

**PROCEDURES FOR
DEVELOPING SCOPES OF WORK
FOR
PROTECTIVE MEASURES RETROFIT PROJECTS
FOR UTILITY, WATER, AND SANITARY
SYSTEMS AND INFRASTRUCTURE**

August 11, 2006

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>PROCEDURES FOR DEVELOPING SCOPES OF WORK FOR PROTECTIVE MEASURES RETROFIT PROJECTS</p> <p>1. PURPOSE</p> <p>The Federal Emergency Management Agency (FEMA) administers two grant programs to assist communities in mitigating the effects of hazards on infrastructure: the Hazard Mitigation Grant Program (HMGP), and the Pre-Disaster Mitigation (PDM) competitive grant program. State, Tribal, and local government agencies may apply through the States to receive funds for these programs. FEMA requires these sub-applicants to meet a specific set of requirements when applying for the funds to ensure that proposed projects meet the program requirements, Federal environmental laws and regulations, and cost-effectiveness requirements.</p> <p>The primary method for reducing future damage to infrastructure and utilities is for the owner to retrofit the equipment or facilities in high-hazard areas to reduce the effects of the applicable hazard.</p> <p>By submitting the data described in Section 2, the sub-applicant facilitates both State and FEMA review of the funding sub-application. Scopes of Work (SOWs) without the data may result in delays or the project funding request being declined. An example sub-application exhibiting the components described in this guidance is included.</p>	

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<p>The left column (Procedures) provides format and requirements for sub-applicants to provide technical and other data in support of their request for funding. The right column (Sample Data) provides examples of data and the presentation or format of the data that the State and FEMA will need to review during their evaluation of the sub-application.</p> <p>Specific information regarding the administrative and eligibility requirements for mitigation programs is not presented here. Furthermore, this report presents a summary of areas that should be covered in an SOW for a mitigation project sub-application. Some areas can be significantly expanded using FEMA or other guidance for implementing specific programs, conducting an environmental review, and preparing a benefit-cost analysis (BCA) to determine cost-effectiveness. The State Hazard Mitigation Officer (SHMO) or FEMA Regional Office should be contacted for additional information. Also, additional requirements from the SHMO are not covered in this document.</p> <p>2. DEVELOPING THE SCOPE OF WORK FOR PROTECTIVE MEASURES RETROFIT PROJECTS</p> <p>One of the goals of FEMA’s mitigation programs is to reduce future damage from natural hazards, particularly to infrastructure. Infrastructure includes those systems necessary to provide electric power, natural gas, water, and wastewater services essential to the well-being of the community served by these systems. Ensuring infrastructure systems function is especially important in assisting recovery following disasters. To achieve this goal, FEMA may provide funding to</p>	

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<p>communities for protective measures retrofits to infrastructure, provided that the owner agrees to the retrofit.</p> <p>Summary of Required Sub-Application Information</p> <p>When a community applies for funding for a protective measures retrofitting project, the following information must be submitted with the sub-application:</p> <ol style="list-style-type: none"> 1. Basic sub-applicant, contact, and community information (Section 2.1). 2. Information regarding the applicable Hazard Mitigation Plan for the jurisdiction in which the project is being implemented (Section 2.1). 3. Descriptions of the hazard, the problem, and the project (Section 2.2). 4. Information regarding the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) (Section 2.2). 5. Property site inventory (Section 2.3). 6. BCA and supporting documentation (Section 2.5). 7. Detailed SOW, which includes a project description (Section 2.6). 8. Sources of the cost share (Section 2.7). 	<p>The City has followed the FEMA Required Application Information checklist in providing and organizing the data to support the funding request.</p>

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<p>9. Schedule for completing the scope of work once the retrofitting is completed (Section 2.7).</p> <p>10. Cost estimate (Section 2.7).</p> <p>11. Description of environmental/historic preservation considerations and supporting documentation (Section 2.8).</p> <p>Internet Resources</p> <p>The FEMA website (www.fema.gov) and the eGrants portal (https://portal.fema.gov/famsVu/dynamic/mitigation.html) have a wealth of useful information to assist sub-applicants through the funding request process. These include:</p> <ul style="list-style-type: none"> • FEMA Mitigation Division, Education and Training (http://www.fema.gov/about/training/index.shtm). • FEMA Mitigation Division, Mitigation Grant Programs, Flood Mitigation Assistance (FMA) (http://www.fema.gov/government/grant/fma/index.shtm). • FEMA Mitigation Division, Mitigation Grant Programs, HMGP (www.fema.gov/government/grant/hmgrp/index.shtm). • FEMA Mitigation Division, Mitigation Grant Programs, PDM (http://www.fema.gov/government/grant/pdm/index.shtm). 	

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<ul style="list-style-type: none">• FEMA Mitigation Division, Success Stories and Case Studies (http://www.fema.gov/plan/prevent/bestpractices/index.shtm).• Flood hazards (www.fema.gov/hazard/flood/index.shtm).• Flood Hazard Mapping (www.fema.gov/plan/prevent/fhm/index.shtm).• Floodplain Management (http://www.fema.gov/plan/prevent/floodplain/index.shtm).• Earthquake Hazards (www.fema.gov/hazard/earthquake).• Earthquake Hazard Mapping (http://earthquake.usgs.gov/hazmaps).• National Earthquake Hazard Reduction Program (NEHRP) (http://www.fema.gov/plan/prevent/earthquake/nehrrp.shtm).• FEMA Environmental and Historic (http://www.fema.gov/plan/ehp/index.shtm).• FEMA Environmental /Historic Preservation Helpline (toll free at 866-222-3580 or via e-mail at ehhelpline@dhs.gov).• FEMA BCA (www.fema.gov/pdf/government/grant/pdm/guidelines_for_bca.pdf).	

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<ul style="list-style-type: none"> • FEMA BCA Helpline (toll free at 866-222-3580 or via e-mail at bchelpine@dhs.gov). • Standards and Guidelines for Natural Hazards can be found at the American Lifeline Alliance (www.americanlifelinesalliance.org). <p>Additional standards and guidelines for organizations with similar information can be found at the following sites:</p> <ul style="list-style-type: none"> • American Water Works Association (www.awwa.org). • American Society of Civil Engineers (www.asce.org). • American Society of Mechanical Engineers (www.asme.org). • American Concrete Institute (www.concrete.org). • Water Environment Federation (http://www.wef.org). • Rural utility services (www.usda.gov/rus). • FEMA 254 - Seismic Retrofit Incentive Programs: A Handbook for Local Governments (http://www.fema.gov/plan/prevent/earthquake/pdf/fema-254.pdf). Note that this is a direct link to the FEMA 254 document in PDF format and the file size is 16.3 MB. • For a number of FEMA publications for building design professionals and engineers (http://www.fema.gov/plan/prevent/earthquake/publications.shtm). 	

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<p>2.1. STEP 1: OBTAIN BASIC PROJECT INFORMATION</p> <p>The sub-applicant must obtain the following basic information to apply for funds:</p> <ul style="list-style-type: none"> • Information regarding the organization applying for the grant, including: <ul style="list-style-type: none"> - Legal status and function. - State and Federal employer tax identification numbers. - DUNS Number. - State and Federal legislative district information. • Information for primary and alternate State and local contacts. Contacts for data clarification or additional data and all consultants should also be clearly identified. 	<p>Sub-applicant: City of Adversity, located in Prosperity County in the State of Any State (AS).</p> <p>State Employer Tax Identification Number: 4576-3456-7782</p> <p>Federal Employer Tax Identification Number: 8897-5643-7743</p> <p>DUNS Number: 1373190124</p> <p>Legislative Districts: 1st Congressional District; 2nd State Assembly District; 3rd State Senate District</p> <p>Primary Local Point of Contact:</p> <table border="0"> <tr> <td>Taylor Gilmour</td> <td>Job Title:</td> <td>Director of City Services</td> </tr> <tr> <td>City of Adversity, AS</td> <td>Telephone:</td> <td>(111) 711-0022</td> </tr> <tr> <td>City Hall, Room 410</td> <td>Fax:</td> <td>(111) 711-0333</td> </tr> <tr> <td>35003 Tornado Alley</td> <td>E-mail:</td> <td>tgilmour@adv.as.us</td> </tr> <tr> <td>Adversity, AS 40009</td> <td></td> <td></td> </tr> </table> <p>Alternate Local Point of Contact:</p> <table border="0"> <tr> <td>James Koff</td> <td>Job Title:</td> <td>Chief Engineer</td> </tr> <tr> <td>City of Adversity, AS</td> <td>Telephone:</td> <td>(111) 711-0045</td> </tr> <tr> <td>City Hall, Room 312</td> <td>Fax:</td> <td>(111) 711-0335</td> </tr> <tr> <td>35003 Tornado Alley</td> <td>E-mail:</td> <td>jkoff@adv.as.us</td> </tr> <tr> <td>Adversity, AS 40009</td> <td></td> <td></td> </tr> </table>	Taylor Gilmour	Job Title:	Director of City Services	City of Adversity, AS	Telephone:	(111) 711-0022	City Hall, Room 410	Fax:	(111) 711-0333	35003 Tornado Alley	E-mail:	tgilmour@adv.as.us	Adversity, AS 40009			James Koff	Job Title:	Chief Engineer	City of Adversity, AS	Telephone:	(111) 711-0045	City Hall, Room 312	Fax:	(111) 711-0335	35003 Tornado Alley	E-mail:	jkoff@adv.as.us	Adversity, AS 40009		
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	<p>Primary State Point of Contact</p> <p>Alton Leonard Job Title: AS SHMO Emergency Telephone: (222) 822-4466 Management Agency Fax: (222) 822-1100 AS EMA, Room 11002 E-mail: aleonard@ema.as.us 1734 Governor's Highway Capital City, AS 40028</p> <p>Alternate State Point of Contact:</p> <p>Susan Smith Job Title: Senior EMA Planner Emergency Management Telephone: (222) 822-4456 Agency Fax: (222) 822-1100 AS EMA, Room 11002 E-mail: sesmith@ema.as.us 1734 Governor's Highway Capital City, AS 40028</p> <p>Application Preparer:</p> <p>Pat Keach Job Title: Community Development City of Adversity, AS Specialist City Hall, Room 430 Telephone: (111) 711-0671 35003 Tornado Alley Fax: (111) 711-0600 Adversity, AS 40009 E-mail: pkeach@adv.as.us</p>

