

Exhibit A-1

Scope of Work Yakima River (Hansen Pits to Yakima Canyon) Multiple Benefit Flood Hazard Reduction & Habitat Restoration Corridor Plan

Kittitas County Public Works and partners seek to develop an integrated vision/plan to reduce flood hazards and improve / preserve habitat along a three mile reach of the Yakima River which extends from the Hansen Pits (a series of abandoned gravel pits) downstream to the mouth of the Yakima River Canyon (Figure 1). The goal is to identify flood reduction and habitat solutions that achieve landowner and community goals, are supported by a diverse group of stakeholders, and will be eligible to receive funding for implementation from multiple sources.

Watershed Science & Engineering (WSE) and sub-consultant Herrera Environmental Consultants (Herrera) have been selected to guide the development of the plan and to complete the technical investigation required to identify solutions. This document serves as the consultant's scope of which will consist of five primary tasks:

- Task 1. Stakeholder Participation
- Task 2. Existing Condition Evaluation
- Task 3. Flood Reduction and Habitat Restoration Opportunities
- Task 4. Integrated Corridor Plan and early Action Projects
- Task 5. Project Management

These tasks are described below.

Task 1. Stakeholder Participation

Active stakeholder participation is essential. The County and Kittitas County Conservation District (Conservation District) will partner to lead this task and the consultant team will provide support. County and Conservation District staff have existing professional relationships with key stakeholders and have successfully completed similar stakeholder engagement activities on past projects.

Stakeholder participation will focus on communication and engagement of three groups: 1) specific individual landowners, 2) a technical advisory committee, and 3) the general public. The primary activities and/or responsibilities of each group and the tasks to be completed by the consultant team are described below.

- Project Kick-Off Meetings
 - Individual Landowner Meetings – A single meeting will be held with key individual property owners who have a significant stake in the outcome of the project. County, Conservation District, and consultant staff will ask the landowners to:
 - Describe observations of past flood hazards (they will be encouraged to provide photographs or other information that will be useful to the team)
 - Share flood hazard concerns
 - Provide recommendations to preserve and improve habitat
 - Provide recommendations to reduce flood hazards
 - Identify limitations or constraints.
 - Technical Advisory Group Meeting – County and Conservation District staff will select the technical advisory group members, setup a 2 hour kick-off meeting, and provide an overview of roles and responsibilities. The consultant project manager and a representative from Herrera will present an overview of the investigation. In preparation for the meeting, WSE and Herrera will prepare a draft list of project objectives and alternative evaluation criteria modeled after those used for the Manastash Creek Corridor Flood Hazard Reduction / Habitat Enhancement Plan. Following County and Conservation district review, the list will be presented to technical advisory group, who will be encouraged to provide feedback and any specific knowledge of the project reach that may be helpful for the consultant team.
 - Public Meeting – One 2-hour evening meeting will be held with the general public to describe the project. County and Conservation District staff will organize and lead the meeting. WSE's project manager will provide a brief overview of the planned technical investigations and seek input and feedback from the audience.
- Presentation Existing Condition Investigation Results and Preliminary Actions
 - Individual Landowner Meeting – A meeting will be held with key individual property owners to discuss the findings of the existing condition investigation and to present a preliminary list of possible flood hazard reduction and habitat enhancement actions.
 - Technical Advisory Group Meeting – County and Conservation District staff will coordinate a two hour meeting at which the WSE's project manager and a representative from Herrera will provide an overview of the findings of the existing condition investigation and present a preliminary list of flood hazard reduction and habitat enhancement actions.
 - Public Meeting – One 2-hour evening meeting will be held with the general public to describe the findings of the existing condition investigation and to present a preliminary list of possible habitat enhancement / flood hazard reduction actions. County and Conservation District staff will organize and lead the meeting.
- Presentation of the Integrated Corridor Plan
 - Individual Landowner Meeting – A meeting will be held with the key individual property owners to present and discuss the draft corridor plan.

- Technical Advisory Group Meeting – The WSE project manager and a representative from Herrera will present the draft plan and seek feedback. The draft plan will be provided to the members of the committee at least one week prior to the meeting.
- Landowner Group Meeting – The WSE project manager will present the draft corridor plan to the general public.

Assumptions:

- Each set of meetings will take place on the same day.
- One representative from WSE and one from Herrera will participate in the kickoff meetings and presentation of the Existing Conditions Investigation and Preliminary Actions. WSE's project manager will participate in the presentation of the Corridor Plan.
- The County or Conservation District will prepare meeting minutes if required.

