

## Appendix A

### Basic Services of Engineer

---

---

#### Section 1. Engineer's Rights and Duties.

- A. To furnish all labor, materials, equipment, supplies, and incidentals necessary to conduct and complete the Engineer's portion of the project as defined in the scope of work and to prepare and deliver to Billings all plans, specifications, bid documents, and other material as designated herein.
- B. Ascertain such information as may have a bearing on the work from local units of government, utility companies, and private organizations and shall be authorized to procure information from other authorities besides Billings, but shall keep Billings advised as to the extent of these contacts and the results thereof.
- C. Prepare and present such information as may be pertinent and necessary in order for Billings to pass critical judgment on the features of the work. The Engineer shall make changes, amendments or revisions in the detail of the work as may be required by Billings. When alternates are being considered, Billings shall have the right of selection.
- D. Engineer's work shall be in accordance with the standards of sound engineering and present City, State, and National standards and policies currently in use.
- E. Conform to the requirements of the Montana Code Annotated Title 18 "Public Contracts" and more particularly Sections 18-2-121 and 18-2-122, and all other codes of the State of Montana applicable to providing professional services including codes and standards nationally recognized.
- F. The Engineer shall certify with the submission of final plans that the plans are in conformance with applicable sections of Title 69, Chapter 4, Part 5, of the Montana Code Annotated as pertaining to existing utilities.
- G. To perform professional services in connection with the project and will serve as Billings' representative in those phases of the project to which this agreement applies.
- H. Where Federal funds are involved, the necessary provisions to meet all requirements will be complied with and documents secured and placed in the bidding documents.
- I. Submit an estimated progress schedule as to time and costs at the beginning of the work, and monthly progress reports thereafter until complete. The reports will include any problems, potential problems, and delays as foreseen by the Engineer. Reports will be submitted in a timely manner to permit prompt resolution of problems.
- J. Contract administration duties will include review of contractor certified payrolls for wage rate compliance. Discrepancies in certified payrolls will be resolved with the

Contractor. A signed Engineer's Payroll Check Sheet (included in the Standard Modifications to MPWSS) will be submitted as proof of this review with one copy of each payroll.

- K. Name a Task Director who shall be the liaison between Billings and the Engineer. For this project the Task Director designated for the Engineer is \_\_\_\_\_ working under the Principal-in-Charge,\_\_\_\_\_.

Section 2. Billings Rights and Duties.

- A. To furnish all labor, materials, equipment, supplies, and incidentals necessary to conduct and complete Billings' portion of the project as designated in the scope of work.
- B. Name a Task Director who shall be the liaison between the Engineer and Billings. For this project, the Task Director designated is Tyler Westrope, PE.

Section 3. Scope of Work.

See following pages:

# Shiloh Conservation Area Preliminary Design SCOPE OF WORK

## Introduction

As discussed at our initial scoping meeting, the Shiloh Conservation Area project will be divided into two phases: 1) Preliminary design; and 2) Final Design and Construction. The following Scope of Work describes the tasks that will be completed under the Preliminary Design phase. The key objectives to be accomplished during this first phase are:

1. Initiate Coordination with Potential Project Partners
2. Collect the information and data necessary to guide decisions regarding project direction, including:
  - a. Water Quality through a range of conditions
  - b. Groundwater elevations throughout the year
  - c. Flow Rates of Hogan's Slough & Shiloh Drain
  - d. Water Rights, particularly on Lower Hogan's Slough
  - e. Potential Future Wetland Supply Sources
  - f. Potential Impacts to Canyon Creek associated with a Bypass Channel
3. Develop preliminary wetland design alternatives

The results of the preliminary design will be documented in a Preliminary Design report and will be used to establish direction for the Final Design phase of this project.

## Potential Partnering Opportunities

It is our understanding that there are several partnering opportunities with various groups such as the Audubon Society that may offer a positive contribution to the Shiloh Conservation Project. During the conceptual planning effort for this project and in recent conversations with Public Works, some of these groups have come forward and expressed an interest in participating in the project. This scope of work would address these potential partners and the resources they may be willing to contribute.

## Client Coordination

Land Design and DOWL HKM will coordinate closely with the City in establishing the desired project goals and objectives and will identify potential project partners that appear to fit within these parameters. Potential project partners will be prioritized on a tiering system in arrived at those that best fit the City's vision for the project. Subsequent efforts will be focused on the tier one or preferred partners.

## Partner Contacts

We will initiate and facilitate conversations with individual tier one partners and identify the opportunities and resources these groups may offer to the project. This will include discussions with Knife River Gravel to investigate potential opportunities for expanding the project through a cooperative arrangement which allows use of their property.

