

CITY OF CEDAR RAPIDS, IOWA

CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN



Revision Summary

Revision #	Description of Changes	Date Adopted
0	Original Issue	06/23/2015
1	Added Chapter VII – Aesthetics Guidelines	10/20/2015
2	West side alignment changes in Kingston and Czech Village; Amended Chapter VII – Aesthetic Guidelines; and Added Chapter VIII – Pump Station Policy	08/09/2016
3	West side alignment revisions including: O Avenue over levee, structure type from Amphitheatre to 8th Avenue, alignment at 12th Avenue, permanent wall at Czech Museum, levee from 17th Avenue to 18th Avenue, and Bowling Street over levee. Added Q Avenue detention basin. Text and figure updates.	08/28/2018
4	Revised and Renamed Chapter V – Financial Plan	09/11/2018
5	Revisions to Flood Control System north tie in at Cedar Lake and south tie in at Cargill Corn Milling plant. Text and figure updates.	10/09/2018
6	Revisions to Property Acquisitions in Czech Village	02/26/2019
7	Revision to Concept at Tree of 5 Seasons Park, 4th to 5th Avenue East, I-380 West to 1st Ave West, and Amphitheater to 7th Ave SW, plus adding A Avenue Permanent Pump Station	12/17/2019
8	2021 Implementation update, Master Plan Alignment Update – August 2021; Revisions to East Reach 1: North Industrial Area, West Reach 1: Time Check; Revisions to Chapter III-28 8 th Avenue Bridge and Festival Grounds; Revisions and updates to acquisition areas on West Reach 1	08/30/2021

9	<ul style="list-style-type: none"> • Master Plan Alignment 2022 • Figure III-7 Add Street extension NE Railyard • Figure III-12 Wall Shift Near 8th Ave. Bridge • Figures III-17 & 17a Add Horizontal Collector Well • Figure III-19 Revise Wall to Levee East of Otis Road • Figure III-19a: Add Trail Connectivity Map • Figure III-20 Revise 8th St. NW to cul-de-sac • Figure III-23 Revise O Avenue Up & Over, add creek outfall from pump station • Figure III-25 Add detention basin • Figure III-26 Add F Avenue Up & Over • Figure III-28 Revise 1st Street West alignment • Figure III-30 Revise Amphitheater alignment • Figure III-30b Add Riverside Skatepark/Playground • Figure III-31&31a Add detention basin • Exhibit VI-5:3&4 Revise East Reach 1 Acquisition Map • Exhibit VI-5:9 Revise West Reach 1 Acquisition Map • Exhibits VI-5:19 & 20 Revise West Reach 3 Acquisition Maps • Aesthetic Guidelines: Add top of wall deterrent 	12/20/2022
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Highlighted Yellow Items are changes made to Master Plan from previous version

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City of Cedar Rapids, Iowa
 Cedar River Flood Control System (FCS) Master Plan

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**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER I: INTRODUCTION**



How to Use this Document

The FCS Master Plan is a long-term plan that will provide direction for the implementation of the flood control system design and construction. The Master Plan provides flexibility, with expectations of review and revisions over the course of time. Regular revisions will take the form of added sections or chapters to provide greater clarity and relevance to future actions. Ultimately, the City Council, appointed boards, staff, and the general public can use this document as a reference for the range of issues and decisions that define the FCS.

Planned FCS alignments and project elements (levees, floodwalls, removable walls, gates and pump stations) are subject to certain engineering design constraints, many of which do not become fully apparent until detailed design is underway. Modeling, design, and coordination with regulatory agencies (Iowa Department of Natural Resources, "IDNR" or "DNR"; United States Army Corps of Engineers, "USACE"; Federal Emergency Management Agency, "FEMA"; etc.) is ongoing, and issues not identified at Master Plan authoring date may result in future necessary changes to the Master Plan. As design of the FCS progresses, solutions that respect City preferences while meeting design, permitting and accreditation requirements will continue to be vetted, and may require additional revisions to the Master Plan.

In continuing Master Plan updates, changes in funding and/or implementation of the project are not being reflected. For additional information on current funding or implementation please contact the Cedar Rapids Public Works Department.

Year of the River

In early 2008, the City declared it the "Year of the River," not yet knowing how the summer would drastically change the context of that declaration. City Council had begun preparing a riverfront master plan for the Cedar River, envisioning Cedar Rapids as a "vibrant urban hometown – a beacon for people and businesses invested in building a greater community..."

However, in June 2008, the community was engulfed by flood waters from that same river. The Cedar River crested at over 31 feet, 19 feet above flood level. The flood surpassed the previous record, set nearly 80 years earlier, by 11 feet.

Virtually nothing was spared by the flood. Floodwaters spread across more than 10 square miles of the city, 14% of the land. Over 1,000 blocks in the heart of the community were flooded. More than 300 public buildings and 900 businesses were damaged. 5,390 homes belonging to more than 18,000 citizens were affected, and 10,000 residents were displaced by the disaster. However, and most importantly, in the midst of the horrific property damage, the Cedar Rapids fire department performed 423 boat rescues with no loss of life.

The flood caused over \$5.4 billion in damages to the community. Arts and cultural assets were displaced or destroyed, as were numerous faith institutions. The force of the event displaced 1,547 children from area child care centers. In addition to the devastation to residential and business properties, all local government facilities were crippled. The Central Fire Station, Police Station, City Hall, County Courthouse, County Administrative offices, and County Jail all required immediate relocation. This was accomplished quickly and efficiently with no interruption in public services.

In the midst of a natural disaster of this magnitude, steps toward recovery began even before the flood waters receded. On June 17, four days after the river crested, the Cedar Rapids City Council met to establish long-term, strategic flood recovery goals. Based on consultation with other communities that had recently experienced similar disasters, Cedar Rapids declared its intent to take charge of its own recovery in order to succeed long-term. The City committed to engaging all sectors of the community in every step of recovery planning. Specific focus was placed on flood-stricken neighborhoods. It meant not only addressing residents' immediate needs and determining how to redevelop flood-ravaged neighborhoods, but planning for the community's protection against future flooding.

Developing a Flood Control Plan

Six weeks after the flood, the first open houses were held for developing the flood management strategy. This began the process of defining the boundaries of neighborhood reinvestment and redevelopment. More than 2,600 community members participated in the four-month process. The community provided feedback first on community needs, then on 22 flood management alternatives. The final series of public meetings resulted in the City Council approving a flood management strategy in November 2008, just five months after the flood.

The community's strategy creates approximately 220 acres of new greenway in the 100-year floodplain. The plan balances protection with recreation, and includes:

- An amphitheater that also serves as a flood levee
- Eight-block downtown promenade
- Over four miles of restored river's edge
- Eight acres of wetlands
- 15 acres of playfields
- 12 miles of trails along the Cedar River

Obviously, substantial sums of money were going to be necessary to implement the plan. In March 2009, Cedar Rapids citizens committed to flood recovery efforts by voting for a five-year, one-percent local option sales tax by a strong 59% to 41% margin.

In 2012, Cedar Rapids proposed a novel funding source to the Iowa legislature. On December 3, 2013, two years of strategic legislative collaboration culminated in the creation of the State of Iowa Flood Mitigation Board, which made its first award to Cedar Rapids in the form of a 20-year, \$263.7 million commitment to flood protection, later amended to \$269.4 million. The Flood Mitigation Board will provide disaster mitigation funding to all Iowa communities by reinvesting a portion of future sales tax growth in those cities across the state dealing with watershed management and flood protection problems.

At the federal level, Congress has appropriated in 2018, approximately \$117.4 million in funding (\$76.3 million firm with \$41.1 million low interest loan) for Cedar Rapids, for only the East side of the Cedar River, as part of the Water Resources Development Act Supplemental Funding.

With funding secured, and following a successful voluntary acquisition program that spanned from 2009 to 2014, the time arrived in 2014 for Cedar Rapids to begin more formal and detailed design work on a

flood mitigation system for the community. HR Green and Stanley Consultants were selected by the City to identify alignment options, review and vet those options, and recommend a select flood control alignment for both the west and east side of the Cedar River. This process has provided a more detailed analysis of the 2008 flood control plan, helped identify and define specific barrier measures, and provided a means to integrate the community's history, culture, and resident feedback.

Renewed Community Engagement



The City and consultant teams desired to gain as much public feedback as possible during this critical design phase. A public outreach campaign was established to solicit input through a variety of communications channels.

To help create awareness and encourage public engagement, the City branded the project "Cedar Rapids Flood Control System" also known as "FCS." This branding was incorporated into all outreach efforts to convey the message that the many parts are all part of a single system to serve the entire city.

Community engagement included everything from work sessions and open houses, to online discussion boards and social media, to more formal stakeholder presentations and one-on-one meetings.

A summation of the key outreach efforts includes:

- Northwest Neighborhood (Time Check): The Northwest Neighborhood area experienced a significant loss of housing following the 2008 flood, and effort was made to reach out to this area specifically to collect as much public input as possible and gain fresh perspective and insight. Not only did this area see significant impact in 2008, but the area also had the fewest engineering constraints on alignment options. This allowed for a greater number of viable alignment options to be considered, providing more opportunities for feedback and input that had the potential to be incorporated. Two work sessions were conducted in the Northwest Neighborhood.
- Community-wide Open House Sessions: Open house sessions were conducted in December, 2014; January, 2015, and March, 2015.
- Online Public Discussion: Additional opportunities were extended for public participation through the City of Cedar Rapids website and online discussion board CRTalks. An online questionnaire was posted following the December Open House and continued to gather data through January 30, 2015. This medium worked much like the open house sessions where participants could review exhibits and provide feedback or ask questions.

- The Cedar Rapids Area Economic Alliance Innovation Council and Self-Supported Municipal Improvement District (SSMID) Commission were also briefed on the project and asked to provide feedback. While these sessions involved both the east and west side flood control systems, the majority of comments corresponded to the east side.
- A series of one-on-one meetings were conducted with organizations, businesses, and select property owners.

The resulting plan showcases the key mission of the flood system and the project goals that remain at the heart of the project:

Key Mission: The Flood Control System will reduce flood risk through the heart of Cedar Rapids on both the west and east sides of the river, and incorporate aesthetic elements that reflect our community's culture, history, and vision.

Project Goals:

- Mitigate against negative impacts to Cedar Rapids from flooding and other hazards.
- Improve the quality and identity of Cedar Rapids' neighborhoods and key corridors.
- Have the best parks, recreation, and trails system in the region.
- Be stewards for the environment, promoting economic and social growth while restoring the relationship between the City and natural environment.
- Demonstrate best practices in building construction.
- Improve the function and appearance of our key corridors.

Special Thanks

The efforts of many individuals led to the creation of this Flood Control System, including the countless residents, property owners, and business leaders who invested time and attention in providing feedback and insight on the plan's design. Thank you to the community.

- Alliant Energy
- African American Museum of Iowa
- Bridgehaven
- Cargill, Inc.
- Cedar Rapids Metro Economic Alliance | Community Development Innovation Council and Downtown SSMID
- Cedar Boat Club
- Cedar Rapids U.S. Courthouse
- CenturyLink



- City of Cedar Rapids Departments of Public Works, Utilities, Police, Fire, Parks and Recreation
- City of Palo
- Coe College
- CRST International
- Czech Village District, Czech Village Association
- Diamond V Mills
- Electro-Coatings
- Friends of Cedar Lake
- GreatAmerica Leasing
- GSA Federal Courthouse
- Hobart Historic Restoration
- ImOn Communications
- International Paper
- Involta
- Iowa Department of Transportation
- ITC Midwest
- Linn County Solid Waste Agency
- Linn County Trails Association
- Mediacom
- MidAmerican Energy
- National Czech & Slovak Museum & Library
- New Bohemia Main Street District / The New Bohemia Group
- Northwest Neighborhood Association
- Oakhill Jackson Neighborhood Association
- OPN Architects
- Quaker Oats / PepsiCo
- Park Cedar Rapids
- Penford Products Corporation
- Ryan Companies
- Solum Lang Architects
- Southside Investment Board, the largest property owners in the district including: Bottleworks, Watertower, the Market, Geometric, Jelenick, CSPS, Cherry Building, St. Wenceslaus, Hatch Development, Chrome Horse. Etc.
- Southslope Investment Board
- Stickle Enterprises
- Time Check Residents
- United Fire
- Unity Point

Following the approval of this Master Plan, public involvement has continued with a series of public meetings and individual meetings with stakeholders to further guide the development of final designs for the FCS.

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER II: EXECUTIVE SUMMARY**



2021 Implementation Plan Update

As stated in the original Master Plan, the initial Implementation Plan scope and purpose was considered a good starting point and subject to future change. As of late Summer 2021, construction is near completion in the lowest lying areas, (Newbo & Czech Village). The addition of United States Army Corps of Engineers (USACE) funding in 2018 has allowed for an accelerated timeline for all four segments on the East side. These factors have contributed to the initial implementation order no-longer being relevant. To complete the FCS project, all remaining areas (NW Neighborhood/Time Check, Kingston, Ingredion, 8th Avenue Bridge) may be worked on concurrently, with prioritization.

Introduction and Purpose of the Plan

Following the 2008 flood event, The City of Cedar Rapids made a commitment to provide flood protection to both sides of the Cedar River. This Flood Control System (FCS) builds upon prior efforts focused on the east side flood control system as well as develops a plan for flood control improvements that will benefit the west side of the river. Ultimately, this document provides a basis for:

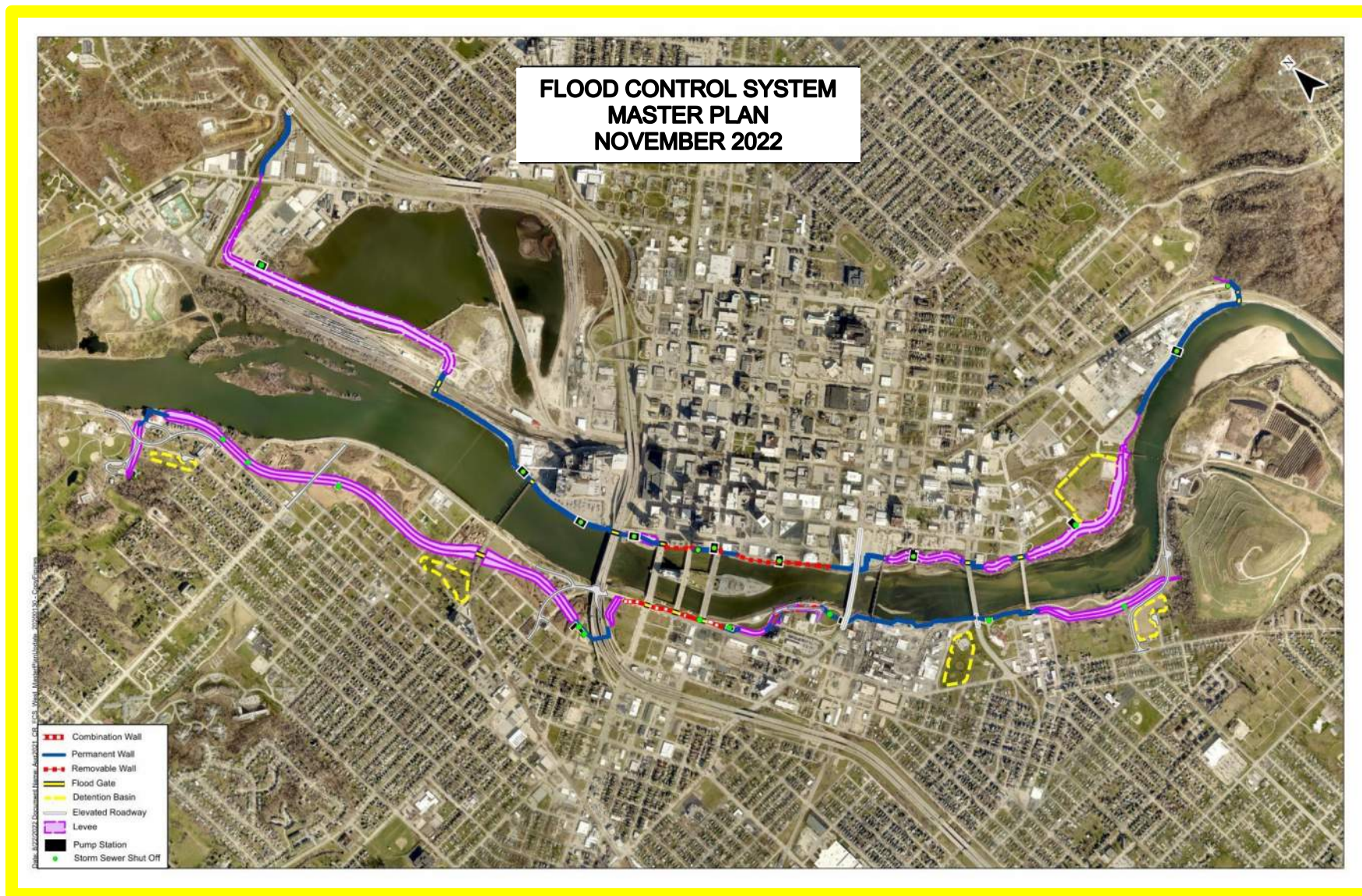
- Defining an alignment for future flood control improvements on both sides of the Cedar River;
- Creating transportation continuity across the Cedar River during flooding (including preserving emergency services and ability to erect and maintain FCS during a flood event);
- Creating overall design criteria;
- Initial prioritization for implementing flood improvements as well as a methodology for future decisions concerning the sequencing of flood improvement design and construction activities;
- The cost opinion for design and construction of the flood control system, along with funding strategy;
- Delineating a property acquisition policy;
- Communications and Public Outreach; and
- Aesthetics and amenities.

These key points are detailed in the following sections of this report.

Recommended Alignment

Determining the recommended alignment, represented in Figure II-1, involved an intensive technical evaluation of the physical environment, design criteria consistent with the US Army Corps of Engineers and a public outreach effort. **The alignment and features also considered reducing the number of roadway gates to be more operable and reduce long term maintenance which allows for a more aesthetically pleasing flood control system.** Additional coordination with the Iowa Department of Transportation, affected railroads, Iowa Department of Natural Resources, and the Iowa State Historical Preservation Office helped set the groundwork and begin securing necessary permits.

Figure II - 1: Cedar Rapids FCS Map



Initial Implementation Plan

(Prior to US Army Corps of Engineers funding announced in 2018)

The implementation phase of the FCS is based on evaluating a series of technical as well as neighborhood and economic impact considerations. The table below reflects a prioritization structure for various reaches. The reaches shaded in red are likely to be implemented in the short term (e.g., 0 – 5 years), projects referenced in blue may be implemented in 5 – 10 years following adoption of this Plan, and long-term projects (over 10 years) are referenced in gray. The actual implementation will be based on availability of capital and confirmation by the City prior to initiating final design and construction. A brief description of the system and associated reaches is summarized below:

Sequence Plan and Reaches	Anticipated Timeline
NewBo/Sinclair – from 8th Avenue Bridge to new Alliant Substation	
Czech Village – from 12th Avenue Bridge to former landfill site 1	
8th Avenue Bridge Replacement*	
North Industrial – from north tie-in point to Interstate 380 (I-380)	
Downtown – from I-380 to 8th Avenue Bridge	
Kingston Village – from I-380 to 8th Avenue Bridge	
Time Check – from Ellis Lane (north tie-in point) to I-380	
Cargill South – from new Alliant Substation to south tie-in point	
Ingredion – from 8th Avenue Bridge to 12th Avenue Bridge	
Edgewood Road Bridge Approach – Will be built in conjunction with other highway and bridge repairs	

Key:

- 0 – 5 years from plan adoption
- 5 - 10 years from plan adoption
- +10 years from plan adoption

The core objective of the FCS is to reduce impacts resulting from future flood events for the entire system. The project team acknowledges that this objective will be achieved over a number of years depending on the availability of capital. To this end, the FCS implementation plan was developed using a common set of criteria and methodology for recommending the sequence of construction. This model will be revisited frequently and the sequence may vary as new information is gathered or conditions change.

The FCS will be constructed in smaller sections of these reaches in order to optimize involvement of local contractors and to match the inflow of funds. With the involvement of the USACE larger project, bids may develop for the Federally-led segments of construction.

Updated Implementation Plan

(After 2018 US Army Corps of Engineers funding announcement)

As the US Army Corps of Engineers allocated funding in 2018 for the East side FCS improvements, the requirement for federal project completion in 2023 was attached to the funding. Therefore, the schedule for implementation for East side FCS has been subsequently accelerated, without altering schedules of the remainder of the system.

Budget (2017 Dollars)

The table below summarizes the estimated costs for the FCS in 2017 dollars.

	West	East
Walls and Levees	\$ 122,000,000	\$ 190,000,000
Pump Stations and Gatewells	\$ 79,000,000	\$ 53,000,000
Real Estate Acquisition	\$ 30,000,000	\$ 13,000,000
Sum	\$ 231,000,000	\$ 256,000,000
8th Avenue Bridge Replacement and Edgewood Road Bridge Improvements (including real estate acquisition)		\$ 63,000,000
Combined Total FCS		\$550,000,000

The program will be spread over twenty years. Based upon the construction sequence presented in the GRI application, and the 4 percent escalation rate assumed in that document, the full cost of the 20-year program will approach \$750 million. A little more than \$100 million of that has been spent already, on acquisitions, engineering and some construction. Revenues will be comprised of a combination of funding through the Army Corps of Engineers, Iowa Flood Mitigation (“IFM” or known locally as “Growth Reinvestment Initiative”), the Department of Housing and Urban and Urban Development (HUD), the Federal Highway Administration, Local Funds, and other grants.

Acquisition and Disposition Policy

The Acquisition and Disposition Policy was developed to clarify which parcels will be required for the FCS, which ones will be eligible for voluntary acquisition, and which properties that are currently owned by the City may be considered for selling. The following table summarizes the type of acquisitions addressed in this policy and factors that prompt possible actions. It is acknowledged that some actions include the use of eminent domain, but the City will attempt to acquire from willing sellers as much as possible by offering to buy on the seller’s schedule. Voluntary acquisitions will be given priority over construction spending. The report includes maps showing which properties fall within the FCS project area. The cost estimate is now maintained in the Public Works Department, outside of the Master Plan, following the funding strategy that was adopted in the Master Plan Amendment No. 4 – Chapter V.

Acquisition Type	Affected Properties	Additional Provisions
Mandatory Acquisitions	Properties required to build, maintain, and operate the FCS	N/A
	Properties upstream of the FCS that experience higher water due to the backwater effect	Purchase flowage easement for structures in city limits that are within the 200-year floodplain (data acquired from 2015 study).
		If flowage easement is 50% or greater than the assessed value; consider full acquisition in city limits.
		City may protect properties rather than acquire or purchase easement if financially feasible.
	Properties with buildings or related improvements on unprotected side of FCS	City will purchase a flowage easement for any property that has a structure within the 200-year post FCS construction floodplain (data acquired from 2015 study).
If flowage easement is 50% or greater than the assessed value; consider full acquisition in city limits.		
Properties on vacant lots or parcels on the unprotected side of the FCS	N/A	
Voluntary Acquisitions	Properties downstream of the FCS and are not affected by construction of FCS	Owners that have structures that would be impacted by 200-year water surface elevation (data calculated from 2015 study).
		This provision expires 2 years from the date of the initial policy adoption (expired 06/23/2017).
	Properties on the protected side of the FCS, within the 2008 inundation zone	Targeted sites involve properties that are inefficient to provide public services.
		Provision expires upon completion of the FCS

Communications and Public Outreach

Public outreach has been a critical component during the entire planning process. Staff and consultant teams remain committed to sharing information on the Flood Control System with the entire community, through a variety of communications channels.

To help create awareness and encourage public engagement, the City branded this project, “Cedar Rapids Flood Control System” (FCS). The Plan presented in this document is the result of collaboration among three separate teams of consultants, one team for the West Side, one team for the East, and one for the 8th Avenue Bridge and Riverfront Improvements. These teams spent months collecting and

evaluating engineering data; presenting concepts and listening to ideas and concerns of residents and commercial and industrial stakeholders; meeting with county, state and federal agencies to facilitate permitting and certification; and engaging City leadership and staff in deliberations over visions, budgets, opportunities and constraints.

The details of the Flood Control System - alignment, implementation and sequencing - will continue to be shared with the public during a variety of community events where residents will already be in attendance. This will eliminate the risk of “open house fatigue” and enable staff to bring the plan directly to the community. In addition to offering a presence at community events, the City will continue to place material and renderings on the City’s website and utilize the communications channels established through the public engagement process. These outreach tools include:

- City website, www.cedar-rapids.org or www.cityofcr.com/floodcontrol
- Social media channels (Facebook, Twitter, Instagram, and YouTube)
- Online discussion board CRTalks.com
- *OurCR* Magazine and City Source electronic newsletter
- Reader-friendly prioritization maps that outline reaches, alignments and approximate timelines
- Public events: Downtown Farmers’ Market, Cedar Rapids Kernels, resident appreciation events, etc.

Additional details on messaging and outreach can be found specifically within each chapter of the Flood Control System Plan.

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER III: THE FCS PLAN**



Project Background

The United States Army Corps of Engineers (USACE) Rock Island District performed a feasibility study that culminated in the recommendation for federal participation in a flood risk mitigation project for the east side of the river only. Although the feasibility study investigated options for reducing the risk on both sides of the river, the ratio of the benefit to the cost did not meet minimum requirements to include the west side. The benefit-cost ratio on the east side is bolstered by the existing high-value industry and commercial infrastructure. The west side has great potential for growth, but many of the businesses that existed before were destroyed in the 2008 flood. Therefore, the scope of the USACE project for Cedar Rapids' Cedar River flood protection includes the east side only.

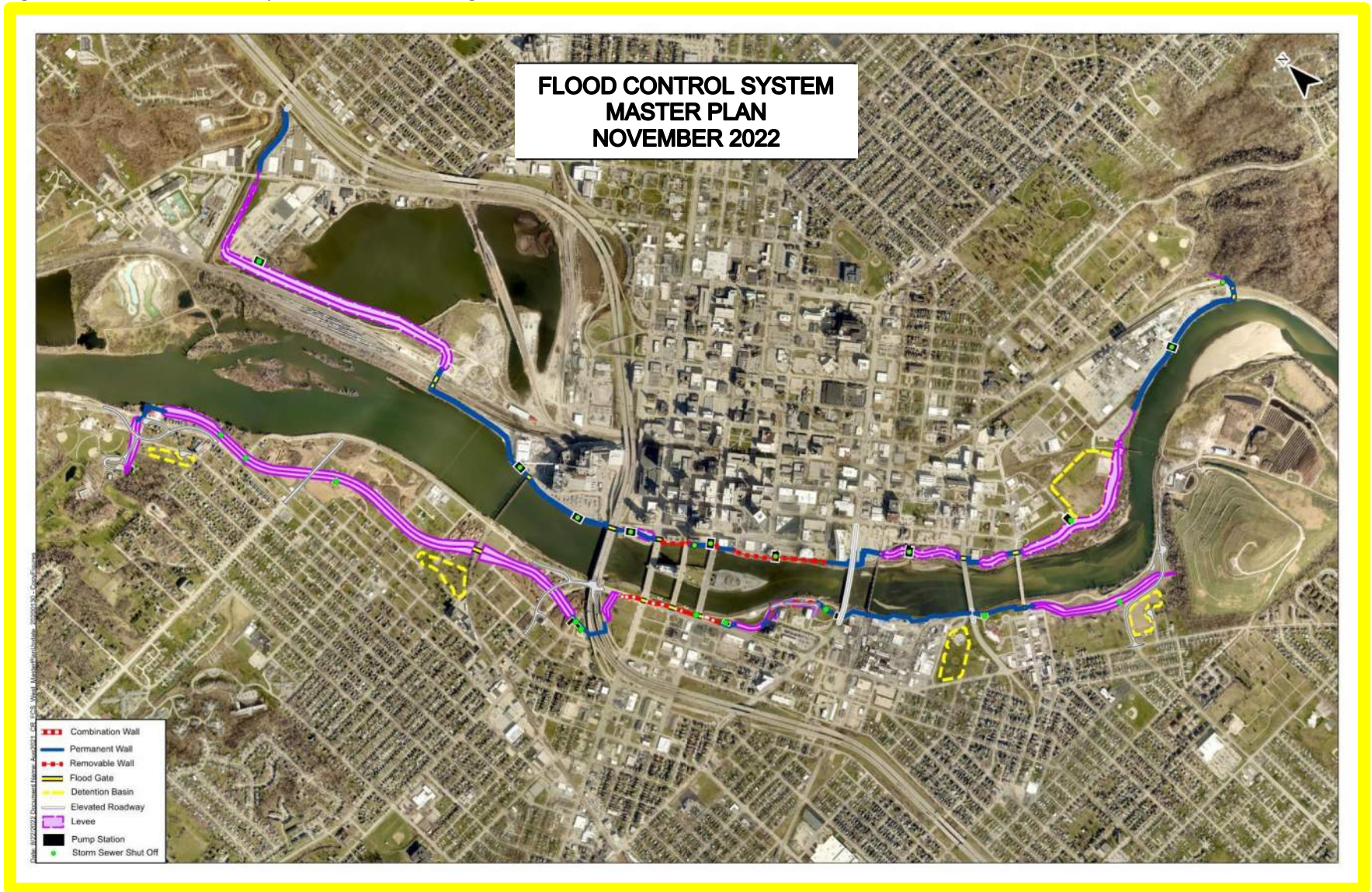
The cost of federal flood risk mitigation projects is shared with the local sponsor, in this case the City of Cedar Rapids, using 35 percent local funds and 65 percent federal funds, plus 100% local costs of any "betterment" that is required for the project, but not included in the Federal Appropriations Bill (2018). The USACE project for the east side was authorized in the 2014 Water Resource Reform and Development Act, and in July of 2018, the City was notified that federal funding had been appropriated for the east side FCS project.

The City has pursued several other means of procuring funds for reducing the risk of future flooding, and has successfully implemented programs under the Federal Emergency Management Agency (FEMA) and the Department of Housing and Urban Development (HUD). In November 2013, the City was awarded the Iowa Flood Mitigation Grant, which is expected to provide up to \$267 million for the FCS over the next 20 years. Iowa Flood Mitigation funds began arriving in 2014.

Figure III - 1 illustrates the Cedar Rapids Flood Control System alignment.

The west side FCS and 8th Avenue Bridge and Riverfront Improvements are just as critical to the success of the overall FCS, as are the east side improvements with the US Army Corps of Engineers. The only differentiation in the Master Plan is the funding sources separating these components.

Figure III - 1: Flood Control System Master Plan Alignment



Data Gathering/Research

The following reports have been reviewed for the development of this recommendation:

- Flood Recovery Planning Process – 2008
- Cedar Rapids River Corridor Redevelopment Plan – March 2009
- USACE Feasibility Study (Revised) – January 2011
- USACE 35% Design Plans, Specifications and Design Documentation Report – July 2012
- Iowa Flood Mitigation grant application – November 2013

Plan Development

Design Criteria

The design criteria for the FCS components on both sides of the Cedar River are being developed to meet US Army Corps of Engineers standards. This facilitates the federal funding, meets the criteria to become accredited by FEMA, and allows all segments to be accepted into the Federal Levee System. Since the construction will span 20 years, these criteria may be updated during the project implementation phase.

Much of the design criteria selected for this project has been adopted from previous recommendations developed for the east side flood protection system. Some of the design criteria which have a significant impact on the development and evaluation of alternatives include:

- Flood Control System Height: 143,300 CFS
- Levee Section: USACE typical (3:1 slopes, minimum 12' top)
- Access / Vegetation Free Zone: 25' minimum, reduced in selected constrained access to 15'
- Combination Wall and Levee Sill Elevation
 - Preferred 106,000 CFS
 - Minimum 103,500 CFS

Agency and Railroad Coordination

Iowa DOT

An initial meeting with the District 6 office of the Iowa DOT was conducted to start the coordinating process for points where the FCS intersects with DOT right of way. Contact information was shared and the concepts were discussed. Particular attention was paid to locations where the FCS would tie into an existing I-380 highway embankment.

Union Pacific and CRANDIC Railroads

Separate and on-going meetings began in 2015 and have continued/will continue with the Union Pacific and CRANDIC railroads to discuss the project's interface with both railroads and possible impacts during construction and operation of the flood control system. These meetings have continued throughout the design process.

Areas of concern related to:

- The Operational Agreement which would state when the gates would be closed and identify the responsible party to conduct this action
- Track closure in advance of flooding
- Track closure during construction.

Iowa DNR and USACE Regulatory Division

The consultant teams completed and submitted a Joint Application to the Iowa DNR and USACE for permits to work within the floodplain. This application will trigger a review of the Hydrologic and Hydraulic models and help identify potential conflicts with applicable laws and regulations.

State Historical Preservation Office (SHPO)

The Background Cultural Research and Geomorphological Investigation of Measures for the Cedar River Flood Risk Management Feasibility Study was prepared by Bear Creek Archaeology for the USACE east side feasibility study in April 2010. SHPO has concurred with the recommendations of the report. The Phase III recovery process has continued as recommended by this Study to comply with the Programmatic Agreement.

The Phase I Architectural and Archeological Investigations for West Bank Cedar River Flood Risk Mitigation reports were completed in March 2015 and May 2015, respectively. The Architectural report was submitted to the SHPO on May 5, 2015 for their review and comment. No adverse comments have been received to date.

Stakeholder and Neighborhood Input

Ideas and concerns have been shared with the most impacted people and organizations throughout the conceptual design phase. Meetings with Neighborhood Organizations have included:

- Southside Investment Board
- Northwest Neighborhood Association
- Time Check Residents
- Friends of Cedar Lake
- Linn County Trails Association
- Cedar Rapids Metro Economic Alliance
- Self-Supporting Municipal Improvement District
- Czech Village/New Bohemia Main Street District
- Oakhill Jackson Neighborhood Association, and
- Czech Village Association
- NewBo Main Street
- Kingston Square Associates

Meetings with Stakeholders have included:

- OPN Architects
- Ryan Companies
- Great America Leasing
- GSA – Federal Court House
- Stickle Enterprises
- Solum Lang Architects
- Cargill (North and South Plants)
- Alliant Energy

- International Paper
- Coe College
- Electro-Coatings
- Bridgehaven
- Unity Point
- ITC Midwest
- Quaker Oats
- Ingredion
- National Czech & Slovak Museum & Library
- Hobart Historic Restoration
- Diamond V Mills
- Cedar Rapids Departments of Public Works, Utilities, Police, Fire, Parks and Recreation
- Linn County Solid Waste Agency
- CRST
- African American Museum
- Schimberg Co.

Some of the key concerns and adjustments resulting from these meetings are noted in reach descriptions below and summarized in the Public Outreach section that follows.

Public Involvement Prior to Initial Master Plan Adoption (2015)

From the beginning, public input has been a vital part of the flood control system planning process. Following the flood of 2008, the City solicited public input when developing its preferred alignment. Since the development of that plan, public involvement has been key to refining the concept and gathering comprehensive data to support more specific planning and design.

Community, Neighborhood and Stakeholder meetings were conducted throughout the fall and winter 2014 and spring 2015.

- Open House No. 1 – December 18, 2014, and January 19, 2015
- Open House No. 2 – March 31, 2015

Open Houses #1 held in December and January, followed by #2 conducted in March served as milestones for the work to date, where the concepts were presented and direct feedback was solicited. This Alignment Plan wraps up what was learned from the public open houses, stakeholder meetings, and engineering evaluations into a complete plan for the Flood Control System alignment.

The improved conceptual designs were presented at Open House #2 on March 31. Exhibits were organized to clarify the alignments and to illustrate the look of the proposed improvements. Participants were given comment cards to share ideas, ask questions, and offer feedback on the exhibits. Residents were also given the opportunity to provide feedback through the City's online discussion board CRTalks.com. Throughout the entire process, planning documents and alignment options were made available on the City's website and social media sites to encourage feedback and disseminate information.

In addition to community events, public meetings with the Flood Control System Committee and City Council have kept the community updated on developments and provided guidance on alignment decisions.

The feedback received on the current plan is summarized here, organized in accordance with reaches:

Time Check

- Build Time Check levee first.
- The floodwall should be along the river just as it is on the east side.
- Storm drainage from streets will be greatly improved in the new concept.
- I love the concept for the west side.
- Save the 1800 block of Ellis.
- Raise the remaining properties along the unprotected side.
- Consider an alternative alignment that might remove garages but save homes.
- Consider converting Hubbard Ice to a floodable pavilion.
- Time Check levee constructed last to allow existing property owners more time before acquisition.

Kingston Village

- Location of canoe launch is too shallow.
- Walls and gates enhance connectivity to Kingston Village and Czech Village.

Czech Village

- Permanent and removable floodwalls to protect the Village's identity and its appearance from flooding in the future.
- The plan looks great.

Quaker Oats

- Good protection for Quaker Oats and Cargill.
- Protect properties on Shaver Road and Center Point Road.
- Protect Cedar Lake from river flood sedimentation.
- The flood protection system will exacerbate the problems of those left unprotected.

Downtown

- Overwhelming enthusiasm for the promenade.

NewBo/Sinclair

- General approval.
- Appreciation for the trails.
- Some desire for look similar to Downtown.
- Some concern for impact on parking.
- Widespread interest in constructing this reach first.

Cargill South

- Reasonable solution.
- Interest in trail on river side of wall.
- Consider tying back to high ground between railroad and Otis Road, thereby eliminating gate on Otis Road SE.

Otis Road

- Stopped short of Rompot.

General Observations

- Concerns about transitioning people out of area.
- Like the overall concept.
- Compensate people for acquisition if necessary but consider redesign.

Public Involvement Subsequent to Master Plan Adoption (2015)

- Ongoing individual meetings with individual property owners
- Cedar Rapids Metro Economic Alliance
- Downtown Parking Management, Inc.
- Kingston Square
- The Cedar Rapids Downtown Farmers' Market
- ConnectCR
- Czech Village/New Bohemia Main Street District
- Northwest Neighborhood (Time Check)
- Multiple local Rotary clubs
- City-wide project updates (twice in 2018 and 2019)
- Individual meetings with Stakeholders and Property Owners
- Joint contractor education sessions with US Army Corps of Engineers

Alignment Plan

East Reach 1: North Industrial Area

The north end of the east side flood system begins at I-380 at J Avenue. From there, it extends along the south side of McLoud Run, crosses under the new Shaver Road bridge, wraps thru the western edge of Cedar Lake, crosses the Union Pacific Railroad and continues past the PepsiCo/Quaker facility alongside the Cedar River (Figures III-2 through III-9). The design includes an earthen levee and flood walls, in addition to a pump station and gate near the northwest corner of Cedar Lake.

On the north side of McLoud Run, the FCS wall will be primarily along the properties belonging to Schimberg Company. Shaver Road will be elevated over both sides of McLoud Run so that it can and will remain open in the design flood event.

The City of Cedar Rapids developed this preferred concept, which has been accepted by the USACE and replaces the original alignment for this area. A feasibility study and environmental clearance were conducted to determine the feasibility of the alignment and found no concerns. Additionally, public feedback has been positive.

Figure III - 2: Rendering of floodwall at Quaker Oats Plant



A large water main in this area affects the cost and type of flood barrier that can fit within the corridor between the tracks and the river.

Maps for this reach are shown on in Figures III-3 through III-9.

