flood protection elevation for the area of the floodplain in which it is located, except for the storage of fuel~~gasoline~~ in existing and replacement underground tanks in existing ~~gasoline~~ fueling service stations and service garages, which tanks are designed to prevent infiltration and discharge into floodwaters and which are adequately anchored and shielded against rupture. For purposes of this paragraph, "existing" means in place and in use on January 1, 1989.

(7~~8~~) Automobile Parking: Notwithstanding other provisions of this title, no person shall establish an area for automobile parking in any portion of the floodplain where flood depths exceed eighteen inches.

(8~~9~~) Flood Warning System: No owner of a hotel, a motel, a dormitory, a rooming house, a hostel, a school, a bed and breakfast, a daycare center, a group home, or a residential or congregate care facility located in the Boulder Creek floodplain shall fail to provide a flood warning system approved by the city manager that is connected to a point of central communication in the building with twenty-four-hour monitoring. No such person shall fail to maintain such a flood warning system.

(9~~10~~) Rental Property: No owner of property that is located in ~~a~~the floodplain and subject to a city rental license under chapter 10-3, "Rental Licenses," B.R.C. 1981, shall fail to post on the exterior of the premises at the entrance a sign approved by the city manager stating that the property is subject to flood hazard and containing such further information and posted at such other locations inside the building as the city manager may require.

(10~~1~~) Manufactured Housing: All manufactured homes placed in the city after July 1, 1989, and all manufactured homes which are substantially improved or substantially modified shall be elevated on a permanent foundation so that the lowest floor of the manufactured home is at or above the flood protection elevation and is securely anchored to an adequately anchored foundation system, and shall meet the anchorage and tie-down requirements of paragraph (a)(2) of this section.

(11~~2~~) Recreational Vehicles: In order to reduce debris and hazard potential, recreational vehicles shall either: a) be in the floodplain for fewer than one hundred eighty consecutive days, b) be fully licensed and ready for highway use, or c) meet the permit requirements and elevation and anchoring requirements for manufactured homes.

(12~~3~~) Structure Orientation: In order to minimize the obstruction to flow caused by buildings, to the extent consistent with other city policies regarding solar access, new structures shall be placed with their longitudinal axes parallel to the predicted direction of flow of floodwaters or be placed so that their longitudinal axes are on lines parallel to those of adjoining structures.

(13~~4~~) Existing Uses: The use of any land or structure that was lawful before the application of this section or any amendment thereto but that does not conform to the requirements of this section may be continued subject to the requirements of this section. If such a use not conforming to the requirements of this section is discontinued for twelve consecutive months, no person shall use the land or structure thereafter unless such use conforms to the requirements of this section.

(14~~5~~) New Uses: All uses allowed by the underlying zoning district may be established, subject to the requirements of this section, except for the outdoor or uncontained storage of moveable objects below the flood protection elevation.

(15~~6~~) Existing Structures: Any structure in existence before the enactment of this section or any amendment thereto that does not conform to the requirements of this section may remain or may undergo rehabilitation subject to the requirements of this section. Further, any such structure may be otherwise improved as follows:

(A) Any person making an expansion or an enlargement to an existing residential structure shall elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation.

(B) Any person making an expansion or an enlargement to an existing nonresidential structure shall floodproof or elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation.

(C) Any person making a substantial modification or a substantial improvement to any existing nonresidential structure shall floodproof or elevate the lowest floor, including the basement, of the substantially modified or improved portion to or above the flood protection elevation and shall floodproof the remainder of the existing structure.

(D) Any person making a substantial modification or a substantial improvement to any existing residential structure shall elevate the lowest floor, including the basement, of the entire residential structure to or above the flood protection elevation.

(16~~7~~) New Structures: Construction of new structures shall meet the following requirements:

(A) Any person constructing a new residential structure shall elevate the lowest floor, including the basement, to or above the flood protection elevation;

(B) Any person constructing a new nonresidential structure shall floodproof in a manner requiring no human intervention or elevate the lowest floor, including the basement, to or above the flood protection elevation with the following exceptions:

(i) Open air carwashes;

(ii) Unheated pavilions;

(iii) Unfinished or flood resistant building entryways or access areas;

(iv) Garden storage sheds;

(v) Sidewalks, paving, or asphalt, concrete, or stone flatwork;

(vi) Fences; and

(vii) Poles, lines, cables, or other transmission or distribution facilities of public utilities.

(C) Any person constructing a new structure on a property removed from the one hundred-year floodplain through a FEMA Letter of Map Revision Based on Fill (LOMR-F) shall protect the lowest floor, including the basement, to or above the flood protection elevation that existed before placement of fill, as follows:

(i) Residential structures: by elevating the structure; or

(ii) Non-residential structures: by elevating or floodproofing the structure.

Solely for the purposes of this subparagraph (a)(17)(C), previously designated floodplain areas that have been removed from the one hundred-year floodplain through a LOMR-F shall be considered to be within the floodplain. No person shall construct a new structure subject to this subparagraph (a)(17)(C) prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

(17~~8~~) Enclosures: Enclosures below the lowest floor that are unfinished or flood resistant, usable solely for parking of vehicles, crawl spaces, building access or storage, in an area that is not a basement, and that are not floodproofed as set forth in this section shall meet the following requirements:

(A) Compliance with the provisions of paragraphs (a)(2), (a)(3), and (a)(4) of this section; and

(B) Design and construction that automatically equalizes hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

(i) Designs for meeting this requirement shall meet or exceed the following minimum criteria: a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(ii) Any designs not in conformance with subparagraph (a)(18)(B)(i) of this section, shall be sealed and certified by a registered professional engineer or licensed architect and shall conform with the most current FEMA Technical Bulletin on~~1-93,~~ Openings In Foundation Walls.

(C) Fully enclosed areas below the lowest floor subject to this provision, include the following:

(i) Residential garages placed at or above grade;
(ii) Enclosures or vestibules that are attached to structures and that are utilized for storage or entryways;
(iii) Crawl spaces; and
(iii) Outdoor pavilions and patio enclosures with removable walls not located in the high hazard zone.

(18~~9~~) Below Grade Crawl Space Construction: New construction, expansion or enlargement, substantial improvement and substantial modification of any below grade crawl space shall meet the following requirements:

(A) Interior grade elevation that is below the base flood elevation shall be no lower than two feet below the lowest adjacent grade;

(B) The height of the below grade crawl space measured from the interior grade of the crawl space to the top of the foundation wall shall not exceed four feet at any point;

(C) Adequate drainage systems shall allow floodwaters to drain from the interior area of the crawl space following a flood; and

(D) The provisions of paragraphs (a)(2), (a)(3), (a)(4) and (a)(18~~7~~) of this section shall be complied with.

Section 3. Section 9-3-4, B.R.C. 1981 is amended to read:

9-3-4 Regulations Governing the Conveyance Zone.

In the conveyance zone, the following standards apply:

(a) The provisions of section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981.

(b) The provisions of section 9-3-5, "Regulations Governing the High Hazard Zone," B.R.C. 1981, if the land is also located in the high hazard zone.

(c) All uses allowed under the provisions of section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981, if they are not prohibited by the underlying zoning district or any ordinance of this city, may be established except that no person shall establish or change any use that results in a rise in the elevation of the one hundred-year flood.

(d) All structures allowed under section 9-3-3, "Regulations Governing the Floodplain," B.R.C. 1981, may be established except that no person shall:

(1) Place any structure in the conveyance zone that will result in any rise in the elevation of the one hundred-year flood; or

(2) Place any obstruction in the conveyance zone, except a device reasonably necessary for flood management if the device is designed and constructed to minimize the potential hazards to life and property.

(e) No person shall carry out any other development that results in a rise in the elevation of the one hundred-year flood.

(f) Localized rises within flood channels or on a specific parcel that is being developed are permissible, if there is no adverse impact on nearby properties and there is no increase in the average water surface elevations along the cross sections of the floodplain.

(g) Localized rises on land owned or controlled by a government, or governmental subdivision or agency or within public drainage or flood control easements are permissible, if the following requirements have been satisfied:

(1) The applicant has necessary property interests or permission to use land to allow the increase in any water surface elevation or there is no adverse impact to such land;

(2) There are no insurable structures under the FEMA National Flood Insurance Program affected by the localized rise;

(3) The applicant minimizes the amount of the localized rise in a flood elevation; and

(4) The applicant complies with all necessary FEMA requirements, including without limitation, obtaining a Conditional Letter of Map Revision (CLOMR) prior to development and a Letter of Map Revision (LOMR) upon completion of a project causing a localized rise in a flood elevation.

Section 4. Section 9-3-5, B.R.C. 1981 is amended to read:

9-3-5 Regulations Governing the High Hazard Zone.

In the high hazard zone of the floodplain, the following standards apply:

(a) The provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981.

(b) The provisions of section 9-3-4, "Regulations Governing The Conveyance Zone," B.R.C. 1981, if the land is also located in the conveyance zone.

(c) All uses allowed under the provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981, if they are not prohibited by the underlying zoning district or any other ordinance of the city, may be established, except that no person shall:

(1) Change the use of an existing structure intended for human occupancy from a nonresidential use to a residential use or use as a school, daycare center, group home, residential care facility, or congregate care facility.

(2) Establish any new parking lot for motor vehicles.

(3) Establish any campground.

(d) All structures allowed under the provisions of section 9-3-3, "Regulations Governing The Floodplain," B.R.C. 1981, may be established, except that no person shall:

(1) Construct or place any new structure intended for human occupancy.

(2) Expand, enlarge, or make a substantial modification or substantial improvement to any existing structure intended for human occupancy. Notwithstanding this provision, a person may reconstruct a non-flood-damaged structure or portion thereof, which otherwise does constitute a substantial improvement, under the provisions of subparagraphs 9-3-3(a)(1~~6~~5)(C) and (a)(1~~6~~5)(D), B.R.C. 1981.

(e) Unconditioned, unenclosed building elements such as balconies, awnings, and roof overhangs may extend up to four feet into the high hazard zone if completely located above the flood protection elevation and the remainder of the structure complies with this chapter.

Section 5. Section 9-3-6, B.R.C. 1981 is amended to read:

9-3-6 Floodplain Development Permits.

(a) Activities Exempt from a Floodplain Development Permit: The following activities are allowed within the flood regulatory areas and do not require a floodplain development permit:

(1) "Maintenance" as defined in chapter 9-16, "Definitions," B.R.C. 1981 that do not constitute a substantial improvement, or a modification to an existing hazardous material facility that exceeds 25 percent market value of the existing structure before the start of construction, and that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.

(2) Sidewalks, concrete, asphalt or stone flatwork that does not result in the establishment or expansion of parking areas and does not modify existing grade by more than six inches.

(3) Underground utilities that do not modify existing grade.

(4) Poles, lines, cables, sign posts, landscaping and artwork that do not affect the efficiency or capacity of the conveyance zone or high hazard zone.

(5) Temporary facilities that are not permanently attached to the ground such as tents, traffic control devices and lawn furniture provided that they will not affect the efficiency or capacity of the conveyance zone or high hazard zone, or they will remain in place for no more than 30 days.

~~(a)~~(b) An applicant for a floodplain development permit shall pay the fee prescribed by section 4-20-44, "Floodplain Development Permits And Flood Control Variance Fees," B.R.C.

1981, and shall complete an application form provided by the city manager that shall include, without limitation, the following:

(1) The written consent of the owners of all property subject to the development request;

(2) A written statement addressing the criteria for approval;

(3) ~~A surface view plan showing elevations and contours of the ground; pertinent structures, fill, and storage elevations; sizes, locations, and spatial arrangements of all proposed, anticipated, and existing structures on the site; location and elevations of streets, water supplies and sanitary facilities; and soil types; and~~

An applicant for a critical facility pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, shall indicate whether the facility will contain hazardous material. If the facility will contain hazardous material, the application must include information on the location of the hazardous material and how the hazardous material will be secured to prevent its release during a five hundred-year flood event.

(4) ~~Specifications for building construction and materials, filling, dredging, grading, channel improvements and changes, storage of materials, water supply, and sanitary facilities.~~ An applicant for a critical facility or lodging facility in the five hundred-year floodplain pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, shall provide a copy of the emergency management plan for the facility meeting the requirements of section 9-9-23(d).

(c~~b~~) The manager may require the applicant to furnish additional information and details deemed necessary to evaluate the effects of the proposed construction upon the floodplain, including, without limitation:

(1) A surface view plan showing elevations and contours of the ground; pertinent structures, fill, and storage elevations; sizes, locations, and spatial arrangements of all proposed, anticipated, and existing structures on the site; location and elevations of streets, water supplies and sanitary facilities; and soil types; and

(2) Specifications for proposed building construction and materials, filling, dredging, grading, channel improvements and changes, storage of materials, water supply, and sanitary facilities.

(3)~~(1)~~ Valley cross sections showing the floodplain surrounding the watercourse, cross sections of the area to be occupied by the proposed development, and one hundred-year flood maximum water surface elevation information; and for critical facilities and lodging facilities, the five hundred-year maximum water surface elevation information pursuant to section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981;

(4~~2~~) A profile showing the slope of the bottom of the channel or thalweg of the watercourse;

(5~~3~~) A floodplain analysis by a Colorado registered professional engineer of the flood profile, elevation, and velocity, using methodology acceptable to FEMA,

including existing and anticipated uses and making a determination that the proposed construction or development will not cause a rise in the elevation of the water surface of a one hundred-year flood;

(6~~4~~) A structural analysis by a Colorado registered professional engineer showing that any proposed structures will be adequately designed and constructed to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy and scouring.

(d~~c~~) When reviewing an application for a permit, the city manager shall determine which portion or portions of the floodplain are affected by the particular development request and shall then apply the provisions of sections 9-3-2, "Floodplains," 9-3-3, "Regulations Governing The Floodplain," 9-3-4, "Regulations Governing the Conveyance Zone," ~~and~~ 9-3-5, "Regulations Governing the High Hazard Zone," and 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, as applicable. The manager also shall determine whether the application meets the intent of this chapter prescribed by subsection 9-3-2(a)~~, B.R.C. 1981~~, and the intent of section 9-9-23 as prescribed by subsection 9-9-23(a), B.R.C. 1981, after considering the following factors:

(1) The effects upon the efficiency or capacity of the conveyance zone and high hazard zone;

(2) The effects upon lands upstream, downstream, and in the immediate vicinity;

(3) The effects upon the one hundred-year flood profile;

(4) The effects upon any tributaries to the main stream, drainage ditches, and any other drainage facilities or systems;

(5) Whether additional public expenditures for flood protection or prevention will be required;

(6) Whether the proposed use is for human occupancy;

(7) The potential danger to persons upstream, downstream, and in the immediate vicinity;

(8) Whether any proposed changes in a watercourse will have an adverse environmental effect on the watercourse, including, without limitation, stream banks and streamside trees and vegetation;

(9) Whether any proposed water supply and sanitation systems and other utility systems can prevent disease, contamination, and unsanitary or hazardous conditions during a flood;

(10) Whether any proposed facility and its contents will be susceptible to flood damage and the effect of such damage;

(11) The relationship of the proposed development to the Boulder Valley Comprehensive Plan and any applicable floodplain management programs;

(12) Whether safe access is available to the property in times of flood for ordinary and emergency vehicles;

(13) Whether the applicant will provide flood warning systems to notify floodplain occupants of impending floods;

(14) Whether the cumulative effect of the proposed development with other existing and anticipated uses will increase flood heights; and

(15) Whether the expected heights, velocities, duration, rate of rise, and sediment transport of the floodwaters expected at the site will adversely affect the development or surrounding property.

(e~~d~~) If the city manager determines that the applicant meets the purposes and requirements of this chapter, the manager shall issue the permit and may attach such conditions as deemed necessary to further the purposes of this chapter.

(f~~e~~) A permit issued on or after April 7, 1985, expires three years after its date of issuance, if the permittee has not commenced construction under the permit. The term "commenced construction" shall mean the first placement of permanent construction of a structure on a site, such as the pouring of slabs or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation; but does not include land preparation, grading and filling, or installation of streets or sidewalks.

(g~~f~~) No person who has obtained a permit shall fail to construct in accordance with their approved application and design.

(h~~g~~) Floodplain development permits that allow for development in the conveyance zone or the high hazard zone, or which will involve a change of watercourse, shall be decided by the city manager. The decision of the city manager shall be subject to call-up by the planning board, or appeal by any aggrieved party to the planning board, subject to the call-up and appeal procedure of section 9-4-4, "Appeals, Call-Ups And Public Hearings," B.R.C. 1981.

(i~~h~~) A floodplain development permit for any of the following items is effective upon the date of its issuance:

(1) Sidewalks, parking lots, or other concrete, asphalt, or stone flatwork that do not modify existing grade;

(2) Uninhabited overhead structural projections, no portion of which extends below the flood protection elevation; or

(3) Rehabilitation of an existing structure in accordance with the definitions in chapter 9-16, "Definitions," B.R.C. 1981. In addition, for properties in the high hazard zone, the rehabilitation shall not result in a prohibited change in use as set forth in subsection 9-3-5(c), B.R.C. 1981.

(j~~i~~) No person shall initiate any use after obtaining a permit under this section without first submitting to the city manager a sealed certification by a Colorado registered professional engineer that the development has been completed in compliance with the approved permit application and that all conditions have been fulfilled.

(k) Floodplain Development Permit Requirements for Critical Facilities Protected by Levee Systems.

(1) An applicant for a floodplain development permit for a critical facility protected by a levee system shall pay the fee prescribed by section 4-20-44, "Floodplain Development Permits and Flood Control Variance Fees," B.R.C. 1981, and shall complete an application form provided by the city manager that shall include, without limitation, the following:

(A) A written statement demonstrating compliance with subsection 9-9-23(f), sealed and certified by a Colorado registered professional engineer; and

(B) Any additional information and details deemed necessary by the city manager to evaluate the permit application.

(2) The city manager shall evaluate a floodplain development permit application for a critical facility protected by a levee system pursuant to the requirements in this subsection (k) and subsection 9-9-23(f), "Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(3) A floodplain development permit for a critical facility protected by a levee system shall be issued only upon a finding by the city manager that, based on a Colorado registered professional engineer's sealed certification, the levee system is in compliance with the requirements of subsection 9-9-23(f), "Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(4) A floodplain development permit issued for a critical facility protected by a levee system is not subject to the call-up and appeal procedures set forth in subsection 9-3-6(h).