## Partner Summary

We will summarize the resources available by the strategic partnerships and how they may be best utilized for the maximum benefit of the project.

## Data Collection

Certain key data is required to provide a comprehensive analysis of design constraints and limiting factors and to understand what is required to achieve the project goals. LiDAR mapping and the estimated hydrologic characteristics of the project area are currently available and it is assumed that this information will be adequate for the preliminary design effort. The proposed scope of work for obtaining additional data is described as follows:

### Water Quality Sampling

In order to evaluate the effectiveness of the proposed wetland water quality treatment project on water quality improvement, baseline water quality monitoring data will need to be collected. The objective of baseline water quality sampling is to evaluate existing (pre-project) conditions at the proposed project site. Sampling locations should evaluate contributions of both Hogan's Slough and the Shiloh Drain, as well as the combined contributions. DOWL HKM suggests sampling at three locations: Shiloh Drain and Hogan's Slough, both near the inflows to the project site as well as the combined flow as it leaves the project site at Shiloh Road.

DOWL HKM coordinated with Boris Krizek of the City of Billings regarding existing water quality sampling methodologies implemented as part of the City's Municipal Separate Storm Sewer System (MS4) permit requirements. Previous sampling efforts (HKM Associates, 1996) included sampling during high and low flow periods of agricultural runoff as well as during a storm event. The baseline sampling for this project should similarly include three events:

- 1) Prior to the irrigation season to characterize baseflow water quality
- 2) When agricultural runoff is greatest
- 3) During one or more storm events (within the first 30 to 60 minutes of the event)

According to Mr. Krizek, the City of Billings currently analyzes storm water samples for several water quality parameters. In addition to the City's existing water quality parameter list, DOWL HKM recommends sampling and testing for pesticides and herbicides during the event where the greatest agricultural runoff is anticipated. DOWL HKM has also coordinated with Energy Laboratories in Billings, Montana to provide current State approved test methods for the proposed water quality sampling suite which is presented in the following table.

Parameters	Approved Laboratory Methods
TSS (total suspended solids)	A2540D

COD (chemical oxygen demand)	E410.4
Total Phosphorus	E365.1
Total Nitrogen	E351.2 and E353.2
Total Copper	E200.7/E200.8
Total Lead	E200.7/E200.8
Total Zinc	E200.7/E200.8
Oil & Grease	E1664A
pH	E150.2/A4500HB
Organochlorine Pesticides and PCBs	SW 8081A + SW8082
Chlorinated Acid Herbicides (long list)	E 515.1

## Hydrogeology and Groundwater Elevations

The purpose of the proposed hydrogeologic study is to assist in understanding the geology and groundwater conditions in the project area.

DOWL HKM is proposing to explore subsurface conditions at the site by advancing 4 soil borings and completing the borings as groundwater observation wells. This assumes that a truck-mounted drill rig can access the site. Prior to performing borings, DOWL HKM will perform a site reconnaissance, locate proposed explorations and request underground utilities locates. Soil borings will be advanced using a drill rig equipped with hollow-stem augers. The soil borings will be advanced to a depth of 20 to 25 feet. The observation wells will be constructed with 2- to 3-inch PVC pipe. The elevation of the ground surface and the top of the observation wells will be established through conventional survey methods.

DOWL HKM will provide personnel to observe drilling and installation of the observation wells. Continuous logs of the borings will be recorded during exploration. Groundwater levels will be monitored and recorded monthly for the duration of one (1) year.

## Flow Rates of Hogan's Slough and Shiloh Drain

DOWL HKM will perform two flow measurements before April 15<sup>th</sup> on Hogan's Slough and the Shiloh Drain respectively, near where they enter the site as well as the combined flow as it leaves the site, to determine base flows prior to the irrigation season. The purpose of dual measurements is to provide quality control verification of measurement accuracy. A standard flow measurement cross section will be identified in the field for both sites and will be surveyed in order to develop rating curves at these cross sections. A staff gage will be installed to assist in determining flows during storm events. Subsequent flow measurements will be performed at these same locations.

DOWL HKM will also perform two flow measurements at each of the three locations sometime after April 15<sup>th</sup> to determine flow rates during the irrigation season, associated with agricultural drainage.

DOWL HKM will perform a hydraulic analysis of key culverts near the project site. These analyses will be used to develop rating curves for the Hogan's Slough culvert crossing of 48<sup>th</sup> Street, the Shiloh Drain culvert crossing of MT Sapphire Street, and the box culvert crossing of Shiloh Road. Staff gages will be installed at each culvert crossing for the purpose of monitoring flow rates during storm runoff.

