



FEMA

**Municipality of Anchorage
COOPERATING TECHNICAL PARTNERS
MAPPING ACTIVITY STATEMENT**

**Mapping Activity Statement No. 3 – Digital Flood Insurance Rate Map
Production and Development of Updated Flood Data**

In accordance with the Cooperating Technical Partners (CTP) Partnership Agreement dated June 3, 1999 between Municipality of Anchorage and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement (MAS) No. 3 is as follows:

SECTION 1—OBJECTIVE AND SCOPE

The objective of the Flood Map Project documented in this MAS is to develop a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Municipality of Anchorage. The DFIRM and FIS report will be produced in the FEMA community-based format. This product will be in vertical datum 1972 NGS.

Existing Geographic Information System (GIS) data and study needs for the community will be researched, obtained, organized, and provided in accordance with the Scoping Activity. The scope of services is presented below. In addition, the Mapping Partners involved in this project will develop new and/or updated flood hazard data, as summarized in Table 1.1, Flooding Sources to be Studied.

The Municipality of Anchorage is contracting the study work. The scope of work from the Municipality of Anchorage to their contractor for the Lower California and Glacier Creek flood studies is provided in Appendix A. The scope of work from the Municipality of Anchorage to their contractor for the Furrow Creek flood study is provided in Appendix B. These scopes of work provide further details on the available data, engineering analysis, and deliverable products related to this MAS.

Table 1.1 Flooding Source(s) to be Studied

Flooding Source	Reach Limits	Reach Length	Detailed Riverine		Detailed Coastal					Limited Detail Study	Redeline-ation of SFHAs Using Effective Profiles and New Topography	Refine/ Establish Zone A
			Hydrology	Hydraulics	Stillwater	Set up	Wave Height	Wave Runup	Erosion			
Glacier Creek	Turnagain arm to FEMA cross section AA	10,400ft		x	x						x	X
California Creek	Glacier Creek Glacier Creek to FEMA Cross section Q	8,600ft		x								X
Furrow Creek	Mouth to Old Seward Highway	5,000 ft	X	X								
Furrow Creek	Old Seward Highway to New Seward Highway	550 ft	X	X								X
Furrow Creek	New Seward Highway to Upper Limits of Furrow Creek Subdivision	1,500 ft	X									X

This Flood Map Project will be completed by the following Mapping Partner:

- Municipality of Anchorage;
- Michael Baker Jr. Inc., the FEMA Mapping Partner for this Flood Map Project.

The Mapping Partner shall notify FEMA and/or its contractor by e-mail of all meetings with community officials at least one week prior to the meeting (with as much notice as possible). FEMA and/or its contractor may or may not attend the community meetings.

The activities for this Flood Map Project, including required Quality Assurance/Quality Control (QA/QC) reviews, and the Mapping Partners that will complete them are summarized in Table 1.2, Flood Mapping Project Activities. The sections of this MAS that follow the table below describe the specific mapping activities, responsible Mapping Partner(s), FEMA standards that must be met, and resultant map components.

Table 1.2 Flood Mapping Project Activities

Activities	CTP	FEMA (or its Contractor)
Scoping	X	
Outreach	X	
Field Survey	X	
Independent QA/QC Review of Field Survey		X
Topographic Data Development	X	
Independent QA/QC Review of Topographic Data		X
Base Map Acquisition and Preparation	X	
Hydrologic Analyses	X	
Independent QA/QC Review of Hydrologic Analyses		X
Hydraulic Analyses (including Levee Evaluation, if applicable)	X	
Independent QA/QC Review of Hydraulic Analyses		X

Activities	CTP	FEMA (or its Contractor)
Coastal Flood Hazard Analyses (including Levee Evaluation, if applicable)	N/A	
Independent QA/QC Review of Coastal Hazard Analyses		N/A
Floodplain Mapping (Detailed Riverine or Coastal Analysis, Redelineation Using Effective Flood Profiles and Updated Topographic Data ¹ , Refinement or Creation of Zone A, Redelineation (digitization) of Non-Revised Areas ¹ , Merge Revised and Non-Revised Information)	X	
Independent QA/QC Review of Floodplain Mapping		X
Redelineation (Redelineation Using Effective Flood Profiles and Updated Topographic Data ¹ , Refinement and Redelineation (digitization) of Non-Revised Areas ¹)	N/A	
Independent QA/QC Review of Redelineation		N/A
Develop DFIRM Database (including Graphic Specifications)	X	
Independent QA/QC Review of DFIRM Database and Graphics		X
Produce Preliminary Map Products	X	
Post-Preliminary Processing	X	
¹ These sub-tasks can be performed and reported in the Management Information Portal (MIP) Work Flow as part of Floodplain Mapping activity or Redelineation activity.		

FEMA has developed tools to assist in the development of the flood hazard data studies and DFIRMs if the CTP wishes to use them. FEMA will provide all CTPs access to and training in these tools. The tools available at this time include WISE software and the DFIRM production tools. The use of these tools will improve the Flood Map Modernization and efficiency of all mapping partners.

QA/QC review activities may be performed by FEMA’s contractor at the discretion of FEMA.

FEMA will be providing download/upload capability for intermediate data submittals through the MIP. Data submittals uploaded via the MIP will include the same data required prior to the existence of the MIP, with the addition of Metadata profiles required for search and retrieve capabilities. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance.

Metadata profiles are to be included with each of the following four activities that must satisfy Data Capture Standards; Base Map Data, Topographic Data, Hydrologic Data, and Hydraulic Data. The metadata profiles are available from FEMA.

Scoping

Responsible Mapping Partner: Municipality of Anchorage

Scope: This task involves collecting data from a variety of sources including community surveys, other Federal and State Agencies, National Flood Insurance Program (NFIP) State Coordinators, Community Assistance Visits (CAVs), and FEMA archives. The Municipality of Anchorage will evaluate the effective FIS report and Flood Insurance Rate Maps (FIRMs) to see if it needs to be updated. Lists of mapping needs will be obtained from the WISE Scoping Tool, MNUSS database, community surveys, and CAVs, if available.

Data collection will include obtaining the best available base map materials (corporate limits, roads, orthophotos, etc) along with stream centerline files.

Identify all stream/coastal reaches where levees are shown as providing protection against the 1-percent-annual-chance flood. The Municipality of Anchorage should work with the FEMA Regional office to request the information specified in Title 44 Code of Federal Regulations (CFR) 65.10, Mapping of areas protected by levee systems, from the community or other party seeking continued recognition of the levee.

In cooperation with the FEMA Region, a Project Management Team will be established consisting of FEMA's regional engineer, the Municipality of Anchorage, and other appropriate officials. The Project Management Team will be responsible for coordinating the activities of this project and completing all tasks identified in this MAS. The MIP shall be updated with Scoping status as appropriate.

Preliminary Research Activities can be separated into two categories—researching effective information and researching available data for the Flood Map Project. The following tasks shall be completed to research effective information: inventory the FEMA archives for effective FIRM panels, Flood Boundary Floodway Map (FBFM) panels, FIS reports, and other flood hazard data or existing study data; summarize the information in the WISE Scoping Tool and/or MNUSS database; summarize contiguous community agreement checks; review CAV and Community Assistance Contact files; and develop a “scoping map” and an overview of the results of the research.

The Municipality of Anchorage will coordinate, setup, and hold the Scoping Meeting. This includes identifying a time, place, and participants. The purpose of this meeting is to present the current information to the local officials (State, county, and municipal) and coordinate on prioritization and identification of study areas. Municipality of Anchorage shall be responsible for compiling the necessary information for the meeting. These items may include: the FIS and FIRM for affected communities; United States Geological Survey quads for the study area; best available community base map(s); effective FIRM summary; Available Data Inventory; Scoping Map; Scoping Meeting Agenda/Minutes form; Aerial photos/topographic mapping, if available; existing drainage studies or other H&H data; Community Master Plan(s)/Drainage Master Plan(s); Zoning Maps; Street Maps; As-built plans; and Floodplain Ordinance(s).

The project management team shall review the initial mapping needs list, review the research findings, and make selections of proposed methods for obtaining/producing flood data. Any additions or changes to the needs list shall be discussed with all members. All needs shall also be prioritized. In general, highest priority shall be given to the following areas: areas of dense existing or anticipated development including areas where new road crossings have been constructed over stream(s); areas affected by

flood-control structures and/or channelization; areas where natural physical changes in the floodplain have been significant (due to subsidence or extreme erosion, for example); areas that were studied by approximate methods and unmapped areas especially those with development pressure; areas where the community has experienced flooding outside mapped floodplains with severe damage to buildings and/or infrastructure; areas where mapped flood hazards do not match those shown on contiguous FIRMs (unless those FIRMs are not considered to be accurate); and areas where flood data (Base Flood Elevations (BFEs), floodplains, and regulatory floodways) are likely to be changed the most by a restudy.