(5) At least once every three years, the owner or operator of the critical facility protected by a levee system shall file with the city manager a determination from the appropriate federal or state agency, or a sealed and certified determination from a Colorado registered professional engineer, that the levee system meets the minimum freeboard criteria as set forth in subsection 9-9-23(f) and appears, on visual inspection, to be structurally sound and adequately maintained. The city manager may require the owner or operator to submit such certification more frequently than once every three years if warranted by recent flood conditions or circumstances that may lead to changes in the levee system at the critical facility. The permit shall lapse if the required determination is not filed.

~~(1)~~(6) Once a floodplain development permit has been issued for a critical facility protected by a levee system, future development on the land protected by the levee system shall not require a floodplain development permit so long as the requirements of this subsection (k) and subsection 9-9-23(f) are satisfied.

Section 6. Section 9-3-6, B.R.C. 1981 is amended to add a new section 9-3-6.5, B.R.C. 1981 to read:

9-3-6.5 Floodproofing Standards.

(a) Floodproofing: Whenever this chapter or section 9-9-23, "Regulations Governing Critical Facilities and Lodging Facilities," B.R.C. 1981, require floodproofing a building or structure, the following standards shall apply:

(1) Floodproofing shall comply with any rules prescribed by the city manager for floodproofing and current FEMA National Flood Insurance Program (NFIP) Technical Bulletins;

(2) The manner of floodproofing shall, without requiring any human intervention, make the building or structure watertight to the flood protection elevation, with walls substantially impermeable to the passage of water;

(3) The building or structure shall have structural components capable of resisting projected hydrostatic and hydrodynamic loads and the effects of buoyancy; and

(4) The applicant shall provide a sealed certification in a form acceptable to the city manager from a Colorado registered professional engineer or licensed architect certifying that the floodproofing measures comply with this chapter or section 9-9-23, as applicable.

Section 7. Section 9-3-7, B.R.C. 1981 is amended to read:

9-3-7 Variances.

(a) A person wishing to develop in a manner~~expand or enlarge an existing structure~~ that does not conform to the requirements of this chapter and cannot be made to conform without unreasonable expense or unreasonable impact on the existing structure may apply to the city manager for a variance from the requirements of subparagraphs 9-3-3(a)(15~~6~~)(C) and (a)(15~~6~~)(D), B.R.C. 1981, except that no variance shall be granted for expansion or enlargement of any structure constructed after July 12, 1978, unless such expansion or enlargement conforms to the flood protection elevation requirement in effect at the time of the original construction.

(b) The city manager shall not grant a variance under this section unless the manager determines that:

(1) Considering the flood hazard, the variance is the minimum necessary to afford relief;

(2) To do so would not result in additional threats to public safety, extraordinary public expense, nuisance, fraud, victimization of the public, or for variances in the conveyance zone a rise in the elevation of the water surface of a one hundred-year flood, or be in conflict with existing provisions of this code or any ordinance of the city; and

(3) Failure to grant the variance would result in exceptional hardship to the applicant.

(c) The manager shall examine the following factors in determining whether or not to grant a variance under this section:

(1) The danger to life and property due to flooding or erosion damage;

(2) The likelihood that the proposed development, in conjunction with existing and anticipated development, may increase flood hazards;

(3) The relationship of the proposed development to the Boulder Valley Comprehensive Plan and any applicable floodplain management programs; and

(4) The cost of providing essential services such as maintaining and protecting public utility systems, roads, and bridges during and after floods.

(d) The city manager shall not grant a cumulative total of variances that increases a structure's floor area by more than ten percent of the structure throughout the life of the structure.

(e) An applicant for a variance shall apply on forms provided by the city manager and pay the fee prescribed by section 4-20-44, "Floodplain Development Permits And Flood Control Variance Fees," B.R.C. 1981, unless a floodplain development permit is required as well, in which case no fee is required for the variance.

(f) Any decision by the city manager to approve a variance is subject to call-up by the planning board or appeal by any aggrieved party to the planning board as described by section 9-4-4, "Appeals, Call-Ups And Public Hearings," B.R.C. 1981.

(g) When granting any variance that allows for construction below FEMA's one hundred-year flood protection elevation, the city manager shall provide to the recipient of the variance written notice that the proposed construction does not conform with FEMA guidelines and that the proposed construction and the original structure may be subject to increased flood insurance premiums.

…

Section 8. Chapter 9-9, B.R.C. 1981 is hereby amended to add a new section 9-9-23 to read:

9-9-23 Regulations Governing Critical Facilities and Lodging Facilities

(a) Purpose: The purpose of this section is to regulate the development of critical facilities in the five hundred-year floodplain in order to minimize the hazards to public health and safety and the interruption of essential services and operations for the community at any time before, during, or after a flood; and to require the development of emergency management plans for all critical facilities and lodging facilities in order to promote an effective and organized flood response.

(b) Scope and Application:

(1) The following development standards apply to critical facilities and lodging facilities located within the five hundred-year floodplain as shown on the most recent maps adopted by the city council, as amended from time to time by the city manager pursuant to subsections (d), (e) and (f) of section 9-3-2, "Floodplains,"

B.R.C. 1981. If any portion of a structure lies partly within the five hundred-year floodplain, all the requirements of this section shall apply to the entire structure.

(2) The standards governing the development of critical facilities and lodging facilities in this section are in addition to the floodplain regulations of sections 9-3-3, "Regulations Governing the Floodplain," 9-3-4, "Regulations Governing the Conveyance Zone," and 9-3-5, "Regulations Governing the High Hazard Zone," B.R.C. 1981, if the critical facility or lodging facility is also located in the one hundred-year floodplain, the high hazard zone or the conveyance zone.

(3) The city manager shall administer the requirements of this section and may adopt rules interpreting and implementing the requirements of this section, and shall make necessary interpretations of the exact location of the boundaries of the five hundred-year floodplain.

(4) Where the water surface elevation of the five hundred-year flood has not been established or is determined by the city manager to be inconsistent with other available topographic or hydraulic data, the city manager may establish a flood protection elevation based on data sources described in subsection 9-3-2(d).

(5) Existing Uses: The use of any land or structure that was lawful before the application of this section or any amendment thereto but that does not conform to the requirements of this section may be continued subject to the requirements of this section. If such a use not conforming to the requirements of this section is discontinued for 12 consecutive months, no person shall use the land or structure thereafter unless such use conforms to the requirements of this section.

(c) Floodplain Development Permit Required. Except as specified in subsection 9-3-6(a), "Activities Exempt From a Floodplain Development Permit," B.R.C. 1981, no development of a critical facility or lodging facility in the five hundred-year floodplain may occur prior to the issuance of a floodplain development permit pursuant to section 9-3-6, "Floodplain Development Permits," B.R.C. 1981.

(d) Emergency Management Plan Required. Owners or operators of a critical facility or lodging facility within the five hundred-year floodplain shall develop an emergency management plan meeting the requirements of this section by January 1, 2023.

(1) Emergency management plans shall include either an evacuation plan or a shelter in place plan.

(A) Evacuation plans shall be sealed and certified by a Colorado registered professional engineer or licensed architect, and shall provide a means for safely evacuating occupants to a location outside of the five hundred-year floodplain.

(B) Shelter in place plans shall be sealed and certified by a Colorado registered professional engineer and shall demonstrate that the structure will be safe to occupy during a five hundred-year flood event.

(2) Emergency management plans shall be posted on the inside of each doorway leading to a separate unit in a lodging facility and displayed in a prominent

location or a location designed to provide information to persons within the critical facility that is approved by the city manager.

(3) Emergency management plans shall be completed prior to issuance of a floodplain development permit.

(e) Construction Requirements for Critical Facilities in the Five Hundred-Year Floodplain. The following requirements apply to critical facilities located within the five hundred-year floodplain. The floodproofing standards applicable to this subsection (e) are set forth in section 9-3-6.5, "Floodproofing Standards," B.R.C. 1981.

(1) No owner or operator of a critical facility shall construct or modify, or cause to be constructed or modified, a critical facility within the five hundred-year floodplain except in compliance with the requirements of this section;

(2) Any person making an expansion or an enlargement to an existing at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, of the expanded or enlarged portion to or above the flood protection elevation;

(3) Any person making a substantial modification or a substantial improvement to any existing at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, of the substantially modified or improved portion to or above the flood protection elevation and shall floodproof or elevate the remainder of the existing structure to or above the flood protection elevation;

(4) Any person constructing a new at-risk population facility or essential service facility shall floodproof or elevate the lowest floor, including the basement, to or above the flood protection elevation;

(5) Any person constructing a new hazardous material facility shall secure all hazardous materials from flooding and from being released during a five hundred-year flood event or shall floodproof the facility. Any person making a development to an existing hazardous material facility that requires a floodplain development permit shall secure all hazardous materials from flooding and from being released during a five hundred-year flood event in the structure or portion of the facility being modified, or shall floodproof the structure or portion of the facility being modified.

(A) The owner or operator of the hazardous material facility shall demonstrate compliance with this standard by providing a sealed certification from a Colorado registered professional engineer documenting that due to the flood threat and hazardous material storage conditions, hazardous material will not be released at or from the facility during a five hundred-year flood event.

(B) No person owning, operating, or otherwise using a hazardous material facility shall fail to bring the entire facility into compliance with this subsection (5) by January 1, 2023.

(f) Critical Facilities Protected by Levee Systems. Critical facilities protected by levee systems within the five hundred-year floodplain are exempt from the requirements of subsections (d), and (e) of this section 9-9-23 provided that the following requirements are satisfied:

(1) Floodplain Development Permit Required. No person shall construct or use a new or existing critical facility protected by a levee system under this subsection 9-9-23(f) prior to the issuance of a floodplain development permit pursuant to section 9-3-6(k), "Floodplain Development Permit Requirements for Critical Facilities Protected by Levee Systems," B.R.C. 1981.

(2) The owner or operator of a new or existing critical facility located landward of a levee system, outside the one hundred-year floodplain but within the five hundred-year floodplain, shall demonstrate that the levee system provides protection against a five hundred-year flood event by meeting the following requirements:

(A) Design criteria consistent with 44 CFR § 65.10, except that the minimum riverine levee freeboard criterion shall be one foot above the water surface elevation of a five hundred-year flood, rather than three; and

(B) Operation and maintenance standards (including an operating and maintenance manual and periodic freeboard and visual inspections) that ensure continuing proper function of the levee system, consistent with Rule 10 of the Colorado Rules and Regulations for Regulatory Floodplains in Colorado. (2 CCR 408-1:10, Criteria for Determining Effects of Levees on Regulatory Floodplains).

(3) The owner or operator of a new or existing critical facility located landward of an accredited levee or a provisionally accredited levee within areas mapped Zone X (shaded) shall demonstrate that the levee system meets the design criteria of 44 CFR § 65.10 and Rule 10 of the Colorado Rules and Regulations for Regulatory Floodplains in Colorado (2 CCR 408-1:10, Criteria for Determining Effects of Levees on Regulatory Floodplains).

(4) The owner or operator of a critical facility must secure an agreement, meeting the requirements of subparagraphs 9-9-23(f)(2) and (3) as applicable, with the levee owner and/or operator for continued operation and maintenance of the levee system in order to be recognized as protected by a levee system.

(5) If a levee system protecting an existing critical facility fails to meet the freeboard criterion of subparagraph (f)(2)(A) of this section because FEMA revises a FIRM, construction and use of that critical facility may occur for two years after the revision, but only while the levee owner or operator actively and diligently pursues levee improvements to comply with this subsection (f). The requirements of section 9-3-3 will apply in the one hundred-year floodplain.

Section 3. Section 9-16-1, B.R.C. 1981 is amended to read:

9-16-1 General Definitions.

(a) The definitions contained in chapter 1-2, "Definitions," B.R.C. 1981, apply to this title unless a term is defined differently in this chapter.

(b) Terms identified with the references shown below after the definition are limited to those specific sections or chapters of this title:

(1) Airport influence zone (AIZ).

(2) Floodplain regulations (Floodplain).

(3) Historic preservation (Historic).

(4) Inclusionary housing (Inclusionary Housing).

(5) Residential growth management system (RGMS).

(6) Solar access (Solar).

(7) Wetlands Protection (Wetlands).

(8) Signs (Signs).

(9) Critical Facilities and Lodging Facilities (Critical Facilities).

(c) The following terms as used in this title have the following meanings unless the context clearly indicates otherwise:

…

"Accredited l~~L~~evee or provisionally accredited levee" means a system of artificial embankment(s) or flood control structure(s) used for property protection, flood control, and flood hazard mitigation accredited or provisionally accredited and mapped Zone X (shaded) by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). (Floodplain and Critical Facilities)

…

"Area of special flood hazard" means the land in the floodplain subject to a one percent or greater chance of flooding in any given year. Such areas may be designated as Zones A, AO, AH, AE and A1-30 on the FIRM for the City of Boulder. (Floodplain)

"At-risk population facility" means a pre-school, public or private primary or secondary school, before and after school care center with twelve or more students, daycare center with twelve or more children, group home, or ~~assisted living~~ residential or congregate care facility with twelve

or more residents. At-risk population facility is also included in the definition of "critical facility." (Floodplain and Critical Facilities)

...

"Base flood elevation" is the computed elevation to which floodwater is anticipated to rise during the one hundred-year flood. (Floodplain)

"Basement" means any enclosed area of a building having its lowest floor a minimum of two feet below grade level on all sides. (Floodplain and Critical Facilities)

...

"Change in a watercourse" means any change in an existing thalweg, bed, or bank of a watercourse. (Floodplain)

...

"Conveyance zone" means those portions of the floodplain required for the passage or conveyance of the one hundred-year flood. The conveyance zone is delineated based on an equal encroachment methodology (measured in volume of water), which is applied to the floodplain from the edges of the flood channel to a point where the one hundred-year flood profile will be raised no more than six inches, after considering a reasonable expectation of blockage at bridges and other obstructions by flood borne debris. The city may, in its discretion, delineate the conveyance zone on city owned land or right of way based on unequal encroachment to minimize delineation on other properties. The conveyance zone is equivalent to a floodway delineation based on a six inch rise. (Floodplain and Critical Facilities)[c1]

...

"Crawl space" means the enclosed area contained inside the foundation walls and below the habitable floor of a structure. Crawl spaces having the lowest floor a minimum of two feet below grade level on all sides shall be considered a basement, and not a crawl space. (Floodplain)

"Critical facility" means any structure or related -infrastructure, the loss of which may result in severe hazards to public health and safety or may interrupt essential services and operations for the community at any time before, during, and after a flood. Critical facilities are classified as follows: (1) e~~E~~ssential s~~S~~ervice~~s~~ f~~F~~acility, (2) h~~H~~azardous m~~M~~aterial f~~F~~acility, and (3) a~~A~~t-risk p~~P~~opulation~~s~~ f~~F~~acility. (Floodplain and Critical Facilities)

...

"Development" means any change to improved or unimproved real estate, including, without limitation, constructing, relocating, rehabilitating, reconstructing or expanding or enlarging (but not maintaining) a building or other structure or portion thereof, or establishing or changing a

use, or mining, dredging, filling, grading, paving, or excavation. (Floodplain and Critical Facilities)

"Essential services facility[JLP2]" means any facility providing essential services that, if flooded, may result in severe hazards to public health and safety or interrupt essential services and operations for the community at any time before, during, or after a flood that include without limitation, public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities and equipment, and government operations. Examples of essential services facilities include without limitation the following:

(1) Public safety facilities such as police stations, fire and rescue stations, and emergency operation centers;

(2) Emergency response facilities, such as emergency vehicle and equipment storage, and essential governmental work centers for continuity of government operations;

(3) Emergency medical facilities, such as hospitals, emergency care, urgent care, and ambulance services but excluding clinics, doctors offices, and non-urgent care medical facilities;

(4) Shelters designated by the city manager that will be used during or after a flood for displaced persons;

(5) Communication facilities, such as main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems, but excluding towers, poles, lines, cables, and conduits;

(6) Public utility plant facilities and essential equipment for treatment, generation, storage, pumping, and distribution such as hubs for water, wastewater, power, and gas but excluding hydro electric facilities, towers, poles, power lines, buried pipelines, transmission lines, distribution lines, and service lines;

(7) Essential governmental facilities necessary for operations including, without limitation, facilities where permanent records, as defined by an agency's data retention policy, public records are stored, courts, jails, building permitting and inspection services, government administration and management, departments that manage utilities and transportation systems, information technology departments, finance departments, health departments, the county commissioner's office, the city manager's office, and maintenance and equipment centers); and

(8) Air transportation lifelines, such as an airport or heliport, and structures serving emergency functions, and associated infrastructure such as (aviation control towers, air traffic control centers, and emergency equipment aircraft hangars).

Essential service facility is also included in the definition of "critical facility." (Floodplain and Critical Facilities)

...

"Exceptional hardship" means a substantially disproportionate burden in relationship to the benefit to be derived from conformance with the requirements of this title. (Floodplain)

...

"Existing manufactured home park or subdivision" means a manufactured home park for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) was completed prior to July 12, 1978. (Floodplain)

...

"Expansion or enlargement" of a structure" means any addition of an exterior wall to the structure or any addition to the floor area of the structure, whether under, at, or above grade, and whether or not the external dimensions of the structure are changed, or the reconstruction of a flood-damaged portion of a structure, so long as such expansion, enlargement or reconstruction does not constitute a "substantial modification" or a "substantial improvement." (Floodplain and Critical Facilities)

"Expansion to existing manufactured home park or subdivision" means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, without limitation, the installation of utilities, the construction of streets, final site grading, or the pouring of concrete pads). (Floodplain)

...

"FEMA" means the Federal Emergency Management Agency. (Floodplain and Critical Facilities)

...

"Five hundred-year flood" means a flood having a 0.2 percent chance of occurring in any year. (Floodplain and Critical Facilities)

"Flood" or "flooding" means a general or temporary condition of partial or complete inundation of normally dry land areas from a watercourse that temporarily overflows the boundaries within which it is ordinarily confined or from the rapid accumulation of runoff of surface water caused by rain, snow melt, flow blockage, or any other source. (Floodplain and Critical Facilities)

"Flood channel" means a natural or artificial watercourse with a definite bed and banks which periodically or continuously conducts flowing water and is shown on the Flood Channel

Inventory Map prepared by the city's Utility Division of the Public Works Department. (Floodplain)

~~"Flood fringe" means those portions of the floodplain that are not in the conveyance zone or in the high hazard zone. (Floodplain)~~

"Flood Insurance Rate Map (FIRM)" means the official map on which FEMA has delineated both the areas of special flood hazard and the risk premium zones applicable to the community. (Floodplain and Critical Facilities)

"Flood insurance study (FIS)" means the official report provided by the Federal Emergency Management Agency that included flood profiles, the Flood Boundary-Floodway Map, and the water surface elevations of the base flood. (Floodplain)

"Flood profile" means a graph showing the elevations of the floodwater surface and the elevations of the underlying land as a function of distance along a path of flow. (Floodplain)

"Flood protection elevation" means the following ~~an elevation of~~:

(1) In the one hundred-year floodplain, an elevation of:

~~1~~A) T~~t~~wo feet above the elevation of the water surface of a one hundred-year flood as determined pursuant to sections 9-3-2 through 9-3-8, B.R.C. 1981, or, if no such elevation is determined, two feet above the highest grade adjacent to a structure;~~,~~ or

~~2~~B) T~~t~~wo feet above the base flood elevation in AE zones or two feet above the flood depth number indicated for AO zones on the FIRM for the City of Boulder, whichever is higher.