Figure III - 3: East Side Project Area – North Industrial Area

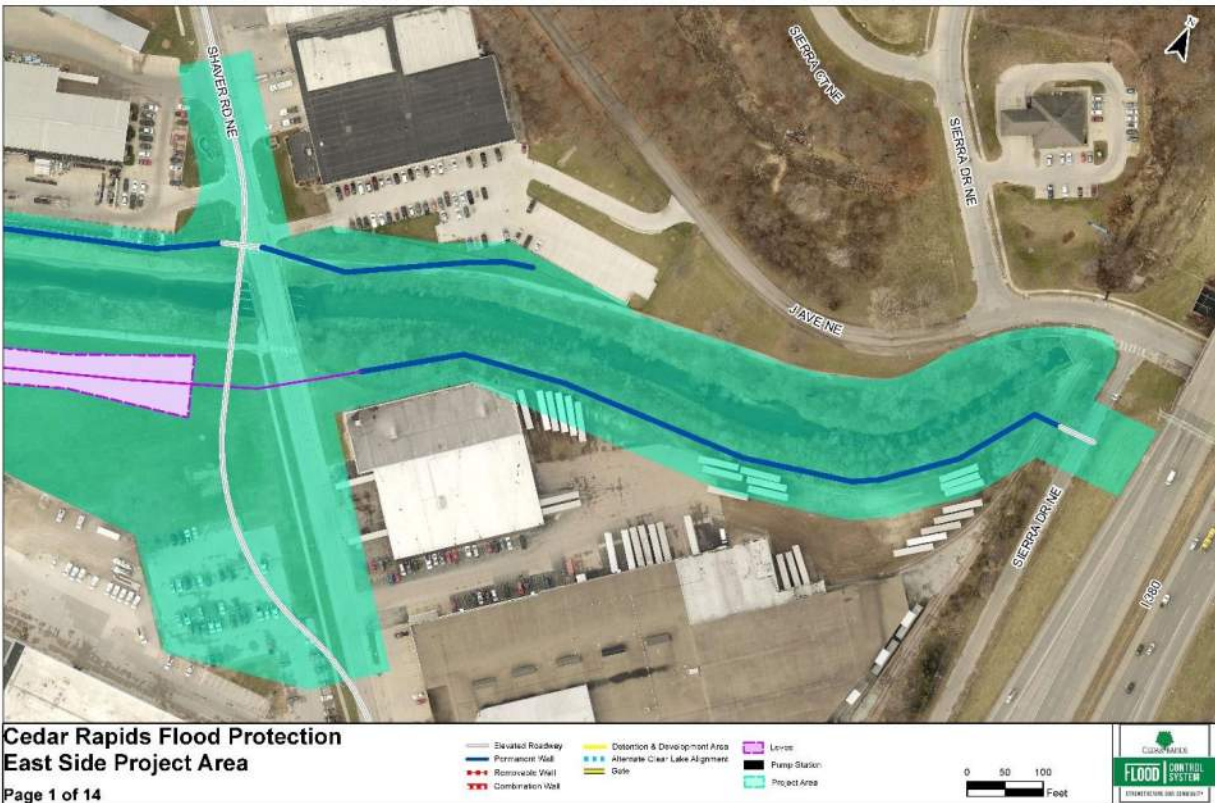


Figure III - 4: East Side Project Area - North Industrial Area

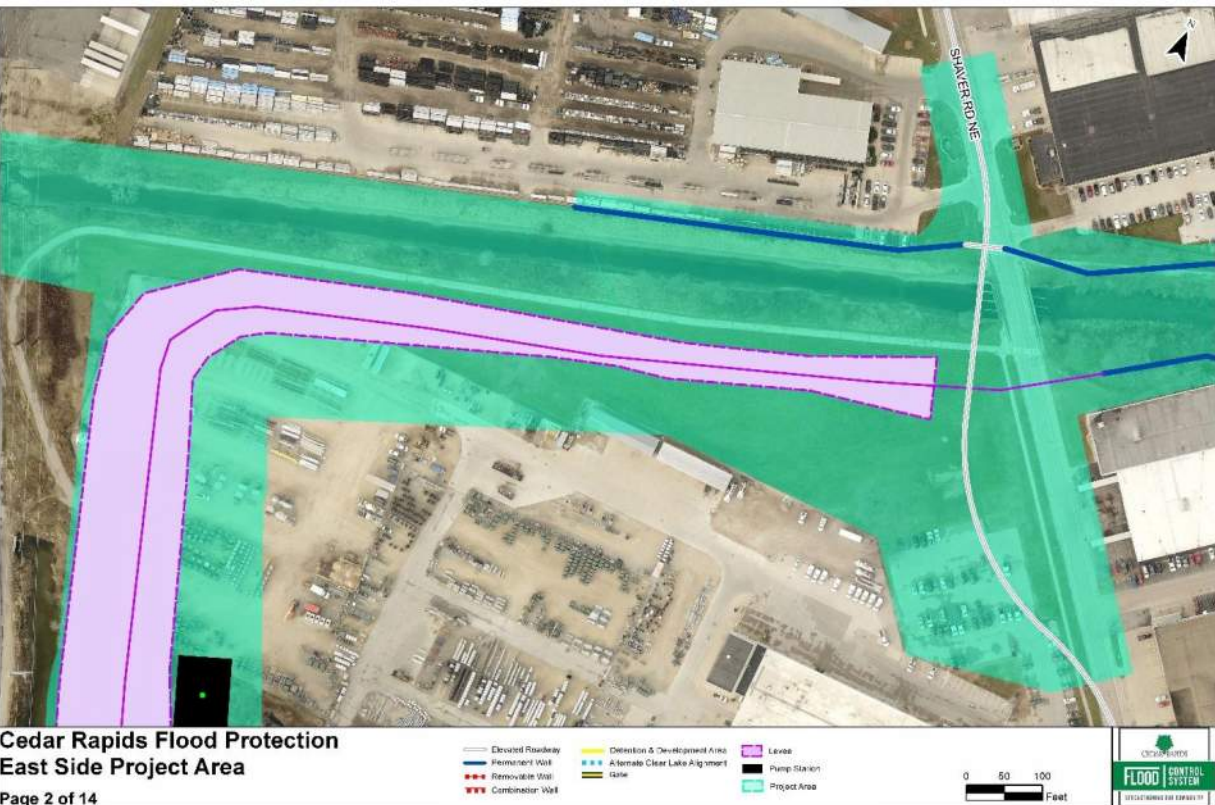


Figure III - 5: East Side Project Area - North Industrial Area

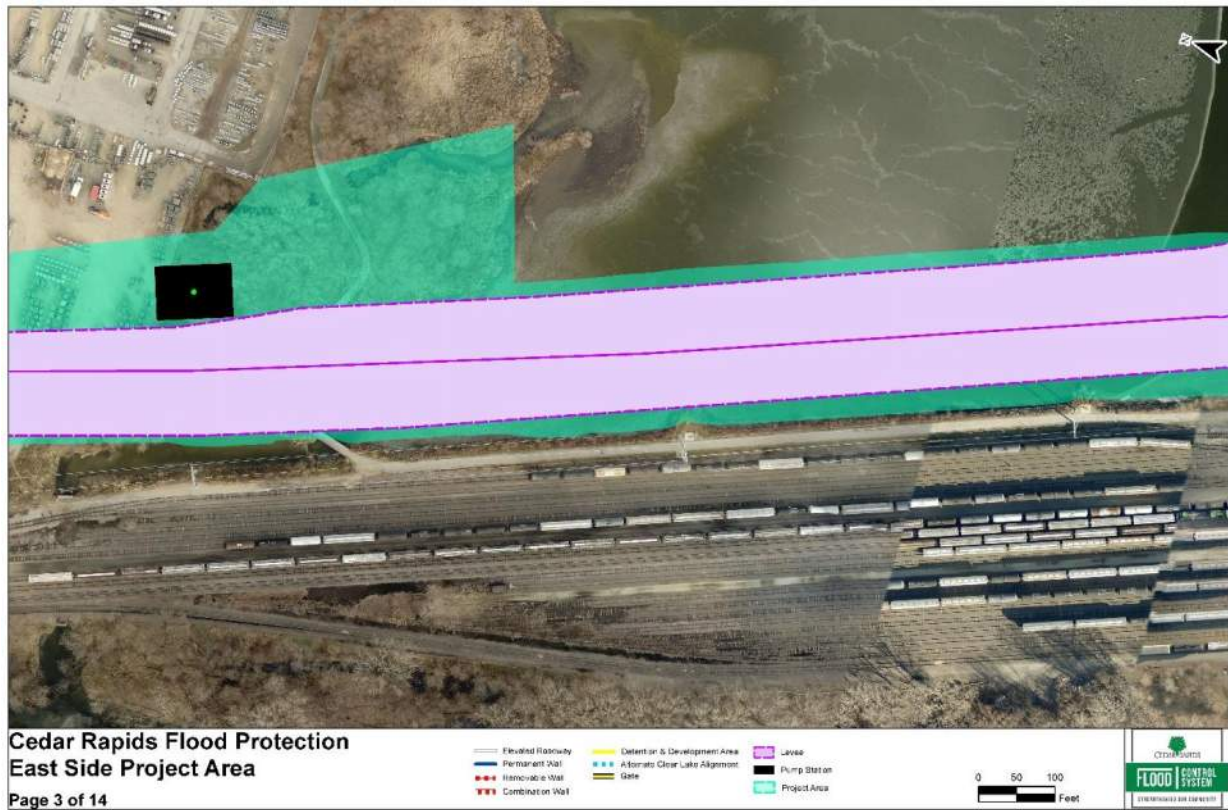


Figure III - 6: East Side Project Area - North Industrial Area

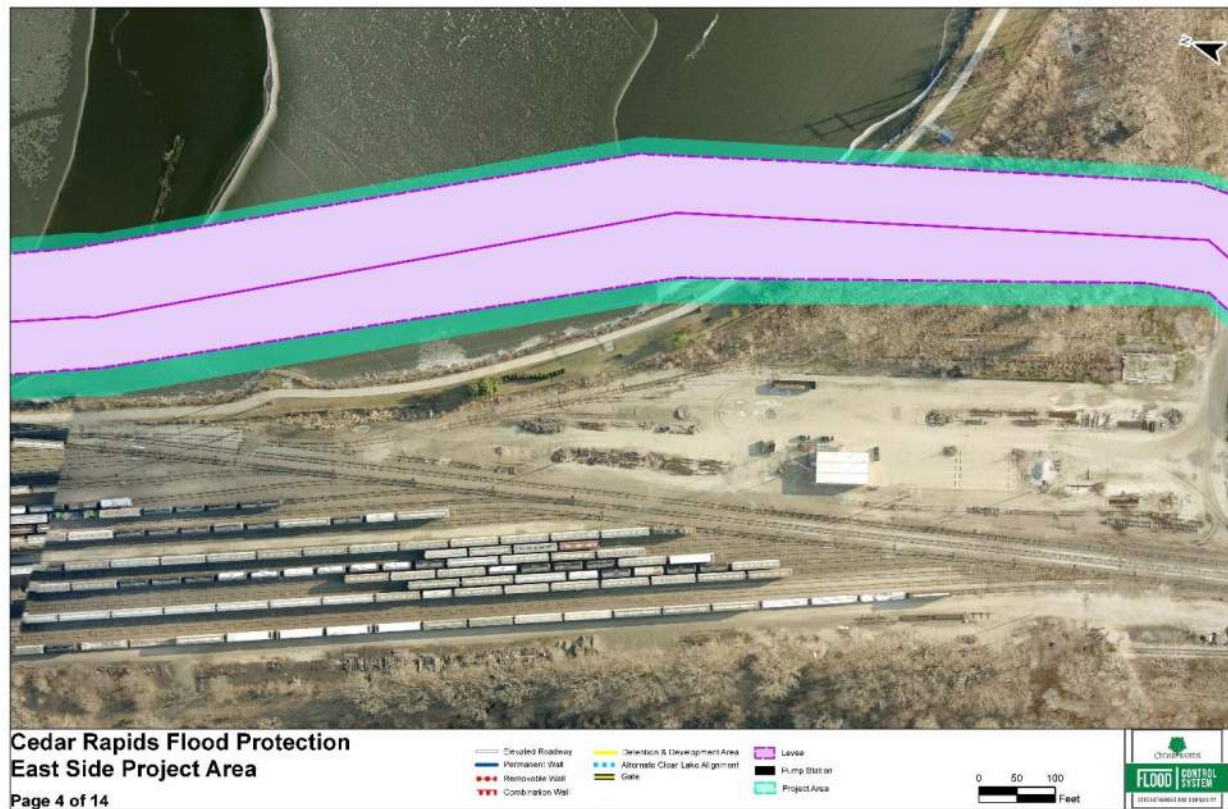


Figure III - 7: East Side Project Area - North Industrial Area

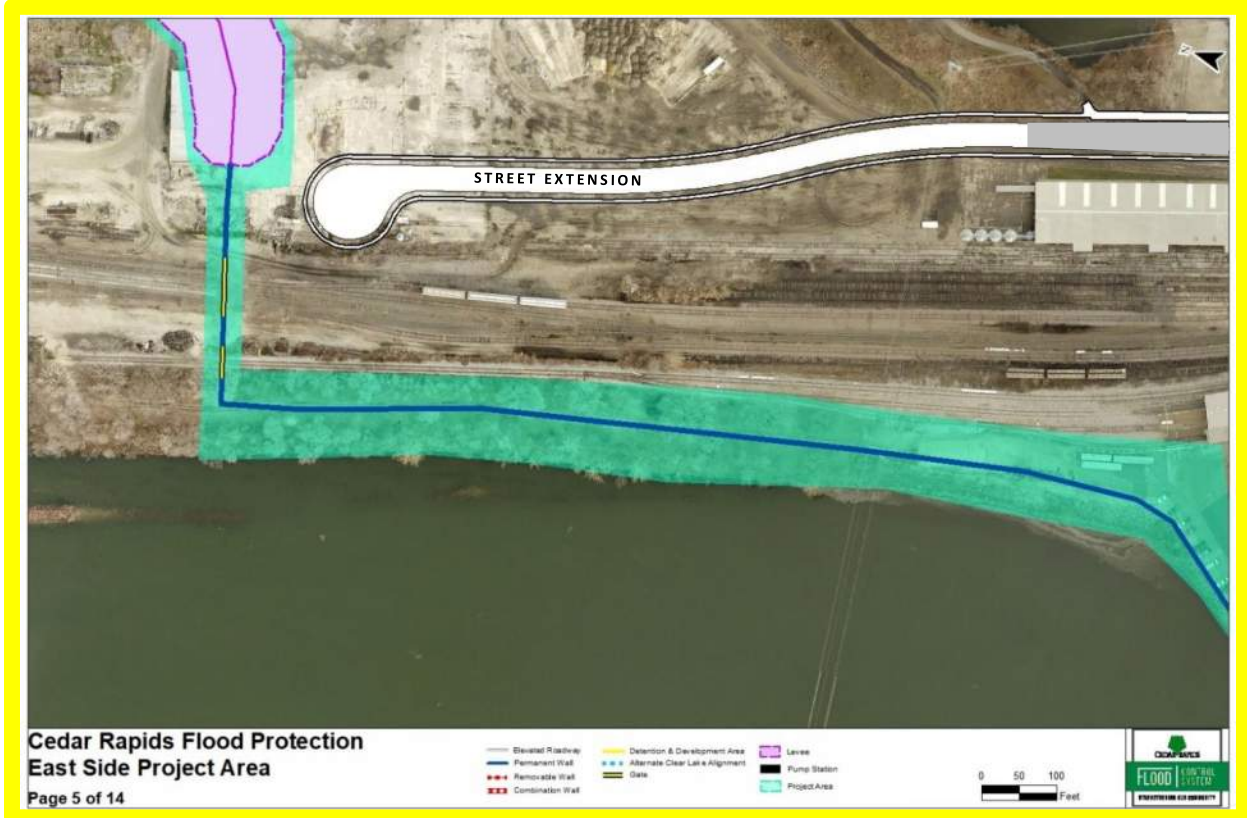
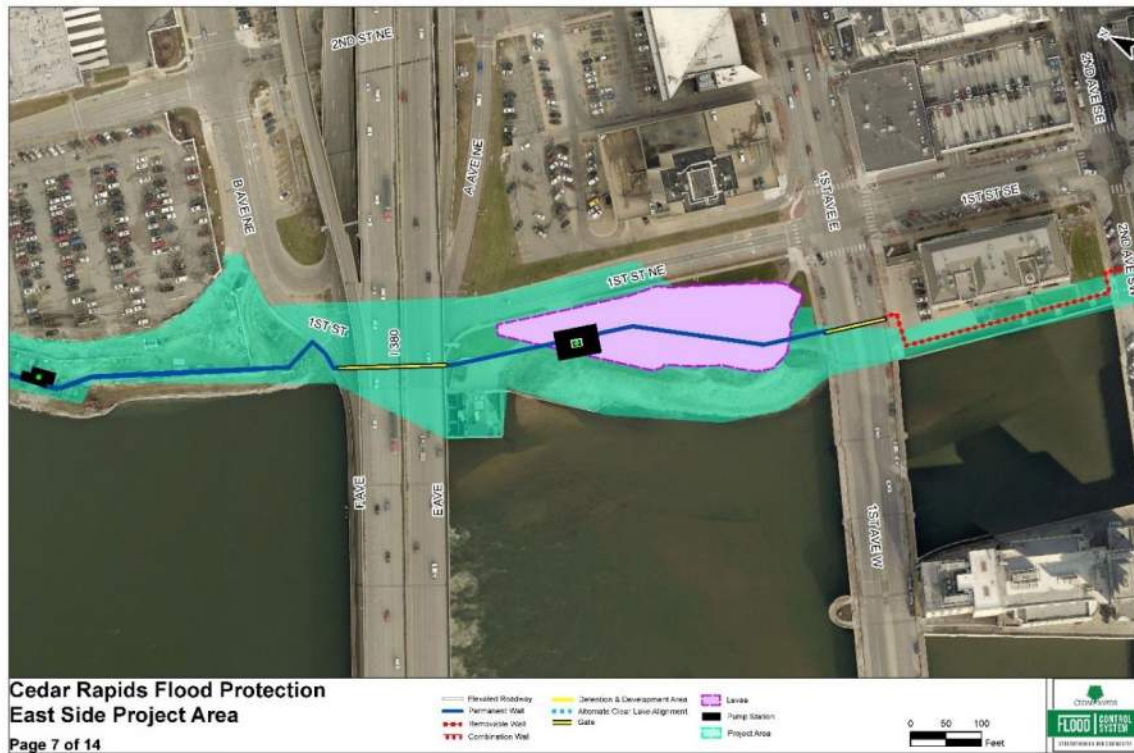


Figure III - 8: East Side Project Area - North Industrial Area



Figure III - 9: East Side Project Area - North Industrial Area/Downtown Area



East Reach 2: Downtown

The downtown reach runs along the riverfront from I-380 to 8th Avenue. The reach starts with a flood gate closure crossing E and F Avenues, transitioning to a permanent floodwall along 1st Street NE (Figure III - 9). The alignment transitions to a levee with an elevated Five Seasons Plaza (Figure III - 9a); both permanent and combination walls are along City Hall between 1st and 2nd Avenues SE. A permanent floodwall is built into the new CRST building between 2nd and 3rd Avenues SE (Figure III - 11). A permanent wall extends from 3rd Avenue to 4th Avenue, and a combination wall system extends from 4th Avenue to 7th Avenue, along the proposed riverfront promenade (Figure III-10). A permanent wall then extends from 7th Avenue to 8th Avenue near the federal courthouse (Figure III - 12).

The conceptual design in this reach will enhance the cultural, recreational, and entertainment appeal of the downtown riverfront. Pedestrian plazas, walkways, and trails will convert the current “alley” look into a recreation and entertainment destination (Figure III - 10). Removable, stoplog system floodwalls above a seat wall (together, creating a combination wall) preserve and enhance the connection with the river. Combination walls replaced the original master plan feature of permanent columns and removable panels to existing grade. This improves the FCS by reducing the frequency of horizontal stop log installation and eliminating visual clutter of permanent columns. But there are concerns over the use of so much removable wall, including:

- Cost – The removable walls cost more to construct and to maintain.
- Risk of completing the installation in time – If the river rises faster than the time required to complete the installation, the entire protected area is at risk.
- Fragility – The removable walls are not as strong as the reinforced concrete permanent floodwalls in the event of a perpendicular impact, therefore only used parallel to the river flow.

A roller gate is planned for a street closure at 1st Avenue and removable floodwalls are planned for street closures on E, F, 2nd, and 3rd Avenues. These stoplog closures eliminate the need for large gate abutments and for walls to store the gates against when open. Finally, removable floodwalls provide a wider opening than gates, which enhances views into and out of the city.

Figure III – 9a: Proposed Tree of Five Seasons Plaza



Figure III - 10: Proposed Fourth Avenue promenade (combination wall)



The public response to the presentation of this concept at the open houses and stakeholder meetings has been overwhelmingly favorable.

Maps for this reach are shown Figures III-9, III-11, and III-12.

Figure III - 11: East Side Project Area, Page 8 of 14

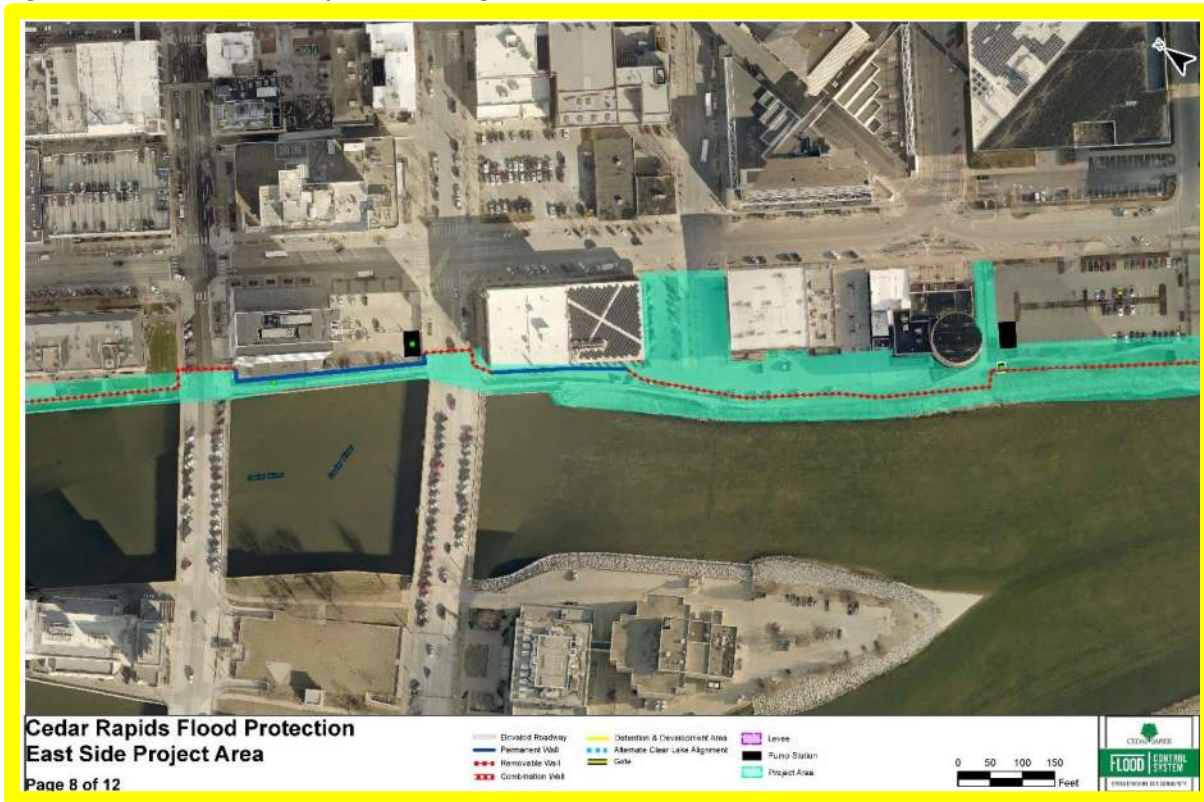
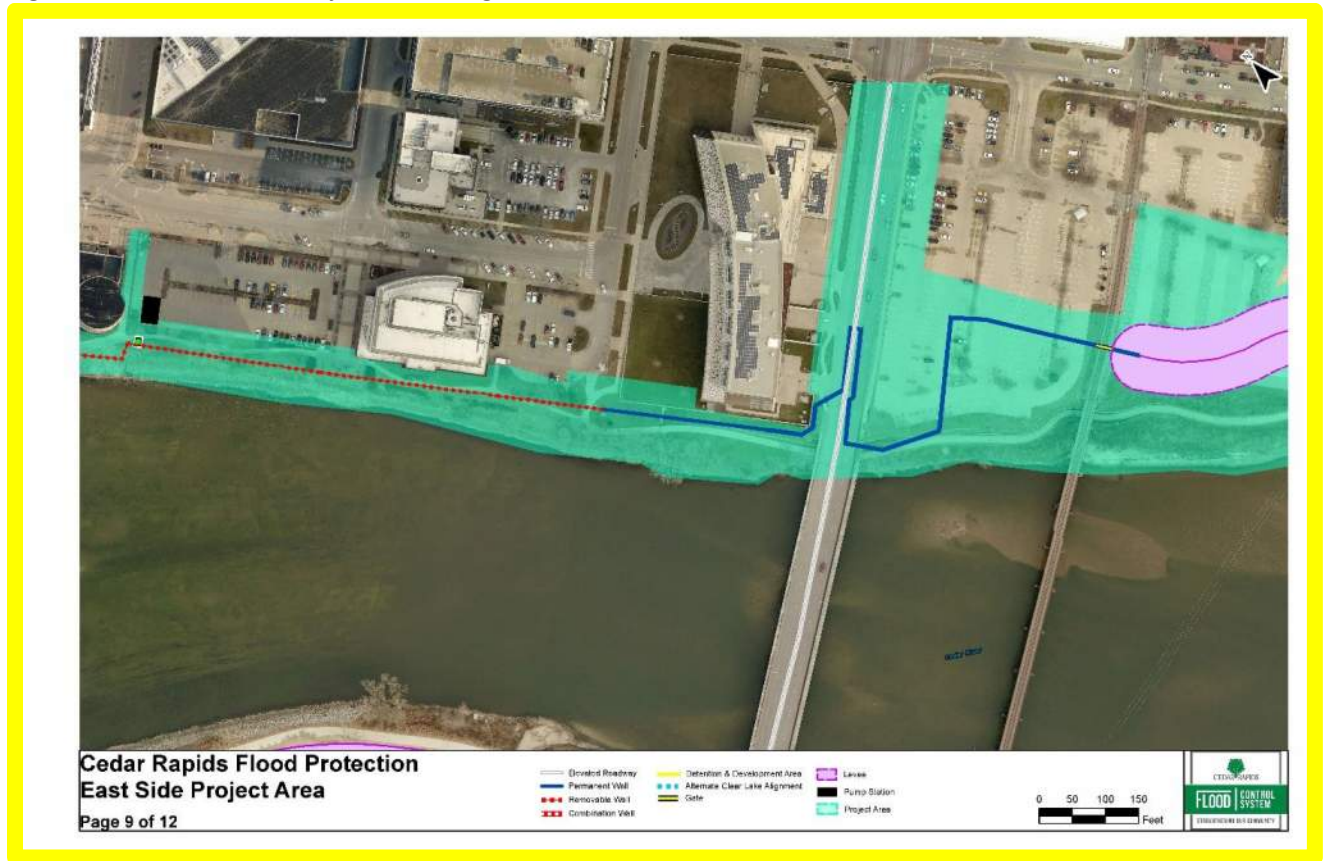


Figure III - 12: East Side Project Area, Page 9 of 14



East Reach 3: New Bohemia and Former Sinclair Site (NewBo/Sinclair)

This reach takes advantage of the open space available to construct levees along the river bank. Levees can be constructed for half the cost of floodwalls, and they can provide opportunities to improve the natural allure (Figures III-12, III-15, III-16, and III-17). The current design continues the Cedar River Trail along the base of the levee on the wet (river) side (Figure III - 13).

Figure III - 13: Proposed river trail near 8th Avenue



Roller gates are used to provide the flood protection system closures on 12th and 16th Avenues; they will be similar in size and style, are stronger than removable floodwalls, and can be closed in less time with fewer workers (Figure III - 14).

Figure III - 14: Roller gate design concept at 16th Avenue



The levee design will include multiple access points from the land side to the top of the levee and down to the river's edge. The existing river side trail could be enhanced with fishing rocks and piers, sandy beaches, and park facilities. The levee corridor will enhance the bicycle trail system, including bike- and pedestrian-friendly designs along the river and the former Union Pacific Railroad (UPRR) alignment, and possibly create a river crossing at the former UPRR Bridge in the Sinclair area.

The African American Museum is too close to the river to allow construction of a levee (Figure III - 15). A floodwall from 12th Avenue past the museum could incorporate murals to complement the museum's aesthetics. With the lowest-lying land on the protected side of the alignment, the Sinclair site (Figure III - 17) will include a detention basin to reduce interior drainage pumping requirements. The final size and shape of the detention was determined in consideration of development plans. Areas of the dry detention basin can be used for parks and recreation whenever the river is not in flood.

Maps for this reach are shown Figures III-12, III-15, III-16, and III-17.

Figure III - 15: East Side Project Area, Page 10 of 14

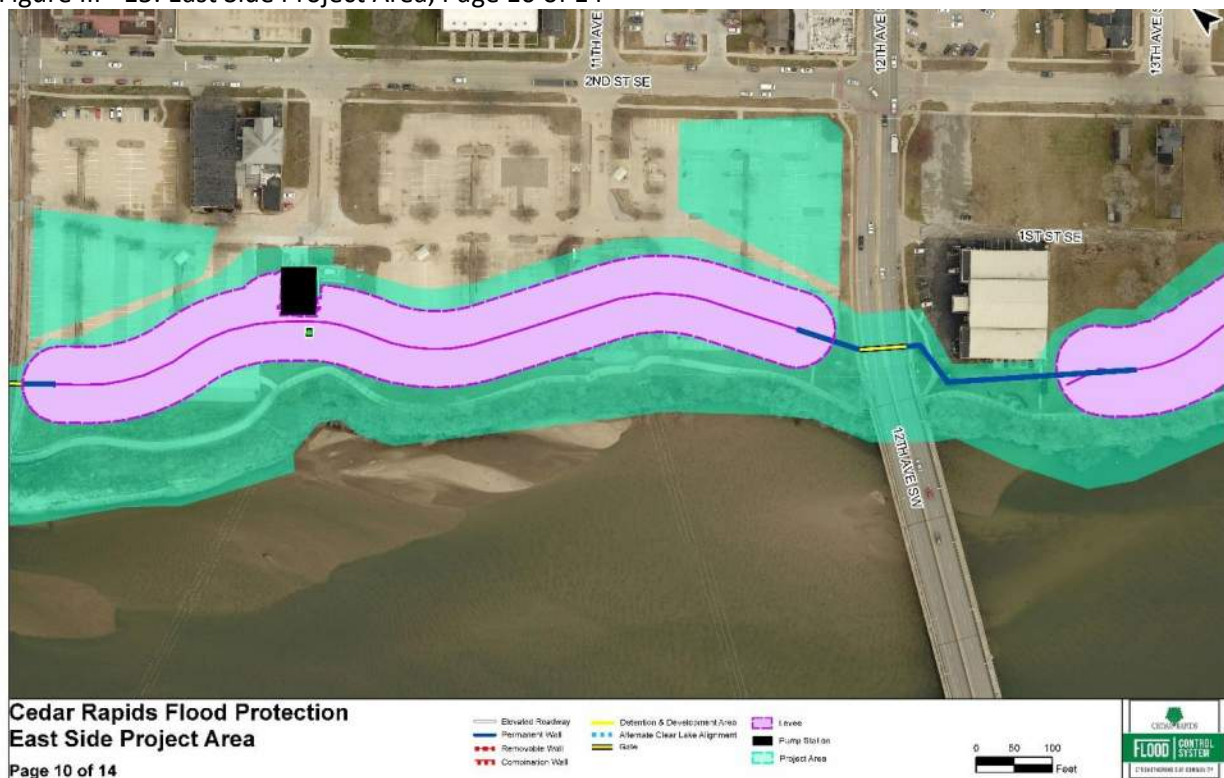


Figure III - 16: East Side Project Area, Page 11 of 14

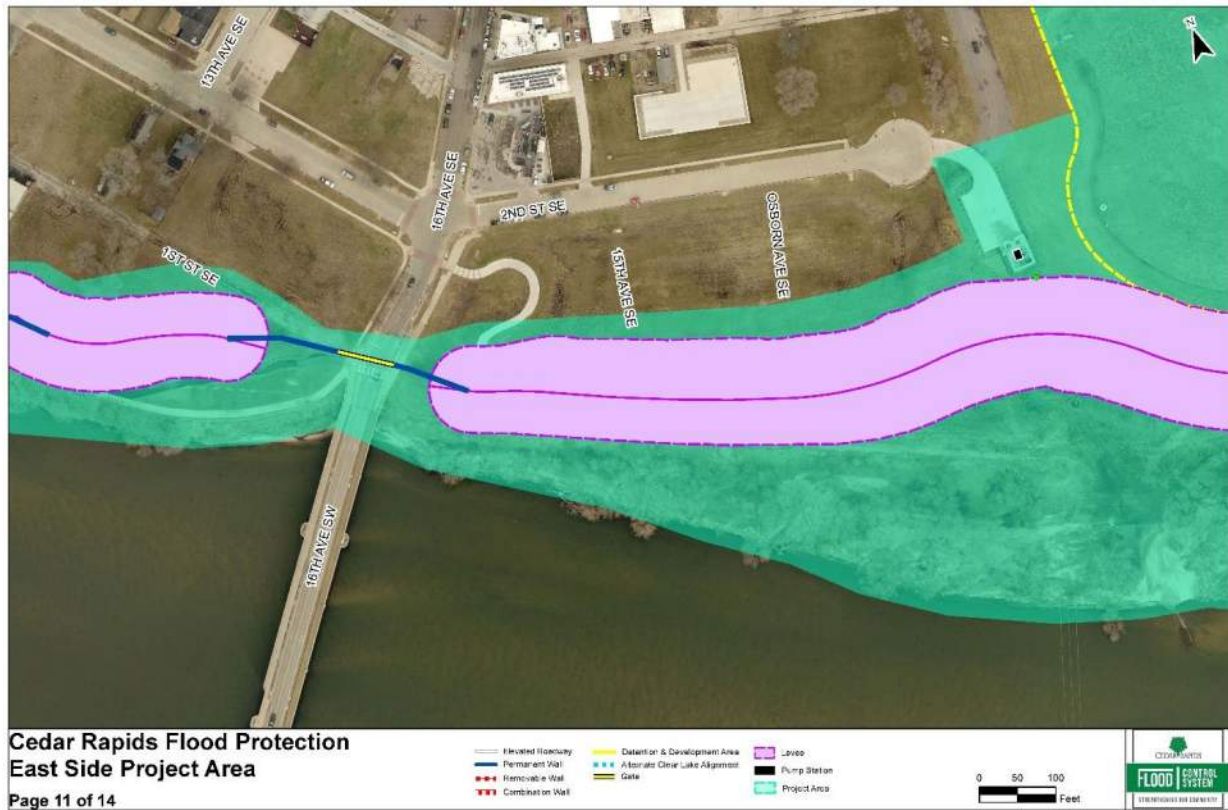


Figure III - 17: East Side Project Area, Page 12 of 14

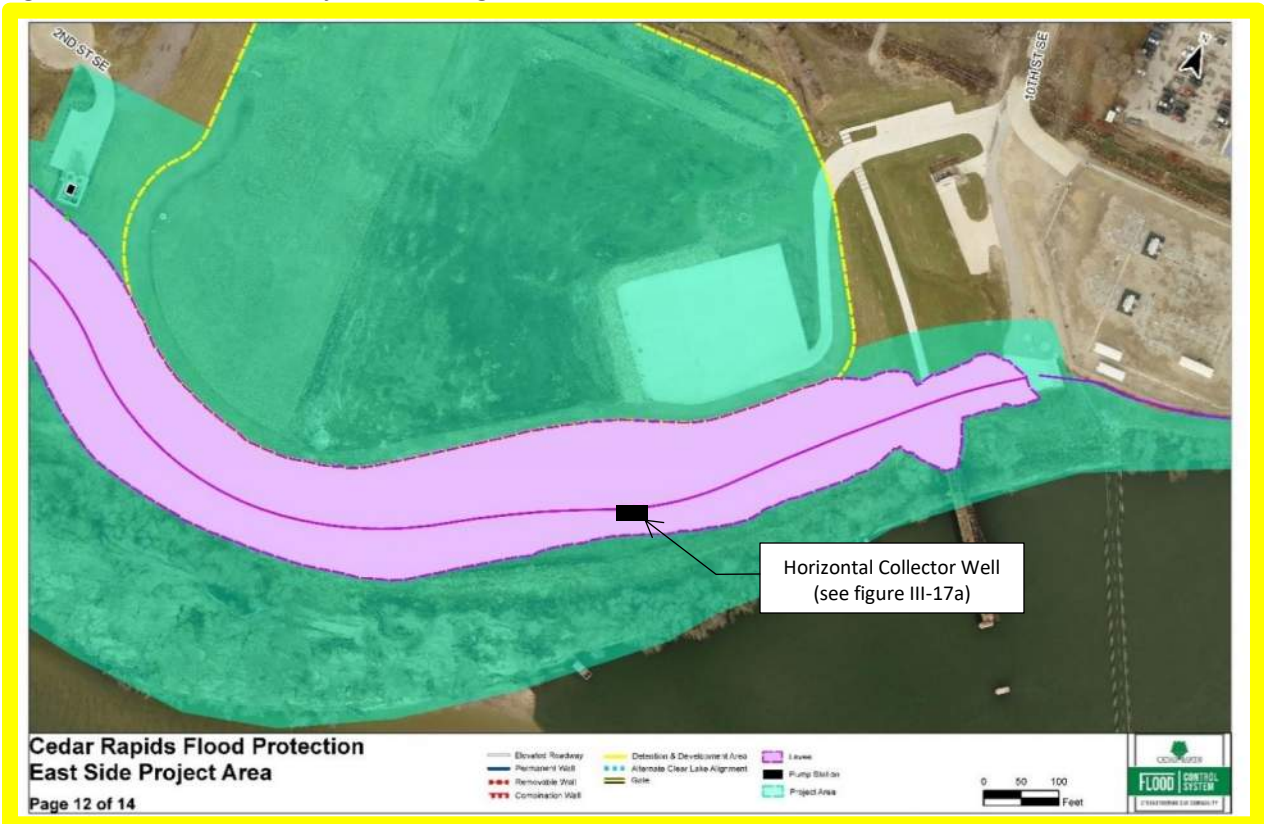


Figure III-17a: East Side Project Area, Horizontal Collector Well Rendering



When the Flood Control System gets constructed, Cargill's existing well may have an impact or reduction to the groundwater supply on the landside of the system. To mitigate the risk of potential water supply issues, a horizontal collector well will be placed on the river side of the levee.

East Reach 4: Cargill South Plant

A permanent floodwall will separate the Cargill corn processing plant from the east side of the Cedar River (Figures III-18 and III-19). The recently constructed Alliant substation at the former RESCAR site provides the connection between the levees of Reach 3 and the floodwall of Reach 4. The substation construction included placement of fill to raise the ground level above design flood level, such that no further protection is required across the site.

The alignment extends past the Cargill corn processing plant south entrance and turns landward to connect to high ground. The drainageway near the alignment will be redirected to remain outside the line of protection. The alignment includes constructing a bike trail on the river side base slab of the floodwall, which would connect the trail from the levee to Otis Road while staying on the river.

Maps for this reach are shown in Figures III-18 and III-19.

Figure III - 18: East Side Project Area, Page 13 of 14

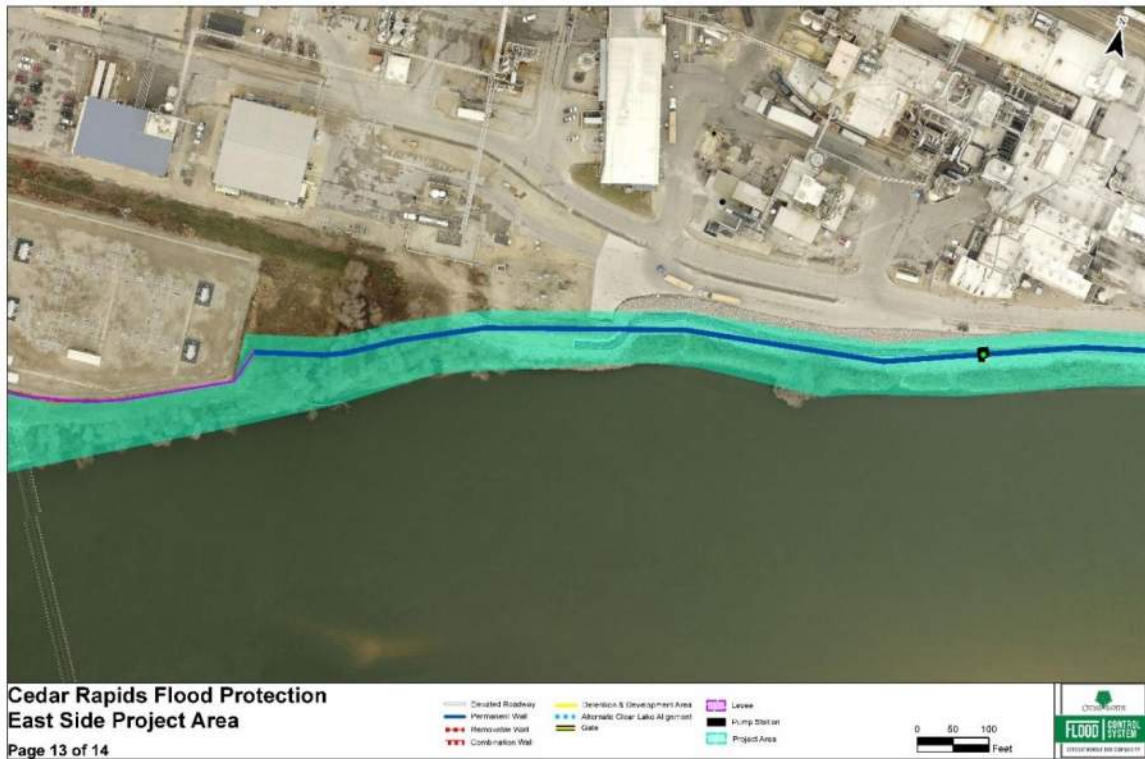
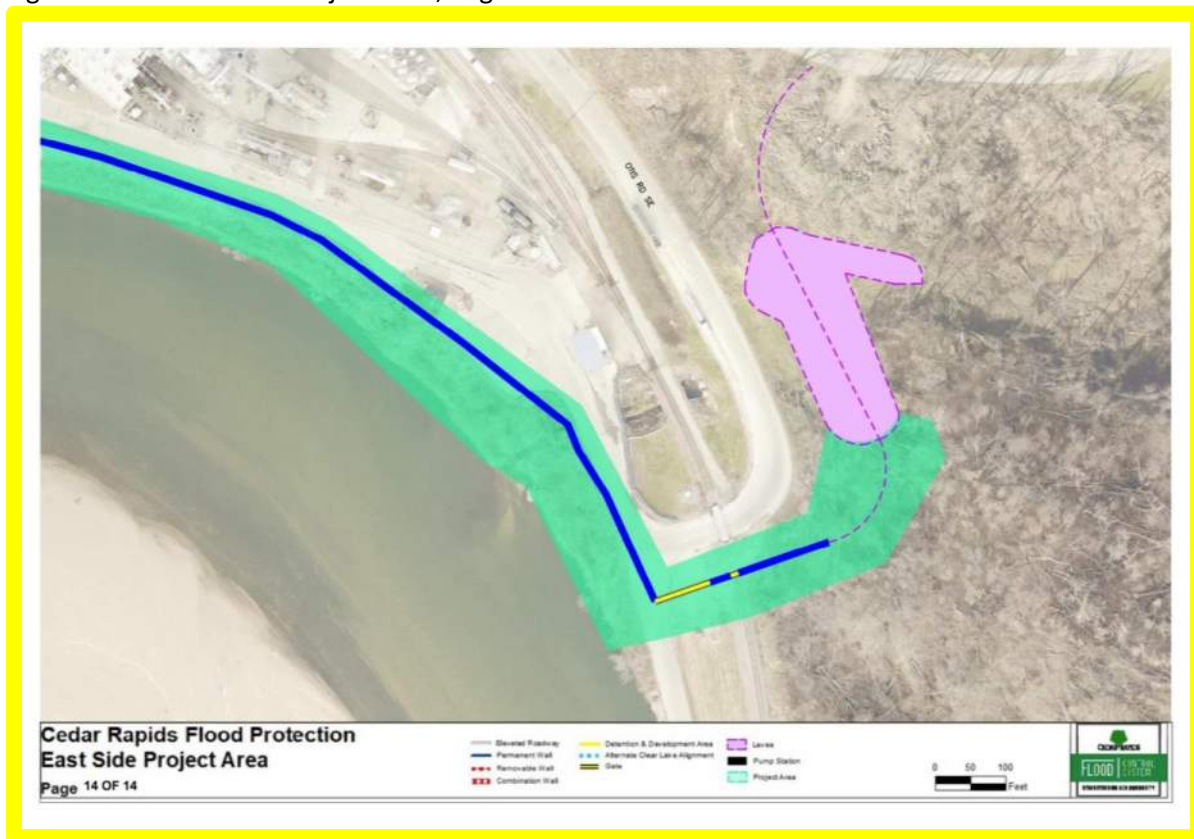


Figure III - 19: East Side Project Area, Page 14 of 14



Trail Connectivity Plan

FCS riverfront trail system shown in Figure III-19a

Figure III-19a: FCS Trail Alignment



West Reach 1: Time Check

The upstream end of the west side alignment through the NW Neighborhood area consists of an earthen levee section that extends from the North end of the system near Ellis Park to the east (Figure III – 20), where it crosses under re-aligned Ellis Boulevard. **Ellis Boulevard NW, O Avenue NW, and F Avenue NW go up and over the levee system.** A short section of floodwall extends towards the river and then turns south where it ties back into the levee. The levee then continues south along the east side of Ellis Boulevard (Figure III - 21). South of Penn Avenue, the levee begins to move away from Ellis Boulevard and closer to the river (Figures III - 22 through III - 25). The alignment is located on properties previously acquired by the City with Community Development Block Grant funds for the majority of the levee footprint, while avoiding impacts to properties acquired with Hazard Mitigation Grant Program funding. The levee terminates at the south end of the Time Check area into a floodwall section that extends under the raised I-380 deck and ties into a ramp roadway embankment (Figure III - 25).

Gates are planned for the Union Pacific Railroad (UPRR) tracks and at F Avenue NW. O Avenue NW will be elevated and go up over the levee.

Maps for this reach are shown in Figures III-20 through III-26.