Based on the discussion of mapping needs, the Municipality of Anchorage and the FEMA Project Officer will finalize the areas to be included in the project (based on recommendations provided by the Project Team). Areas to be studied by detailed, limited detail, and approximate methods shall be identified. The following issues will be discussed and refined: Review and Refinement of Flood Hazard Identification Methodologies, Review of Proposed Paneling Scheme, Review and Refinement of Base and Topographic Map Source, and Finalization of Map Production and Database Options.

The Municipality of Anchorage will be acting as the Consultation Coordination Officer for this flood study as identified in 44 CFR Part 66. At this point, the Municipality of Anchorage will prepare and setup the Community Case File and Flood Elevation Docket for the maintenance of all communication and coordination throughout the project as outlined in 44CFR Parts 66 and 67.

Standards: All Scoping work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables:

- The Final Scoping memorandum detailing flood study needs and available data will be delivered in accordance with the schedule outlined in Section 6 - Schedule to the Regional Project Officer for approval.

OUTREACH

(NOTE: The performance of outreach takes place throughout the life of the flood study project. Therefore, we recommend tracking the outreach budget, in the MIP Workflow, equally between Produce Preliminary Map Products and Post Preliminary Processing. An alternate tracking method is acceptable with approval from the project management team.)

The outreach activities for a Flood Map Project can best be understood as a process that begins during the Project Scoping phase and continues through the map production and post-preliminary phases. A regulatory overview of required activities is followed by a description of tools that can be used in working with stakeholders to keep them informed and to solicit their input.

The overarching goal for conducting outreach is to create a climate of understanding and ownership of the mapping process at the State and local levels. Well-planned outreach activities can reduce political stress, confrontation in the media, and public controversy, which can arise from lack of information, misunderstanding, or misinformation. These outreach activities also can assist FEMA and other members of the Project Team in responding to congressional inquiries.

The Municipality of Anchorage will work with the Regional Office during the initiation of this activity to determine an Outreach Plan for implementation throughout the mapping project. The Regional Office will have access to many outreach tools that have been developed for this process that can be utilized or customized.

All communication with local governments will be done in accordance with 44 CFR Part 66.

- Upon determination of an Outreach and Coordination Approach the Municipality of Anchorage shall deliver the following to the FEMA Regional Project Officer in accordance with the schedule outlined in Section 6 - Schedule:
 - A report detailing outreach and coordination activities
 - Backup or supplemental information used in writing this report

Field Survey

Responsible Mapping Partner: Municipality of Anchorage

Scope: To supplement any field reconnaissance conducted during the Project Scoping phase of this project, Municipality of Anchorage shall conduct a detailed field reconnaissance of the specific study area to determine conditions along the floodplain(s), types and numbers of hydraulic and/or flood-control structures, apparent maintenance or lack thereof of existing hydraulic structures, locations of cross sections to be surveyed, and other parameters needed for the hydrologic and hydraulic analyses.

In addition to the initial field reconnaissance, the Municipality of Anchorage shall conduct field surveys, including obtaining channel and floodplain cross sections, identifying or establishing temporary bench marks, and obtaining the physical dimensions of hydraulic and flood-control structures. Municipality of Anchorage also shall coordinate with other Mapping Partners that are involved in the Topographic Data Development process.

Standards: All Field Survey work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the Technical Support Data Notebook (TSDN) format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- A report summarizing the findings of the field reconnaissance;
- Maps and drawings that provide the detailed survey results;

- Survey notebook containing cross sections and structural data;
- Documentation of the Datum; and
- Format Survey Database or Data Delivery consistent with the Data Capture Standards— Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Topographic Data Development

Responsible Mapping Partner: Municipality of Anchorage

Scope: To supplement the field surveys conducted under this MAS, the Municipality of Anchorage shall obtain additional topographic data of the overbank areas of the flooding sources studied to delineate floodplain boundaries. The Municipality of Anchorage shall gather information on what topographic data is available and what accuracy and currency it meets. The Municipality of Anchorage shall use this topographic data that is better than that of the original study.

Standards: All Topographic Data Development work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall upload the digital data to the MIP or submit to FEMA by using other digital media if the MIP is unavailable so that FEMA can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 - Schedule. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital topographic maps;
- Report summarizing methodology and results;
- Mass points and breaklines data;
- Digital work maps with contours;
- Checkpoint analyses to assess the accuracy of data, including Root Mean Square Error calculations to support vertical accuracy;
- Identification of remote-sensing data voids and methods used to supplement data voids;
- National Geodetic Survey data sheets for Network Control Points used to control remote-sensing and ground surveys;
- Metadata compliant with Federal Geographic Data Committee standards;

- Documentation of the Datum;
- Format Terrain Database or Data Delivery consistent with the Data Capture Standards— Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*; and

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of Topographic Data

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the mapping data generated by the Municipality of Anchorage under Topographic Data Development to ensure that these data are consistent with FEMA standards and standard engineering practice, and are sufficient to prepare the DFIRM. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

Standards: All Topographic Data Development work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- A Summary Report that describes the findings of the independent QA/QC review; and
- Recommendations to resolve any problems that are identified during the independent QA/QC review.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Base Map Acquisition

Responsible Mapping Partner: Municipality of Anchorage

Scope: Base Map Acquisition consists of obtaining the digital base map, cadastral feature data set, for the project. The Municipality of Anchorage shall provide the digital base map. The required activities are as follows:

- Obtain digital files (raster or vector) of the base map.

- Secure necessary permissions from the map source to allow FEMA’s use and distribution of hardcopy and digital map products using the digital base map, free of charge.
- Certify that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production.

Standards: All Base Map Acquisition work shall be performed in accordance with the standards specified in Section 5 - Standards. The Data Capture Standards must be met for this deliverable to be acceptable.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. The Municipality of Anchorage shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 – Schedule.

- Written certification that the digital data meet the minimum standards and specifications;
- Documentation that FEMA can use the digital base map; and
- Documentation of the Datum, if appropriate.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of Base Map

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the base map acquired by the Municipality of Anchorage to ensure it includes data consistent with FEMA standards and sufficient to include on the DFIRM. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at time of delivery. An FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- A Summary Report that describes the findings of the independent QA/QC review;

- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- If data changed during review, then updated deliverables from previous tasks will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Hydrologic Analyses

Responsible Mapping Partner: Municipality of Anchorage

Scope: The Municipality of Anchorage shall perform hydrologic analyses for the lower half of the Girdwood drainage basin, which is 62 square miles, for the flooding source(s) listed earlier in Table 1.1. The Municipality of Anchorage shall calculate peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events using the GEORAS computer program. These flood discharges will be the basis for subsequent Hydraulic Analyses performed under this MAS. In addition, the Municipality of Anchorage shall address all concerns or questions regarding the hydrologic analyses that are raised during the independent QA/QC review.

If GIS-based modeling is used, Municipality of Anchorage shall document automated data processing and modeling algorithms, and provide the data to FEMA to ensure these are consistent with the standards outlined above. Digital datasets (such as elevation, basin, or land use data) are to be documented and provided to FEMA for approval before performing the hydrologic analyses to ensure the datasets meet minimum requirements.

Standards: All Hydrologic Analyses work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, Municipality of Anchorage shall upload the digital data to the MIP or submit to FEMA by using other digital media if the MIP is unavailable so that FEMA can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 - Schedule. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital copies of all hydrologic modeling (input and output) files for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events;
- Digital Summary of Discharges Tables presenting discharge data for the flooding sources for which hydrologic analyses were performed;
- Digital draft text for Hydrologic Analyses Section of the FIS report;
- Digital versions of all backup data used in the analysis including work maps;

- Format Hydrology Database or Data Delivery consistent with the Data Capture Standards– Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*; and
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in the approved QA/QC Plan.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of Hydrologic Analyses

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the technical, scientific, and other information submitted by Municipality of Anchorage specific to the hydrologic analyses to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice, and are sufficient to prepare the DFIRM. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

This work shall include, at a minimum, the activities listed below.

- Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:
 - Use of acceptable models;
 - Use of appropriate methodology(ies);
 - Correctly applied methodology(ies)/model(s), including QC of input parameters;
 - Comparison with gage data and/or regression equations, if appropriate; and
 - Comparison with discharges for contiguous reaches or flooding sources.
- Maintain records of all contacts, reviews, recommendations, and actions and make the data readily available to FEMA;
- Maintain an archive of all data submitted for hydrologic modeling review. (All supporting data must be retained for three years from the date funding recipient submits its final expenditure report to FEMA, once the study is effective all associated data should be submitted to the FEMA library); and
- If data changed during review, then updated deliverables for previous tasks will be submitted at this time.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available

by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. An FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- A Summary Report that describes the findings of the independent QA/QC review and
- Recommendations to resolve any problems that are identified during the independent QA/QC review.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Hydraulic Analyses

Responsible Mapping Partner: Municipality of Anchorage

Scope: The Municipality of Anchorage shall perform hydraulic analyses for approximately 4.9 miles of the flooding sources listed earlier in Table 1.1. The modeling will include the 10-, 2-, 1-, and 0.2-percent-annual-chance events based on peak discharges computed under Hydrologic Analyses.

The Municipality of Anchorage shall use the cross-section and field data collected during Field Survey to perform the hydraulic analyses. The hydraulic analyses will be used to establish flood elevations and regulatory floodways for the subject flooding sources.

The Municipality of Anchorage shall use the FEMA CHECK-2 or CHECK-RAS checking program to verify the reasonableness of the hydraulic analyses. To facilitate the independent QA/QC review, the Municipality of Anchorage shall provide explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate. In addition, the Municipality of Anchorage shall address all concerns or questions regarding the hydraulic analyses that are raised by FEMA during the independent QA/QC review.

Standards: All Hydraulic Analyses work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall upload the digital data to the MIP or submit it to FEMA by using other digital media if the MIP is unavailable so that FEMA can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 - Schedule. An FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital profiles of the 10-, 2-, 1- and 0.2-percent-annual-chance water-surface elevations representing existing conditions using the FEMA RASPLOT program or similar software;
- Digital Floodway Data Tables for each flooding source that is compatible with the DFIRM database;
- Digital hydraulic modeling (input and output) files;
- Digital tables with range of Manning’s “n” values;
- Explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate;
- Digital versions of all backup data used in the analyses;
- Digital versions of draft text for inclusion in the FIS report;
- Format Hydraulic Database or Data Delivery consistent with the Data Capture Standards– Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*; and
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in the approved QA/QC Plan.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of Hydraulic Analyses

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the technical, scientific, and other information submitted by Municipality of Anchorage under Hydraulic Analysis to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice, and are sufficient to revise the FIRM. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

- Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:
 - Use of acceptable model(s);
 - Starting water-surface elevations;
 - Cross-section geometry;
 - Manning’s “n” values and expansion/contraction coefficients;
 - Bridge and culvert modeling;
 - Flood discharges;
 - Regulatory floodway computation methods; and

- Tie-in to upstream and downstream non-revised Flood Profiles.
- Use the CHECK-2 or CHECK-RAS program, as appropriate, to flag potential problems and focus review efforts.
- Maintain records of all contacts, reviews, recommendations, and actions and make the data readily available to FEMA.
- Maintain an archive of all data submitted for hydrologic modeling review. (All supporting data must be retained for three years from the date funding recipient submits its final expenditure report to FEMA, once the study is effective all associated data should be submitted to the FEMA library); and
- If data changed during review, then updated deliverables for previous tasks will be submitted at this time.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- A Summary Report that describes the findings of the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- If the data changed during the Hydrologic and/or Hydraulic Analyses QA/QC process, then the updated and verified deliverables from these activities will be resubmitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Floodplain Mapping

Responsible Mapping Partner: Municipality of Anchorage

Scope for Detailed Riverine: The Municipality of Anchorage shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for the flooding sources for which detailed hydrologic and/or hydraulic analyses were performed. The Municipality of Anchorage shall incorporate all new or revised hydrologic and/or hydraulic modeling and shall use the topographic data acquired under Topographic Data Development to delineate the floodplain and regulatory floodway boundaries on a digital work map.

Scope for Refinement or Creation of Zone A: The Municipality of Anchorage shall delineate the 1-percent-annual-chance floodplain boundaries for segments 2 and 3 of Furrow Creek, as listed earlier in Table 1.1 (also described in Appendix B). The Municipality of Anchorage shall use existing topographic data or the topographic data acquired under Topographic Data Development to delineate the floodplain boundaries on a digital work map. The Municipality of Anchorage may expand on the approaches for analyzing Zone A areas outlined in *Guidelines and Specifications for Flood Hazard Mapping Partners* and in FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas* (April 1995), and/or develop new approaches. Such approaches must be coordinated with and approved by the FEMA Regional Project Officer identified in Section 12 – Points of Contact, before analysis and mapping begin.

Scope for Non-revised Areas: For all flooding sources except those segments for which updated flood data will be developed, the Municipality of Anchorage shall convert the information shown on the effective FIRM and FBFM panels for all incorporated and unincorporated areas of Municipality to digital format in conformance with FEMA DFIRM specifications. The Municipality of Anchorage shall use the acquired base map for the conversion. The Municipality shall digitize three (3) FIRM panels (panels 0360B, 0505B, and 0510C) and zero (0) FBFM panels. The Municipality of Anchorage shall not digitize the flood theme for those segments of flooding sources for which updated flood data will be developed. It is estimated that four county-wide DFIRM panels (DFIRM Panels D020005 1735, 1755, 1135, and 1155) will be produced by the Municipality of Anchorage.

Scope for Merging Revised and Non-Revised Information: Upon completion of the floodplain mapping activities for the revised and non-revised areas, the Municipality of Anchorage shall merge the digital floodplain data into a single, updated DFIRM. This work is to include tie-in of flood hazard information for areas that were not studied as part of the Flood Map Project documented in this MAS. The Municipality of Anchorage also shall tie in the revised and non-revised Flood Profiles, floodplain boundaries, and regulatory floodway boundaries with contiguous communities that were not studied as part of the Flood Map Project documented in this MAS. The Municipality of Anchorage shall coordinate with FEMA and any additional Mapping Partners responsible for other components of Floodplain Mapping, as necessary, to resolve any potential tie-in issues.

The Municipality of Anchorage shall incorporate the results of all effective LOMCs for all affected communities on the DFIRM. Also, the Municipality of Anchorage shall address all concerns or questions regarding Floodplain Mapping that are raised by FEMA during the independent QA/QC review.

Standards: All Floodplain Mapping work shall be performed in accordance with the standards specified in Section 5 - Standards. Mapping quality standards should be consistent with Procedure Memorandum No. 38, dated September 2, 2005.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall upload the digital data to the MIP or submit by using other digital media if the MIP is unavailable at time of delivery so that FEMA can access it for the independent QA/QC review. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The mapping for the remaining flooding sources including any non-revised digital panels and all merged revised and non-revised floodplain mapping data is to be submitted for a final QA/QC review at the completion of this activity. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- DFIRM mapping files prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in the approved QA/QC Plan;
- Any backup or supplemental information including supporting calculations and assumptions used in the mapping required for the independent QA/QC review of Hydrologic, Coastal and /or Hydraulic Analyses and Floodplain Mapping;
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- Written summary of the analysis methodologies;
- Digital versions of input and output for any computer programs that were used;
- Format Mapping Database or Data Delivery consistent with the Data Capture Standards–Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of Floodplain Mapping

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the floodplain mapping submitted by Municipality of Anchorage under Floodplain Mapping to ensure that the results of the analyses performed are accurately represented, the redelineation of existing data on new, updated topography is appropriate, and to ensure that the new DFIRM panels accurately represent the information shown on the effective FIRMs and FBFMs for the unrevised areas that are mapped. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

- Review the cross sections for proper location and orientation on the work map and agreement with the Floodway Data Table.
- Review the BFEs shown on the work map for proper location and agreement with the results of the hydraulic modeling.
- Review the regulatory floodway widths for agreement with the widths shown in the Floodway Data Table and the results of the hydraulic modeling.
- Review the floodplain boundaries for agreement with the flood elevations shown in the Floodway Data Table, the contour lines, and other topographic information shown on the work maps.