(2) In the five hundred-year floodplain, the lower of the following elevations:

A) ~~O~~one foot above the water surface of a five hundred-year flood under the~~se~~ standards in section 9-3-2 through 9-3-8~~5,~~ and section 9-9-23 B.R.C., 1981;~~,~~ or

B) T~~t~~he one hundred-year flood protection elevation (Floodplain and Critical Facilities)

"Floodplain" means the area that is susceptible to being inundated by a flood. Unless the context clearly indicates otherwise, "floodplain" refers to the one hundred-year floodplain. (Floodplain).

"Floodplain development permit" means any permit granted under the terms and conditions of sections 9-3-2 through 9-3-8, and section 9-9-23, B.R.C. 1981, for development on land in a floodplain. (Floodplain and Critical Facilities)

"Floodplain, five hundred-year" means the area inundated by a flood having a 0.2 percent or greater chance of occurring in any given year. (Floodplain and Critical Facilities)

"Floodplain, one hundred-year" means the area inundated by a flood having a one percent or greater chance of occurring in any given year. (Floodplain)

"Floodproofing" means any combination of structural and nonstructural changes, modifications, or adjustments to structures or real property which reduce or eliminate flood damage to improved or unimproved real property, water and sanitary facilities, structures and their contents. (Floodplain and Critical Facilities)

"Floodway, FEMA regulatory" means the channels of watercourses and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. (Floodplain)

...

"Hazardous material" means any material used, generated, or stored at a facility of a type and in a quantity that would classify the facility as a hazardous materials facility. (Floodplain and Critical Facilities)

~~"Hazardous material building" means any structure on a hazardous materials facility in which hazardous material is used, generated, or stored. (Floodplain)~~

"Hazardous material facility" means a structure or group of structures that is:

(1) s~~A facility s~~ubject to Section 303 of the Emergency Planning and Community Right-to-Know Act, 42 USC §11003, because it has ~~on site~~ an "Extremely Hazardous Substance" on site in quantities that meet or exceed the "Threshold Planning Quantities" established by the United States Environmental Protection Agency and listed at 40 CFR Part 355, Appendix A and Appendix B;~~.~~

(2) u~~U~~nless covered by subpart (1) above, ~~facilities~~ storing hazardous material as defined by Department of Transportation regulations at 49 CFR Parts 171-180 but only to the extent that the facility is storing the hazardous material in the "Bulk Packaging" container in which it was delivered as that term is defined at 49 CFR 171.8;~~.~~

(3) s~~A facility s~~toring a hazardous substance of the type and quantity listed by §29-22-107,C.R.S; or~~.~~

(4) ~~A facility~~ regulated as a transfer facility under Colorado hazardous waste regulations at 6 CCR 1007-3, Part 263.

Hazardous material facility is also included in the definition of "critical facility."

(Floodplain and Critical Facilities)

"Hazardous substance" means any substance, as determined from time to time by the city manager pursuant to the rule making authority granted by subsection 9-3-2(c), B.R.C. 1981, that is flammable, radioactive, toxic, or explosive, and that in times of flooding could be released in sufficient quantities to be harmful to humans, animals, or plant life. (Floodplain)

…

"High hazard zone" means those portions of the floodplain where an unacceptably high hazard to human safety exists defined as those areas where the product number of flow velocity (measured in ft./sec.) times flow depth (measured in feet) equals or exceeds four, or where flow depths equal or exceed four feet. (Floodplain and Critical Facilities)

…

"Intended for human occupancy" means, as applied to structures, capable of and likely to be used for residential habitation, or for commercial, industrial or governmental occupation by persons on a regular basis. Examples of structures normally not intended for human occupancy include, without limitation, garages useable solely for the parking of vehicles or storage, open air carwashes, unheated pavilions, porches or patio covers, crawl spaces, flood resistant enclosures useable solely for building access, barns and other agricultural buildings, garden storage sheds, ATMs, and mausoleums. (Floodplain)

…

Lodging facility" means a hotel, motel, dormitory, bed and breakfast, or hostel, as defined in the Boulder Revised Code. -(Floodplain and Critical Facilities)

…

"Lowest floor" means the lowest floor of the lowest enclosed area (including basement or crawl space). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable design requirements of sections 9-3-2 through 9-3-8, and section 9-9-23, B.R.C. 1981. (Floodplain and Critical Facilities)

…

"Maintenance" means any activity undertaken to repair or prevent the deterioration, impairment or failure of any stream, previously constructed improvement or structure including, without limitation: the removal of sediment and debris, installation of erosion and sediment control devices and the replacement of structural components. Maintenance does not include substantial modifications, substantial improvements, total replacement of existing facilities or total reconstruction of a facility. (Floodplain and Critical Facilities)

…

"Manufactured home" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle." (Floodplain)

"Manufactured home park or manufactured home subdivision" means any lot or tract of land designed, used, or intended to provide a location or accommodation for one or more manufactured homes and upon which any manufactured home or homes are parked or located, whether or not the lot or tract or any part thereof is held or operated for profit, on which construction was completed on or after July 12, 1978. (Floodplain)

...

"Moveable object" means an item or material not anchored to the ground that is subject to being transported by water, including, without limitation, a manufactured home not anchored to a permanent foundation, a tank, a trash dumpster, lumber, and other materials, but not a motor vehicle. (Floodplain)

...

"New construction" means structures for which the "start of construction" commenced on or after July 12, 1978, and includes any subsequent improvements to such structures. (Floodplain and Critical Facilities)

"New manufactured home park or subdivision" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, final site grading, or pouring of concrete pads) is completed on or after July 12, 1978. (Floodplain)

"Nonresidential structure" means any structure or any portion of a structure used exclusively for, or designed as and capable of being used for, office, commercial, industrial, or governmental occupation. (Floodplain)

...

"Obstruction" means any item or material not constituting a moveable object in, along, across, or projecting into the floodplain that might impede, retard, or change the direction of a flow of water, either by itself or by catching or collecting debris carried by such water, in a way that the city manager determines would increase the flood hazard to adjacent properties. (Floodplain)

...

"One hundred-year flood" means a flood having a one percent chance of occurring in any year. (Floodplain and Critical Facilities)

...

"Reconstruction" means exact replacement of an existing structure or portion thereof or exact structural repair of a damaged structure. (Floodplain and Critical Facilities)

"Recreational vehicle" means a vehicle which is: 1) built on a single chassis; 2) four hundred square feet or less when measured at the largest horizontal projections; 3) designed to be self-propelled or permanently towable by a light duty truck; and 4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use. (Floodplain)

...

"Rehabilitation" means any improvement, maintenance, or remodeling made to the interior or exterior of any existing structure or the reconstruction of a deteriorated or non-flood-damaged portion of an existing structure so long as such improvement or reconstruction does not constitute an "expansion or enlargement of a structure," "substantial modification," or a "substantial improvement." (Floodplain)

...

"Residential structure" means any structure or any portion of a structure that is used for, or designed as and capable of being used for, the temporary or permanent domicile of persons, including, without limitation, a dwelling, a boarding house, a hotel, a motel, and similarly used structures. (Floodplain)

...

"Start of construction" means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within one hundred eighty days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. (Floodplain and Critical Facilities)

...

"Structure" means a building or other roofed construction, a basement, a wall, a fence, a manufactured home, or a storage tank. (Floodplain and Critical Facilities)

...

"Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed fifty percent of the market value of the structure before the damage occurred. (Floodplain)

"Substantial improvement" means any repair, reconstruction, rehabilitation, addition, or improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work

performed. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either: 1) any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or 2) any alteration of a structure listed on the National Register of Historic Places or the Colorado Inventory of Historic Places or designated as an individual landmark under section 9-11-2, "City Council May Designate Or Amend Landmarks And Historic Districts," B.R.C. 1981. (Floodplain and Critical Facilities)

...

"Substantial modification" means any expansion or enlargement of a structure which equals or exceeds fifty percent of the floor area of the structure intended for human occupancy, considered cumulatively, commencing July 12, 1978. (Floodplain and Critical Facilities)

...

Section 4. This ordinance shall become effective on the later of _____, 2013[JLP3], or 30 days after its final passage by the City Council. This ordinance shall apply to all permits and development applications submitted to the city after the effective date of its passage.

Section 4. This ordinance is necessary to protect the public health, safety, and welfare of the residents of the city, and covers matters of local concern.

Section 5. The City Council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, AND ORDERED PUBLISHED BY TITLE ONLY this ____ day of _____, 2013.

_____
Mayor

Attest:

_____
City Clerk on behalf of the
Director of Finance and Record

READ ON SECOND READING, PASSED, ADOPTED, AND ORDERED PUBLISHED BY TITLE ONLY this _____ day of _____, 20__.

_____
Mayor

Attest:

_____
City Clerk on behalf of the
Director of Finance and Record

APPENDIX E

ASFPM WHITE PAPER

"CRITICAL FACILITIES AND FLOOD RISK"

Association of State Floodplain Managers, Inc.

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Critical Facilities and Flood Risk

This is a position paper prepared by the Association of State Floodplain Managers (ASFPM), a professional non-profit organization dedicated to reducing flood losses and protecting floodplain functions and resources in the United States, without causing adverse impacts to others.

Background

Both flood risk and flood damage are increasing in the United States, despite multiple decades and billions of dollars to first attempt to control floods and then to attempt to reduce flood damage by managing floodplains. This increase in damage has occurred for three very simple reasons: (1) communities, other governments and property owners continue to build in high flood-risk areas; (2) when structures are built in high-risk areas, it is often done with inadequate adjustments for either the flood hazard that exists and certainly not for the flood hazard that will exist in the near future; and (3) facilities that are flooded once are not mitigated when rebuilt, despite the provision of the disaster recovery public assistance law that provides funding for mitigation (Stafford Disaster Act). In an attempt to remedy this, there is an effort to shift the current focus to reducing development in flood risk areas in order to reduce consequences and flood risk and to manage flood risk that may be caused from watershed development or changing conditions due to climate or demographics. Historically, the consequences of floods were considered only from an economic damage perspective; but loss of life and human suffering, as well as environmental degradation along with community sustainability and resilience, are equally important factors to consider when making decisions to reduce and manage flood risk.

For the purposes of this paper, it is important to explain that "flood risk" is not just the probability (chance) that a flood will impact a facility, but rather is the result of that probability multiplied by the consequences of when a flood does happen. Thus, flood risk may actually increase behind a levee if more development or higher value structures are placed behind the levee where they will be damaged when the levee is overtopped or fails and the flood occurs.

What are Critical Facilities and Critical Actions?

Critical facilities are those that are essential to a community's resiliency and sustainability— otherwise defined as its ability to quickly and efficiently respond to floods, recover from floods, meet the needs of its citizens, and rebuild after floods. Stated simply, critical facilities should never be flooded, and critical actions should never be conducted in floodplains if at all avoidable. The economic, social, and environmental impacts of the facility being flooded are so great that it should not be located in a flood hazard area. If there are no practical alternatives to locating the facility in a floodplain, federal guidelines should be followed requiring protection from the "500-year" flood event.

Critical facilities fall within the following categories:

1. **Governmental Facilities**: Essential for the delivery of critical services and crisis management, including data and communication centers, key government complexes, etc.
2. **Essential Facilities**: Those that are vital to health and welfare of entire populations, including hospitals and other medical facilities, retirement homes, police and fire departments, emergency operations centers, prisons, evacuation shelters, and schools, etc.
3. **Transportation Systems**: Those systems, and the supporting infrastructure, necessary for transport of people and resources (including airports, highways, railways, and waterways) during major disasters, including flood events up to the 500-year flood.
4. **Lifeline Utility Systems**: Those vital to public health and safety, including potable water, wastewater, oil, natural gas, electric power, communication systems, etc.
5. **High Potential Loss Facilities**: Failure or disruption of operations may have significant physical, social, environmental, and/or economic impact to neighboring communities, including nuclear power plants, high-hazard dams, urban levees, and military installations.
6. **Hazardous Material Facilities**: Involved in the production, storage, and/or transport of corrosives, explosives, flammable materials, radioactive materials, toxins, etc.

To further assist in determining if a facility is critical, the following questions should be asked:

1. If flooded, would the facility add another dimension to the disaster? (e.g., petroleum terminals, hazardous and toxic waste sites)
2. Based on the available flood warning time, would people be able to evacuate the facility/building without loss of life?
3. Would the facility be operable during an extreme flood event (e.g., 500-year flood)?
4. Would essential and irreplaceable records, utilities, and /or emergency services be lost or become inoperable?
5. If the services provided by the facility were disrupted by flood (e.g., police, fire, emergency services), would the flood disaster result in even more damages and loss of life?

If the answer to any of these or similar questions is “yes,” then the facility is considered critical, and the action to place the facility at risk of flooding would be a critical action.

The impacts of the loss of function of critical facilities could include:

- The inability to provide essential services, such as police, hospital, rescue and fire.
- Endangering large numbers of concentrated people, such as within emergency evacuation centers that cannot be accessed or serviced, or are otherwise at risk.
- Denying life-safety ingress and egress via critical streets and highways.
- Adding to the hazard of the flood water itself, such as by pollutants from flooded wastewater treatment plants or toxic materials.

Critical actions support facilities, and their activities, for which even a slight chance of flooding would be too great. Critical actions include but are not limited to:

- Providing financing assistance and/or construction of critical facilities

- Acquiring, managing, and disposing of lands for critical facilities
- Conducting programs and activities affecting land use for critical facilities

Minimum federal floodplain management standards for federal activities related to critical facilities come from Executive Order 11988, which cites the 500-year flood elevation as the minimum standard. The American Society of Civil Engineers (ASCE) Standard 24-05, and the International Building Code also provide minimum standards for some Category structures. Those standards, depending on the type of flood exposure, require protection to the 100-year flood elevation, plus up to three feet of freeboard or the "design flood elevation," whichever is higher. Therefore, the "design flood elevation" for critical facilities, as referred to in this paper, is the higher of the 500-year flood elevation, or the elevation required by applicable codes and standards.

Extent of the Problem

When critical facilities in the United States are flooded, they not only sustain costly flood damage, but may also become inoperative and unable to fulfill their function in response and recovery. This can result in greater loss of life and human suffering, and means that it takes longer for the community to get back to pre-flood levels of functionality. Two examples from recent floods illustrate this problem.

New Orleans and Hurricane Katrina, 2005: The frequency of flooding was reduced in the Greater New Orleans area, after Hurricane Betsy in 1965, when the federal government began to build structural levees/floodwalls. In the short term, the levees/floodwalls decreased flood risk; however, the reduced frequency of flooding altered the New Orleans style of construction. Traditionally, residents had avoided placing buildings in the lowest areas, instead opting for elevating buildings such as houses with enough space to park a car beneath them. After the levees/floodwalls were in place, the trend shifted to wholesale construction of "slab on grade" buildings, including critical facilities throughout the area. The result was that the levee/floodwall system actually increased long-term flood risk, because the consequences of flooding from levee failure increased greatly. Many, if not most, critical facilities in the area were built with first floors at elevations ranging from several feet below sea level to just a few feet above sea level.

When Hurricane Katrina struck, deaths resulted not only from direct floodwater, but also because of the inability to evacuate once the levees failed or overtopped. Additionally, many critical facilities were unable to continue in operation due to the lack of supplies and resources, such as power, potable water, food, sanitation, and medications. Critical facilities such as neighborhood schools and auditoriums that could have served as emergency evacuation centers were also flooded. Because of the distance and the need to traverse floodwater, many people were unable to evacuate to the Superdome. When the floodwaters arrived at St. Rita's Nursing Home 35 residents died while trying to evacuate from this home which was built 20 years previously in an area considered "protected" by the levee/floodwall system. Transportation infrastructure to provide access to the facility was inoperable during the flood. Critical facilities could have been located at the highest locations in the city, elevated or flood proofed, with accessibility, in order to achieve operability, maximum flood risk reduction and community resiliency.

Cedar Rapids, Iowa, and the Floods of 2008: When Cedar Rapids experienced a major flood in 2008, the city had levees and floodwalls in place, but these structural measures were overwhelmed by the

flood. Critical facilities such as the city hall, county courthouse, county detention complex, county sheriff's headquarters, police headquarters, and medical center were all located in areas that flooded when such measures were overwhelmed. The city hall, county courthouse, and county detention complex were actually located on an island in the Cedar River, and evacuation of the detention complex did not occur until floodwater had inundated the complex and all evacuation routes were flooded. Much of the city lies above the elevation of any flood event, and all of these facilities could have, and should have, been constructed at locations with very low flood risk. As in New Orleans, the location of critical facilities in flood prone areas not only added to cost of the flood damage, but it also hindered flood response and prolonged flood recovery, thus negatively impacting the city's economy, resiliency and sustainability.

Examples like these exist nationwide in many communities that are subject to flooding. These results will continue to occur unless communities use long-term planning to: (1) locate or build critical facilities at locations above projected high flood levels, (2) relocate their existing critical facilities, or (3) flood proof their critical facilities.

In many locations, critical facilities have been located in areas considered "protected" by levees, floodwalls, or dams that reduce flood frequency but do not eliminate flood risk. Furthermore, because of the misconception that a floodplain does not exist if a property is "protected" by a levee, floodwall, or dam accredited for purposes of the National Flood Insurance Program (NFIP), it is common for critical facilities to be constructed using "slab on grade" construction in these "protected" areas and to have no operability or access during major disasters.

Many levees and floodwalls, specifically those built after passage of the Water Resources Development Act of 1986 (WRDA) and after full implementation of the NFIP, were built to only provide "protection" from the 100-year flood. This has occurred for two reasons:

(1) the NFIP currently does not require flood insurance purchase or floodplain regulation in areas "protected" by levees and floodwalls that are accredited as providing a minimum of 100-year flood "protection," and

(2), the WRDA required construction cost sharing by a local sponsor with the Corps of Engineers, so communities generally opt to pay for only the minimum levee or floodwall, in order to remove them from the designated 100-year floodplain

Development and construction in areas behind a levee or floodwall, or in the failure zone below dams, can proceed as if no flood risk exists. Then, when a flood event occurs that exceeds the "protection" level provided, such as the 2005 or 2008 events described above, critical facilities are flooded—sometimes to depths greater than would have been the case had the levee, floodwall or dam never been built. This can be due to entrapment of the water within the overtopped or breached levee or floodwall and/or that no other mitigation, such as elevation above ground level, is performed.