DOWL HKM will visit the site during/after "large" storm events to monitor flow into and out of the site. For budgeting purposes, it is assumed that 3 trips will be made to document storm flows. DOWL HKM will review precipitation records to determine the storm frequency as it relates to the flows in Hogan's Slough and the Shiloh Drain and the combined flow out of the site. This information combined with past observations of the extents of flooding in this area will be used to "reality check" current estimates of storm runoff potential.

## Water Rights

In order to document existing water demands that must be maintained downstream from the project site, the surface water rights for Hogan's Slough will be researched. The Department of Natural Resources and Conservation (DNRC) on-line water right query system will be the main source of water rights information. Data available through this website will be evaluated, summarized, and presented as part of this study. The results of this database query will be double-checked with the DNRC for accuracy.

## Potential Future Wetland Supply Sources

DOWL HKM will review aerial photographs, the DNRC Water Resources Survey for Yellowstone County and LiDAR mapping to identify potential irrigation ditches and conveyance systems that could be used to perpetuate a dependable water supply to the wetland complex into the future. A field verification of identified wasteway/delivery points and conveyance paths will also be performed. DOWL HKM will also coordinate with Sanderson Stewart regarding their work on the Integrated Water Plan related to ditches and drains, to verify this information.

This information will be documented in the Preliminary Design report and will potentially be used to initiate discussions with prospective irrigation companies during the next phase of work.

## Potential Impacts to Canyon Creek associated with a Flood Bypass Channel

DOWL HKM will review aerial photographs to identify crossings, residences, and other structures along Canyon Creek that may be impacted by increasing flows to Canyon Creek through a potential flood bypass channel. This will be followed-up by a site review of the Canyon Creek channel reach starting northwest of the Zoo and continuing downstream to the confluence with the Yellowstone River. DOWL HKM will identify potential issues, including apparent restriction in capacity and potential flood hazards. This will not entail a detailed flood delineation analysis.

# Preliminary Wetland Design

Geum Environmental Consulting will conduct an initial field evaluation of the Shiloh Conservation Area site, including existing and potential vegetation, soils, wetlands, surface hydrology indicators, wildlife use, and potential connection to Waters of the U.S. The site will also be evaluated to identify any “red flag” issues relative to wetlands-related permitting.

Draft wetland design criteria will be developed in the context of identified site constraints. An initial draft of the preliminary wetland layout showing potential wetland cell locations and open water will be developed using the existing LiDAR elevation data and other resource layers as a base. Spatial data including soils survey, National Wetlands Inventory and other related information from public sources will be used in this process. The additional data collected for this project will also be used in establishing an appropriate wetland design.

DOWL HKM will utilize topographic data developed for the initial site layout to evaluate the detention routing potential of the site. This will be performed using HechMS or StormNET and the storm runoff hydrographs available from the West Billings Flood Hazard Study. The results of this analysis will, in large part, provide direction regarding the need for, or required capacity of, a supplemental flood bypass channel and/or supplemental detention storage, as may be available on the adjacent Knife River Gravel property.

It is anticipated that DOWL HKM and Geum Environmental Consulting will participate in two separate meetings with the City as the preliminary wetland design proceeds. The first will be to present the draft design concepts and site layout that reflects what is feasible for the site given design constraints and the established goals and objectives. The second will be to present the preliminary design and to obtain feedback. Comments and questions will be addressed as the final draft of the preliminary design is developed.

The Preliminary Design report will include draft wetland design criteria in tabular and narrative format, GIS data and figures, and other narrative descriptions.

## Quality Control and Independent Review

MWH and Terracon will provide quality control and independent reviews, respectively.

MWH will coordinate with the design team through conference calls to discuss project direction and status, project design criteria and design concepts and will perform reviews of draft project deliverables at two stages of the preliminary design: (1) after the initial draft of the Preliminary Design concept is complete and prior to presentation to the City; and (2) after the final draft of the Preliminary Design report is complete and prior to submittal to the City. MWH will review the project for selection and application of design criteria, appropriate planning processes, and feasibility of conclusions and recommended project concepts.

In addition to the quality control review by MWH, Gary Rome of Terracon will provide an independent review of the project through participating in a project team meeting, reviewing the project site, and providing input on the draft deliverable work products.

## Preliminary Design Report

A Preliminary Design report will be prepared discussing the methodologies and results for each of the tasks described in the preceding sections. The Preliminary Design report will also include the recommended scope of work for the Final Design and Construction phase of the project.