

**AMENDMENT NO. 1**  
**TO**  
**CONTRACT FOR PROFESSIONAL ARCHITECTURAL AND ENGINEERING SERVICES**  
**CITY OF BILLINGS WORK ORDER 20-24,**  
**WEST END STORM SYSTEM IMPROVEMENTS**

THIS AGREEMENT, made and entered into on \_\_\_\_\_, 2021, by and between the following:

CITY OF BILLINGS, a Municipal Corporation,  
Billings, Montana 59103,  
Hereinafter designated the City

and

DOWL  
222 N. 32<sup>nd</sup> Street, Suite 700  
Billings, Montana 59101  
Hereinafter designated the Contractor

WITNESSETH:

WHEREAS, the City and Contractor have entered into a contract dated April 7, 2020, for Contractor to provide preliminary design professional services to the City for Work Order 20-24, and;

WHEREAS, the City has need for additional professional services, and;

WHEREAS, the City has authority to contract for professional services, and;

WHEREAS, the Contractor represents that he is qualified to perform such services, is in compliance with Montana Statutes relating to the registration of professional engineers and is willing to furnish such services to the City;

NOW, THEREFORE, in consideration of the terms, conditions, covenants and performance contained herein, or attached and incorporated herein, the Parties hereto agree as follows:

Exhibit A is amended to include the following design services:

SEE ATTACHED

**TOTAL INCREASE THIS AMENDMENT:**

<b>Contract Amendment #1</b>	<b>\$297,861.00</b>
<u>Original Contract Amount</u>	<u>\$136,526.75</u>
Total W.O. 20-24 Contract	\$434,387.75

All other terms and conditions of the contract, as amended, to which this amendment applies, shall remain in full effect.

CONSULTANT

NAME: Wade Irion, P.E.

BY: \_\_\_\_\_

TITLE: Water Resources Practice Lead

DATE: 11/30/2021

CITY OF BILLINGS, MONTANA

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

**WO 20-24 - West End Storm Drain System Improvements  
Contract Amendment #1**

**Scope of Services**

The following tasks will be performed by DOWL (Engineer) for the above reference project. The attached exhibit illustrates the geographic area of focus for the various tasks of Phase II. The following scope of work includes eight primary tasks: 1) Phase II Project Management, 2) Big Ditch/Snow Ditch Coordination, 3) Grand Peaks Lift Station & Outfall Final Design and Construction Documents, 4) Snow Ditch Capacity Evaluation & Recommended Improvements, 5) Big Ditch Survey and Cleaning Details, 6) Rimrock Road Drainage Alternatives, 7) 54<sup>th</sup> Street to Snow Ditch Storm Drain Design and 90% Construction Documents, and 8) Baseline Drain Investigation & Inspection Plan. Any item not specifically discussed or as otherwise noted are assumed to be a City of Billings (City) responsibility or beyond the services included in this scope of work.

**Task 1000 – Phase II Project Management**

- 1) Perform general project management including project setup, contracting, project planning, resource planning, scheduling, and project status updates. The budget for this task accounts for all major tasks below and is assumed to extend to the 90% construction plan deliverable date on December 31, 2022.
- 2) Coordination and project status updates with the City of Billings.
- 3) Compile and review available information, documents, and studies.
- 4) Prepare monthly progress reports for the City, detailing the work completed each month. The monthly progress reports will be completed and submitted with each monthly invoice.

***Task 1000 Deliverables:***

1. ***Monthly Progress Reports***

**Task 1100 – Big Ditch/Snow Ditch Coordination**

- 1) Attend a follow-up meeting with Russ Cummins to discuss using the Snow Ditch as a stormwater outfall.
- 2) Coordination meetings with City of Billings on next steps.
- 3) Coordination with Greg Kindsfather, Russ Cummins and Nicole Seward to facilitate a meeting with the Big Ditch board of directors.
- 4) Develop map exhibits for meeting with the Big Ditch board of directors.
- 5) Coordination meeting with City of Billings on presentation to the Big Ditch Board.
- 6) Present project findings to the Big Ditch at their annual meeting at Laurel Country Club.
- 7) Review City of Billings draft language for the joint-use agreement.
- 8) Follow-up meetings with the City of Billings on Big Ditch agreement.