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<ul style="list-style-type: none"> National Flood Insurance Program (NFIP) community name, Community Identification Number (CID), participation status, and compliance history. Information clearly defining the location of the proposed project, including latitude and longitude. Attach maps showing the location of the project. Acceptable formats include recent topographic maps or aerial photographs, and U.S. Geological Survey (USGS) quadrangle maps. Also, note the existence of any deeds or restrictions that might limit Federal funding for the project. Identification of any FEMA grant funds previously received for the project. For example, if the facility was damaged during an event that the President declared to be a disaster, the sub-applicant may have received a grant to repair the facility under the Public Assistance Program. 	<p><u>NFIP Community Name:</u> City of Adversity, located in Prosperity County in the State of Any State (AS); CID = 006006.</p> <p><u>NFIP Participation Status:</u> Participating since June 1974. Last Community Assistance Visit conducted in January 2000.</p> <p><u>Compliance History:</u> The City has exceeded the minimum floodplain management criteria required under the NFIP. Although uncontrolled construction of homes occurred prior to the establishment of the floodplain regulations, current enforcement of these regulations has eliminated construction of new or substantially improved homes in floodplains. The City’s zoning includes buffers around floodplains and only allows for recreational or open space use within floodplains.</p> <p>The project is located in the City of Adversity. The purpose of the project is to mitigate a 180-foot long, 16-inch diameter ductile iron sanitary sewer force main where the pipe crosses Lyons Creek. The pipe is subject to failure from several hazards. The attached aerial map (dating from 1997) is clearly marked with the locations of the project, with Global Positioning System (GPS) coordinates given for the crossing.</p> <p>The City has not previously received disaster assistance for repairs or protective measures retrofit of this structure. However, the City received assistance from FEMA for emergency response and debris removal following the Presidential disaster declaration for the 03/28/02 flood event.</p>

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<ul style="list-style-type: none"> • A description of any projects or components of this project, whether funded by FEMA or another entity, that will be completed in the vicinity of the project. Projects in the same watershed should be considered. FEMA must evaluate cumulative effects of projects when conducting the environmental review. • A description of the preferred solution. Identify the protective measures retrofit method to be used for this project. Optional components for protective measures retrofits may include service lines and/or service facilities. <p>A protective measures retrofit project can take a number of forms based on the type of infrastructure, the type of facility, and the type of structures that are susceptible to damage. Projects could range from simple and inexpensive, such as installing flexible couplers on propane and natural gas lines, to significant and expensive structural projects involving engineered designs and temporary shut downs of utility lines for several days to several weeks, such as the enhanced anchoring of utilities crossing over or under roadways.</p> <p>Depending on the size and expense of the proposed measure, it may be necessary to seek the services of a professional engineer, architect, building contractor, or the local building department to determine the types of retrofits needed. All protective measures retrofits must also meet the requirements of local and state building codes or national standards.</p>	<p>No other projects are currently proposed for the project area.</p> <p>Solution 1 – Protective Measures Retrofit (Preferred Solution)</p> <p>The proposed project will implement measures to retrofit a 180-foot long, three section, 16-inch diameter ductile iron sanitary sewer force main at the point where the pipe crosses Lyons Creek. The pipe is subject to failure from several significant hazards, including, but not limited to, erosion/scour of footings from flooding, displacement of the footings from earthquakes, and destruction of the footings from landslides (from heavy rains or earthquakes). Failure of the support structure and pipe would result in discharge of a large volume of raw sewage into the stream.</p>

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<p>Electrical infrastructure retrofit projects may include modifications to substations, transmission towers, poles, and lines, or distribution poles and wires.</p> <p>Water and wastewater system retrofit projects may include modifications to buried pipelines, aboveground pipelines, pumping stations, and storage tanks.</p> <ul style="list-style-type: none"> • The American Lifeline Alliance has identified guidelines and standards applicable for various hazards. More information on the guides and standards can be obtained by going to: www.americanlifelinesalliance.org. • A description of the problem, including a brief description of hazard, risk, magnitude, severity, and how the hazard will be mitigated through implementation of the protective measures retrofit project. • A description of how the proposed protective measures retrofit project will mitigate potential risks. • The scheduled completion date for the project. • If applicable, the community’s Community Rating System (CRS) status and the status of the FMA plan. This information should include the date that FEMA approved the FMA plan and a reference of how this project is included in the plan. 	<p>The potential failure will be mitigated by raising the force main pipe support structure and installing new footings designed to the current seismic code provisions and constructed outside of the stream channel (see attached plans).</p> <p>The City anticipates completing the project by October 2007. This assumes approval of the grant sub-application by October 2006.</p> <p>The City of Adversity is a Class 7 CRS community. The Prosperity County multi-jurisdictional plan, of which the City of Adversity is a signatory, is a DMA/FMA/CRS approved plan.</p>

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<p>with a 10% chance of being exceeded in a 50-year period. In technical terms, the levels of ground shaking are shown as peak ground acceleration (% of g, the acceleration of gravity). The USGS maps are available at: http://earthquake.usgs.gov/hazmaps/products_data/2002/us2002.html.</p> <p>Not all of the maps are 10% in 50-year maps. A drop down menu at the top can be used to select the probability (2% in 50 years can also be selected).</p> <p>Sub-applicants may want to consider contacting their state emergency management office to talk with the State Earthquake Program manager or the SHMO to obtain a more state-specific hazard map and assistance.</p> <p>In addition to the USGS maps, an evaluation of local soils and rock should be completed. Areas of loose, soft, wet soils may amplify earthquake ground motion. This increases the potential for earthquake damage. As a screening method to account for approximate impacts of poor soils, it is suggested that the hazard level be raised by one level (color) for areas of the community located on loose, soft and wet soils. In many areas of the country, detailed county soil maps are available that identify areas with loose, soft, wet soils. Soil surveys are produced by the Natural Resources Conservation Service (NRCS) (http://soils.usda.gov/). A second, more costly option is to hire a geotechnical engineer or geologist to complete mapping for specific areas.</p>	<p>The effective soils maps are the Published Soil Surveys for the State of Any State (AS), Prosperity County Area, dated 1966.</p>

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<p>The NRCS soil types are not related to NEHRP soil types. The best sources are State Geological Surveys.</p> <p>Finally, many of the building code councils include seismic maps and/or seismic design manuals as part of their services.</p> <p>Note that seismic map scales are much larger than the flood map scales, which are typically at a scale of 1:400 to 1:2000. Therefore, it is not possible to determine the seismic zone down to the lot level. However, using the seismic maps and the soils maps will provide adequate information for the design consideration.</p> <p>The following data should be submitted with the sub-application:</p> <ul style="list-style-type: none"> • A copy of the effective USGS map for the project area is the Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years dated October 2002. The map should be copied at the same scale as other maps of the project area. • A copy of the effective soils maps, with the location(s) of the structures to be retrofitted clearly marked. 	<p>See attached USGS Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years dated October 2002 (at same scale as original USGS map) and copy of local topographic map (based on an aerial survey from April 1997) with the project site marked in red on each map.</p> <p>A copy of the effective soils maps for Prosperity County, dated 1966, with the locations of the structures clearly marked in red is attached.</p>

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<p>2.2.2. Seismic History</p> <p>The sub-applicant should document the history of seismic problems in the project area. Essential information includes date(s) of earthquake events, earthquake characteristics, damage, location, duration and extent of earthquakes (including aftershocks), and cost of damage. Other key data include:</p> <ul style="list-style-type: none"> • Earthquake magnitude as determined by the USGS, earthquake intensity based on observations at the time of the earthquake using the Modified Mercalli Intensity scale, the proximity of the epicenter of the earthquakes to the project site, the peak ground acceleration, the spectral response acceleration, the depth of the earthquake, and the duration of the earthquake. 	<p>Many residents in Adversity live on or near the Quakeston Fault, and approximately 1,500 property owners have suffered earthquake damage since records have been kept. The sanitary sewer stream crossing in Adversity has suffered damage to the footings and pipes from the recent earthquakes. Most recently in 2005, a 5.1 magnitude earthquake struck along the Quakeston Fault, causing significant damage to the crossings.</p> <p>Due to Adversity’s proximity to the Quakeston Fault, the community has experienced an earthquake on an average of once every 24 years with an average magnitude of just under 4.0.</p> <p>Additionally, the community-wide cost of damages from each earthquake event has increased from approximately \$600,000 in March 1910 to approximately \$14.4 million in March 2005.</p> <p>The March 2005 earthquake’s magnitude was 5.1, with an intensity of VI on the Modified Mercalli Intensity Scale. The epicenter of the earthquake was located 2 miles outside of town with a hypocritical depth of 2 miles, and the earthquake lasted for 15 seconds. The Peak Ground Acceleration was 4-8%. The December 1970 earthquake was of similar size, depth, and duration; detailed information is not available on earlier earthquakes. This suggests that Adversity can expect similar earthquakes approximately every 24 years (frequencies were estimated by a State geologist). The recorded earthquakes include:</p> <p>03/26/1910 – 3.1 magnitude earthquake.</p> <p>04/05/1954 – 4.0 magnitude earthquake.</p> <p>05/25/1970 – 3.7 magnitude earthquake.</p> <p>03/12/2005 – 5.1 magnitude earthquake.</p>

