



## Engineering Department

**DATE:** January 9, 2024

**FROM:** Gabe Schell, City Engineer

**ITEM:** South Bismarck Flood Control Project

**REQUEST:**

Consider approval of amendment 1 with Apex Engineering Group, Inc for design engineering services related to FEMA South Bismarck Flood Control Project.

**BACKGROUND INFORMATION:**

The City of Bismarck has been awarded \$50,000,000 in Hazardous Mitigation Assistance (HMA) funding from the Federal Emergency Management Agency (FEMA) to address flood mitigation in south Bismarck. Previous commission actions and updates occurred at the [March 14, 2023](#), [November 8, 2022](#), [November 9, 2021](#), and [May 25, 2021](#), meetings. While no official notification has been provided by FEMA, ND Department of Emergency Services (NDDDES) has assured me the engineering services phase is approved, cost incurred prior to FEMA notification are reimbursable at the specified cost share, and the final FEMA notification is only awaiting some FEMA procedural items to be completed. The FEMA funds are capped at \$50,000,000. A cost share of 60% for the non-federal costs has been requested from the ND Department of Water Resources (DWR). This project application is scheduled to be on the February 8, 2024, State Water Commission meeting agenda for discussion and approval.

The HMA grant is split into a phased approach. The first phase consists of all the engineering and design and will get the project ready for bid. The second phase consists of the construction project(s). Amendment 1 is within the first phase and will advance the project to a point at which a decision on the preferred alternative will be made. The primary deliverable for this amendment is an updated project concept report that details the alternatives that were further analyzed for consideration. The estimated construction cost of the project ranges from \$78,000,000 to \$116,000,000 depending on the alternative selected. The local costs the City of Bismarck may expect to incur are estimated from \$11,600,000 to \$26,400,000 depending on the alternative selected and assuming a typical state match from DWR. The City has applied for a two percent loan from the Clean Water State Revolving Fund (CWSRF) for financing all local costs. The funding source used to pay the principal and interest on the local match loan has not

been identified and will be determined in future budgets. Potential sources include special assessments, storm water utility, sales tax, general fund, other sources, or a combination of these.

I also request permission to engage with stakeholders on the potential impacts this project may cause. Stakeholders include but are not limited to Bismarck Parks and Recreation District, Dakota Zoo, and ND Department of Transportation. We are at a point in the project development where additional input from these and other stakeholders will help inform project decisions.

**RECOMMENDED CITY COMMISSION ACTION:**

Approve amendment 1 with Apex Engineering Group, Inc for design engineering services related to FEMA South Bismarck Flood Control Project.

Grant permission to engage with stakeholders on potential impacts this project may cause including but not limited to Bismarck Parks and Recreation District, Dakota Zoo, and ND Department of Transportation.

**STAFF CONTACT INFORMATION:**

Gabe Schell, City Engineer, 701-355-1507, gschell@bismarcknd.gov

**ATTACHMENTS:**

1. Amendment 1

This is **EXHIBIT K**, consisting of 2 pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated November 9, 2021.

**AMENDMENT TO OWNER-ENGINEER AGREEMENT**  
**Amendment No. 1**

**The Effective Date of this Amendment is: January 9, 2024.**

Background Data

Effective Date of Owner-Engineer Agreement: November 9, 2021

Owner: City of Bismarck, ND

Engineer: Apex Engineering Group, Inc.

Project: South Bismarck Flood Control Project

Nature of Amendment:

- Modifications to services of Engineer
- Modifications of payment to Engineer
- Modifications to time(s) for rendering services

Description of Modifications:

***See Attachment 1.***

Agreement Summary:

Original agreement amount:	\$ <u>407,400</u>
Net change for prior amendments:	\$ <u>0</u>
This amendment amount:	\$ <u>1,100,874</u>
Adjusted Agreement amount:	\$ <u>1,508,274</u>

The foregoing Agreement Summary is for reference only and does not alter the terms of the Agreement, including those set forth in Exhibit C.

Owner and Engineer hereby agree to modify the above-referenced Agreement as set forth in this Amendment. All provisions of the Agreement not modified by this or previous Amendments remain in effect.