**Task 1100 Deliverables:**

- 1. Meeting Summaries**
- 2. Map Exhibits**

**Task 1200 – Grand Peaks Lift Stations & Outfall**

DOWL previously developed 60% design plans for the Grand Peaks Lift Stations project assuming an outfall to the east along Grand Avenue, as part of the Phase I Contract. Task 1100 represents the scope of additional work to advance the 60% plans to final design based on a new outfall along 52<sup>nd</sup> Street to the Big Ditch as well as other minor changes to the preliminary design. DOWL will develop “bid-ready” construction plans and project manual and provide minor support through the bidding process.

**Task 1300 – Snow Ditch Capacity Evaluation**

**Task 1301 – Snow Ditch Survey**

1. Verify existing control or survey and provide values for at least three semi-permanent control monuments (e.g. rebar and cap, nail glued into concrete, etc.). Survey temporary or naturally-occurring ground control points (GCPs) for drone image processing.
2. Survey cross sections for a +/- 10,200 ft. corridor along the Snow Ditch from the unloader at Big Ditch to the spillway into Shiloh Drain at Central Avenue. Cross sections will range from 100-ft to 200-ft frequency as needed to fully define capacity constraints. This estimate assumes no more than 100 total cross sections will be needed. Perform drone mapping of the Snow Ditch corridor when conditions are favorable, i.e. leaf-off tree conditions, little or no flowing or ponding water, and no drifted snow. Delays caused by winter conditions in collection of this data could cause a shift in the early deliverable date for this Task.
3. Key structures will be surveyed along the Snow Ditch, including the Big Ditch Unloader, culverts, drop chutes, inflow culverts, bridges, flumes, and the downstream spillway structure. Based on initial assessments from aerial imagery, DOWL has identified approximately 30 key structures from google earth aerial imagery. Structure data collection will include opening sizes, invert or flow-line elevations, and critical structure horizontal and vertical geometry. Key structures are assumed to require 5-25 points per structure, depending on structure complexity. Each structure will have at least two photos taken from different perspectives.
4. Process data and develop basemap for the Snow Ditch Corridor.

### **Task 1302 – Snow Ditch Hydraulic Analysis**

- 1) Review Shiloh Road As-Built Construction Drawings to better understand the Snow Ditch outfall to Shiloh Drain.
- 2) Perform a field assessment of the Snow Ditch, document erosion areas, constriction points, and stormwater inflow locations.
- 3) Conduct flow measurements in the Snow Ditch for one season of operation for the purpose of validating initial estimates of typical flows and capacity constraints. One flow measurement location will be just below the Big Ditch Unloader and the other will be along Central Avenue, just upstream of the outfall structure. These flow measurements will be used to define typical flow levels as well as flow surges due to stormwater runoff.
- 4) Develop a HEC-RAS hydraulic model of the Snow Ditch to determine existing capacity along its length to identify capacity constraints. Verify model accuracy through measurements of actual flows.
- 5) Utilize the existing ASSA model to determine stormwater runoff contributing to the irrigation flows in Snow Ditch. This modeling will consider runoff from adjacent developments and agricultural lands in projecting current and future runoff during representative 2 and 10-year storm events.
  - a. Delineate drainage sub-basins contributing runoff to Snow Ditch.
  - b. Determine runoff properties of the drainage basins.
  - c. Determine runoff from adjacent developments, with flow adjustment to reflect retention/detention facilities.
  - d. Verify model accuracy through flow measurement during actual storm event(s).
- 6) Determine available ditch capacity for stormwater runoff assuming no improvements.
- 7) Evaluate 3 to 5 alternatives for increasing capacity in the Snow Ditch to provide additional stormwater conveyance capacity.
- 8) Draft a technical memorandum summarizing the evaluations and submit to City for review.
- 9) Present findings to the Big Ditch Board. Address concerns of the Big Ditch Board, as appropriate. DOWL has assumed the City of Billings will take lead on coordination with the Big Ditch.

#### ***Task 1302 Deliverables:***

1. ***Preliminary Memorandum of Snow Ditch Capacity Evaluation***
2. ***Final Memorandum of Snow Ditch Capacity Evaluation***

### **Task 1400 – Big Ditch Survey & Cleaning Details**

#### **Task 1401 – Big Ditch Survey**

1. Verify existing control or survey and provide values for at least three semi-permanent control monuments (e.g. rebar and cap, nail glued into concrete, etc.). Survey temporary or naturally-occurring ground control points (GCPs) for drone image processing.