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<ul style="list-style-type: none"> • Cost of damage to buildings, contents, and infrastructure (broken out by each of these three components, if possible). • Whether use of structures, public services, utilities, roads or bridges was lost, and if so, for how long. • The seismic damage functions for buildings and structure contents for the structures to be retrofitted, if available. • Specific data for the structures to be retrofitted (discussed in more detail in Section 2.3). <p>The State Earthquake Program Manager may provide historical seismic information. However, other potential</p>	<p>Note: The amounts listed below represent total damages reported on a community-wide basis (combined buildings, contents, and infrastructure).</p> <p>03/26/10 – Reported damages of \$600,000.</p> <p>04/05/54 – Reported damages of \$4,400,000.</p> <p>05/25/70 – Reported damages of \$7,800,000.</p> <p>03/12/05 – Reported damages of \$14,400,000.</p> <p>Average loss of public services is 3 days per event.</p> <p>Average loss of electricity, water and sewer, and natural gas is 7 days per event.</p> <p>Two bridges were out of service after the 1970 and 2005 events, with an average detour of 20 minutes per trip (40 minutes per round trip), for a distance of 10 miles for approximately 75 one-way vehicle trips per day.</p> <p>Six schools were closed for an average of one semester; students had to be bused to nearby schools or placed in portable classrooms.</p> <p>Not Applicable.</p>

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<p>sources of this information include:</p> <ul style="list-style-type: none"> • Natural Resources Conservation Service (NRCS) (www.nrcs.usda.gov). • U.S. Geological Survey (USGS) (www.usgs.gov). • USGS Seismic Hazard Maps (http://earthquakes.usgs.gov/hazmaps). • USGS EQ Facts and Lists (http://wwwneic.cr.usgs.gov/neis/seismology/seismology.html). • USGS Regional Websites (http://earthquake.usgs.gov/regional). • USGS National Earthquake Information Center (NEIC) (http://wwwneic.cr.usgs.gov). • USGS Earthquake news and highlights archives (http://earthquake.usgs.gov/eqcenter/eqinthenews/). • USGS Historical Earthquakes (http://earthquake.usgs.gov/learning/topics.php?topicID=66&topic=Historic%20Earthquakes). <p>Note: The Federal agency website addresses above are for the agency national headquarters. The websites contain links to agency offices or districts within individual States.</p> <p>2.2.3. NFIP Flood Hazard Data</p>	<p>The proposed project location, in northeastern Adversity, is a rolling, hilly upland consisting of uncompacted till. The stream</p>

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<p>Information regarding flood hazards can usually be obtained from the NFIP maps for the community in which the project is located. Floodplain boundaries and flood elevations are shown on the FIRM for the community. Additional information, including flood profiles (a graph showing the relationship of the water surface elevation of a flood event to locations along a body of water) and supporting technical information, may be found in the accompanying FIS report. FIRMs and FIS reports may be obtained through the FEMA Map Service Center at www.msc.fema.gov or by calling 800-358-9616 (toll free).</p> <p>Along with other information, FISs and FIRMs provide information regarding the flood hazard boundary, which has a 1 percent chance of being equaled or exceeded in any given year. On FIRMs, the flood hazard boundary areas where riverine flooding sources have been studied by detailed methods is designated Zone AE (or on older maps, the designation may be a numbered Zone A, such as “Zone A1”). The flood hazard boundary in coastal areas is designated Zone VE (or as a numbered V zone on older maps). Zone VE, also known as the Coastal High Hazard Area, will have more stringent construction standards. FIRMs may also show the Base Flood Elevation (BFE), which is the expected elevation (relative to a datum, usually sea level) of the flood hazard boundary.</p> <p>If BFEs are shown on the FIRM, the corresponding FIS may contain profiles of the 10-, 50-, 100-, and 500-year flood elevations for the flooding source in question. Using features such as roads and bridges that are labeled on the profile, it is possible to measure to a location on the profile adjacent to the</p>	<p>that flows through the valleys of this hilly area slopes to the Quake River 6 miles downstream. The land adjacent to the river is 1 to 5 feet above normal (non-flood) river level, with a sharp rise adjacent to the water. The property where the current footings are located is within the FEMA-designated floodway for the Quake River as shown on the FIRM.</p> <p>The ground elevation at the base of the footings ranges from 989 to 1,102 feet National Geodetic Vertical Datum of 1929 (NGVD).</p> <p>The base flood elevations range from 992 to 1,110 feet NGVD.</p> <p>The effective FIRM for the project area is from the FIS for the City of Adversity, CID No. 006006, Panel 010C, dated March 6, 1994 (see attached FIRM).</p>

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<p>project area and read the BFE from the profile. To determine the distance a structure may be located from a road or bridge, measures the distance on the FIRM along the centerline of the river and then find the corresponding location on the flood profile. This is an acceptable method for obtaining a BFE.</p> <ul style="list-style-type: none"> • The FIRM may also show a floodway for the flooding source. The floodway designates the portion of the flood hazard boundary that represents the area of highest conveyance and flow velocity, and therefore the area that poses the greatest risk for flood damage. If a property is located in a floodway, this fact should be noted in the sub-application. • If a floodplain is simply designated “Zone A” (for riverine areas) or “Zone V” (for coastal areas), it was determined by approximate methods, and therefore does not have a corresponding BFE on the map. In such cases, it is necessary to develop flood hazard data for the project location. <p>The following data should be submitted with the sub-application:</p> <ul style="list-style-type: none"> • A copy of the FIRM with FIRM title block, including the NFIP CID number, effective date, and panel number and suffix. The FIRM should be copied at the same scale as other maps of the project area. The sub-applicant should determine if the community has requested a revision to these maps that has not yet been incorporated, and if so, whether the change would affect the property. 	<p>See attached FIRM (at same scale as original FIRM) and copy of local topographic map (based on an aerial survey from April 1997) with the project site marked in red on each map.</p> <p>There are no previous or pending FEMA map revisions requested for the Quake River or its tributaries.</p>

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<ul style="list-style-type: none"> • A copy of the FIS profile with the location(s) of the structures to be acquired, elevated, relocated, or retrofitted clearly marked. In cases where local flooding or ponding appears on the FIRM, it is likely that the flood hazard was identified by approximate methods, and no flood profile exists. • The data used to develop the BFE if the floodplain was determined by approximate methods on the FIRM. The BFE should be used to delineate the corresponding floodplain on the topographic map for the sub-applicant’s area. <p>To determine the discharge of a river at a given location, a hydrologic model, such as a rainfall-runoff model or a simplified method, such as use of USGS regression equations, can be used. To determine the flood elevations for the stream, hydraulic models or other normal depth calculations can be used. A qualified professional engineer or hydrologist must prepare this information.</p> <ul style="list-style-type: none"> • Specific data for the structures to be retrofitted (discussed in more detail in Section 2.3). 	<p>A copy of the flood profile from the FIS for the City of Adversity (Panel 04P, dated March 6, 1994) for the Quake River is attached. The profile has been marked in red to show the upstream and downstream boundaries of the project site.</p> <p>(No information is required here if the flood data from the FIS is used to determine the BFEs for the project site.)</p>