- Review the floodplain widths at cross sections as shown on the work maps to ensure the data matches the Floodway Data Table.
- Review the floodplain boundaries as shown on the work maps to ensure the data matches the Flood Profiles.
- For non-revised floodplain areas, the 1- and 0.2-percent-annual-chance floodplain boundaries agree with the floodplain boundaries shown on the FIRM, the contour lines, other topographic information, and planimetric information shown on the DFIRM base.
- Road and floodplain relationships are maintained for all unrevised areas.
- Review the flood insurance risk zones as shown on the work maps to ensure the data are labeled properly.
- Review the DFIRM mapping files to ensure the data were prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Review the metadata files to ensure the data includes all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available by uploading the digital data to MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- A Summary Report that describes the findings of the QA/QC review, noting any deficiencies in or agreeing with the mapping results;
- Recommendations to resolve any problems that are identified during the independent QA/QC review;
- An annotated work map with all questions and/or concerns indicated, if necessary; and
- If data changed during review, then updated deliverables for previous tasks will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

DFIRM Database

Responsible Mapping Partner: Municipality of Anchorage

Scope: The Municipality of Anchorage shall apply the final FEMA DFIRM graphic and database specifications to the DFIRM files produced under Floodplain Mapping. This work shall include adding all required annotation, line pattern, area shading, and map collar information (e.g., map borders, title blocks, legends, notes to user). The Municipality of Anchorage will be preparing the database for this project in the Enhanced format. The database shall be produced in accordance with Appendix L of the *Guides and Specifications for Flood Hazard Mapping Partners*. The Municipality of Anchorage shall coordinate with those Mapping Partners responsible for QA/QC of DFIRM Database and Graphics, as necessary, to resolve any problems that are identified during development of the DFIRM Database and graphics.

Standards: All DFIRM Database work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- DFIRM mapping files prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale;
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in approved QA/QC Plan; and
- Format DFIRM Database or Data Delivery consistent with the Data Capture Standards– Appendix N of the *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Independent QA/QC Review of DFIRM Dbase

Responsible Mapping Partner: FEMA

Scope: Upon completion of the floodplain mapping and redelineation activities, FEMA shall review the DFIRM spatial database to determine if it meets current FEMA database specifications. In addition, FEMA shall review the DFIRM to ensure it meets current FEMA graphic specifications. FEMA shall coordinate with the Municipality of Anchorage, as necessary, to resolve any problems identified during this QA/QC review. If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

- All DFIRM features are correctly symbolized with the appropriate symbol, line pattern, or area shading and follow the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- All map collar information is complete, correct, and follows the requirements specified in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- DFIRM mapping files are in a GIS file and database format as specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*, and conform to those specifications for content and attribution.
- DFIRM database files are in one of the database formats specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*, and conform to those specifications for content and attribution.
- Metadata files describing the DFIRM data include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Standards: All DFIRM Database Development work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- A Summary Report that describes the findings of the QA/QC review noting any deficiencies in or agreeing with the mapping results and the results of all automated or manual QA/QC steps taken during the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- An annotated copy of the DFIRM with all questions and/or concerns indicated, if necessary.
- If the data changed during the QA/QC process, then the updated deliverables from Floodplain Mapping and Redelineation will be resubmitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Produce Preliminary Map Products

Responsible Mapping Partners: Municipality of Anchorage

Scope: Preliminary Map Products consists of the final preparation, review, and distribution of the Preliminary copies of the DFIRM and FIS report for community officials and the general public review and comment. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. The activities to be performed are summarized below.

Preliminary Transmittal Letter Preparation: The Municipality of Anchorage shall prepare letters and transmit the Preliminary copies of the DFIRM and FIS report and related enclosures to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA. This letter may be prepared for FEMA only or for signature by FEMA and Municipality of Anchorage.

Distribution of Preliminary DFIRM and FIS Report: The Municipality of Anchorage shall distribute the Preliminary copies of the DFIRM and FIS report to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

News Release Preparation: The Municipality of Anchorage shall prepare news release notifications of BFE changes for all affected communities, if appropriate, and perform QA/QC reviews of the notices for accuracy and compliance with FEMA format requirements. The Municipality of Anchorage shall file the notifications for later submittal to FEMA for review.

Preliminary Summary of Map Actions (SOMA) Preparation: The Municipality of Anchorage shall prepare Preliminary SOMAs for all affected communities, if appropriate. The SOMA shall list pertinent information regarding LOMCs that will be affected by the issuance of the DFIRM (i.e., superseded, incorporated, revalidated).

Standards: All Preliminary Map Products work shall be performed in accordance with the standards specified in Section 5 - Standards. Mapping quality standards should be consistent with Procedure Memorandum No. 38, dated September 2, 2005. The Data Capture Standards must be met for this deliverable to be acceptable.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- Preliminary transmittal letters shall be prepared and transmitted. These letters and any additional letters requested by FEMA shall be prepared in accordance with the current version of the FEMA *Document Control Procedures Manual* and in conjunction with Guidance provided by the Region and/or its contractor.

- The FIS report is prepared in the FEMA community-based Format as documented in Appendix J of *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Preliminary copies of the DFIRM and FIS report, including all updated data tables and Flood Profiles shall be mailed to the Chief Executive Officer (CEO) and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.
- Preliminary SOMAs, prepared in accordance with FEMA requirements, shall be provided as appropriate.
- If appropriate, revised DFIRM mapping and database files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided by uploading the digital data to the MIP or submitting it by using other digital media if the MIP is unavailable at the time of delivery.
- An FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance.
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the final preparation of the preliminary DFIRM shall be provided as outlined in the approved QA/QC Plan.
- Municipality of Anchorage will submit a summary of outreach activities and any changes made in the outreach approach based on the actual implementation.

Independent QA/QC of Preliminary Map Products

Responsible Mapping Partners: FEMA

Scope:

Final QA/QC Review of Preliminary DFIRM and FIS Report: FEMA shall perform a final QA/QC review of the Preliminary DFIRM and FIS report including all data tables, Flood Profiles, and other components of the FIS report. The QA/QC review procedures shall be consistent with the *Guidelines and Specifications for Flood Hazard Mapping Partners* and the QA/QC report submitted for approval at the end of scoping.

Discrepancy Resolution: The Municipality of Anchorage shall work to resolve discrepancies identified during the final QA/QC review.

If FEMA utilizes a contractor to perform the QA/QC, the contractor must be a different contractor than who performed the original analyses. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, Municipality of Anchorage shall make the following products available by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its

contractor to assure compliance. The MIP shall be updated for status reporting monthly and when the activity is complete. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- A Summary Report that describes the findings of the QA/QC review noting any deficiencies in or agreeing with the mapping results and the results of all automated or manual QA/QC steps taken during the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- An annotated copy of the DFIRM with all questions and/or concerns indicated, if necessary.
- If data changed during review, then updated deliverables for previous tasks will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Post-Preliminary Processing

Responsible Mapping Partners: Municipality of Anchorage and FEMA

Scope: Post-Preliminary Processing includes coordination with FEMA and the Community to schedule a Community Meeting(s) for review of the Preliminary DFIRM, if required. This activity consists of finalizing the DFIRM and FIS report after the Preliminary copies of the DFIRM and FIS report have been issued to community officials and the public for review and comment. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. The activities to be performed are summarized below.

Community Coordination Meeting: If a community coordination meeting is required, the Municipality of Anchorage shall arrange for and verify that the following activities are completed:

- Establish invitee list,
- Schedule meeting date and place,
- Complete and Distribute Meeting Notice/Letter,
- Record Meeting Minutes, and
- Identify any/all communities with BFE changes for required appeal period.

Initiation of Statutory 90-Day Appeal Period: When required, upon completion of a 30-day community comment period and/or final coordination meeting with the affected communities, FEMA and/or the Municipality of Anchorage shall arrange for and verify that the following activities are completed in accordance with the current version of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners* and *Document Control Procedures Manual*:

- Proposed BFE determination letters are sent to the community CEOs and floodplain administrators.

News release notifications of BFE changes are published in prominent newspapers with local circulation in accordance with 44 CFR.

- The FEMA shall prepare the appropriate notices (Proposed Rules) that are to be published in the *Federal Register*.
- When the Municipality of Anchorage holds public meetings to present and discuss the results of this Flood Map Project, FEMA may attend the meetings and assist where possible, if requested.

Resolution of Appeals and Protests: The Municipality of Anchorage shall review and resolve appeals and protests received during the 90-day appeal period. For each appeal and protest, the following activities shall be conducted as appropriate:

- Initial processing and acknowledgment of submittal;
- Technical review of submittal;
- Preparation of letter(s) requesting additional supporting data;
- Performance of revised analyses; and
- Preparation of a draft resolution letter for co-signature with FEMA and Municipality of Anchorage and revised DFIRM and FIS report materials for FEMA review.

The Municipality of Anchorage shall mail all associated correspondence upon authorization by FEMA.

Preparation of Special Correspondence: The Municipality of Anchorage shall support FEMA in responding to comments not received within the 90-day appeal period (referred to as “special correspondence”) including drafting responses for FEMA review when appropriate and finalizing responses for co-signature. The Municipality of Anchorage also shall mail the final correspondence (and enclosures, if appropriate) and distribute appropriate copies of the correspondence and enclosures upon receipt of authorization from FEMA.