Figure III - 20: West Side Project Area, Page 1 of 14

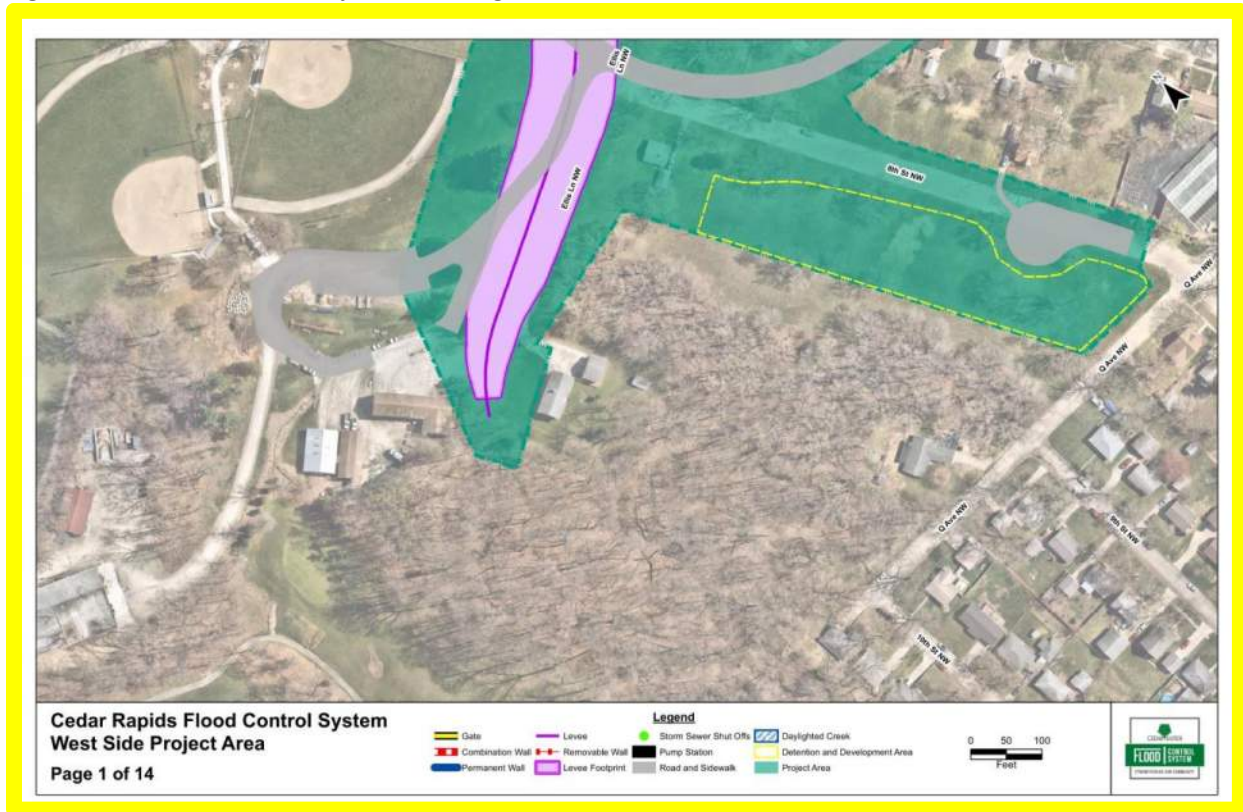


Figure III - 21: West Side Project Area, Page 2 of 14

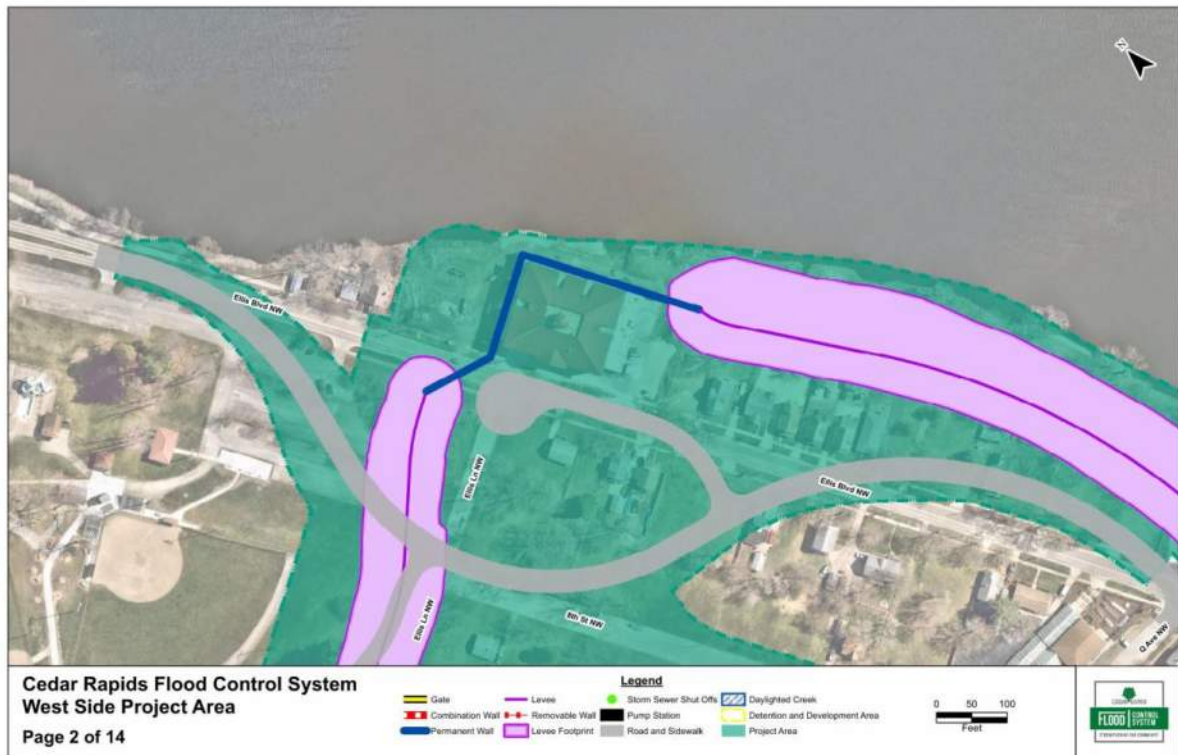


Figure III - 22: West Side Project Area, Page 3 of 14



Figure III - 23: West Side Project Area, Page 4 of 14

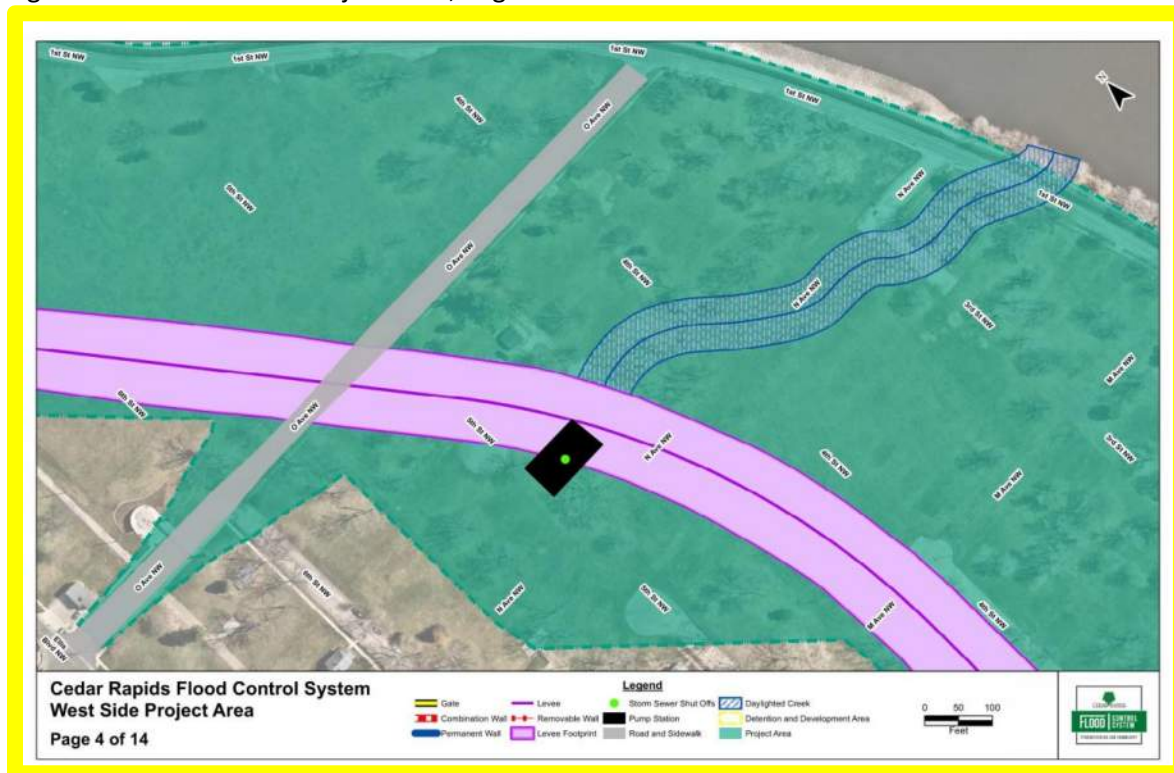


Figure III - 24: West Side Project Area, Page 5 of 14



Figure III - 25: West Side Project Area, Page 6 of 14

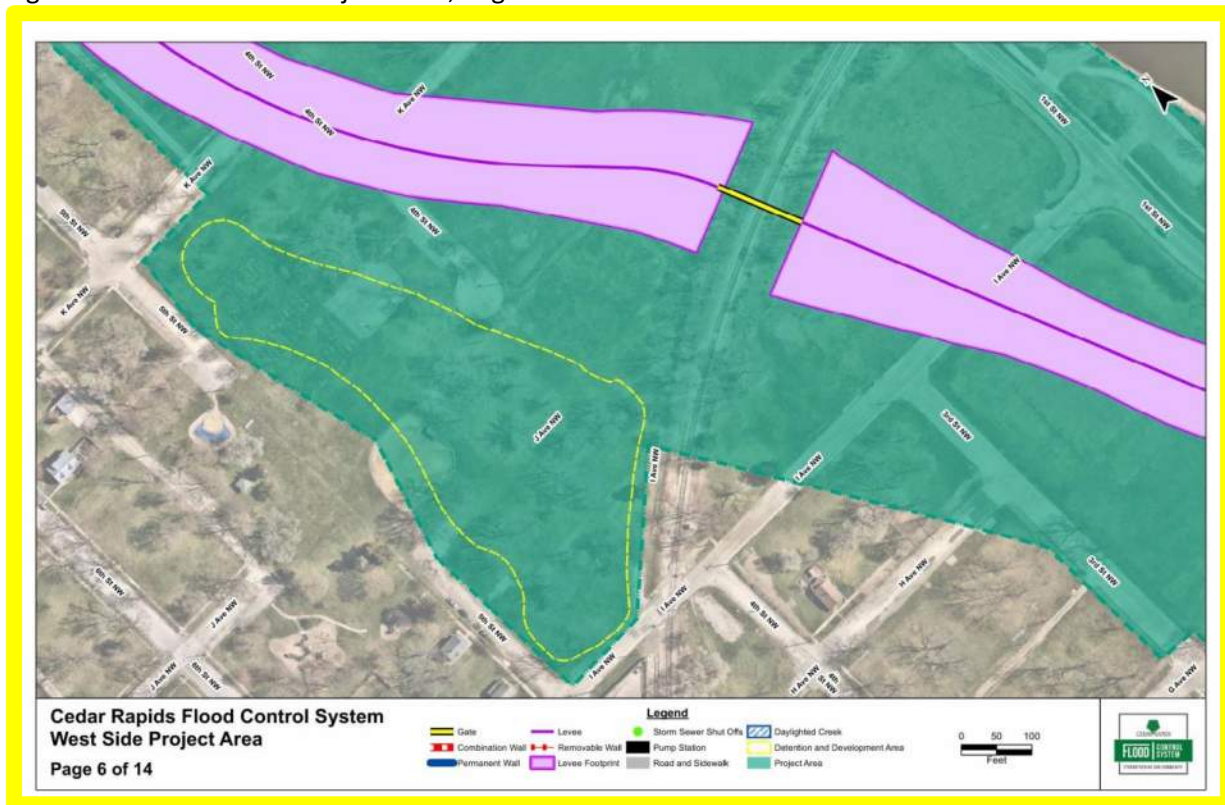
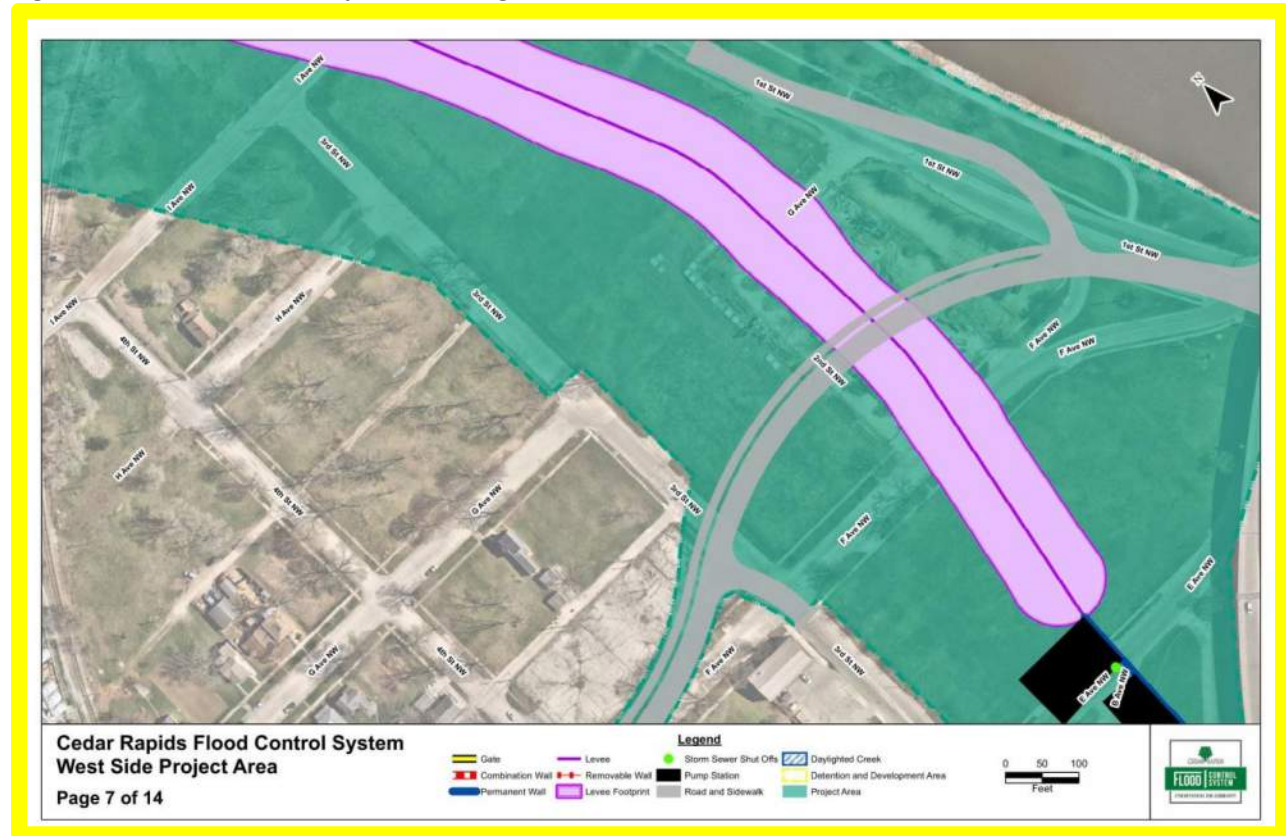


Figure III - 26: West Side Project Area, Page 7 of 14



West Reach 2: Kingston

South of I-380, a levee extends east from the roadway ramp embankment to 1st Avenue NW. An option exists for a gate to go across 1st Street NW. Final determination regarding this gate may depend on several factors for the implementation plan during a flood, including time necessary to activate, maintenance, future development, etc. (Figure III - 27). From this point, a combination wall extends southerly, with gate closures at 1st Avenue, 2nd Avenue, and 3rd Avenue. South of the gate across 3rd Avenue, a pump station is positioned to be incorporated into the protection system, with a combination wall connecting this station to the existing combination wall near the Amphitheatre (Figure III - 28). Another section of combination wall then connects this section to the existing levee along the southwest site of the McGrath Amphitheatre. Starting immediately south of the Amphitheatre to 7th Avenue SW will consist of an earthen levee up to the sill wall elevation with a fold up or removable flood wall on top to reach the full protection height. From 7th Avenue SW to 8th Avenue SW the system will transition into a floodwall which ties in into the future raised 8th Avenue bridge abutment before continuing south into the Czech Village area (Figure III - 29).

Figure III - 27: Rendering of Kingston riverfront



Maps for this reach are shown in Figures III-28 through III-30.

Figure III - 28: West Side Project Area, Page 8 of 14

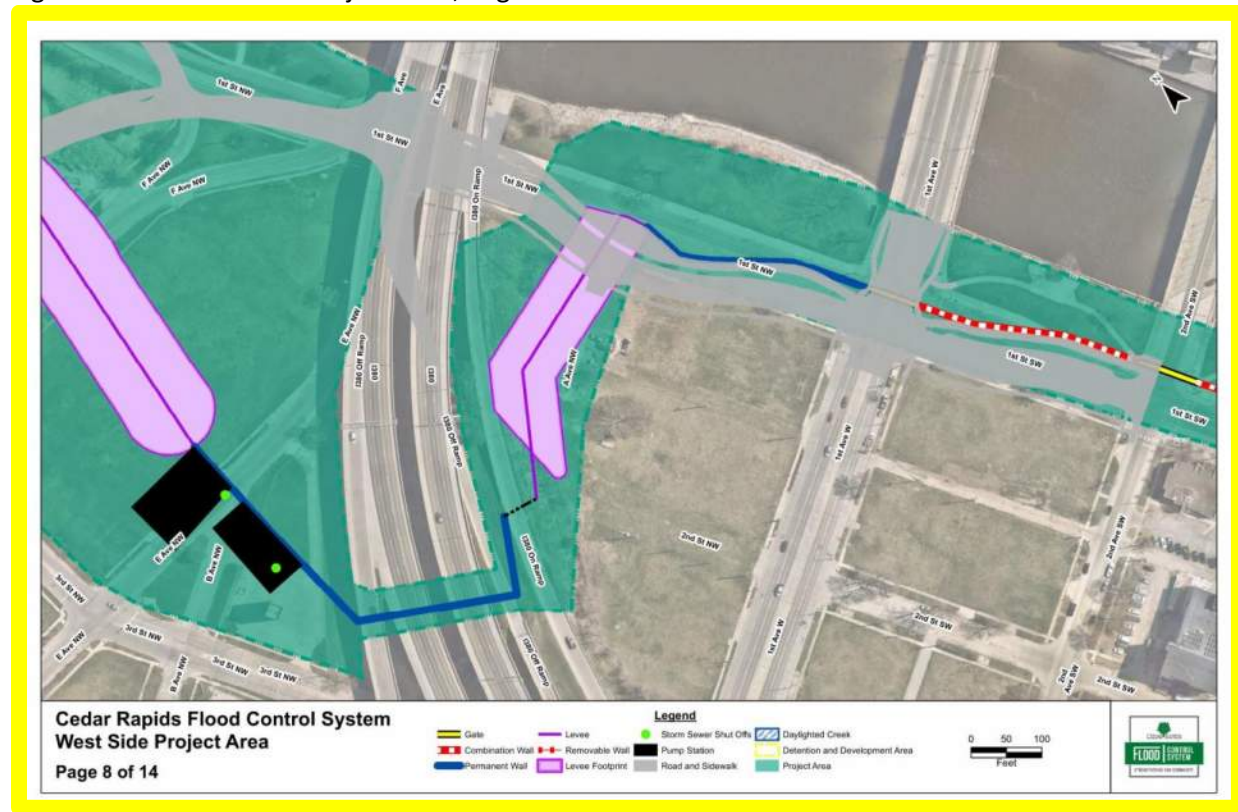


Figure III - 29: West Side Project Area, Page 9 of 14

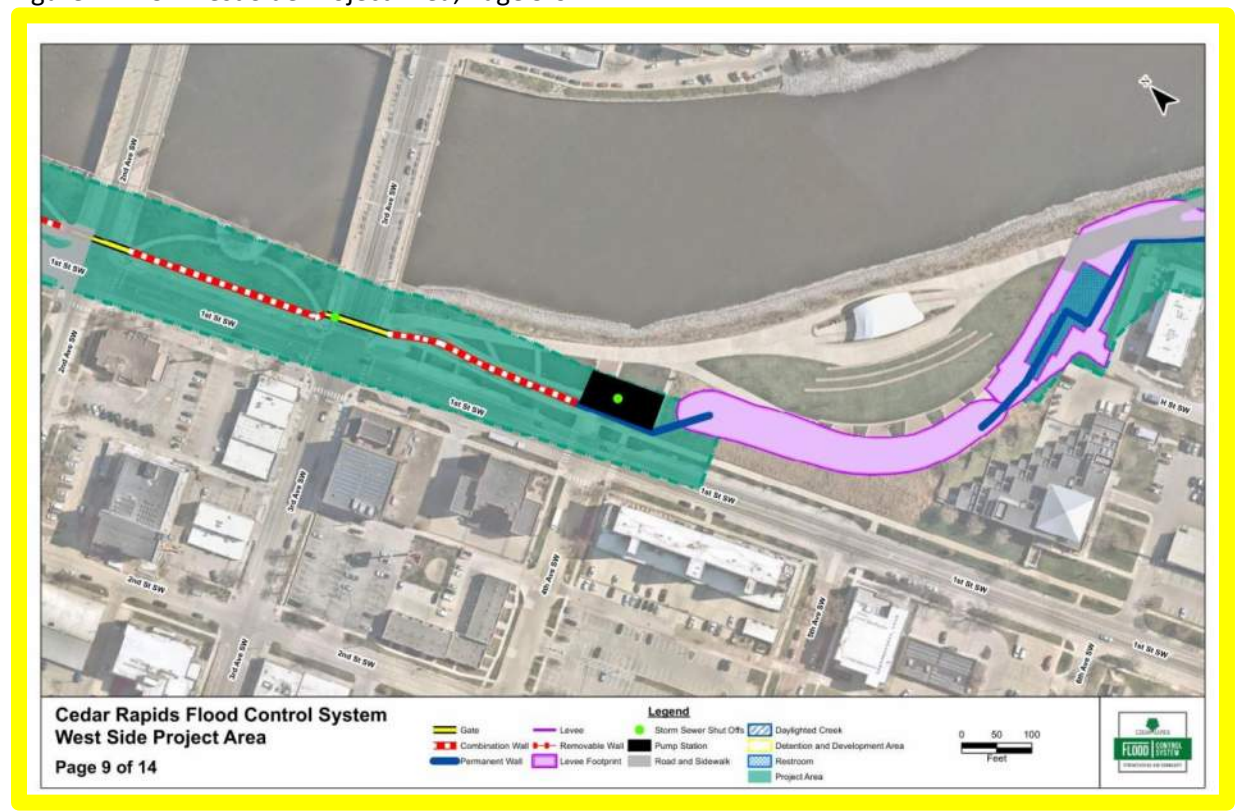
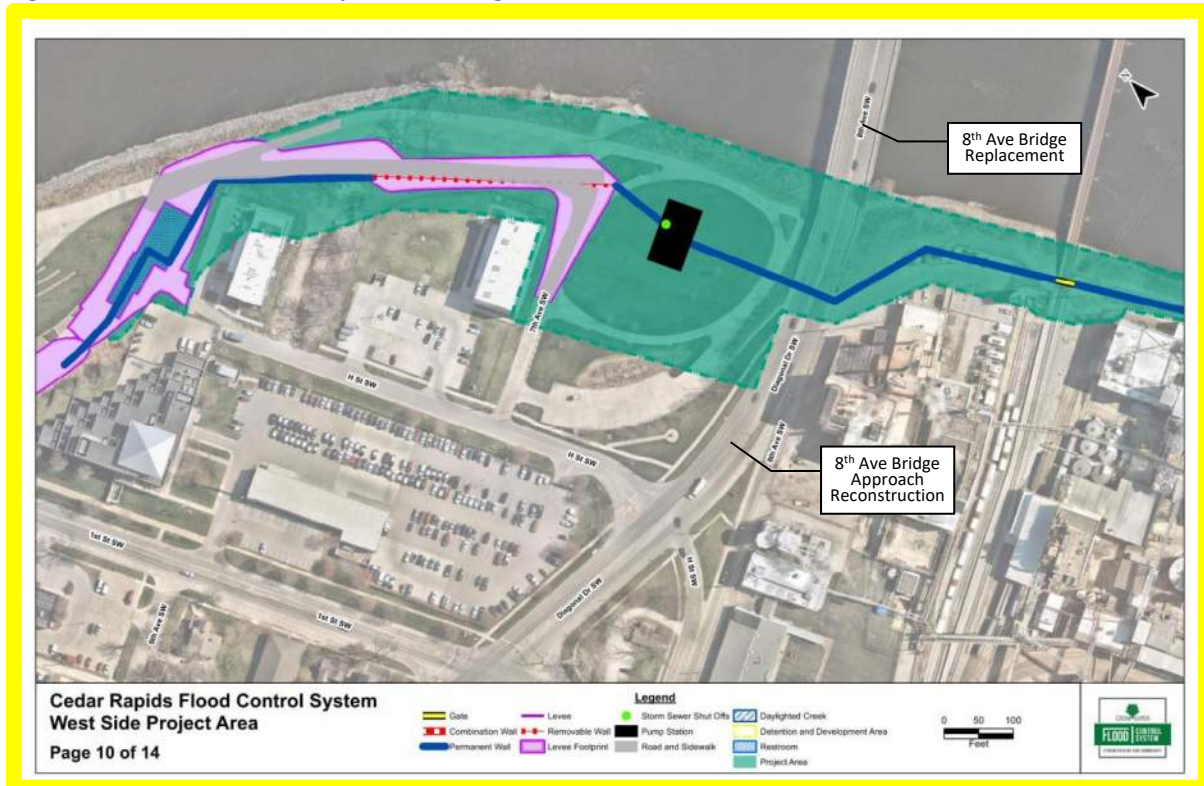


Figure III - 30: West Side Project Area, Page 10 of 14



West Reach 3: Ingredion

The reach along the Ingredion property from 8th Avenue to 12th Avenue was formerly associated with the Czech Village Reach; however, for purpose of preparing the sequencing analysis, this alignment was divided and defined as an independent reach.

This reach contains a full height permanent wall that extends along the river side of the Ingredion property with gates located at the CRANDIC railroad track (Figure III - 30). The permanent wall continues south under the 12th Avenue bridge, protecting the National Czech and Slovak Museum and Library loading dock access road.

Maps for this reach are shown in Figures III-30 III-31, III-31a, and III-31b.

Figure III-31b: A detention basin will be constructed at Riverside Park which will be a net savings as opposed to building a larger pump station. The cost of building a detention basin in Riverside Park to achieve that pump station savings will require the reconstruction and relocation of the existing Skate Park, Playground, and associated parking lot. Plus, there will be ongoing long-term savings of operating the smaller pump station.

Figure III - 31: West Side Project Area, Page 11 of 14



Figure III – 31a: West Side Project Area, Page 12 of 14

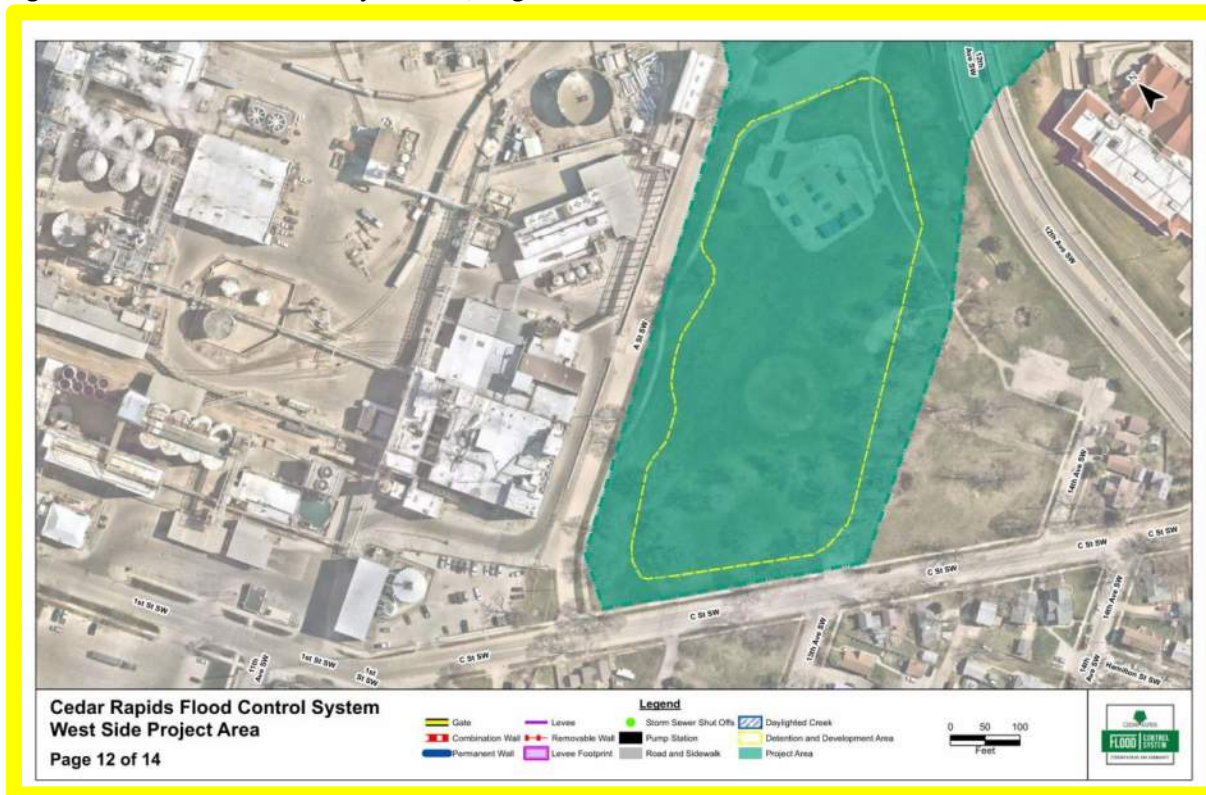


Figure III – 31b: West Side Project Area, Skatepark and Playground Concept



8th Avenue Bridge & Festival Grounds

A newly designed single-pier cable stayed bridge will be constructed at 8th Avenue to replace the current 80+ year old bridge and is planned to be designed for a 100-year life span. The use of a single pier in the water, in place of the current seven piers, will improve the hydraulic flow of the river, as well as reduce upstream backwater water levels. Because of the pier limitation, a more unique, cable-support bridge will result, and will differ from most of the city's existing bridge designs. The bridge will be raised 15 feet to go over top of the FCS system; this allows the 8th Avenue bridge to remain open and act as a critical arterial route connecting the East and West sides of the river. Additional design amenities include a multi-use pedestrian and bicycle trail which connects to both sides of the Cedar River. On the West side of the river, the new 8th Avenue Bridge will tie into a proposed public amenity (see "festival grounds" details below).

The riverfront between 7th Avenue SW and 8th Avenue SW (an area commonly known by the FCS team as "the festival grounds") will be redeveloped with a pump station and a gathering space. This gathering space is intended to also act as a focal point to enhance the recreational opportunities of the area and minimize the industrial look of flood control components. The Sunner Memorial will remain at a location within the riverfront improvements.

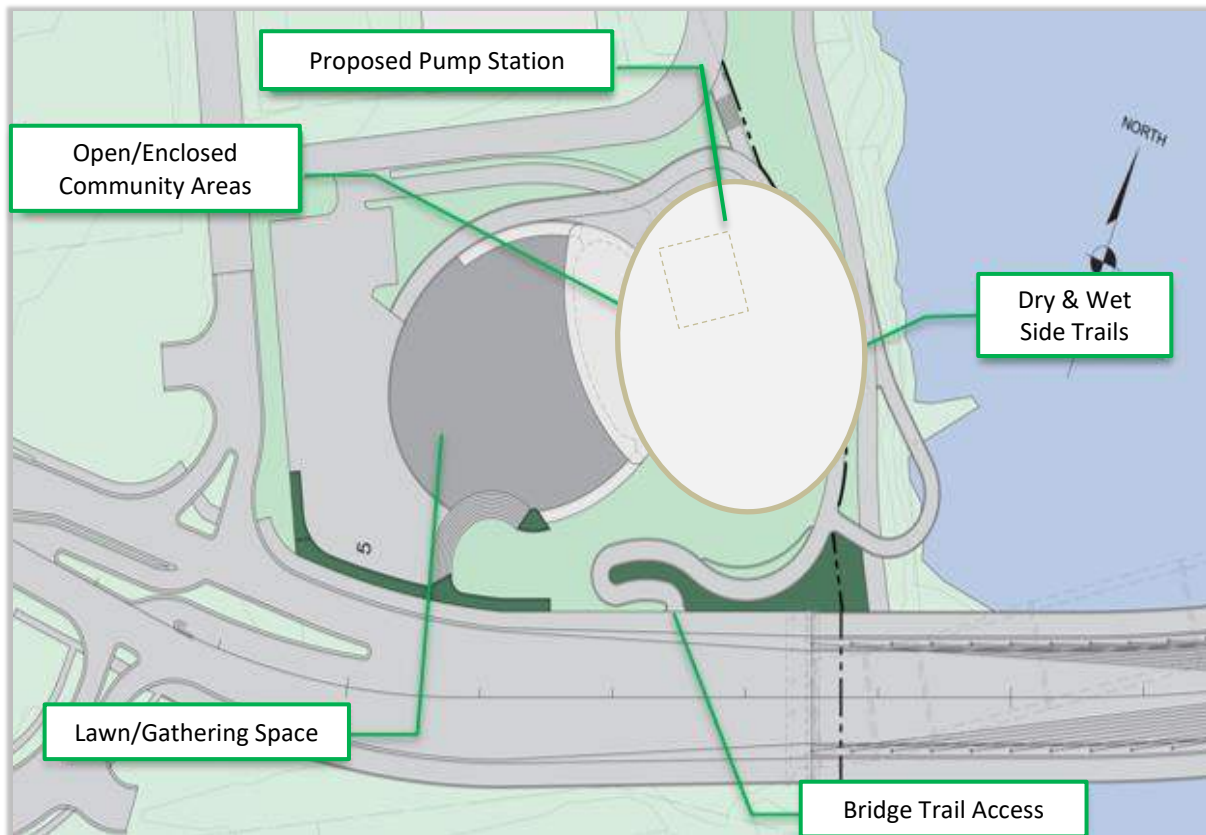
The festival grounds will celebrate the river and provide multi-uses to the public. The festival grounds redevelopment is considered part of the FCS due to it being impacted to the North by a levee, to the

East by a floodwall, to the South by the 8th Avenue Bridge, and a pump station is being incorporated into the building. Trail access to the festival grounds will be provided off the 8th Avenue Bridge.

Maps for this reach are shown in Figures III-30 III-31, III-31a, and III-31b.



Rendering of 8th Avenue Bridge Conceptual Plan.



Rendering of the Festival Grounds Conceptual Plan.

West Reach 4: Czech Village

The permanent wall section extends south from under the 12th Avenue bridge to the pump station planned adjacent to the National Czech & Slovak Museum & Library and on toward 16th Avenue SW (Figure III-31). A gate crosses 16th Avenue (Figure III - 31) and transitions into an earthen levee section that crosses A Street and continues easterly, ultimately terminating into a tie-in point near the landfill (Figures III – 33 and III-34). A realignment of 21st Avenue SW (aka Bowling Street) over the top of the levee is to provide access to the former landfill site #1 location which continues to be used as a composting operation (Figure III-34).

Maps for this reach are shown in Figures III-31, III-33, III-34, III-35, and III-36.

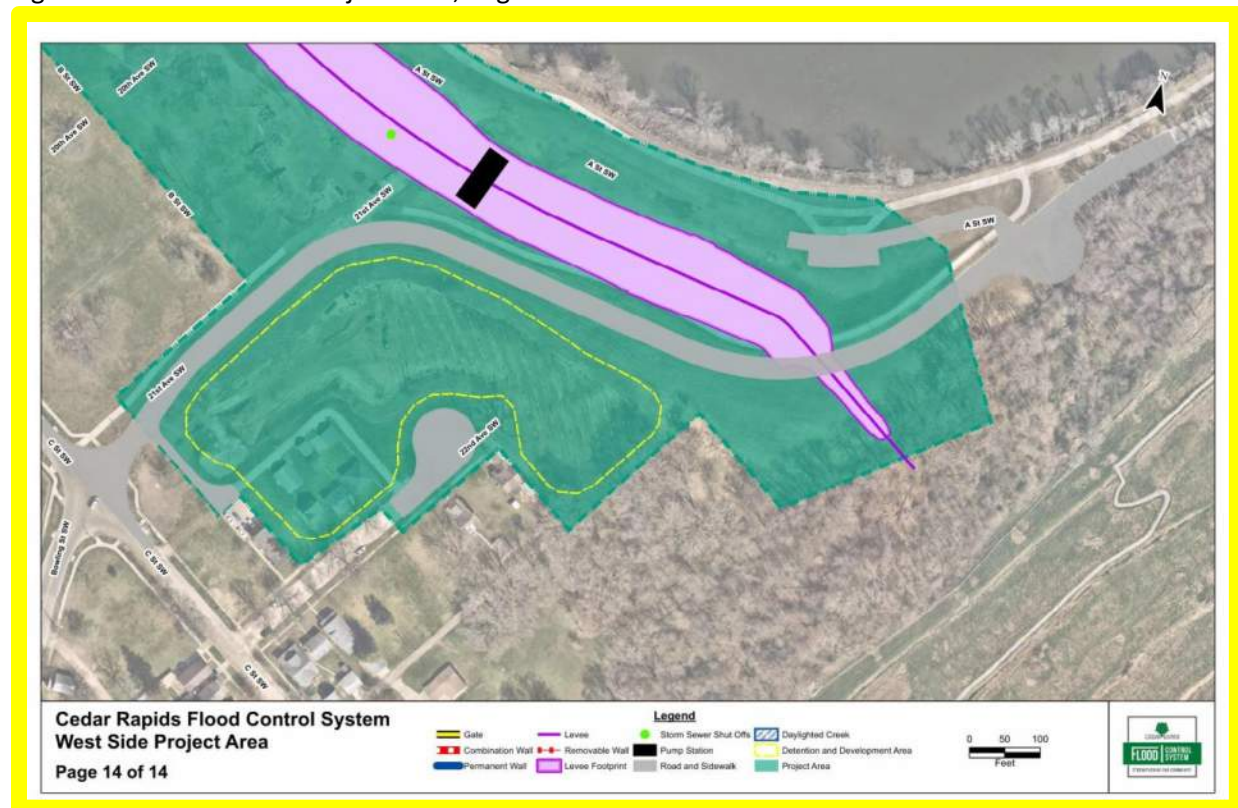
Figure III - 32: Rendering of the entrance to Czech Village



Figure III - 33: West Side Project Area, Page 13 of 14



Figure III - 34: West Side Project Area, Page 14 of 14



Communications & Messaging

- The recommended alignment was found to be the best alignment to protect as many flood-vulnerable properties as possible to the 2008 flood volume, whilst ensuring the system integrates sensitively into the existing characteristics of the community.
- Permanent and removable floodwalls were selected based on their ability to adequately protect against a flood event while also supporting the aesthetic needs of our neighborhoods and downtown.

CHAPTER IV: IMPLEMENTATION PLAN



2021 Implementation Plan Update

As stated in the original Master Plan, the initial Implementation Plan scope and purpose was considered a good starting point and subject to future change. As of late Summer 2021, construction is near completion in the lowest lying areas, (Newbo & Czech Village). The addition of United States Army Corp of Engineers (USACE) funding in 2018 has allowed for an accelerated timeline for all four segments on the East side. These factors have contributed to the initial implementation order no-longer being relevant. To complete the FCS project, all remaining areas (Time Check, Kingston, Ingredion, 8th Avenue Bridge) shall be completed concurrently. This allows for projects in the remaining areas to be prioritized as conditions warrant.

Scope and Purpose

The Cedar Rapids Flood Control System (FCS) project aims to reduce the impacts of future flood events along the entire system. This document summarizes the considerations and methodology used in determining the order in which the system will be constructed. Criteria used to make these recommendations include hydraulic impacts on other reaches, enhanced interim protection ability, protection of critical infrastructure, availability of property, factors that encourage complementary development, emergency access, economic development, social impacts and neighborhood preference.

This implementation plan is a start, and will probably change, as conditions change, over time. The recommendations provide a good place to start, but plans for construction more than five years out should be considered preliminary.

The City is encouraged to revisit this implementation plan periodically to confirm prior assumptions or to acknowledge changing conditions.

Description of the Flood Control System

Figure III - 1 in the Alignment Plan illustrates the overall FCS limits and defines the reaches of the east and west side system.

The limits for each reach are summarized below:

East Side System Project Reaches:

- E-1: North Industrial – from north tie-in point to Interstate 380 (I-380) (Figure IV-1)
- E-2: Downtown – from I-380 to 8th Avenue Bridge (Figure IV-2)
- E-3: NewBo/Sinclair – from 8th Avenue Bridge to new Alliant Substation (Figure IV-3)
- E-4: Cargill South – from new Alliant Substation to south tie-in point (Figure IV-4)

West Side System Project Reaches:

- W-1: Time Check – from Ellis Lane (north tie-in point) to I-380 (Figure IV-5)
- W-2: Kingston Village – from I-380 to 8th Avenue Bridge (Figure IV-6)
- W-3: Penford/Ingredion – from 8th Avenue Bridge to 12th Avenue Bridge (Figure IV-7)
- W-4: Czech Village – from 12th Avenue Bridge to former landfill site 1 (south tie-in point) (Figure IV-8)

Figures IV - 1 through IV - 8 present the extent of each reach. The pump stations and road gates are considered to be part of the associated reach for this analysis, but those may be separate contracts, constructed in a different order. The implementation sequence analysis considered each entire reach as a unit, although the work of each reach may be divided among several contracts in order to keep the individual contracts from becoming too large.

Figure IV - 1. East Side Reach 1: North Industrial

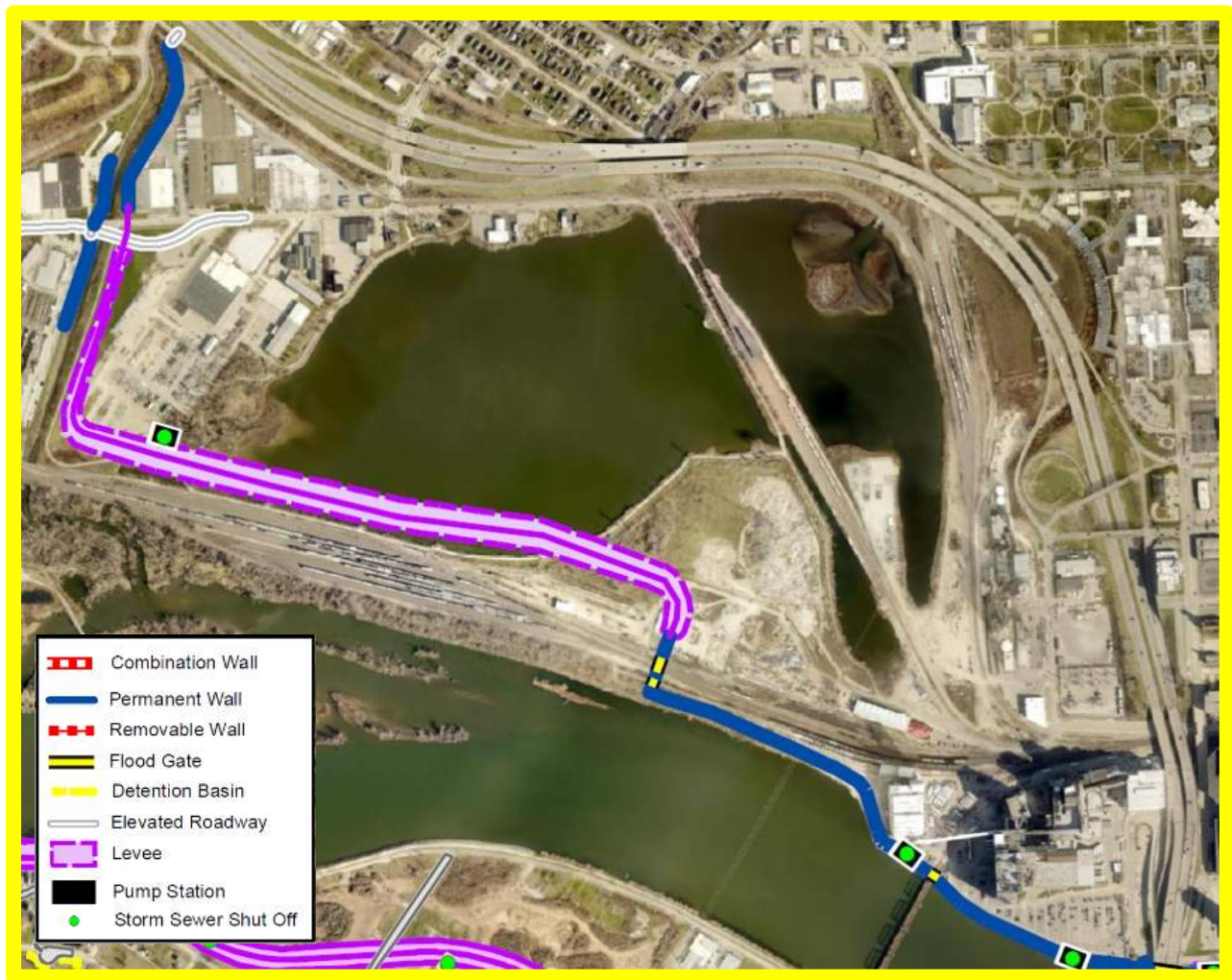


Figure IV - 2. East Side Reach 2: Downtown

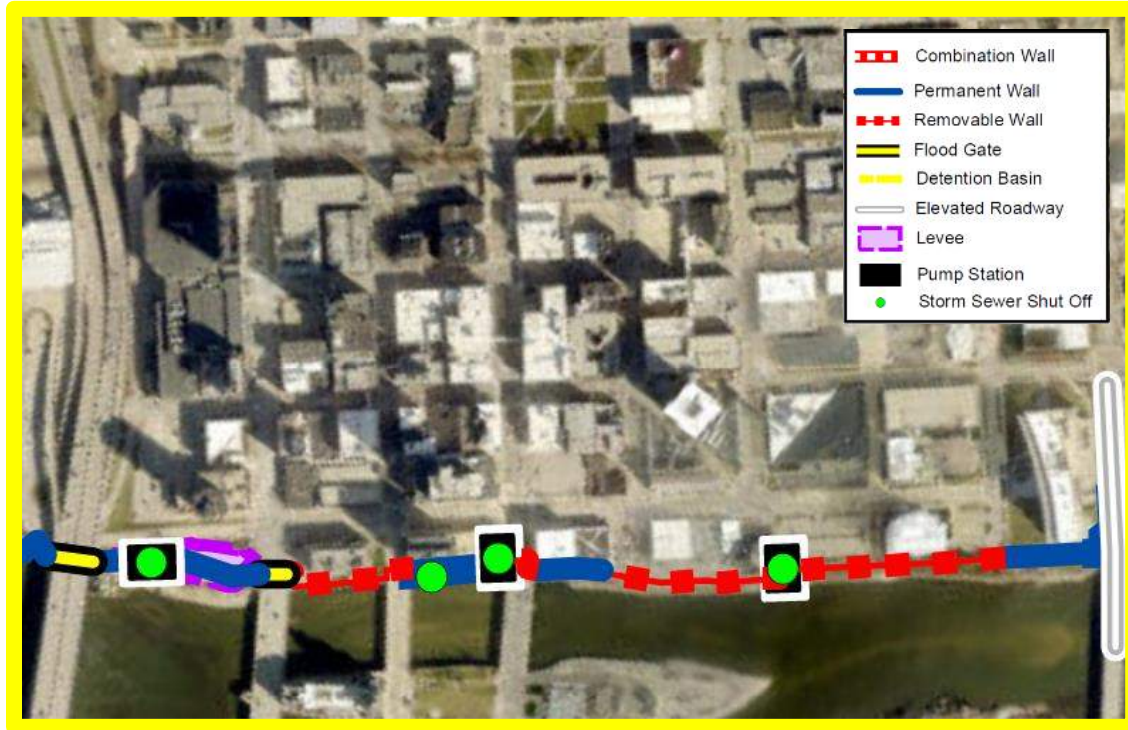


Figure IV - 3. East Side Reach 3: NewBo/Sinclair

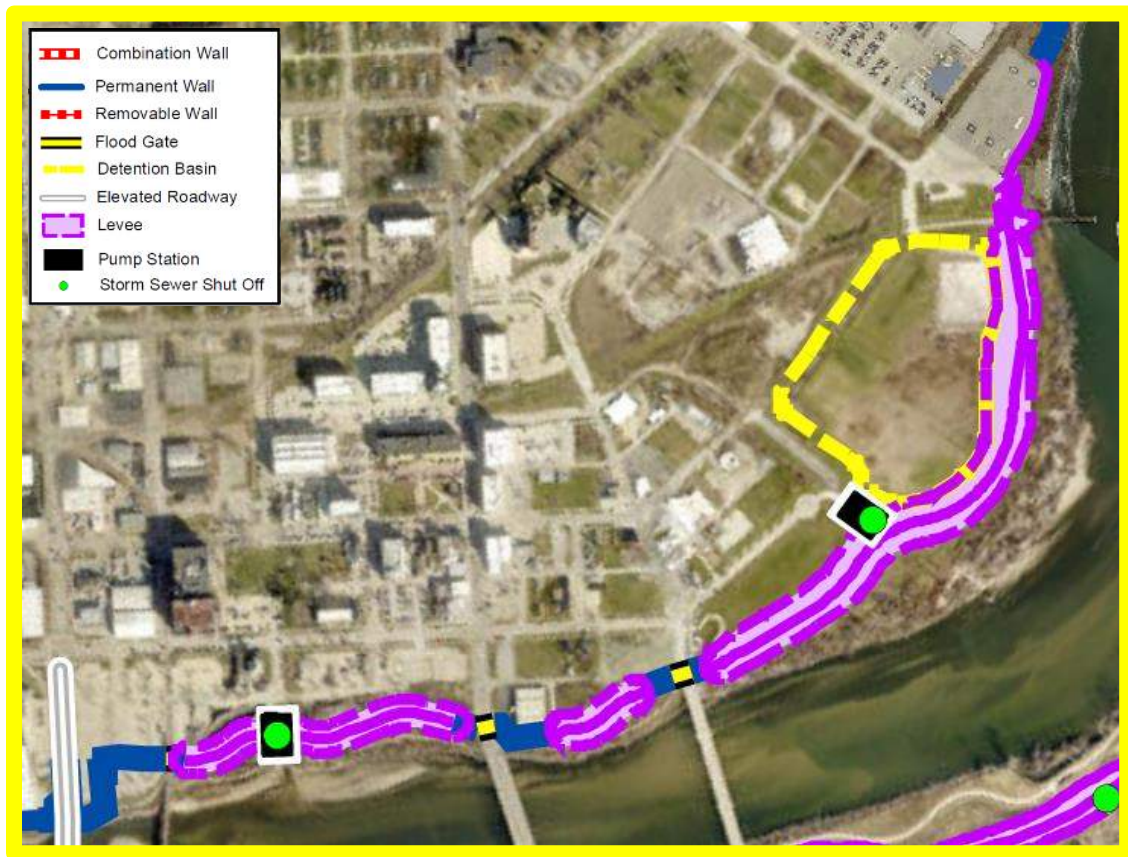


Figure IV - 4. East-4: Cargill South



Figure IV - 5. West-1: Time Check



Figure IV - 6. West- 2: Kingston Village

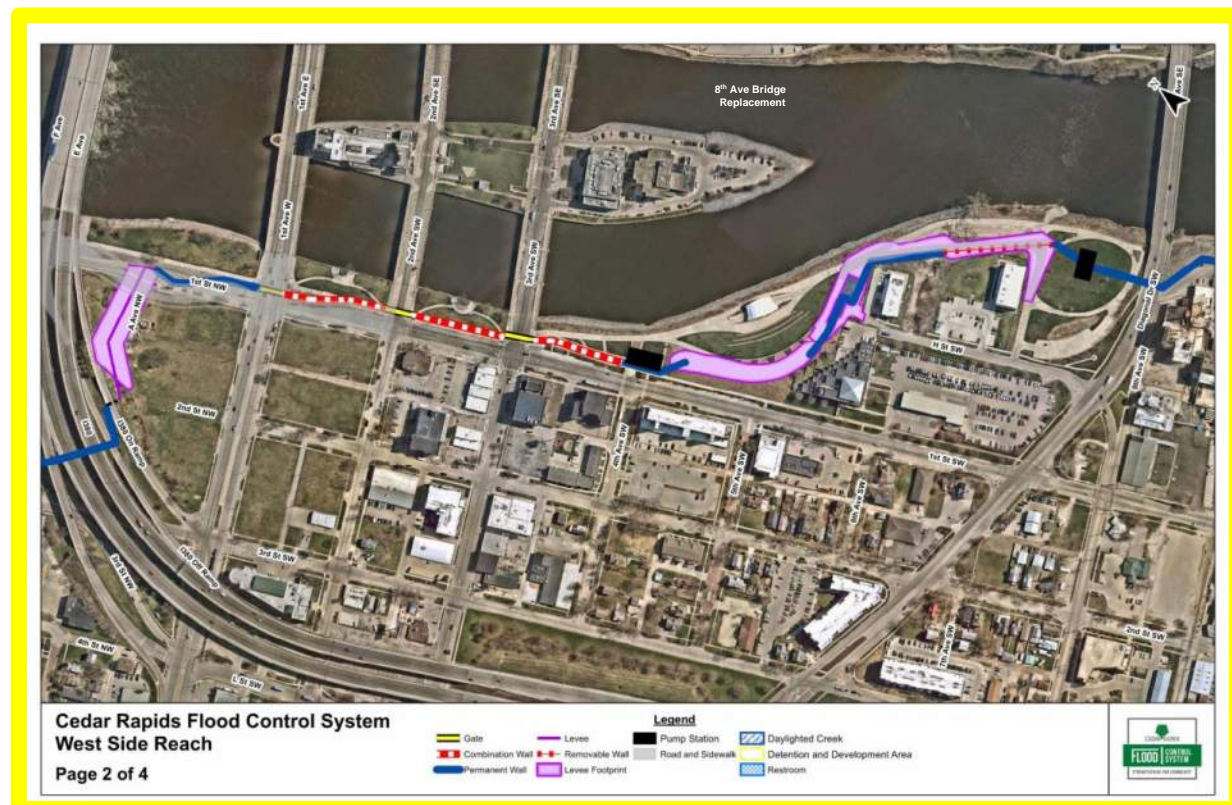


Figure IV - 7. West- 3: Penford/Ingredion

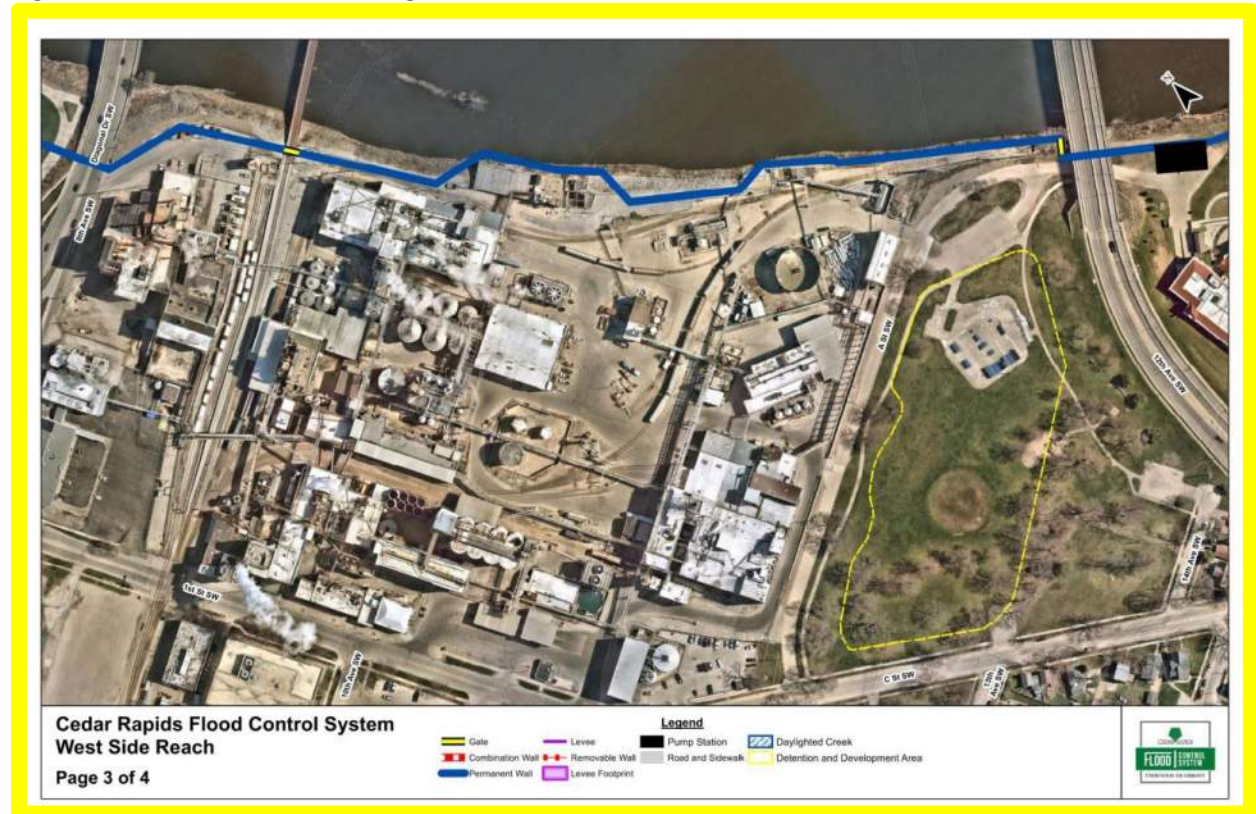


Figure IV - 8. West- 4: Czech Village



Methodology Used to Outline Implementation Plan

(Up to time of funding announcement from the US Army Corps of Engineers in 2018)

City Public Works staff and the consultants for the east side and the west side completed separate implementation plans for each side of the river, and then engaged in a work session to formulate the plan for the entire project.