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<p>2.2.4. Flood History</p> <p>The sub-applicant should document the history of flooding problems in the project area. Essential information includes date(s) of flooding events, flood characteristics, flood location, duration and extent of flooding, and cost of damage. Other key data include:</p> <ul style="list-style-type: none"> Flood elevation, discharge, and flood frequency data, including the source and methodology used to determine the frequency. Also, include nearby high water marks (if available) and any interior high water marks that show the depth of flooding above the first floor elevation (FFE) in the structure(s). 	<p>Many residents in Adversity live on or near the river, and approximately 1,500 property owners have suffered flood damage since records have been kept. Approximately 500 property owners suffer damage or fight rising waters regularly (every 5 to 10 years). Most recently, the Quake River flooded in March 2002, causing significant damage to over 500 residential properties.</p> <p>Due to Adversity’s proximity to the Quake River, the community has experienced flooding on an average of once every 3 to 5 years for over half a century.</p> <p>Additionally, the community-wide cost of damage from each flood event is increasing from an average of \$2.4 million between March 1939 and February 1970, to an average of \$14.4 million between March 1970 and March 2002. (See the attached FIS data for a more detailed history of the flooding.)</p> <p>There was only one flood exceeding the 100-year flood elevation of 1,110 feet since March 1939. The largest recorded floods, as estimated by a State hydrologist, include:</p> <p>03/26/39 – Peak flood elevation of 999.5, 11,760 cubic feet per second (cfs), 55-year flood.</p> <p>04/05/54 – Peak flood elevation of 1,114.5, 18,800 cfs, 120-year flood.</p> <p>07/20/63 – Peak flood elevation of 997.1, 8,500 cfs, 40-year flood.</p> <p>05/25/78 – Peak flood elevation of 1,102.3, 13,400 cfs, 70-year flood.</p> <p>03/12/96 – Peak flood elevation of 1,101.9, 12,000 cfs, 65-year flood.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Cost of damage to buildings, contents, and infrastructure (broken out by each of these three components, if possible). • Whether use of structures, public services, utilities, roads or bridges was lost, and if so for how long. • Depth-damage functions (that is, percent damage of the building replacement value at each flood depth) for the structures to be retrofitted, if available. • Specific data for the structures to be retrofitted (discussed in more detail in Section 2.3). 	<p>03/28/02 – Peak flood elevation of 999.0, 11,200 cfs, 50-year flood.</p> <p>Note: The amounts listed below represent total damages reported on a community-wide basis (combined buildings, contents, and infrastructure).</p> <p>03/26/39 – Reported damages of \$900,800.</p> <p>04/05/54 – Reported damages of \$4,400,000.</p> <p>07/20/63 – Reported damages of \$2,700,000.</p> <p>05/25/78 – Reported damages of \$7,800,000.</p> <p>03/12/96 – Reported damages of \$20,200,000.</p> <p>03/28/02 – Reported damages of \$24,700,000.</p> <p>Average loss of public services is 3 days per event.</p> <p>Average loss of electricity, water, sewer, and natural gas is 7 days per event.</p> <p>Two bridges were out of service during the 1978, 1996, and 2002 floods, with an average detour of 20 minutes per trip (40 minutes per round trip), for a distance of 10 miles for approximately 75 one-way vehicle trips per day.</p> <p>The depth-damage functions in the FEMA Riverine Limited Data BCA module are representative of the damages for this project.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>The FEMA FIS may provide historical flood information. However, other potential sources of this information include:</p> <ul style="list-style-type: none"> • Association of State Flood Plain Managers (ASFPM) (www.floods.org). • National Weather Service (NWS) (www.nws.noaa.gov). • Natural Resources Conservation Service (NRCS) (www.nrcs.usda.gov). • U.S. Army Corps of Engineers (USACE) (www.usace.army.mil). • U.S. Bureau of Reclamation (BOR) (www.usbr.gov). • U.S. Geological Survey (USGS) (www.usgs.gov). • State water resources agencies. <p>Note: The Federal agency website addresses above are for the agency national headquarters. The websites contain links to agency offices or districts within individual states. The ASFPM website contains mitigation information and links to State NFIP Coordinating Offices (which may also have useful flood data) and State agencies.</p>	

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.3. STEP 3: PREPARE A PROPERTY OR FACILITY INVENTORY</p> <p>An inventory of the structures, facilities, or utilities to be retrofitted must be prepared. This inventory should be updated as new information is collected or property owners decline to participate in the program.</p> <p>Property owners may initially express interest in the retrofit program but subsequently decide not to take part. In some cases, these withdrawals occur after FEMA has approved grant funding. Consequently, the inventory should include alternate properties that may be retrofitted when withdrawals occur.</p> <p>For each property, facility or utility to be retrofitted, the community should complete a Property Site Inventory. Record all relevant information that led the community to decide to include this structure in the project, attaching at least two color photographs of the main structure (from two different sides). Specific data regarding the structure and its earthquake history should be collected, including:</p> <ul style="list-style-type: none"> • Latitude and longitude for each property to assist FEMA with future tracking of mitigation projects. • Utility type, type of material (type of pipe, type of wire) foundation type (pier or post), length, and capacity. 	<p>Property: Parcel No. 301-0011-008, 1375 Hurricane Way</p> <p>Property owner and co-owner information: Jerome Cress, Superintendent, Adversity Public Works Department</p> <p>Mailing address: P.O. Box 7510, Adversity, AS 40233</p> <p>Daytime Telephone Number: (111) 228-7725</p> <p>Latitude and longitude are only available for the structures surveyed for this project (data attached).</p> <p>The current sewer crossing is a 16-inch ductile iron sewer main supported by two concrete pylons located in the floodway of the Quake River. The crossing is 24 feet bank to bank.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Customers Served - Average number of customers served. • Physical Damage Estimate. The estimated average cost of damage based on historical data. • Loss-of-Function Impacts. Economic impacts of loss of service are generally the largest category of benefits. • Functional Downtime Estimates. This is the amount of time that the system is expected to be down as determined by system days of loss of service. If service is not lost due to redundancy in the system, then there is no functional downtime. • Loss of public services. The estimated dollar value per day for the loss of public services. • Mitigation project useful life. This estimated amount of time (in years) that the mitigation action will be effective. • Mitigation project cost. This is the estimated total cost of the proposed mitigation action (includes Federal and non-Federal share). • Continuity premium. A multiplier on the ordinary value of services that applies to services critical to immediate disaster response and recovery. 	<p>The number of customers served by this sewer line is 19,000 people per day.</p> <p>The City’s Public Works Director estimates that the cost of repairing the stream crossing from either floods or earthquakes is approximately \$80,000 per event.</p> <p>A detailed description of the loss of service and the means by which this was determined are attached.</p> <p>If the pylon supports fail for this stream crossing, there is a 100% loss of service for the residents served by this line. Expected total downtime is estimated to be 7 days for an earthquake and 7 days plus the amount of time it takes the flood waters to recede for flooding.</p> <p>Not applicable here.</p> <p>A value of 30 years was used.</p> <p>The mitigation project cost is \$300,000. This estimate is based on a detailed cost breakdown by component, and is attached to this sub-application.</p> <p>Not applicable here.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.4. STEP 4: ESTABLISH A METHOD FOR DETERMINING BUILDING REPLACEMENT VALUE</p> <p>When funding protective measures retrofit projects involving or affecting large or entire portions of buildings, it may be necessary to establish and document the building replacement value (BRV). If needed, the BRV should be derived from a reasonable methodology that has been applied consistently throughout the community. Two methods of calculating BRVs are acceptable:</p> <ul style="list-style-type: none"> <p>Estimates. Professional estimates or appraisals typically yield the most accurate results. Methods include inspections, comparisons with similar properties, checking building permit information, and reviewing documentation of recent improvements. Estimates must show the breakdown of the value of the structures and the value of land. In the BCA, the sub-applicant may only enter the value of the structures for the BRV and cannot include the land value. Communities may also use estimates by local building officials or from a national cost estimating guide such as R.S. Means or Marshall and Swift.</p> <p>The community must allow property owners of non-government buildings to dispute any estimates that the City makes and provide a second estimate. Typically, the community requires the property owner to pay for the second estimate.</p>	<p>The BRV will be based on the pre-disaster value. The City of Adversity used estimates that the public works director received from three construction firms to estimate the BRV. However, we averaged the estimates and used the average in this sub-application (copies of original estimates are attached).</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<ul style="list-style-type: none"> • Use of tax assessor’s records. Because tax assessments are not usually computed annually, they tend to be lower than the true value. Therefore, use of tax assessment data requires a percent adjustment factor based on the normal adjustment procedures used in the county or community where the structure is located. The percent adjustment factor updates the assessed tax value to the current BRV. <p>The selected method for determining property values must be used consistently for all participating property owners. Generally, pre-event market value is used only up to one year after the disaster occurs.</p> <p>2.5. STEP 5: PREPARE A BENEFIT-COST ANALYSIS</p> <p>A BCA is FEMA’s method for determining whether proposed mitigation measures are cost-effective. It is recommended that a preliminary BCA be completed using rough estimates of the project costs and benefits to evaluate the project. Once a detailed scope of work has been determined, a more thorough and precise BCA should be prepared using specific data. A complete BCA is required for all FEMA-funded mitigation projects.</p> <p>The BCA is completed using the hazard frequency and damage history for the project area, the property inventory, and the estimated project costs. All information used to prepare the BCA must be documented, including data sources, dates, assumptions, and analysis procedures. Data from recognized sources such as FEMA, the USGS, the USACE, and State agencies have a high degree of credibility. When local data are</p>	<p>Copies of tax records for each property in the project are attached. This data includes the adjusted tax value for the current year and the multiplier used to estimate BRV.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>used, supporting documentation from an engineer or other qualified source must be submitted.</p> <p>This section presents general guidance regarding the preparation of BCAs for retrofit projects. More detailed information regarding BCAs may be obtained from the FEMA website at http://www.fema.gov/fima/pdm.shtm (search word: BCA) or from the <i>FEMA Mitigation BCA Toolkit CD</i>.</p> <p>FEMA has also established a BCA Helpline, which can be reached at 866-222-3580 (toll free), or by e-mail at bchelpine@dhs.gov.</p> <p>Along with the BCA for each property or group of similar aggregated properties, the sub-applicant should include a completed Data Documentation Template (DDT) to support the values used in the BCA. The DDTs are available on the <i>FEMA Mitigation BCA Toolkit CD</i>.</p> <p>Generally, sub-applicants use a FEMA-approved software-based BCA to determine the cost-effectiveness of projects. Projects submitted for consideration under any of these programs must adhere to all requirements set forth in the various governing statutes and program regulations.</p>	

