DAVENPORT'S Flood Resiliency plan

IAFSM Annual Conference March 8, 2022

Clay Merritt City of Davenport

Teresa Stadelmann, PE, CFM HR Green







- Mississippi River flood of record (stage 22.7)
- Mississippi River was continuously above flood stage for 103 days
- Failure of temporary barriers inundated 3 blocks of downtown and further restricted vehicular access

PROJECT GOALS

- Engage with the public and stakeholder groups on flood resiliency
- Develop and recommend non-structural and structural flood mitigation systems that support the City's Flood Plan objectives, increase
 operational efficiency, and enhance transportation routes during times of Mississippi River flooding.
- Develop an **implementation plan and funding strategy** for the recommended programs and projects to increase flood resiliency.







FLOOD RESILIENCY PLAN

CHAPTER 1 VISIONING

CHAPTER 2 TESTING IDEAS

CHAPTER 3 VISION REFINEMENT

AUG	DEC	SPRING	FALL
2020	2020	2021	2021

- Data collection
- Analysis (demographic, environmental, ecological)
- Flood mitigation analysis
- Flood operations review

- Draft vision and goals
- Concept alternatives for land
 use planning
- Concept alternatives for flood mitigation
- Concept alternatives for flood operations

- Refine preferred direction for land use planning
- Flood mitigation recommendations
- Flood operations recommendations
- Funding and implementation strategy
- Final documentation

PUBLIC ENGAGEMENT PROCESS



PUBLIC ENGAGEMENT OVERVIEW

V | S | O N | N G

Fall 2020

Key Questions

- How do you experience flooding today?
- How do you use the riverfront today?
- What do you want to do on the riverfront that they can't do today?

Stakeholder Meetings

- Village of East Davenport
- Downtown
- West Davenport Businesses
- West Davenport Residents
- Riverfront/Parks Focus Group
- City Operations Group
- Riverfront Improvement Commission
- QC Chamber

Survey: Visioning and Interactive Mapping

• 346 responses



ALTERNATIVES

Spring 2021

Key Questions

- What are your top priority goals for flood strategies?
- What options for solutions do you support? Why?

Stakeholder Meetings

- Village of East Davenport
- Downtown
- West Davenport Business & Black Hawk/Walnut Representatives
- QC Chamber
- USACE, Rock Island District
- Canadian Pacific Railroad

Open House

- Diversity, Equity and Inclusion organizations
- Community utility and response partners
- Neighborhood leaders
- Media
- High school student newspapers

Media

- Presentation airings on all local media
- interviews

Survey: Alternatives

• 507 responses

CONFIRMATION

Summer 2021

Key Questions

- Do the recommendations reflect your priorities and feedback?
- What are your concerns/priorities around phasing and implementation?

Stakeholder Meetings

- Village of East Davenport
- Downtown
- West Davenport Business & Black Hawk/Walnut Representatives
- Riverfront Improvement Commission
- QC Chamber

Open House

- Diversity, Equity and Inclusion organizations
- Neighborhoods and Friends groups

Booth Outreach

- Farmers Market
- QC Empowerment Open Air Market

Media

- Presentation airings on all local media
- interviews

Survey: Recommendations

165 responses

TYPES OF STRATEGIES



COMBINATIONS OF STRATEGIES TO MEET THE FLOOD STAGES



- Improve resilience and access
- Relatively lower-costs
- Reduce operational flood fighting effort
- WITHOUT continuous flood protection
- Focus on storm sewer system improvements and targeted road raises

- Improve resilience and access to higher stages
- Relatively higher-costs
- Reduce operational flood fighting effort
- WITH continuous flood protection
- More walls and berms with underground utility improvements/seepage mitigation

INCREMENTAL

GUIDING PRINCIPLES

What are the overarching values and goals that apply to all flood resilience concepts for Davenport?

RESILIENCE	Reduce the impact of flooding on day-to-day lives and economies, including the ability to recover more quickly from a flood event.
OPERATIONS	Reduce the operational drain of flood fighting on the City's resources.
EQUITY	Provide balanced investment in flood mitigation infrastructure and level of flood fighting effort along the full riverfront.
PUBLIC ACCESS	Prioritize the riverfront as a public amenity for the community and deepen Davenport's relationship to the Mississippi.