Deliverables:

- Power Point Presentations or other materials and as needed for the:
 - Project kick-off meetings
 - Existing condition and preliminary action meetings
 - Corridor plan presentation meetings.
- List of project objectives and evaluation criteria.

Task 2. Existing Condition Evaluation

The consultant team will document existing habitat and flood/erosion hazard conditions by completing the two investigations described below. Herrera will lead the effort to document existing habitat conditions, and WSE will lead the investigation to evaluate flood and erosion hazards.

Task 2.1 Existing Habitat Documentation. Existing habitat conditions within the project reach will be documented by completing the following tasks:

- **Data Review and GIS Mapping.** Herrera will review existing data on the fish presence and habitat use and conditions. They will examine current and historic aerial photographs, channel bathymetry, and LiDAR imagery to identify different classifications of aquatic habitat and terrestrial vegetation communities. GIS will be used to create draft maps that identify and locate the different habitat units. The maps will also locate key habitat forming features (such as large woody debris) and anthropogenic features that may affect habitat conditions (such as bank armoring and levees).
- **Field Inspection.** Herrera will conduct a field investigation to verify the mapping created as part of the Data Review and GIS Mapping, to identify and define the past and present geomorphic processes responsible for habitat formation within the project reach, and to identify habitat restoration/enhancement project opportunities. The inspection will be conducted both on foot and by floating the river in a drift or jet boat.

- **Hydraulic Aquatic Habitat Conditions.** Alterations in the natural hydrologic regime of the Yakima River have significantly affected habitat quality and availability. In Task 2.2 below, WSE will use existing information to document how mean daily and annual peak flows have changed since the upstream reservoirs were constructed. This data will be provided to Herrera who will use it to help form conclusions on how the reservoirs have impacted channel processes and therefore aquatic habitat quantity and quality.

In Task 2.2 below, WSE will use the hydraulic model to estimate the location and quantity of aquatic edge habitat that would be present during the average annual mean daily discharge. Herrera will provide WSE with velocity and depth criteria to be used to classify the habitat. A GIS map showing the edge habitat will be created and provided to Herrera for use in refining/verifying the draft habitat unit maps created above.

WSE will also use the hydraulic model to estimate the amount of floodplain habitat in the form of sloughs and swales that have been cut off from the river channel by berms, levees, road fill, etc.. This data will be provided to Herrera, who will include this data in their habitat tables and will identify the cutoff areas on the habitat maps.

- **Finalization of Habitat Maps and Habitat Data Table.** The GIS maps created above will be refined to reflect the observations from the field inspection and the data provided by the hydraulic model. Tables will be created that list the surface area of each habitat unit and also lists the surface area of habitat that has been cut-off by anthropogenic features.
- **Technical Memorandum.** Herrera will prepare a write-up that will accompany the maps to present the findings of the Existing Habitat Investigation.

Assumptions:

- Two Herrera staff will conduct the field inspection. An engineer/geomorphologist with habitat restoration and planning design experience, and a fisheries biologist.
- The habitat field inspection will be coordinated with flood and erosion hazard field inspection (described in Task 2.2 below) so that the river guide and boat costs can be limited to a single day.
- Report text will be kept to a minimum and most information will be presented via figures.
- Existing wetlands (if any) will not be delineated or assessed in a way that could satisfy local, state, or federal agency regulatory requirements.

Deliverables: (note – all items below will be presented in the Existing Conditions Report)

- GIS maps that identify existing condition habitat units
- GIS map(s) that present edge habitat based upon velocity and depth criteria.
- Table that lists surface area of each habitat unit.
- Technical memorandum that includes tables and figures.

Task 2.2 Existing Flood and Erosion Hazard Documentation. WSE will identify and document current flood and erosion hazards and assess the condition of existing flood