OWNER: City of Bismarck

ENGINEER: Apex Engineering Group, Inc

By: \_\_\_\_\_  
Print  
name: Michael T Schmitz

Title: President, Board of City Commissioners

Date Signed: \_\_\_\_\_

By: Mike Berg  
Print  
name: Mike Berg

Title: Vice President

Date Signed: 12/22/23



# Attachment 1

## Engineer's Scope of Services – Amendment 1

### South Bismarck Flood Control Project (SBFCP)

#### Summary of Tasks

City of Bismarck, North Dakota

December 13, 2023

#### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) has developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

The SBFCP has been selected from a FEMA Flood Mitigation Assistance Grant. The grant application was submitted as a phased project with the first phase being the full development of the project planning and design. The FMA Grant application included a Project Concept Report (PCR) that identified the Airport Pond Alternative No. 7 as the preferred alternative. Following completion of this PCR, a potentially local preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Alternative. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

Additional feasibility planning tasks have been identified to further evaluate Alternatives No. 6 and 7 including interior drainage analysis, geotechnical analysis, alternative development, preliminary environmental assessment, project outlet investigation, project control and design guidelines, and updates to opinion of probable costs, economic analysis and updates to the PCR.

The preliminary list of services to begin upon amendment approval is listed below; City staff will authorize subsequent tasks. Summary of the task fees are as follows and the detailed Scope of Services for each task are attached.

Description of Service	Amount
1. Basic Services	
a. Task 1 - Project Management, Outreach, Coordination	\$227,430
b. Task 2 - Internal Drainage Analysis	\$161,724
c. Task 3 – Supplemental Summary of Alternatives Report	\$34,490
d. Task 4 - Geotechnical	\$80,452
e. Task 5 – Preliminary Environmental Assessment	\$64,466
f. Task 6 – Feasibility Level Project Outlet Investigation	\$158,329
g. Task 7 – Project Control and Design Guidelines	\$50,873
h. Task 8 – Opinion of Probable Cost Updates	\$137,208
i. Task 9 – Funding Assistance	\$141,106
j. Task 10 – PCR Supplemental Feasibility Report	\$44,796
TOTAL COMPENSATION	\$1,100,874

Preliminary list of services to begin upon amendment approval:

Task 1 – PM

Task 2 – Interior Drainage Analysis, Subtask 1 - Model Conversion

Task 4 – Geotech, Subtask 1 - Existing Data Collection

Task 6 – Feasibility Level Project Outlet Investigation, Subtask 1 -Existing Data Collection and Subtask 2 - Field Survey

Task 9 – Funding Assistance, Subtask 1 - Project Management and Administration



## South Bismarck Flood Control Project (SBFCP) Task 1 - Project Management/Outreach/Coordination

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

This Scope of Services task is intended to provide the project management, outreach, and coordination of a feasibility level analysis of the outlet from the Bismarck Expressway Alternative No. 6 to the Missouri River as well as additional updates to the previously studied Alternatives No 6 and .7.

## Task 1 - Project Management/Outreach/Coordination

### **Objective:**

This Task includes Project Management, Outreach, and various Coordination Tasks for the additional feasibility services for the SBFCP. The Apex project manager will be responsible for monitoring project milestones and ensuring that adequate progress is being made. Consultant team meetings and communication will be held as needed to coordinate with project staff and to discuss the work plan, coordination of work activities, and project submittals. The project schedule, scope, and budget will be tracked and the City will be notified of any potential changes. This task includes scoping of the next phase (assuming to be design phase) and the scoping completed for this phase since the announcement of the FMA Grant Award. The task includes Project Outreach with the City of Bismarck to various stakeholders including the Bismark Airport, Bismarck Parks and Recreation, NDDOT and the Southport Homeowners Association(s). The task includes progress reporting, management of technical staff through all phases of the project, including contract administration and coordination of quality assurance and quality control.

### **Subtasks:**

1. Project Management/Outreach/Coordination
- 1.1 Project Administration
- 1.2 Progress Meetings with City of Bismarck
- 1.3 Project Team Coordination/Meetings
- 1.4 Project Outreach with City of Bismarck to various stakeholders
- 1.5 Scope and Fee Development
- 1.6 Quality Assurance/Quality Control

### **Task Deliverables:**

- ✓ Meeting agendas and minutes
- ✓ Monthly invoices
- ✓ Scope and Fee Documents



## South Bismarck Flood Control Project (SBFCP) Task 2 - Interior Drainage Analysis

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) has developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

This Scope of Services is intended to provide the additional modeling required to fully develop Alternative No. 6 as well make any modeling adjustments to Alternative No. 7.