MITIGATION RECOMMENDATIONS



NON-STRUCTURAL RECOMMENDATIONS

PROPERTY ACQUISITION PROGRAM

Target properties

- Located in the floodway
- Repetitive losses
- Identified by the building risk and mitigation assessment
- Access challenges

Benefits

- Remove on-going flood
 risks for owners
- Reduce City effort to furnish services in floodprone areas



INDIVIDUAL Building Mitigation

Public-Private Partnership

- Addresses residual risk
- Cost-share
- Utilize building risk and mitigation assessment
- Encourage private
 responsibility for risk
- Balance public and private investment

Riverfront public facilities

- Reduce flood-fighting
 effort
 - Protect public investment

UPDATE Stormwater Master Plan

Interior drainage

Reduce pumping requirements

Co-benefits for greenspace and water quality



OTHER PROGRAMMATIC APPROACHES

Improve CRS Rating

Building codes

Ordinance updates

Land Use & Zoning

Require flood mitigation to utilize public funding programs

Stream & Watershed studies





STRUCTURAL RECOMMENDATIONS - BASIS

Davenport's Historical Precedent and Relationship with the River Results from the Public Engagement Process Stage-Frequency History on Mississippi River Benefits and Costs Existing Seawall Elevation

Sti ba Cit aw Ior

Structural mitigation to stage 22 offers the City of Davenport a balanced, equitable, and cost-effective solution that's rooted in the City's rich history of co-existing with the river and lives out public awareness that the mighty Mississippi can always produce a larger or longer flood beyond what anyone can expect or affordably mitigate.

AREA 1: EAST VILLAGE TO ARSENAL BRIDGE

Key Takeaways

- Storm sewer systems are the first source of flooding
- Closing E River Drive hinders transportation access on the east side of Davenport
- Lack of east/west connectivity is detrimental to East Village businesses
- Portions of E River Drive, from approximately Federal Street to the Arsenal Bridge, lie within the regulatory floodway





Over the past 20 years, these projects would have benefitted the City's flood response for 181 days

AREA 2: ARSENAL BRIDGE TO CENTENNIAL BRIDGE

Key Takeaways

- City expends significant effort flood fighting in Area 2
- Flooding over portions of River Drive by stage 18
- Riverfront park amenities either flooded or difficult to access during major flood events
- Flood fighting done by Canadian Pacific has benefits for the City
- Canadian Pacific track raise created an additional visual barrier to the river



AREA 2 RECOMMENDATIONS



AREA 2 BENEFITS

4 Aug



000

0

000

B

STRUCTURAL MITIGATION PROJECT SUMMARY

Area	Total Project Cost Estimate
1 – East End to Arsenal Bridge	\$ 24.8MM
2 – Arsenal Bridge to Centennial Bridge	\$ 52.2MM
3 – Centennial Bridge to West End	\$ 49.6MM
4 – West End and Credit Island	\$ 36.3MM

Note: One project, estimated at \$2.5MM, has been excluded from the Area-based Total Project Cost Estimates because the costs span all project areas.

OPERATIONAL FLOOD PLAN RECOMMENDATIONS



OPERATIONAL FLOOD PLAN RECOMMENDATIONS

Update the Flood-Fighting Plan

- Allocate staff time and budget annually to update the Flood Plan
- Update operations and maintenance plan and renew agreements with private entities annually
- Revise based on recent construction projects (sewer interceptor project and others)

Standardize equipment, centralize controls

- Existing valves are all unique (i.e., turn counterclockwise, 76 times), and many leak
- Standardize gate valves, add automated closures, and connect to central SCADA system
- Gate valves can be monitored, exercised, opened/closed remotely
- Reduce training requirements, simplify operation, reduce labor effort

Retreat or flood proof impacted public facilities

- Public facilities at risk that require individual actions to prepare for flooding
- Remove, elevate, or flood proof electrical, plumbing, and other utilities
- Plan and budget to relocate susceptible city facilities at the end of useful life (i.e., Marquette Facility)

OPERATIONAL FLOOD PLAN RECOMMENDATIONS

Integrate Operational Flood Plan actions into current workflow software

- Complexity and scale of Flood Plan necessitate transition into work order management software and geo-spatial representation of flood tasks
- Work order management simplifies execution and tracking
- Geo-spatial elements enable visual tracking, map development, and mobile applications
- Reduce dependence on institutional knowledge to execute tasks

Develop agreements with partners that implement the Flood Plan

- Coordination with several entities is required. Formalize the expectations, actions, and communication channels.
- Reduce dependence on institutional knowledge and long-term relationships to execute tasks.