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.5.1. Using FEMA’s BCA Modules</p> <p>FEMA has developed software and guidance to prepare BCAs in accordance with agency requirements. The BCA software includes modules for different hazards. Sub-applicants are encouraged to use the FEMA BCA software to ensure that the calculations and methods are standardized. Alternative BCA software may be used only if approved by FEMA in advance of submitting a sub-application based on the alternative software.</p> <p>Many of the FEMA BCA modules contain standard or default data. Use of such data is acceptable as long as the data are applicable to the specific retrofit project being proposed.</p> <p>The Seismic Non-Structural Module can be used for non-structural as well as lifeline projects that do not easily fit into the Full Data Seismic (Structural) BCA module, such as bracing fire sprinklers, false ceilings, ceiling lights, and book or storage shelves. The information needed to complete this module may include, but is not limited to:</p> <ul style="list-style-type: none"> • Structural data for infrastructure to be protected by the project. • Documentation of the seismic risk and the seismic hazard data. 	<p>The FEMA Flood Full Data, Limited Data, Seismic Full Data, and Seismic Non-Structural BCA modules were used for the BCAs prepared for these projects, since they included both structural and non-structural retrofits.</p> <p>The default values in the FEMA Flood and Seismic BCA modules were used in the analyses for this project.</p> <p>See the Property List attached to the City’s sub-application.</p> <p>See the information cited in Seismic History and the attached copies of the effective USGS seismic maps, which have been marked in red to show the property locations.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Documentation of flood risk and the flood hazard data. • Project cost, useful life, and facility replacement value. • Facility flood and seismic damage estimates before- and after-mitigation. • Value of services to community provided by the utility (if loss-of-function benefits are to be considered). • Estimates of deaths and injuries due to seismic events. • Demolition threshold. 	<p>See the information cited in Flood History and the attached copies of the effective FEMA Flood Insurance Rate Map (FIRM), which have been marked in red to show the property location.</p> <p>The Project Engineer has estimated that the retrofit would cost \$300,000. After careful study of the existing structure, he has indicated that the useful life of the structure could be extended up to 30 years by the project (see attached letter). The BRV is noted in Section 2.4.</p> <p>The project useful life has been determined to be 30 years.</p> <p>The flood and seismic damage functions in the Flood and Seismic Non-Structural BCA module were used.</p> <p>FEMA default data was used.</p> <p>There were no deaths, and documentation for the injuries is explained under the “Benefits” category below. The values used for injuries were in accordance with the FEMA guidance provided on the <i>FEMA Mitigation BCA Toolkit CD</i>.</p> <p>The Public Works Department has agreed to 50 percent as the amount of damage per structure that would result in demolition.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.5.2. Preparing the BCA</p> <p>Considerations for preparing the BCA are described below. It should be noted that net social benefits and total costs (both Federal and local share), as opposed to the benefits and costs to the Federal Government, should be the basis for evaluating whether a project is cost-effective. Therefore, all social benefits would be considered.</p> <p>2.5.2.1. Benefits</p> <p>The benefits of both flood and seismic protective measures retrofits are the reduction in damage, losses, and casualties that would occur if occupancy continued at the current standards. For example, if the project’s structure has been damaged, then relocating the pylons and retrofitting the joint connections would lessen the need to repair the structure in the future.</p> <p>Examples of common benefits include avoided (or reduced):</p> <ul style="list-style-type: none"> • Damage to buildings and contents, including public buildings, commercial structures, and residences, as well as damage to infrastructure serving the structures. • Displacement costs incurred by businesses, residents, or institutions that must relocate elsewhere while buildings are repaired. • Emergency response costs for police, fire, and other public services when the buildings are damaged. 	<p>The benefits claimed for the structure damage, loss-of-function, and injuries (there were no deaths) are documented in the attached benefits data. The data followed the guidance in the Data Documentation Templates on the <i>FEMA Mitigation BCA Toolkit CD</i>.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Removal of debris from streets and public areas, such as municipal parking lots and recreational areas. • Loss of utility services to the buildings, as well as repairs to damaged utilities. • Economic losses resulting from displacement of commercial or light industrial uses of the structures. • Deaths and injuries. Refer to the <i>FEMA Mitigation BCA Toolkit CD</i> for current statistical values for deaths, major injuries, and minor injuries. <p>“Multiplier” effects cannot be counted. A multiplier effect is an indirect or secondary benefit such as tourism or recreational benefits.</p> <p>2.5.2.2. Project Costs</p> <p>All costs should be reflected in the project SOW. Only costs that are relevant to the implementation of the project should be counted in the total project cost. Project costs should:</p> <ul style="list-style-type: none"> • Include all costs associated with the retrofitting of the structure (either structural or non-structural). These costs should be shown in an itemized cost estimate and for all major components of the proposed project, including the construction costs, permits, and debris removal • Be based on a reasonable estimate. That is, there should be no obvious over- or under-estimate of the true cost of the 	<p>The benefits claimed here do not involve secondary benefits.</p> <p>A detailed breakdown of the project costs is attached. All costs are relevant to the project (per guidance form the FEMA Regional Office).</p> <p>Yes.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>project. If construction will be completed using a contractor, all elements of the contractor’s costs, including overhead and profit, should be included.</p> <ul style="list-style-type: none"> • Include separate retrofitting costs and site restoration costs, if applicable, for each structure within the project. • Be calculated using present-day dollars. • Be based on current project and structure information. • Be well documented and from a credible source. • Reflect the total project cost, not just the FEMA share. <p>Costs for a protective measures project include those costs that are eligible for Federal reimbursement, and non-Federal costs.</p> <p>2.5.3. Cost-Effectiveness</p> <p>As with all mitigation projects, a protective measures retrofit project is considered cost-effective if the ratio of benefits to costs is 1.0 or greater. FEMA does not fund projects with a benefit-cost ratio (BCR) less than 1.0. Some states may use the BCR as a ranking factor for selecting projects to submit to FEMA for funding when the number of projects is greater than the available funds. When used as a ranking factor, a project with a higher BCR is considered to be more cost-effective than a project with a lower BCR.</p>	<p>The structural and non-structural costs are listed by property address and Tax ID number in the detailed project cost.</p> <p>Yes.</p> <p>Yes.</p> <p>Yes.</p> <p>Yes.</p> <p>The method used by the City for determining protective measures retrofit costs followed the FEMA guidance.</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>If there is more than one BCA submitted for the project, the sub-applicant should include a calculation page showing how the overall project BCR was calculated. The overall BCR involves the total benefits of all structures divided by the total costs of all structures.</p> <p>2.6. STEP 6: PREPARE A SCOPE OF WORK FOR THE PROJECT</p> <p>The scope of work serves as the basis for FEMA’s review of eligibility, feasibility, and cost-effectiveness, and establishes the framework for expenditure of grant funds. The scope of work is described below and should include all elements for implementing the project, from design through project completion.</p> <ul style="list-style-type: none"> • Determine the type, size, and cost of the proposed protective measures. If various measures will be used among several structures, facilities, or utilities, prepare brief but detailed SOWs for each measure. Include an inventory of where each measure will be installed. <p>If the project being submitted is to protect the facility from flooding, the Scope of Work must include the construction, elevation, or protective measures to provide the appropriate level of protection from the Base Flood Elevation with the appropriate amount of “free board” as determined by a licensed engineer or hydrologist.</p> <ul style="list-style-type: none"> • If the proposed project is for a critical facility, then the level of protection stated above must be at a level that 	<p>The overall project BCR (total documented benefits divided by total documented costs) is 1.36. There is one property involved in this project, with a separate BCA for earthquakes and floods. A spreadsheet is attached that shows the benefits and costs determined using the FEMA BCA module.</p> <p>The proposed project does not involve a critical facility and will include measures to retrofit a 180-foot long, three section, 16-inch diameter ductile iron sanitary sewer force main at the point where the pipe crosses Lyons Creek. The new sanitary sewer supports will involve three 12-foot high, 48-inch diameter concrete support posts anchored to existing casings by 30 12-inch diameter seismic bolts.</p> <p>The pipe is subject to failure from erosion/scour of footings from flooding, displacement of the footings from earthquakes, and destruction of the footings from landslides (from heavy rains or earthquakes). Failure of the support structure and pipe would result in discharge of a large volume of raw sewage into Lyons Creek. The potential failure will be mitigated by raising the force main pipe support structure and installing new footings designed</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>exceeds the 5% chance of flooding, with the appropriate amount of free board as determined by a licensed engineer or hydrologist.</p> <ul style="list-style-type: none"> • Prepare bid packages for any services that will be contracted, including site investigations, surveys, and retrofitting. • Retrofit the structure or utility. Remove debris and ensure that it is taken to a permitted disposal facility. <p>2.7. STEP 7: PREPARE A COST ESTIMATE AND SCHEDULE</p> <p>2.7.1. Cost Estimate</p> <p>The sub-application must be accompanied by a cost estimate for completion of the project. Elements of the cost estimate are described below. For all of these items, reasonable costs can be obtained by contacting two or three potential vendors and then applying the average cost for a single property to all properties involved in the retrofit project. Another alternative for determining costs is to contact nearby communities that may have recently undertaken a protective measures retrofit project.</p> <ul style="list-style-type: none"> • Estimate. To determine the construction cost of the retrofit project, an estimate should be based on bids from qualified contractors. • Management Costs. See specific program guidance for additional information. 	<p>to the current seismic code provisions and constructed outside of the stream channel.</p> <p>Based on a draft bid package, the City has obtained preliminary non-binding cost estimates from three construction firms. A draft bid package for the protective measures work is attached.</p> <p>The contractor will retrofit the structures and remove all construction debris.</p> <p>The cost estimate for the proposed project is \$300,000 and a detailed cost estimate is included with the application support materials.</p> <p>The City has used an average of three qualified cost estimates to determine the estimated project cost.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Environmental/Historic Preservation Costs. The costs should include a detailed estimate for remediation and/or treating any potential adverse impacts of the project (see Section 2.8). Costs associated with remediation of hazard materials, such as asbestos abatement and aboveground storage tank removal, should be included. • Legal Fees. If the city or county attorney is not responsible for this project, it may be necessary to hire an outside attorney. Legal fees may be eligible if the community has not been approved for an indirect cost rate that included legal services in the base in accordance with applicable program guidance. <p>In addition to estimating project costs, the sub-applicant must identify potential sources of funding for the project in accordance with applicable program guidance.</p> <p>2.7.2. Schedule</p> <p>A schedule for completing the work must be submitted with the sub-application. This schedule must include the time frame for all actions described in the Scope of Work, from initial public meetings through completion of the retrofit of the last structure or utility. The duration of each phase of the project should be identified. The schedule may be presented in terms of time frames following certain activities; for example, construction will begin as soon as weather permits.</p>	<p>After notification of the grant, the project will take approximately 12 months from start until finish. A detailed schedule is included with the application support materials.</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>2.8. STEP 8: CONSIDER ALL ENVIRONMENTAL AND HISTORIC PRESERVATION IMPACTS</p> <p>2.8.1. National Environmental Protection Act (NEPA)</p> <p>NEPA requires FEMA to evaluate the effects of its actions and actions it funds on the natural and human environments. FEMA must also ensure that its actions comply with all other applicable Federal environmental laws and regulations, such as the Endangered Species Act and the National Historic Preservation Act (NHPA). Although FEMA is responsible for ensuring Federal-level compliance, the sub-applicant must provide information required for the compliance process. The sub-applicant is also responsible for ensuring that the project complies with applicable State, Tribal, and local environmental laws and permitting requirements.</p> <p>Specific considerations are outlined below. The information requested is the minimum required and should not constrain sub-applicants from providing more information where potential impacts are identified. Lack of documentation may delay completion of FEMA’s review or cause the sub-application to be declined.</p> <p>For purposes of environmental and historic preservation review, the sub-applicant must evaluate not only the potential impacts of the project itself, but also of any associated construction activities, such as temporary access roads, staging yards, borrow areas, and site restoration or remediation. All costs associated with avoidance and minimization measures must be included in the project cost estimate (see Step 7).</p>	