Why the Problem Persists

Why are so many critical facilities vulnerable to damage and operational shutdown because of floods? It is important to recognize that critical facilities may be viewed or addressed differently depending on whether they already exist (and may be substantially damaged by an event and need rebuilding), or if they are being planned and the location for them is more open to discussion and decision. If there is any

federal involvement (most cases), the Executive Order directs that any at risk area be avoided if at all possible, followed by a construction decision, requiring mitigation and elevation above the 500-year flood (if a flood hazard area absolutely cannot be avoided). Factors contributing to the problem include:

- Federal agencies have contributed to the problem by directly building critical facilities or by funding states and localities (via grant programs) to build such facilities in flood hazard areas. This is true even though the Executive Order (11988, Floodplain Management, issued May 24, 1977) directed agencies of the federal government to give special consideration to, and avoid supporting critical facilities and critical actions in, flood-prone areas. Examination of the implementing guidelines to federal agencies published by the U.S. Water Resources Council (WRC) and codified into federal regulation February 10, 1978, includes specific reference to critical actions and critical facilities. The Order states that even a slight chance of flooding is too great for critical facilities and actions, so they should not be located in flood hazard areas if alternatives exist. The guidelines state that, "The minimum floodplain of concern for certain critical actions is the area subject to inundation from a flood having a 0.2 % chance of occurrence", also known as the 500-year flood. The Order faces challenges in implementation as a result of local and political pressure to develop in flood risk areas for short-term economic gain.

  A current example of this is in East St. Louis, Illinois—an area that has been considered "protected" by a levee that has been accredited by the NFIP as providing 100-year "protection", and which many considered to have 500-year protection. As a result, all development behind the levee over the years has been built essentially at-grade. This includes critical facilities, even though the EO and a subsequent state executive order require that critical facilities either not be built in a 500-year floodplain or be flood-proofed to be functional during a 500-year flood. The State of Illinois is requiring a state-funded nursing home, proposed for the area, to comply with 500-year standards of both the federal and the state executive orders. The reaction to these efforts, to consider life and safety for these critical facilities, has been a demand for change in both state and federal executive orders from the local community officials, the developers, and the area Congressional delegation. The state legislature in Illinois actually passed and the governor signed a law declaring that the area behind this levee is not a floodplain!

- Not all states have recognized the need for additional regulation relative to critical facilities and critical actions. Those that have recognized the need have generally followed the federal guidelines for implementing the EO. The prevalence for state purview often disappears when critical facilities are (to be) located in areas that are "protected" to NFIP minimum floodplain management standards by structural measures such as levees, floodwalls, or dams.

- Critical facilities are reconstructed after a disaster without being mitigated. Too often, public assistance (PA) funds from FEMA, or federal monies from other agencies such as DOT, HUD, EDA, etc, are used to reconstruct critical facilities after a disaster, but mitigation is not performed despite the use of federal dollars.

- A disconnect exists between land use decisions and flood risk costs. Land use decisions are made by communities and tend to be based on local short-term economic factors in the form of community growth and resultant increases in the local tax base. These decisions often favor

using floodplains for economic development, with the fact that the area is subject to flooding being a much lower priority in the decision. Local communities gain the "benefits" of the tax base growth but can then "externalize" the costs incurred during and after a flood to others, usually federal and state taxpayers. When a flood disaster occurs these same communities turn immediately to the state, which turns to the federal government for funds to respond, recover, and rebuild. When making land use decisions about critical facilities, communities usually place highest priority on getting the lowest-cost facility that meets the primary objective of the facility. The need for the facility to be fully functional during and after floods is often not a consideration. If flood risk is considered, it is usually from the perspective that the cost to rebuild after a flood will be largely paid for by a state or federal taxpayer recovery program, and thus not a local responsibility.

- Community acceptance of shared responsibility for flooding is lacking. The lack of responsibility for flooding results in unwise land use decisions by communities and by property owners because over the decades, people and communities have been "taught", over the decades, that flood disasters are a federal responsibility. This is reinforced by the ever-increasing prevalence of Presidential disaster declarations for floods and the resultant federal funding that goes principally to those communities and people that have taken the least amount of responsibility—thus rewarding unwise development in flood risk areas.

  An example of the lack of shared responsibility can be seen by a simple comparison of two types of disasters: fire and flood. In both cases, insurance is available for purchase by property owners. In the case of flood, most people try hard to avoid the requirement to buy flood insurance, and many communities base land use decisions not on flood risk, but on short-term economic growth. Communities also attempt to reduce the extent of the identified floodplain on the NFIP flood maps, even urging their members of Congress to delay flood maps or exempt their citizens in identified flood hazard areas from the mandatory purchase of flood insurance. With floods, the perception is that the taxpayer, via the federal government, will pay the cost of the response, recovery, and rebuilding. In the case of fire, quite the opposite occurs. With fire, it is understood that the individual is wholly responsible for fire damage and if any broader support comes, it generally stops at the local community level. Because flood disasters are generally large and devastating, the individual and local community's lack of responsibility in managing flood risk is rewarded flood after flood with large amounts of funding borne mostly by the federal and state taxpayers. Critical facilities that are damaged or destroyed by floods are often the first recipients of federal rebuilding funds because of the urgency to restore the services they provide. Furthermore, communities often argue strongly to be allowed to rebuild the critical facility in the same flood risk area where it was destroyed.

- Many communities do not know what critical facilities exist in their area or what constitutes a critical facility. Communities may not have looked ahead and thought about what facilities exist that are "critical" for flood response, recovery, and community resilience in the long term. Each community should have an inventory of all its critical facilities, and a list of the actions to be taken if that facility is damaged or must be rebuilt.

- It may not be clear if critical facilities are in flood risk areas. Many communities have inadequate or inaccurate floodplain information. FEMA has recently undertaken an initiative to

modernize flood maps and to update many flood maps across the nation. While this has resulted in good information, some communities are still operating with maps that simply digitized decades-old information. In addition, watersheds and floodplains are dynamic, and today's best information may be inaccurate tomorrow due to physical changes in the floodplain or watershed brought about by human development, climate change, flood events, or other factors. Without accurate and current floodplain mapping, proper location and/or construction and operability of critical facilities is difficult to achieve.

- Lack of community understanding about where flood risk exists. There is a common misunderstanding that flood risk only exists in the shaded 100-year floodplain area on the NFIP maps. This is highly inaccurate, but is reinforced by the fact that the 100-year floodplain is the only flood risk area with any relevance on the NFIP flood maps, therefore it has become the de facto "recognized" flood risk area throughout the nation. The 100-year floodplain on NFIP maps exists primarily for flood insurance purchase, not to show flood risk. According to public misconception, if a facility is within the 100-year floodplain on the NFIP maps, it has a flood exposure; if it is not within the 100-year floodplain it does not have, and will never have, a flood problem. This is one of the greatest misconceptions people and communities have, supported by the federal flood maps and policies. This fallacy must be addressed at the local community level by educating the public about the "nature's" floodplain and that flood risk is a continuum throughout the community, not an "in or out" concept. Communities must take necessary steps to have critical facilities accessible and functional in all flood events, no matter how large the event.

- Flood maps do not reflect future flood conditions. NFIP flood mapping reflects only the flood that will occur based on existing, not future conditions. FEMA claims this is because the NFIP maps must reflect current risks for insurance rating purposes. The focus on existing watershed and floodplain conditions, rather than on future conditions, has resulted in critical facilities being located in what will be high flood risk areas after the watershed is developed, storms intensify, or sea level rises. Thus, critical facilities are placed in areas inappropriate to support community resiliency and sustainability.

Recommendations

The following actions for change are recommended by ASFPM:

Recommendation 1
Reconnect land use decisions and flood risk responsibility and cost. A disconnect between land use decisions and flood risk cost is a problem across all categories of buildings and structures, not just critical facilities. The actions below should address the differences between existing and new critical facilities:

Action item: Grant funds should not be available from any federal agency to construct any critical facility that does not meet the flood risk process/standards of the Floodplain Management Executive Order 11988. This would connect community land use decisions to the flood risk cost and exposure of the federal taxpayers; meaning the facilities must be built in accordance with the Federal Order or federal support is not available.

Action item: Post disaster funds from any federal agency should only be available for post-flood rebuilding of a critical facility if the facility is protected from and operable in the 500-year flood, or the funds can be used toward relocating the facility. This action should be undertaken by the federal and state agencies responsible for the funding, permitting, rebuilding and location decisions of critical facilities.

Action item: When providing funding for disaster relief, including critical facilities, federal assistance should use a "sliding" cost share policy. Thus, under federal policy, those communities that do the poorest job of managing flood risk would either receive the same or less funds as those communities that do the best job.

Action item: Communication and education on the importance of flood risk and appropriate land use decisions by local communities is extremely important. Flood risk communication and education to inform local land use decision makers, as well as local citizens, on current flood risk and on effective flood risk management, must be instituted at least annually in all communities. This need is especially important for critical facilities and how citizens in that community can access those facilities during major flood events.

Action item: The NFIP regulations should include standards for critical facilities that are required for a community ordinance in order to be compliant and to participate in the NFIP.

Recommendation 2

Ensure that communities are aware of the critical facilities within their jurisdictions. Many communities may not know what role certain facilities should play during disasters/emergencies.

Action item: Communities are required to identify and maintain, in their hazard mitigation plan, a list of facilities that are essential to reducing and preventing human suffering and death during and after floods or other disasters. This action is the responsibility of each community with support and oversight from each state's mitigation and floodplain management office. The community mitigation plan should identify the actions the community will take when a facility is damaged or rebuilt. To assist this effort a critical facility "tool kit" focused on identifying critical facilities, as well as location or flood-proofing of existing critical facilities, should be developed by the Federal Interagency Floodplain Management Task Force. Floodplain management experts such as states and ASFPM Chapters could provide this to communities and others.

Recommendation 3

A shift in flood risk management benefits thinking, from "short term" to "long term", must occur. The level of flood risk considered acceptable and sustainable must be established nationwide and at the state and local level. Any short-term objectives must be supportive of, and not negate, the long-term

objectives. Requiring those who build and live at risk to pay the full cost of adding to that risk is key, and other actions can support this.

> **Action item:** All communities should be required to have a flood hazard mitigation plan that focuses on maximum reduction of flood risk for critical facilities by 2050. Measurable and implementable actions must be adopted that are achievable short-term, but that also continually move the community and its critical facilities toward this flood risk objective. This could be a further requirement of the present flood hazard mitigation plan for community eligibility for FEMA Mitigation funding as well as for USACE water resources projects. This would be a FEMA and USACE action, with strong support from state floodplain management and mitigation programs and from ASFPM. Congressional action may be needed to update the DMA 2000 requirements for a community to adopt an all-hazards mitigation plan.

Recommendation 4

Issue an updated federal executive order on floodplain management to replace the 30 year old EO 11988. The updated executive order should not be just a restatement of the 1977 EO, but also require that each federal agency take active leadership to promote a national focus on long-term sustainability and resilience for the nation's communities. The agencies must ensure that any federal investment or action does not add to flood risk, and has no adverse impact on other properties, communities or the environment. Essentially, the nation should be moving to a "no, or minimal flood risk" environment. The updated EO should require an annual national "rollup" of flood risk-related damage and death information and analyze trends in order to measure success or failure in reducing flood risk. The EO must explicitly address critical facilities and require that each federal agency provide leadership in flood risk management to achieve the goal of minimal flood risk by 2050. The new EO must also address the need to protect data that is essential to community sustainability and resilience, and shall link the National Infrastructure Protection Plan to these requirements, to provide for continuity of functions the facilities provide.

> **Action item:** The Federal Interagency Floodplain Management Task Force should promote the adoption of an updated executive order within the next year.
>
> **Action item:** The FEMA guidelines to implement the updated EO must direct that all community and state hazard mitigation plans identify and assess their critical facilities for action steps needed to comply with the requirements.
> **Action item:** The Administration must assign oversight of federal agency compliance with the existing and updated EO to one of the federal agencies, OMB or CEQ.

Recommendation 5

Accurate floodplain information is essential if communities are to ensure that their critical facilities are not located in flood risk areas or are flood proofed and operable to and during the 500-year flood minimum standard. Funding for accurate floodplain mapping information must be a high priority within communities and within agencies at the state and federal level. Within this context, the nation must have information that reflects future conditions, which must provide enough information to effectively expose and finally eliminate the myth that flood risk does not exist beyond the 100-year floodplain.

Action item: FEMA's floodplain mapping program of the NFIP is the nationally recognized source for floodplain information. If sufficient funding is not available for this task, flood insurance rates within the NFIP should be increased to provide adequate funding, or Congress must increase funding for floodplain mapping, recognizing the key role this information plays in community resilience and security.

Action item: Ultimately, it is the responsibility of every community to ensure that they are locating their critical facilities properly. Communities can develop floodplain information and verify the accuracy of existing information through a number of sources, such as investigation of historic flood information, review of basic topographic maps to determine elevations relative to flood sources, and hydraulic studies to determine flood information. Floodplain management organizations such as ASFPM and NASFMA should instill in membership what communities can do themselves to ensure the best information and decision making.

Action item: Since the flood insurance rate map of the NFIP has become the national de facto source for floodplain information, the mapped floodplains should also reflect future conditions. This is a FEMA action item. FEMA can also require NFIP communities adopt freeboard in the ordinances to require elevation of structures above the 100-year flood level by 1 or 2 feet. Currently nearly half of NFIP communities require freeboard.

Action item: A national flood risk communication and education campaign must be initiated that will address the public misperception that flood risk exits only in mapped 100 year floodplains. The public and communities must understand that flood risk is a continuum from high to low, with few areas having minimal flood risk. This is an action item that should be discussed and developed by the Federal Interagency Floodplain Management Task Force and the Intergovernmental Flood Risk Management Committee. This will require collaboration with organizations representing the key state and local partners that work with the federal government to reduce flood risk and protect lives and property from flooding through flood risk management measures and protecting the natural resource and functions of floodplains.

Recommendation 6

All states should adopt or update their state executive order on floodplain management dealing with critical facilities, if current State statutes or directives do not require critical facilities be either out of or flood proofed, and operable to at least the 500-year flood level.

Action item: FEMA and the ASFPM and its Chapters should engage in dialogue with State Mitigation staff and Floodplain Managers to facilitate appropriate implementation and provide information on the need for such action to the governors of each state.

Recommendation 7

A shift in the understanding of who pays for "at-risk" development is needed in order to support good community decision making. This is especially the case for critical facilities, to ensure that critical facilities be located and built with flood risk in mind. It must become politically "safe" and acceptable to support the implementation of 500-year (or higher) minimum standards for critical facilities, because that supports community resilience; rather than oppose implementation of such standards based on local short-term economic gain at the long-term expense of federal and state taxpayers.

Action item: Fully implement the concepts of "No Adverse Impact" so those who are adversely impacted by a development, including critical facilities, have a voice in community development decisions. This same approach can be linked to community infrastructure and the need for that infrastructure to be operable during disasters so the community is secure. This can be initiated by such agencies and entities as FEMA, Corps of Engineers, other federal and State agencies, and by ASFPM, NEMA and NASFMA.

Recommendation 8

Higher minimum standards should be considered for critical facilities. The current 500-year minimum standard for critical facilities may be insufficient in the 21st Century, just as the 100-year minimum standard is no longer sufficient for general flood risk management involving structural measures in urban areas. This could mean moving to a higher standard, such as the 1,000-year standard or to a no flood risk criteria for critical facilities. This may involve a variable standard depending on the type of facility and changing local risk conditions, such as those outlined in ASCE 24.

Action item: Leading floodplain and flood risk management organizations, such as ASFPM, NASFMA, Army Corps of Engineers, and FEMA, acting through the Federal Interagency Floodplain Management Task force, should debate and determine the appropriate standard for critical facilities.

Resources

American Society of Civil Engineers, “Flood Resistant Design and Construction,” ASCE 24-05. (2006).

American Society of Civil Engineers, “Minimum Design Loads for Buildings and Other Structures,” ASCE 7-05. (2006).

L.S. Buss. “No Flood Risk—A Concept Whose Time Has Come.” (2010)

Executive Order No. 11988, “Floodplain Management,” 42 *Federal Register* 26951 (May 24, 1977).

Federal Emergency Management Agency, “Design Considerations for Improving Critical Facility Functionality during Flood Events,” (October 2009).

Federal Emergency Management Agency, “Midwest Floods of 2008 in Iowa and Wisconsin,” FEMA P-765 (October 2009).

Federal Emergency Management Agency, “Risk Management Series, Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds,” FEMA 577 (June 2007).
Federal Emergency Management Agency, “Risk Management Series, Design Guide for Improving Critical Facility Safety from Flooding and High Winds,” FEMA 543 (January 2007).

Federal Emergency Management Agency, “Hurricane Katrina in the Gulf Coast: Mitigation Assessment Team Report, Building Performance Observations, Recommendations, and Technical Guidance,” FEMA 549 (July 2006).

Water Resources Council, “Floodplain Management Guidelines for Implementing EO 11988,” 43 Federal Register 29 (February 10, 1978).

APPENDIX F

COLORADO WATER CONSERVATION BOARD (CWCB)

FLOOD REGULATIONS

DEPARTMENT OF NATURAL RESOURCES
COLORADO WATER CONSERVATION BOARD

RULES AND REGULATIONS FOR REGULATORY FLOODPLAINS IN COLORADO

November 17, 2010

RULES AND REGULATIONS FOR REGULATORY FLOODPLAINS IN COLORADO

COLORADO WATER CONSERVATION BOARD
DEPARTMENT OF NATURAL RESOURCES

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RULES AND REGULATIONS FOR REGULATORY FLOODPLAINS IN COLORADO

Rule 1. **Title**: The formal title of the previous Rules and Regulations was "Rules and Regulations for the Designation and Approval of Floodplains and of Storm or Floodwater Runoff Channels in Colorado" as approved in 1988. The title for these Rules and Regulations was revised in 2005 to "Rules and Regulations for Regulatory Floodplains in Colorado," and amended here under the same title (referred to herein collectively as the "Rules" or individually as "Rule"). These Rules supersede both the 2005 and the 1988 Rules.