Revision of FIRM and FIS Report: If necessary, The Municipality of Anchorage shall work with FEMA to revise the DFIRM and FIS report and shall distribute revised Preliminary copies of the DFIRM and FIS report to the CEO and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

Final SOMA Preparation: The Municipality of Anchorage shall prepare Final SOMAs for the affected communities with assistance from FEMA, as appropriate.

Processing of Letter of Final Determination: The Municipality of Anchorage shall work with FEMA to establish the effective date for the DFIRM and FIS report, and shall prepare Letters of Final Determination (LFDs) for each affected community for FEMA review in coordination with the Region and its contractor, and in accordance with the *FEMA Document Control Procedures Manual*. FEMA or its designated contractor shall mail the final signed LFDs and enclosures and distribute appropriate copies of the signed LFDs.

Processing of Final DFIRM and FIS Report for Printing: The Municipality of Anchorage shall prepare final reproduction materials for the DFIRM and FIS report and provide these materials to FEMA for printing by the United States Government Printing Office. The Municipality of Anchorage shall also prepare the appropriate paperwork to accompany the DFIRM and FIS report (including Print Processing

Worksheet, Printing Requisition Forms, and Community Map Actions Form) and transmittal letters to the community CEOs.

Revalidation Letter Processing. Municipality of Anchorage shall prepare and distribute letters for FEMA signature to the community CEOs and floodplain administrators to notify the affected communities about LOMCs for which determinations will remain in effect after the DFIRM and FIS report become effective.

Archiving Data: Municipality of Anchorage shall ensure that technical and administrative support data are packaged in the FEMA required format and stored properly in the library archives until transmitted to the FEMA Engineering Study Data Package Facility. In addition, the Municipality of Anchorage will maintain copies of all data for a period of no less than three years.

Standards: All Post Preliminary DFIRM work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the Municipality of Anchorage shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A FGDC adopted metadata profile, CSDGM, must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. The MIP shall be updated for status reporting monthly and when the activity is complete.

- Documentation that the news releases were published in accordance with FEMA requirements;
- Draft and final Special Correspondence (and all associated enclosures, backup data, and other related information) for FEMA review and signature, as appropriate;
- Draft and final Appeal and Protest acknowledgment, additional data, and resolution letters (and all associated enclosures, backup data, and other related information) for FEMA review and signature, as appropriate;
- Draft and final LFDs (and all associated enclosures, backup data, and other related information) for FEMA review and signature;
- DFIRM negatives and final FIS report materials including all updated data tables and Flood Profiles;
- Paperwork for the final DFIRM and FIS report materials;
- Transmittal letters for the printed DFIRM and FIS report;
- LOMC Revalidation Letters, if appropriate;
- Completed, organized, and archived technical and administrative support data; and
- Completed, organized, and archived case files and flood elevation dockets.

SECTION 2—TECHNICAL AND ADMINISTRATIVE SUPPORT DATA SUBMITTAL

The Project Team members for this Flood Map Project that have responsibilities for activities included in this MAS shall comply with the data submittal requirements summarized below.

All supporting documentation for the activities in this MAS shall be submitted in the TSDN format in accordance with Appendix M of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners*, dated April 2003. Appendix M may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/pdf/fhm/frm_gsam.pdf. Table 2-1 indicates the sections of the TSDN that apply to each mapping activity.

If any issues arise that could affect the completion of an activity within the proposed scope or budget, the responsible Mapping Partner shall complete a Special Problem Report (SPR) as soon as possible after the issue is identified and submitted to FEMA. The SPR is to describe the issue and propose possible resolutions. (For additional information on SPRs, refer to Appendix M, Subsection M.2.1.1 of *Guidelines and Specifications for Flood Hazard Mapping Partners*.)

Table 2-1. Mapping Activities and Applicable TSDN Sections

TSDN Section	Mapping Activities													
	Scoping	Field Survey	Topo Data	QA/QC of Topo	Base Map	Hydrology/Coastal	QA/QC of Hydrology/Coastal	Hydraulic Analysis	QA/QC of Hydraulics	Flood-plain Mapping (and Re-delineation)	QA/QC of FP Mapping	DFIRM Database	Preliminary Map Products	Post-Preliminary
General Documentation														
Special Problem Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Telephone Conversation Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meeting Minutes/ Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General Correspondence	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Engineering Analyses														
Hydrologic Analyses		X			X	X	X	X	X	X	X			
Hydraulic Analyses		X			X	X	X	X	X	X	X			
Key to Cross-Section Labeling		X			X	X	X	X	X	X	X			
Key to Transect Labeling		X			X	X	X	X	X	X	X			
Draft FIS Report					X	X	X	X	X					
Mapping Information	X		X	X						X	X	X	X	X
Miscellaneous Reference Information	X	X	X	X	X	X	X	X	X	X	X	X	X	X

SECTION 3—PERIOD OF PERFORMANCE

The mapping activities outlined in this MAS will begin on the award date, and will be completed no later than 30 September 2008. The mapping activities may be terminated at the option of FEMA or Municipality of Anchorage in accordance with the provisions of the Partnership Agreement dated June 3, 1999. If these mapping activities are terminated, all products produced to date and the remaining funds from uncompleted activities, provided by FEMA for this MAS, will be returned to FEMA.

SECTION 4—FUNDING/LEVERAGE

FEMA is providing funding, in the amount of XX to Municipality of Anchorage for the completion of this Flood Map Project. Municipality of Anchorage shall provide any additional resources required to complete the assigned activities for this Flood Map Project. During the scoping process, additional needs may be identified. Activities associated with any additional needs would be performed based on availability of additional funds. The CTP Leverage listed below includes in-kind services and blue book values for acquired information (i.e. base map data, hydrologic and hydraulic analyses, etc.). More detailed leverage information will be determined during the detailed scoping process and reported back to FEMA at that time.

Funding for Project	FEMA Contribution	CTP Contribution	% Leverage	Total Project Cost
TOTAL FUNDING AMOUNTS				

The FEMA funds identified above are available to be used for the activities included in Table 4.1.

SECTION 5—STANDARDS

The standards relevant to this MAS are provided in Tables 5-1 and 5-2. Information on the correct volume, appendix, section, or subsection of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners* to be referenced for each mapping activity are summarized in Table 5-2.

These guidelines may be downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm.

Table 5-1. Applicable Standards for Project Activities

Applicable Standards	Activities														
	Scoping	Field Survey	Topo Data	QA/QC Topo Data	Base Map	Hydrology/Coastal	QA/QC Hydrology/Coastal	Hydraulic Analysis	QA/QC of Hydraulic Analysis	Floodplain Mapping (inc. Redelineation)	QA/Qc Flood-plain Mapping	DFIRM Dbase	QA/QC DFIRM Database	Preliminary Map Products	Post-Preliminary Processing
<i>Guidelines and Specifications for Flood Hazard Mapping Partners</i> , April 2003	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
American Congress on Surveying and Mapping Procedures	X	X	X	X											
Global Positioning System (GPS) Surveys: National Geodetic Survey (NGS-510), "Guidelines for Establishing GPS-Derived Ellipsoid Heights," November 1997	X	X	X	X											
Engineer Manual 1110-1-1000, <i>Photogrammetric Mapping</i> (USACE), July 1, 2002	X	X	X	X											
Engineer Manual 1110-2-1003, <i>Hydrographic Surveys</i> (USACE), January 1, 2002	X	X													
"Numerical Models Accepted by FEMA for NFIP Usage," Updated April 2003	X				X	X	X	X	X						
<i>Content Standard for Digital Geospatial Metadata</i> (Federal Geographic Data Committee), 1998	X		X	X						X	X	X	X	X	X
<i>Document Control Procedures Manual</i> , December 2000	X													X	X
<i>44 Code of Federal Regulations Part 66 and 67</i>	X													X	

Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Scoping	Appendix I, Scoping Report document attached in Appendix A to this Mapping Activity Statement; 44 Code of Federal Regulations Part 66 and 67
Field Survey	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1)
	Appendix A, Sections A.4, A.5, A.6, A.7, and A.8
	Appendix F, Section F.3
	Appendices B, C, and M
Topographic Data Development	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1)
	Appendix A, Sections A.2 , A.3, A.7, and A.8
	Appendix M
Independent QA/QC Review of Topographic Data	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.1)
	Appendix A, Sections A.2, A.3, A.7 (specifically Subsection A.7.5), and A.8 (specifically Subsection A.8.6)
	Appendix M
Base Map Acquisition and Preparation	Volume 1, Section 1.3 (specifically Subsection 1.3.1.8) and 1.4 (specifically Subsections 1.4.3.1 and 1.4.3.2)
	Appendix A, Section A.1 (specifically Subsection A.1.1)
Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4)
	Appendix A, Section A.4
	Appendix C, Sections C.1 and C.7
	Appendices E, F, G, H, and M