## Task 2 - Interior Drainage Analysis

### Objective:

This Task includes the hydrology and hydraulic modeling of the interior drainage system and how the interior drainage is managed under both a gate open condition and gate closed condition. The interior modeling completed to date for the original PCR was completed utilizing the existing South Bismarck Watershed InfoSWMM Model. FEMA does not recognize InfoSWMM as an approved drainage model; therefore it is proposed to convert the model to XP-SWMM, which is an approved FEMA model. All hydrology and hydraulic components of the InfoSWMM model would be assumed to convert directly to XP-SWMM with a sample validation of hydraulic features and output. The model conversion would include the quality assurance of entrance/exit losses. The model conversion would include cross checking the model to the original calibration event from 2015. The updated XP-SWMM storm water model will be used to evaluate alternatives and resulting hydraulic benefits.

The converted XP-SWMM model would be used to evaluate the interior drainage system for the Multiple Discrete Event modeling for both Alternative No. 6 Bismarck Expressway North Option and Alternative No. 7 (Airport Pond). The MDE analysis requires the statistical analysis of flood stages for the interior system based on actual rain events. The project Team has previously developed the coincident rain events to be used for the MDE Analysis. The Bismarck Expressway option would also allow for future storm sewer system improvements to be made to potentially reduce risk of Expressway Avenue localized flooding. Future storm sewer system improvements and potential benefits would be documented in a Technical Memorandum.

Additional interior drainage analysis includes modeling the larger pump station(s) options at S. Washington Street to determine if the pump station impacts the Tavis Road pump station and its' backwater storage area. Modeling of the new outfall concept near Bismarck Expressway will be required. Existing Missouri River backwater/storage areas will need to be accounted for in the outfall modeling.

### Subtasks:

#### 1. Model Conversion

- 1.1 Convert InfoSWMM to XP-SWMM
- 1.2 Review Calibration Event in XP-SWMM
- 1.3 Summarize model conversion in Technical Memorandum

#### 2. Interior Drainage Modeling

- 2.1 Airport Pond Alternative Modeling
- 2.2 Bismarck Expressway North Option Modeling
- 2.3 Expressway Outfall modeling
- 2.4 Future project benefits with Technical Memorandum
- 2.5 Downstream impacts modeling (Tavis Road)
- 2.6 Inundation mapping

### Task Deliverables:

- ✓ Model conversion Technical Memorandum
- ✓ Bismarck Expressway Interior Drainage Results
- ✓ Bismarck Expressway Future Projects Memo



## South Bismarck Flood Control Project (SBFCP) Task 3 – Supplemental Summary of Alternatives

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) has developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

The original project development included an extensive alternative evaluation. The alternative evaluation was focused on the hydraulic benefits of various alternatives to meet the goal of the project goal which is to mitigate the flood risk upstream of the South Washington Street Closure Structure. To summarize the alternative concepts developed, a *Summary of Alternatives Evaluation* report was developed. This task would provide updates to the *Summary of Alternatives Evaluation* report based on additional alternative and model development.

## Task 3 – Supplemental Summary of Alternatives

### **Objective:**

This Task includes the update to the Summary of Alternatives Evaluation report to include a more in-depth analysis and documentation of additional technical analysis of Alternatives No. 6 and 7. Maps will be updated with alternative features. Model results including the Multiple Discrete Event (MDE) for the internal drainage system will be documented along with the results of downstream stages. Outfall results will be included and inundation mapping from alternatives will be updated.

### **Subtasks:**

1. Summary of Alternatives Evaluation
  - 1.1 Alternatives 6 and 7 Further Evaluation
  - 1.2 Updates to Maps
  - 1.3 Summary Report Updates

### **Task Deliverables:**

- ✓ Updated Summary of Alternatives Evaluation Report



## South Bismarck Flood Control Project (SBFCP) Task 4 - Geotechnical Reconnaissance Findings and Supplemental Groundwater Investigations

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

As part of Alternative No. 6 (aka. Bismarck Expressway North Option), a new diversion pipe constructed of reinforced concrete box culvert would be installed along the north side of Bismarck Expressway from the Missouri River floodplain east to South 12<sup>th</sup> Street. This project is to mitigate flood effects from the Missouri River and to provide capacity for stormwater conveyance/diversion during storm events. In addition to the diversion pipe along Bismarck Expressway, this alternative would also include the following components.