2. Survey cross sections for a +/- 6,400 ft. corridor along the Big Ditch from the intersection with 48<sup>th</sup> Street to the Shiloh Road Crossing. Cross sections will range from 150-ft to 300-ft frequency as needed to fully define capacity constraints. This estimate assumes not more than 40 total cross sections will be needed. Perform drone mapping of the Snow Ditch corridor when conditions are favorable, i.e. leaf-off tree conditions, little or no flowing or ponding water, and no drifted snow.
3. Key structures or constrictions will be surveyed along the Big Ditch, including culverts, drop chutes, inflow culverts, bridges, flumes, buildings, trees, fence lines, and the downstream spillway structure. Based on initial assessments from aerial imagery, DOWL has identified approximately 10 key structures from aerial imagery. Structure data collection will include opening sizes, invert or flow-line elevations, and critical structure horizontal and vertical geometry. Key structures are assumed to require 5-25 points per structure, depending on structure complexity. Each structure will have at least two photos taken from different perspectives.
4. Process data and develop basemap for the Big Ditch Corridor.

#### **Task 1402 – Develop Cleaning Plan, Quantities, and Details**

- 1) Review survey data and photos to determine cleaning needs for the individual reaches along the Big Ditch.
- 2) Develop a plan view exhibit highlighting the Big Ditch Stationing and the individual reaches to be cleaned. DOWL has assumed up to four reaches will be identified.
- 3) Develop cross-section views to illustrate cleaning requirements and to estimate the quantity of sediment to be removed.
- 4) Develop a typical detail for spoil of the removed sediment on the ditch bank for those areas where the material does not need to be hauled away.
- 5) Provide sediment quantities and preliminary cost estimate for cleaning each reach, including haul quantities versus the quantity to be spoiled on the ditch bank.

#### **Task 1402 Deliverables:**

1. ***Ditch Reach Plan View Exhibit and Cross Section Cleaning Details***
2. ***Quantities and Preliminary Cost Estimate***

#### **Task 1500 – Rimrock Road Outfall Alternatives**

##### **Task 1500 – Stormwater Modeling**

- 1) Evaluate Alternative 1 – Storm drain system directly down 54<sup>th</sup> Street, with no detention storage. This model has already been developed as part of West Billings Stormwater Development Plan. Review model and update using consistent conditions as other alternatives.

- a. Size stormwater infrastructure along 54<sup>th</sup> Street, Grand Avenue, and 48<sup>th</sup> Street to the Snow Ditch, just below the Big Ditch crossing.
  - i. Size for future roadway corridor only.
  - ii. Verify pipe size using the various “check storms” with development discharge.
  - iii. Size the 54<sup>th</sup> and Grand storm drain assuming no detention storage control of the runoff from the Rimrock Road Corridor.
  - iv. Determine stormwater flow contribution to the Snow Ditch.
- 2) Evaluate Alternative 2 – Storm drain system down 58<sup>th</sup> Street, discharging into a regional detention pond below High Ditch and then running east along the south boundary of Cottonwood Park into 54<sup>th</sup> Street.
  - a. Develop a conceptual layout of a regional detention pond that will fit the current terrain below High Ditch. Determine the maximum practical storage volume for this regional pond.
  - b. Develop ASSA model with new storm drain layout.
    - i. Size upstream storm drain infrastructure to the regional detention pond.
  - c. Evaluate potential storage needs to reduce flows discharging into the 54<sup>th</sup> Street storm system. DOWL will evaluate the sensitivity of detention storage size on the size of the downstream storm drain piping.
  - d. Define the range of potential stormwater inflows into the Snow Ditch with the range of detention storage ponds.
- 3) Evaluate Alternative 3 – Storm drain system down Rimrock Road to the west, discharging into the 62<sup>nd</sup> Street Ponds
  - a. Layout storm drain system and size pipes to handle the controlling flow.
  - b. Identify any downstream impacts and required improvements to accommodate the additional stormwater flows.
  - c. Size the 54<sup>th</sup> and Grand storm drain assuming no contribution from the Rimrock Road Corridor.
  - d. Determine contributing flows to the Snow Ditch under this option.
- 4) Develop preliminary cost estimates for each of these alternatives. Cost estimate will include infrastructure along Rimrock Road, 54<sup>th</sup> Street, Grand Avenue, portions of the 48<sup>th</sup> Street corridor before discharging into Snow Ditch, and Snow Ditch improvements.
- 5) Develop summary memo of the alternatives evaluation and present findings to City of Billings.
- 6) Coordination meeting with City of Billings for selection of preferred alternative to advance to 90% design of the storm system on 54<sup>th</sup>, Grand, and 48<sup>th</sup> Street.