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Independent QA/QC Review of Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1) Appendix A, Section A.4 Appendix C, Section C.2 Appendices E, F, G, H, and M
Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4) Appendix A, Section A.4 (specifically Subsection A.4.7) Appendix C, Sections C.3 and C.7
Independent QA/QC Review of Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1) Appendix A, Section A.4 (specifically Subsection A.4.7) Appendix C, Section C.5
Levee Evaluation (if appropriate)	Appendix H Procedure Memorandum 34 (and related PMs) 44 CFR 65.2, 44 CFR 65.10
Coastal Hazard Analyses	Appendix A, Section A.4 (specifically Subsection A.4.7) Appendix C, Section C.5 Appendices B, D, and M
Independent QA/QC Review of Coastal Hazard Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1) Appendix A, Section A.4 Appendices B, D, and M

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Floodplain Mapping	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2) Appendix C, Sections C. 4 and C.6 (specifically Subsection C.6.1.3) Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (specifically Subsection D.3.7) Appendices E, F, G, H, K, L, and M
Perform Redelineation	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2) Appendix C, Section C.6 (specifically Subsection C.6.1.3) Appendices K, L, and M
Independent QA/QC Floodplain Mapping (including Redelineation/Digitization)	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3) Appendix C, Sections C.4 and C.6 Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (specifically Subsection D.3.7) Appendices E, F, G, H, K, L, and M
Independent QA/QC Review of DFIRM Database and Graphic Specs	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3, 1.4.3.3, 1.4.3.9, and 1.4.3.10) Appendices K, L, and M
Production of Preliminary Map Products	Volume 1, Sections 1.4 (specifically Subsections 1.4.2 and 1.4.3) and 1.5 (specifically Subsection 1.5.1) Appendices J, K, L, and M
Post-Preliminary Processing	Volume 1, Section 1.5 (specifically Subsection 1.5.2) Appendices J, K, L, and M

SECTION 6—SCHEDULE

The activities documented in this MAS shall be completed in accordance with the project schedule below. If changes to this schedule are required, the Municipality of Anchorage shall coordinate with FEMA and the other Mapping Partners in a timely manner.

Table 6.1 Mapping Activities Schedule

Activities	RESPONSIBLE PARTNER(S)	DATE DUE
Scoping	MOA	Nov. 21, 2006
Field Surveys	MOA	Jan. 15, 2007
Topographic Data Development	MOA	Feb. 1, 2007
Independent QA/QC Review of Topographic Data	FEMA	Feb. 15, 2007
Base Map Acquisition	MOA	Nov. 30, 2006
Hydrologic Analyses	MOA	March 21, 2007
Independent QA/QC Review of Hydrologic Analyses	FEMA	April 15, 2007
Hydraulic Analyses <ul style="list-style-type: none"> • Levee Evaluation (if appropriate) 	MOA	June 31, 2007
Independent QA/QC Review of Hydraulic Analyses	FEMA	July 31, 2007
Coastal Flood Hazard Analyses <ul style="list-style-type: none"> • Levee Evaluation (if appropriate) 	NA	NA
Independent QA/QC Review of Coastal Hazard Analyses	NA	NA

Activities	RESPONSIBLE PARTNER(S)	DATE DUE
Floodplain Mapping: <ul style="list-style-type: none"> • Detailed Riverine or Coastal Analysis • Refinement or Creation of Zone A • Merging Revised and Unrevised Areas <Floodplain Mapping or Redelineation> <ul style="list-style-type: none"> • Redelineation Using Effective Flood Profiles and Updated Topographic Data • Redelineation/Digitization of Non-Revised Areas 	MOA	Aug. 31, 2007
Independent QA/QC Review of Floodplain Mapping	FEMA	Sept. 30, 2007
Redelineation <Floodplain Mapping or Redelineation> <ul style="list-style-type: none"> • Redelineation Using Effective Flood Profiles and Updated Topographic Data • Redelineation/Digitization of Non-Revised Areas 	NA	N/A
Independent QA/QC Review of Redelineation	NA	N/A
DFIRM Database (including Graphic Specifications)	MOA/FEMA	Aug. 31, 2007
Independent QA/QC Review of DFIRM Database	FEMA	Sept. 30, 2007
Produce Preliminary Map Products (including 1/3 Outreach)	MOA	Oct. 31 2007
Post-Preliminary Processing (including 1/3 Outreach)	MOA	Sept 30, 2008

SECTION 7—CERTIFICATIONS

Field Surveys and Topographic Data Development

A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic data in accordance with 44 CFR 65.5(c). Certification of topographic data by the American Society for Photogrammetry and Remote Sensing is also acceptable.

Base Map Acquisition and Preparation

- A community official or responsible party shall provide written certification that the digital data meet FEMA minimum standards and specifications.
- The responsible Mapping Partner shall provide documentation that the digital base map can be used by FEMA. Please note that uploading base map data to the MIP does not constitute agreement that the digital base map can be used by FEMA. Documentation that the digital base map can be used by FEMA will still be required.

Certifications must be made at the time the intermediate data is submitted. For example, if hydrologic data is submitted, certification will be required at the time it is submitted.

Hydrologic Analyses, Hydraulic Analyses, and Floodplain Mapping

- A Registered Professional Engineer shall certify hydrologic and hydraulic analyses and data in accordance with 44 CFR 65.6(f).
- A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic information in accordance with 44 CFR 65.5(c).
- Any levee systems to be accredited will be certified in accordance with 44 CFR 65.10(e).

Floodplain Mapping, Independent QA/QC Review of Floodplain Mapping and DFIRM Database

The DFIRM metadata files shall include a description of the horizontal and vertical accuracy of the DFIRM base map and floodplain information.

SECTION 8—TECHNICAL ASSISTANCE AND RESOURCES

Project Team members may obtain copies of FEMA-issued LOMCs, archived engineering backup data, and data collected as part of the Mapping Needs Assessment Process from FEMA and/or your Regional Project Officer.

General technical and programmatic information, such as FEMA 265 and the Quick-2 computer program, can be downloaded from the FEMA website at <http://www.fema.gov/fhm/>. Specific technical and programmatic support may be provided through FEMA and/or its contractor; such assistance should be requested through the FEMA Project Officer specified in Section 12 – Points of Contact.

Project Team members also may consult with the FEMA Regional Project Officer to request support in the areas of selection of data sources, digital data accuracy standards, assessment of vertical data accuracy, data collection methods or subcontractors, and GIS-based engineering and modeling training.

SECTION 9—CONTRACTORS

Municipality of Anchorage intends to use the services of HDR as a contractor for this Flood Map Project. Municipality of Anchorage shall ensure that the procurement for all contractors used for this Flood Map Project complies with the requirements of 44 CFR 13.36.

Part 13 may be downloaded in PDF or text format from the United States Government Printing Office website at http://www.access.gpo.gov/nara/cfr/waisidx_04/44cfr13_04.html.

SECTION 10—REPORTING

FINANCIAL REPORTING:

Because funding has been provided to Municipality of Anchorage by FEMA, financial reporting requirements for Municipality of Anchorage will be in accordance with Cooperative Agreement Articles V and VI.

Municipality of Anchorage shall provide financial reports to the FEMA Regional Project Officer and Assistance Officer in accordance with the terms of the signed Cooperative Agreement for this MAS.

STATUS REPORTING:

Status reports will be submitted on a quarterly basis in accordance with the financial reporting submittals. At a minimum, these reports will include a summary of the work. The Project Officer, as needed, may request additional information on status.

Municipality of Anchorage may meet with FEMA and/or its contractor as needed to review the progress of the project in addition to the quarterly financial and status submittals

SECTION 11—PROJECT COORDINATION

Throughout the project, all members of the Project Team will coordinate, as necessary, to ensure the products meet the technical and format specifications required and contain accurate, up-to-date information. Coordination activities can include:

- Meetings, teleconferences, and video conferences with FEMA and other Project Team members;
- Telephone conversations with FEMA and other Project Team members;
- Updates to the MIP and other FEMA status information systems in accordance with requirements in Volumes 1 and 3 of *Guidelines and Specifications for Flood Hazard Mapping Partners*; and
- E-mail, facsimile transmissions, and letters.