Criteria and Associated Weighting

With involvement from City staff, the consultant teams identified the technical criteria listed here, applied weighting factors, and then ranked each reach accordingly.

Technical Criteria:

- Hydraulic impacts on other reaches,
- Enhanced interim protection ability,
- Protection of critical infrastructure,
- Availability of property,
- Encourages complementary development, and
- Emergency access.

The ranking based upon technical criteria was balanced with consideration for Economic Development, Social and Neighborhood impacts; rankings for each were averaged to establish an overall rank. In the case of a tie, preference was given to the reach with a higher technical rank.

The technical criteria were weighted from 2 to 7, with 7 being the most significant and 2 the least significant factor. Each reach was assessed a prioritization score of 1, 2 or 3 for each of the six criteria, with 3 representing the highest priority, 1 the lowest (Table IV-1).

- **Hydraulic Impacts to Other Reaches (weighted value 7):** This criterion considers how construction of one portion of the FCS will cause a rise of the water surface elevation and affects areas upstream and across the river that have yet to be built. Constructing elements of the FCS equally on both sides of the river may help offset negative impacts. A score of 3 means that there is little or no effect on other reaches, 2 represents more substantial impacts, and a score of 1 signifies the most impact on unprotected reaches. This scoring was performed without the benefit of a hydraulic model for every scenario. As each construction contract is prepared, the hydraulic model should be re-run to determine the expected impacts, and to help in modification of the flood response plan.
- **Enhanced Interim Protection (weighted value 6):** This criterion considers the ability of the reach to provide improved protection prior to completion of the entire FCS. Low areas, such as New/Bo-Sinclair and Czech Village will benefit more from early construction under this criterion because they currently flood at lower river levels than other reaches. This criterion also includes consideration of the practicality of constructing temporary tie-backs to high ground to isolate an area that has the permanent floodwall in place. The Cargill South reach, for example, can be closed off relatively easy by constructing a berm along 10th Street SE, back to Otis Road. A score of 1 on this criterion means that the reach has very few properties affected by the 100-year flood elevation, 2 indicates that a moderate number of properties would be protected, and 3 corresponds to highest value of properties that could be protected if the improvement is constructed.

- **Protection of Critical Infrastructure (weighted value 5):** Maintaining critical infrastructure (for example, utilities and substations, railroads, public safety facilities and related government buildings, hospitals, and major industries) during a flood event was also considered. Evaluation of this criterion included consideration of the devastating effect that infrastructure has upon employment, not just during the flood, but for months afterwards during recovery. Score of 1 indicates that very little or no critical infrastructure is vulnerable within the reach, 2 indicates a moderate number of facilities, and 3 indicates a substantial volume of critical infrastructure.
- **Availability of Property (weighted value 4):** Implementing a recommended alignment will involve the acquisition of additional properties. This criterion acknowledges that scheduling issues associated with acquisitions are likely, and potential delays may occur. Score value of 1 indicates that several acquisitions will be required for construction, 2 represents a moderate number of acquisitions, and 3 indicates that the majority of property is already owned by the City.
- **Encourages Complementary Development (weighted value 3):** The FCS program has great potential for expanding its impact beyond flood control. Examples include the McGrath Amphitheatre, the new CRST Building, the proposed downtown promenade, the interface with the Parks Greenway Plan, NewBo and Sinclair redevelopment and improved trails. This criterion evaluates the opportunity for early synergy with planned developments. A score of 1 indicates that the reach has little or no potential for early complementary development, 2 indicates moderate opportunities for early development, and 3 indicates the most substantial opportunities.
- **Emergency Access (weighted value 2):** This criterion evaluates the importance of each reach in maintaining access to critical infrastructure and facilities during a flood. A value of 1 means that emergency access is not significantly impacted by the reach, 2 indicates that emergency access is impacted, and a value of 3 indicates that emergency access will be seriously curtailed without construction of the reach. The analysis did not identify any reach that warranted a value of 3.

	Criteria	Wt	Scoring								Weighted scoring							
			W-1	W-2	W-3	W-4	E-1	E-2	E-3	E-4	W-1	W-2	W-3	W-4	E-1	E-2	E-3	E-4
1	Hydraulic impacts to other reaches	7	3	1	2	1	3	1	1	1	21	7	14	7	21	7	7	7
2	Enhanced interim protection	6	2	1	1	3	1	1	3	3	12	6	6	18	6	6	18	18
3	Protection of critical infrastructure	5	1	2	2	2	2	2	3	2	5	10	10	10	10	10	15	10
4	Available property	4	1	3	2	2	2	2	3	2	4	12	8	8	8	8	12	8
5	Encourage complementary development	3	3	2	1	3	1	3	2	1	9	6	3	9	3	9	6	3
6	Emergency access	2	1	2	1	1	1	2	2	1	2	4	2	2	2	4	4	2
Total score											53	45	43	54	50	44	62	48
Reach rank											3	6	8	2	4	7	1	5

Additional documentation of the east and west side technical evaluations is available for review.

Once the technical ranking described above was completed, economic and social considerations, and neighborhood preferences were applied. This evaluation considered the redevelopment plans for the NewBo and Kingston Areas, and the desire to revitalize the downtown commercial zone. It also reflects the currently-constructed parts of the FCS (Amphitheatre) and those parts that are already being constructed or are under design (CRST, Quaker Oats). The Time Check neighborhood request to be part of a later phase of the project was also taken into consideration.

Findings and Recommendations

The evaluation returned the following recommended sequence of construction:

Order of Construction	Reach
1	E-3 NewBo/Sinclair
2	W-4 Czech Village
3	E-1 North Industrial
4	8th Avenue Bridge*
5	W-2 Kingston Village
6	E-2 Downtown
7	W-1 Time Check
8	E-4 Cargill
9	W-3 Ingredient

*To be constructed as funding becomes available

The overall implementation of cited improvements is subject to the availability of capital and scheduling challenges. Sections of the reaches or specific components such as gates or pump stations may be divided into smaller projects. This analysis is seen more as a starting point than as a comprehensive plan.

Communications & Messaging

While it is prudent to develop a prioritization list to guide the construction, the public message remains that the City is committed to an entire Flood Control System on both sides of the river. This implementation plan is in addition to an already established interim flood protection plan that remains in place today. Staff will integrate a consistent set of communications messages regarding the implementation portion of the plan:

- The prioritization was developed using criteria that answered the need for technical engineering as well as social, economic, and development considerations.
- The prioritization provides the greatest risk reduction as early as possible, while ensuring construction on one reach would not jeopardize other reaches.
- The plan will be flexible to accommodate funding availability, potential development opportunities and shovel-readiness for additional grant opportunities.

Communication to Stakeholders

In addition to the general community, stakeholders directly involved with the implementation of the plan will serve as a target audience and receive more direct communication. This outreach strategy will include:

- **Business Community:** Stakeholder meetings with local businesses who were involved in the planning process during the public outreach phase. Staff will provide basic timeline information and help remove speculation and assumptions.
- **Development Community:** Staff will create an information sheet tailored to the development community's needs regarding land use, property acquisition, timelines, etc., to aid in future development projects.
- **Legislative partners:** Shovel-readiness will be emphasized on all projects to ensure legislative partners see the potential for flood control growth.

Addendum After 2018 Federal Funding Announcement

This section has been effectively superseded on the east side by the US Army Corps of Engineers east side project, which has required all east side segments to begin design back in 2018 and are projected to be complete in 2023. Neither the west side implementation plan, nor the 8th Avenue Bridge and Riverfront Improvements, is not affected by this east side funding.

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER V: FINANCIAL PLAN**



Financial Plan (2018)

The Flood Control System (FCS) Master Plan reflects the design and policy needs of the planned FCS and consists of four main funding components:

1. Federal – US Army Corps of Engineers (USACE) East Side Funding = \$117 million
2. State of Iowa Flood Mitigation Funds (IFM) = \$267 million (max)
3. Grants = \$15 million (as of 2018)
4. Local Funding = Total project costs less federal, state and grant participation

Assuming the State of Iowa funds are fully achieved and no additional grants are received, the estimated local balance of funds is \$351 million needed to complete a total \$750 million project. As of 2018, the City has funded approximately \$9 million in local funds, leaving a balance of approximately \$342 million to fund and complete the full FCS project. The sooner this project can be completed, the less construction inflation will affect the project costs.

The City has looked at several scenarios to fund the \$342 million local gap and concluded that the funding plan should include the following:

- *Accelerate construction to reduce inflationary costs risk to the local funding component.* Project implementation to date has emphasized acquisition of necessary land for the FCS, clearing environmental and cultural resource obstacles, developing project designs that can be bid individually or in combination with other bid packages depending upon projected cash-flows. Design and implementation teams are mindful and focused on completing designs in a timely manner.
- *Continue to seek grant funds.* Several elements of the FCS are conducive to leveraging outside funds. The proposed 8th Avenue Bridge replacement project, proposed trails and related amenities, exhibit characteristics that are consistent with several identified federal and state competitive grants. Pursuing these funding opportunities leverages additional unanticipated funds and enables the City to commit flood-specific funding for flood related improvements.
- *Continue to identify and implement appropriate cost reductions.* The City has outlined its expectations that the FCS be accredited by FEMA and provide protection to the 2008 flood elevation. Consistent with this direction, several notable changes have been made to reduce costs but not the level of protection. Among the changes are removal of gates at select areas as well as replacing walls and removable systems with levees.
- *Sell local municipal bonds to partially fund the remaining local share.* The recommended local funding source is to sell municipal bonds to fund a portion of the local share of FCS project costs. Bonding is limited to the City's debt capacity and any large increase in bonding may result in a property tax increase for properties located inside City limits.

The schedule below provides a funding plan that is mindful of current city operational needs, yet maintains a reserve for unforeseeable capital needs. Issuance of bonds also enables the City and potential partners to leverage funding over a shorter term, resulting in reduction in the inflationary impacts.

After FY 2029 the local funding gap will be approximately \$78 million assuming construction inflation has not outpaced initial estimates. This local funding gap will be reviewed to determine what options are available to complete the construction of the flood control system.

Table V - 1: Municipal Bond Financing FY20-29

Local Funding Needed				\$ 351,000,000
City bonds issued thru 2019				(9,000,000)
Local Funding remaining				\$ 342,000,000
		Additional Bonding	From current Bonding	
FY 2020	\$ 20,000,000	\$ -		
FY 2021	\$ 20,000,000	\$ -		
FY 2022	\$ 20,000,000	\$ 8,000,000		
FY 2023	\$ 20,000,000	\$ 8,000,000		
FY 2024	\$ 20,000,000	\$ 8,000,000		
FY 2025	\$ 20,000,000	\$ 8,000,000		
FY 2026	\$ 20,000,000	\$ 8,000,000		
FY 2027	\$ 20,000,000	\$ 8,000,000		
FY 2028	\$ 20,000,000	\$ 8,000,000		
FY 2029	\$ 20,000,000	\$ 8,000,000		
	\$ 200,000,000	\$ 64,000,000		\$ (264,000,000)
Local funding gap remaining after FY 2029				\$ 78,000,000

*For purposes of this document the current bonding of \$8 million assumes property tax valuation growth will average 2.5% over the next ten years. This is in line with the previous ten-year growth pattern for Cedar Rapids.

Project Costs

As planning and design has advanced, the projected costs for the FCS project have been updated to include all elements in the Master Plan and all updated costs based on the revisions to the Master Plan. These revisions include pump station sizing, wall or levee revisions, gate revisions and elevated transportation elements. The estimated budget cost for the FCS is \$550 Million based on 2017 dollars. The total project with inflation over the 20-year life of the project is estimated at \$750 Million.

Initial cost estimates were developed for the 2015 FCS Master Plan. In 2017, a comprehensive system wide cost estimate was completed. This update used prices from projects that had been completed to apply actual costs to plan elements. The estimate also reflects further development of designs. The following is a listing of the project elements that are included in the FCS budget cost:

- Project Costs
 - Construction Costs
 - Design Engineering and Outreach
 - Environmental and Cultural
 - Construction Engineering
 - Administration and Management

- Acquisition Costs
 - Right-of-Way Required for the Flood Control System
 - Lease Purchase Agreement for a Previously Constructed Project

While these estimates were updated from the original master plan in 2015, many of these project costs are based on a cost per linear foot and pump station estimates.

A breakdown of project elements is presented in Table V - 2. Total project cost including remaining real estate acquisition is located in Table V – 3. The costs for the FCS are in 2017 dollars. It has been estimated that construction inflation will be 3.5% based on historic averages.

Table V - 2: Cost Estimate (2017 \$)

	Levee [ft]	Perm. Wall [ft]	Demount. Wall [ft]	Gates [ft]	Total Length [ft]	Construction Cost	Design Engineering and Outreach 8%	Management and Admin. 10%	Env. And Cultural 2%	Construction Engineering 6%	Total Cost Excluding Real Estate (Round to nearest \$1M)
Reach 1: North Industrial	1425	5,172	0	323	6,920	\$68,000,000	\$5,400,000	\$6,800,000	\$1,400,000	\$4,100,000	\$86,000,000
Reach 2: Downtown	0	2940	522	430	3,892	\$46,000,000	\$3,700,000	\$4,600,000	\$900,000	\$2,800,000	\$58,000,000
Reach 3: New/Bo - Sinclair	3723	693	0	175	4,591	\$18,000,000	\$1,400,000	\$1,800,000	\$400,000	\$1,100,000	\$23,000,000
Reach 4: Cargill South	0	2,725		160	2,885	\$18,000,000	\$1,400,000	\$1,800,000	\$400,000	\$1,100,000	\$23,000,000
Pump Stations and Stormwater Improvements						\$32,000,000	\$2,600,000	\$3,200,000	\$600,000	\$1,900,000	\$40,000,000
Total East Side	5,148	11,530	522	1,088	18,288	\$182,000,000	\$14,500,000	\$18,200,000	\$3,700,000	\$11,000,000	\$230,000,000

Reach 1: Time Check	6900	1,294	400	383	8,977	\$49,000,000	\$3,900,000	\$4,900,000	\$1,000,000	\$2,900,000	\$62,000,000
Reach 2: Kingston Village	0	269	1192	0	1,461	\$27,000,000	\$2,200,000	\$2,700,000	\$500,000	\$1,600,000	\$34,000,000
Reach 3: Ingredion	1,927			40	1,967	\$15,000,000	\$1,200,000	\$1,500,000	\$300,000	\$900,000	\$19,000,000
Reach 4: Czech Village	2177	521	0	76	2,774	\$15,000,000	\$1,200,000	\$1,500,000	\$300,000	\$900,000	\$19,000,000
Pump Stations and Stormwater Improvements						\$68,000,000	\$5,400,000	\$6,800,000	\$1,400,000	\$4,100,000	\$86,000,000
Total West Side	11,004	2,084	1592	499	15,179	\$174,000,000	\$11,718,064	\$9,765,053	\$1,953,011	\$10,400,000	\$220,000,000

Table V - 3: Total Project Cost Estimate (2017 \$)

	West	East
Walls and Levees	\$ 135,000,000	\$ 190,000,000
Pump Stations and Gatewells	\$ 85,000,000	\$ 40,000,000
Real Estate Acquisition	\$ 20,000,000	\$ 15,000,000
Sum	\$ 240,000,000	\$ 245,000,000
8th Avenue Bridge Replacement and Edgewood Road Bridge Improvements (including real estate acquisition)		\$ 65,000,000
		\$ 550,000,000
Total with inflation at 3.5% for 2034 Completion		\$750,000,000

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER VI: ACQUISITION / DISPOSITION POLICY**



POLICY GOAL

- A. To provide a consistent and just process for acquisition of properties needed for implementation of the comprehensive Cedar River Flood Control System. This policy provides property owners the information they need to make decisions regarding future plans.
- B. To provide a consistent and just process for disposition of City-owned properties that are not required for construction and function of the FCS.

POLICY DEFINITIONS

- A. City – City of Cedar Rapids, Iowa
- B. FCS – Flood Control System, includes all physical, operational, maintenance, and administrative features of the City’s program to reduce the risk of flood damage from the Cedar River. The FCS includes:
 - Physical improvements, such as levees, floodwalls, gates and pump stations;
 - Acquisition of non-protected properties;
 - Resources for implementing the Flood Response Plan; and
 - Resources for operation and maintenance of the physical features.
- C. Project Area – Boundaries of the physical features of the FCS plus permanent maintenance easements, temporary construction easements, utility accommodations, and contingency areas for revisions of conceptual design. The Project Area is delineated graphically by the figures in Chapter III of the FCS Master Plan. Property ownership maps associated with the Project Area are represented in Exhibit VI – 3.
- D. Mandatory Acquisition – Acquisition of property that is required to complete the FCS.
- E. Voluntary Acquisition – An offer by the City to purchase property that is not required for the FCS but meets other conditions prescribed in this policy. Examples of Voluntary Acquisition include buying, rather than protecting, properties that are prone to flooding and purchasing properties that become so isolated that they become inefficient to continue providing City services.
- F. Structure – Principal Structure, as defined by the Federal Emergency Management Agency National Flood Insurance Plan (NFIP):

"Structure" for insurance coverage purposes, means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises.

Non-Residential Structures that are eligible for coverage in the NFIP Program, such as the ones copied here from the NFIP General Rules, May 2011, are defined as Structures for this policy:

- *Hotel or motel with normal guest occupancy of less than 6 months;*
- *Licensed bed-and-breakfast inn;*

- *Retail shop, restaurant, or other business;*
 - *Mercantile building;*
 - *Grain bin, silo, or another farm building;*
 - *Agricultural or industrial processing facility;*
 - *Factory;*
 - *Warehouse;*
 - *Pool house, clubhouse, or other recreational building;*
 - *House of worship;*
 - *School;*
 - *Nursing home;*
 - *Non-residential condominium;*
 - *Condominium building with less than 75% of its total floor area in residential use;*
 - *Detached garage;*
 - *Tool shed;*
 - *Stock, inventory, or other commercial contents.*
- G. Flowage Easement – The right, power, privilege, and easement to overflow, submerge, or flood the property resulting from the impact of the FCS on the water level in the Cedar River.
- H. Fair Market Value – The cash price which would be arrived at between a voluntary seller that is willing, but not compelled, to sell and a voluntary purchaser that is willing, but not compelled to buy, both of whom are acting freely, intelligently, and at arm’s length, bargaining in the open market.
- I. Interior Drainage – Stormwater management system on the protected side of the FCS.
- J. 100-year Floodplain – The area that will be inundated by the 0.01 probability flood on the Cedar River—94,100 cubic feet per second (cfs), as determined by the hydraulic model used for this report depicted in Exhibit VI-1.
- K. 200-year Floodplain – The area that will be inundated by the 0.005 probability flood on the Cedar River—106,000 cfs, as determined by the hydraulic model used for this report and depicted in Exhibit VI-2.
- L. 500-year Floodplain – The area that will be inundated by the 0.002 probability flood on the Cedar River—122,000 cfs, as determined by the hydraulic model used for this report and depicted in Exhibit VI-3.
- M. 2008 Design Floodplain – The area that will be inundated by the discharge in the Cedar River designated as the design flood event—143,000 cfs, as determined by the hydraulic model used for this report and depicted in Exhibit VI-4.
- N. Uniform Act – The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.
- O. Backwater – Water backed up in its course by an obstruction (Merriam-Webster). Specific to this project, the higher water upstream of the FCS caused by constricting the flow between the floodwalls and levees of the FCS.

- P. Willing Seller – A property owner who is willing to offer a property for sale voluntarily before it is needed for the FCS per paragraph 3.A below or for sale voluntarily under the conditions of paragraphs 3.B below, and who is willing to negotiate a fair and reasonable property purchase price with a basis in an appraised value

ACQUISITION POLICY STATEMENT

The acquisition policy varies according to the impact that the construction and function of the FCS has on the property.

- A. Mandatory Acquisition
 - I. Properties required to build the FCS, including construction and maintenance activities, shall be acquired by the City.
 - II. Properties upstream of the FCS protection that will experience higher water as a result of the Backwater effect of the 200-year event the FCS:
 - a. The City shall purchase a Flowage Easement for any property within the Cedar Rapids Corporate Boundaries that has a structure that lies within the 200-year Floodplain.
 - b. If the Flowage Easement is valued at 50 percent or greater than the total assessed value for the entire property then the property will be acquired by the City.
 - c. The City may protect the property rather than acquire the property rights in items 3.A.I.a and 3.A.I.b above if the City determines that it is financially feasible to do so.
 - III. Properties with buildings or related improvements on the unprotected side of the FCS are subject to acquisition:
 - a. The City shall purchase Flowage Easement for any property that has a structure within the 200-Year post FCS construction Flood Plain, as shown on Exhibit VI-2.
 - b. If the Flowage Easement is valued at 50% or greater than the total assessed value for the entire property, the property shall be acquired by the City.
 - IV. Properties that are vacant lots or parcels on the unprotected side of the FCS shall be acquired by the City.
- B. Voluntary Acquisition
 - I. Properties downstream of the FCS are not affected by the construction of the FCS, therefore:
 - a. The City shall purchase from willing sellers those properties that have structures as of the date of this policy that would be impacted by floodwater within the 200-Year Cedar River Water Surface Elevation as shown in Exhibit VI-2 and VI-6.

- b. This Voluntary Acquisition option expires two years from the date of initial policy adoption.
- II. Properties on the protected side of the FCS, within the 2008 flood inundation zone, as shown on Exhibit VI-4, are eligible for acquisition from willing sellers.
 - a. Properties for which it would be inefficient to provide City services.
 - b. This Voluntary Acquisition option expires upon completion of construction of the FCS.

DISPOSITION POLICY STATEMENT

- A. Upstream and Downstream of Physical FCS Improvements
 - I. The City will maintain ownership of City-owned properties within the 200- Year floodplain and dispose of City-owned properties outside of the 200-year floodplain.
- B. Project Area
 - I. The City will not dispose of City-owned properties.

APPLICABILITY

This acquisition policy applies to all properties within the Cedar Rapids Corporate Boundaries as of the date of adoption of this policy. Structures referenced in this policy must be in place as of the date of adoption of this policy.

IMPLEMENTATION

- A. Mandatory Acquisitions shall occur when needed for construction or when offered by a willing seller, whichever occurs first. City may exercise eminent domain for a Mandatory Acquisition (Paragraph 3.A.) prior to needing said property for construction, if a property owner indicates a desire to sell the property prior to the City needing it and initiates negotiations with the City, but does not meet the definition of “willing seller.”
- B. Funding for Voluntary Acquisitions shall take precedence over funding for construction.
- C. The decision to acquire/protect versus buying a Flowage Easement shall be made solely by the City, based upon the certified appraisal value for the Flowage Easement relative to the assessed property value.
- D. To establish the Fair Market Value of a property, the City will contract with a qualified, State of Iowa certified appraiser to perform the appraisal services required per the Uniform Act.
- E. Acquisitions shall comply with Uniform Act, (Title 49 CFR Part 24, Code of Federal Regulations).

END OF POLICY

Exhibit VI - 1: 100-Year Inundation

Six maps showing the extent of flooding under existing conditions and upon completion of the proposed Flood Control System. The maps show the alignment and type of proposed FCS structures. The map scale varies to provide a closer look at specific areas of interest.



Map 1 (Exhibit VI-1-2) - Upstream of the City; from the upstream limits of the backwater effect at Palo to the Edgewood Road Bridge.

Map 2 (Exhibit VI-1-3) – River reach from Seminole Valley Road to Mays Island.




Map 3 (Exhibit VI-1-4) – River reach from Mays Island to the downstream extent of the project, Otis Road.

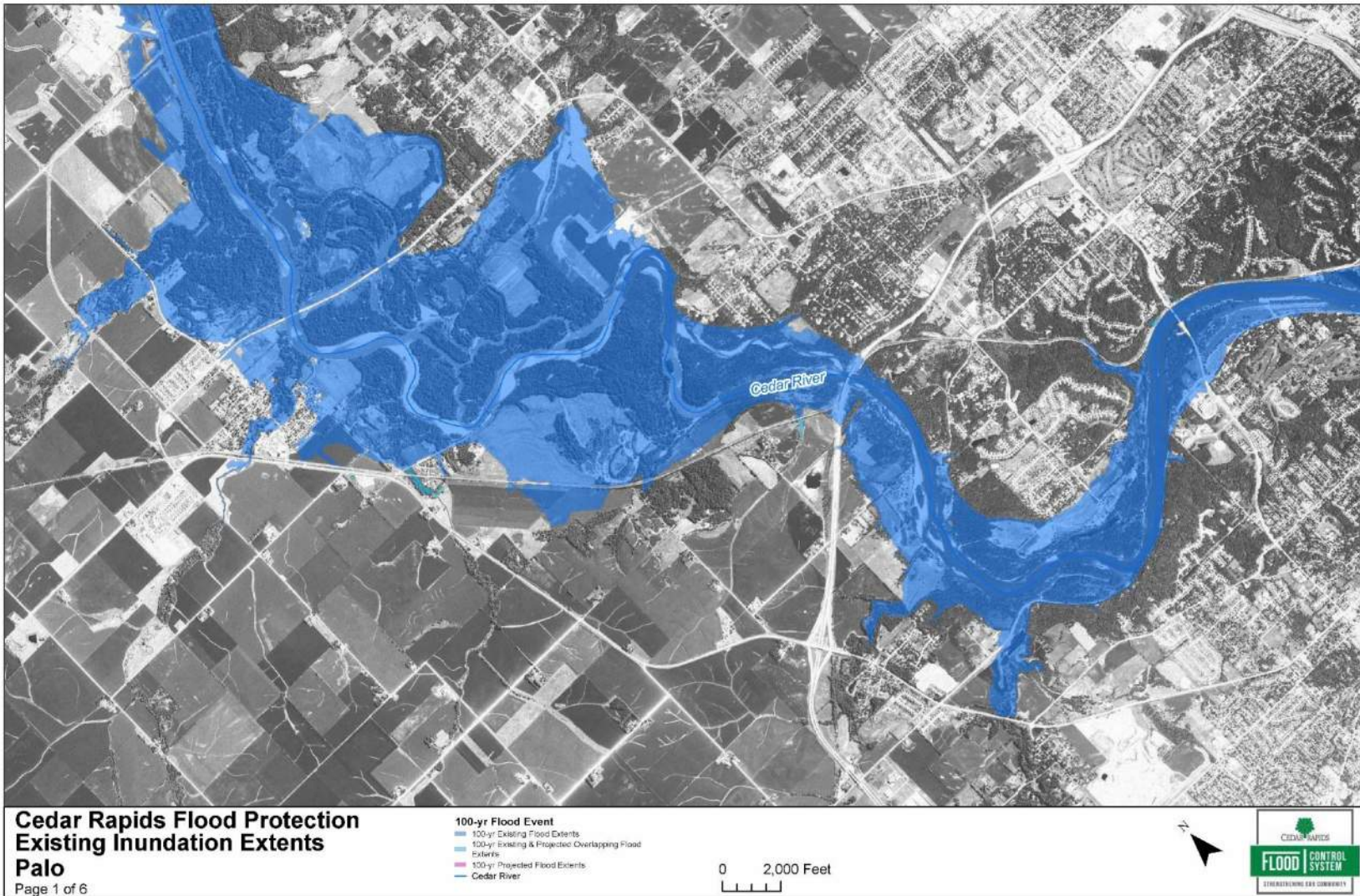
Map 4 (Exhibit VI-1-5) – Zoomed in on the area near Edgewood Road and Robbins Lake. Includes elevation contours.

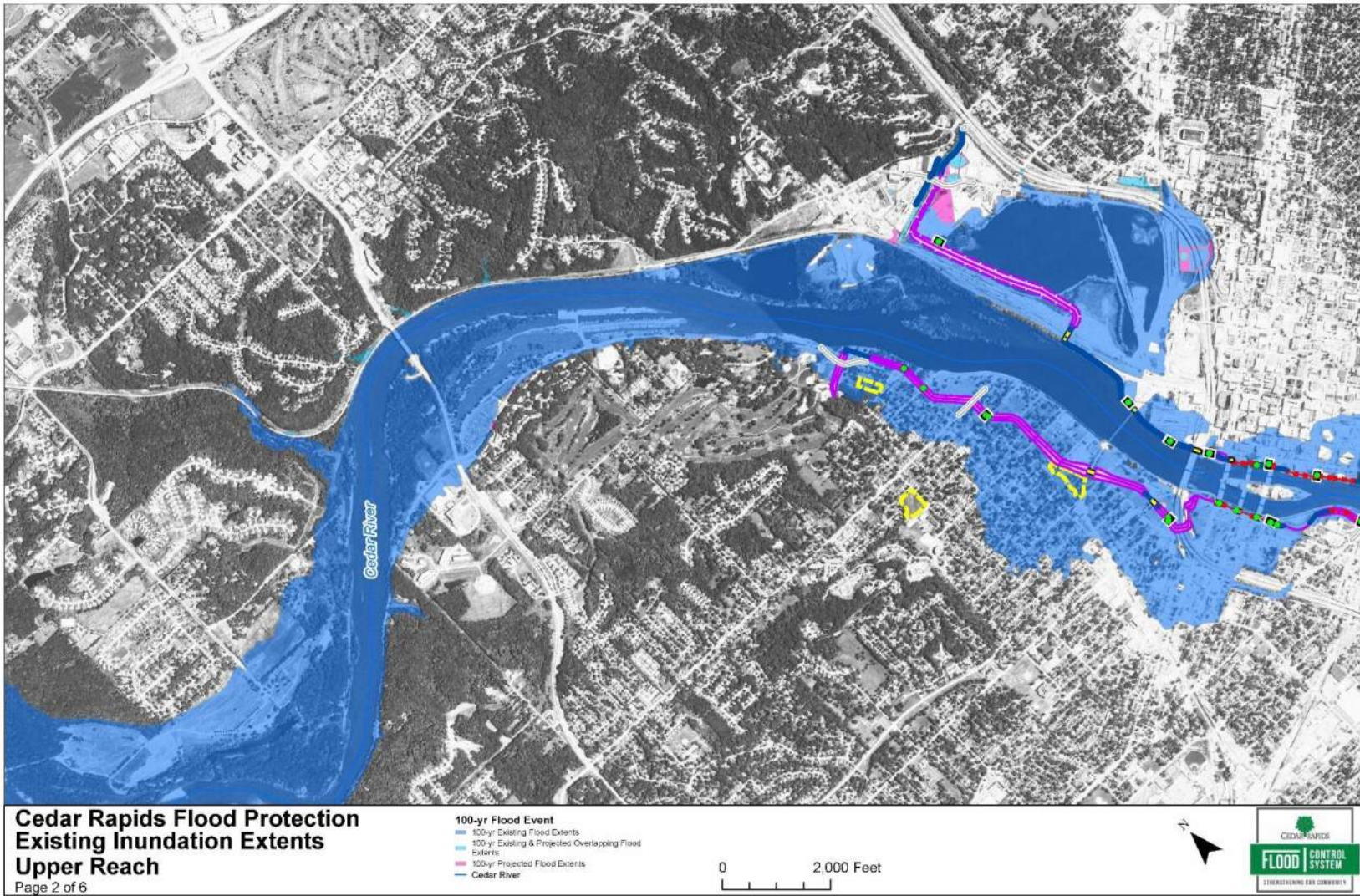
Map 5 (Exhibit VI-1-6) - Zoomed in on Cedar Lake vicinity. Includes elevation contours.

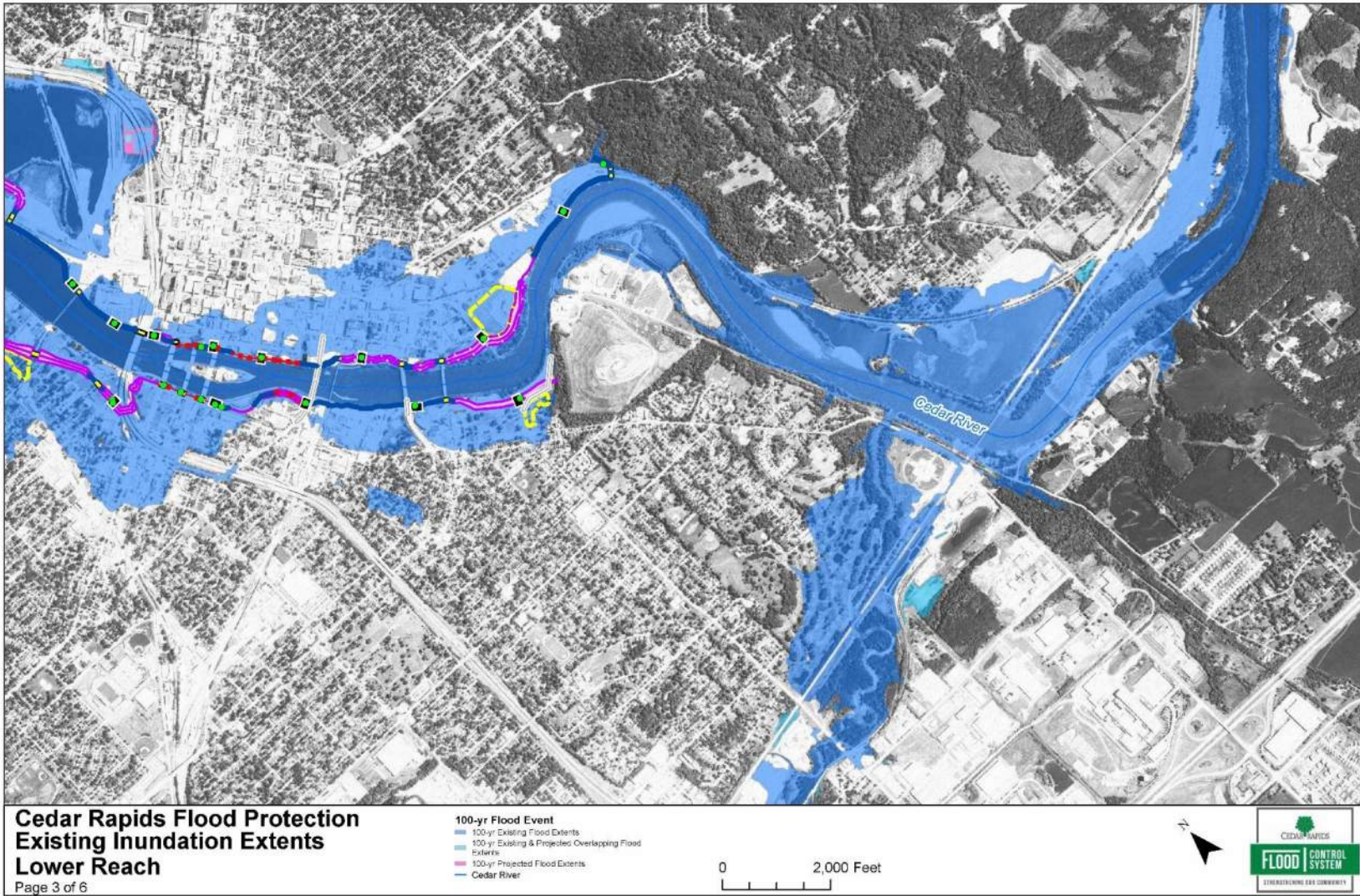
Map 6 (Exhibit VI-1-7) – Zoomed in on Cedar Valley Neighborhood (Rompot). Includes elevation contours.

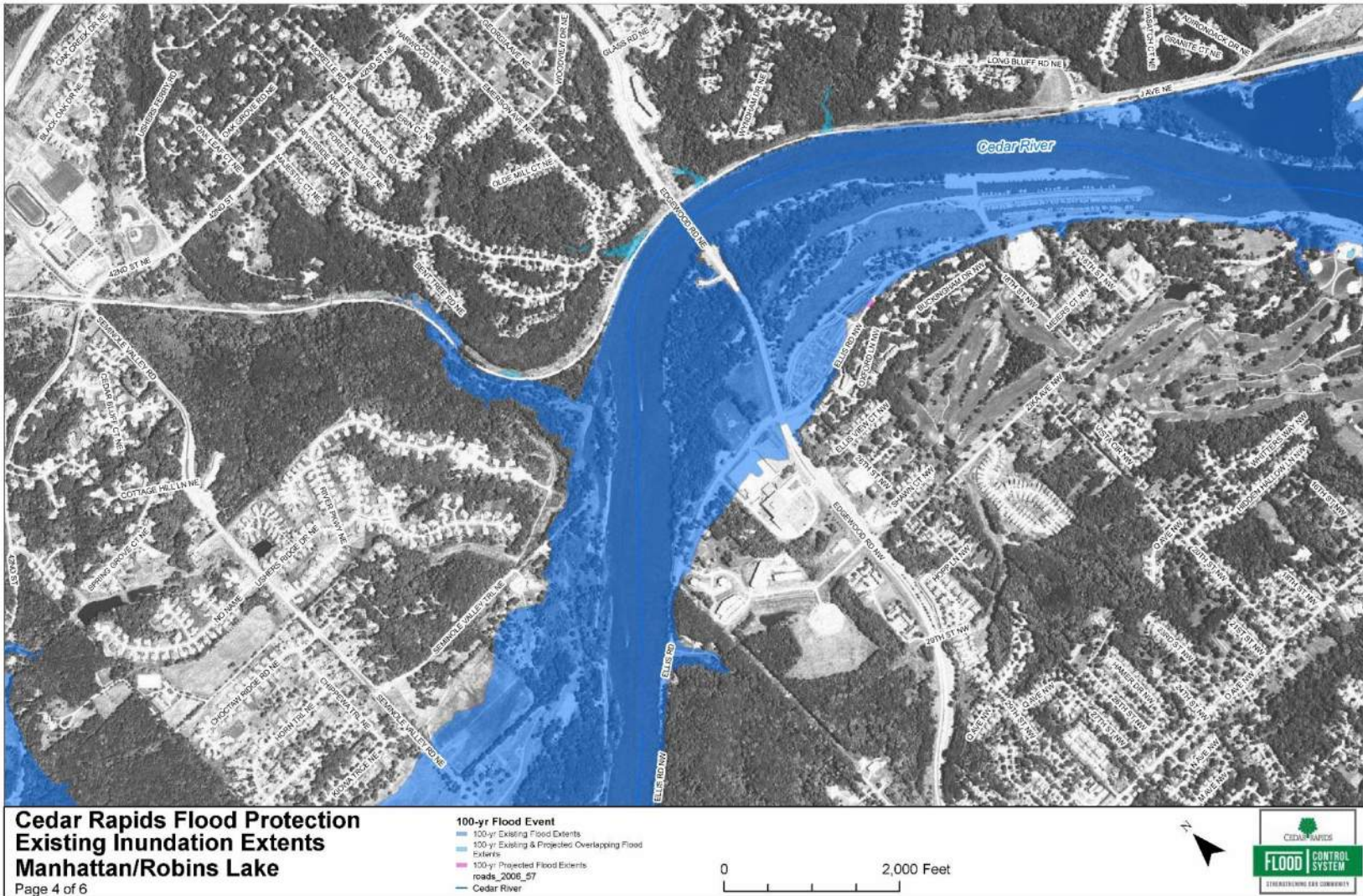
The maps indicate the effect of the FCS on inundated areas.