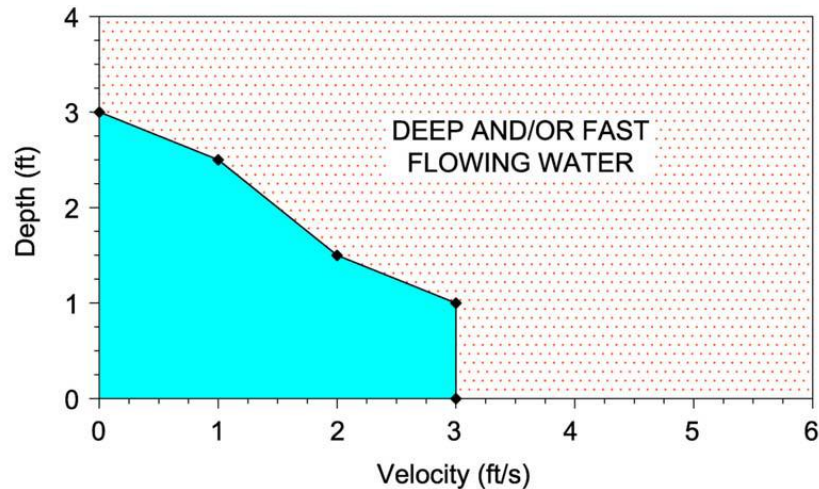
protection countermeasures, including the dikes along and adjacent to the Hansen Pits. This will be accomplished by completing the following:

- **Discussions with County and Conservation District.** In addition to seeking information from the landowners in the meetings described above, WSE will talk with County and Conservation District staff to record their eyewitness observations or knowledge of past floods and to document how they perceive the river has changed with time. WSE will seek to obtain photographs they may have of past flooding or erosion.
- **Hydrology.** WSE will review the hydrologic analysis performed by the U.S. Bureau of Reclamation (USBR) for the Schaake levee setback. It is assumed that the analysis completed by the USBR will provide the information required to draw conclusions as to how the reservoirs have altered river mean daily and annual peak flows. It is also assumed that the USBR report will provide estimates of current annual instantaneous peak discharges for the project reach.

This information will be used to:

- Determine how flood risk is different today than it was before the reservoirs were constructed.
- Understand how the reservoirs have impacted the characteristics of the river channel within the project reach.
- **Field Inspection.** WSE will conduct a field investigation to examine existing channel and floodplain conditions as well as existing flood and erosion protection features. The inspection will be conducted both on foot and by floating the river in a drift or jet boat and will take place at the same time as the habitat field inspection.
- **Hydraulic Modeling.** The existing USBR two-dimensional SRH-2D model of the Schaake reach extends from approximately the Umptanum Road bridge downstream to Stone Road - - approximately the middle of the project reach for this investigation. WSE will obtain and review the model SMS input files. They will extend the input files to the downstream end of the project reach near Ringer Loop Road using 2008 LiDAR available from the US Army Yakima Training Center and 2012 river bed soundings available from the USBR. The model will be calibrated to observed flood events if flow and observed high water mark data are available. If they are not, WSE staff will make reasoned judgments to assign appropriate model parameters. In addition to running the model for one habitat discharge (average annual mean daily flow) as described above, the model will be run for the 2-, 10-, and 100-year annual instantaneous floods to examine and document flood hazard and erosion risk. Water surface elevation, depth, and velocity GIS figures will be created for each discharge and a short write-up will be prepared to describe model development. These will be incorporated into technical memorandum described below.

- **Flood Risk Zones for Public Safety.** For the existing condition 100-year flood, WSE will create GIS maps of the corridor that show flood hazard risk based upon the principle of deep and fast flow shown in the graph below. This is a concept that is based upon research published by the U.S. Bureau of Reclamation* which examines depth and velocity risk thresholds for children and adults.



*USBR, December 1988. "ACER Technical Memorandum No. 11 - Downstream Hazard Classification Guidelines".

Flood hazards will be categorized as follows:

- **Severe:** Area within 100-year flood limits with greater than 3 foot flow depth or 3 fps velocity.
 - **High:** Area within 100-year flood limits with flow depth between 1' and 3' or velocity between 1 fps and 3 fps.
 - **Medium:** Area within 100-year flood limits with flow depth less than 1' or velocity less than 1 fps.
 - **Low:** Areas outside of the 100-year flood for existing conditions.
- **Lateral Channel Migration or Bank Erosion Risk Areas.** Historical aerial photographs of the project reach will be examined and channel planform alignments delineated. These will be compared to document planform changes and historical lateral movement of the river. Planform lines will be delineated from three different historical photographs. These results will be shared with Herrera to inform their geomorphic characterization of habitat forming processes in the reach.
- The output from the hydraulic model (depth, water surface elevation, and velocity maps) will be examined to identify areas where lateral movement of the river is most likely to occur in the future. Particular interest will be paid to conditions along and through the Hansen Pit ponds and dike and near Ringer Loop Road.
- **Avulsion History and Potential.** The historical aerial photographs and hydraulic model output will be examined to determine if channel avulsions are common within the project

reach and to determine whether avulsions are likely to occur in the future. Avulsions can have a significant impact on lateral channel migration potential within a river corridor. A GIS map will be created to show the locations of past avulsions and to identify sites where avulsions are mostly likely to occur in the future.