Rule 2. **Authority**: These Rules are promulgated pursuant to the authority granted the Colorado Water Conservation Board (Board or CWCB) in sections 24-4-103, 24-65.1-101(1)(c)(I), 24-65.1-202(2)(a)(I), 24-65.1-302(2)(a), 24-65.1-403(3), 30-28-111(1)–(2), 31-23-301(1)–(3), 37-60-106(1), 37-60-106(1)(c)–(g), (j), (k), C.R.S. (2010).

Rule 3. **Purpose and Scope**:

A. **Purpose**. The purpose of these Rules is to provide uniform standards for regulatory floodplains (or floodplains) in Colorado, to provide standards for activities that may impact regulatory floodplains in Colorado, and to stipulate the process by which floodplains will be designated and approved by the CWCB. Rules for Regulatory Floodplains are of statewide concern to the State of Colorado and the Colorado Water Conservation Board in order to prevent flooding and the negative impacts of floods, as well as to assure public health, safety, welfare and property by limiting development in floodplains. These Rules will also assist the CWCB and communities in Colorado to develop sound floodplain management practices and implement the National Flood Insurance Program (NFIP). These Rules shall apply throughout the State of Colorado, without regard to whether a community participates in the National Flood Insurance Program. These Rules shall also apply to activities conducted by state agencies and to Federal activities that are fully or partially financed by state funds. These Rules also apply to projects or studies for which the Board has made a loan or grant pursuant to sections 37-60-120(2) and 37-60-121(1)(b)(VII), (IX)(C).

B. **Scope**

(1) **Zoning**. These Rules apply to all floodplain information developed for zoning and for floodplain permitting purposes for waterways in the State of Colorado by, but not limited to, individuals, corporations, local government agencies, regional government agencies, state government agencies, Indian tribes, and federal government agencies.

(2) **Subdivisions**. These Rules generally apply to the local approval of subdivision drainage reports that provide 100-year floodplain information. Local governments should ensure that site-specific floodplain delineations, intended for regulatory purposes when they are prepared, for development activities are consistent with floodplain information designated and approved by the Board.

(3) **Dam Failure floodplain**. These Rules do not apply to the identification of the area potentially inundated by the catastrophic or sudden failure of any man-made structure such as a dam, canal, irrigation ditch, pipeline, or other artificial channel.

Rule 4. **Definitions**: The following definitions are applicable to these Rules and Regulations for Regulatory Floodplain in Colorado:

Term	Definition
100-year Flood	A flood having a recurrence interval that has a one-percent chance of being equaled or exceeded during any given year (1-percent-annual-chance-flood). The terms "one-hundred-year flood" and "one percent chance flood" are synonymous with the term "100-year flood." The term does not imply that the flood will necessarily happen once every one hundred years.
100-year Floodplain	The area of land susceptible to being inundated as a result of the occurrence of a one-hundred-year flood.
500-year Flood	A flood having a recurrence interval that has a 0.2-percent chance of being equaled or exceeded during any given year (0.2-percent-chance-annual-flood). The term does not imply that the flood will necessarily happen once every five hundred years.
500-year Floodplain	The area of land susceptible to being inundated as a result of the occurrence of a five-hundred-year flood.
Addition	Any activity that expands the enclosed footprint or increases the horizontal square footage of an existing structure.
Alluvial Fans	A fan-shaped sediment deposit formed by a stream that flows from a steep mountain valley or gorge onto a plain or the junction of a tributary stream with the main stream. Alluvial fans contain active stream channels and boulder bars, and recently abandoned channels. Alluvial fans are predominantly formed by alluvial deposits and are modified by infrequent sheet flood, channel avulsions and other stream processes.
Approximate Floodplain Information	Floodplain information that significantly reduces the level of detail for topographic mapping or hydraulic calculations to arrive at floodplain delineations without a comparison of water surface profiles with a topographic map of compatible accuracy. The level of detail for hydrology is consistent with that of detailed floodplain information.

Base Flood Is synonymous with 100-year flood and is a flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) The elevation shown on a FEMA Flood Insurance Rate Map for Zones AE, AH, A1-A30, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO, V1-V30, and VE that indicates the water surface elevation resulting from a flood that has a one percent chance of equaling or exceeding that level in any given year.

Basin The total land surface area from which precipitation is conveyed or carried by a stream or system of streams under the force of gravity and discharged through one or more outlets.

Channel The physical confine of stream or waterway consisting of a bed and stream banks, existing in a variety of geometries.

Channelization The artificial creation, enlargement or realignment of a stream channel.

Code of Federal Regulations (CFR) The codification of the general and permanent Rules published in the Federal Register by the executive departments and agencies of the Federal Government. It is divided into 50 titles that represent broad areas subject to Federal regulation.

Colorado Floodplain and Stormwater Criteria Manual The Manual prepared by the CWCB to aid local officials and engineers in the proper regulation and design of flood protected facilities. The Manual is advisory, rather than regulatory, in purpose.

Community Any political subdivision in the state of Colorado that has authority to adopt and enforce floodplain management regulations through zoning, including, but not limited to, cities, towns, unincorporated areas in the counties, Indian tribes and drainage and flood control districts.

Conditional Letter of Map Revision (CLOMR) FEMA's comment on a proposed project, which does not revise an effective floodplain map, that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodplain.

Critical Facility or Critical Facilities Means a structure or related infrastructure, but not the land on which it is situated, as specified in Rule 6, that if

	flooded may result in significant hazards to public health and safety or interrupt essential services and operations for the community at any time before, during and after a flood. *See* Rule 6.
Debris Flow	Movement of mud, water, and other materials downward over sloping terrain. The flow typically consists of a mixture of soil, rock, woody debris and water that flows down steep terrain.
Designation and Approval	Certification by formal action of the Board that technical information developed through scientific study using accepted engineering methods is suitable for local governments making land use decisions under statutorily authorized zoning powers.
Detailed Floodplain Information	Floodplain information prepared utilizing topographic base mapping, hydrologic analysis, and hydraulic calculations to arrive at precise water surface profiles and floodplain delineations suitable for making land use decisions under statutorily authorized zoning powers.
Development	Any man-made changes to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.
DFIRM Database	Database (usually spreadsheets containing data and analyses that accompany DFIRMs). The FEMA Mapping Specifications and Guidelines outline requirements for the development and maintenance of DFIRM databases.
Digital Flood Insurance Rate Map (DFIRM)	FEMA digital floodplain map. These digital maps serve as "regulatory floodplain maps" for insurance and floodplain management purposes.
Federal Register	The official daily publication for Rules, proposed Rules, and notices of Federal agencies and organizations, as well as executive orders and other presidential documents.
FEMA	Federal Emergency Management Agency.
FEMA Guidelines & Specifications for Flood Hazard Mapping Partners	Floodplain mapping specifications published by FEMA. The FEMA Guidelines and Specifications for Flood Hazard Mapping Partners (2009) are incorporated herein by reference and available for viewing at www.fema.gov/fhm/dl_cgs.shtm and for inspection at the CWCB offices at 1313 Sherman Street, Room 721,

Denver CO 8020. The regulations may also be examined at any state or federal publications depository library. The FEMA Mapping Specifications and Guidelines incorporated herein by reference are only those in existence at the time of the promulgation of these Rules and Regulations for Regulatory Floodplains in Colorado and do not include later amendments to or editions of the incorporated material.

"Flood" or "Flooding"

A general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of water from channels and reservoir spillways;
2. The unusual and rapid accumulation or runoff of surface waters from any source; or
3. Mudslides or mudflows that occur from excess surface water that is combined with mud or other debris that is sufficiently fluid so as to flow over the surface of normally dry land areas (such as earth carried by a current of water and deposited along the path of the current.

Flood Contour

A line shown on a map joining points of equal elevation on the surface of floodwater that is perpendicular to the direction of flow.

Flood Control Structure

A physical structure designed and built expressly or partially for the purpose of reducing, redirecting, or guiding flood flows along a particular waterway.

Flood Insurance Rate Map (FIRM)

A FIRM is the official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood Mitigation Project

A project within or adjacent to a flooding source that is specifically intended to reduce or eliminate the negative impacts caused by excessive floodwaters through improvement of drainage, flood control, flood conveyance or flood protection.

Floodplain

The area of land that could be inundated as a result of a flood, including the area of land over which floodwater would flow from the spillway of a reservoir.

Floodplain Management

The operation of an overall program of corrective and preventive measures for reducing flood damage, including, but not limited to, zoning or land-use

regulations, flood control works, and emergency preparedness plans.

Floodplain Management Regulations Zoning ordinances, subdivision regulations, building codes, health regulations, land-use permits, special purpose ordinances (floodplain ordinance, grading ordinance, or erosion control ordinance) and other applications of regulatory powers. The term describes state/local regulations that provide standards for flood damage preservation and reduction.

Floodplain Maps Maps that show in a plan view the horizontal boundary of floods of various magnitudes or frequencies. Such maps include, but are not limited to, Flood Hazard Boundary Maps (FHBM), Flood Insurance Rate Maps (FIRM), and Digital Flood Insurance Rate Maps (DFIRM) published by FEMA, Flood Prone Area Maps published by the U.S. Geological Survey (USGS), Flooded Area Maps published by the U. S. Army Corps of Engineers (COE), Floodplain Information Reports published by the CWCB or others, Flood Hazard Area Delineations (FHAD) published by the Urban Drainage and Flood Control District (UDFCD), and other locally adopted floodplain studies and master plans.

Floodplain Studies A formal presentation of the study process, results, and technical support information developed for floodplain maps.

Floodway The channel of a river or other watercourse and the adjacent land areas that must be kept free of obstructions in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Foreseeable Development The potential future development of, or changes in, the land uses that are likely to take place during the period of time covered by a community's adopted master land use plan or comprehensive community plan, or if no time period is specified, over a 20-year period. If there is no adopted community plan, then potential development patterns based on zoning, annexations, and other relevant factors should be evaluated.

Freeboard The vertical distance in feet above a predicted water surface elevation intended to provide a margin of safety to compensate for unknown factors that could contribute to flood heights greater than the height calculated for a

selected size flood such as debris blockage of bridge openings and the increased runoff due to urbanization of the watershed.

Geographic Information Systems (G.I.S.) Computer software that utilizes databases and terrain mapping to store and display spacial and tabular data, such as floodplains, as layers (e.g. political boundaries, roadways, structures, topographic information) for natural resource management and other uses.

Hydraulic analysis The determination of flood elevations and velocities for various probabilities based on a scientific analysis of the movement and behavior of floodwaters in channels and overbank areas.

Hydrologic Analysis The computation of the peak rate of flow, or discharge in cubic feet per second, for various selected probabilities for streams, channels, or watersheds based on a scientific analysis of the physical process.

Letter of Map Revision (LOMR) An official revision to the currently effective FEMA map. It is issued by FEMA and changes flood zones, delineations, and elevations.

Letter of Map Revision Based on Fill (LOMR-F) FEMA's modification of the Special Flood Hazard Area (SFHA) shown on the Flood Insurance Rate Map (FIRM) based on the placement of fill outside the existing regulatory floodway.

Levee An artificial structure or land feature that has been designed and is operated, wholly or in part, for the purpose of containing, controlling, or diverting the flow of water.

Low Impact Development (LID) Development design/construction strategy that maintains the predevelopment hydrologic regime to the extent possible. The goal of LID is to mimic the natural runoff hydrograph as much as practicable in terms of magnitude, frequency, duration, timing, and rate of change of stream flows. LID focuses on small scale stormwater retention and detention, reduced impervious areas, and increased runoff periods.

Material Safety Data Sheet (MSDS) A form with data regarding the properties of a particular substance. An important component of product stewardship and workplace safety, it is intended to

	provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures.
Mitigation	The process of preventing disasters or reducing related hazards. Structural Mitigation, includes, but is not limited to, flood proofing structures, diverting floodwaters, detention ponds, floodwalls or levees. Nonstructural Mitigation includes, but is not limited to, education, planning, and design of flood prevention measures, emergency preparedness plans, elevating relocating structures, purchasing property for open space, or early flood warning detection systems.
National Flood Insurance Program (NFIP)	FEMA's program of flood insurance coverage and floodplain management administered in conjunction with the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The NFIP has applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations. The U.S. Congress established the NFIP in 1968 with the passage of the National Flood Insurance Act of 1968.
Post-Wildfire Hydrology	Methodologies and calculations developed to account for the increased stormwater runoff following forest fires. Post-wildfire hydrology is typically evaluated every 3 to 5 years to assess the need for further revision based on watershed recovery, forest re-growth, and other factors.
Provisionally Accredited Levee (PAL)	A levee that FEMA has previously credited with providing protection from a 1-percent-chance-annual-flood on an effective FIRM or DFIRM, for which FEMA is awaiting data and/or documentation that will show the Levee's compliance with Levee certification requirements of the NFIP regulations.
Regulatory Floodplain	Floodplain Maps, Profiles, and related information for flood hazard areas that have been designated and approved by the CWCB. *See* Rule 5.
Residual Risk	The threat to the areas behind levees that may still be at risk for flooding. Although the probability of flooding may be lower because a levee exists, the consequence to

	personal safety and property is much higher should a levee overtop or fail.
Stream Alteration Activity	Any manmade activity within a stream or floodplain that alters the natural channel, geometry, or flow characteristics of the stream.
Substantial Change	Any improvement to, or rehabilitation due to damage of, a structure for which the activity performed equals or exceeds 50% of the pre-improvement or pre-damaged value of the structure. The value of the structure shall be determined by the local jurisdiction having land use authority in the area of interest.
Threshold Planning Quantity (TPQ)	A quantity designated for each chemical on the list of extremely hazardous substances that triggers notification by facilities to the State that such facilities are subject to emergency planning requirements.
Topography	Configuration (relief) of the land surface elevation; the graphic delineation or portrayal of that configuration in map form, as by lines of constant elevation called contour lines.
Use Change	Any change in the primary use of a facility.
Water Surface Profile	A graph that shows the relationship between the vertical elevation of the top of the floodwater and of the streambed with the horizontal distance along the stream channel.

Rule 5. **Regulatory Floodplain**: The Regulatory Floodplain in Colorado is the 100-year floodplain. However, the CWCB will Designate and Approve 500-year floodplain information but only at the written request of a local authority having land use jurisdiction. In addition, previously designated floodplain areas that have been removed from FEMA's effective regulatory floodplain by a Letter of Map Revision based on Fill (LOMR-F) shall remain within the Regulatory Floodplain for all activities affected by Rule 11(c). All Designated and Approved Regulatory Floodplain information can be used by local authorities having land use jurisdiction for the purpose of local regulation. The General Assembly has deemed the designation of floodplains a matter of statewide importance and interest and gave the CWCB the responsibility for the designation of Regulatory Floodplains and to assure protection of public health, safety, welfare and property by protecting development in the Regulatory Floodplains. §§ 24-65.1-101, 24-65.1-202(2)(a)(I), 24-65.1-302(1)(b), (2)(a), 24-65.1-403(3), 24-65.1-404(3).

Rule 6. **<u>Critical Facilities:</u>**

A. **Classification:** Critical Facilities are classified under the following categories: (1) Essential Services; (2) Hazardous Materials; (3) At-risk Populations; and (4) Vital to Restoring Normal Services.

(1) *Essential services facilities* include public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities , and transportation lifelines.

These facilities consist of:

a. *Public safety (police stations, fire and rescue stations, emergency vehicle and equipment storage, and, emergency operation centers);*
b. *Emergency medical (hospitals, ambulance service centers, urgent care centers having emergency treatment functions, and non-ambulatory surgical structures but excluding clinics, doctors offices, and non-urgent care medical structures that do not provide these functions);*
c. *Designated emergency shelters;*
d. *Communications (main hubs for telephone, broadcasting equipment for cable systems, satellite dish systems, cellular systems, television, radio, and other emergency warning systems, but excluding towers, poles, lines, cables, and conduits);*
e. *Public utility plant facilities for generation and distribution (hubs, treatment plants, substations and pumping stations for water, power and gas, but not including towers, poles, power lines, buried pipelines, transmission lines, distribution lines, and service lines); and*
f. *Air Transportation lifelines (airports (municipal and larger), helicopter pads and structures serving emergency functions, and associated infrastructure (aviation control towers, air traffic control centers, and emergency equipment aircraft hangars).*

Specific exemptions to this category include wastewater treatment plants (WWTP), Non-Potable water treatment and distribution systems, and hydroelectric power generating plants and related appurtenances.. Owners of these facilities are encouraged to meet the spirit of Rule 6(D) when practicable in order to protect their own infrastructure and to avoid system failures during extreme flood events. Emergency restoring plans following major flood events should be considered as a prudent addition to operation and maintenance plans for those facilities.

Public utility plant facilities may be exempted if it is demonstrated to the satisfaction of the local authority having jurisdiction that the facility is an element of a redundant system for which service will not be interrupted during a flood. At a minimum, it shall be demonstrated that redundant facilities are available (either owned by the same utility or available through an intergovernmental agreement or other contract) and connected, the alternative facilities are either located outside of the 100-year floodplain or are compliant with this rule, and an operations plan is in effect that states how redundant systems will provide service to the affected area in the event of a flood. Evidence of ongoing redundancy shall be provided to the local authority on an as-needed basis upon request by that local authority.

(2) *Hazardous materials facilities* include facilities that produce or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.

These facilities may include:

a. *Chemical and pharmaceutical plants (chemical plant, pharmaceutical manufacturing);*
b. *Laboratories containing highly volatile, flammable, explosive, toxic and/or water-reactive materials;*
c. *Refineries;*
d. *Hazardous waste storage and disposal sites; and*
e. *Above ground gasoline or propane storage or sales centers.*

Facilities shall be determined to be Critical Facilities if they produce or store materials in excess of threshold limits. If the owner of a facility is required by the Occupational Safety and Health Administration (OSHA) to keep a Material Safety Data Sheet (MSDS) on file for any chemicals stored or used in the work place, AND the chemical(s) is stored in quantities equal to or greater than the Threshold Planning Quantity (TPQ) for that chemical, then that facility shall be considered to be a Critical Facility. The TPQ for these chemicals is: ***either*** 500 pounds ***or*** the TPQ listed **(whichever is lower)** for the 356 chemicals listed under 40 C.F.R. § 302 (2010), also known as Extremely Hazardous Substances (EHS); ***or*** 10,000 pounds for any other chemical. This threshold is consistent with the requirements for reportable chemicals established by the Colorado Department of Health and Environment. OSHA requirements for MSDS can be found in 29 C.F.R. § 1910 (2010). The Environmental Protection Agency (EPA) regulation "Designation, Reportable Quantities, and Notification," 40 C.F.R. § 302 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr302_03.html, and OSHA regulation "Occupational Safety and Health Standards," 29 C.F.R. § 1910 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_99/29cfr1910_99.html, are incorporated herein by reference and include the regulations in existence at the time of the promulgation of these Rules, but exclude later amendments to or editions of the regulations.