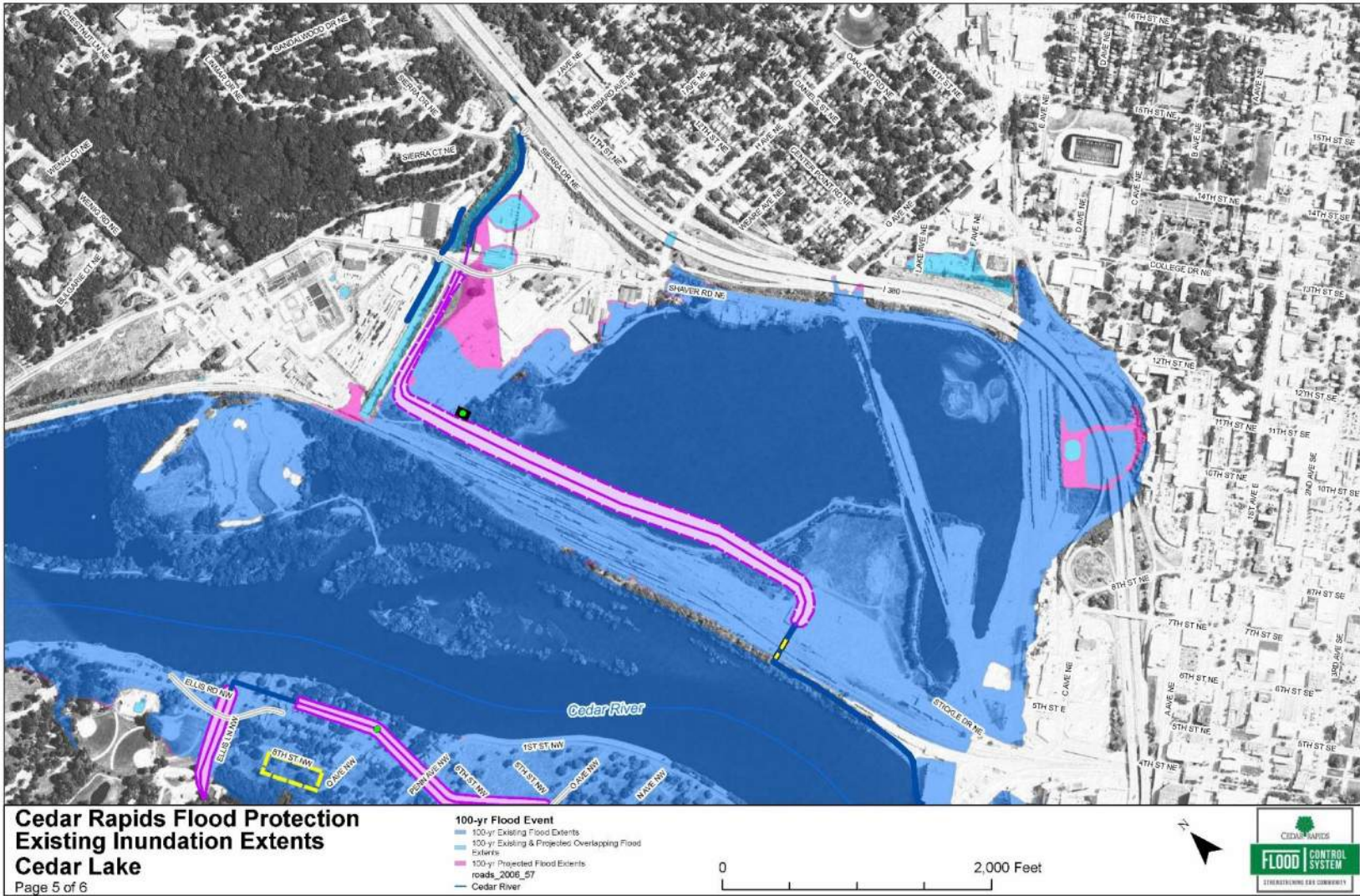
	Area inundated under pre-FCS conditions, but not inundated under post-FCS conditions
	Area inundated under both pre- and post-FCS conditions.
	Area not inundated under pre-FCS conditions, but inundated under post-FCS conditions.











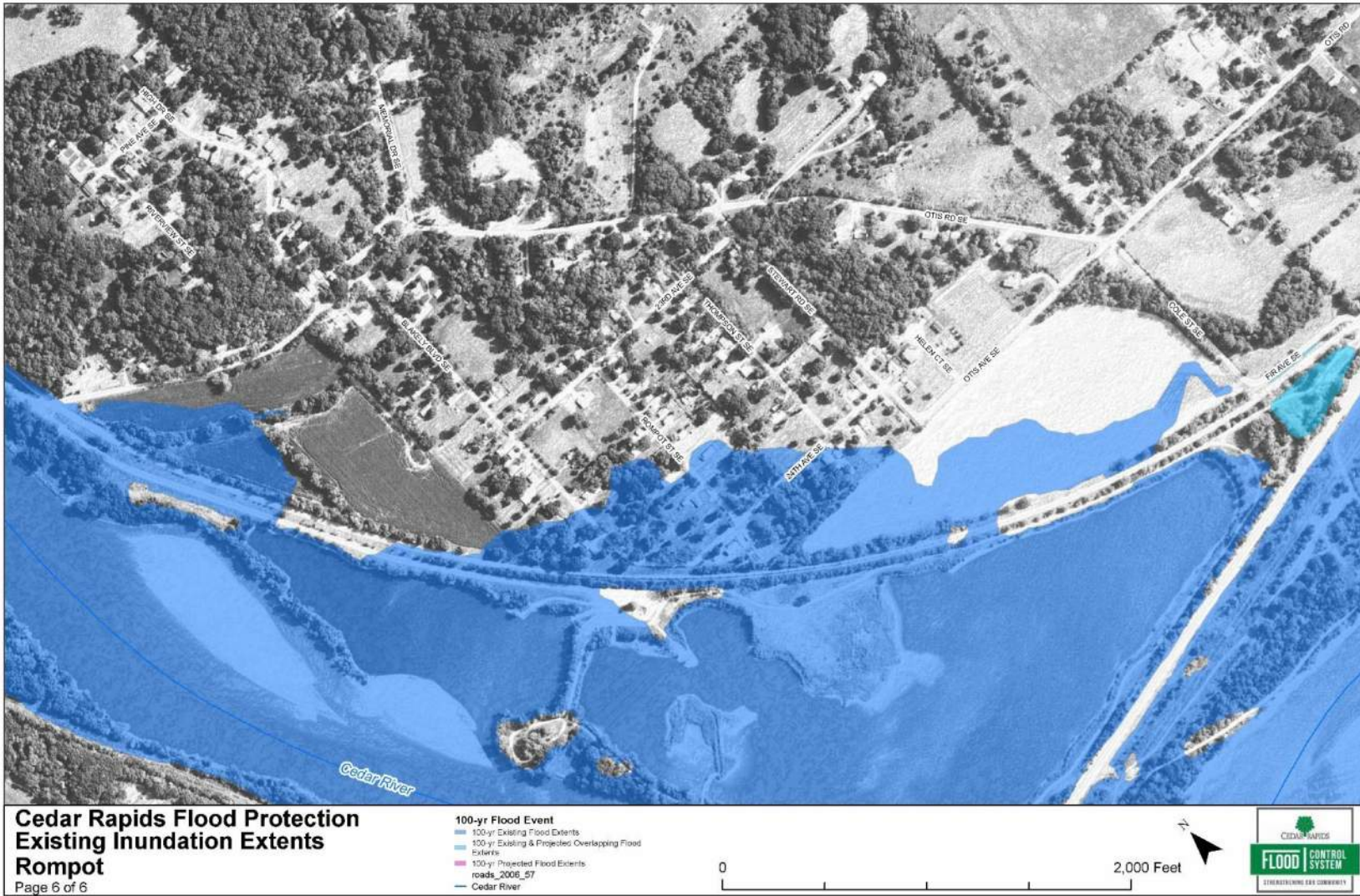


Exhibit VI - 2: 200-Year Inundation

Six maps showing the extent of flooding under existing conditions and upon completion of the proposed Flood Control System. The maps show the alignment and type of proposed FCS structures. The map scale varies to provide a closer look at specific areas of interest.



Map 1 (Exhibit VI-2-2) - Upstream of the City; from the upstream limits of the backwater effect at Palo to the Edgewood Road Bridge.

Map 2 (Exhibit VI-2-3) – River reach from Seminole Valley Road to Mays Island.




Map 3 (Exhibit VI-2-4) – River reach from Mays Island to the downstream extent of the project, Otis Road.

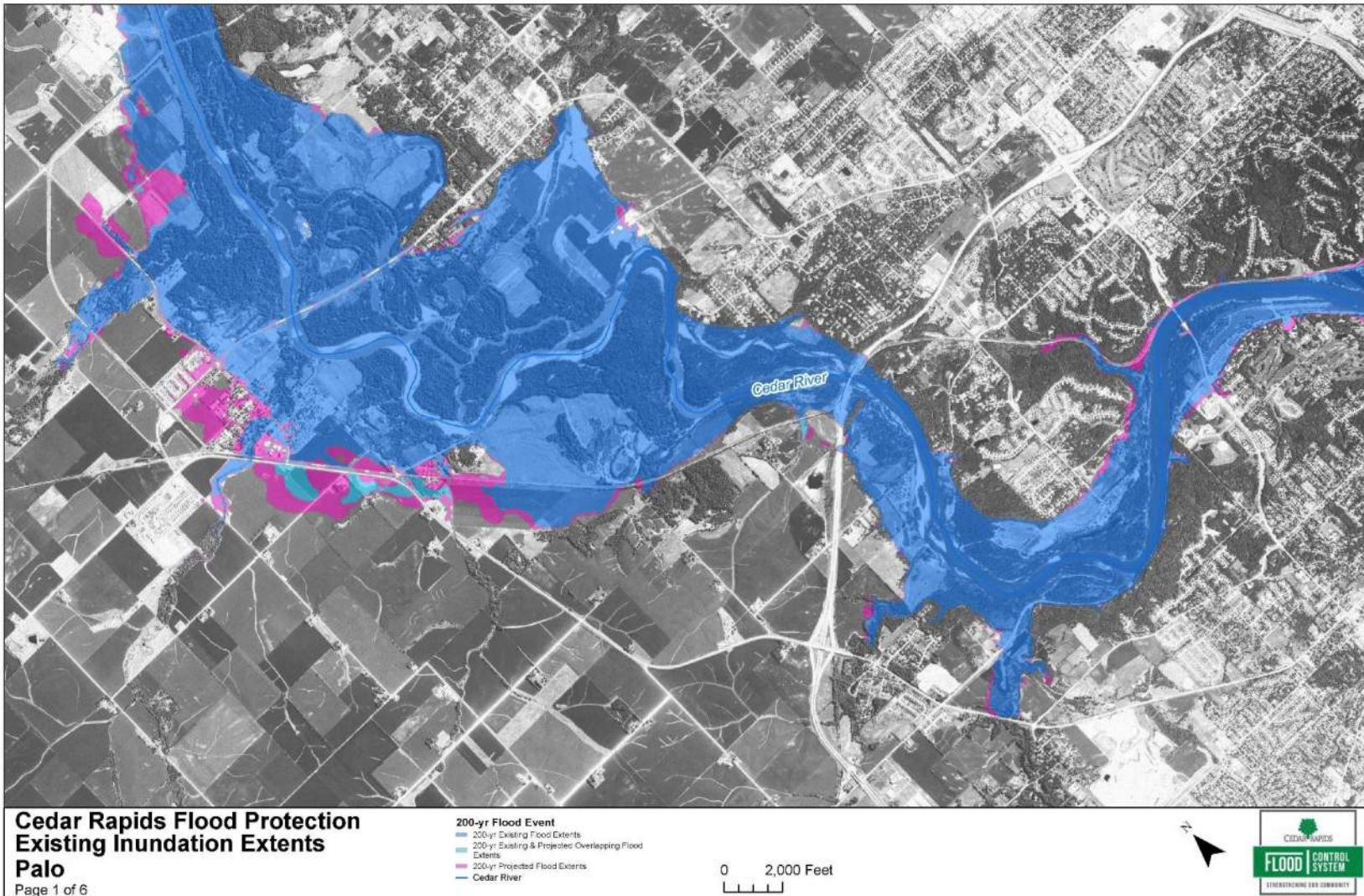
Map 4 (Exhibit VI-2-5) – Zoomed in on the area near Edgewood Road and Robbins Lake. Includes elevation contours.

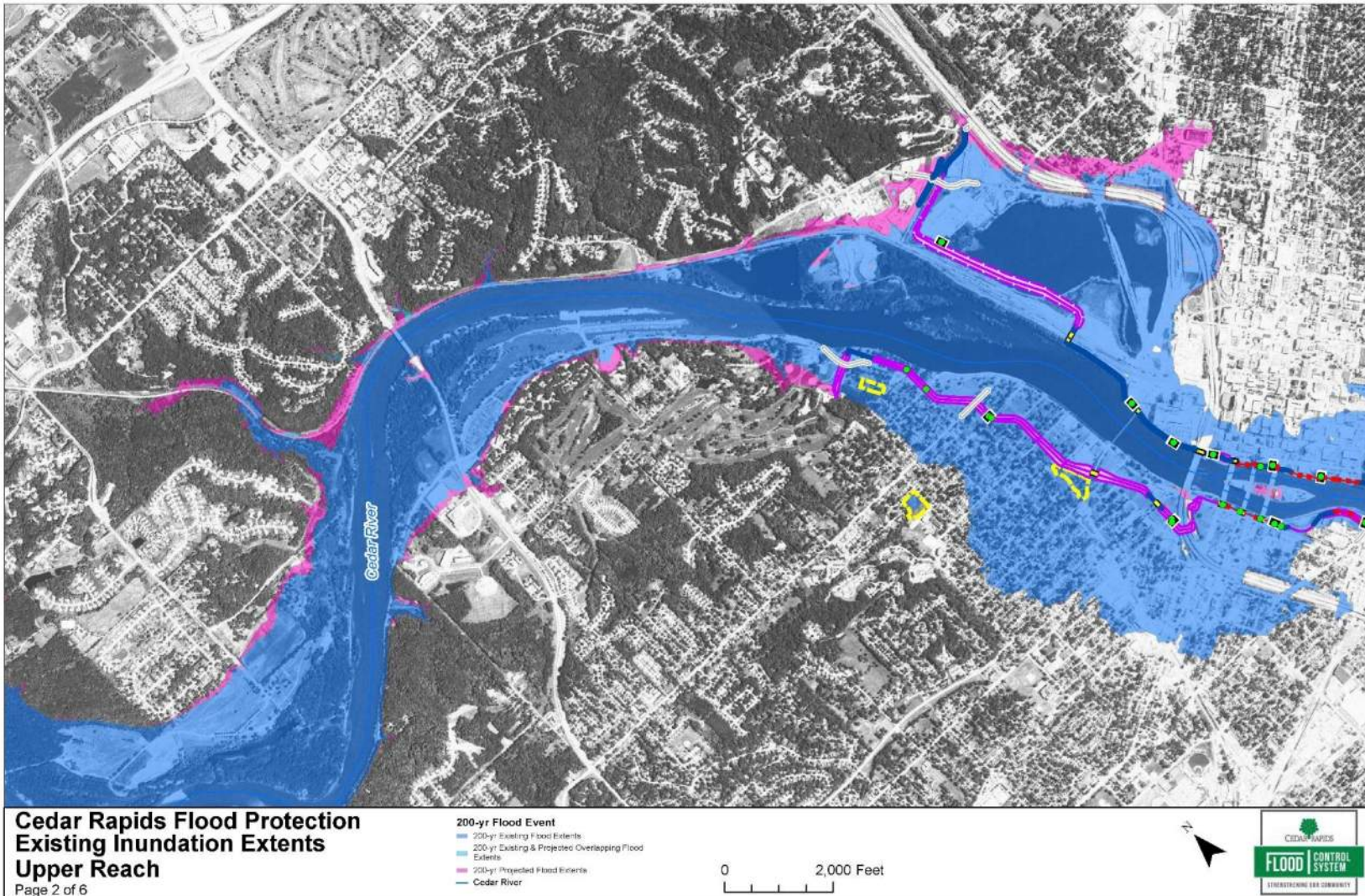
Map 5 (Exhibit VI-2-6) - Zoomed in on Cedar Lake vicinity. Includes elevation contours.

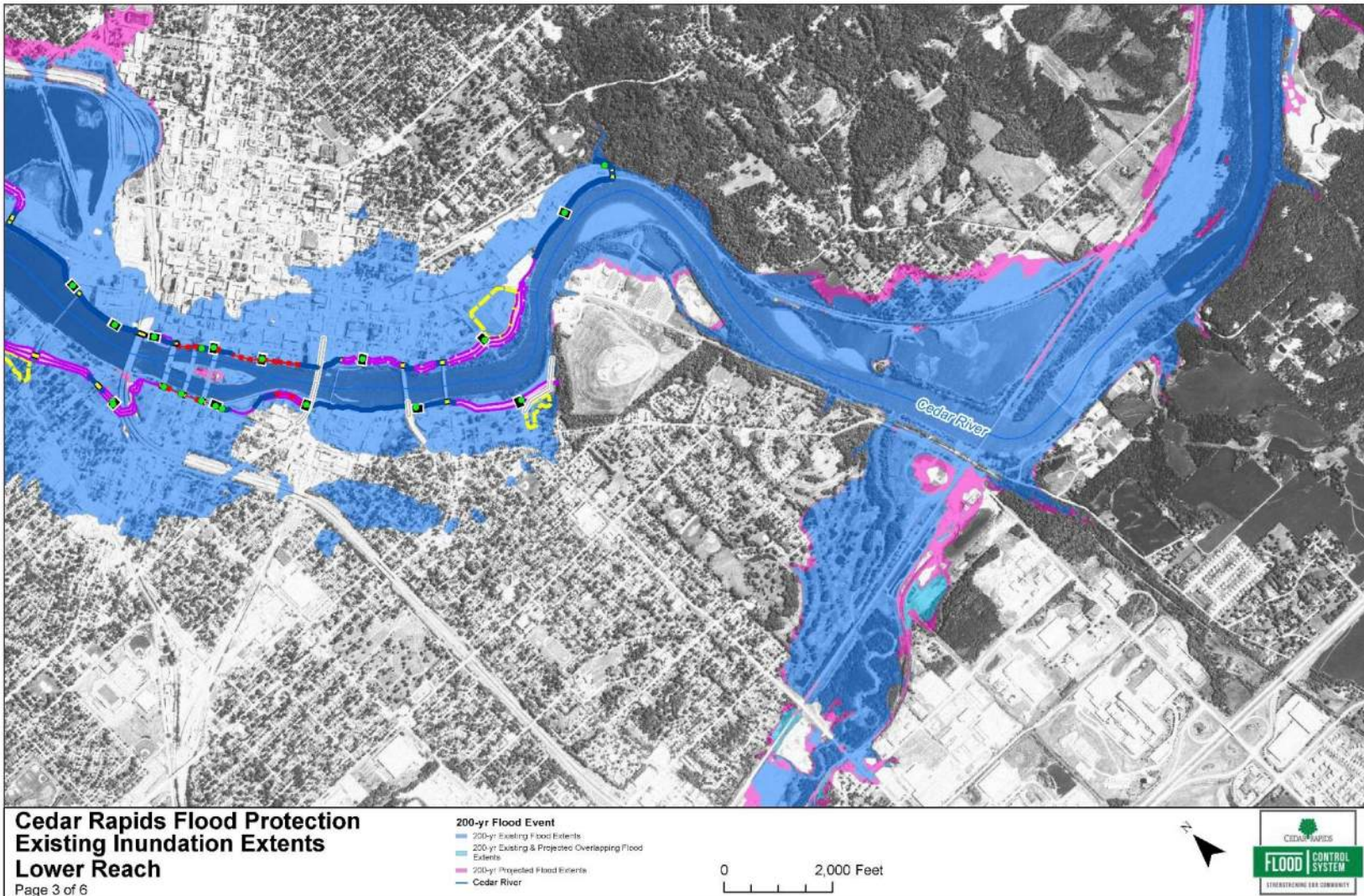
Map 6 (Exhibit VI-2-7) – Zoomed in on Cedar Valley Neighborhood (Rompot). Includes elevation contours.

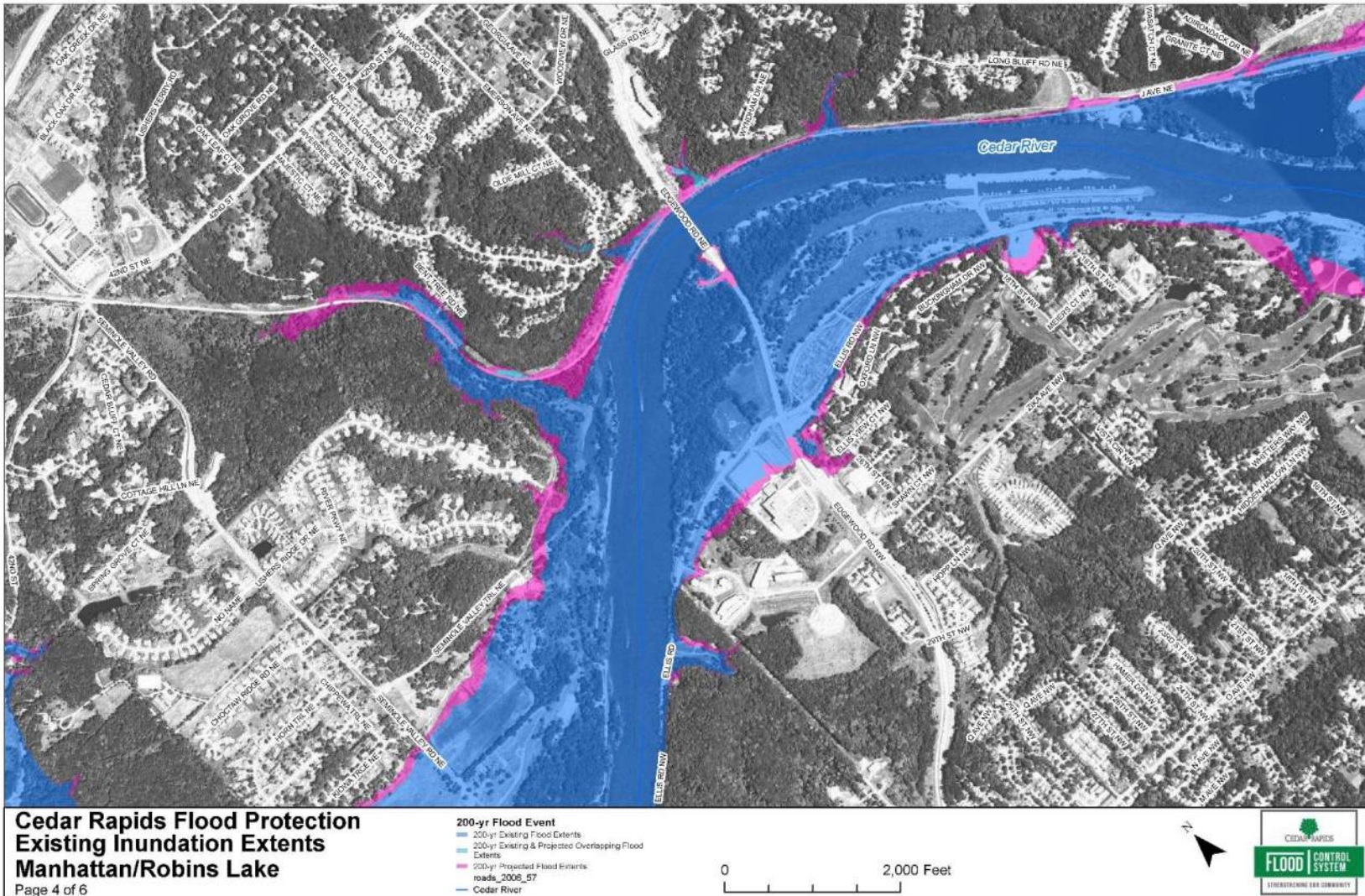
The maps indicate the effect of the FCS on inundated areas.

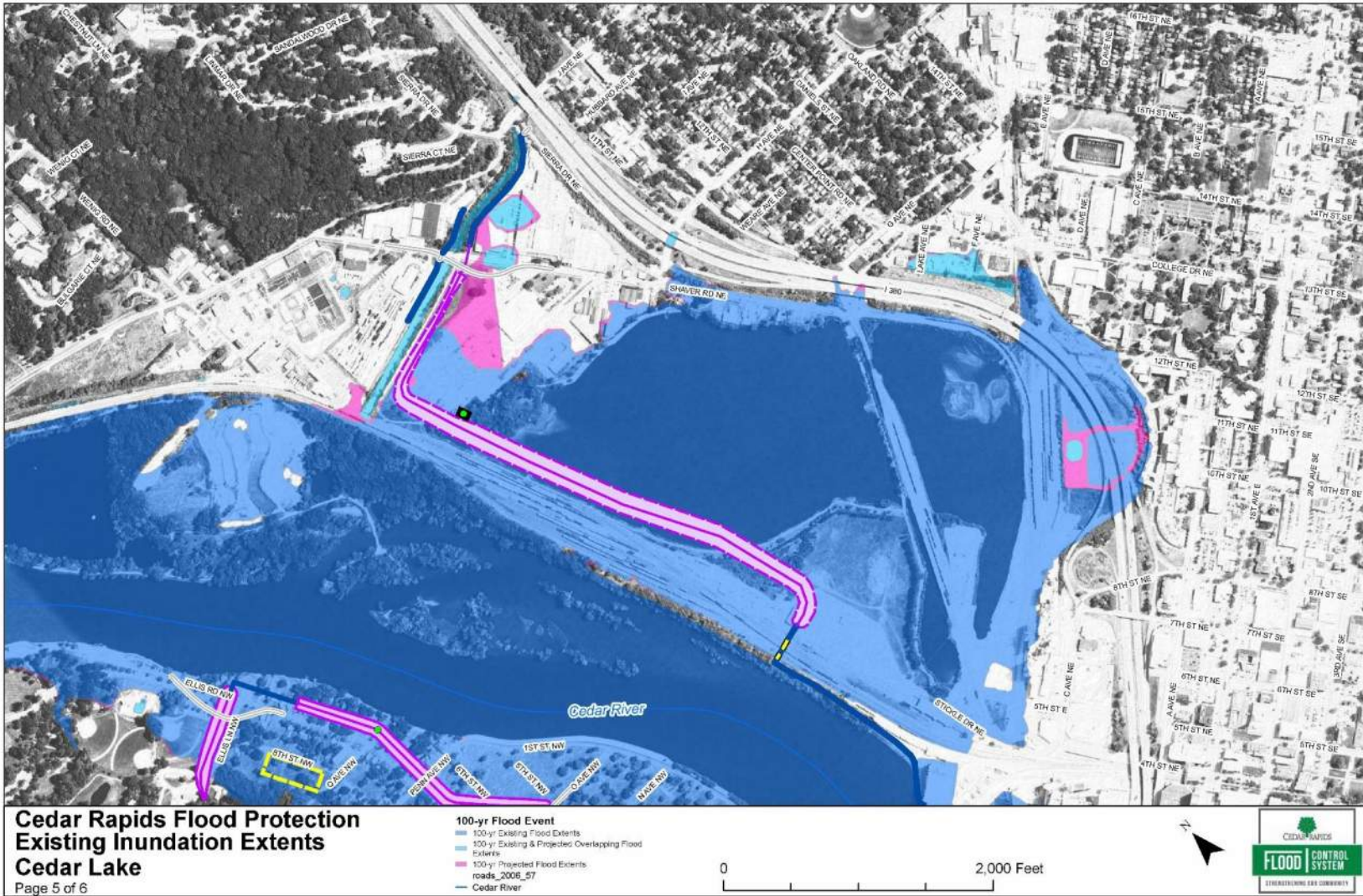
	Area inundated under pre-FCS conditions, but not inundated under post-FCS conditions
	Area inundated under both pre- and post-FCS conditions.
	Area not inundated under pre-FCS conditions, but inundated under post-FCS conditions.











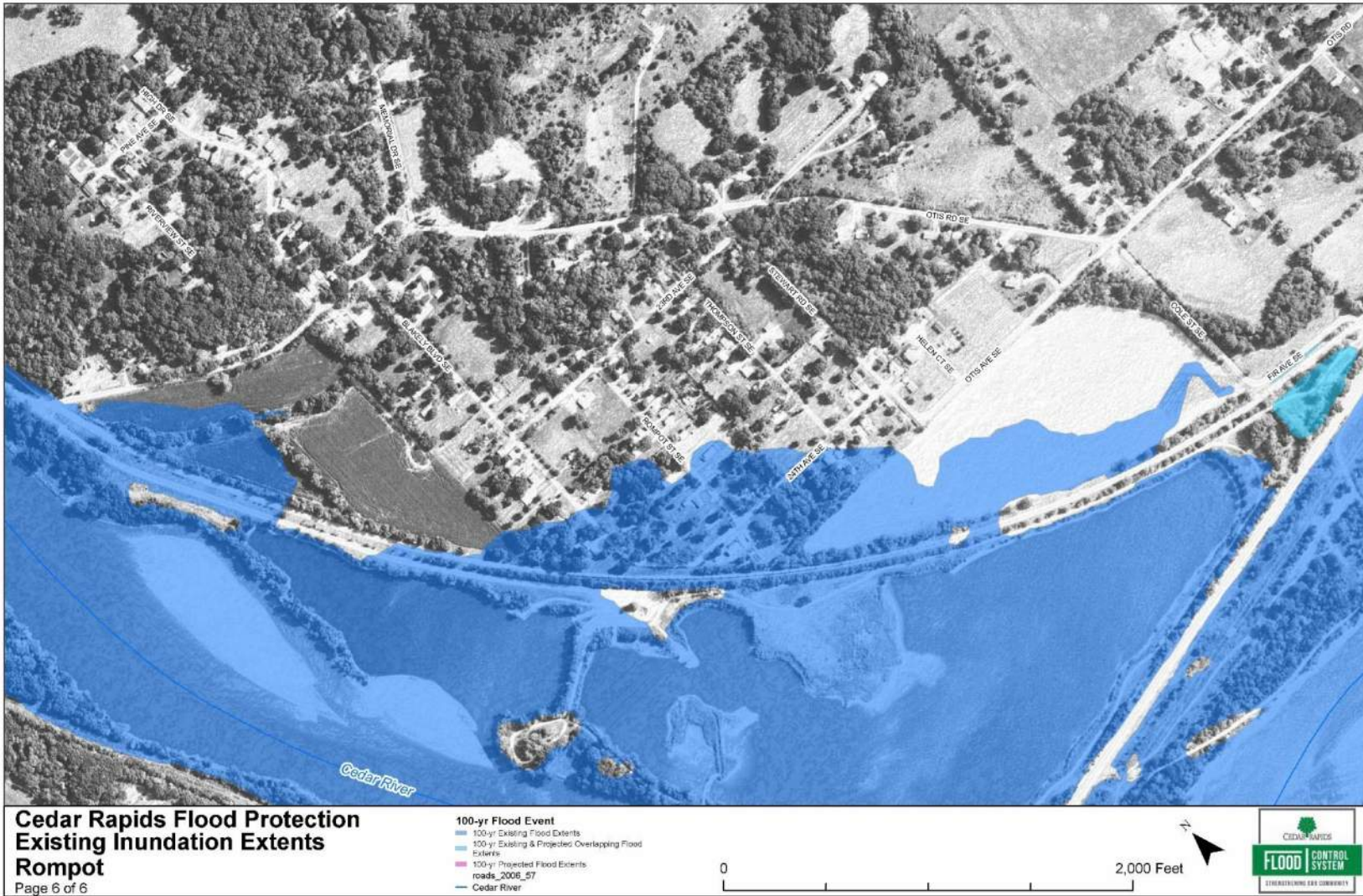


Exhibit VI - 3: 500-Year Inundation

Six maps showing the extent of flooding under existing conditions and upon completion of the proposed Flood Control System. The maps show the alignment and type of proposed FCS structures. The map scale varies to provide a closer look at specific areas of interest.



Map 1 (Exhibit VI-3-2) - Upstream of the City; from the upstream limits of the backwater effect at Palo to the Edgewood Road Bridge.

Map 2 (Exhibit VI-3-3) – River reach from Seminole Valley Road to Mays Island.




Map 3 (Exhibit VI-3-4) – River reach from Mays Island to the downstream extent of the project, Otis Road.

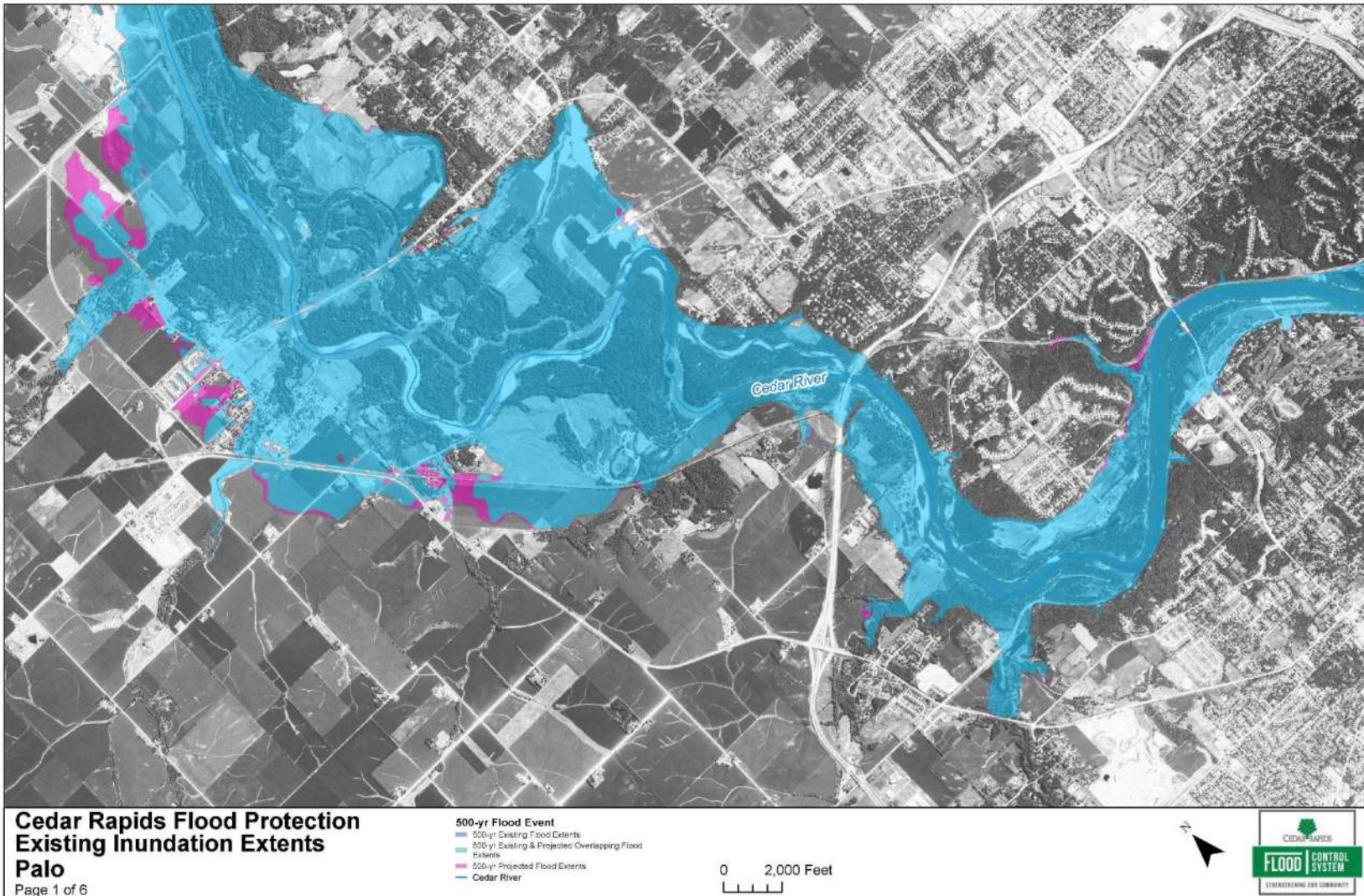
Map 4 (Exhibit VI-3-5) – Zoomed in on the area near Edgewood Road and Robbins Lake. Includes elevation contours.

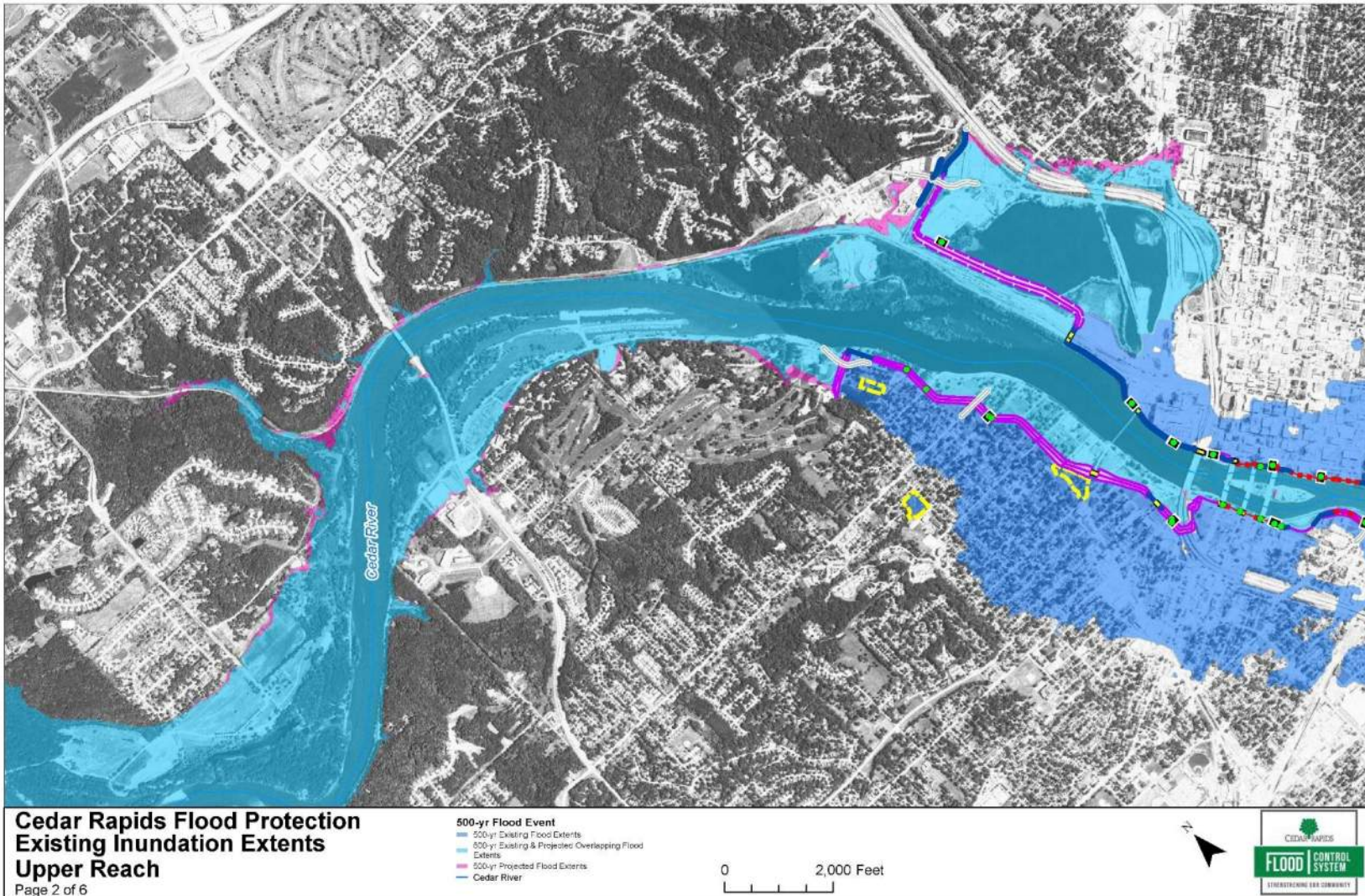
Map 5 (Exhibit VI-3-6) - Zoomed in on Cedar Lake vicinity. Includes elevation contours.

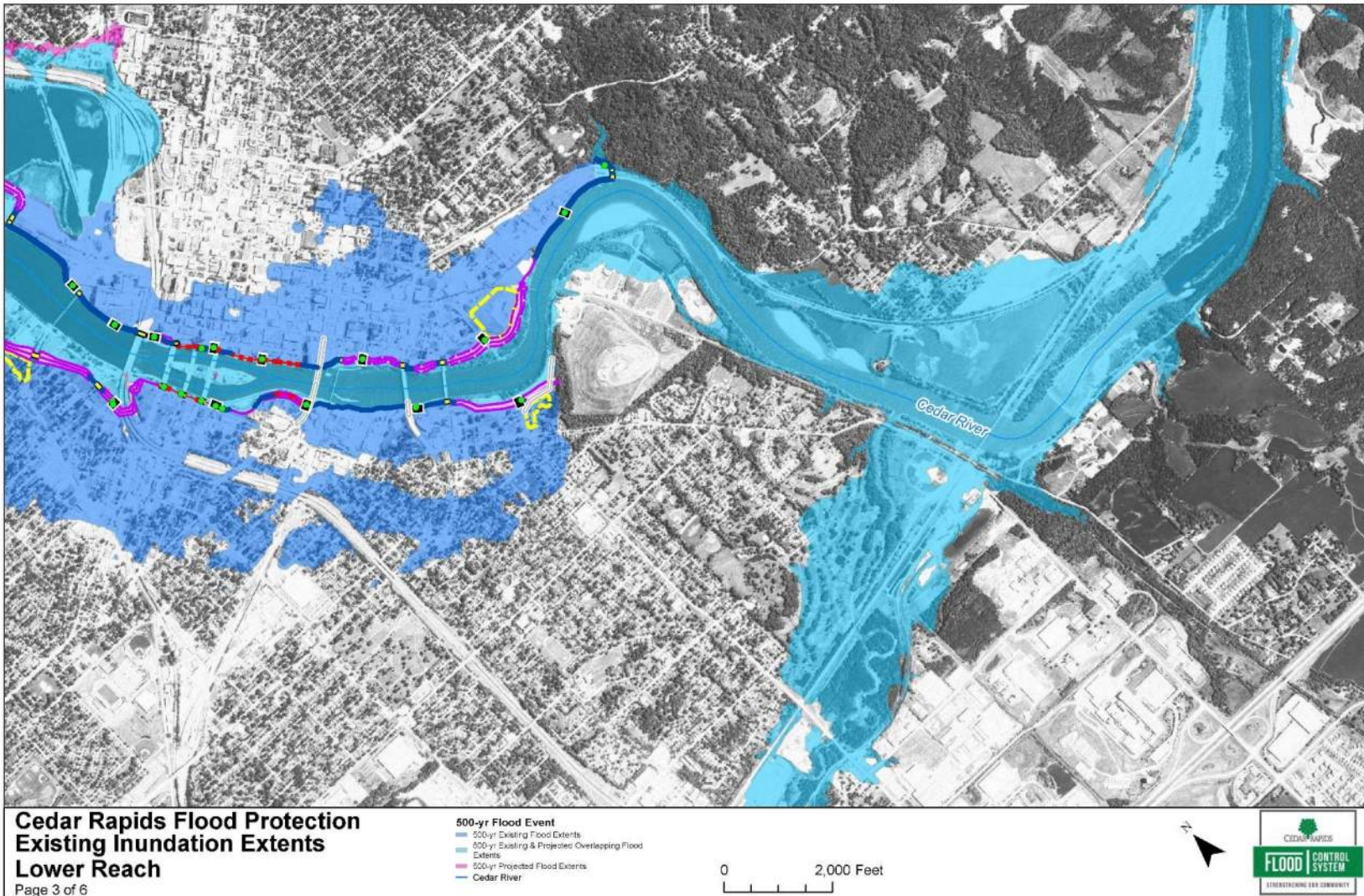
Map 6 (Exhibit VI-3-7) – Zoomed in on Cedar Valley Neighborhood (Rompot). Includes elevation contours.

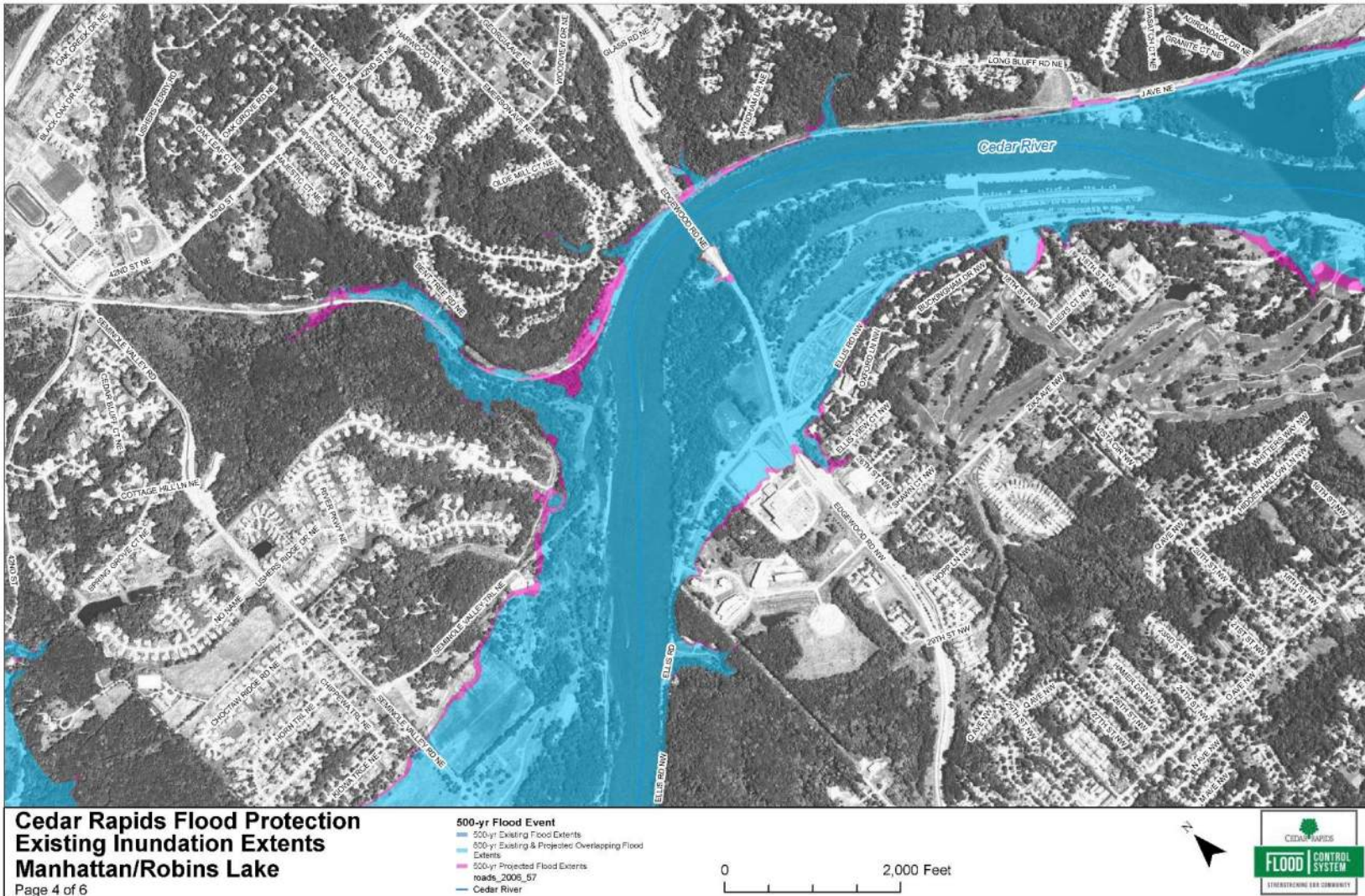
The maps indicate the effect of the FCS on inundated areas.