- **Technical Memorandum.** WSE will prepare a brief write-up that will accompany the maps to present the findings of the existing flood and erosion investigation.

Assumptions:

- The USBR will provide their SRH-2D model or at a minimum their conceptual SMS mesh input files.
- The USBR will provide the river bathymetry they recently collected.
- The USBR will provide the surface TIN they recently developed for their modeled reach.

Deliverables (note – all items below will be presented in the Existing Conditions Report):

- Summary/description of observations (and photographs) made by landowners, County and Conservation District staff, and others during past flood events.
- GIS maps of depth, water surface elevation, and velocity for each discharge modeled.
- GIS maps that present flood hazard public safety risk zones based “Fast and/or Deep” flow.
- GIS Maps comparing historical river channel planforms.
- GIS Map showing historical and likely future avulsion sites.
- Memorandum.

Task 3. Flood Reduction and Habitat Restoration Opportunities

Based upon input received in Task 1 and the findings of Task 2, Task 3 will consist of identifying and evaluating actions that can be implemented to preserve or enhance habitat and to reduce flood and erosion hazards. The consultant team will complete the following tasks:

- **Preliminary Identification of Habitat Enhancement Actions.** Based upon the findings above, Herrera will identify potential habitat enhancement actions along the project reach. The location of each action will be identified on a map of the corridor and included on a list in a spreadsheet.
- **Preliminary Identification of Flood and Erosion Hazard Reduction Actions.** Based upon the findings above, WSE will identify potential flood and erosion hazard reduction actions for the entire project reach. The location of each action will be identified on a map of the corridor and included on a list in a spreadsheet.

Actions will include two different levee setback alignment alternatives for the existing dike along the Hanson Pits, and will consider options to protect Canyon Road, Ringer Loop, and Riverbottom Road. Up to four flood alternative actions total, at one or more of the proposed locations, will be evaluated at least in conceptual form with the hydraulic model under 100-year conditions. Results will be used to help inform the consultant team as they rank the

alternative flood actions. Deliverables under this task will not include any detailed modeling results or the generation of GIS mapping output for the alternative actions.

- **Screen and Rank of Potential Actions.** Herrera, with support from WSE, will use the evaluation criteria developed at the start of the project to screen and rank the habitat and flood/erosion hazard reduction actions.
- **Recommended Actions.** Based upon the results of the evaluation above and feedback received from the landowners and technical committee, WSE and Herrera will identify actions that should be included in the multiple benefit corridor plan. The maps created above that show the preliminary actions will be refined to show those actions that will be included in the plan. Each map will be accompanied by a brief summary that will describe key attributes of each action.

Assumptions:

- Up to 15 habitat enhancement actions and 8 flood and erosion hazard reduction actions will be identified.
- Habitat enhancement actions will include general recommendations to enhance the habitat benefits of Hansen Pits, but will not include a detailed evaluation or design -- this will be done in the future as part of a separate project that is focused solely on the restoration and protection of Hanson Pit site.
- No detailed engineering design work will be completed for any of the proposed actions.

Deliverables:

- Figures that identify the type and location of each preliminary action.
- Table that lists all preliminary actions and ranks actions based upon evaluation criteria.
- A worksheet for each action that describes the action, the potential benefits and impacts, the relative cost and priority.

Task 4. Corridor Plan and early Action Projects

- **Priority Projects.** WSE and Herrera will work with the County and with the technical advisory committee to identify specific actions that can be moved forward quickly and for which grant funds may be available. Up to two flood/erosion hazard reduction and three habitat restoration/preservation priority projects will be identified. The projects will be developed to a conceptual design level that is satisfactory to seek grant funds (per Salmon Recovery Funding Board Manual 18, Appendix D). This will include preparation of concept level plans, construction cost estimates, and descriptive text.
- **Multiple Benefit Flood Hazard Reduction and Habitat Restoration Corridor Plan.** A succinct report will be prepared that will serve as the road map to an integrated vision to improve both flood protection and habitat along the Yakima River project reach and its floodplain. The target audience will be non-technical individuals and professionals including landowners, elected officials, and interested stakeholders. It will contain sufficient technical information to inform grant applications. A draft version of the plan will be submitted to the County and technical advisory committee for review and comment. Upon receipt of comments, WSE will refine and submit the final plan to the County.