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>Any action that may affect the environment must first try to avoid impacts, and then mitigate impacts on-site, and finally, mitigate impacts off-site. The intent is to design a proposed project within the local environmental constraints and avoid or minimize impacts. Doing so usually minimizes delays in the permitting process.</p> <p>Temporary impacts, such as heavy equipment crossing over wetlands or floodplain areas, economic losses due to closed roads, and detour costs should be discussed and documented in the sub-application. Sub-applicants should also explain their intent to avoid or mitigate these impacts.</p> <p>As part of the NEPA environmental review, FEMA has determined that certain categories of action normally have no significant effect on the human environment and, therefore, can be categorically excluded from the preparation of environmental impact statements and environmental assessments except in extraordinary circumstances as defined below. The following are exclusion categories that might be relevant to retrofit projects:</p> <ul style="list-style-type: none"> iii. Studies that involve no commitment of resources other than manpower and funding (Level 1). 	<p>Structural engineers advised the City that the appropriate means for seismic retrofit of the structure on-site would be to increase the number and size of piers. The increase in the number of piers would increase the amount of debris trapped during floods. To mitigate these negative impacts, a crossing supported by cables with no piers in the floodway was proposed. Native vegetation with well-developed root systems will be planted to help limit the amount of erosion. The City will restore the original stream crossing to its natural state. This will be completed during the month of August, which is historically the period of lowest water elevations. Plans for the crossing, vegetation planting, and restoration of the stream bottom are attached.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>iv. Inspection and monitoring activities, actions to enforce standards or regulations (Level 1).</p> <p>vii. Acquisition of properties and associated demolition/removal when the acquired property will be dedicated in perpetuity to uses that are compatible with open space, recreational, or wetland practices (Level 2).</p> <p>ix. Acquisition, installation, or operation of utility and communication systems that use existing distribution systems or facilities, or currently used infrastructure rights-of-way (Level 2).</p> <p>xi. Planting of indigenous vegetation (Level 1).</p> <p>xii. Demolition of structures and other improvements or disposal of uncontaminated structures and other improvements to permitted off-site locations, or both (Level 2).</p> <p>xv. Repair, reconstruction, restoration, elevation, retrofitting, upgrading to current codes and standards, or replacement of any facility or utility in a manner that substantially conforms to the preexisting design, function, and location (Level 2).</p> <p>Examples of exclusion category xv include, but are not limited to, the repair, reconstruction, elevation, retrofit, upgrade or replacement of an electric transformer, phone switching station, or pumping station on site, that will not change the outside dimensions or vary from the pre-existing location on the lot.</p>	

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>xvi. Improvements to existing facilities and the construction of small-scale hazard mitigation measures in existing developed areas with substantially completed infrastructure, when the immediate project area has already been disturbed, and when those actions do not alter basic functions, do not exceed capacity of other system components, or modify intended land use; provided the operation of the completed project will not, of itself, have an adverse effect on the quality of the human environment (Level 3).</p> <p>Examples of exclusion category xvi. include, but are not limited to, measures such as:</p> <ol style="list-style-type: none"> 1. A small flood wall or ring dike directly adjacent to a building, structure, or protective fence in an existing development or subdivision that will not significantly modify the area; 2. The construction of a new foundation for an existing facility that will not significantly increase the area impacted; 3. Retrofitting of un-reinforced masonry structures to prevent failure during a seismic event. <p>xvii. Actions conducted within enclosed facilities where all airborne emissions, waterborne effluent, external radiation levels, outdoor noise, and solid bulk waste disposal practices must comply with existing Federal, State, and local laws and regulations.</p>	

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>The documentation required varies depending on whether the Categorical Exclusion (CATEX) is a Level 1, Level 2, or Level 3. The sub-applicant should prepare the following at a minimum:</p> <p>Level 1. The project file should indicate the CATEX for which the project or action qualifies and justification, if necessary.</p> <p>Level 2. Requires indication and justification of the specific CATEX(s) being used. Also requires an indication that there are no extraordinary conditions or, where appropriate, documentation of consultations. Requires completion of the Section 106 process of the National Historic Preservation Act if there are historic resources involved.</p> <p>Level 3. CATEX xvi requires full review, consultation, and documentation as appropriate and as described in the NEPA Desk Reference for:</p> <ul style="list-style-type: none"> • National Historic Preservation Act; • Archeological & Historical Preservation Act; • Endangered Species Act; • Farmlands Protection Policy Act; • Section 404 of the Clean Water Act; • Executive Orders 11988, 11990, and 12898; • Any other environmental laws and Executive Orders if they apply; and 	

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<ul style="list-style-type: none"> • Extraordinary circumstances. <p>If one or more of the following extraordinary circumstances exist and may be affected by the project, the project may no longer qualify as a CATEX and an Environmental Assessment must be prepared.</p> <ol style="list-style-type: none"> i. Greater scope or size than normally experienced for a particular category of action; ii. Actions with a high level of public controversy; iii. Potential for degradation, even though slight, of already existing poor environmental conditions; iv. Employment of unproven technology with potential adverse effects or actions involving unique or unknown environmental risks; v. Presence of endangered or threatened species or their critical habitat, or archaeological, cultural, historical or other protected resources; vi. Presence of hazardous or toxic substances at levels which exceed Federal, State or local regulations or standards requiring action or attention; vii. Actions with the potential to affect special status areas adversely or other critical resources such as wetlands, coastal zones, wildlife refuge and wilderness areas, wild and scenic rivers, sole or principal drinking water aquifers; 	

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>viii. Potential for adverse effects on health or safety;</p> <p>ix. Potential to violate a Federal, State, local, or Tribal law or requirement imposed for the protection of the environment;</p> <p>x. Potential for significant cumulative impact when the proposed action is combined with other past, present and reasonably foreseeable future actions, even though the impacts of the proposed action may not be significant by themselves.</p> <p>2.8.2. Historic Properties: Structures</p> <p>Under Section 106 of the National Historic Preservation Act, FEMA must consider the effects of its finding on buildings, structures, sites, districts, and objects that are listed or eligible for listing on the National Register of Historic Places. Consultation with the State or Tribal Historic Preservation Officer (SHPO/THPO), other consulting parties, and the public is required as part of this consideration.</p> <p>Even if the property is not listed on the National Register, FEMA must evaluate properties 50 years or older for their historic significance and determine whether the property is eligible for listing on the National Register. The sub-applicant should provide information to FEMA supporting this evaluation.</p> <p>Determine if any of the structures or utilities to be structurally or non-structurally retrofitted are potentially historic or adjacent to or near historic properties or a historic district.</p>	<p>None of the structures in the project are 50 years or more in age or have historic significance. The SHPO concurred with this finding (letter attached).</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>Consider roads, bridges, and other infrastructure as part of this evaluation. The preferred sources of information to determine original age of a structure are building permit data, engineering documents, and tax or land records. The SHPO/THPO, relevant local government agency, historic commission, or historical society may be contacted to obtain information on identification of structures, local or State surveys, and the presence of historic districts encompassing or adjacent to the proposed protective measures retrofit project sites.</p> <p>If the project affects a historic property, or if any nearby structures are over 50 years old or located within a known or potential historic district, provide:</p> <ul style="list-style-type: none"> • The property address, date of original construction, and source of documentation for each structure. • At least two color photographs showing at least three sides of the structure. If outbuildings are present, such as a separate garage or barn, provide photographs of two sides of these structures as well. • Documentation associated with the structure being listed or determined eligible for listing on the National Register of Historic Places. • A detail of the property location(s) or proximity to a historic district on 1:24,000 scale USGS topographic map. • Documentation of coordination with the SHPO/THPO or other parties. 	