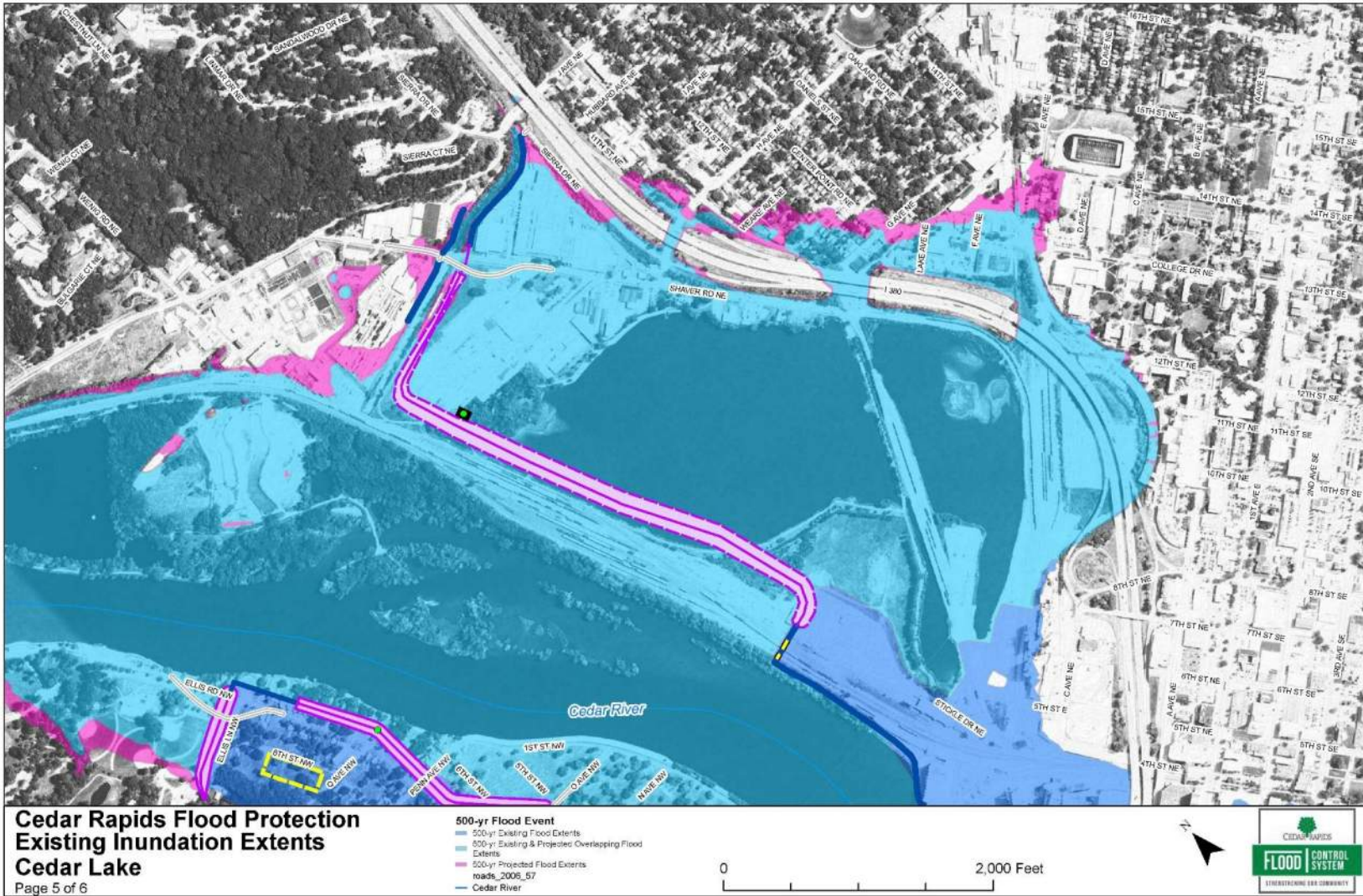
	Area inundated under pre-FCS conditions, but not inundated under post-FCS conditions
	Area inundated under both pre- and post-FCS conditions.
	Area not inundated under pre-FCS conditions, but inundated under post-FCS conditions.











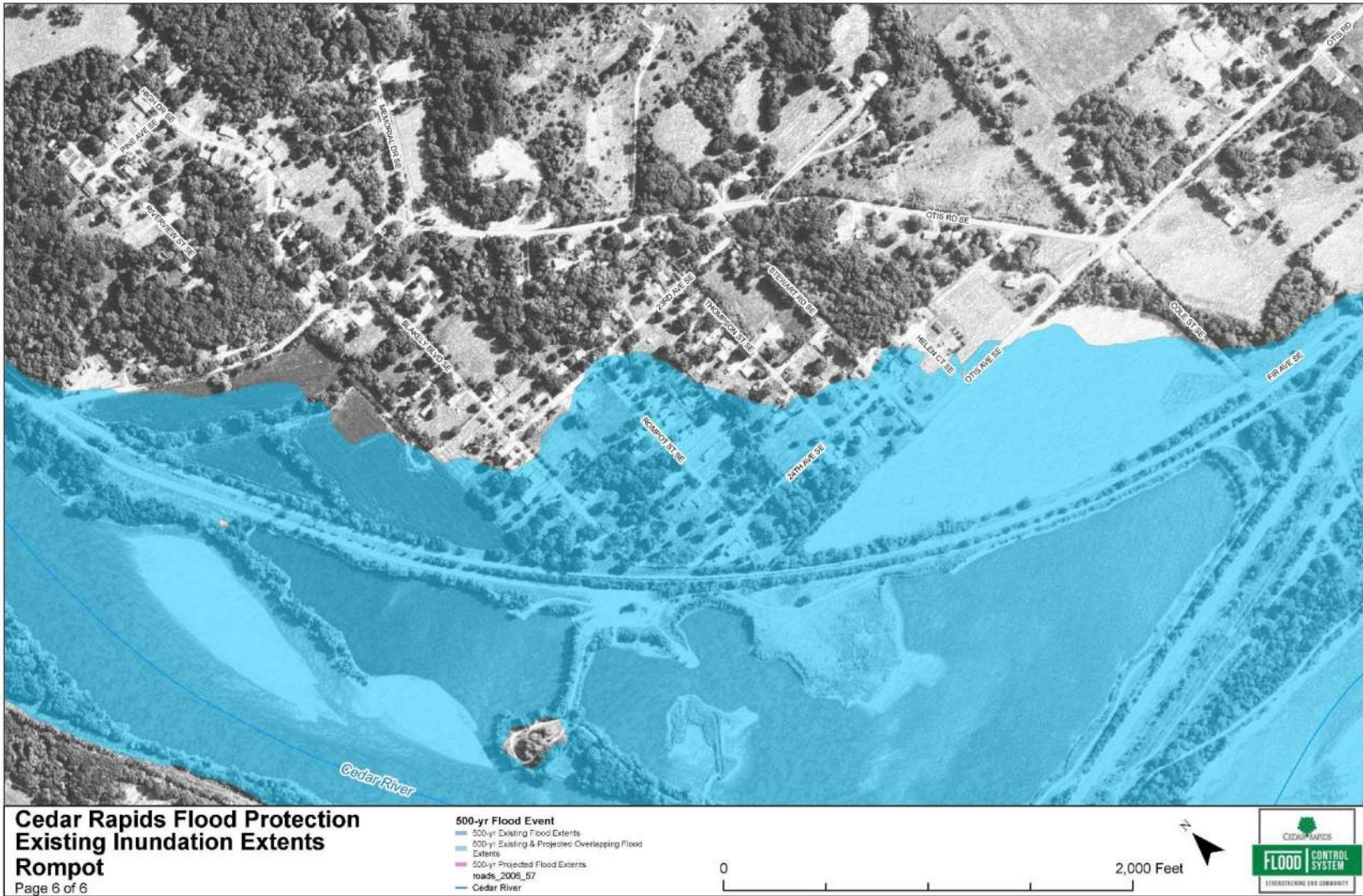


Exhibit VI - 4: Design Storm Inundation (143,300 CFS)

Six maps showing the extent of flooding under existing conditions and upon completion of the proposed Flood Control System. The maps show the alignment and type of proposed FCS structures. The map scale varies to provide a closer look at specific areas of interest.



Map 1 (Exhibit VI-4-2) - Upstream of the City; from the upstream limits of the backwater effect at Palo to the Edgewood Road Bridge.

Map 2 (Exhibit VI-4-3) – River reach from Seminole Valley Road to Mays Island.




Map 3 (Exhibit VI-4-4) – River reach from Mays Island to the downstream extent of the project, Otis Road.

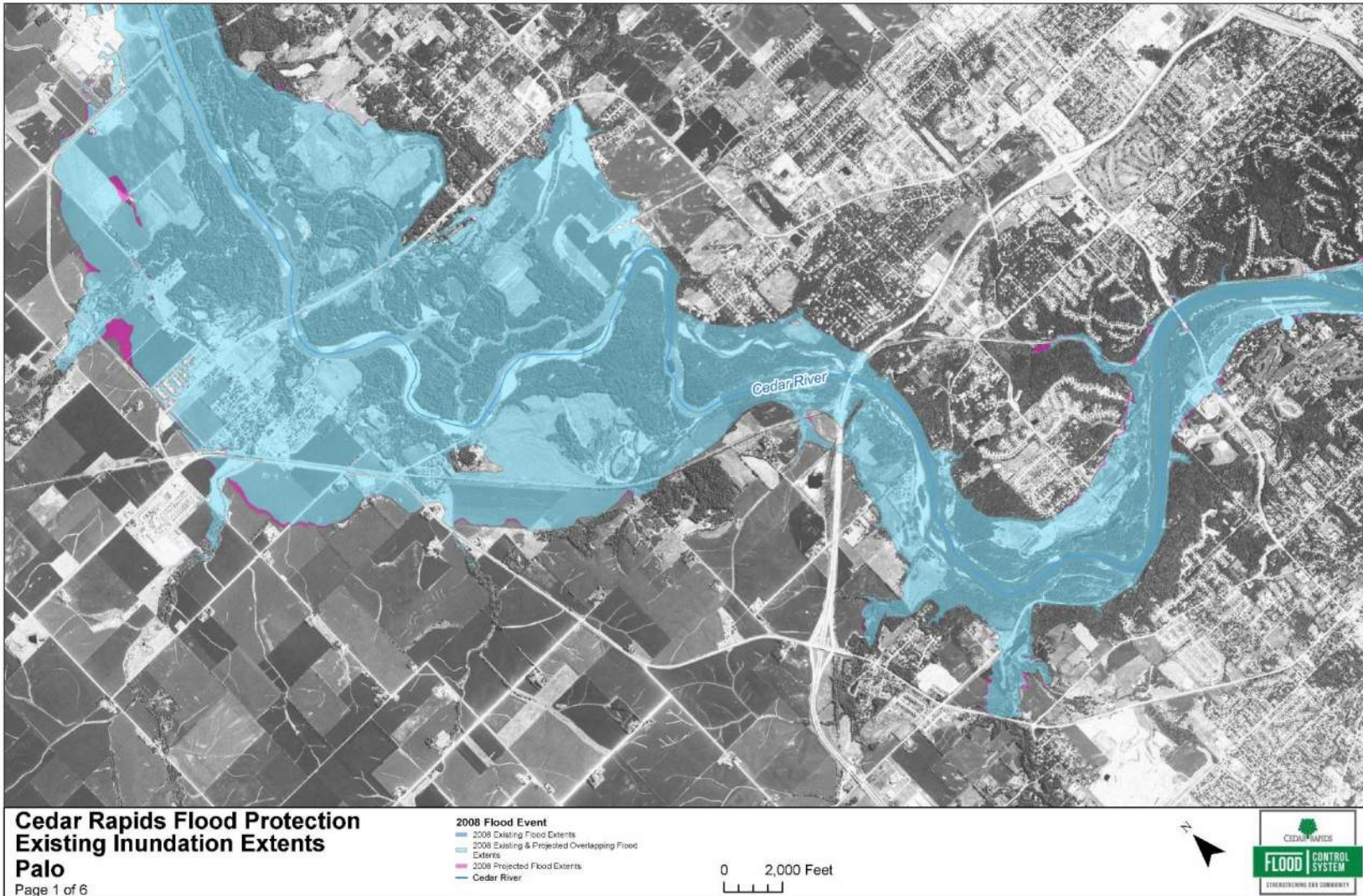
Map 4 (Exhibit VI-4-5) – Zoomed in on the area near Edgewood Road and Robbins Lake. Includes elevation contours.

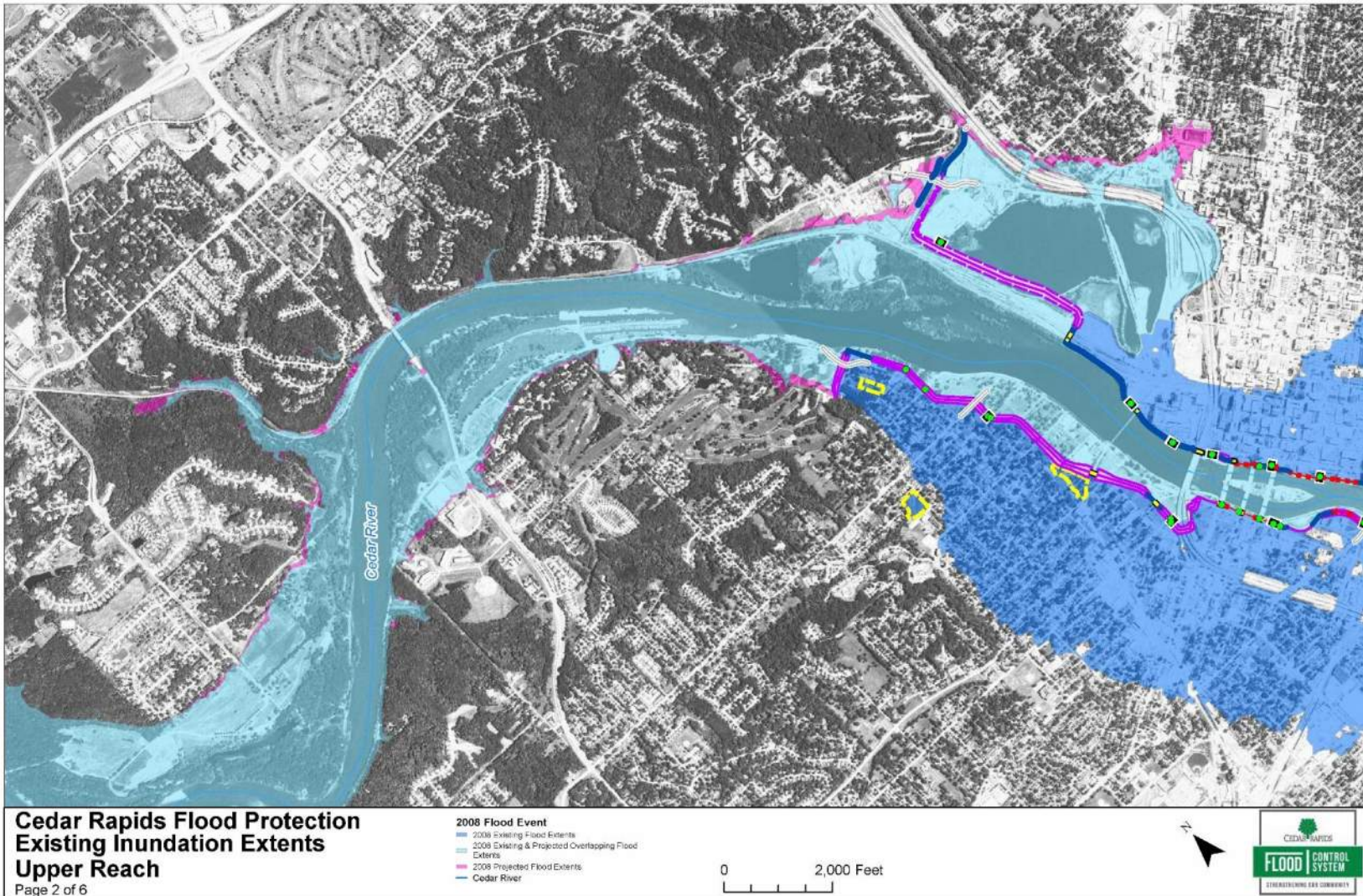
Map 5 (Exhibit VI-4-6) - Zoomed in on Cedar Lake vicinity. Includes elevation contours.

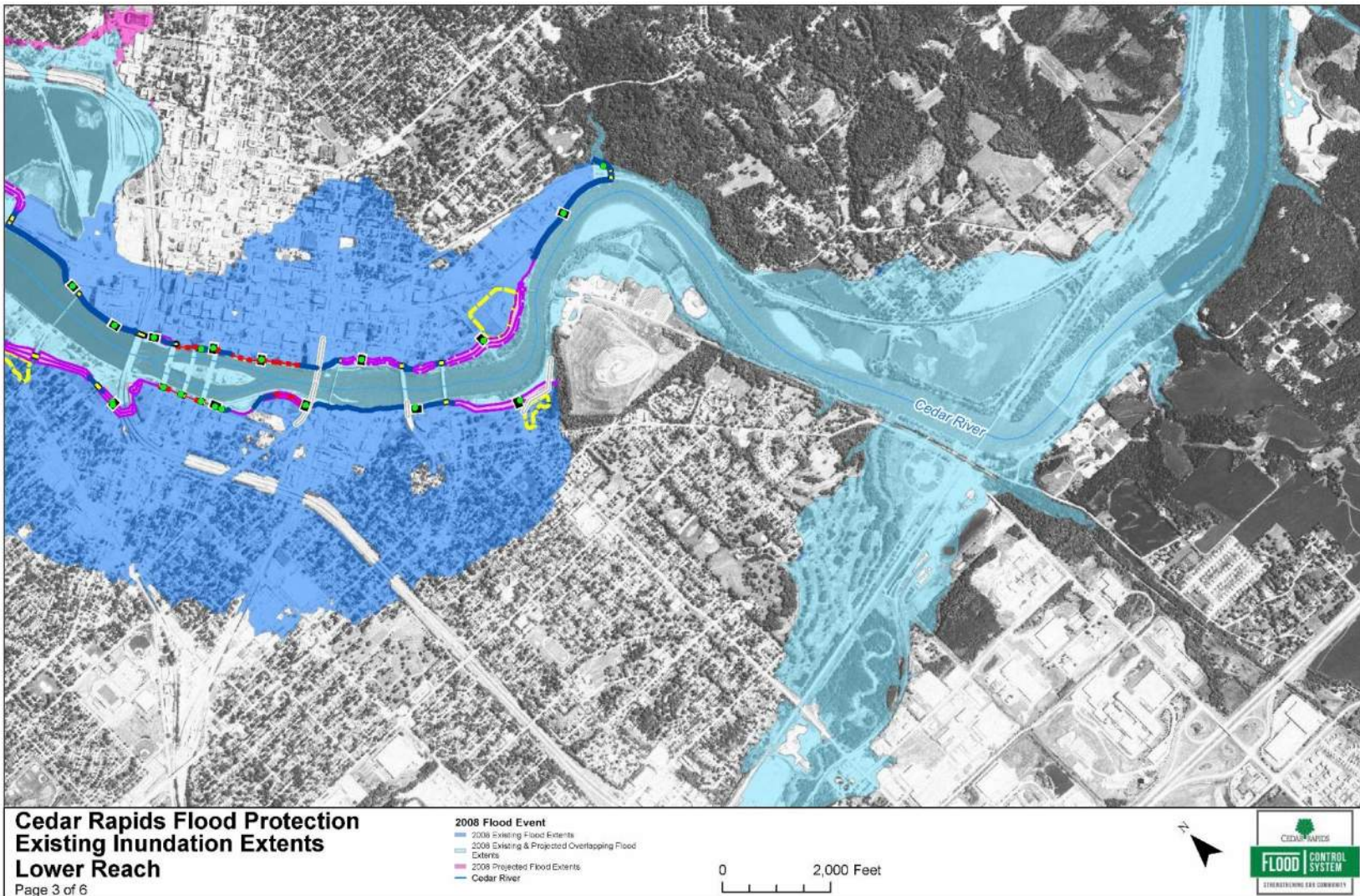
Map 6 (Exhibit VI-4-7) – Zoomed in on Cedar Valley Neighborhood (Rompot). Includes elevation contours.

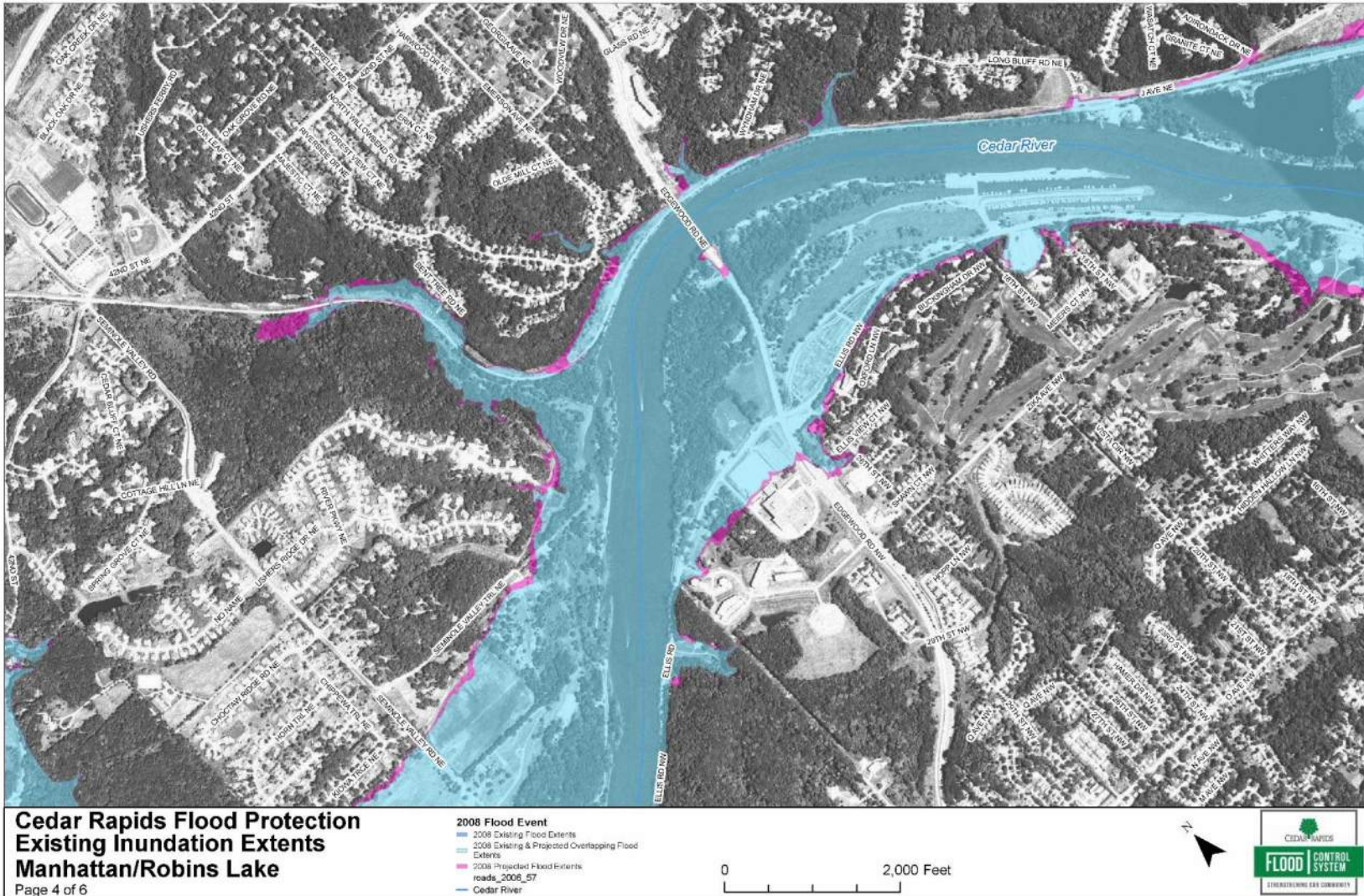
The maps indicate the effect of the FCS on inundated areas.

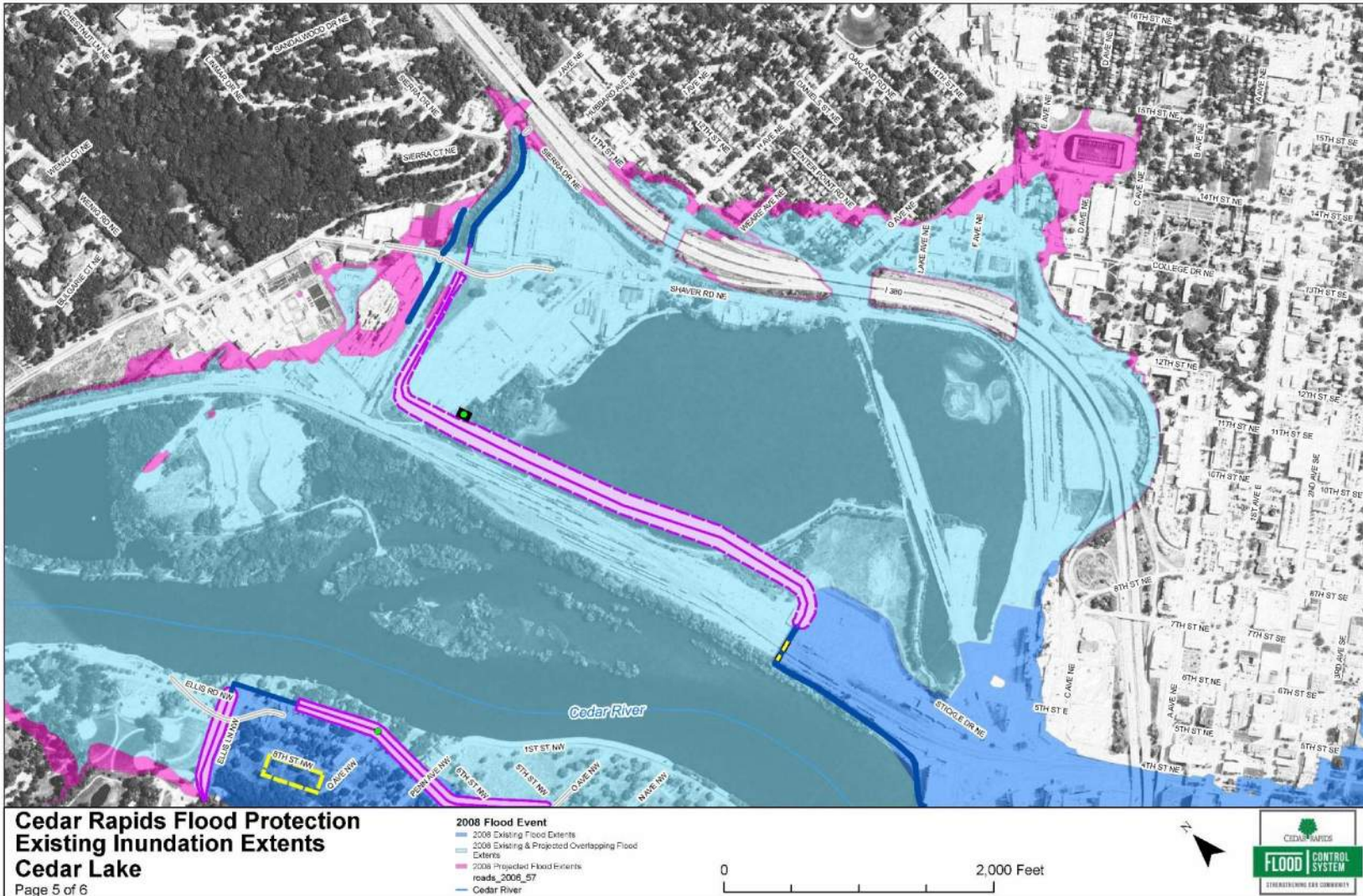
	Area inundated under pre-FCS conditions, but not inundated under post-FCS conditions
	Area inundated under both pre- and post-FCS conditions.
	Area not inundated under pre-FCS conditions, but inundated under post-FCS conditions.

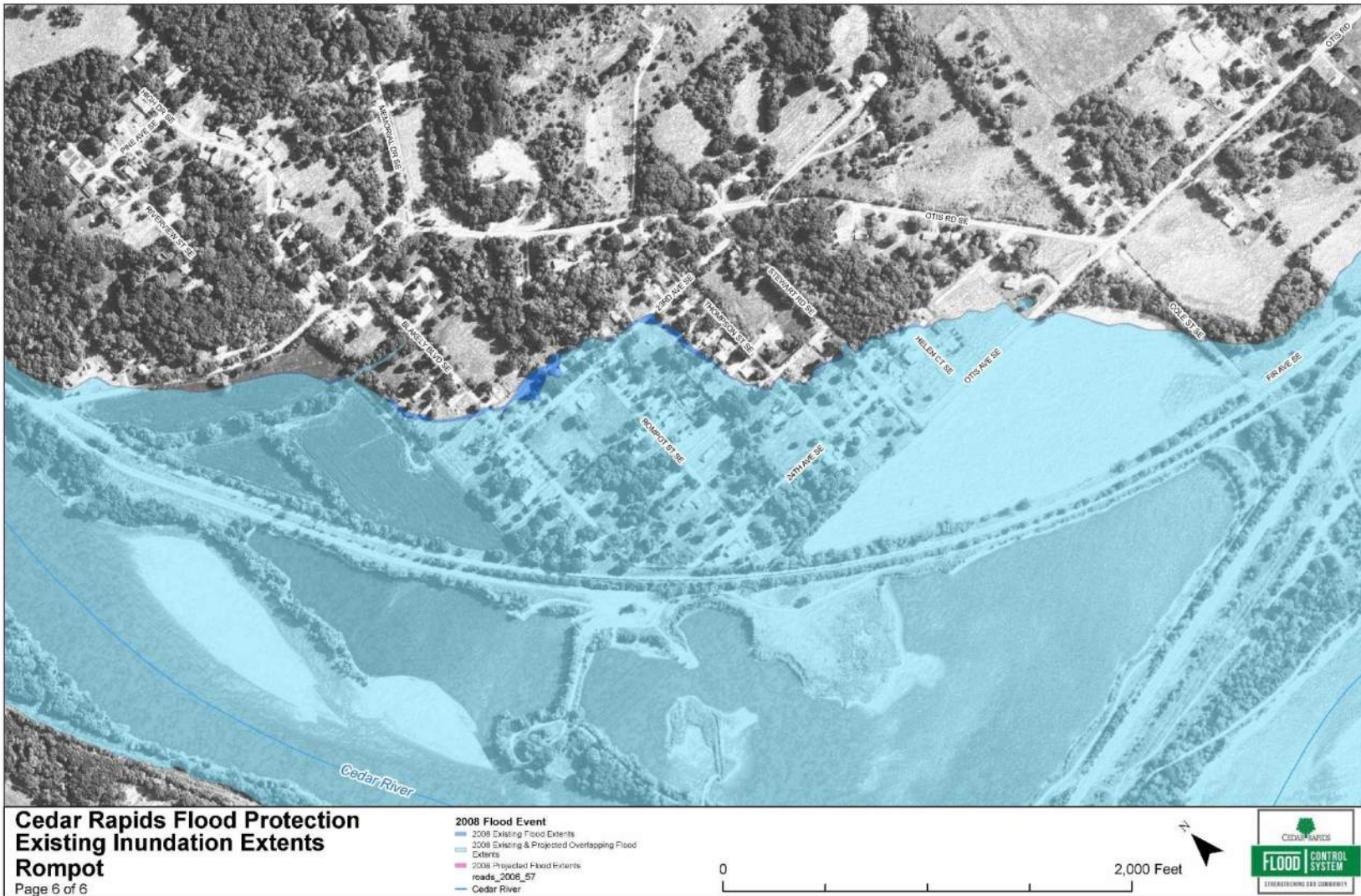




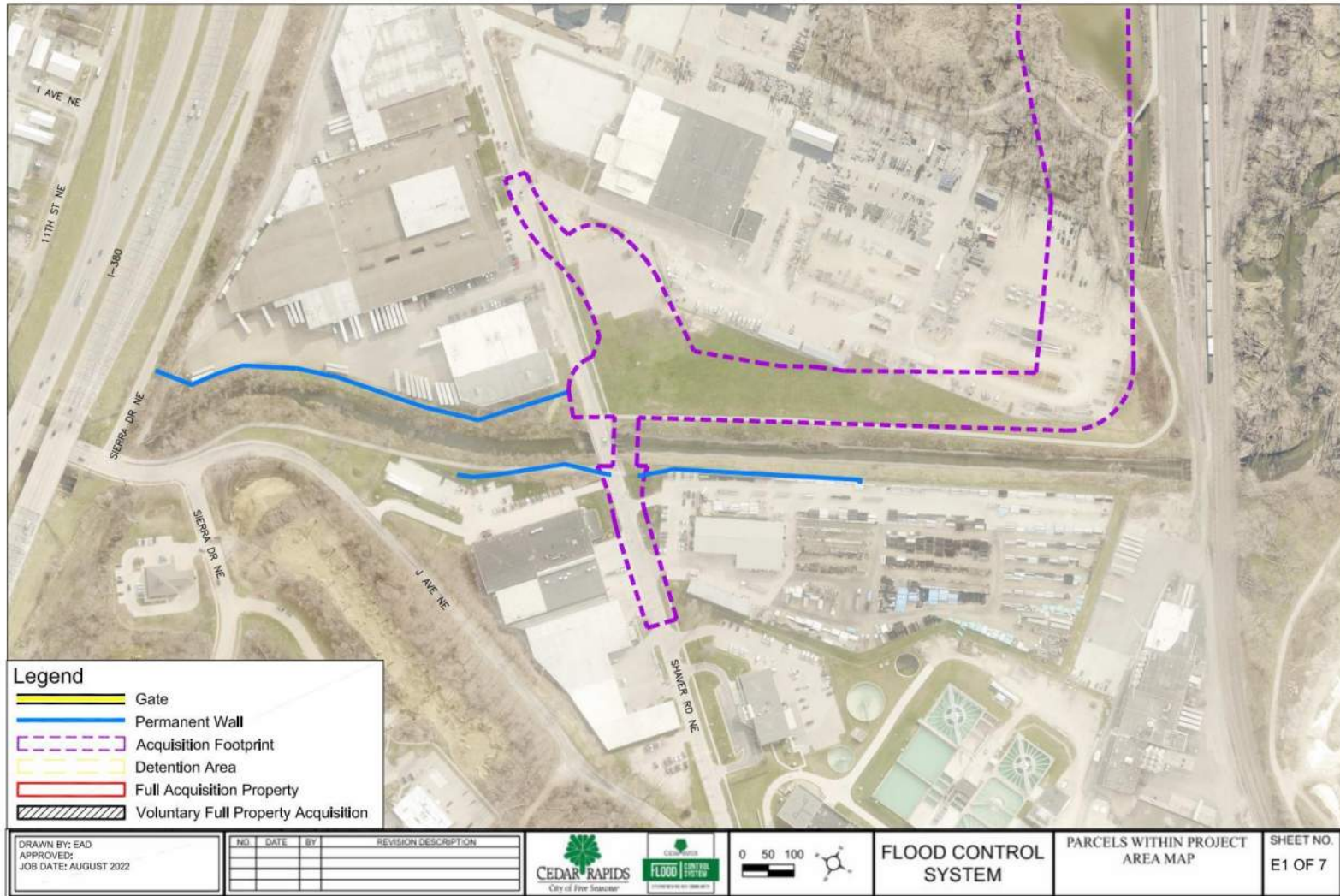






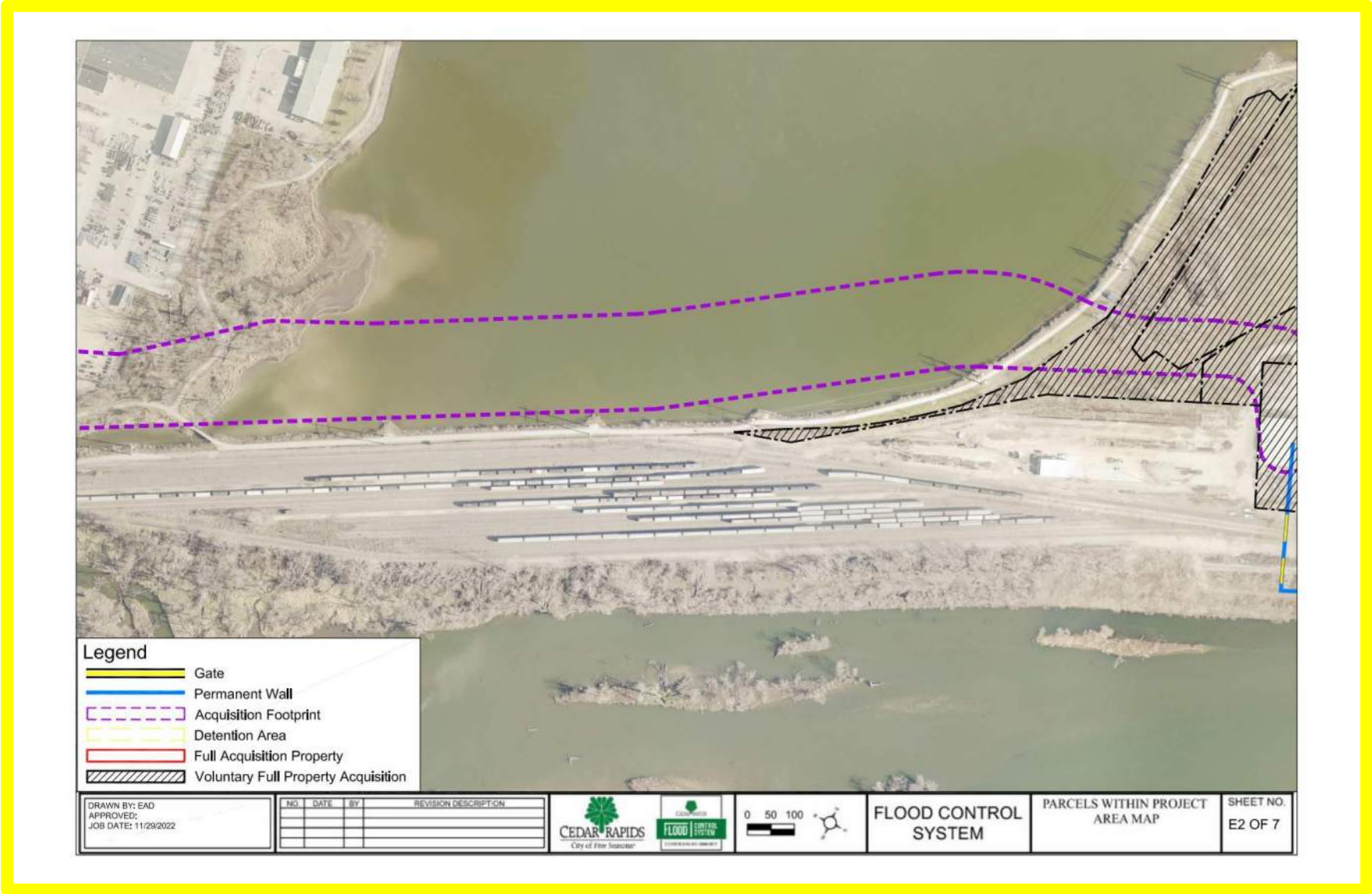


**EXHIBIT VI-5: PROPERTY OWNERSHIP MAPS/PROJECT AREA
MAPS SHOW ONLY FULL PROPERTY ACQUISITIONS
PARTIAL ACQUISITIONS AND TEMPORARY EASEMENTS
NECESSARY WILL BE PER STANDARD CITY PROCESS**