Assumptions:

- All submittals will be electronic PDF or Word files.

Deliverables:

- Up to two early action flood/erosion hazard reduction and three habitat enhancement concepts developed to a level of detail that is adequate for grant applications – figures, construction cost estimate and descriptive text.
- Draft and final plan document

Task 5. Project Management

WSE will manage the consultant team and will be responsible for providing the following project management duties:

Communication with County Project Manager: Through informal phone calls and e-mail WSE will keep the County's project manager updated on the status of the project and/or specific project tasks. This will include working together to set dates and times for all landowner and technical committee meetings. Herrera will manage their staff as appropriate and will be in regular communication with WSE's project manager.

Monthly Project Invoices: WSE's project manager will prepare and submit monthly invoices. The invoices will include a brief summary of the work that was completed during the invoiced month. Herrera will prepare and submit monthly invoices to WSE

Sub-Consultant Agreements: WSE will prepare contracts for all sub-consultants.

Exhibit D-2 Payment (Cost Plus a Fixed Fee)

The CONSULTANT shall be paid by the AGENCY for completed work and services rendered under this AGREEMENT as provided hereinafter. Such payment shall be full compensation for work performed or services rendered and for all labor, materials, supplies, equipment, and incidentals necessary to complete the work specified in Section II, "Scope of Work." The CONSULTANT shall conform to all applicable portions of 48 CFR Part 31.

A. Actual Costs: Payment for all consulting services for this PROJECT shall be on the basis of the CONSULTANT'S actual cost plus a fixed fee. The actual cost shall include direct salary cost, overhead, direct non-salary costs, and fixed fee.

1. Direct Salary Costs: The Direct Salary Cost is the direct salary paid to principals, professional, technical, and clerical personnel for the time they are productively engaged in work necessary to fulfill the terms of this AGREEMENT. The CONSULTANT shall maintain support data to verify the direct salary costs billed to the AGENCY.

2. Overhead Costs: Overhead Costs are those costs other than direct costs, which are included as such on the books of the CONSULTANT in the normal everyday keeping of its books. Progress payments shall be made at the rate shown in the heading of this AGREEMENT under "Overhead Progress Payment Rate." Total overhead payment shall be based on the method shown in the heading of the AGREEMENT. The two options are explained as follows:

- a. Fixed Rate: If this method is indicated in the heading of the AGREEMENT the AGENCY agrees to reimburse the CONSULTANT for overhead at the percentage rate shown. This rate shall not change during the life of the AGREEMENT.
- b. Actual Cost: If this method is indicated in the heading of the AGREEMENT the AGENCY agrees to reimburse the CONSULTANT the actual overhead costs verified by audit, up to the Maximum Total Amount Payable, authorized under this AGREEMENT, when accumulated with all other Actual Costs.

A summary of the CONSULTANTS cost estimate and the overhead computation is shown in Exhibit "E" attached hereto and by this reference made part of this AGREEMENT. When an Actual Cost method is used, the CONSULTANT (prime and all sub-consultants) will submit to the AGENCY within six (6) months after the end of each firm's fiscal year, an overhead schedule in the format required by the AGENCY (cost category, dollar expenditures, etc.) for the purpose of adjusting the overhead rate for billing purposes. It shall be used for the computation of progress payments during the following year and for retroactively adjusting the previous year's overhead cost to reflect the actual rate.

Failure to supply this information by either the prime CONSULTANT or any of their subconsultants shall cause the AGENCY to withhold payment

of the billed overhead costs until such time as the required information is received and an overhead rate for billing purposes is approved.

The AGENCY, STATE and/or the Federal Government may perform an audit of the CONSULTANT'S books and records at any time during regular business hours to determine the actual overhead rate, if they so desire.

3. Direct Non-Salary Costs: Direct Non-Salary Costs will be reimbursed at the Actual Cost to the CONSULTANT. These charges may include, but are not limited to, the following items: travel, printing, long distance telephone, supplies, computer charges and subconsultant costs.

- a. Air or train travel will be reimbursed only to economy class levels unless otherwise approved by the AGENCY. The CONSULTANT shall comply with the rules and regulations regarding travel costs (excluding air, train, and rental car costs) in accordance with the AGENCY'S Travel Rules and Procedures. However, air, train, and rental car costs shall be reimbursed in accordance with 48 CFR Part 31.205-46 "Travel Cost
- b. The billing for Direct Non-Salary Costs shall include an itemized listing of the charges directly identifiable with the PROJECT.
- c. The CONSULTANT shall maintain the original supporting documents in their office. Copies of the original supporting documents shall be supplied to the AGENCY upon request.
- d. All above charges must be necessary for the services provided under this AGREEMENT.

