

CITY OF MISSOULA LEVEE RE-CERTIFICATION SUPPORT

The City of Missoula (City) authorized Herrera Environmental Consultants (Herrera) to prepare a scope of work and budget to provide support for re-certification of the following accredited levees in Missoula:

- Clark Fork III
- Clark Fork V

The re-certification of the levees is required to retain their accreditation with the Federal Emergency Management Agency (FEMA), tied to the effort to update Flood Insurance Rate Maps (FIRMs) for the Clark Fork River by the Montana Department of Natural Resources and Conservation (DNRC) and FEMA on behalf of the City of Missoula.

The City also seeks support from Herrera to update documentation regarding the Grant Creek Levee, Pattee Creek Levee, and South Hills Storm Drain System (including the South Hills Stormwater Detention Basins at Playfair Park, high hazard dam, and the grit chamber at SW Higgins).

The scope of this project includes completion of an interior drainage analysis for landward areas associated with Clark Fork III and Clark Fork V levees, preparation of an emergency action plan for all levees in the City and the South Hills Storm Drain System, and preparation of an operations and maintenance plan for all levees and South Hills Storm Drain System.

This scope of work describes the activities, assumptions and deliverables associated with the following tasks:

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SCOPE OF WORK

TASK 1– PROJECT MANAGEMENT

Herrera will manage the scope, schedule, and budget of the work described in Tasks 2-4, and coordinate with the City on a regular basis to keep the City's project manager informed about project progress, project issues, and schedule.

The anticipated duration of the project work is ten (10) months from notice-to-proceed. The following project management work will be completed:

- a. Project Schedule – Herrera will prepare an overall project schedule for the work as well as sub-schedules for completing individual tasks and update as needed. Any updates to the schedule will be discussed with the City Project Manager.
- b. Progress Reports & Invoices – Herrera will submit monthly invoices and progress reports. The progress reports will include descriptions of the progress to date on each task.
- c. Conduct a kick-off meeting with the project team (via conference call). Herrera will prepare agenda and meeting minutes. Kick-off meeting will be an approximately 60-minute conference call, attended by City staff and up to four staff from the Consultant team.
- d. Internal Team Coordination – Herrera's project manager will coordinate the work across tasks and be the main point of contact for requesting information from City staff and relaying information provided by the City.
- e. Coordination with the City of Missoula – Herrera's project manager will be the main point of contact for communication and coordination with the City on this project. Coordination will include regular phone calls and in-person or conference call meetings with the City as needed to coordinate getting City input and review.
- f. QA/QC - Herrera will perform quality assurance and quality control during development of all work product submittals.

Assumptions:

- The duration of active project work will be no longer than ten (10) months.
- Meetings among Consultant team members that do not involve City staff will be conducted under other tasks in this scope of work.
- Herrera will set up and maintain a project file sharing site
- Kickoff meeting will include up to four Herrera team members (1 hr meeting)

Deliverables:

- Project Schedule (Electronic format - Microsoft Project and PDF)
- Project meeting agendas, meeting notes

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- Monthly invoices, progress reports, and budget tracking report

TASK 2 – INTERIOR DRAINAGE ANALYSIS

Interior drainage analysis and associated reporting for FEMA review will be completed for the Clark Fork III and Clark Fork V levees. The analysis will rely on updated draft mapping of the FEMA Flood Insurance Rate Map (FIRM) panels 30063C1480E and 30063C1195E (revised July 6, 2015), respectively, for the 100-year flood water surface elevation profile in the river. Draft FIRM maps are anticipated to be prepared by March of 2022. This analysis will follow FEMA's *Guidance for Flood Risk Analysis and Mapping* (2019).

Task 2.1 – Data Review

Herrera will review the following information to be provided by the City:

- 2019 LIDAR survey of drainage areas landward of the Clark Fork III and Clark Fork V levees
- Drainage outfalls to the river: pipe diameter, pipe material, and gate/valve characteristic details for the Clay Street outfall; proposed design plan for a retrofit gate/valve on the Caras Park outfall pipe, and the pipe diameter and material that will be in place long term after the retrofit (whether existing or new pipe)
- Storm drainage infrastructure on City-owned land (e.g., street rights of way and parks): storm drain alignments and diameters, drywell locations, and any other drainage collection and conveyance information available
- High resolution 2020 aerial photo
- Design plans for the Caras Park stormwater treatment retrofit project
- Master Plan information for proposed redevelopment in the drainage area north of Levee V and for Caras Park north of Levee III
- Any other documentation the City has that may be relevant to the levee interior drainage analysis

This information will be used to approximately define the boundaries of drainage basin areas that contribute runoff to the ponding areas adjacent to Levee III and Levee V.