Address flood crests above planned flood mitigation

- Outline actions in the Flood Plan above line of defense
- Define the stage when mitigation actions cease, transition to public safety

TRANSPORTATION RECOMMENDATIONS



ESTABLISH A STANDARD FLOOD DETOUR ROUTE

- INCREMENTAL NATURE OF CURRENT FLOOD RESPONSE YIELDS INCREMENTAL CHANGES TO DETOUR ROUTES
- CHANGES TO DETOUR ROUTES CONFUSE MOTORISTS AND EXPEND CITY COMMUNICATION & LABOR EFFORT

WEST 31ST STREET

EAST 30TH STREE

BOW EVARO

HAYES STREET

PHASE 1 PROJECTS WILL KEEP RIVER DRIVE OPEN MORE OFTEN

ANTH STOP



MAKE NECESSARY IMPROVEMENTS TO DETOUR ROUTES

- PRIORITIZE REPAIRS TO CITY STREETS USED FOR FLOOD DETOURS
- ACCOUNT FOR ESTIMATED TRAFFIC LOADS FROM RIVER DRIVE ON FLOOD DETOUR STREETS



IMPLEMENTATION PLAN



IMPLEMENTATION: PHASE 1

- Projects across the riverfront that offer immediate return on investment in the form of increased resiliency during lowmoderate flood stages
- Implement non-structural mitigation programs and plans
- Several projects identified in previous studies - including rehabilitation of existing stormwater pump stations and rehabilitation of the Garden Addition flood berms
- Projects to raise E River Drive in the East Village and install backflow prevention in several locations along River Drive are included.

Area	CIP Number	Location	Treatment	Project
1	1103	River & 4th	Underground	Install backflow prevention on local storm sewer to keep E River Drive dry until seawall is overtopped. Includes new storm sewer connection to separate intakes below stage 22 between Carey and 4th from the upland area. Should be designed/constructed in conjunction with River Heritage Park projects.
1	1104	River & 3rd	Underground	Install backflow prevention on storm sewer to keep E River Drive dry until seawall is overtopped. Includes gatewell structure. Should be designed / constructed in conjunction with River Heritage Park projects.
3	1301	River & Marquette	Underground	Install segment of future bypass storm sewer and backflow prevention on existing storm sewer to keep W River Drive dry until area is flooded via overland.
4	1402	Garden Addition - Left Bank BHC	Berms	Left Bank Levee of Black Hawk Creek from Homestead to CP railroad. Berm Improvements - Reconstruct existing berms using driven sheet pile, per recommendations from 2020 Shive-Hattery report. Includes new road closure at Concord St bridge.
4	1403	Garden Addition - Right Bank BHC & Walnut	Berms	Right Bank Berm of Black Hawk Creek from Homestead to confluence with Walnut Creek, and Left Bank Berm of Walnut Creek between Fairmount and confluence with Black Hawk Creek. Berm Improvements - Reconstruct existing berms using driven sheet pile, per recommendations from 2020 Shive-Hattery report.
4	1404	Garden Addition - East Closure	Berms and Floodwalls	East Closure for Garden Addition from Left Bank of Black Hawk Creek berm into high ground near Concord St. Construct berm and floodwall to close off Garden Addition from flood waters entering from the east.
Varies	1406	Various	Interior Drainage	Rehabilitate Existing Stormwater Pump Stations per 2016 Pump Station System Assessment Report
1	1101	River & Mound	Road Raise	Elevate E River Drive in low areas that flood from storm sewer surcharge below the seawall elevation east and west of Mound Street.
4	1401	Garden Addition	Underground and Interior Drainage	Buy out four properties in the Garden Addition and remove existing utility service infrastructure. As part of an enhanced park space, create dry storm water detention area to serve as collection point for interior drainage and pump station wet well. Eliminate four outfalls (and gates) to Black Hawk Creek. Re-route storm sewer to detention area. Upgrade outfall and gatewell at Burroughs Pump Station east of Floral Lane.
1	1102	Oneida Landing	Underground	Reconfigure storm sewer intakes below Stage 22 (two in parking lot at end of Oneida Ave) and construct gatewell to keep area dry until river overtops the seawall.
4	1405	Garden Addition - Along Daisy	Berms	Right Bank Berm of Black Hawk Creek from confluence to abutment of River Drive overpass.

IMPLEMENTATION: PHASES 2 & 3

- Projects across the riverfront that form a continuous line of defense for increased resiliency during moderate to major flood stages
- Continues non-structural mitigation programs and plans begun in Phase 1
- Starts at the Arsenal Bridge and progresses downstream, constructing above- and belowground structural flood mitigation infrastructure including storm sewer separation and backflow prevention, seepage mitigation, flood walls, levees, road raises, and temporary closures
- Permanent pump stations



The Mississippi River Flood Resiliency Plan

- Meets community and City goals
- Supports the existing riverfront, park and land use plans
- Maintains the City's unique relationship with the Mississippi River
- Can be scaled to accommodate future needs, constraints, and funding opportunities
- Offers incremental and transformational recommendations that balance respect for and retreat from the river
- Phased approach that can leverage multiple funding strategies to incrementally mitigate flood risk
- Balances public investment and individual responsibility to increase flood resiliency



Questions

Clay Merritt Assistant Public Works Director City of Davenport <u>clay.merritt@davenportiowa.com</u> Teresa Stadelmann, PE, CFM Operations Manager – Water Resources HR Green, Inc. <u>tstadelmann@hrgreen.com</u>