**Task 1500 Deliverables:**

- 1. Plan view exhibit of the alternative stormwater management plans**
- 2. Conceptual Layout of the Regional Detention Pond**
- 3. Preliminary Cost Estimate for each alternative**

## **Task 1600 – 54<sup>th</sup> & Rimrock to Grand and 48<sup>th</sup> Storm Drain - Preliminary Design**

### **Task 1601 – Coordination with Landowners & Ditch Company**

It is assumed that the City of Billings will take the lead in any coordination with landowners and ditch companies for this project. DOWL will provide support to the City and have assumed the following services:

- 1) Support for landowner meetings.
  - a. Assume production of up to three exhibits.
  - b. Attend one landowner meeting including prep time and meeting minutes.
- 2) Support for High Ditch and Big Ditch coordination
  - a. Assume production of up to four exhibits.
  - b. Assume attending two landowner coordination meetings including prep time and meeting minutes.

### **Task 1602 – Survey & Mapping**

- 1) Set mapping control along the 54<sup>th</sup> Street, Grand Avenue, and 48<sup>th</sup> Street corridor for collection of drone mapping.
- 2) Design survey will be completed using a small, unmanned aircraft system (i.e. drone). DOWL will use terrestrial GPS survey methods to establish horizontal and vertical control and ground control points that will be used to georectify an orthomosaic image and terrain mapping derived from drone obtained aerial imagery. A minimum of five ground control points will be set for each mapping segment. Drone mapping will be completed by a licensed FAA Part 107 remote pilot, and FAA regulations will be followed. Flight approval will be obtained using the LAANC system. The horizontal and vertical datums for this project shall be approved by the City. The plans will use aerial imagery from the drone mapping as a background, and key elevations will be obtained from the collected topographic data. Utility locates will be requested prior to the drone survey using the One-Call service, and the located private utilities will be drawn from the drone imagery. Limited conventional GPS survey will be used to collect features and utilities that couldn't be collected by the drone, such as in areas under tree cover, elevations of water valves, and other vertical elements like power poles.
- 3) DOWL will supplement existing topographic data already collected as well as verify drone topography in highly vegetated areas to develop a basemap for the proposed project. Survey will include cross sections throughout the 54<sup>th</sup> Street corridor from Rimrock Road to Grand Avenue, the Grand Avenue corridor between 54<sup>th</sup> Street and 48<sup>th</sup> Street and 48<sup>th</sup> Street between Grand Avenue and Snow Ditch tie-in. Key facilities include culverts, fire hydrants, and power poles. The survey width will be extended roughly 5-ft beyond the proposed right-of-way limits on both sides of the roadway.
- 4) Establish survey control for construction following preliminary design decisions that will establish the location of construction features. Control will be intervisible, established

outside of planned construction, and spaced at approximately 500 ft. intervals along the project corridors. DOWL anticipates establishing 10 total control points for construction.

- 5) Unless directed otherwise by the City, the following coordinate system parameters will be used:
  - a. Montana State Plane (NAD83-2011) with horizontal units expressed in international feet.
  - b. Vertical datum will be NAVD88 with GPS elevations derived from GEOID12A and vertical units expressed in U.S. survey feet.

Provide coordinate listings of benchmarks and control stations for new and existing survey control in the design plans.

- 6) Coordinate with the City and private utility companies for the location, type, and size of their utilities within the project corridor. This survey request will supplement existing utility survey data collected in the Phase I project. Utility information for the project as a whole will be determined through utility-provided atlas mapping, Montana One Call, and surface features as marked or indicated by the respective owners. DOWL will notify the City of any non-responsive utility companies.