- Reconstructed South Washington Street Closure Structure and New South Washington Street Pump Station
- Bismarck Expressway Detention Pond
- Bismarck Expressway Pump Station
- Associated Roadway Restorations, Municipal Utilities, and Franchise Utilities Modifications

This Task is intended to provide Geotechnical Reconnaissance Findings and Supplemental Groundwater Investigations of Alternatives 6 and 7. This evaluation is necessary to better understand the potential impacts that existing geotechnical and groundwater conditions might have on the proposed alternative feasibility and opinion of probable cost based on a feasibility level review of existing data.

## Task 4 - Geotechnical Reconnaissance Findings and Supplemental Groundwater Investigations

### **Objective:**

Services will include providing Geotechnical Reconnaissance Findings and Supplemental Groundwater Investigations of Alternatives 6 and 7. This investigation will build off the preliminary geotechnical and groundwater data included in the Section 4 of the Project Concept Report. This evaluation is necessary to better understand the potential impacts that existing geotechnical and groundwater conditions might have on the proposed alternative feasibility and opinion of probable cost based on a feasibility level review if existing data.

### **Subtasks:**

#### 1. Existing Data Collection and Project Management

- 1.1 Collect Existing Geotechnical Data available within the Project Areas (i.e. Reports, Record Drawings,...)
- 1.2 Collect Existing Previous Design Reports
- 1.3 Existing Groundwater Studies and Reports
- 1.4 Project/Task Management
- 1.5 Progress Meetings

#### 2. On Site Field Reconnaissance

- 2.1 Site Visit and Alignment Review
- 2.2 Meeting with NDDWR to discuss previous Groundwater Studies and Monitoring Locations

#### 3. Desktop Evaluation / Preliminary Cost Implications

- 3.1 Desktop Geotechnical Investigation
- 3.2 Desktop Groundwater Investigation

#### 4. Geotechnical Reconnaissance Findings

- 3.1 Develop Report on Known Design Constraints
- 3.2 Preliminary Recommendation on Geotechnical Design Assumptions for Cost Estimating
- 3.3 Identify Data Collection Needs and Locations

#### 5. Supplemental Groundwater Investigation

- 5.1 Develop Report on Known Design Constraints
- 5.2 Preliminary Recommendation on Geotechnical Design Assumptions for Cost Estimating
- 5.3 Identify Data Collection Needs and Locations

### **Task Deliverables:**

- ✓ Geotechnical Reconnaissance Findings and Supplemental Groundwater Investigation Report



## South Bismarck Flood Control Project (SBFCP) Task 5 - Preliminary Environmental Assessment

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station, (Bismarck Expressway North Option)*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7 - *Reconstruct South Washington Street Closure Structure, New South Washington Street Pump Station, South Bismarck Stormwater Channel Conveyance Improvements, and South Bismarck Detention Pond, (Airport Pond Option)*. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

This Task is intended to provide a Preliminary Environmental Assessment for the SBFCP, including the evaluation of Alternatives 6 and 7. Information developed as part of this Scope of Services is intended to assist the City in selecting a preferred alternative. This information will also assist the design team in identifying environmental avoidance alignment alternatives, preparing cost estimates, and identifying future regulatory permit requirements. All information collected will ultimately be used in the Final Environmental Assessment required for the project under the National Environmental Policy Act (NEPA).

## Task 5 - Preliminary Environmental Assessment SBFCP including Alternatives No. 6 (Bismarck Expressway North) and Alternatives No. 7 (Airport Pond Option)

### Objective:

Services will include the preparation of a Preliminary Environmental Assessment document for review by the City and Federal Emergency Management Agency (FEMA). The Preliminary Environmental Assessment document will be prepared as outlined in FEMA guidance and will meet NEPA requirements and standards. The tasks under this Scope of Services are documented in additional detail below.

### Subtasks:

#### 1. Project Purpose and Need, Range of Alternatives, and Scoping

##### 1.1 Consult with FEMA to Develop the Project Purpose and Need and the Range of Project Alternatives.

Receive Input from FEMA and Gain Concurrence.