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>2.8.3. Historic Properties: Archaeological Resources and Historic Sites</p> <p>Consideration of effects on historic properties is not limited to buildings and other built features. Previously undisturbed or agricultural areas may also be significant, either because archaeological resources may exist at the site or because the site is in an area where a historic event occurred, including sites significant to Native Americans. If any resources are located during the construction of this project, construction activity will stop immediately and FEMA will be contacted to initiate appropriate notification and coordination.</p> <p>Determine if the protective measures retrofits requires ground-disturbing activities. If so, provide documentation of:</p> <ul style="list-style-type: none"> • The area of disturbance on a 1:24,000 USGS topographic map, including dimensions and location, and site maps. • Past uses of the area to be disturbed, including the results of a literature search to determine if known archaeological sites exist in the area. • Coordination with the SHPO/THPO or other parties. 	<p>There is high probability that prehistoric or historic archaeological resources are located in the project area. There are several documented archaeological sites on the same land forms in surrounding areas. The SHPO has completed an environmental review and determined that the project should have no effect on these resources (see letter dated 05/05/06 in Attachments).</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>2.8.4. Endangered Species and Biological Resources</p> <p>Under Section 7 of the Endangered Species Act (ESA), FEMA must evaluate the effects of its actions on federally listed threatened and endangered species and their habitat. While protective measures projects are often undertaken in previously disturbed areas that are unlikely to have suitable habitat for listed species, any project dealing with rivers and streams must be carefully evaluated for potential impacts on aquatic species and species associated with riparian habitat. Additionally, aspects of a project such as access roads and staging may have effects on nearby biological resources that should be evaluated. The sub-applicant can speed the review process by obtaining species information and initiating contact with appropriate State wildlife agencies, the U.S. Fish and Wildlife Service (USFWS) and, if ocean-going fish are affected, with the National Marine Fisheries Service (NMFS). However, any formal consultation with Federal agencies must be handled by FEMA.</p> <p>Another law that addresses waterways and associated species with a particular interest in the effects brought about by changes in hydrology is the Fish and Wildlife Coordination Act. Since this act is also overseen by the USFWS and NMFS, it should be handled at the same time as the ESA.</p> <p>Potential effects on biological resources should be evaluated if aspects of the project:</p> <ul style="list-style-type: none"> • Are located within or adjacent to a body of water (typically within 200 feet), such as a perennial, intermittent, or 	<p>Impacts will be minimal and none of the natural features of the project area will be altered in size, shape, or natural material by the proposed project. The State department of Environmental Protection (DEP) was contacted for consultation on fish, wildlife, and endangered species. This project will not affect any endangered or threatened species. See attached correspondence from the State DEP dated 09/21/06.</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>seasonal stream; drainage swale; seasonally wet area; pond; lake; creek; or coastal waterway.</p> <ul style="list-style-type: none"> • Result in the removal of vegetation. • Are located within or adjacent to identified critical habitat for federally listed species known to occur in the project area; locations of critical habitat can be obtained from the USFWS and NMFS. • Affect the hydrology or hydraulics of the waterway. <p>If biological resources have the potential to be affected, submit:</p> <ul style="list-style-type: none"> • A map showing the nearby water body, its dimensions, the proximity of the project to the water body, and the expected and possible changes to the water body, if any. Identify all water bodies regardless of whether there may be an effect. • Documentation and map showing the amount and type of vegetation affected. Discuss the presence of critical habitat or other significant feature with Federal or State wildlife agencies before undertaking extensive field work or mapping. • Documentation of species in or near the project area. • Documentation of coordination with the USFWS or NMFS, or both, regarding the potential occurrence of federally listed species and potential impacts to species. 	<p>Information regarding the presence of federally listed threatened and endangered species was obtained from the U.S. Fish and Wildlife Field Office. The project area does not fall within designated critical habitat, nor does the project area contain suitable habitat for threatened or endangered species known to be present in the vicinity.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>If a reviewing agency suggests redesign of the project or use of measures to reduce effects on species, the sub-application Scope of Work, budget, and project decision-making description should address the suggested changes.</p> <p>2.8.5. Clean Water Act and Protection of Wetlands</p> <p>Waters of the United States and designated wetlands are protected through the Federal Clean Water Act (CWA) and through Executive Order 11990, Protection of Wetlands in order to comply with the NEPA regulations. Applicable resources include rivers, streams, ponds, lakes, and coastal waterways and include seasonal as well as perennial bodies of water. If the structures are floodprone, they may be located adjacent to water bodies or wetlands, and activities such as staging, disposal of debris, and site remediation may have effects that must be considered. Permits for work in waters of the United States are issued by the USACE under Section 404 of the Clean Water Act. The sub-applicant is also responsible for obtaining any permits required under State law, such as the CWA Section 101 water quality certificate and the National Pollutant Discharge Elimination System (NPDES) permit.</p> <p>If the protective measures retrofit involves disposal, excavation, fill placement, or other modifications to water bodies or wetlands, submit:</p> <ul style="list-style-type: none"> • Documentation of coordination with the USACE, or any State or local agencies with jurisdiction over wetlands regarding the potential for wetlands, and applicability of permitting requirements. 	<p>Impacts will be minimal and none of the natural features of the project area will be altered in size, shape or natural material by the proposed project. Contact was made with the State DEP for consultation on fish, wildlife, and endangered species. This project will not affect any endangered or threatened species. See attached correspondence from the State DEP dated 09/21/06.</p> <p>The City consulted with the State DEP regarding the location of protected wetlands within the community and there are none outside of Lyons Creek itself. Copies of correspondence with the DEP dated 09/21/06, including DEP maps of area wetlands, are included with the support data for this application.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<ul style="list-style-type: none"> • Documentation of the alternatives considered to eliminate or minimize impacts to wetlands. For example, if earthwork during site remediation could result in silt-laden runoff, water quality could be affected; a plan for reducing erosion and runoff should therefore be included. • Documentation that applicable permits have been applied for or obtained at the time of project sub-application. <p>2.8.6. Floodplain Management</p> <p>Executive Order 11988, Floodplain Management, states that each Federal agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to, water and related land resources planning, regulating, and licensing activities. In accordance with Executive Order 11988, FEMA must ensure that its actions avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains.</p>	<p>Copies of the required permits, including a letter from the USACE determining that there was no impact under their jurisdiction, are attached. (The support data for all of the permits have not been attached, but is on file at the City and can be provided upon request.)</p> <p>The project will reduce the possibility of future damage to the sanitary sewer force main and will not alter the natural floodplain in the area. Because of their shape and quantity, the existing piers collect minimal debris after floods of a 10-year frequency or higher and do not create a backwater effect. The existing piers will be left in-place after construction so as not to affect the streambed and adjacent overbank areas. Therefore, there are no impacts to the floodplain management in this area.</p> <p>The State DEP, which is also the State Coordinating Office for the NFIP, was contacted for consultation to ensure that the project will not adversely affect the floodplain or any endangered or threatened fish, wildlife, or other species. See attached correspondence from the DEP dated 09/13/06 and 09/21/06 that approves the project.</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>While very few protective measures retrofit projects are likely to affect the floodplain (see below), there may be an opportunity to consider the inclusion of flood mitigation in the project. For example, if a building being retrofitted is in the floodplain and has utilities in a basement that is below the base flood elevation (BFE), moving those utilities to an elevation above the BFE could minimize flood risks as well as other hazard risks.</p> <p>The project sub-application must include flood hazard data, including a floodplain map, as described in Step 2. However, if the project involves additional work in the floodplain after the structure or utility is retrofitted, such as the placement of fill as part of the site remediation, submit documentation of:</p> <ul style="list-style-type: none"> • Analysis regarding the means or the alternatives considered to eliminate or minimize impacts of retrofitting activities in the floodplain. • Hydrologic and hydraulic information from a qualified engineer or hydrologist to demonstrate how drainage and flood flow patterns would be changed and to identify any upstream and downstream effects. • Consultation with the USACE with regard to Section 404 of the Clean Water Act, as described in Section 2.8.5. • Coordination with the corresponding State agency with jurisdiction over modification of waterways, if applicable. 	