4. Fixed Fee: The Fixed Fee, which represents the CONSULTANT'S profit, is shown in the heading of this AGREEMENT under Fixed Fee. This amount does not include any additional Fixed Fee, which could be authorized from the Management Reserve Fund. This fee is based on the Scope of Work defined in this AGREEMENT and the estimated personhours required to perform the stated Scope of Work. In the event the CONSULTANT enters into a supplemental AGREEMENT for additional work, the supplemental AGREEMENT may include provisions for the added costs and an appropriate additional fee. The Fixed Fee will be prorated and paid monthly in proportion to the percentage of work completed by the CONSULTANT and reported in the Monthly Progress Reports accompanying the billings. Any portion of the Fixed Fee earned but not previously paid in the progress payments will be covered in the final payment, subject to the provisions of Section IX entitled "Termination of Agreement."

5. Management Reserve Fund: The AGENCY may desire to establish a Management Reserve Fund to provide the Agreement Administrator with the flexibility to authorize additional funds to the AGREEMENT for allowable unforeseen costs, or reimbursing the CONSULTANT for additional work beyond that already defined in this AGREEMENT. Such authorization(s) shall be in writing and shall not exceed the lesser of \$100,000 or 10% of the Total Amount Authorized as shown in the heading of this AGREEMENT. The amount included for the Management Reserve Fund is shown in the heading of this AGREEMENT. This fund may not be replenished. Any changes

requiring additional costs in excess of the Management Reserve Fund shall be made in accordance with Section XIV, "Extra Work."6. Maximum Total Amount Payable: The Maximum Total Amount Payable by the AGENCY to the CONSULTANT under this AGREEMENT shall not exceed the amount shown in the heading of this AGREEMENT. The Maximum Total Amount Payable is comprised of the Total Amount Authorized, and the Management Reserve Fund. The Maximum Total Amount Payable does not include payment for Extra Work as stipulated in Section XIV, "Extra Work." No minimum amount payable is guaranteed under this AGREEMENT.

- B. Monthly Progress Payments: The CONSULTANT may submit billings to the AGENCY for reimbursement of Actual Costs plus the calculated overhead and fee on a monthly basis during the progress of the work. Such billings shall be in a format approved by the AGENCY and accompanied by the monthly progress reports required under Section III, "General Requirements" of this AGREEMENT. The billings will be supported by an itemized listing for each item including Direct Salary, Direct Non-Salary, and allowable Overhead Costs to which will be added the prorated Fixed Fee. To provide a means of verifying the billed salary costs for CONSULTANT employees, the AGENCY may conduct employee interviews. These interviews may consist of recording the names, titles, salary rates, and present duties of those employees performing work on the PROJECT at the time of the interview.
- C. Final Payment: Final Payment of any balance due the CONSULTANT of the gross amount earned will be made promptly upon its verification by the AGENCY after the completion of the work under this AGREEMENT, contingent upon receipt of all PS&E, plans, maps, notes, reports, electronic data and other related documents which are required to be furnished under this AGREEMENT. Acceptance of such Final Payment by the CONSULTANT shall constitute a release of all claims for payment, which the CONSULTANT may have against the AGENCY unless such claims are specifically reserved in writing and transmitted to the AGENCY by the CONSULTANT prior to its acceptance. Said Final Payment shall not, however, be a bar to any claims that the AGENCY may have against the CONSULTANT or to any remedies the AGENCY may pursue with respect to such claims.

The payment of any billing will not constitute agreement as to the appropriateness of any item and at the time of final audit, all required adjustments will be made and reflected in a final payment. In the event that such final audit reveals an overpayment to the CONSULTANT, the CONSULTANT will refund such overpayment to the AGENCY within thirty (30) days of notice of the overpayment. Such refund shall not constitute a waiver by the CONSULTANT for any claims relating to the validity of a finding by the AGENCY of overpayment. The CONSULTANT has twenty (20) days after receipt of the final POST AUDIT to begin the appeal process to the AGENCY for audit findings.

- D. Inspection of Cost Records: The CONSULTANT and their sub-consultants shall keep available for inspection by representatives of the AGENCY, STATE and the United States, for a period of three (3) years after receipt of final payment, the cost records and accounts pertaining to this AGREEMENT and all items related to or bearing upon these records with the following exception: if any litigation, claim or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the three (3) year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.