- Develop and Characterize Project Alternatives
- Develop and Characterize Project Purpose and Need Statement
- FEMA Consultation
- Prepare the Notice of Intent and Publish

##### 1.2 Send Scoping Letters Soliciting Agency Input on the Project and Alternatives.

- Consult with FEMA on the Scoping Process and List of Agency Contacts
- Send Scoping Letters, Receive and Address Project Comments

##### 1.3 Prepare Project Alternatives Section of the EA Document

- Project Alternatives Analyzed and Dismissed
- Project Alternatives Carried Forward

#### 2. Affected Environment and The Potential Impacts of the Alternatives Carried Forward

##### 2.1 Prepare Descriptions of Each Affected Environment, Analyze the Impact of the Alternatives, Evaluate Potential Mitigation Measures for Negative Impacts. Note that all work under this task will be based on off-site (desktop) reviews of existing data. It is anticipated that this information would need to be updated for the Final EA after field work is completed in the future as part of Task 5 (as Part of a Future Scope).

- Geology and Soils
- Land Use and Planning
- Traffic Circulation, Volume and Parking Access
- Public Health and Safety
- Socioeconomic Issues
- Air Quality
- Noise
- Public Services and Utilities
- Water Resources and Water Quality
- Biological Resources
- Cultural Resources
- Hazardous Materials and Wastes
- Cumulative Impacts
- Coordination and Permits

3. Prepare the Summary Section of the Document

- 3.1 Prepare a Section Summarizing the Project Characteristics, Project Need and Project Alternatives
- 3.2 Prepare a Table Summarizing the Environmental Setting, and Assessment Categories and the Potential Impacts for Each Alternative Considered

4. Prepare an Agency Consultation Summary Section of the Document

- 4.1 Prepare a List of Agencies Consulted Throughout the Development of the EA, Including Contact Information for each Agency.
- 4.2 Assemble the Coordination Letters Sent to the Agencies and their Responses.
- 4.3 Assemble and Document Additional Agency Consultations Including Phone Conversations and Meeting Notes

5. Conduct Field Studies and Reports as Needed and to be Determined by Scoping and Agency Consultation (Part of Future Scope)

- 5.1 Phase 2 Cultural Resources (Part of Future Scope)
- 5.2 Biological Assessment (Part of Future Scope)
- 5.3 Wetland Delineation (Part of Future Scope)
- 5.4 Other Waters and Sovereign Lands Delineation (Part of Future Scope)
- 5.5 Water Quality Sampling and Analysis (Part of Future Scope)

6. Prepare Preliminary EA Document for Review and Public Notice

- 6.1 Submit the Preliminary EA for Review by the City of Bismarck, Address Comments
- 6.2 Submit the Preliminary EA for Review by FEMA, Address Comments (Part of Future Scope)
- 6.3 Prepare and Coordinate the Public Notice (Part of Future Scope)
- 6.4 Assemble Comments, Address Comments (Part of Future Scope)

7. Prepare and Notice the Final EA and FONSI (Part of Future Scope)

- 7.1 Prepare and Notice the Final EA Document (Part of Future Scope)
- 7.2 Prepare the FONSI Document (Part of Future Scope)
- 7.3 Coordinate with FEMA on Publishing the FONSI (Part of Future Scope)

**Task Deliverables:**

- ✓ Preliminary EA Document for Review and Public Notice



## South Bismarck Flood Control Project (SBFCP) Task 6 - Alternative No. 6 (Bismarck Expressway North) Feasibility Level Project Outlet Investigation

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

As part of Alternative No. 6 (aka. Bismarck Expressway North Option), a new diversion pipe constructed of reinforced concrete box culvert would be installed along the north side of Bismarck Expressway from the Missouri River floodplain east to South 12<sup>th</sup> Street. This project is to mitigate flood effects from the Missouri River and to provide capacity for stormwater conveyance/diversion during storm events. In addition to the diversion pipe along Bismarck Expressway, this alternative would also include the following components.

- Reconstructed South Washington Street Closure Structure and New South Washington Street Pump Station
- Bismarck Expressway Detention Pond
- Bismarck Expressway Pump Station
- Associated Roadway Restorations, Municipal Utilities, and Franchise Utilities Modifications

This Task is intended to provide a feasibility level design of the outlet from the Bismarck Expressway Pump Station to the Missouri River. Earlier evaluations did not fully define the outlet route and design in this reach. This evaluation is necessary to better understand the alignment and potential impacts/costs that would likely result from construction of this outlet.