The City will also provide draft flood insurance study documentation prepared by the DNRC for updating the FIRMs through the Missoula area – specifically for the 100-year flood water surface

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elevations that are needed to define “tailwater” for the interior drainage analysis at each of the Clark Fork III and Clark Fork V levees.

Additionally, Herrera will review the recorded history of Clark Fork flooding in Missoula as presented in the *Clark Fork River Floodplain Study – Phase I, Clark Fork River Hydrologic Analysis* (Pioneer Technical Services 2017) to assess the most extreme flood events in the record, and then research corresponding precipitation records at Missoula International Airport to assess the coincidence of high river stages with precipitation characteristics. This comparison will yield a recommendation for the design storm event to use for interior drainage area modeling in Task 2.3 that is reasonably conservative for pairing with the simulated 100-year recurrence flood event water surface elevation profile in the Clark Fork River.

Deliverables:

- A summary of the adequacy of available information to use in the interior drainage analysis modeling effort, and to inform the site visits described below

Task 2.2 – Site Visits

Herrera staff will meet with City staff in the field to walk areas currently mapped as interior drainage ponding areas on the FIRMs to discuss observations of past high water levels, and any issues the City is aware of that affect ability of those areas to drain under typical storm conditions and when the river is running high.

Herrera staff will accompany City staff to obtain and record storm drainage system “measure downs” of the difference between catch basin rim elevations and pipe invert elevations in the drainage areas tributary to the levee-induced ponding areas as defined based on Task 2.1 data review. These drainage areas encompass numerous city blocks north of the two levees. If storm drain pipe diameters appear to differ from the diameter reflected in the City’s GIS data, pipe diameters will also be measured. A photograph(s) will be taken of the interior of each drainage structure opened.

Subsequent field visits will be performed as necessary to obtain additional photographs and to refine the estimated drainage basin boundaries, ideally during a rain storm.

Assumptions:

- For the drainage system measure-down work, City staff will be responsible for pulling and replacing drainage structure lids and local traffic control safety measures as needed, and Herrera staff will be responsible for documenting/confirming the structure location and the measured dimensions.
- Following the field data collection, Herrera will augment the City’s geodatabase with the data and photographs for each drainage structure inspected

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Deliverables:

- GIS data files with attributes associated with each drainage structure and storm drain measured in the field.
- Photo log documenting photos from the site visits.

Task 2.3 – Modeling

Using the information obtained and reviewed in Task 2.2 and the supplemental field data collected in Task 2.3, Herrera will develop a stormwater runoff routing model for each of the two drainage basins associated with Levee III and Levee V using PC SWMM and EPA SWMM. For mapping of interior drainage areas to be approved by FEMA, the modeling done to develop the mapped ponding area must be done with a hydrologic or hydraulic model approved by FEMA. EPA SWMM is approved by FEMA, whereas PC SWMM is easier to work with for entering all of the model input data. After the data is entered in PC SWMM, EPA SWMM can import it and run the simulations, producing output that FEMA will accept. For each drainage area, the associated 100-year flood water level riverward of the levee resulting from recent hydraulic modeling work for the FIRM updates will be used to define a static tailwater level for the duration of the 24-hour precipitation hyetograph.

Herrera will calibrate the SWMM model inputs (runoff time of concentration, pipe slopes, runoff infiltration rates on pervious land cover, and drywell infiltration rates) to replicate past observations of runoff ponding as close as is possible, and then use the calibrated models to simulate the interior drainage design storm that yields the ponding areas adjacent to each of the two levees to propose for FEMA use in updated the FIRMs (in the report to be produced in subtask 2.4).

Deliverables:

- Final SWMM input and output files in digital form

Task 2.4 – Interior Drainage Analysis Reporting

Herrera will prepare a report covering each of the two interior drainage areas documenting data sources, modeling methods, and modeling results. A draft of this report will be prepared for City review. Herrera will incorporate City comments to prepare a final version suitable for submittal to FEMA. It is expected that FEMA may have comments on the report that need to be addressed before the revised/updated interior drainage area mapping can be considered final for inclusion in the updated FIRMs.

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Assumptions:

- The interior drainage analysis report will be subject to one round of draft review by the City. The City will provide one consolidated, complete set of comments on the draft deliverable. Allow ten (10) working days for project team review.
- Herrera will address comments from FEMA, if there are any, to produce the final version of the report and associated interior drainage areas that will be shown on the updated FIRMs for FEMA's records.