SECTION 12—POINTS OF CONTACT

The points of contact for this Flood Map Project are Joe Weber, the FEMA Regional Project Officer; Jack Puff, the Project Manager for the Municipality of Anchorage; or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. When necessary, any additional FEMA assistance should be requested through the FEMA Regional Project Officer.

Each party has caused this MAS to be executed by its duly authorized representative.



Jack Puff
Project Manager
The Municipality of Anchorage

9-19-06

Date



Joe Weber
Regional Project Officer
Federal Emergency Management Agency, Region 10

09/28/06

Date

Attachments to include:

- Appendix A – Scope of Services for Lower California and Glacier Creek Flood Restudy
- Appendix B – Scope of Services for Furrow Creek Flood Restudy

Appendix A

Lower California And Glacier Creek Flood Restudy

Scope Of Services

Project Understanding

The purpose of this mapping project is to produce a letter of map revision request with accompanying supporting hydraulic and hydrologic data, model development, and study narrative for a portion of the Glacier and California Creeks in Girdwood Valley, Alaska within the Municipality of Anchorage. This project will involve a restudy of the existing mapped areas of Glacier and California Creeks downstream cross section A-A to Turnagain Arm. The hydraulic structures in the Ruane Road, Alaska Railroad, and the Seward Highway will be evaluated. This work will be done for the Municipality of Anchorage.

The existing flood study of these creeks was done in the 1970s. While little development has occurred in the majority of the floodplain, the California Creek Ruane Road culvert and the Glacier Creek railroad trestle and highway bridge have been modified from their 1970s configuration that was used in the flood mapping. The affect on the floodway and flood plain by the culvert and bridge modifications were not modeled. This work will now develop new river models and reevaluate the floodway and floodplains. This study will establish the new floodways for each creek in the study reach.

Scope of work

The primary work tasks and activities to conduct the project scoping and flood study activities are presented below. This scope of services assumes that all review fees for reviewing all work products levied by FEMA will be paid by the Municipality of Anchorage (MOA) and their partners in this study.

I.1.1.2 Task 1 - Preliminary Research Activities

Task 1.1 Scoping Meeting. The Contractor will attend a scoping meeting with the MOA to discuss study goals, standards, scope of work, public outreach program, and other issues in preparation of the commencement of the study.

1.2 Data Collection. The Contractor will collect pertinent data and information by submitting a written request to or conducting interviews with the appropriate agencies, such as the Alaska Railroad Corporation (ARRC), Alaska Department of Transportation (ADOT), the Alaska Department of Natural Resources (ADNR), Girdwood Road Board, US Geological Survey, and FEMA. Information requested will include the ADOT bridge, ARRC trestle, and culvert as-built plans, river gauge data, and historic flooding information. It is understood that information regarding the effective Flood Insurance Rate Maps (FIRMs) for the Municipality of Anchorage (MOA) will be available from the MOA. This material will be reviewed for use in conducting this flood study.

Task 1.3 Field Reconnaissance. The Contractor shall perform field reconnaissance of the Glacier and California Creeks to document field conditions, locate hydraulic structures, and gather data needed to analyze flood conditions in the Girdwood valley.

I.1.1.3 Task 2 - Outreach and Coordination

Task 2.1 Public Notices. The Contractor will assist the MOA with notifying the Girdwood community of this flood zone restudy as prescribed in the Letter of Map Revision guidance documents.

Task 2.1.2 Public Notice. The Contractor will draft the FEMA required newspaper advertisement for the project for publication in the Turnagain Times. The MOA will review and publish the announcement.

Task 2.2.2 Individual Property Owner Notice. The Contractor will draft the FEMA required individual affected property owner notice letters. The MOA will review the letters. The Contractor will mail the letter via certified mail to each affected property owner

Task 2.2 Public Meetings. The Contractor will assist the MOA with their outreach and coordination program in Girdwood. A series of 3 meetings will be presented as outlined below.

Task 2.2.1. Meeting 1. The Contractor will assist in preparing and attend study introduction meeting in Girdwood. The presentation will discuss the general approach and scope of the work. The Contractor will attend the initial public presentation to provide technical support the MOA in presenting the purpose, scope of work, and schedule for completing this study. The public presentation will be scheduled to coincide with the Girdwood Board of Supervisors (GBOS) meeting.

Task 2.2.2. Meeting 2. The Contractor will assist in preparing and attend a second public presentation to provide technical support to the MOA in presenting the draft study results. The public presentation will be scheduled to coincide with the Girdwood Board of Supervisors (GBOS) meeting.

Task 2.2.3. Meeting 3. The Contractor will assist in preparing and attend a final public presentation to provide technical support to the MOA in presenting the study results. The public presentation will be scheduled to coincide with the Girdwood Board of Supervisors (GBOS) meeting.

I.1.1.4 Task 3 – Base Map Acquisition

Task 3.1. Base Map Coordination. Based on discussions with MOA, it is apparent that digital base mapping is available for almost all the proposed study area. A limited area of California Creek near Crow Creek road may not be covered by the 2000 aerial photograph based mapping. It is assumed that recent MOA LIDAR based contour mapping can be used for this area. This assumption will be verified with FEMA prior to starting work. In addition, base map features, such as roads, streets, property boundaries, hydrographic features, political jurisdiction boundaries, will be included from existing MOA GIS data in a complete seamless coverage.

Task 3.2. Base Map Compilation. The Contractor will assemble the work map for the entire study area from the digital sources collected in Task 3.1. Feature names, such as roads, railroads, streams, lakes, will be added and aligned to the feature as necessary. Ownership boundaries will be added from the best available sources; text will be added, where required.

I.1.1.5 Task 4 - Field Surveys and Reconnaissance

Task 4.1. Manning's n Documentation. A field reconnaissance will be conducted to photographically document site characteristics for computing and selecting Mannings' n values.

Task 4.2 Field Surveys. Field surveys will be performed of the Ruane Road culvert, ARRC Trestle, and Seward Highway bridge and adjacent channels. This survey information will be used in model development. Channel cross-sections and floodplain geometry will be obtained from the digital topographic mapping that will be provided by the MOA under Task 3.

I.1.1.6 Task 5 - Hydrologic Analyses

Task 5.1. Estimate Peak Discharges. Initial research into the documentation of the existing flood model from the current effective FIS found the flows used for the BFE and floodway determinations. These flows will be used for preparing the new model of the current condition and establishing the new floodway locations. This study will model the 10, 50, 100, and 500-year event flows.

Task 5.2. Prepare and Submit Hydrology Technical Memorandum. The Contractor will prepare and submit a brief technical memorandum describing the applicability of using these flows.

I.1.1.7 Task 6 - Hydraulic Analyses

Task 6.1. Establish Starting Water Surface Elevations. The starting BFE water surface elevation for Glacier Creek will initially be the same as those used existing model at the downstream most cross section in the current model at Turnagain Arm. Model runs will also be done assuming high tide at Girdwood as the starting water surface. It is anticipated that the differences in watershed characteristics between the two creeks will be sufficient to determine the peaks to be non-concurrent. This will allow the use of normal depth for the controlling water surface in California Creek. Should it be determined that the timing of flows are close enough to warrant using computed water surface elevations in Glacier Creek, any changes to the California Creek hydrology (Task 5.1) will need to be incorporated into the Glacier Creek hydrology and hydraulic models.

Task 6.2. Establish Manning's n Values. Manning's n values will be estimated using the report titled Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains, USGS Water Supply Paper 2339. The report information will be supplemented by the field reconnaissance photographic documentation.

Task 6.3. Model Channel and Floodplain Cross-sections. This work will prepare new HEC-RAS models for California and Glacier Creek between A-A Turnagain Arm.

Channel and floodplain cross-sectional information will be obtained from the digital topographic mapping provided by the MOA under task 3. The 10, 5, 1 and 0.5-percent-annual-chance flood events for both creeks will be modeled. Cross sections will be developed using a TIN developed from topographic data collected in Task 3.1 in ARC View using GEORAS extension.

We will not replicate the effective model. The documentation for this model is very limited and sufficient information is not available to restore this model.

This work will create two new models of the study reach in each creek. The first model will represent the current condition of Glacier and California Creek. This model will be used to establish the current condition floodway and will evaluate whether the floodway between California and Glacier Creeks and Turnagain Arm over the ARRC Track to the east of Glacier Creek is needed. This final model will be used to establish new floodways for each creek should that be needed.

Task 6.4. Model Hydraulic Structures. Road crossings will be modeled using information from a combination of topographic mapping, as-built plans, and existing field surveys.

Task 6.6. Prepare Water Surface Profiles. Water surface profiles will be prepared for the base flood percent-annual-chance-events.