Specific exemptions to this category include: a) Finished consumer products within retail centers and households containing hazardous materials intended for household use, and agricultural products intended for agricultural use. b) Buildings and other structures containing hazardous materials for which it can be demonstrated to the satisfaction of the local authority having jurisdiction by hazard assessment and certification by a qualified professional (as determined by the local jurisdiction having land use authority) that a release of the subject hazardous material does not pose a major threat to the public. c) Pharmaceutical sales, use, storage, and distribution centers that do not manufacture pharmaceutical products.

These exemptions shall not apply to buildings or other structures that also function as Critical Facilities under another category outlined in this Rule 6(A).

(3) *At-risk population facilities* include medical care, congregate care, and schools.

These facilities consist of:

a. Elder care (nursing homes);

b. Congregate care serving 12 or more individuals (day care and assisted living);

c. Public and private schools (pre-schools, K-12 schools), before-school and after-school care serving 12 or more children);

(4) *Facilities vital to restoring normal services* including government operations.

These facilities consist of:

a. Essential government operations (public records, courts, jails, building permitting and inspection services, community administration and management, maintenance and equipment centers);

b. Essential structures for public colleges and universities (dormitories, offices, and classrooms only);

These facilities may be exempted if it is demonstrated to the satisfaction of the local authority having jurisdiction that the facility is an element of a redundant system for which service will not be interrupted during a flood. At a minimum, it shall be demonstrated that redundant facilities are available (either owned by the same entity or available through an intergovernmental agreement or other contract), the alternative facilities are either located outside of the 100-year floodplain or are compliant with this rule, and an operations plan is in effect that states how redundant facilities will provide service to the affected area in the event of a flood. Evidence of ongoing redundancy shall be provided to the local authority on an as-needed basis upon request by that local authority.

B. **Identification of Critical Facilities.** It is the responsibility of the local jurisdiction having land use authority to identify and confirm that specific structures in their community meet the criteria outlined in Rule 6(A) and are deemed to be Critical Facilities. All structures that clearly meet the intent of Rule 6 shall be deemed Critical Facilities by that jurisdiction. For those structures for which it is unclear or otherwise ambiguous if the criteria are met, the local jurisdiction shall have the sole discretion to determine if the structure is a Critical Facility. Local jurisdictions may adopt ordinances that regulate to higher standards or that include additional facilities within the definition of Critical Facilities. Critical Facilities that are also designated as historic structures (determinations by the State Historic Preservation Office) are exempt from these requirements. Pursuant to section 24-65.1-202(2)(a)(I)(A), C.R.S. (2010), open space activities such as agriculture, horticulture, floriculture, recreation, and mineral extraction, including oil and gas activities, shall be encouraged in the floodplain, and are exempt as Critical Facilities unless provisions within Rule 6(A)(2) apply.

Required identification of Critical Facilities shall be limited to owner-occupied structures. Local jurisdictions may, at their sole discretion, include leased facilities in their identification of Critical Facilities.

C. **500-year Flood Events.** The CWCB acknowledges that flooding does occur above and beyond 100-year (1% annual chance) events. Communities are encouraged to regulate development of Critical Facilities within the 500-year floodplain, when available.

D. **Protection of Critical Facilities.** All new and Substantially Changed Critical Facilities, and new Additions to Critical Facilities, shall be regulated to a higher standard than those structures not determined to be Critical Facilities. Local jurisdictions having land use authority are encouraged to consult with the owner of the Critical Facility in determining the value of the Critical Facility when a Substantial Change is being considered. This Rule 6 shall be applied to a Use Change if the new use meets the provisions within Rule 6(A). Further, although Rule 6 shall apply to new Additions made at Critical Facilities, it shall only apply to the new Additions, and not the Critical Facility to the extent the Critical Facility existed prior to the amendment of these Rules. The higher standard for Critical Facilities shall be as follows: For Critical Facilities located within the 100-Year Floodplain, the structure shall be protected according to Rule 11(B) herein, with the exception of a freeboard of two feet substituted for the standard one-foot freeboard. The *International Building Code* (2006) and *Flood Resistant Design and Construction* (ASCE 24) (2005) can be used as reference tools for this standard, but are not incorporated by reference herein.

For the purposes of this Rule 6(D), protection shall include one of the following:

a) Location outside the Regulatory Floodplain; or

b) Elevation or Flood-proofing of the structure so that it is protected to the level indicated in this Rule 6(D).

Unimproved lands associated with a Critical Facility that lie within a regulatory floodplain shall not be subject to this requirement, until future development takes place on those lands. Likewise, if an undeveloped portion of a facility's property lies within a Regulatory Floodplain, but the developed portion of that facility lies outside of the Regulatory Floodplain, then that facility shall not be classified as a Critical Facility. All other rules and regulations governing structures not deemed Critical Facilities remain in effect and unchanged.

E. **Ingress and Egress for New Critical Facilities** shall, when practicable as determined by the local jurisdiction having land use authority, have continuous non-inundated access (ingress and egress for evacuation and emergency services) during a 100-year flood event. This criterion is also recommended, but not required, for changes to existing Critical Facilities and use changes involving existing structures whose classification changes to Critical Facilities.

F. For all Critical Facilities, the Variance procedure outlined in Rule 15 herein remains available and may be considered when deemed necessary and appropriate by the local jurisdiction having land use authority over the Critical Facility.

Rule 7. <u>Standards for Delineation of Regulatory Floodplain Information</u>:

A. **Intent of this Rule**. This Rule contains standards for approximate and detailed floodplains. All floodplain information intended to be used by local jurisdictions for the purpose regulating flood hazard areas, with the exception of local stormwater drainage reports,

CLOMR, LOMR, and LOMR-F submittals, and supporting documentation submitted to FEMA, shall be provided to the CWCB for designation and approval in order to enable local governments to regulate floodplains appropriately. The standards in this rule reference, and incorporate herein, the FEMA Guidelines and Specifications for Flood Hazard Mapping Partners. Whenever such a reference is made, it includes the FEMA Guidelines and Specifications for Flood Hazard Mapping Partners material in existence at the time of the promulgation of these Rules, but excludes later amendments to or editions of the material.

B. **Level of Detail.**

(1) Approximate Floodplain Information will be based on detailed hydrology computed for 100-year floods. Hydraulic information shall be produced using approximate, field, or limited techniques and best available topographic/survey data.

(2) Detailed Floodplain Information will be based on detailed hydrologic and hydraulic determinations for 100-year floods Flood profiles and floodplain delineations for 100-year flood and other frequencies, if any, shall be plotted, preferably using a digital method. The CWCB shall designate and approve 100-year floodplain information, and 500-year information but only at the request of a local authority having land use jurisdiction.

C. **Base Mapping.** Base mapping for floodplain studies shall meet the minimum standards as set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference.

D. **Topography and Surveys.** Topographic and field survey information for floodplain studies shall meet the minimum standards as set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference.

E. **Geographic Information Systems (GIS).** GIS information for floodplain studies in Colorado shall meet the minimum standards as set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference.

F. **Hydrology.** Hydrologic analyses for floodplain studies in Colorado shall be completed using the information set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference. The Colorado Floodplain and Criteria Manual may be used as a reference document to aid in this analysis. In addition, hydrology studies must comply with the following:

(1) All floodplain studies, regardless of the level of detail, (e.g., approximate or detailed) shall utilize detailed hydrologic information. The CWCB recognizes existing and future watershed conditions for the purposes of computing flood hydrology. The CWCB may evaluate future watershed conditions, in addition to existing conditions when Foreseeable Development is expected.

(2) Any new study to evaluate hydrologic information and/or design storm criteria shall be completed in such a way that it is scientifically defensible and technically reproducible.

(3) All jurisdictions and communities affected by revised hydrologic data, due to their geographic proximity to the affected stream reach within a particular watershed,

are encouraged to participate in the update process, and shall be given the opportunity by the study sponsor to review and comment on the revised information. Opponents to the revised information may present technically accurate and sound scientific data to the CWCB that clearly demonstrates that the information in question is inaccurate pursuant to Rule 12. The CWCB shall make the final determination regarding disputes.

(4) Within any given watershed, or hydrologic subregion, consistency in hydrologic data and runoff methodology shall be pursued to the extent possible through cooperation of all affected jurisdictions and entities.

G. **Detailed Hydraulic Method**. Hydraulic analyses for floodplain studies in Colorado shall be completed using protocols set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference.

H. **Floodplain Delineations.** Floodplain delineations shall be completed using protocols set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference, and shall, at a minimum, comply with the technical quality assurance standards as follows:

(1) The flood elevations and the floodplain delineations on the maps must correlate reasonably to the best available topographic information for the stream and adjacent corridor and must meet an acceptable level of technical accuracy.

(2) The planimetric features on the floodplain maps (including, but not limited to, streets and highways, stream centerlines, bridges and other critical hydraulic features, corporate limits, section lines and corners, survey benchmarks) must be consistent with the best available aerial photographs or other suitable information for the stream and the adjacent corridor, as determined through prevailing industry practices, and must meet an acceptable level of technical accuracy.

I. **Special Floodplain Conditions**. There are a number of special floodplain conditions, or natural flood hazards, in Colorado that fall outside of the standard riverine environment. Studies for the 100-year flood involving special conditions shall be completed using protocols set forth in FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, as incorporated herein by reference. The special conditions are:

(1) Alluvial Fan and Debris Flow floodplains located within foothill and mountainous regions of Colorado shall be considered on a case-by-case basis.

(2) Post-wildfire hydrology shall be evaluated on a case-by-case basis in forested areas immediately following moderate to intense wildfires resulting in approximately 15% or greater burn area of the affected watershed. Interim flood advisory maps, based on burned watershed conditions, shall be produced at the request of the local governing authority or by Board initiative. The interim floodplain maps shall show increased runoff from hydrophobic soils and lack of vegetation. The post-wildfire maps shall be evaluated every 3 to 5 years to assess the need for further revision based on watershed recovery, forest re-growth, and other factors.

(3) Ice jam flooding shall be considered within stream reaches where this phenomenon is known to occur. Ice jam flooding may be analyzed utilizing methodologies

available through the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL), located in Hanover, New Hampshire.

J. **Written reports and maps**. The results of the hydrologic analyses, hydraulic analyses, and floodplain delineations shall be summarized in a written report and submitted to the CWCB. All Approximate and Detailed Floodplain Information that is presented to the CWCB for designation and approval shall be properly titled, dated, organized, and bound as a stand-alone document. In addition to the hard copy final report, the CWCB requires that a digital copy of the final report be submitted in MS Word and PDF formats. All pertinent technical backup data such as GIS files, and hydrologic and hydraulic models shall also be provided to the CWCB in acceptable digital formats. The CWCB shall electronically distribute to interested parties, to the extent possible, pertinent study information. Access to original GIS information shall be provided to local governments and other authorized users through a secure and protected website or other secure means.

(1) The Regulatory Floodplain maps shall show, at a minimum, the flood boundaries, the location of all cross sections used in the hydraulic analysis, the reference line drawn down the center of the floodplain or low flow channel, and a sufficient number of flood contours in order to reconstruct the flood water surface profiles.

(2) New Physical Map Revisions requested by local jurisdictions or involving local jurisdictions should include detailed 500-year floodplain information when practicable.

(3) Flood contours, or Base Flood Elevations, shall be shown as wavy lines drawn perpendicular to the direction of flow of floodwater and shall extend completely across the area of the mapped Regulatory Floodplain. Each flood contour shall indicate its elevation to the nearest whole foot.

(4) The Regulatory Floodplain map scale shall be 1-inch equals 1000 feet or such map scale showing greater detail. FEMA map panels may also be published at 1 inch equals 500 feet, 1 inch equals 1,000 feet or 1 inch equals 2000 feet.

(5) Where discrepancies appear between Regulatory Floodplain maps and water surface profiles, any regulatory water surface profile designated and approved by the Board shall take precedence over any corresponding flooded area map for the same stream reach or site location, unless a profile error is identified and substantiated.

K. **Contractor Qualifications**

(1) Qualified engineers licensed in Colorado shall direct or supervise the floodplain mapping studies and projects pertaining to the Regulatory Floodplain. All floodplain maps, reports and project designs pertaining to the Regulatory Floodplain, except those prepared by federal agencies, shall be certified and sealed by the Colorado Registered Professional Engineer of record.

(2) Federal agencies or other recognized and qualified government authorities may produce floodplain mapping work as a study proponent or on behalf of a study proponent.

Rule 8. <u>Standards for Regulatory Floodways</u>:

A. **Establishment of Floodway Criteria.** The CWCB recognizes that Designated Floodways are administrative limits and tools used by communities to regulate existing and future Floodplain developments within their jurisdictions. This Rule 8(A) does not require communities to automatically map ½ foot floodways within their jurisdictions. However, at such time when floodways are to be delineated through Physical Map Revisions involving local government participation, communities shall delineate floodways for the revised reaches based on ½-foot rise criteria. Letters of Map Revision to existing floodway delineations may continue to use the floodway criteria in place at the time of the existing floodway delineation. Until such time that floodways are revised and designated, communities may continue to regulate their mapped one-foot floodways. For reaches where a transition must be shown to connect new studies to existing studies with different floodway criteria, the transition length shall not exceed 2,000 feet.

B. **Designation of floodways.** Designation and approval of Floodplain information shall also include the designation and approval of corresponding Floodway Information. For waterways with Base Flood Elevations for which Floodways are not computed, the community shall apply a ½ foot floodway regulation according to its own determination, as outlined in FEMA Regulation 44 C.F.R. § 60.3(c)(10) (2010),incorporated herein by reference, for a 1-foot floodway. This reference is *available at* http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfr60_02.html, and is hereby incorporated by reference into this Rule and includes the material in existence at the time of the promulgation of these Rules, but does not include later amendments to or editions of this incorporated material

C. **Incorporation of FEMA's Floodway Regulations.** All regulations defined in the FEMA regulations "Criteria for Land Management and Use," 44 C.F.R. § 60.3(c)(10), (d) (2010) *available at* http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfr60_02.html, are hereby incorporated by reference into this Rule and includes the material in existence at the time of the promulgation of these Rules, but does not include later amendments to or editions of this incorporated material. All communities participating in the National Flood Insurance Program that have Base Flood Elevations defined for one or more of the waterways within their jurisdictions shall adopt and enforce these floodway regulations. Failure to enforce floodway regulations may impact the community's standing in the National Flood Insurance Program and may eliminate or reduce eligibility for federal or state financial assistance for flood mitigation and disaster purposes.

D. **Communities in Which This Rule Applies.** Communities with Regulatory Floodplains that have been Designated and Approved by the CWCB with Base Flood Elevations defined for one or more of the waterways within their jurisdictions shall be required to establish technical (quantified) surcharge criteria for floodway determination and regulation, which must meet or exceed the requirements set forth in this Rule. This Rule shall not apply in communities without Base Flood Elevations established, unless otherwise adopted by the community. This Rule shall not apply to approximate stream reaches for which Base Flood Elevations have not been defined.

Rule 9. <u>Criteria for Determining the Effects of Flood Control Structures on Regulatory Floodplains</u>:

A. For the purposes of this Rule, local and regional hydraulic structures providing local or regional flood or stormwater detention, shall be considered to be "Flood Control Structures." There are no separate criteria for these structures.

B. **Flood Control Structures**. If a publicly operated and maintained structure is specifically designed and operated either in whole or in part for flood control purposes, then its effects shall be taken into consideration when delineating the floodplain below such structure. The effects of the structure shall be based upon the 100-Year Flood with full credit given to the diminution of peak flood discharges, which would result from normal Flood Control Structure operating procedures.

The hydrologic analysis pertaining to State Regulatory Floodplains shall consider the effects of on-site detention for rooftops, parking lots, highways, road fills, railroad embankments, diversion structures, refuse embankments (including, but not limited to, solid waste disposal facilities), mill tailings, impoundments, siltation ponds, livestock water tanks, erosion control structures, or other structures, only if they have been designed and constructed with the purpose of impounding water for flood detention and are publicly operated and maintained. For the purposes of this Rule, Public operation and maintenance may include direct responsibility or ultimate responsibility through written agreement. Detention structures that are privately operated or maintained shall not be included in the hydrologic analysis unless it can be shown that they exacerbate downstream peak discharges.

C. **Non-Flood Control Structures**. If a structure is not specifically designed and operated, either in whole or in part, for flood control purposes, then its effects, even if it provides inadvertent flood routing capabilities that reduce the 100-Year Flood downstream, shall not be taken into account, and the delineation of the Floodplain below such structure shall be based upon the 100-Year Flood that could occur absent the structure's influence. However, if adequate assurances have been obtained to preserve the flood routing capabilities of such structure, then the delineation of the Floodplain below the structure may, but need not, be based on the assumption that the reservoir formed by the structure will be filled to the elevation of the structure's emergency spillway and the 100-Year hydrology can be routed through the reservoir to account for any flood attenuation effects.

D. **Adequate Assurances**. For the purposes of this Rule 9 "adequate assurances" shall, at a minimum, include appropriate recognition in the community's adopted master plan of: (1) the flood routing capability of the reservoir, as shown by comparison of the 100-Year Floodplain in plan and profile with and without the structure in place, in order that the public may be made aware of the potential change in level of Flood protection in the event that the reservoir flood routing capability is lost; (2) the need to preserve that flood routing capability by whatever means available in the event that the reservoir owners attempt to make changes that would decrease the flood routing capability; and (3) a complete operations and maintenance plan.

E. **Irrigation Facilities.** The CWCB recommends that irrigation facilities (including, but not limited to, ditches and canals) not be used as stormwater or flood conveyance facilities, unless specifically approved and designated by local governing jurisdictions and approved by the irrigation facility owners. The flood conveyance capacity of irrigation facilities shall

be acknowledged only by agreement between the facility owners and local governing jurisdictions, with review and concurrence from the Colorado Division of Water Resources to ensure that water rights administration needs are properly considered. A maintenance easement or agreement shall be in place allowing the local government maintenance access if needed.

Unless specified otherwise by aforementioned written agreement, flood hydrology for State Regulatory Floodplain mapping purposes shall consist of peak hydrologic flows that are identical immediately downstream and immediately upstream of a ditch or canal that is generally perpendicular to the stream or drainageway of interest. The irrigation facility shall be assumed as running full so that there are no computed flood reduction benefits downstream of the irrigation facility. Backwater behind irrigation facilities shall be mapped. The CWCB will designate and approve 100-Year Floodplain information for irrigation facilities if the above recommendations are met. This Rule is not intended in any way to interfere with Colorado water law.