Deliverables:

- Draft interior drainage analysis report for City review – MS Word and PDF electronic file formats
- Final interior drainage analysis report for submittal to FEMA - PDF electronic file
- GIS shapefiles of modeled interior ponding areas for submittal to FEMA
- Revised final interior drainage analysis report if FEMA requests revisions - PDF electronic file
- Revised GIS shapefiles of modeling interior ponding areas if FEMA requests any adjustments to the model used to generate them

TASK 3 – EMERGENCY ACTION PLAN

The City is required to update its Emergency Action Plan (EAP) for the Clark Fork III levee, Clark Fork V levee, Grant Creek levee, Pattee Creek levee and South Hills Storm Drain System (including the Spartan/Playfair Park Retention Basins). The EAP will define responsibilities and provide procedures designed to identify unusual and unlikely conditions which may endanger the dam, initiate remedial actions to prevent or minimize the downstream impacts of dam failure, and initiate emergency actions to warn downstream residents of impending or actual failure of the dam. The EAP will include:

- Roles and responsibilities,
- Expected actions during impending or actual levee or dam failure,
- Map of the downstream flood zone,
- List of materials to stockpiling for intervening in a developing problem,
- Contact information for emergency responders (24-hr contact),
- Contact information for local contractors and pump suppliers (24-hr contact),
- Contact information for City staff and engineers familiar with the levees and dams,

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- Fact sheet of key information on levees and dams (height, storage, construction, past performance, location, access, etc.)

The Emergency Action Plan will comply with the following guidelines:

- USACE Circular No. 1110-2-6075 – Inundation Maps and Emergency Action Plans and Incident Management for Dams and Levee Systems
- MT DNRC Guidelines for Developing and Updating Dam Emergency Action Plans (EAP)
- MT ARM 36.14.406

Assumptions:

- Herrera will use the Natural Resources Conservation Service (NRCS) fill in the blank EAP template, which the Montana Dam Safety Program encourages the use of.
- Dam failure hazard area maps are available from existing EAPs, which were prepared in 2017. These will be reviewed and checked for accuracy. No new dam break modeling will be conducted.
- The City will provide one consolidated, complete set of comments on the draft deliverable. Allow ten (10) working days for project team review.
- City comments on the draft deliverable will be incorporated into the final deliverable.

Deliverables:

- Draft Emergency Action Plan (Electronic format - Microsoft Word and PDF)
- Final Emergency Action Plan (Electronic format - Microsoft Word and PDF)

TASK 4 – OPERATIONS AND MAINTENANCE MANUAL

The City is required to update its Operations and Maintenance (O&M) Manual for the Clark Fork III levee, Clark Fork V levee, Grant Creek levee, Pattee Creek levee and South Hills Storm Drain System (including the Spartan/Playfair Park Retention Basins). The updated O&M Manual will include project data, roles and responsibilities, operation requirements, inspection requirements, maintenance procedures, record keeping methods, and forms.

Assumptions:

- The O&M Manual will follow the guidelines set forth in USACE Circular ER 1110-2-1156, Chapter 12 for Operations and Maintenance Activities.
- Herrera will follow the Montana DNRC guidelines for O&M manuals and will use the DNRC template for the O&M Plan.

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- The City will provide one consolidated, complete set of comments on the draft deliverable. Allow ten (10) working days for project team review.
- City comments on the draft deliverable will be incorporated into the final deliverable.

Deliverables:

- Draft O&M Plan (Electronic format - Microsoft Word and PDF)
- Final O&M Plan (Electronic format - Microsoft Word and PDF)

SCHEDULE

Herrera is available to begin work on this project immediately and we anticipate performing this work starting in early winter 2021/2022. An overall project duration of 10 months is assumed, with completion occurring in September 2022 assuming FEMA can provide comments on the interior drainage analysis report within 6 weeks of receiving it. A rough schedule based on a Notice to Proceed of December 17, 2021 is as follows:

Interior Drainage Analysis – Data Review:	Feb. 2022
Interior Drainage Analysis – Site Visits:	March 2022
Interior Drainage Analysis – Modeling:	April/May 2022
Interior Drainage Analysis – Draft Report:	June 2022
Interior Drainage Analysis – Final Report:	July 2022
Interior Drainage Analysis – Revised Final Report:	Sept. 2022
Emergency Action Plan:	Dec. 2021- Mar 2022
O&M Plan:	Dec 2021- Apr 2022