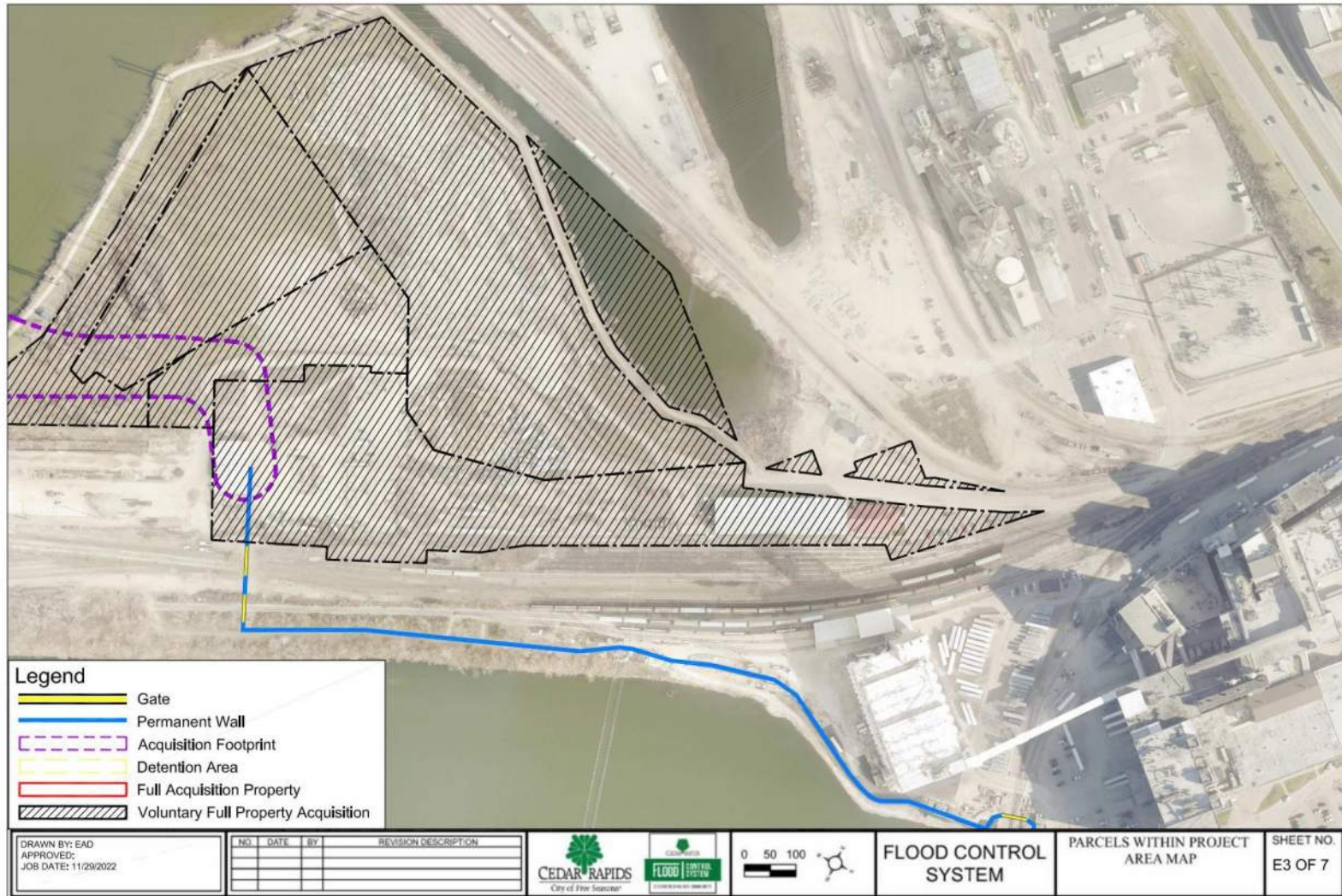
East Reach 1

Sierra Drive NE to Alliant property



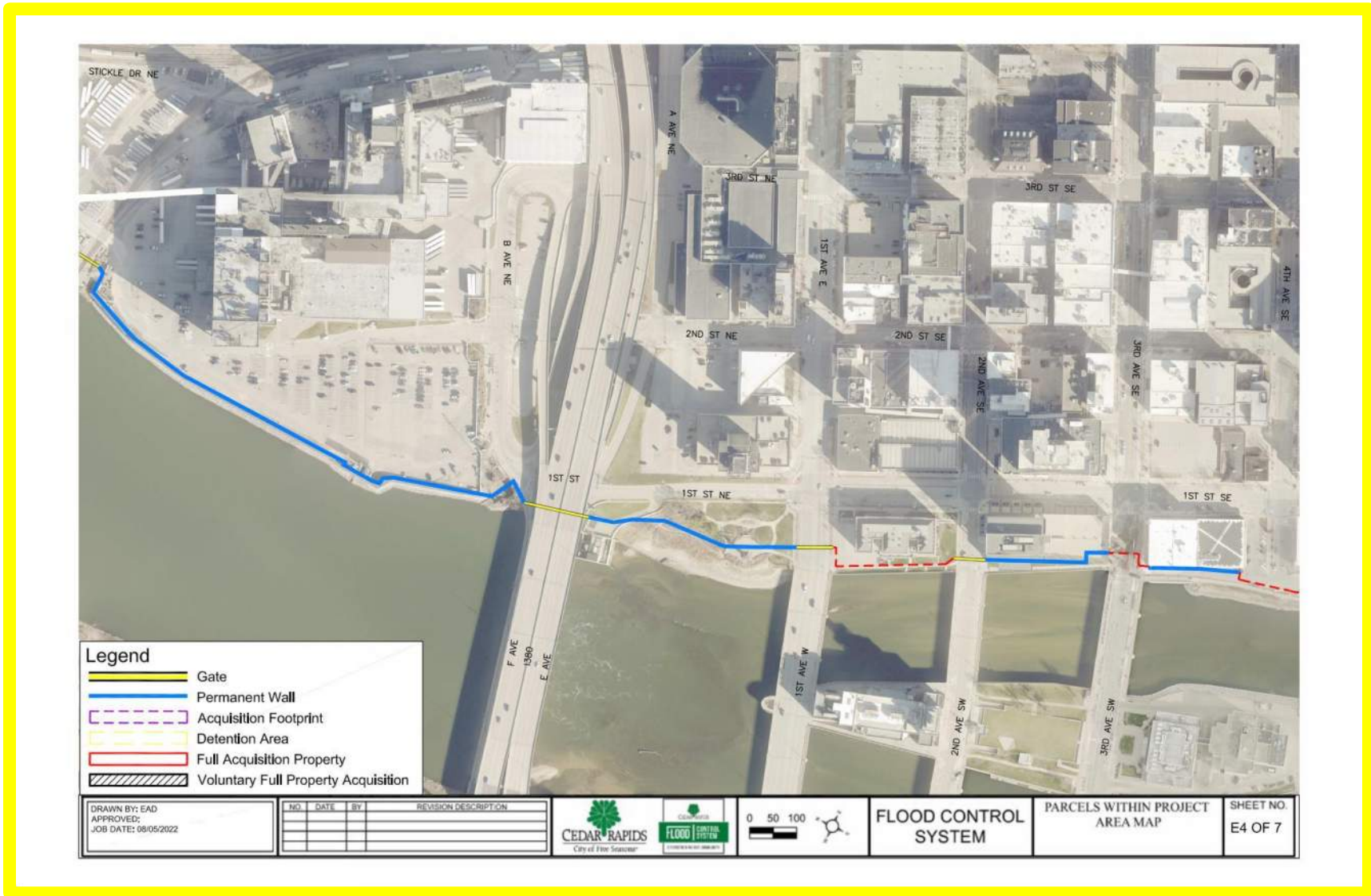
East Reach 1

Midwestern Rail Yard



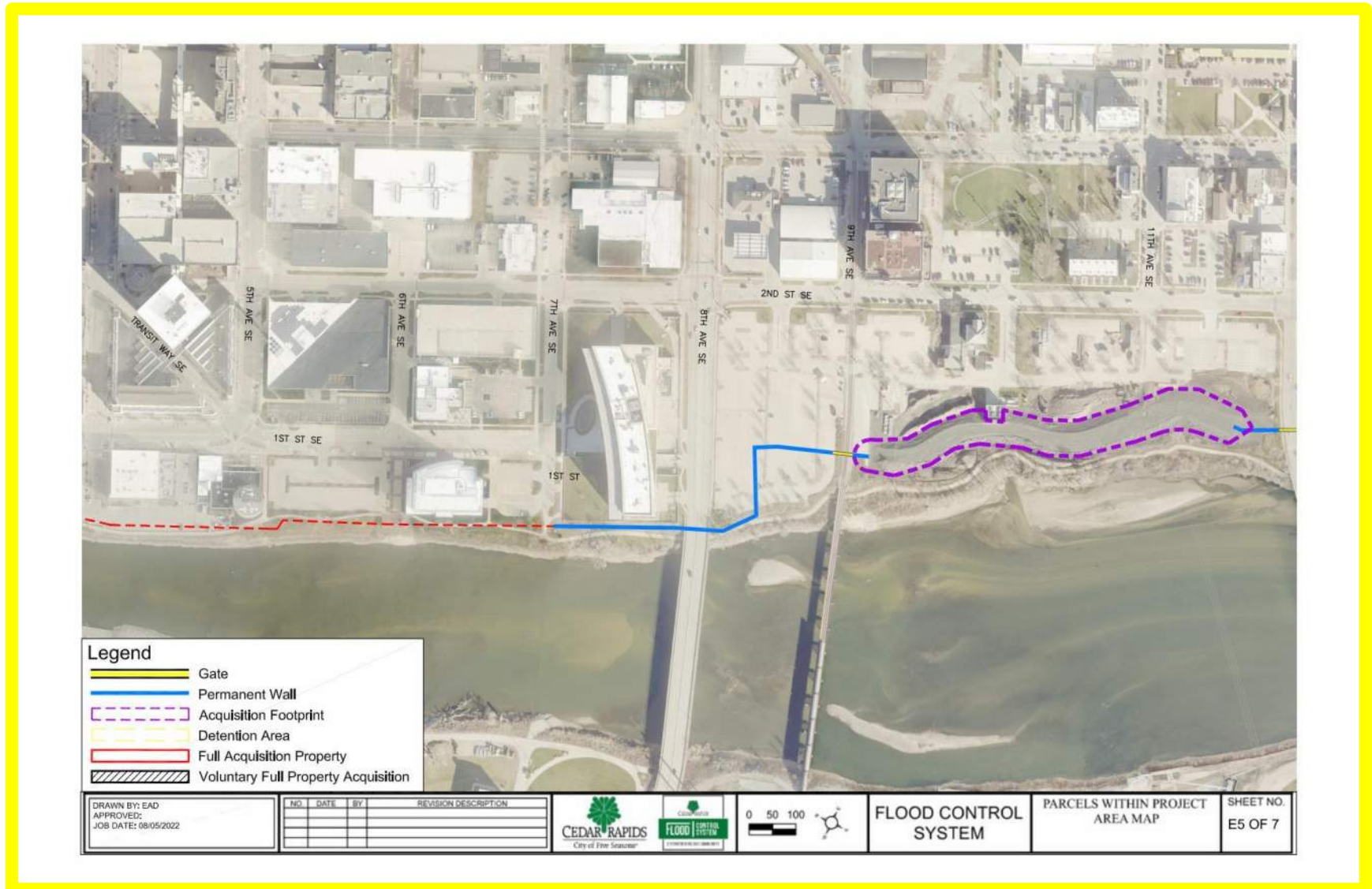
East Reach 1

Cargill to Quaker



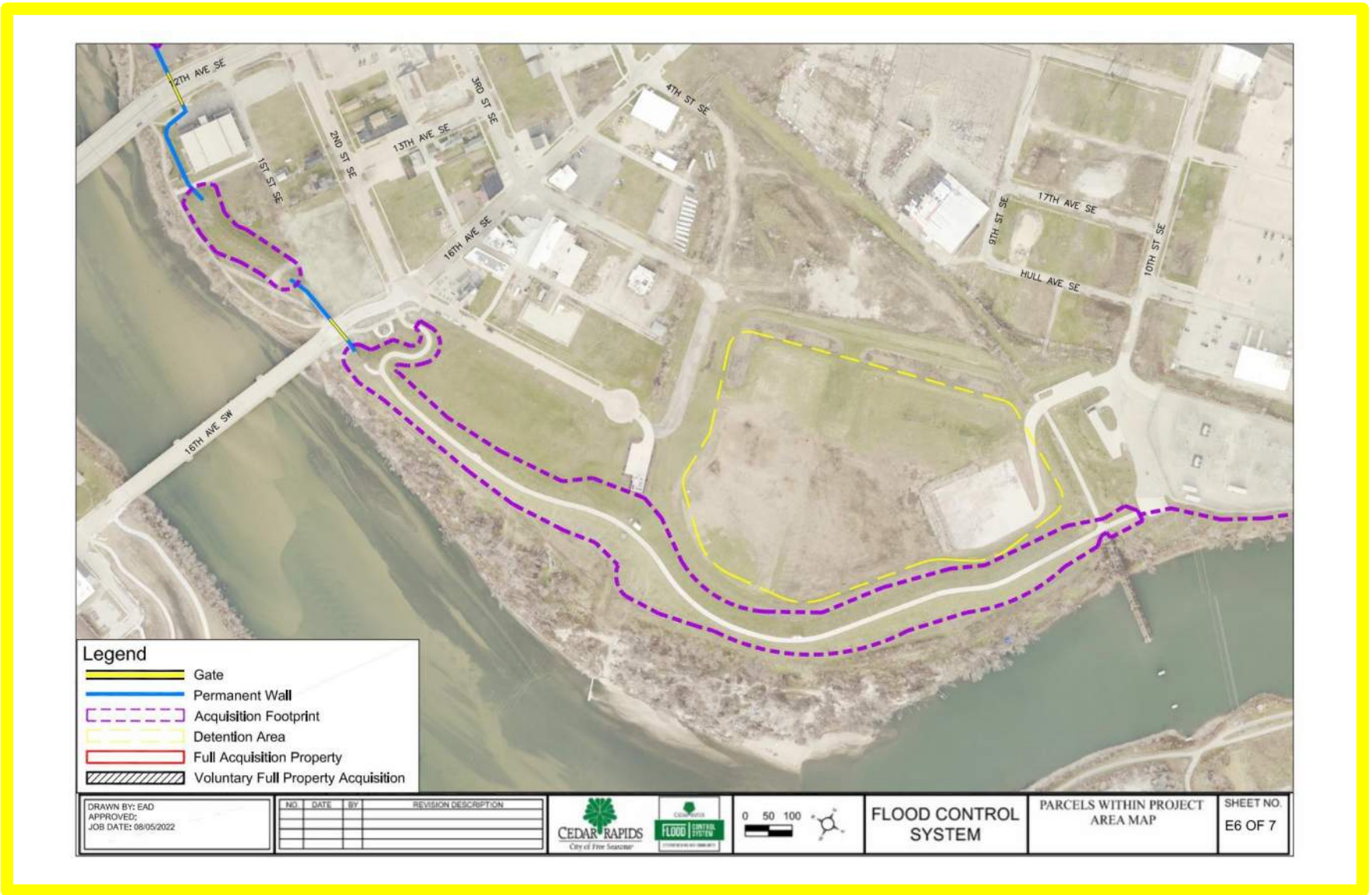
East Reach 2

Quaker to 4th Avenue SE



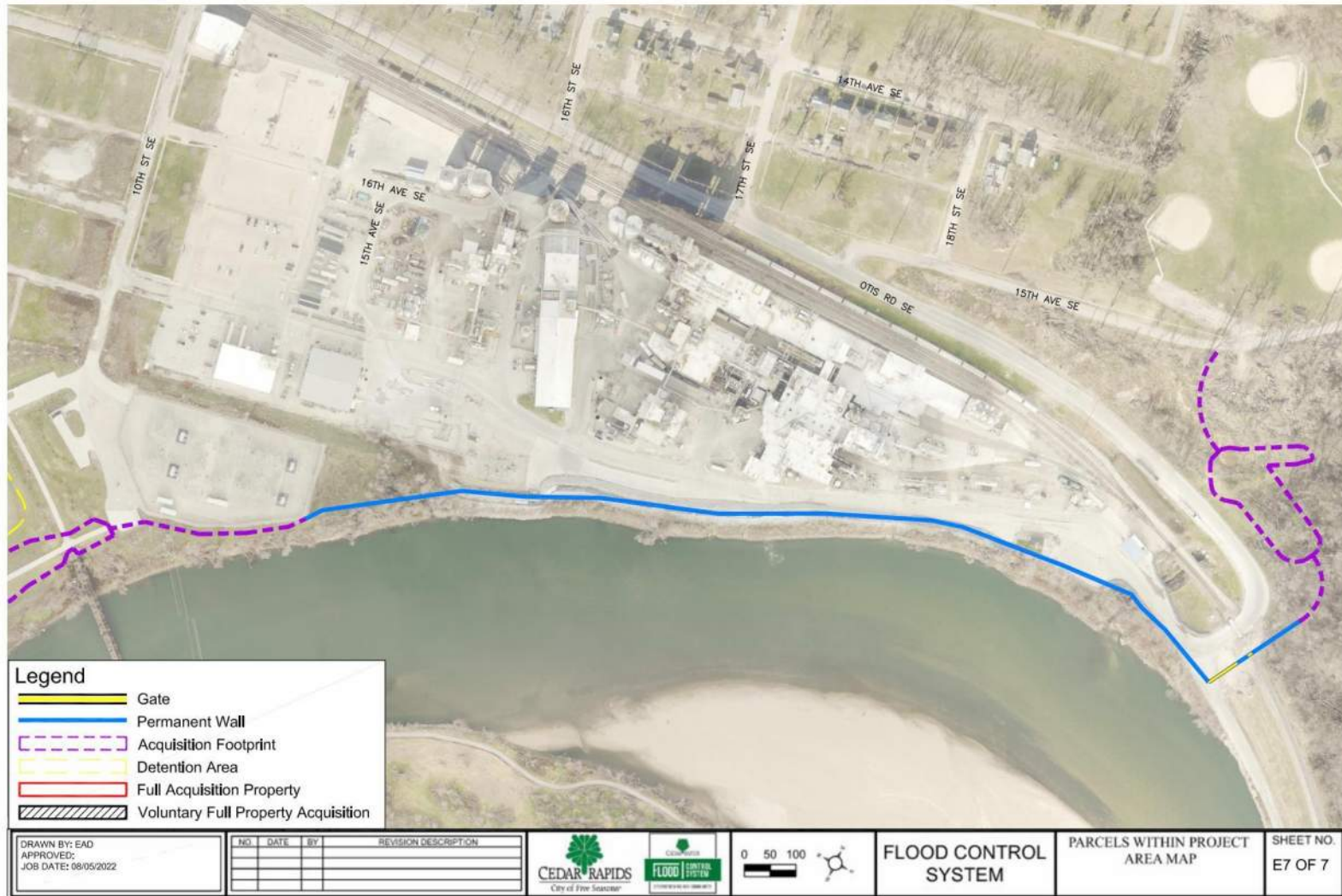
East Reach 2 & 3

5th Avenue SE to 12th Avenue SE



East Reach 3

12th Avenue SE to South Cargill



East Reach 4

South Cargill to Van Vechten Park at Otis Road

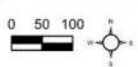


Legend

- Permanent Wall
- Acquisition Footprint
- Detention Area
- Full Acquisition Property
- ▨ Voluntary Full Acquisition Property

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 Approved: Job Number: 10140022
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NO.	DATE	BY	REVISION DESCRIPTION