#### ***Task 1602 Deliverables:***

##### ***1. Base Map for Construction Drawings***

#### **Task 1603 – Preliminary Design**

- 1) Utility Research & Coordination
  - a. Acquire from the City all available as-builts, water and sewer service line records, CCTV inspections, and other information and studies as applicable. Incorporate available information into design drawings and specifications.
  - b. Coordinate the evaluation of potential private utility conflicts, including overhead and underground power, cable TV, natural gas, telephone, and communications. Send preliminary construction plans to private utilities for review and comment.
  - c. Coordinate with PUD for design of any required water system modifications that result from the installation of the storm drain system. It is expected that this task will only include minor relocation of select hydrants and small laterals. Utility conflicts will be identified in the 30% construction plans and design details will be incorporated in the 90% construction plans.
- 2) Geotechnical Investigation
  - a. Review available geotechnical information provided by the City and research/review regional geology, soil survey, site setting, and topography.
  - b. Conduct a limited site investigation including borings, piezometer installations, and laboratory testing for the project:
    - i. Facilitate and drill five borings along the storm-drain pipe corridor to depths of about 10 feet and one boring near the existing Big Ditch crossing to a depth of approximately 30 feet. Arrange for single-lane closure traffic control during exploration. Complete two (2) bore holes as



- c. Assemble preliminary quantities and opinion of probable construction cost
  - d. DOWL will perform Quality Assurance and Quality Control during the preliminary design and prior to the preliminary plan review meeting.
- 2) Conduct a plan review meeting with City staff to discuss the 30% Construction plan package. Document the City's comments from the plan review meeting and distribute to the City.
- 3) Identify required utility relocations along 54<sup>th</sup> Street, Grand Avenue, and 48<sup>th</sup> Street. Distribute preliminary construction plans to the affected private utility companies. One (1) copy of the preliminary plans will be sent to each private utility company for their review and comment.
- 4) Submit construction plans to Big Ditch Board and assist the City with a coordination meeting to discuss. DOWL has assumed the City will take the lead on coordination with the Big Ditch.

**Task 1604 Deliverables:**

- 1. 30% Construction Plans Package**
- 2. Opinion of Probable Construction Costs**
- 3. 30% Review Meeting Minutes**
- 4. Utility Company Submittals**

**Task 1605 – 90% Construction Plans and Review**

- 1) Address the City's 30% Construction Plan comments in the 90% Construction Plans, including modifications to the plan, profile, details and grading.
- 2) Include input on existing and proposed private utilities as provided by the private utility companies. The scope of services does not include design or engineering for the relocation of private utilities.
- 3) Develop demolition plans to identify items to be removed or adjusted.
- 4) Develop 90% Construction Plans for the City's review. Plans will include:
  - a. Cover Sheet (1)
  - b. Sheet Index, Legend and Note Sheet (1)
  - c. Survey Control Sheet (2)
  - d. Demolition Sheets (3)
  - e. Storm Drain Plan & Profile Sheets (12)
  - f. Big Ditch Crossing Plan and Profile Sheet (2)
  - g. Snow Ditch Improvement Details (4)
  - h. Miscellaneous Detail Sheets (5)
  - i. Grand Peaks Pump Stations Detail Sheets (6)
- 5) Perform Quality Assurance and Quality Control during the final design and prior to 90% Construction Plan submittal.
- 6) Prepare a water system impact design report for the City, and as required for Montana Department of Environmental Quality (MDEQ) approval. Submit construction documents, the design report, and related checklist materials for approval by MDEQ. All MDEQ review fees will be paid by the City.

- 7) Construction stormwater permits shall be the responsibility of the construction Contractor and are excluded from this scope of work.
- 8) Develop a Pre-Final project manual. The project manual will include project specifications and special provisions based on the current edition of the Montana Public Works Standard Specifications (MPWSS) and City of Billings 2021 Standard Modifications to the MPWSS.
- 9) Prepare a 90% Construction Plan Opinion of Probable Construction Cost.
- 10) Submit 90% Construction Plans Package and Opinion of Probable Cost to City for review.
- 11) One (1) copy of the 90% Construction Plans will be sent to each private utility company for their review and comment.

***Task 1605 Deliverables:***

1. ***90% Construction Plans***
2. ***90% Project Manual***
3. ***90% Opinion of Probable Construction Cost***
4. ***Water System Impact Design Report***
5. ***MDEQ Submittal Package***

***Task 1700 – Baseline Drain Preliminary Investigation***

- 1) Meeting and field review with Paul Bromenshenk and Charlie Yegen regarding the baseline drain, location, access points, and potential for use as a storm drain outfall. DOWL has assumed time to meet with and complete a field visit with one other individual who may be familiar with the Baseline Drain.
- 2) Gather information about location and access points of the Baseline Drain and coordinate with TruPipe to develop a plan for a CCTV inspection of the pipeline. Provide CCTV plan, requirements, and initial cost estimate to the City.

***Task 1700 Deliverables:***

1. ***Baseline Drain Inspection Plan and Cost Estimate***