Rule 10. <u>Criteria for Determining Effects of Levees on Regulatory Floodplains</u>:

General. The use of levees for property protection, flood control, and flood hazard mitigation is not encouraged by the CWCB, unless other mitigation alternatives are not viable. The areas landward of an accredited levee and Provisionally Accredited Levee (PAL) system shall be mapped as Zone X (shaded). The Digital Flood Insurance Rate Maps (DFIRMs) for these areas will include an informational note that advises users of the flood risk in levee-impacted areas. In situations where levees are the only viable alternative for protection of existing development, "setback" levees should be designed and constructed to maintain the natural channel and reserve a portion of the natural floodplain capacity. Levees should not be used for flood protection along streams or watercourses where new development is planned. However, levees may be used to protect public utility plant facilities for wastewater treatment and pumping as well as electric power plants due to their close proximity to natural waterways. For existing levees that protect existing development, proper maintenance should be performed by levee owners/operators, or non-federal sponsors in the case of federal levees, according to an operations and maintenance plan.

Levees should not be constructed for the primary purpose of removing undeveloped lands from mapped floodplain areas for the purposes of developing those lands because of the potential impairment of the health, safety, welfare and property of the people. Design and construction of levees identified for this purpose will not be eligible for CWCB grants or loans.

When constructed, levees for which protection will be considered for designation and approval must meet the requirements set forth in "Mapping of Areas Protected by Levee Systems,"44 C.F.R. § 65.10 (2010). Artificial embankments that either function as a Levee or a Flood Control Structure must meet the provisions of this Rule or "Office of the State Engineer Rules and Regulations for Dam Safety and Dam Construction," 2 C.C.R. § 402-1 (2010), respectively, in order to be considered as providing protection. 44 C.F.R. § 65.10 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfr65_02.html, and 2 C.C.R. § 402-1 (2010), *available at* http://water.state.co.us/pubs/rule_reg/ds_rules07.pdf,

are hereby incorporated by reference and include the incorporated material in each in existence at the time of the promulgation of these Rules, but do not include later amendments to or editions of either.

A. **Maintenance.** An Operating and Maintenance manual that ensures continuing proper function of the structure shall be prepared and updated. The levee shall be structurally sound and adequately maintained. Sedimentation effects shall be considered for all levee projects. Certification from a federal agency, state agency, or a Colorado Registered Professional Engineer that the levee meets the minimum freeboard criteria, as stated above, and that it appears, on visual inspection, to be structurally sound and adequately maintained shall be required on a three-year basis and provided to the CWCB. Levees that have obvious structural defects or that are obviously lacking in proper maintenance shall not be considered in the hydraulic analysis.

B. **Ownership**. Privately-operated or maintained levee systems will not be considered in the hydraulic analysis performed pursuant to Rule 7 unless a local ordinance mandates operation and maintenance of the levee system and the criteria set forth below are met. Levees for which the community, State, or Federal government has responsibility for operations and maintenance will be considered, provided that the criteria set forth below are met. Privately-owned levee systems shall only be considered in the hydraulic analysis if a fully executed agreement exists between the levee owner and a governmental entity enabling unrestricted access to the governmental entity for the purposes of inspection and maintenance and gives the governmental entity responsibility for maintenance. A copy of the executed agreement shall be provided to the Board and the Board shall be notified in writing of any changes made to this agreement.

C. **Freeboard**. A minimum levee freeboard of 3 feet shall be necessary, with an additional 1-foot of freeboard within 100 feet of either side of hydraulic structures within the levee or wherever the flow is constricted, such as at bridges. An additional 0.5-foot above this minimum is also required at the upstream end of the levee.

D. **Interior Drainage.** In cases where levees are mapped as providing 100-year protection the adequacy of interior drainage systems, on the landward side of the levee, shall be evaluated. Areas subject to flooding from inadequate interior drainage behind levees will be mapped using standard procedures.

E. **Human Intervention and Operation.** In general, evaluation of levees shall not consider human intervention (e.g., capping of levees by sandbagging, earth fill, or flashboards) for the purpose of increasing a levee's design level of protection during an imminent flood. Human intervention shall only be considered for the operation of closure structures (e.g., gates or stop logs) in a levee system designed to provide at least 100-year flood protection, including adequate freeboard as described above, provided that such human operation is specifically included in an emergency response plan adopted by the community.

F. **Analysis.** For areas protected by a levee providing less than 100-year protection (e.g., 10-year protection), flood elevations shall be computed as if the levee did not exist. For the unprotected area between the levee and the source of flooding, the elevations to be shown shall be obtained from either the flood profile that would exist at the time levee overtopping

begins or the profile computed as if the levee did not exist, whichever is higher. This procedure recognizes the increase in flood elevation in the unprotected area that is caused by the levee itself. This procedure may result in flood elevations being shown as several feet higher on one side of the levee than on the other. Both profiles shall be shown in the final report and labeled as "before levee overtopping" and "after levee overtopping" respectively.

Rule 11. <u>Floodplain Management Regulations</u>:

A. **Compliance with Minimum Standards of the National Flood Insurance Program.** Each community in the State of Colorado shall comply with the minimum floodplain criteria set forth in the FEMA regulation"Criteria for Land Management and Use,"44 C.F.R. §§ 60.3–60.5 (2010), unless more restrictive standards have been adopted as set forth in Rules 1 through 20 of these Rules and Regulations for Regulatory Floodplains in Colorado or pursuant to regulations adopted by the local community. These Rules do not apply to local stormwater or local storm drainage studies where riverine flooding sources are not considered. 44 C.F.R. §§ 60.3–60.5 (2010) *available at* http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfr60_02.html, are hereby incorporated by reference and include the material in existence at the time of the promulgation of these Rules, but do not include later amendments to or editions of the material.

B. **Minimum Freeboard.** A minimum freeboard of one foot above the 100-year flood elevation (Base Flood Elevation) shall apply to structures in the floodplain as follows:

(1) Residential Structures. New and Substantially Changed residential structures, and Additions to existing residential structures shall be constructed with the lowest floor, including basements, placed with a minimum of one foot of freeboard above the Base Flood Elevation.

(2) Non-residential Structures. New and Substantially Changed non-residential structures, and Additions to existing non-residential structures shall be constructed with the lowest floor, including basements, placed with a minimum of one foot of freeboard above the Base Flood Elevation, or be flood-proofed to an elevation at least one foot above the Base Flood Elevation. Agricultural structures shall be exempt from this requirement.
Critical Facilities shall be regulated according to Rule 6.D. This rule does not affect the freeboard requirement for levees described in Rule 10.C.

C. **Permit Restrictions for Properties Removed from the Floodplain by Fill.** No Community shall issue a permit for the construction of a new structure on a property removed from the floodplain by the issuance of a FEMA Letter of Map Revision Based on Fill (LOMR-F) with a floor elevation placed below the base flood elevation with one foot of freeboard that existed prior to the placement of fill. Issuance of any such permit shall constitute a violation of these Rules. Critical Facilities are exempted from this restriction if the facility is protected according to Rule 6.D herein.

Rule 12. <u>Effects of Flood Mitigation Measures and Stream Alteration Activities on Regulatory Floodplains</u>:

In order to assist the CWCB in carrying out its mission to protect the health, safety, welfare and property of the public, through the prevention of floods in Colorado, the CWCB requires the following:

A. Detention/flood control storage and LID should be considered, when practicable, as part of a basinwide program for the watershed.

B. Flood control channels shall include a low-flow channel with a capacity to convey the average annual flow rate, or other appropriate flow rate as determined through a hydrogeomorphological analysis, without excessive erosion or channel migration, with an adjacent overbank floodplain to convey the remainder of the 100-year flow. The channel improvement shall not cause increased velocities or erosive forces upstream or downstream of the improvement.

C. Channelization and flow diversion projects shall appropriately consider issues of sediment transport, erosion, deposition, and channel migration and properly mitigate potential problems through the project as well as upstream and downstream of any improvement activity. A detailed geomorphological analysis should be considered, when appropriate, to assist in determining the most appropriate design.

Project proponents for a mitigation activity must evaluate the residual 100-year floodplain. Proponents are also encouraged to map the 500-year residual floodplain.

D. All public and private Flood Control Structures shall be maintained to ensure that they retain their structural and hydraulic integrity. Annual inspections including, as appropriate, field surveys of stream cross-sections, shall demonstrate to the appropriate regulatory jurisdictions that the project features are in satisfactory structural condition, that adequate flow capacity remains available for conveying flood flows, and that no encroachment by vegetation, animals, geological processes such as erosion, deposition, or migration, or by human activity, endanger the proper function of the project. If any significant problems, as identified within annual inspection reports, , the facility or project owner shall notify the CWCB within 60 days of the inspection. The inspections shall be conducted by the local jurisdiction for all publicly owned or publicly maintained facilities, and shall be conducted by the property owner or facility owner for all privately owned and maintained facilities.

E. Any stream alteration activity proposed by a project proponent must be evaluated for its impact on the regulatory floodplain and be in compliance with all applicable federal, state and local floodplain rules, regulations and ordinances.

F. Any stream alteration activity shall be designed and sealed by a Colorado Registered Professional Engineer or Certified Professional Hydrologist.

G. All activities within the regulatory floodplain performed by federal agencies using local or state funds, or by private, local or state entities shall meet all applicable federal, state and local floodplain requirements.

H. Stream alteration activities shall not be constructed unless the project proponent demonstrates through a floodway analysis and report, sealed by a Colorado Registered

Professional Engineer, that there are no adverse floodway impacts resulting from the project. This requirement only applies on stream reaches with Base Flood Elevations established.

I. No adverse floodway impact means that there is a 0.00-foot rise in the proposed conditions compared to existing conditions floodway.

J. Whenever a Stream Alteration activity is known or suspected to increase or decrease the established Base Flood Elevation in excess of 0.3 vertical feet (or a more stringent standard adopted by the local government authority), a Letter of Map Revision showing such changes shall be obtained in order to accurately reflect the proposed changes on FEMA's regulatory floodplain map for the stream reach. The local community is responsible for ensuring that this process is pursued. This section herein does not require a Conditional Letter of Map Revision (CLOMR) to be applied for, unless mandated by the local government having land use authority.

Rule 13. <u>Process for Designation and Approval of Regulatory Floodplains</u>:

A. **Designation and Approval Requirements**. The Board will designate and approve Regulatory Floodplains by the adoption of written resolutions based only upon such floodplain information as the Board determines meets the standards set forth in Rule 7, as applicable, with consideration of the effects of dams and levees being subject to the criteria or Rules 9 and 10, respectively and any mitigation activity in Rule 12.

B. **Base Flood.** 100-year floodplain information shall generally be the basis for all designation and approval actions by the Board for regulatory purposes in Colorado. However, the CWCB will designate and approve 500-year floodplain information but only at the written request of a local authority having land use jurisdiction.

C. **Provisional Designation.** The CWCB may designate and approve, on a provisional basis and for a maximum period of time not to exceed two years, floodplain information that does not meet the minimum requirements as set forth in Rule 7.

D. **Process for Taking Designation and Approval Actions**. The Board shall consider the designation and approval of floodplain information either by request of a community or by acting on its own initiative.

(1) **Consideration at a Community's Request**. The Board shall consider designation and approval of floodplain information upon written request from the governing body of any community having jurisdiction in the area where the floodplain information is applicable. The letter of request shall identify the report title, date, author or agency which prepared the report, stream name(s), upstream and downstream limits of the stream reach(es) to be designated, stream length(s) in miles, type of designation requested (detailed or approximate), and any other relevant information. The Board shall receive such a request at least 30 days prior to the Board meeting at which consideration of designation and approval is requested.

(2) **Consideration at the Board's initiative**. If designation and approval of a floodplain would be in the best interest of the health, safety, welfare and property of the citizens of the State of Colorado, then the Board may take action at its own initiative to consider the designation and approval of floodplain information. In such cases, the Board shall notify the affected communities in writing at the time of study initiation or, in the case of a previously completed study, the Board shall receive concurrence in writing from the affected community at least 45 days prior to the Board meeting at which it will consider the designation and approval of floodplain information within their jurisdiction.

(3) **Notification of Adopted Resolutions**. The CWCB shall send signed copies of each adopted resolution of designation and approval to the applicable local legislative bodies of each community having jurisdiction over land-use decisions in the study area and to FEMA within 30 days of adoption.

Rule 14. <u>Designation and Approval of Changes to Regulatory Floodplains</u>:

When changes are made to the characteristics of a floodplain that result in a revision of a community's Flood Insurance Rate Maps or Flood Hazard Boundary Maps (and a subsequent designation of the new map), the Board will designate and approve changes to the regulatory floodplain caused by development, new or better technical information, or other sources. The CWCB will designate the changed floodplains by adopting written resolutions based upon such floodplain information as the Board determines meets the standards set forth in Rules 6-12. In the event that a community is aware of and has access to better available information on a previously designated flooding source, then the CWCB allows for that undesignated information to be used for regulatory purposes.

A. **Conditions.** All changes to designated floodplains shall meet the same conditions as those required for original approval and designation.

B. **Process for Designation and Approval of Changes to a Regulatory Floodplain.** The Board may consider the designation and approval of floodplain information either by request of a community or by acting on its own initiative.

(1) **Consideration at a Community's Request.** The Board shall consider designation and approval of changes to a regulatory floodplain upon written request from the governing body of any community having jurisdiction in the area where the floodplain information is applicable. The Board staff shall receive such requests at least 30 calendar days prior to the Board meeting at which consideration of designation and approval is requested.

(2) **Consideration at the Board's Initiative.** If designation and approval of a floodplain would be in the best interest of the health, safety, welfare and property of the citizens of the State of Colorado, then the Board may take action at its own initiative to consider the designation and approval of floodplain information. In such cases, the Board shall notify the affected communities in writing at the time of the study initiation or, in the case of a previously completed study, the Board shall receive concurrence in writing from the affected community at least 45 days prior to the Board meeting at which it will consider the designation and approval of floodplain information within their jurisdiction.

(3) **Notification of Adopted Resolution.** The CWCB shall send signed copies of each adopted resolution of designation and approval of changes to a regulatory floodplain to the applicable local legislative bodies of each community having jurisdiction over land-use decisions within the limits of the changed floodplain within 30 calendar days of designation and approval.

C. **Identification of Designations of Changes to a Regulatory Floodplain.** The designation of the changes to the regulatory floodplain will be given a reference identification number that will differentiate the changed designation from the original. It is implied that designations to changes to a regulatory floodplain will only rescind the affected portions of the previously designated floodplain information. All other unaffected reaches will remain as originally designated.

D. **Map Revisions to Flood Insurance Rate Maps or Flood Hazard Boundary Maps.** Floodplain map revisions (e.g., FEMA Letters of Map Revision) will be designated twice annually by the CWCB during a regularly scheduled Board meeting and will not be subject to a full technical review by the CWCB staff.

Rule 15. <u>Variances</u>:

A. **Consideration by local jurisdiction.** Request for a variance to any of these Rules may be considered by the local jurisdiction having land use authority , provided the entity or individual requesting the variance has submitted a written request to the appropriate authority. A notice of the Request must be provided to any adjacent communities that would be affected by the variance.

B. **Contents of a Request for Variance**. The request for a variance shall identify:

(1) The Rule from which the variance is requested;
(2) The communities that would be affected by the variance;
(3) The reasons why the Rule cannot be complied with;
(4) The estimated difference in water surface elevations, flood velocities and flood boundaries that would result if the requested variance were granted than if the calculations were made through strict compliance with the Rule;
(5) The estimated number of people and structures that will be impacted by granting of the variance; and
(6) Any other evidence submitted by the community, the CWCB staff, or other party of interest.

C. **Factors to be considered**. Variances may be issued if it can be determined that:

(1) There is a good and sufficient cause; and
(2) The variance is the minimum necessary, considering the flood hazard, to afford relief; and
(3) Failure to grant the variance would result in exceptional hardship to the community or the requestor and that the hardship is not the community's or requestor’s own making; and

(4) The granting of a variance will not result in increased vulnerability to flood losses, additional threats to public safety and welfare, extraordinary public expense, create nuisances, cause fraud or victimization of the public, hide information of significant interest to the public or conflict with existing local laws or regulations.

(5) In lieu of items C(1) through C(4) above, a local jurisdiction having land use authority may, at its sole discretion, use an established variance procedure.

D. **Variance Process**. Variance requests shall be processed as follows:

(1) Local jurisdictions having land use authority shall render, confirm, modify, or reject all variance requests pertaining to these Rules.

(2) The Board may review local variance decisions on a case-by-case basis to ensure that the overall intent and spirit of these Rules are properly considered at the local level.

(3) Informal variance determination request may be presented to CWCB staff in order to guide community officials or project applicants as to whether a formal variance would be needed on a case by case basis.

Rule 16. <u>Enforcement of Floodplain Rules and Regulations</u>:

A. **Procedure to be followed regarding alleged violations**

(1) **Notice of Non-Compliance.**

a. A Notice of Non-Compliance (NONC) may be prepared and transmitted by the CWCB or its Director. Information regarding potential violations may be discovered directly by CWCB staff or can be brought to the CWCB or its Director by a Complainant, such as the Federal Emergency Management Agency, other state agencies, the local government within whose boundaries the alleged violation took place, or by any other person who may be directly and adversely affected or aggrieved as a result of the alleged violation.

b. Oral complaints shall be confirmed in writing by the Complainant. Persons making a complaint are required to submit a formal letter of complaint to the CWCB Director.

c. NONC process.

i. An NONC issued by the CWCB shall be delivered to an alleged violator by personal delivery or by certified mail (return receipt requested). A copy of the NONC shall be transmitted to FEMA Region VIII and the local jurisdiction having land use authority.

ii. The NONC does not constitute final agency action.

iii. The NONC shall identify the statute, Rule, regulation, or policy subject to CWCB jurisdiction allegedly violated and the facts alleged to constitute the violation. The NONC may propose appropriate corrective action and suggested corrective action(s) if any, that the CWCB elects to require.

(2) FEMA Region VIII shall support, through its National Flood Insurance Program activities, these Rules. This support will include the existing ability for FEMA to place sanctions upon a community for non-compliance.

(3) Certain CWCB decisions to provide flood and watershed related grant funding to communities may be directly dependent upon a community's compliance with these Rules.