FLOOD CONTROL SYSTEM

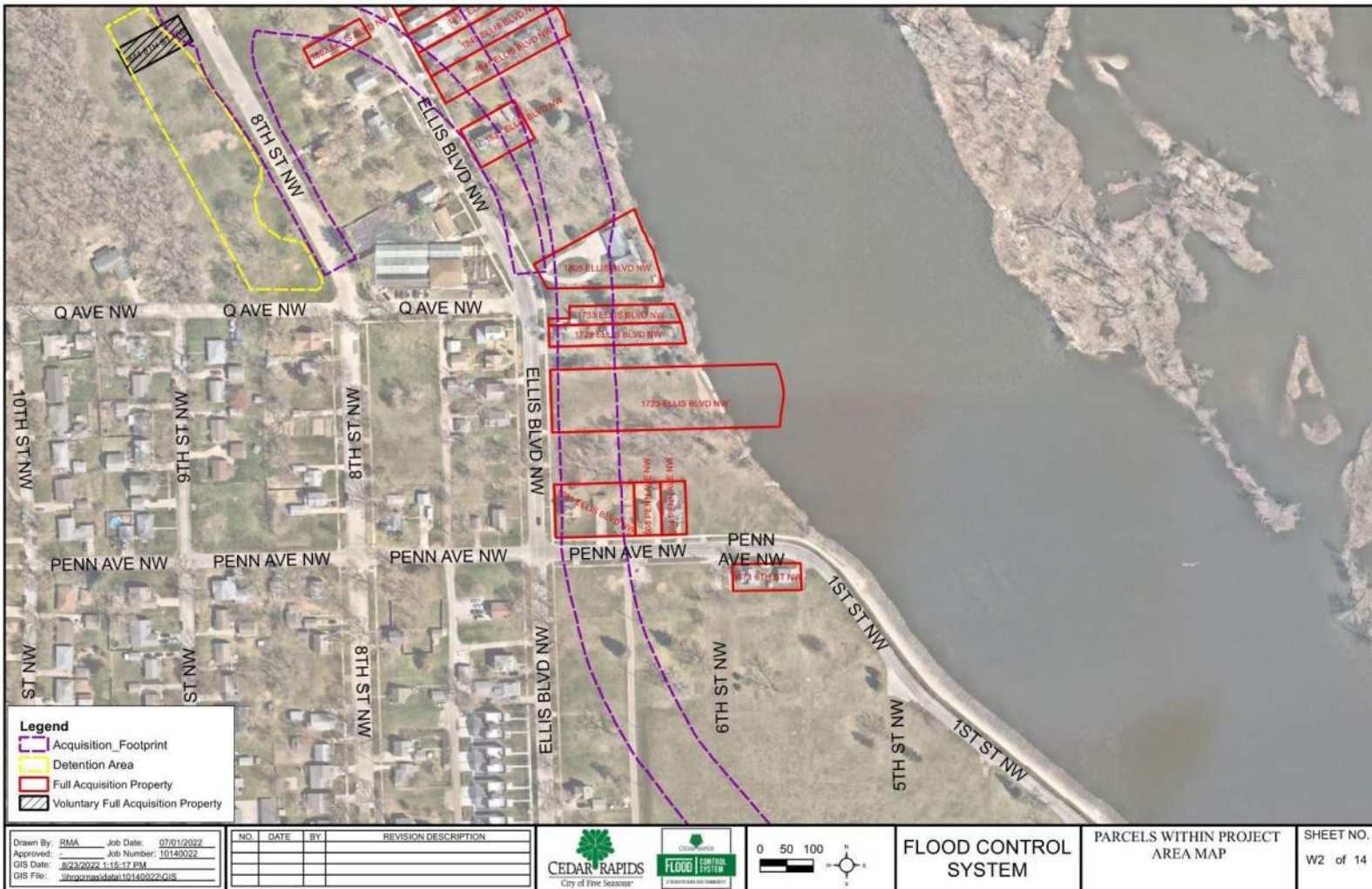
PARCELS WITHIN PROJECT AREA MAP

SHEET NO.
W1 of 14

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West Reach 1

Ellis Pool to Q Avenue NW



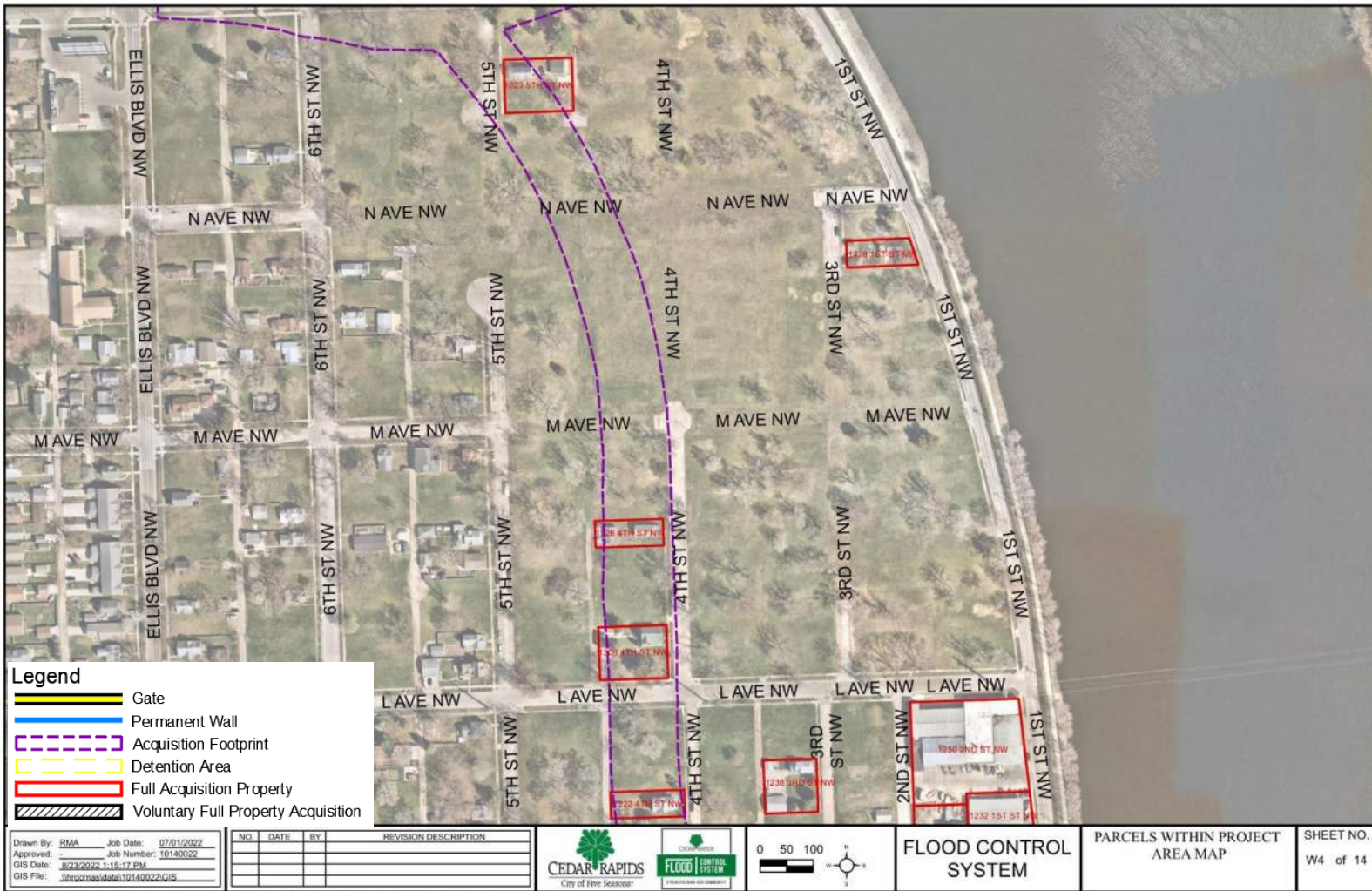
West Reach 1

Ellis Lane NW to O Avenue NW



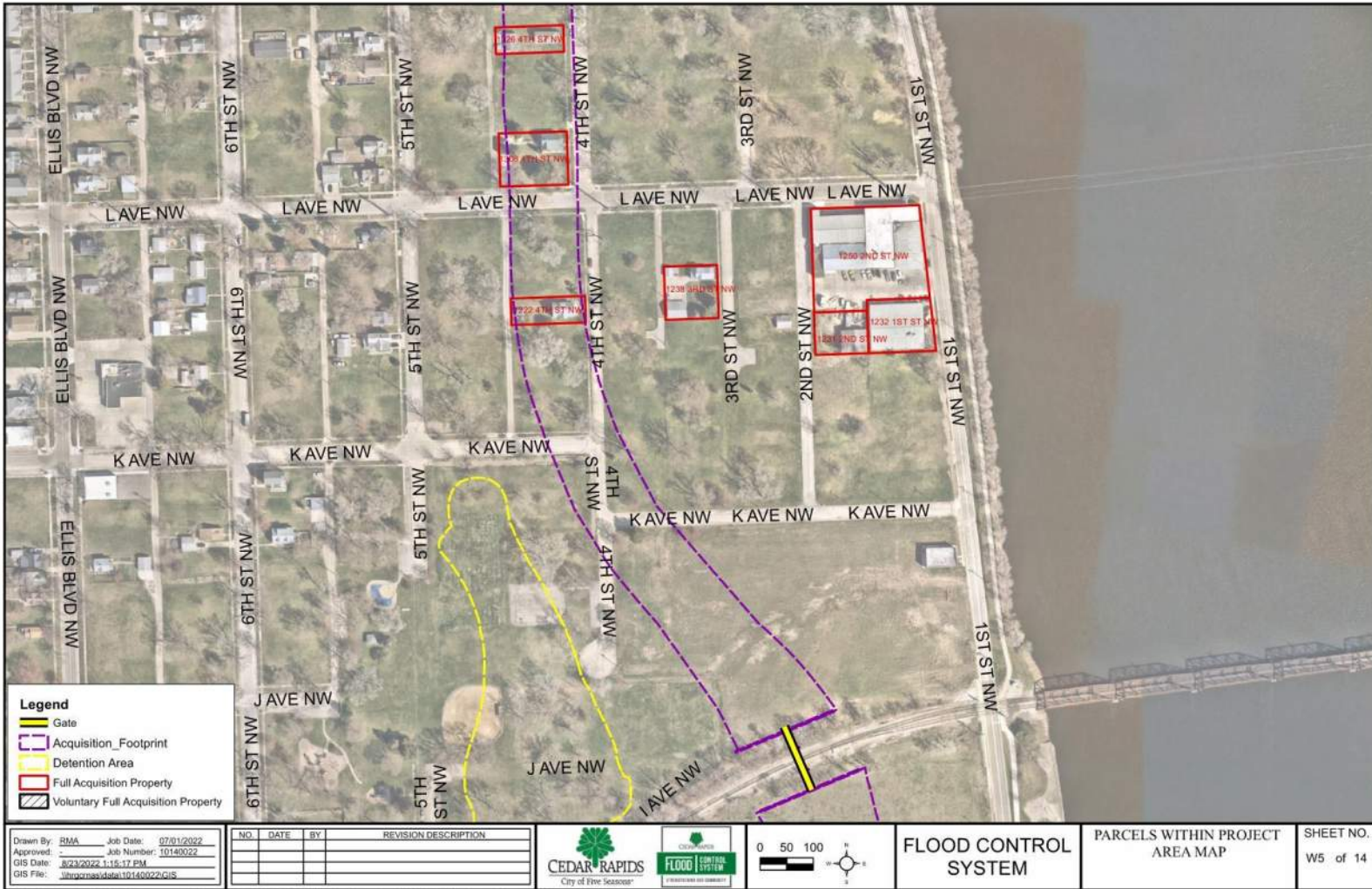
West Reach 1

Penn Avenue NW to M Avenue NW



West Reach 1

O Avenue NW to K Avenue NW

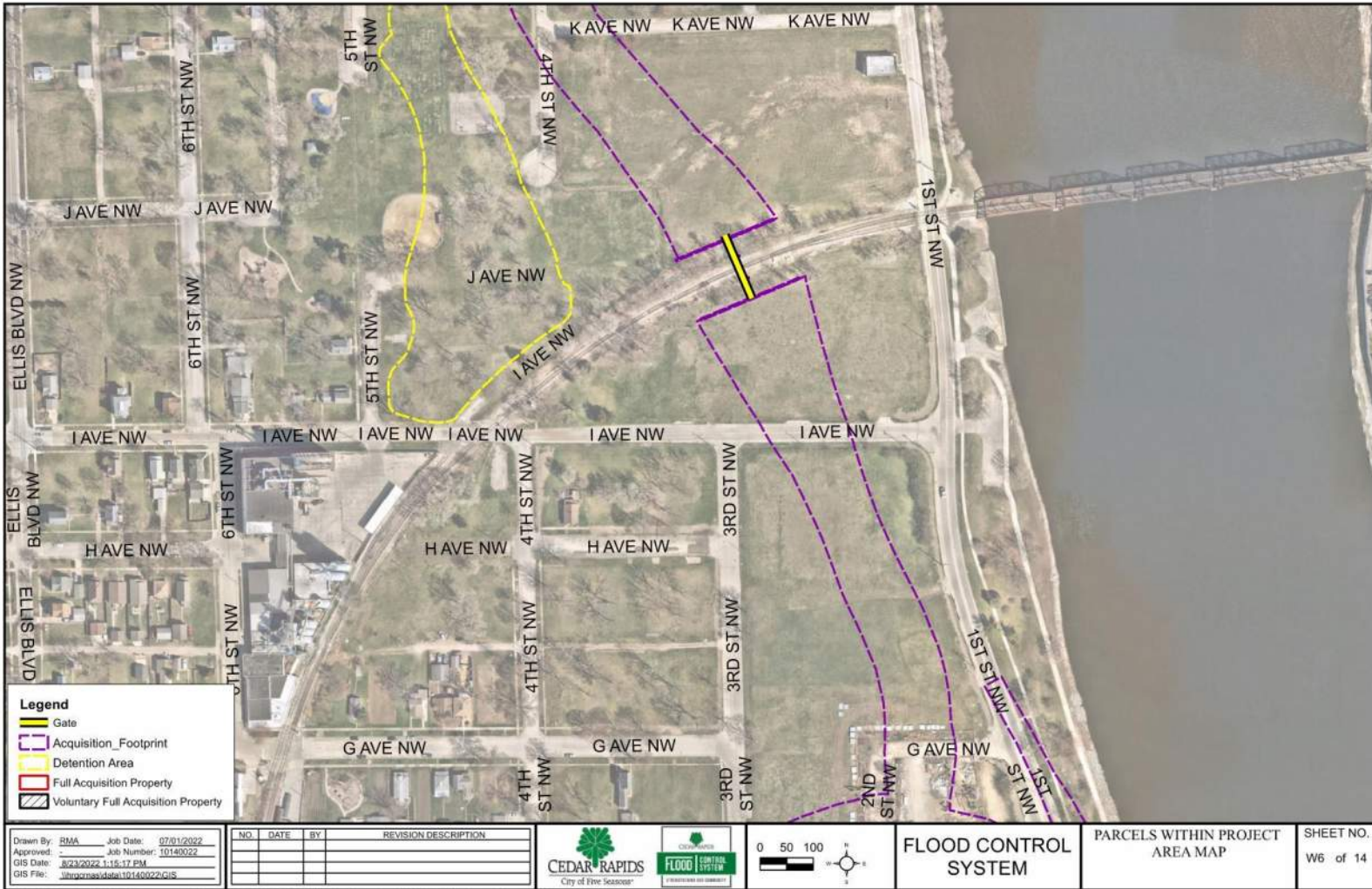


West Reach 1

M Avenue NW to I Avenue NW

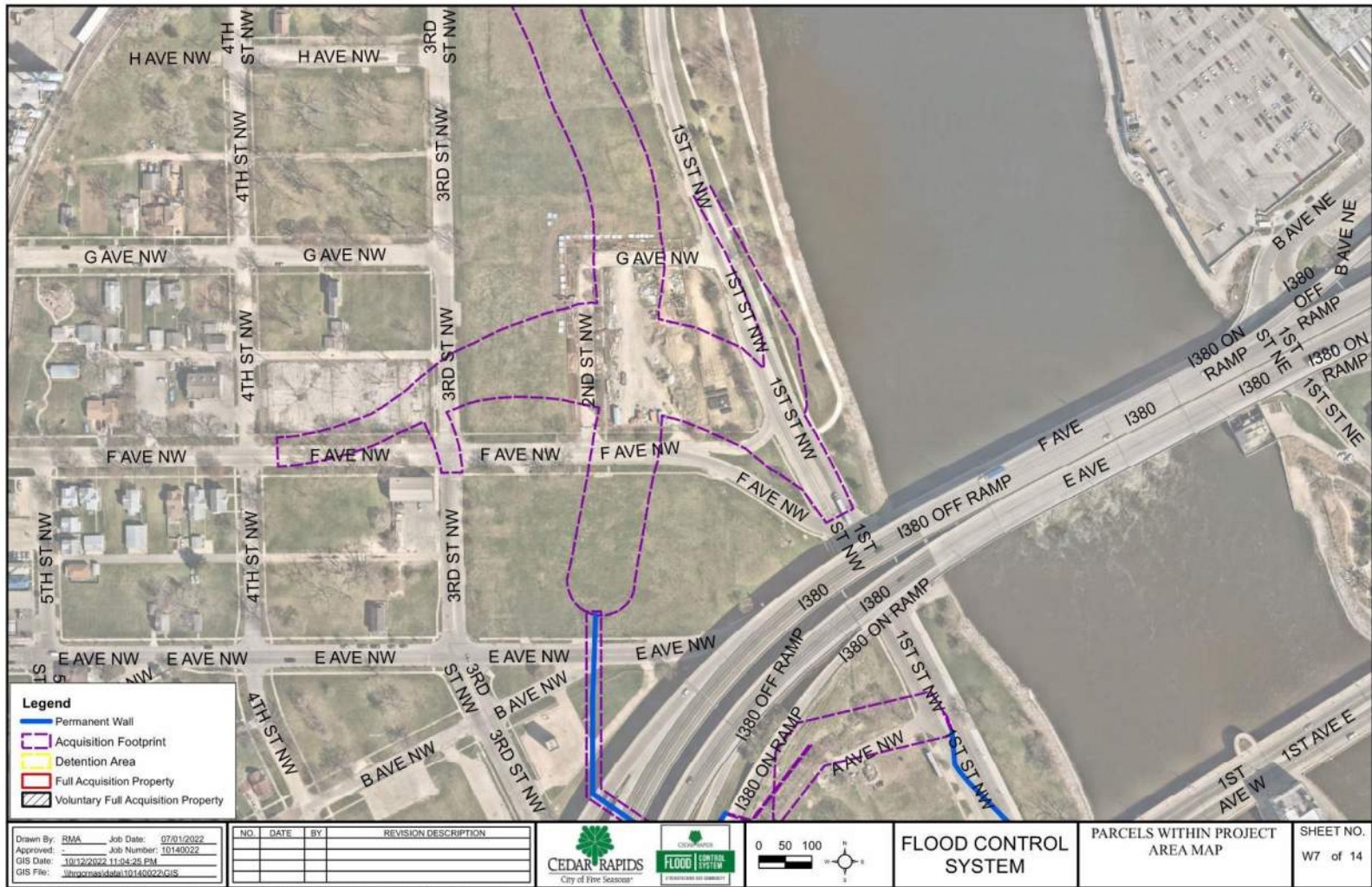
Revision 9

Exhibit VI-5



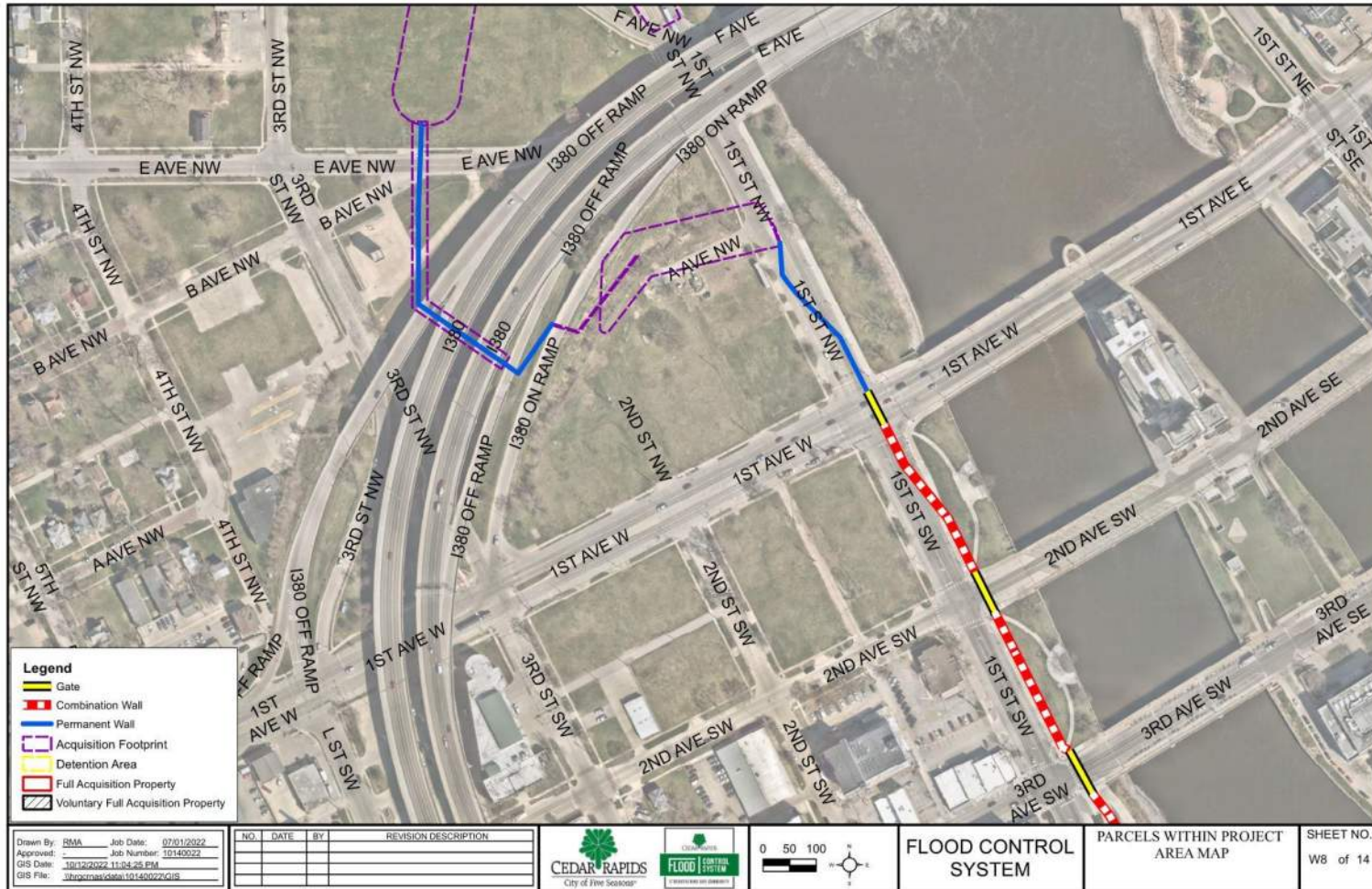
West Reach 1

K Avenue NW to F Avenue NW



West Reach 1

I Avenue NW to 1st Avenue W



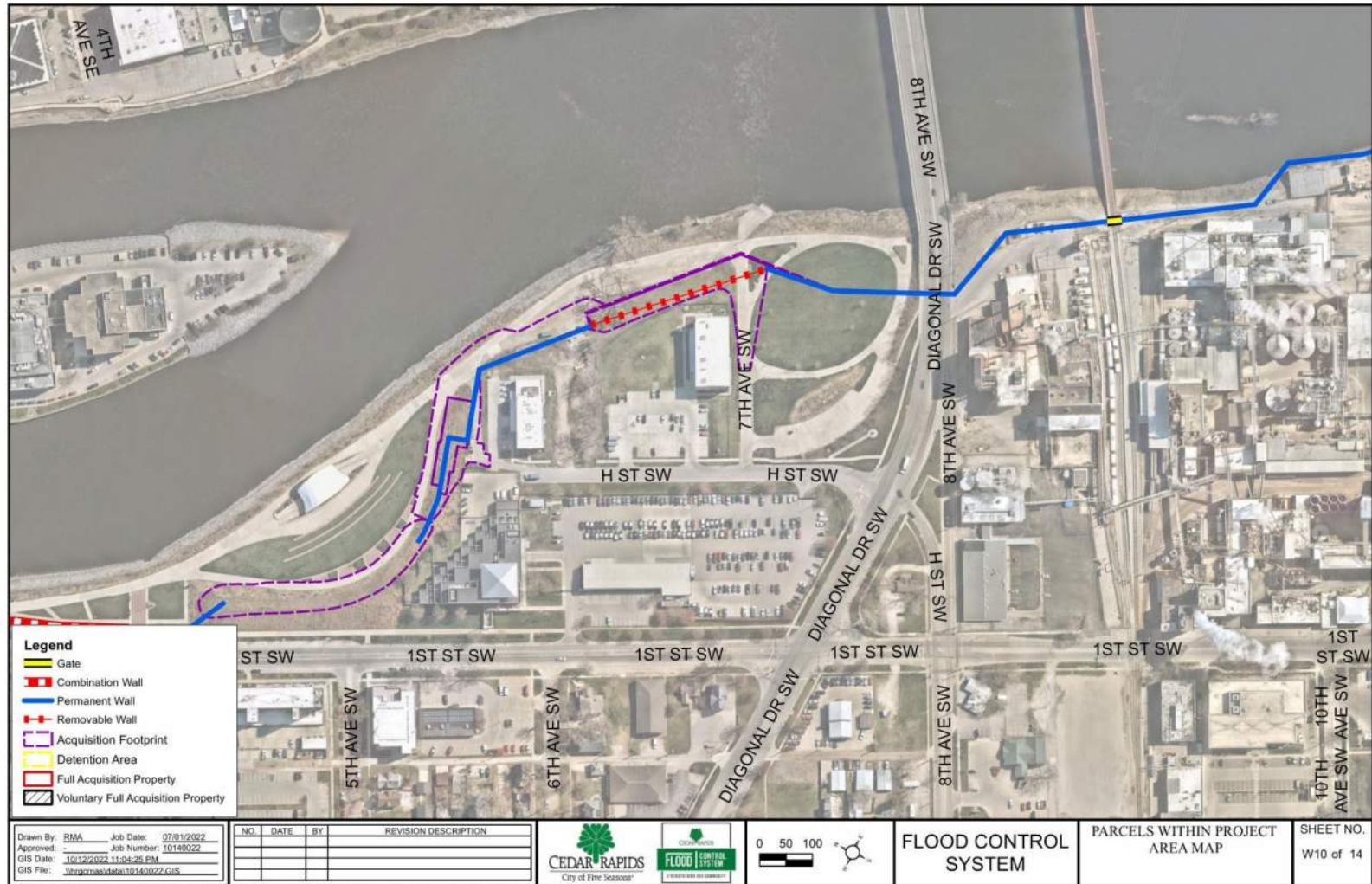
West Reach 1

F Avenue NW to 3rd Avenue SW



West Reach 1 & 2

I-380 to Diagonal Drive SW



West Reach 2 & 3

3rd Avenue SW to Ingredion

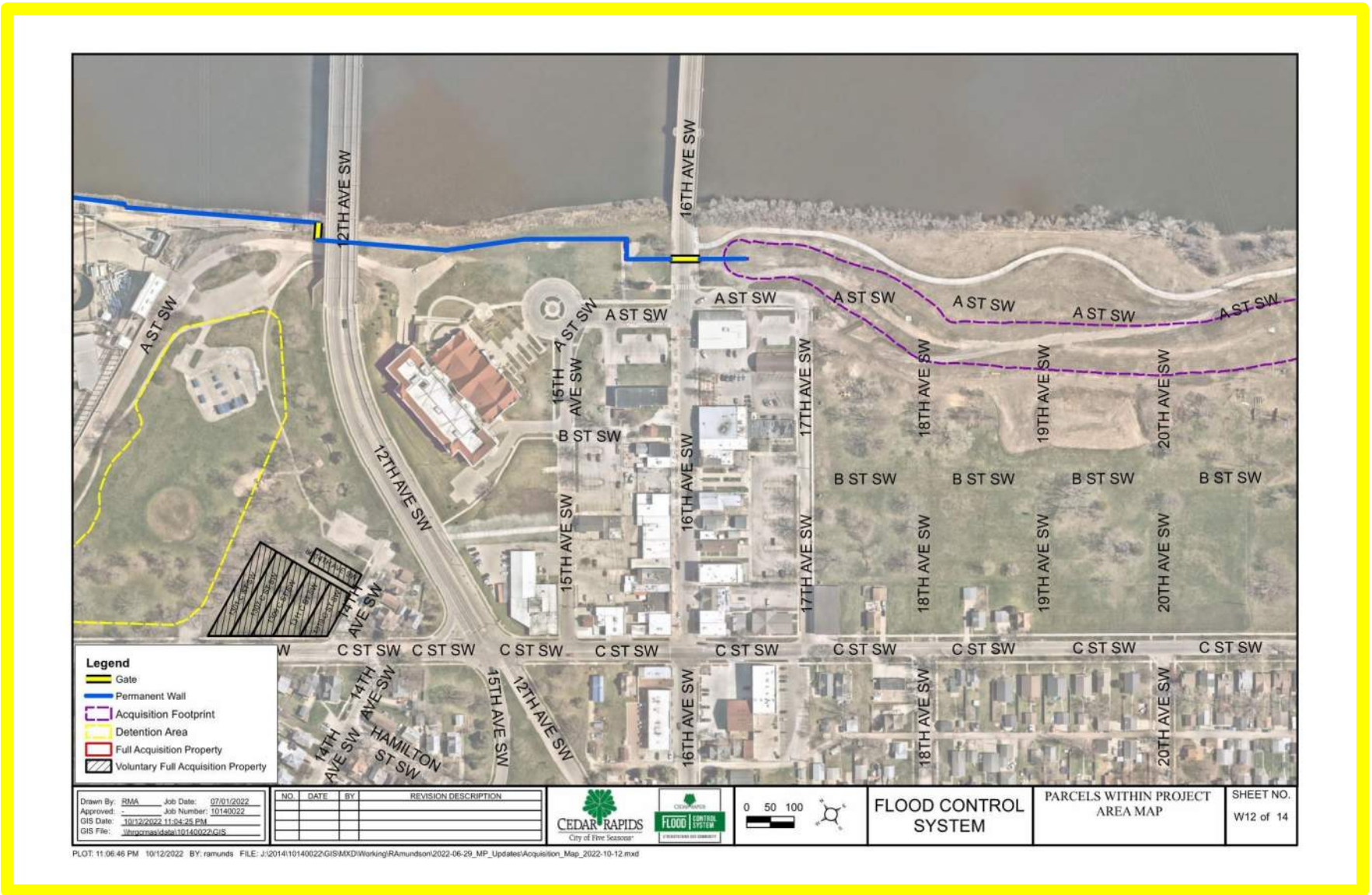
Revision 9

Exhibit VI-5



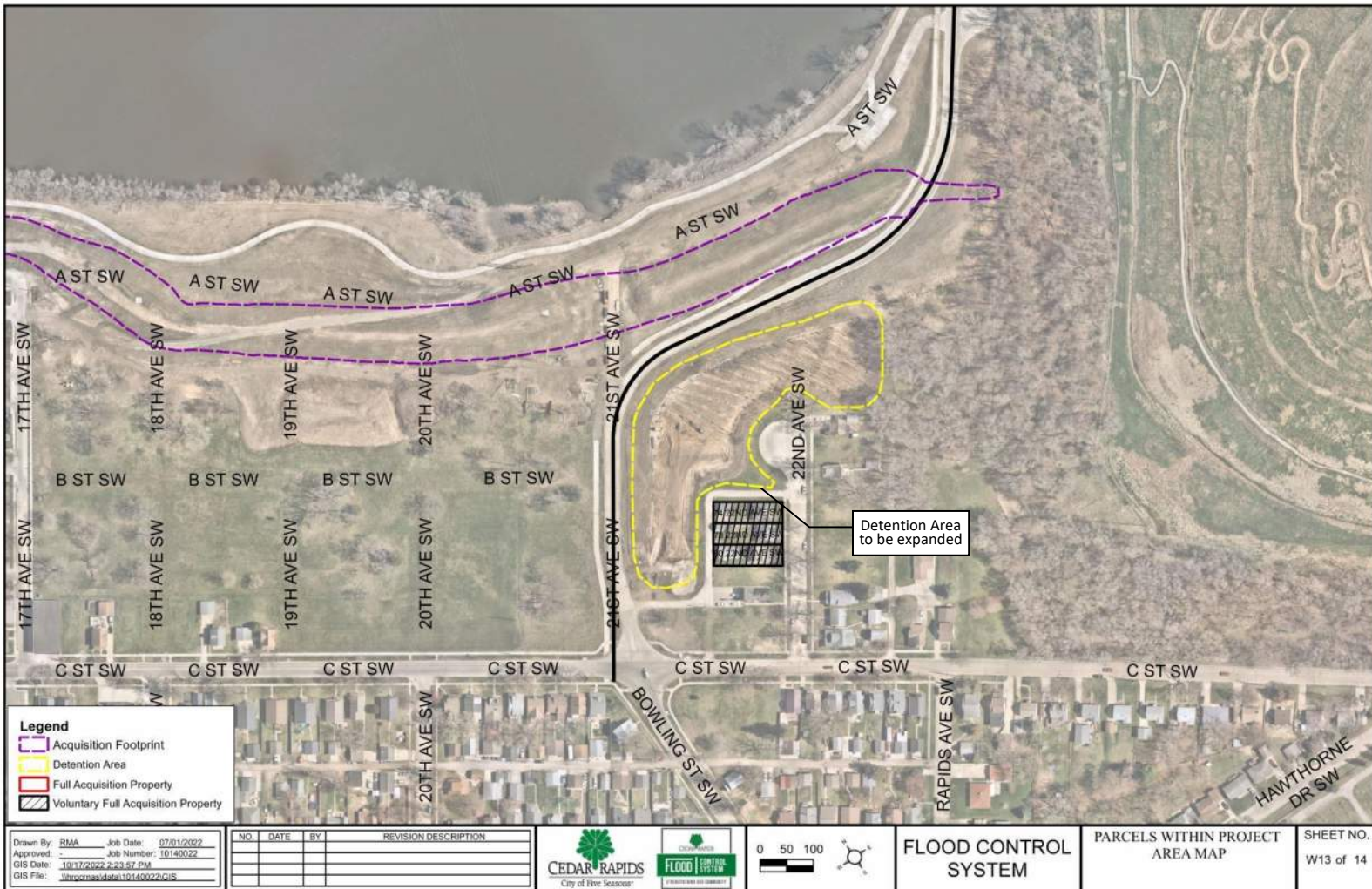
West Reach 3

7th Avenue SW to 16th Avenue SW Gate & Levee



West Reach 3

Ingression to 21st Avenue SW



West Reach 3 & 4

16th Avenue SW to Mount Trashmore

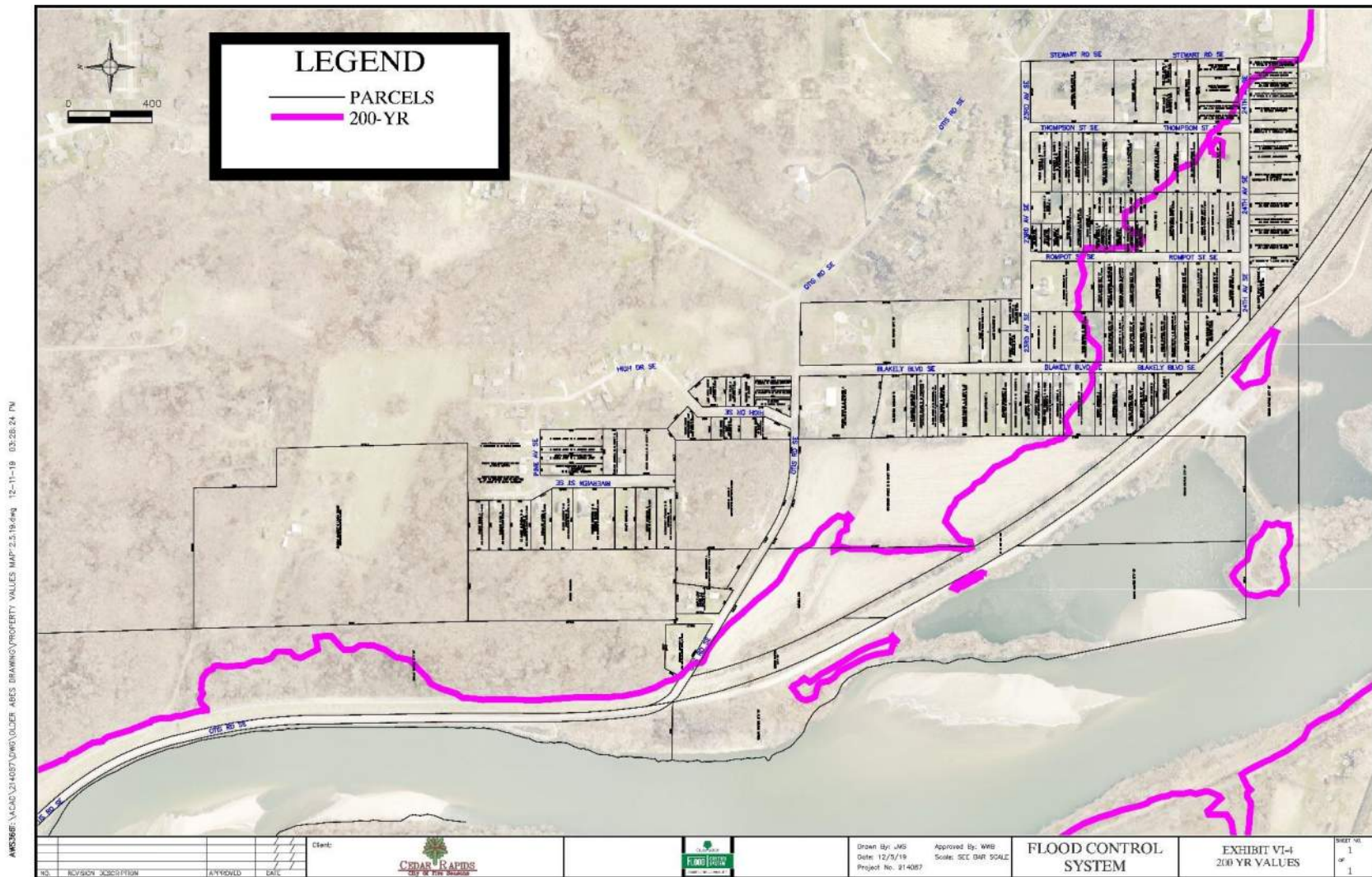


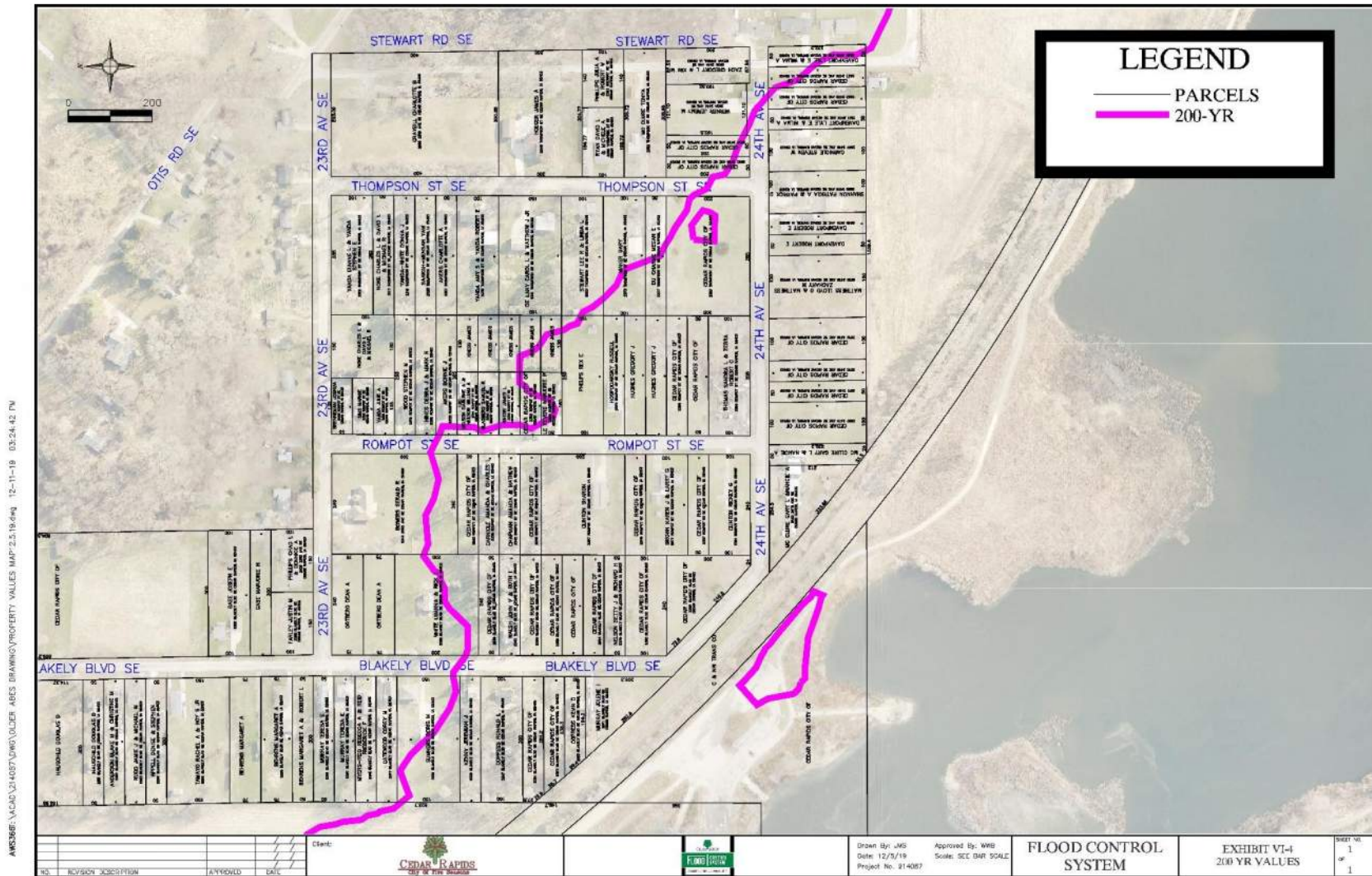
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West Reach 4

Czech Village to Mount Trashmore

EXHIBIT VI–6: Voluntary Acquisition Maps





ARMSB6E:\CAD\24\087\086\050\AGES DRAWING\PROPERTY VALUES MAP\2.5.19.dwg 12-11-19 03:24:42 PM

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NO.	REVISION	DATE	BY	APPROVED	DATE														

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER VII: AESTHETIC GUIDELINES**



Preface

The purpose of the Aesthetic Guidelines is to ensure that the aesthetic goals as defined in this document are fulfilled by the use of cohesive design that will be used equitably on the East and the West sides of the Cedar River as well as with-in each individual sub-area physically and visually.

Background & Purpose

The Cedar Rapids Flood Control System Aesthetic Guidelines are the basis for the aesthetic treatment of the flood control systems and its amenities that make up both the East and West sides of the Cedar River. These guidelines will establish the framework that will guide Design Teams through the process of creating a clear and consistent design aesthetic that will work in concert with all of its functional parts while contributing to the greater whole of the City of Cedar Rapids.

While the Aesthetic Guidelines are meant to provide a clear and consistent direction for initial and future aesthetic design of the flood control systems and amenities, they are also meant to be reasonably flexible in order to promote a level of design creativity.

Aesthetic Principles

Aesthetics are defined as being concerned with beauty or the appreciation of beauty. A principle is a fundamental truth or proposition that serves as the foundation for a system of belief or behavior or for a chain of reasoning.

Thus, aesthetic principles are basically the foundation for the appreciation of beauty. With a possible chain of reasoning being stated as this; A LINE creates a SHAPE, a shape defines a FORM, and a form is enhanced by COLOR and by TEXTURE. The definition of each of these principle elements being as follows;

- **Line** - visual and/or physical link between two points. Lines can be implied and real, such as an allée of trees or light poles or the top of a wall.
- **Shape** - is a two-dimensional space created by intersection horizontal lines.
- **Form** - is the three-dimensional space when vertical lines intersect shape.
- **Color** - defines, clarifies, modifies, accentuates or subdues a form, a space or a line.
- **Texture** - provides surface variations, shades and shadows on forms, shapes and lines. Textures can also be used on large expansive elements, to bring them more or less into scale with the surrounding context.

Aesthetic Qualities

With Aesthetics being defined as being concerned with beauty or the appreciation of beauty and Qualities being defined as the general standard or grade of something. Based on these definitions, aesthetic qualities are essentially the standards for beauty.

Standards like other parameters follow a flow or process, this flow might be stated as this; *order* is the arrangement of the design elements; *proportion* and *rhythm* provide methods for this order, with

harmony providing the cohesion of elements and *balance* establishes design equilibrium. *Contrast* minimizes monotony and *scale* ensures context compatibility, all leading to design *unity* for a project. The definition of each of these quality elements being as follows:

- **Order** - proper place and function to ensure the whole works as a unit without confusion.
- **Proportion** - creating a sense to the order by assigning relative size to various elements.
- **Rhythm** - creating a sense to the order by repetition. Harmony - visually similar and complementary.
- **Balance** - perceived equilibrium of elements around an axis or focal point.
- **Contrast** - complementing design elements with their opposites.
- **Scale** - relative size of the elements compared to the observer.
- **Unity** - a sense of wholeness, encompassing of the perfect application of all the aesthetic qualities.

These principles and qualities aren't exclusive to aesthetics, but when considered all together they provide a balance between form and function at the whole project level, as a well as the individual element level.

General Compliance

The Flood Control System aesthetic elements must comply with all applicable statutes, ordinances, rules and regulations promulgated by the City and all other agencies which have jurisdiction over the project.

In additional to complying with the applicable regulations mentioned above, efforts have been made with these guidelines to offer design flexibility to ensure the various aesthetic elements will be compatible and complimentary with future Citywide wayfinding and branding efforts. This may include, but is not limited to signage (identity and wayfinding), trails (names and wayfinding), logos, colors, images and lighting.

It is the intent of these guidelines be viewed as a "living" document, with amendments, additions, and deletions as needed to keep the document relevant and applicable to the flood control system project and the role this project plays in the development of the social, cultural and economic fabric of the City.

How to Use the Aesthetic Guidelines

The guidelines established in this document build upon the Framework for Redevelopment and Reinvestment Plan and the other chapters of the Cedar River Flood Control System (FCS) Master Plan, and should be utilized as companion pieces and not independent directives.

It is the interrelationship between the flood control systems' structure, both the engineered and the natural elements that can define the form and physical environment of the City. Yet it is the design aesthetics that serve to create an understandable, attractive, and cohesive environment of unifying public and private spaces; aesthetics are critical to a vibrant public realm in the city.

While this project must contribute to the character of the City in a coordinated manner, there are many different ways that an appropriate contribution is realized in detailed design. These guidelines,

therefore, are expressed in descriptive, qualitative terms that indicate an intended design character that will achieve a visual enhancement to the necessary functionality of the flood control system. The guidelines leave room for the inventive solutions by the landscape architects, planners, engineers and architects tasked with the design and implementation of this project. The purpose of these guidelines is not to limit the creativity but to ensure that creativity is working in a desired direction and within a range of acceptable choices focused on achieving the goals and objectives of the community.

Together with the Framework and Master Plans previously mentioned, the aesthetic guidelines make up the design recommendations for the east side, west side and more importantly, the connection corridors; from the planning vision to the project implementation. Each designer should be familiar with all levels of direction, starting with the Framework and Master Plans. It is critical to understanding the overriding context from which these guidelines were framed, and the significance of these to the intended design character within the individual neighborhoods.

As phases are implemented, design or review of a specific proposal requires decisions on the aesthetic details of the project in relation to the design intent and guidelines. In using this document, greater emphasis should be placed on effective interpretation of the statements of element intent rather than the particular examples used to illustrate how the recommendations can be realized.

Ease of Use

The guidelines are presented in four (4) main sections; Overview, Primary Elements, Secondary Elements and Approval Process.

- **Overview** gives the background and sets the stage for the successful application of the aesthetic recommendations.
- **Primary Elements** serve as the main unifying components, establishing an overriding aesthetic for the entire project. These primary components are elements that are included through all sections of the project, and may be visible from side to side.
- **Secondary Elements** directly and indirectly support the primary elements. Providing an additional unifying layer through color, texture and material.
- **Approval Process** outlines the submittal and approval process necessary to move each phase / segment forward.

The Primary and Secondary Elements sections are further broken down into three parts: 1) intent, 2) parameters and 3) application possibilities.

Not all the elements contained in the Flood Control system are addressed within these Guidelines. The expectation is that if an element isn't specifically identified and addressed herein, that it will be designed in a way to blend in with its' surrounding context or to other applicable standards.

For instance, pump-houses, these should be designed and constructed to blend in. In other words, if the location of the proposed pump-house is in a residential neighborhood, then the pump-house shall be designed with appropriate materials and to an appropriate scale to appear as a residential building. In an urban industrial area, the pump-house shall be designed to an urban industrial scale with appropriate materials.

Levees are another example. Levees will be designed to applicable regulations with any aesthetic enhancements, such as over-burden also being designed and installed to comply with applicable regulations.

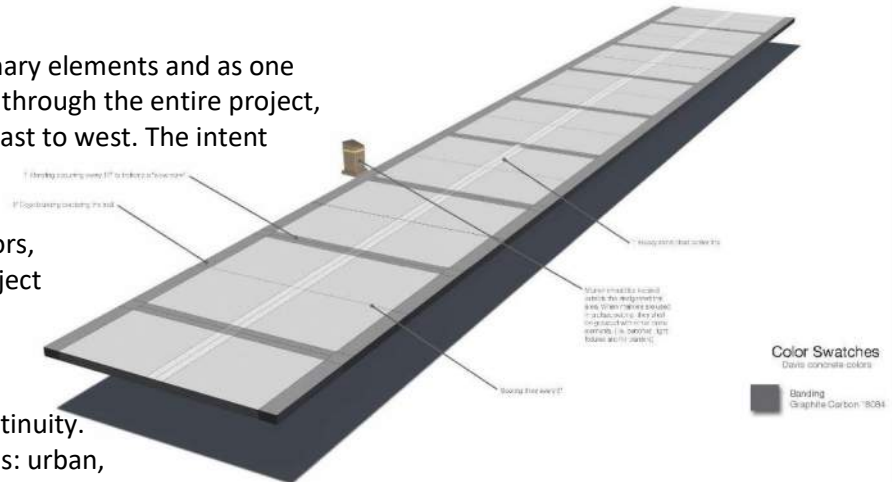
Primary Elements

“Aesthetic duality, according to which objects with practical functions can be aesthetically pleasing or put more simply, satisfaction of functional requirements in most cases contributes positively to aesthetic value.” - *Sven Ove Hansson, October 17, 2005*



Trail (Urban Zone)

The trail is one of the three primary elements and as one of those elements is contiguous through the entire project, connecting north to south and east to west. The intent of the trail design is to create a continuous ribbon, with recognizable and consistent colors, design and relation to other project elements. It is envisioned that a user can distinguish and navigate the entire trail system easily because of the design continuity. The project has three trails zones: urban, park and intersections.



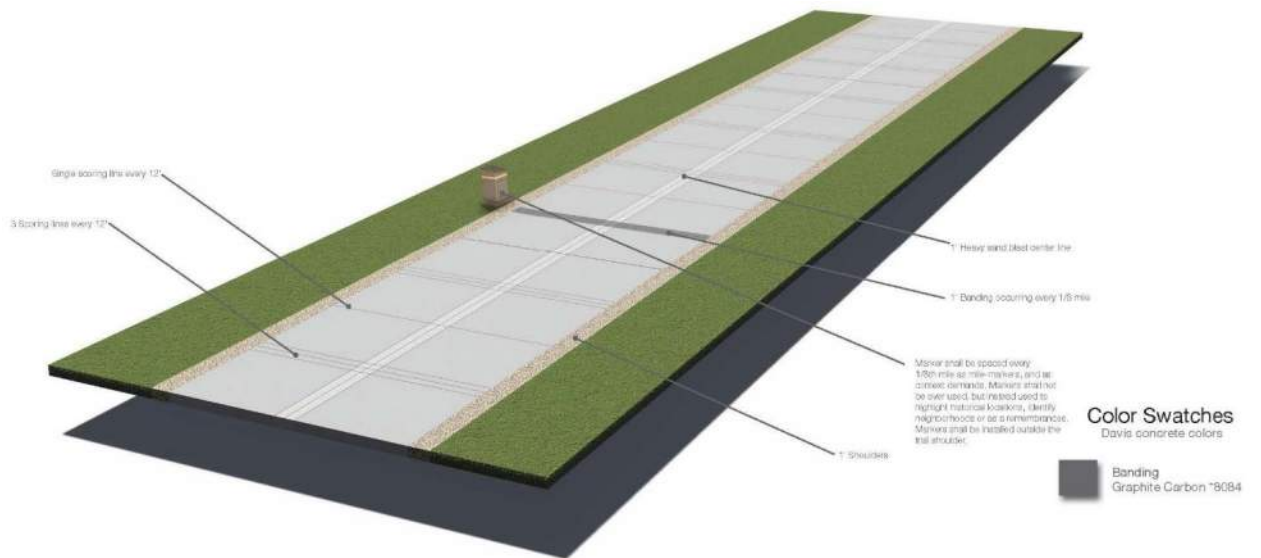
The trail in the urban zone has colored concrete banding on the edges and every 12 feet across the trail to indicate a slow area. This part of the trail is envisioned to run through the numerous plazas located in and directly adjacent to the downtown area.



Trail (Park Zone)

The trail is one of the three primary elements and as one of those elements is contiguous through the entire project, connecting north to south and east to west. The intent of the trail design is to create a continuous ribbon, with recognizable and consistent colors, design and relation to other project elements. It is envisioned that a user can distinguish and navigate the entire trail system easily because of the design continuity. The project has three trails zones: urban, park and intersections.

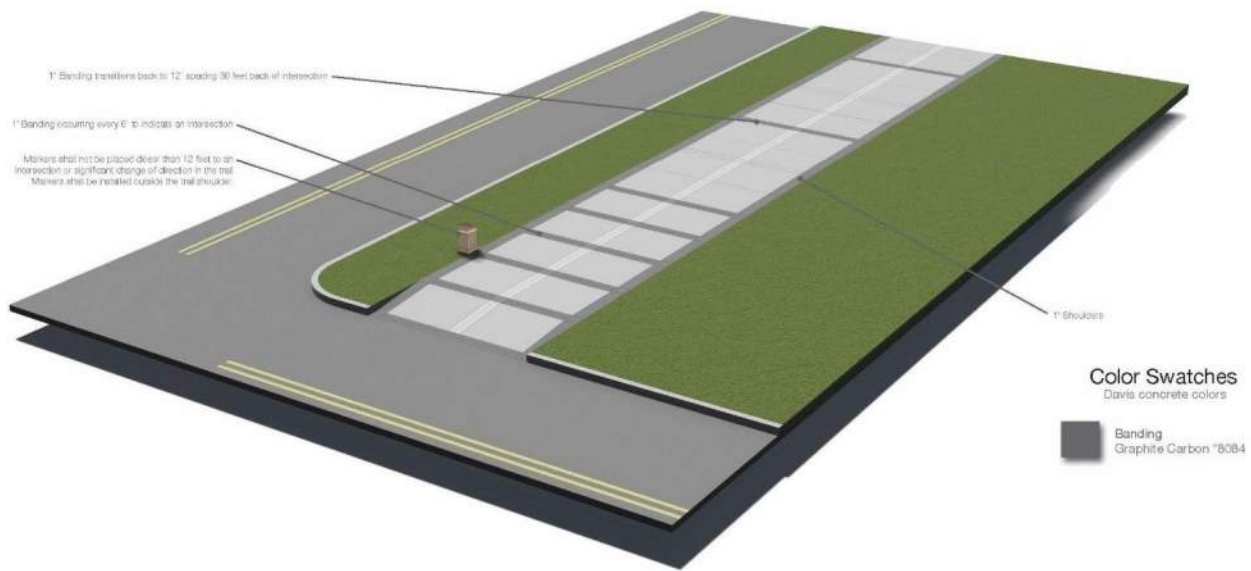
The trail in the park zone has a 1-foot shoulder which can be either gravel or permeable paver. The trail also has cross banding every 1/8 mile. This cross banding has a dual purpose, first to inform users how far they have traveled and second to emphasize the location of the marker elements.



Trail (Intersection Zone)

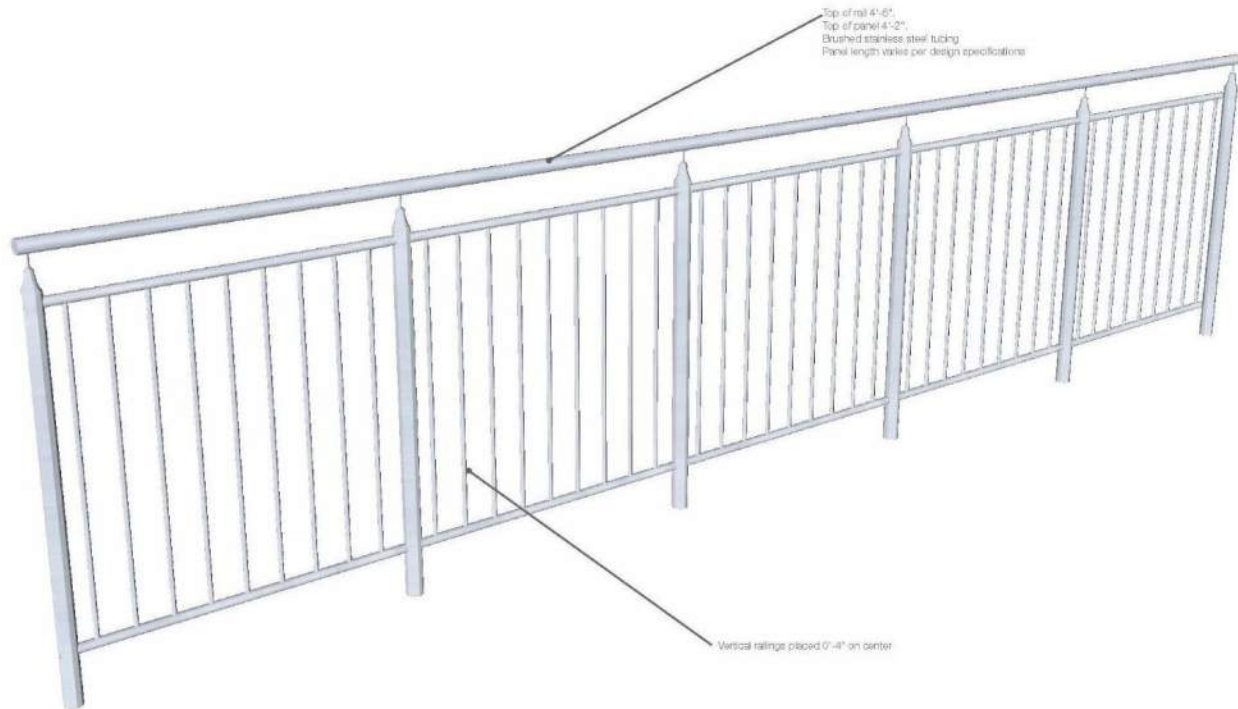
The trail is one of the three primary elements and as one of those elements is contiguous through the entire project, connecting north to south and east to west. The intent of the trail design is to create a continuous ribbon, with recognizable and consistent colors, design and relation to other project elements. It is envisioned that a user can distinguish and navigate the entire trail system easily because of the design continuity. The project has three trails zones: urban, park and intersections.

The trail in the intersection zone has a 1-foot permeable paver or gravel shoulder with cross banding every 6 foot extending 30 feet back from an intersection. This banding has a purpose of informing the trail user that they are approaching cross traffic and caution should be taken.



Railings

As one of the three primary elements, the railings used throughout the Flood Control System project will be the same. As with the other primary elements, the railings are a significant component and element used in tying the whole project together from north to south and east to west. The only variable within the design of the railing will be the post (panel width) spacing, this is to allow the railing to be context sensitive to various installation locations.



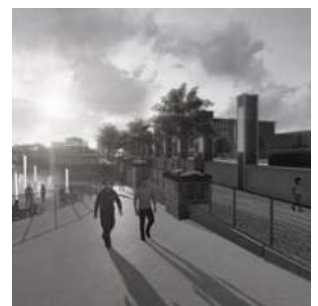
Rendering of the proposed trail along the CRST building (East Side Reach 2).



Rendering of proposed park surrounding the 5 Seasons sculpture.

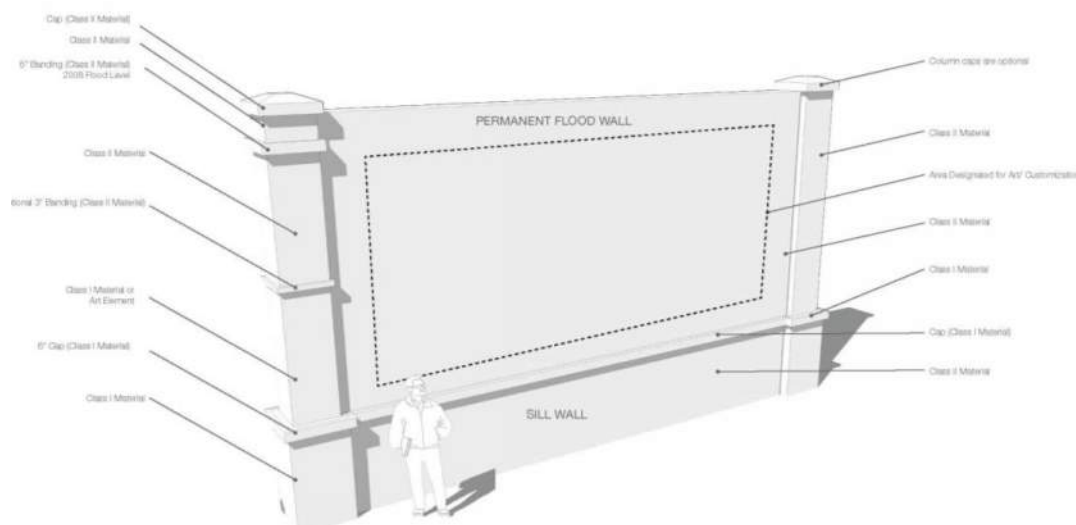
Secondary Elements

“Beauty and Aesthetics are not languid but energetic. By beautifying the outward aspects of life, one would beautify the inner ones.” - *Oscar Wilde, 1882*



Wall System (Permanent)

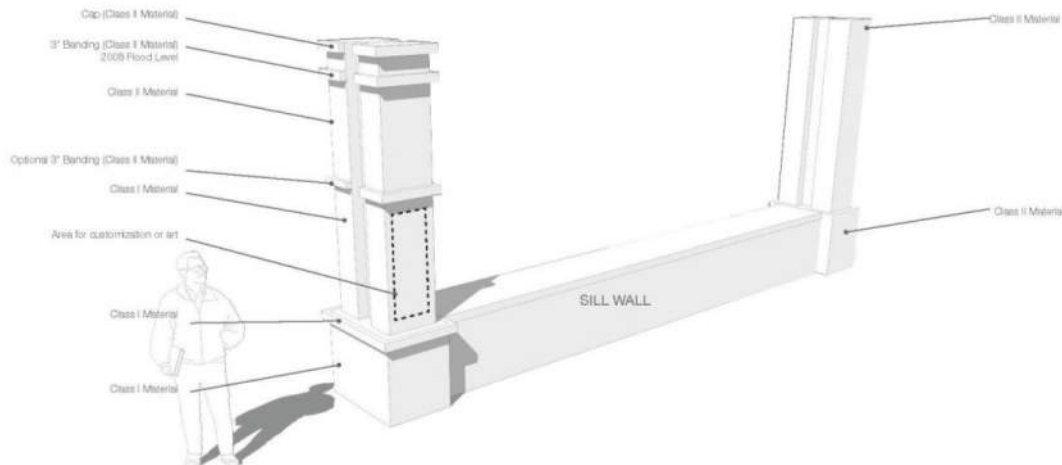
Columns are scalable based on application and location. The proportions (dimensions) of the columns shall remain relative as shown in the example below. The minimum size of each column will be determined by a structural engineer, with the aesthetic elements being added to the exterior of this engineered core. It is the aesthetic elements that shall fit within these proportional parameters and will be governed by these guidelines. Columns may be freestanding, embedded in a berm or affixed to other structures, but the overall proportion, scale and detail shall remain consistent. **A top of wall triangular deterrent cap will be transitioned into the wall design; this will be utilized as necessary to discourage use of the wall for anything other than a floodwall.**



Rendering of the aesthetics of proposed permanent wall wet side trail.

Wall System (Removable)

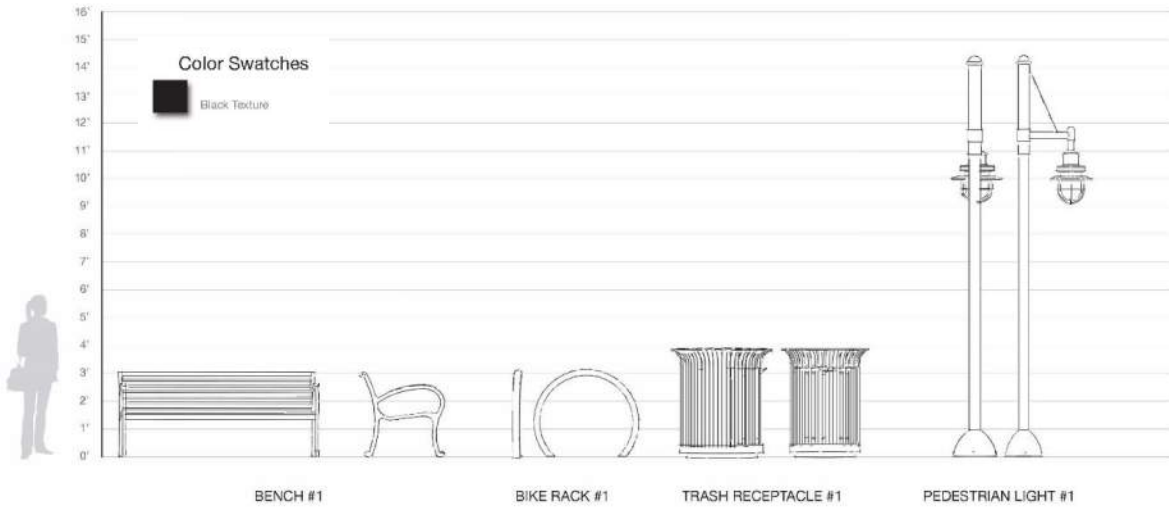
Columns are scaleable based on application and location. The proportions (dimensions) of the columns shall remain relative as shown in the example to the right. The minimum size of each column will be determined by a structural engineer, with the aesthetic elements being added to the exterior of this engineered core. It is the aesthetic elements that shall fit within these proportional parameters and will be governed by these guidelines. Columns may be freestanding, imbedded in a berm or affixed to other structures, but the overall proportion, scale and detail shall remain consistent.



Rendering of proposed removable system near greenspace in downtown Cedar Rapids.

Amenities (Family-1)

Family 1 is a combination of site amenities that provide a cohesive sense of style for the traditional neighborhoods. A good compliment to the other three families, this family of furniture offers some traditional lines and characteristics suited to a mainstreet setting.



Rendering of proposed Amenities Family 1.

Amenities (Family 2)

Family 2 is a combination of site amenities that provide a cohesive sense of style for the urban environment. With the modern lines and styles, this family is envisioned to provide cohesion and character to the urban plazas and spaces.



Rendering of Amenities Family 2.

Amenities (Family 3)

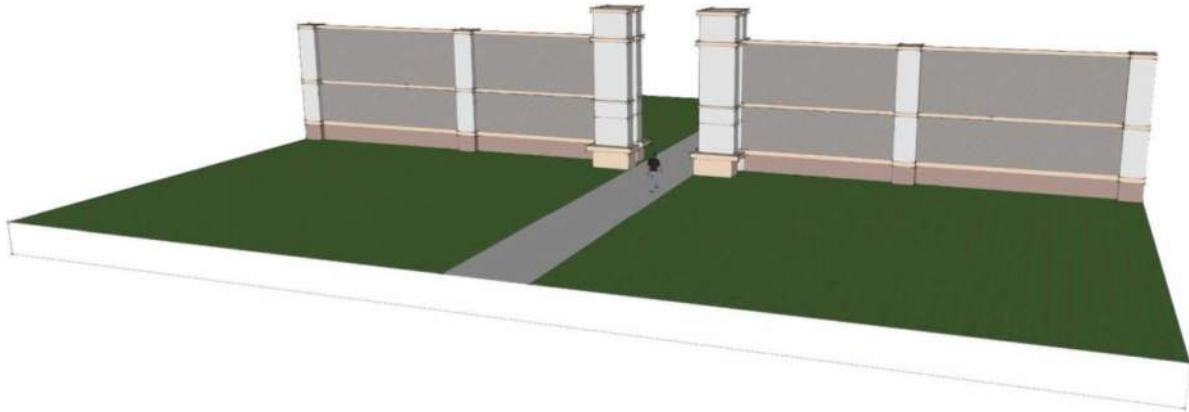
Family 3 is a combination of site amenities that provides a cohesive sense of style for the park environment. This style is a more basic style, lending its' use to a variety of settings.



Rendering of Amenities Family 3.

Gateways (Pedestrian)

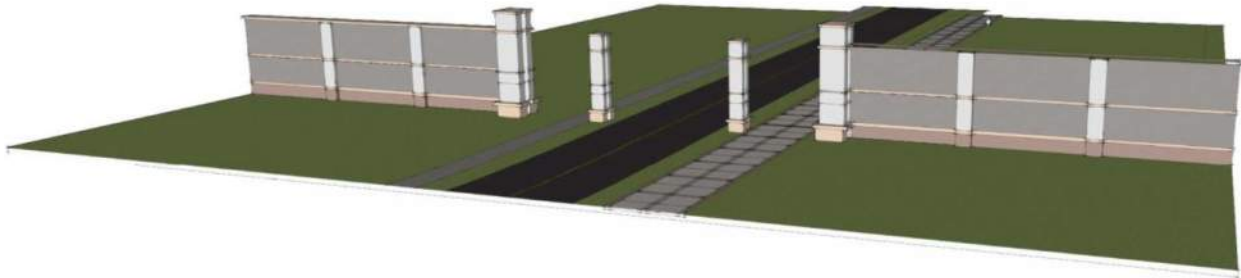
To maintain permeability of the flood control structure, several scales of “gateways” are imagined. The smallest in scale and the most critical from an aesthetics standpoint is the pedestrian level. This will be at sidewalk and trail locations, with the walls, berm and other structures being scaled to as small a size as possible.



Rendering of Pedestrian Gateway

Gateways (Roadway)

The most prominent and important gateway is expected to be the roadway; this will be the one most likely to define, enhance and announce the different neighborhoods and districts. The structural elements shall be scaled and designed to reflect the individual and unique circumstance each of these will be installed in. It is expected the aesthetic elements will have a medium level of detail, being bold and recognizable from both the pedestrian and the vehicular levels and speeds.



Rendering of Roadway Gateways

Gateways (Bridge)

The only physical connection this project has between the east and west sides are the bridges. Thus, these gateways will be the most critical in visually and physically connecting the two sides and making this project appear as one. These gateways should be scaled and designed with bold more abstract aesthetic elements that are in proportion to the surrounding setting.



Rendering of proposed Bridge Gateway

Approval Process

“Beauty and Aesthetics are not languid but energetic. By beautifying the outward aspects of life, one would beautify the inner ones.” – *Oscar Wilde, 1882*



A. Applicability

1. All phases and segments of the flood control system project within the project limits, and as indicated on the project map (Appendix A) shall be subject to these Aesthetic Guidelines. Guideline compliance review and recommendation(s) shall be completed by the Aesthetic Guidelines Committee (AGC). The review and recommendation(s) will be provided to the City of Cedar Rapids City Council for final approval.
 - a. AGC Members, or as amended / appointed by City Council;
 - i. City Representative - Program or Project Managers
 - ii. (3) Representatives from East side Design team
 - iii. (3) Representatives from West side Design team
2. All elements deemed “art” shall be reviewed and approved post AGC review, but prior to City Council review and approval, by the City of Cedar Rapids’ Visual Arts Commission.

B. Pre-application Meeting

1. A pre-application meeting shall be held between the Design Team and the AGC to review the scope, the design review process, and to identify all requirements, presumptions and considerations.

C. Submittal requirements

1. The Design Team shall request approval from the AGC at the following three key project phases:
 - a. Schematic Design

- b. Design Development
- c. Final Construction Document
2. Informal design review meetings may be requested by the Design Team at any point in the development process as necessary to provide clear direction on location or project specific items.
3. At each design submittal phase the AGC may request a meeting to discuss the application 5 - 7 business days after receipt of the SD plans submittal.
4. At each design submittal phase the AGC shall review and provide comments to the applicant within 7 - 10 business days after receipt of each submittal.

D. Schematic Design

1. Submittal Requirements:
 - a. Detailed narrative explaining how the Aesthetic Guidelines have been met.
 - b. Site Plan showing location and context of aesthetic treatment(s).
 - c. Enlarged Plan(s)
 - d. Elevation(s)

E. Design Development

1. Submittal Requirements
 - a. Revised detailed narrative explaining how the Aesthetic Guidelines have been met.
 - b. Site Plan
 - c. Enlarged Plan(s)
 - d. Elevation(s)
 - e. Sections
 - f. Outline specifications

F. Final Construction Documents

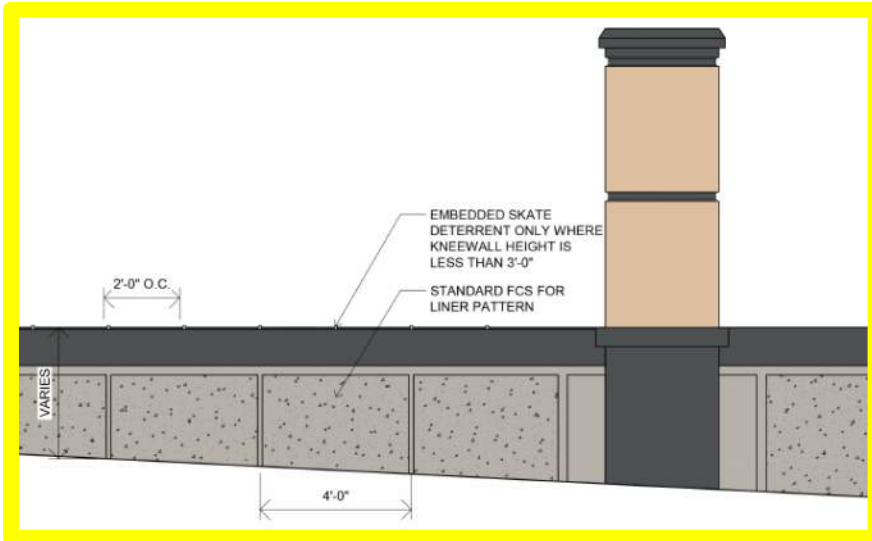
1. Submittal Requirements
 - a. Revised detailed narrative explaining how the Aesthetic Guidelines have been met.
 - b. Site Plan and details
 - c. Enlarged Plan(s)
 - d. Elevation(s)
 - e. Sections
 - f. Details
 - g. Specifications

G. Modification

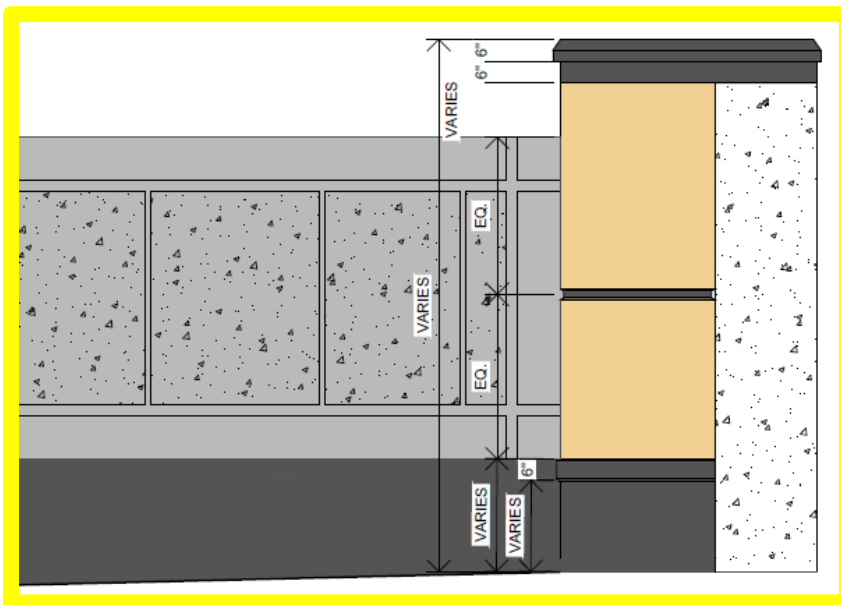
1. The Aesthetic Guidelines are intended to be flexible. The Aesthetic Guidelines Committee (AGC) may recommend a variance for an individual item if it is inconsistent with the Aesthetic Guideline. For a variance, the applicant shall prove that the following two conditions have been met:
 - a. The variance meets or exceeds the stated intent of the specific element within these Aesthetic Guidelines.

- b. The variance meets or exceeds the overall intent of these Aesthetic Guidelines.

Figure VII-1: FCS Wall Deterrent and Columns



Knee Walls



Abutment at Closures (gates and bridges)

**CITY OF CEDAR RAPIDS, IOWA
CEDAR RIVER FLOOD CONTROL SYSTEM (FCS) MASTER PLAN
CHAPTER VIII: STORMWATER PUMP STATION POLICY**



Stormwater Pump Station Policy

Background

Interior drainage studies have been completed for both East and West sides of the proposed Cedar Rapids Flood Control System to determine the impact of stormwater runoff and ponding from local precipitation events occurring behind the constructed system. This includes evaluation of rainfall events that occur during normal river conditions as well as flooding conditions on the Cedar River. During normal river conditions, this interior drainage will flow directly to the river via storm sewers and existing conveyance means. During Cedar River flood conditions, storm sewer closures are put into place and drainage conveyance relies on the pump station and interior storage plans developed for the overall flood control system.

Stormwater models were developed to simulate runoff conveyance within storm sewers and channels (1D) as well as overland routes and ponding that occurs on the ground surface (2D). This allows for the simulation of underground and overland drainage and the depth of any ponding that results. The storm sewer networks should generally convey the 5-year storm event from the upland watersheds to the Cedar River. In the existing system there are a few areas that experience ponding during the 5-year storm, but those ponding areas are mostly limited to street right-of-way and should be corrected through storm sewer system improvements.

Various storm events and outlet conditions have been reviewed to develop pumping capacity needs for the proposed stormwater pump station locations. In FEMA accredited levee systems, interior drainage within the individual watersheds is evaluated for both flooding and non-flooding conditions on the Cedar River. Interior ponding elevations occurring during a range of storm events including the 1% coincident probability event of precipitation during river flooding were determined. The modeling shows significant interior ponding during larger storm events (from 10-year through 100-year), which is not unexpected given that the storm sewer is generally flowing full for a 5-year storm. Also, this interior ponding occurs independent of river levels, with much of the ponding occurring in areas well away from the river and away from the Flood Control System alignment.

FEMA Levee Accreditation guidelines require ponding limits and ponding elevations be documented for conveyance systems that flow through flood protection alignments. Areas having one foot or greater depth of ponding during the 1% coincident probability event may be mapped as floodplain. Consequently, pumping capacity guidelines should be established to handle flows in the storm sewer system and drain dedicated surface ponding areas during large interior storms.

Policy

Stormwater pump stations for interior drainage runoff conveyance during flood conditions on the Cedar River are recommended to have a pumping capacity equal or greater than the peak runoff from the 5-year storm event. To further reduce the occurrence, extent, and depth of ponded water on the interior of the flood control system, the City will pursue upland stormwater runoff detention and infiltration in each watershed.