Task 6.7. Determine Floodways. Floodways will be determined for the study reaches and a floodway table developed. Floodway will be determined using equal conveyance method 4 and refined with method 1.

Task 6.8. Conduct Internal QA/QC. The Contractor will submit the hydraulic analysis to our internal QA team member/s for review and comment.

Task 6.9 Address Internal Review Comments. The Contractor will finalize the hydraulic analysis reflecting the internal QA team comments.

I.1.1.8 Task 7 - Floodplain Mapping

Task 7.1. Prepare Digital Work Maps. The Contractor will prepare a digital work maps delineating cross section locations, 10, 5, 1, and 0.5-percent-annual channel floodplain boundaries, base flood elevations, and the floodway boundaries. Final cartography will be completed by FEMA's contractor based on the digital information provided by HDR.

Task 7.2. Conduct Internal QA/QC. The Contractor will submit the digital work maps to our internal QA team member/s for review and comment.

Task 7.3 Address Internal Review Comments. The Contractor will submit final the digital work maps reflecting the internal QA team comments.

I.1.1.9 Task 8 - Project Management

Task 8.1. Project Management. The Contractor will complete all tasks in accordance with the written project management manual. A project management plan will be developed and implemented ensure all scope, budget, schedule, and quality requirements are met.

Table 1. Summary of HDR Project Activity Budgets

Lower California and Glacier Creek Flood Restudy	HDR Budget
Activity 1: Pre-Scoping	
Activity 2: Scoping	
Activity 3: Field Surveys and Reconnaissance	
Activity 4: Topographic Data Development	
Activity 5: Independent QA/QC Review of Topographic Data	
Activity 6: Hydrologic Analyses	
Activity 6A: Coastal Flood Hazard Analyses	
Activity 7: Independent QA/QC Review of Hydrologic Analyses	
Activity 7A: Independent QA/QC Review of Coastal Hazard Analyses	
Activity 8: Hydraulic Analyses	
Activity 9: Independent QA/QC Review of Hydraulic Analyses	
Activity 10: Floodplain Mapping (Detailed Riverine or Coastal Analysis)	
Activity 10A: Floodplain Mapping (Redelineation Using Effective Flood Profiles and Updated Topographic Data)	
Activity 10B: Floodplain Mapping (Refinement or Creation of Zone A)	
Activity 11: Independent QA/QC Review of Floodplain Mapping (Revised Areas)	
Activity 12: Base Map Acquisition	
Activity 13: DFIRM Production (Non-Revised Areas)	
Activity 13A: Independent QA/QC Review of DFIRM Production (Non-Revised Areas)	
Activity 14: DFIRM Production (Merging Revised and Non-Revised Information)	
Activity 14A: DFIRM Production (Application of FEMA Graphics and Database Specifications)	
Activity 14B: Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications	
Activity 15: Preliminary DFIRM and FIS Report Distribution	
Activity 16: Post-Preliminary Processing	
Activity 17: Outreach	

Appendix B

Furrow Creek Flood Study

Scope Of Services

Background

Furrow Creek flows through south east Anchorage. Development of the creek's floodplain the creek has been subdivided the creek channel into 3 distinct segments. The first segment is between the mouth in Turnagain Arm and the Old Seward Highway and is approximately 5,000 feet in length. This segment flows in open channel through a fully developed residential subdivision. The creek reach has been channelized through much of the subdivision and contains numerous street crossing culverts. Houses were constructed are close to the creek between 20 and 30 years ago. The downstream approximately 1,500 feet of the reach flows through a park before entering Turnagain Arm.

The second segment of the creek is between the Old Seward Highway and approximately 500 feet east of the New Seward Highway following Huffman Road. The reach is piped in a 30 and 36-inch storm drain.

The third segment is upstream of the piped segment. This reach is in a reconstructed channel and is approximately 1,500 feet in length. Near the upper end of this reach the main channel forks into a branch from the north and a branch to the east. The north branch flows approximate 150 feet in a constructed channel to the storm drain from which it discharges. The main stem flows approximately 50 feet to a wetland which contains a indistinct channel.

Furrow Creek segments 1 and 2 have not been studied for flood hazards. Segment 3 has had a flood hazard evaluation done which the Municipality of Anchorage uses to regulate deployment along this reach. Segments 1 and 3 are subject to flooding. This work is being proposed to define the flood risks along all 3 reached in order to better regulate development along the creek. The following presents an outline of the proposed study plan and the anticipated outcome and their uses.

Study Plan Highlights

The proposed flood study will evaluate the creeks hydrology and hydraulics to develop either detailed or approximate flood hazard mapping. All study steps not discussed below will follow FEMA study guidelines without modification.

Hydrology

Basin hydrology will be evaluated using HEC- 1 to develop the 10, 50, 100, and 500-year event flows. Precipitation data used in the HEC-1 model will be taken from the NOAA weather station at the Anchorage Internationals Airport, which is approximately 7 miles from the watershed. Land use input parameters will be derived from 2006 aerial photography. Basin topography will be developed from 2003 LIDAR data.

Hydraulics

Because of the types of land use in the 3 creek segments, two types of flood hazard analyses will be done. Detailed flood hazard analyses will be done for Segment 1. Detailed mapping is appropriate for this reach because the floodplain is fully developed with houses constructed close to the creek. The potential flood risk to the existing structures is high and detailed flood hazard evaluation is needed to best define the risks to the existing properties.

Approximate methods are proposed for Segments 2 and 3. Approximate methods are appropriate for the fully piped Segment 2. Approximate methods are also appropriate for segment 3 because the previous flood hazard evaluation was used to define a green belt adjacent to the creek channel that approximately contains the 100-year flood event. Houses adjacent to the creek have been built beyond this buffer and all lots adjacent to the creek are developed and no additional development is anticipated.

Hydraulic modeling of flood flows in Segment 1 will use HDR-GeoRAS for the detailed study proposed for this segment. Geometric data will come from two sources. First the 2003 LIDAR data will be used to develop a model of the ground surface. This will be augmented with field surveyed cross sections. Field surveyed cross sections will be done at each end of each culvert and at least 1 intermediate location between the culverts. It is anticipated that between 12 and 18 cross sections will be surveyed in the approximately 4,000 foot segment. Culvert hydraulic data will also be collected during the field survey for use in the model.

Hydraulic evaluation of Segment 2, the piped reach will be done with HY8 or Stormcad depending upon pipe configuration and conditions.

Segment 3 analysis approximate floodplain analysis. This will be done with approximate methods using available data from previous studies and available topographic mapping.

Map Preparation

Development of the DFIRM will be done by the team currently working on the map modernization program for the Municipality from digital data supplied by this work.

Public Notification

The affected property owners will be notified as prescribed in FEMA study guidelines through registered mail notification. In addition 2 presentations will be made at the local Community Councils, the local community advisory body. The first will be made as the work begins to cover the study purpose and gain community insight to know flood problems. The second presentation will cover the study results and how the study results will affect flood hazard insurance ratings in the area.

Table 1. Summary of Furrow Creek Project Activity Budgets

Furrow and Creek Flood Restudy	HDR Budget
Activity 1: Pre-Scoping	
Activity 2: Scoping	
Activity 3: Field Surveys and Reconnaissance	

Furrow and Creek Flood Restudy	HDR Budget
Activity 4: Topographic Data Development	
Activity 5: Independent QA/QC Review of Topographic Data	
Activity 6: Hydrologic Analyses	
Activity 6A: Coastal Flood Hazard Analyses	
Activity 7: Independent QA/QC Review of Hydrologic Analyses	
Activity 7A: Independent QA/QC Review of Coastal Hazard Analyses	
Activity 8: Hydraulic Analyses	
Activity 9: Independent QA/QC Review of Hydraulic Analyses	
Activity 10: Floodplain Mapping (Detailed Riverine or Coastal Analysis)	
Activity 10A: Floodplain Mapping (Redelineation Using Effective Flood Profiles and Updated Topographic Data)	
Activity 10B: Floodplain Mapping (Refinement or Creation of Zone A)	
Activity 11: Independent QA/QC Review of Floodplain Mapping (Revised Areas)	
Activity 12: Base Map Acquisition	
Activity 13: DFIRM Production (Non-Revised Areas)	
Activity 13A: Independent QA/QC Review of DFIRM Production (Non-Revised Areas)	
Activity 14: DFIRM Production (Merging Revised and Non-Revised Information)	
Activity 14A: DFIRM Production (Application of FEMA Graphics and Database Specifications)	
Activity 14B: Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications	
Activity 15: Preliminary DFIRM and FIS Report Distribution	
Activity 16: Post-Preliminary Processing	
Activity 17: Outreach	