Rule 17. **Incorporation by Reference:** FEMA Regulations 44 C.F.R. §§ 59, 60, 65, and 70 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_00/44cfrv1_00.html, EPA Regulations 40 CFR § 302 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr302_03.html, and OSHA Regulations 29 CFR § 1910 (2010), *available at* http://www.access.gpo.gov/nara/cfr/waisidx_99/29cfr1910_99.html, are incorporated herein by reference. In addition, The Colorado "Office of the State Engineer Rules and Regulations for Dam Safety and Dam Construction Materials," set forth in 2 C.C.R. § 402-1 (2010), *available at* http://water.state.co.us/pubs/rule_reg/ds_rules07.pdf, are incorporated herein by reference. The FEMA Guidelines and Specifications for Flood Mapping Partners (2009), *available at* www.fema.gov/fhm/dl_cgs.shtm, are also incorporated herein by reference. These regulations are hereby incorporated by reference by the Colorado Water Conservation Board and made a part of these Rules and Regulations for Regulatory Floodplains in Colorado. Materials in these Rules, including, but not limited to those mentioned here in Rule 17, which are incorporated by reference are those materials in existence as of the effective date of these Rules and do not include later amendments to or editions of these materials. The material incorporated by reference is available for public inspection during regular business hours at the Colorado Water Conservation Board, 1313 Sherman Street, Room 721, Denver, CO 80203 or may be examined at any state or federal publications depository library, or on the FEMA or CWCB website.

Rule 18. **Severability:** If any portion of these Rules is found to be invalid, the remaining portion of the Rules shall remain in force and in effect.

Rule 19. **Recommended Activities for Regulatory Floodplains:** The following list contains floodplain management activities and actions suggested by the CWCB to increase a community's overall level of flood protection. Communities and other authorized government entities may:

A. Adopt local standards above and beyond the FEMA and CWCB minimum requirements.

B. Develop a Flood Response Plan that identifies responsibilities/actions before, during and after a flood event.

C. Enroll in FEMA's National Flood Insurance Program (NFIP) and possibly FEMA's Community Rating System (CRS) Program.

D. Develop an early warning flood detection system (flood warning system) using available technologies such as automated precipitation and stream flow gages linked to an appropriate notification system.

E. Coordinate with lenders, insurance agents, real estate agents, and developers to prepare and discuss educational tools based on state and federal requirements.

F. Promote wise floodplain development and support effective structural and non-structural flood mitigation projects.

G. Conduct floodplain studies in areas of Foreseeable Development that do not currently have detailed floodplain studies.

H. Maintain an electronic or paper library of local flood related data.

I. Develop a flood risk outreach program and notify flood prone residents annually of flood hazards and the need for flood insurance.

J. Encourage elevation of flood-prone structures and flood-proofing of structures in the floodplains.

K. Utilize available state/federal mitigation and preparedness funds.

L. Require certified floodplain managers to review proposed land developments.

M. Advise the public at large that flooding does occur above and beyond the 100-year and 500-year floods. Floods greater than 500-year floods do occur, and loss of life and property is possible in areas mapped outside of both the 100-year and 500-year floodplains. .

N. Utilize the concept of "No Adverse Impact" floodplain management where the action of one property owner does not adversely impact the rights of other property owners, as measured by increased flood peaks, flood stage, flood velocity, and erosion and sedimentation. No Adverse Impact could be extended to entire watersheds as a means to promote the use of retention/detention or other techniques to mitigate increased runoff from urban areas.

O. Prohibit the construction of new levees that are intended to remove land from a regulatory floodplain for the purpose of allowing new development activity to take place in areas that are otherwise flood prone.

P. Require an appropriate level of freeboard at bridges between the 100-year water surface elevation and the lowest elevation of the lowest structural member to allow for passage of waterborne debris.

Q. Identify areas prone to flooding outside of the 500-year floodplain where loss of life or substantial property damage may occur. Flooding greater than 500-year (0.2% chance) events can and do occur as well, and loss of life and property is possible in areas mapped outside of both the 100-year and 500-year regulatory floodplains. Communities are encouraged to map and regulate 500-year floodplains for Critical Facilities at their sole discretion.

R. Maintain a flood hazard page on the community website with links to the CWCB, FEMA Flood Map Store, National Flood Insurance Program, National Weather Service, local building codes, and local permitting information.

S. The CWCB discourages Compensatory Flood Storage because existing flood storage volume should be preserved. However, when necessary, structures and fill that displace floodplain storage volume shall be compensated for by excavation of equivalent volumes at equivalent elevations within a nearby vicinity of the displaced volume. The compensatory storage area shall be hydraulically connected to the source of flooding.

T. Adopt Buffer Ordinances that limit development in and near natural protective features such as riparian stream corridors and wetlands. Natural protective features may extend beyond 100 year flood elevations. Extra protections for these areas are beneficial because these areas attenuate runoff periods, improve water quality, stabilize streambanks, recharge groundwater aquifers, allow for lateral stream migration, and protect aquatic and terrestrial habitat. Riparian and wetland areas also enhance the general aesthetic value of a community.

U. Buffer ordinances are often seen as part of land use or zoning code. They may also stand alone in other portions of the municipal code. Options for widths include fixed width, variable width, or multi-zoned buffers.

V. Establish Residual Risk Mapping. Residual Risk is the threat to the areas behind levees that may still be at risk for flooding. FEMA has identified thousands of miles of levees nationwide, affecting millions of people. It is important for levee owners, communities, and homeowners to understand the risks associated with living in levee-impacted areas and the steps that can be taken to provide full protection from flooding. Even the best flood protection system or structure cannot completely eliminate the risk of every flood event, and when levee systems fail, the results may be catastrophic and the damage may be more significant than if the levee system had not been built.

Rule 20. **Effective Date:** These Rules shall apply to the designation and approval of all floodplain information made by the Board and all other floodplain activities on or after January 14, 2011 and are, therefore, not retroactive to any floodplain information designated and approved by the Board or other floodplain activities prior to the effective date. These Rules contain provisions that will require many local ordinances to be updated to be consistent with these rules. A transition period of three years beginning from the effective date of these rules will be in effect during which all local governments may follow current local ordinances but must undertake activities to come into compliance with these Rules. Following this transition period, all floodplain activities shall be in conformance with these Rules. In addition, communities may, at their sole discretion, allow un-built projects that were previously permitted by the local government, prior to the adoption date of the local ordinance for which these Rules are incorporated, to be built and therefore considered to be in compliance with these Rules. Communities may also, at their sole discretion, permit and allow projects for which a valid CLOMR was issued prior to the adoption date of the local ordinance for which these Rules are incorporated.

Floodplain Rules and Regulations

Statement of Basis and Purpose – November 17, 2010

Proposed Basis and Purpose for CWCB floodplain Rules and Regulations:

1. These Rules are promulgated to carry out the authority and responsibilities of the Colorado Water Conservation Board ("the Board" or "CWCB") pursuant to sections 24-4-103, 24-65.1-403(3), 24-65.1-101(1)(c)(I), 24-65.1-202(2)(a)(I), 24-65.1-302(2)(a), 30-28-111(1)–(2), 31-23-301(1) & (3), 37-60-106(1), 37-60-106(1)(c)–(g), (j), (k), C.R.S. (2010). The General Assembly has deemed the designation of floodplains a matter of statewide importance and interest and gave the CWCB the responsibility for the designation of regulatory floodplains and to assure public health, safety, welfare and property by limiting development in regulatory floodplains. §§ 24-65.1-202(2)(a)(I), 24-65.1-302(1)(b)&(2)(a), 24-65.1-403(3), 24-65.1-101 and 24-65.1-404(3), C.R.S. (2010).
2. The Rules will help the CWCB carry out its statutory mission to devise and formulate methods, means, and plans for the prevention of flood damages. § 37-60-106(1)(c).
3. The purpose of the Rules is to provide uniform standards for regulatory floodplains in Colorado, to provide standards for activities that may impact regulatory floodplains in Colorado, and to stipulate the process by which floodplains will be designated and approved by the CWCB. These Rules will also assist the CWCB and Colorado communities in developing sound floodplain management practices and in assisting with the implementation of the National Flood Insurance Program.
4. Implementing a sound flood protection program is necessary to reduce flood damages because flooding is the most devastating natural disaster in terms of both property damage and human fatalities in Colorado.
5. The General Assembly gave the CWCB the authority to prevent flood damages and regulate and designate floodwater runoff channels or basins. §§ 37-60-106(1)(c), 37-60-106(1)(e), 37-60-106(1)(f), 37-60-106(1)(g), 37-60-106(1)(h), 37-60-106(1)(k), 37-60-108. The CWCB, in cooperation and coordination with local governments, ensures proper regulation of floodplains.
6. Floodplain administration is an area of state interest. §§ 24-65.103(7) & 24-65.1-202(2)(a), C.R.S. (2010). The General Assembly gave local authorities broad authority to plan for and regulate land use within their jurisdictions, including regulation of development in hazardous areas and regulating on the basis of impacts to the communities and surrounding areas. §§ 29-20-102(1) & 29-20-104(1)(a)&(g), C.R.S. (2010). County planning commissions may establish, regulate and limit uses on or along any storm or floodwater runoff channel or basin that has been designated and approved by the CWCB in order to lessen or avoid flood damage. § 30-28-111(1), C.R.S. (2010). The governing body of municipalities may establish, regulate and limit uses on or along any storm or floodwater runoff channel or basin that has been designated and approved by the CWCB in order to lessen or avoid flood damage. § 31-23-301(1), C.R.S. (2010). Thus, all federal agencies using local or state funds, and all private, local or state entities conducting activities on or along any storm or floodwater runoff channel or basin shall abide by all state and federal regulations and applicable local regulations on or along any storm or floodwater runoff channel or basin that has been designated and approved

by the CWCB. Such activities shall also be in conformance with FEMA Regulations 44 C.F.R. § § 59, 60, 65, and 70 (2009).

7. Domestic water and sewage systems, such as wastewater treatment facilities or water treatment facilities, any systems of pipes, structures and facilities through which wastewater is collected for treatment, are areas of state interest. § 24-65.1-104(5), C.R.S. (2010). Similarly, the site selection and construction of major new domestic water and sewage treatment systems and major extension of existing domestic water and sewage treatment systems are also areas of state interest as determined by local governments. § 24-65.1-203(1)(a), C.R.S. (2010). Structures, such as domestic water and sewage systems, in the floodplain shall be built and designed to incorporate flood protection devices, consider proposed intensity of use and the structure's effects on the acceleration of floodwaters and any potential significant hazards to public health and safety or to property. § 24-65.1-202(2)(a)(I)(A), C.R.S. (2010). Shallow wells, solid waste disposal sites, and septic tanks and sewage disposal systems shall be protected from inundation by floodwaters. § 24-65.1-202(2)(a)(I)(A), C.R.S. (2010).

8. The Rules apply throughout the State of Colorado, without regard to whether a community participates in the National Flood Insurance Program. The Rules also apply to activities conducted by state agencies. §§ 24-65.1-301(1), 24-65.1-403(3)(a), 24-65.1-404(3), 24-65.1-501, 31-23-301 and 30-28-111(1), C.R.S. (2010).

9. The Rules incorporate new standards for critical facilities that, if flooded, may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during, and after a flood. These Rules are proposed for promulgation in recognition that such critical facilities must be protected to a higher standard from flood damages. § 37-60-106(1)(c). Further, the General Assembly has required that building of structures in the floodplain must be designed in terms of the availability of flood protection devices, proposed intensity of use, effects on the acceleration of floodwaters, potential significant hazards to public health and safety or to property, and other impact of such development on downstream communities such as the creation of obstructions during floods. § 24-65.1-202(2)(a)(I)(A), C.R.S. (2009). Finally, floodplains shall be administered so as to minimize significant hazards to public health and safety or to property. § 24-65.1-202(2)(a)(I)(A).

10. The Rules provide for procedures for and conditions of proposed variances from the Rules if such variance is for good and sufficient cause and will not increase flooding or threaten public safety.

11. The Rules contain standards and specifications for approximate and detailed regulatory floodplain determinations in Colorado. The 2005 Rules contained detailed standards within Appendix A, Appendix B, and Appendix C. These Appendices have been omitted as incorporation into the Rules, but are still available as a reference tool.

12. The Rules will provide the necessary steps for floodplain mapping partners to follow in order to have county and community flood hazard information designated and approved by the CWCB so that statutory requirements can be met.

13. The Rules will assist communities and other floodplain mapping partners with developing and providing accurate regulatory floodplain information for use in wise floodplain management activities. The Rules provide for a process whereby all affected communities have the

opportunity to review, analyze, and object to the floodplain studies if not based on technically accurate and sound scientific data.

14. The Rules provide for the CWCB's review of the results of the hydrologic analyses, hydraulic analyses, and floodplain delineations in a published floodplain study report. The Rules provide that a qualified Colorado registered professional engineer in good standing shall direct or supervise the floodplain mapping studies and projects within the regulatory floodplain and that such floodplain maps, reports and project designs within the regulatory floodplain shall be certified and sealed by the Colorado registered professional engineer of record.

15. The Rules provide that designation and approval of floodways shall be considered, as requested by the local governing entity, as part of the designation and approval of corresponding regulatory floodplains. The Rules provide criteria for determining the effects of dams, levees, stormwater detention, irrigation facilities, flood mitigation measures and stream alteration activities on or in regulatory floodplains in order to quantify peak flood discharges and to assess the effects of flooding conditions that would result.

16. The Rules set forth the process and procedures for the CWCB to designate and approve regulatory floodplains. The 100-year flood shall be the basis for all designation and approvals by the Board, for zoning and land use purposes, of regulatory floodplains in Colorado, unless the 500-year flood is requested for designation in writing by the local jurisdiction.

17. The Rules provide the process and procedures for the CWCB to designate and approve changes to regulatory floodplains resulting from development, watershed changes, new or better technical information, or other factors, subject to the same criteria as required for an original approval and designation.

18. The Rules will provide additional information and recommendations, above and beyond the regulatory floodplain requirements, that can serve communities in need of technical, regulatory, and administrative information in order to allow for safe and reasonable floodplain development that will lead to better protection of Colorado citizens and their property.

19. The Rules will increase the quantity of statewide uniform credit for the Community Rating System, a program within FEMA's National Flood Insurance Program that provides flood insurance discounts for flood programs that exceed federal minimum standards. This will serve to make flood insurance premiums more affordable statewide for the citizens of Colorado.

20. The Rules establish freeboard for all new and substantially changed structures statewide. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as debris blocking bridge openings, inherent uncertainty in hydrologic and hydraulic models, rainfall in excess of design events, legal encroachments into the floodplain, and the hydrological effect of urbanization of the watershed. Freeboard results in substantially safer construction and significantly lower flood insurance rates due to lower flood risk. This standard will not apply to existing mapping, but rather, it will be in effect for future mapping and studies. This new standard does not result in any new requirements.

21. The Rules provide for a uniform statewide floodway criteria. Current minimum standards set by the National Flood Insurance Program allow for encroachment into the floodplain that raises base flood elevations by one foot. While legally permissible in most cases, this encroachment results in increased risk to neighboring property owners without recourse that may result in lower property values and increased liability for the permitting communities. Some local communities in Colorado have already successfully adopted and implemented a ½ foot surcharge, as proposed by these Rules. However, due to the non-uniform surcharge criteria between neighboring communities, this higher local regulation is difficult to enforce near community boundaries and is often unable to be reflected on countywide floodplain maps due to the non-uniform regulations. While this regulation only applies to future activities, it has the potential to provide benefits for both existing and future facilities by limiting higher flood depths impacting these structures due to encroachment. This regulation has the net effect of lowering flood elevations on nearby properties, thus increasing the safety and property value of these positively impacted properties.

22. These Rules apply higher standards to regulations and processes that currently exist, including requirements to: 1) follow all state and federal regulations, 2) obtain a local permit for development in the floodplain (where applicable), 3) elevate or floodproof structures to a safe elevation, and 4) get a local determination of when substantial changes occur. These Rules do not change the current need to obtain a local permit for development in the floodplain and do not alter how substantial change determinations are made by local governments. Identification of a structure as a critical facility does not create a new regulatory nexus nor does it prevent its occupation in the floodplain; rather it simply requires an additional foot of freeboard when designed and constructed.

23. These Rules contain provisions that will require many local ordinances to be updated to be consistent with these rules. A transition period of three years beginning from the effective date of these rules will be in effect during which all local governments may follow current local ordinances but must undertake activities to come into compliance with these Rules. Following this transition period, all floodplain activities shall be in conformance with these Rules. In addition, communities may, at their sole discretion, allow un-built projects that were previously permitted by the local government, prior to the adoption date of the local ordinance for which these Rules are incorporated, to be built and therefore considered to be in compliance with these Rules. Communities may also, at their sole discretion, permit and allow projects for which a valid CLOMR was issued prior to the adoption date of the local ordinance for which these Rules are incorporated.

24. These Rules reduce expenditure of public money for costly flood control structures. In many cases, proper application of these Rules may reduce, or in some cases, eliminate the need for these costly public expenditures due to wiser use of floodplain areas and safer development within them.

25. These Rules minimize the need for response and rescue efforts associated with flooding and generally undertaken at the expense of the general public. While these Rules actually regulate only structures and facilities in the regulatory floodplain, response and rescue efforts associated with flooding affect all residents of a community in terms of cost and reduced availability of these services during and following a flood to non-floodplain areas. Depending on the circumstances for a particular flood event, the cost of these services can be enormous and, in

worst cases, can impact the financial viability of a community.

26. These Rules minimize business interruptions. While there is a tangible cost of complying with these Rules, it often pales in comparison to the lost business income, tax revenue, and employment that are often experienced following flood events. There are many examples, both from Colorado and around the nation, of a damaging flood impacting the financial stability of a community or region for long periods. While disaster assistance may be available following some events, it is often not sufficient to fully restore services, especially to individuals and businesses. These Rules reduce the risk of flooding to future infrastructure and therefore lessen the vulnerability of communities to losses and economic risk.

27. These Rules minimize expenses to taxpayers for costly disaster bailouts, relief efforts, and recovery programs. Disaster assistance only benefits those directly affected by a flood disaster but the costs are shared by entire communities, the state as a whole and, in some cases, the entire nation. Application of these Rules places responsibility and costs on property owners most likely to be directly affected by a flood event. These costs are often low compared to costs experienced during flood events. These Rules reduce the risk of flooding to future infrastructure and therefore lessen the vulnerability of communities and the State to costly and avoidable post-flood activities.

28. These Rules are not to be applied retroactively. These Rules are in effect for future construction, substantial changes to existing construction, and new additions. Substantial change determinations are already made by local governments, and the process for this decision is not altered by these Rules.