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.8.7. Coastal Issues</p> <p>Coastal Zone Management Act</p> <p>Under the Coastal Zone Management Act, FEMA must ensure that its actions are consistent with the approved State Coastal Zone Management Plan. Coastal zones may also be defined by how far ocean-living fish migrate upstream. In such cases, the coastal zone is considered to be the upstream boundary of the community to which the fish can migrate.</p> <p>If the protective measures retrofit project is located in the State’s designated coastal zone, obtain a permit or clearance letter from the appropriate State agency that implements the Coastal Zone Management Plan or attach documentation regarding sub-application of coastal zone management requirements to the project.</p> <p>Coastal Barrier Resources Act</p> <p>The Coastal Barrier Resources Act (CBRA) was designed to protect barrier islands along the East Coast, Gulf of Mexico, and Great Lakes. The law prohibits Federal funding for construction of any new structure or appurtenance on barrier islands. Also, no new flood insurance coverage may be provided on or after October 1, 1983 for any new construction or substantial improvement of a structure located in a Coastal Barrier Resources System (CBRS). Therefore, FEMA may not fund protective measures retrofit projects in a CBRS.</p>	<p>The project area is not located within a coastal zone.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>2.8.8. Hazardous and Toxic Materials</p> <p>Potential contamination and environmental liability are significant concerns for sub-applicants; FEMA must ensure that the sub-applicant takes steps to dispose of hazardous or toxic materials properly when the structure or utility is retrofitted.</p> <p>Site contamination may be of concern if:</p> <ul style="list-style-type: none"> • Current or past land uses of the property or the adjacent properties are associated with hazardous or toxic materials. • Studies, investigations, or enforcement actions exist for the property. <p>If contamination is suspected:</p> <ul style="list-style-type: none"> • Provide any relevant documentation regarding the contamination. It may be necessary to conduct an Environmental Site Assessment to formally identify hazardous materials concerns. • Consult with the appropriate State or local agency to obtain permit and requirements for handling, disposing of, or addressing the effects of hazardous or toxic materials. <p>The SOW description for the project must describe the retrofit components and the plan for disposing of debris. The plan must include steps for proper disposal of hazardous waste, including compliance with any State or local requirements.</p>	<p>Although no hazardous materials are anticipated, the City will properly dispose of hazardous or toxic materials found during the construction of the new force main.</p>

<p style="text-align: center;">PROCEDURES</p>	<p style="text-align: center;">SAMPLE DATA FOR THE SCOPE OF WORK</p>
<p>2.8.9. Effects on Minority and Low-Income Populations</p> <p>Executive Order 12898, Environmental Justice, requires Federal agencies to identify and address, where appropriate, adverse human health, environmental, economic, and social effects when they disproportionately affect minority or low-income populations. The Executive Order also directs Federal agencies to avoid excluding persons from receiving the benefits of programs because of their race, color, or national origin. Further, Federal agencies are encouraged to integrate this Executive Order with the NEPA process to identify potential effects and related mitigation measures in consultation with affected communities. Consequently, the effects of protective measures retrofit projects that are undertaken in communities with a high proportion of minority or low-income residents must be evaluated. If potential adverse disproportional effects caused by the project are identified, then it would be necessary to determine if the conditions of this Executive Order are triggered.</p> <p>Either of two conditions can trigger Executive Order 12898: 1) if the community is predominately minority or low-income and 2) if the demographic profile of the area affected by the proposed mitigation project has a significantly higher minority or low-income percentage than the surrounding area which is not impacted. This can be determined using data collected by the U.S. Census Bureau or by local entities such as social services agencies or redevelopment authorities. If adverse effects from the project meet either of the above conditions, then there are disproportionate impacts that must be addressed. If adverse effects fall on a community or part of a community</p>	<p>There is not a predominantly minority or low-income population in the project area. Residents will be minimally impacted for only a short time, as the lines are switched from the existing crossing to the new crossing; however, it is the position of the City that retrofit projects will benefit all residents by reducing environmental impacts and loss of sewer function, and the threat to human life associated with the washout or displacement of the stream crossing due to a flood or earthquake.</p>

PROCEDURES	SAMPLE DATA FOR THE SCOPE OF WORK
<p>where the impacts are evenly distributed then there is no disproportionality and the Executive Order is not triggered.</p> <ul style="list-style-type: none"> • If the Executive Order is triggered, then it is necessary to communicate with the affected population to determine what mitigation measures can be taken to minimize the impacts. Often this includes translations for public notices, documents, and other key communications to ensure participation of all residents. <p>2.8.10. Land Use and Socioeconomic Effects</p> <p>Under NEPA, the potential effects of the protective measures retrofit project on the community must be evaluated. Determine if the project will:</p> <ul style="list-style-type: none"> • Disrupt the physical and economic arrangement of an established community. For example, if a transformer station is elevated in the middle of a block, will the aesthetics of the community be affected; or if the elevations of utility lines or junction boxes for individual structures are elevated, will the homes and businesses be adversely affected? If a significant portion of the residents in a small town relocate, will the tax base suffer? • Affect fire or police protection, schools, maintenance of public facilities, or other governmental services. • Interrupt utilities and service systems. • Be consistent with the zoning and the general plan of the jurisdiction map. 	<p>The County has no economic concerns or issues because no residences or business areas are affected by this project and the project will not alter the land use of the project site or the adjacent areas.</p> <p>The project will replace an existing force main with a force main of the similar capacity. The stream crossing is being moved to a different site to reduce future flood and seismic damage. The interruption of the system will be minimal, lasting less than one day as valves are tested, and then opened on the new force main and closed on the old one.</p>

Sample Property Inventory Summary					
See subsequent pages for additional properties.					
Project #	Lot or Parcel #	NFIP Policy #	Property Owner's Name	Property Address & Zip Code	Estimated BRV*
1	306-0021-008	NA	City of Adversity	Lyons Creek Sanitary Sewer Force Main crossing at Stream Mile 3.6	\$400,000
Total Estimated BRVs this page					\$400,000

* BRV = Building replacement value (in this example, the “building” replacement value is actually a “structure” replacement value).

Note: Although the example presented in this SOW involves only one location/property, mitigation projects involving multiple buildings, structures, or locations would be presented here as a summary of all properties include in the project.

(FROM STEP 7): SAMPLE COST ESTIMATE AND SCHEDULE

Item Description	Unit	Quantity	Unit Cost	Amount	Source
Appraisal	Lump Sum	1	\$500	\$500	Acme Appraisal Services
Property survey	Lump Sum	1	\$1,000	\$1,000	Smith Surveyors
Seismic and Flood Protective Measures Retrofit *	Lump Sum	1	\$295,500	\$295,500	Average of three cost estimates
Legal fees	Lump Sum	1	\$3,000	\$3,000	Sheldon and Howe, Attorneys
Total Project Cost				\$300,000	
Total Federal Share (@75%)				\$225,000	

* (see detailed breakdown of lump sum cost estimate on next page)

Breakdown of Lump Sum Costs for Protective Measures Retrofit

Item Description	Unit	Quantity	Unit Cost	Amount	Source
Mobilization	LS	1	\$7,500	\$7,500	Contractor
Coffer dam soil	CY	3,500	\$10.75	\$37,625	Supplier
Coffer dam soil placement	CY	3,500	\$35.00	\$122,500	Contractor
Excavation for concrete pipe supports	CY	850	\$21.00	\$17,850	Contractor
Concrete	CY	930	\$18.25	\$16,973	Supplier
Concrete placement	CY	930	\$46.40	\$43,152	Contractor
180-foot, 16-inch diameter ductile pipe	FT	180	\$45.98	\$8,276	Manufacturer
180-foot, 16-inch diameter ductile pipe - installation	FT	180	\$82.00	\$14,760	Contractor
Subtotal				\$268,636	
Engineering design and construction inspection (@10.0%)				\$26,864	
Total				\$295,500	

Proposed Project Schedule (to start within one month of grant award)				
Description of Task	Starting Point	Unit of Time	Duration	Unit of Time
Bid proposal and award	1	Month	1	Months
Permitting and contracting	2	Month	2	Months
Site inspection and preparation	3	Month	1	Months
Construction (including clean-up)	4	Month	4	Months
Note: Some tasks may overlap or occur simultaneously				

Damages for Past Flood and Earthquake Events for Lyons Creek Sanitary Sewer Force Main Crossing (at Stream Mile 3.6).

Owner's Name	Estimated BRVs*	FLOOD Est. \$ Loss in 2002	FLOOD % Damage	FLOOD Est. \$ Loss in 1963	FLOOD % Damage
City of Adversity (Public Works Department)	\$400,000	\$130,000	65%	\$26,000	13%
		EARTHQUAKE Est. \$ Loss in 2005	EARTHQUAKE % Damage	EARTHQUAKE Est. \$ Loss in 1954	EARTHQUAKE % Damage
City of Adversity (Public Works Department)	\$400,000	\$100,000	50%	\$50,000	25%

* BRV = Building replacement value (in this example, the “building” replacement value is actually a “structure” replacement value).

Note: Although the example presented in this List of Damages involves only one location/property, mitigation projects involving multiple buildings, structures, or locations would be presented here as a summary of all properties with damages.