## Task 6 - Alternative No. 6 (Bismarck Expressway North) Feasibility Level Project Outlet Investigation

### Objective:

Services will include providing a feasibility level design of the outlet from the Bismarck Expressway Pump Station to the Missouri River. This investigation will build of the preliminary design that shown in the October 9, 2023 Preliminary Concept Plans for Bismarck Expressway North Option that was previously developed for cost estimating purposes. This phase will include the tasks listed below with the final product being a Feasibility Level Design Report summarizing the findings.

### Subtasks:

#### 1. Existing Data Collection and Project Management

- 1.1 Collect Existing Record Drawings in Project Area
  - Missouri River Bridge
  - West Bismarck Expressway
  - Southport/Bay Area
  - Channels between West Bismarck Expressway and Southport
  - Riverfront Trail System
- 1.2 Collect Existing Previous Design Reports
  - Channels between West Bismarck Expressway and Southport
  - Other if Available in Project Areas
- 1.3 Project/Task Management
- 1.4 Progress Meetings

#### 2. Field Survey

- 2.1 Topographic Survey
  - Alignment between Bismarck Expressway Pump Station to the W Bismarck Expressway Crossing
  - Channel and Crossing between Missouri River and West Bismarck Expressway
  - Channel and Crossings between West Bismarck Expressway and Southport
  - Southport/Bay View Marina Inlet/Outlet.
- 2.2 Create a tree inventory/estimate tree density in forested areas using field investigation.
- 2.3 GIS Property Identification and Parcel Lines.

#### 3. Hydraulic Design

- 3.1 Develop Project Design Flows (Q1.5, Q2, Q5, Q10, Q25, Q50, and Q100) – Diversion Pipe
- 3.2 Missouri River Elevations in Project Area for Q1.5-Q10 Flow Events
- 3.3 Develop Alternative Outlet Box Culvert Sizes between Bismarck Expressway Pump Station to the W Bismarck Expressway Crossing – Account for Bismarck Expressway Detention Pond Storage and Topographic/Cover Constraints
- 3.4 Develop W Bismarck Expressway Crossing Pipe Requirements (accounting for Storage North of W Bismarck Expressway)
- 3.5 Determine Hydraulic Impacts of Outlet in Southport/Bay View Area (External and Internal to Marina)
- 3.6 Develop Hydraulic Memorandum

4. Alternative Development

- 4.1 Development and Screening of up three (3) alternatives
- 4.2 Civil Considerations.
  - a. Conceptual Drainage Structure and Channel Alignments.
  - b. Municipal utilities.
  - c. Walkway modifications.
  - d. Recreation facilities.
  - e. Debris/trash impacts
- 4.3 Review Environmental Review Data (Developed under Separate Task)
- 4.4 Conceptual Drawings
- 4.5 Alternative Screening / Select Preferred Alternative
- 4.6 Develop Alternative Memorandum

Task 5. Preferred Plan Development

- 5.1 Coversheet
- 5.2 Overview Map
- 5.3 Topographic Survey
- 5.4 Right-of-Way / Real Estate
- 5.5 Environmental Sensitive Areas (Developed under Separate Tasks)
- 5.6 Demolition/Removal Plans
- 5.7 Channels and Crossings – Plan/Profile Sheets
- 5.8 Grading and Paving Plans (Roadways, trails,....)
- 5.9 Utility Relocation Plans (STS, SS, Water,...)
- 5.10 Permanent Erosion/Bank Protection
- 5.11 Typical Details and Sections

Task 6. Opinion of Probable Cost Development – Preferred Alternative Only

- 6.1 Quantity Estimates
- 6.2 Unit Price Development
- 6.3 Right-of-Way / Real Estate
- 6.4 Opinion of Probable Cost

Task 7. Feasibility Report

- 7.1 Preliminary Feasibility Level Design Report
  - Report will address Hydraulic, Civil, Environmental and Real Estate Considerations for the preferred Alternative
- 7.2 Recommendations
- 7.3 Presentation to City Staff
- 7.4 Incorporation of City Comments into Final Report

**Task Deliverables:**

- ✓ Preliminary Feasibility Level Design Report



## South Bismarck Flood Control Project (SBFCP) Task 7 - Project Design and Control Guidelines

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Per the PCR, the Opinion of Probable Costs (in 2022 dollars) for this project is approximately \$78 million. The primary project components will generally consist of the following:

- Reconstructed South Washington Street Closure Structure and New South Washington Street Pump Station
- South Bismarck Stormwater Channel Conveyance Improvements
  - South Washington Street Conveyance Improvements
  - South 3rd Street Conveyance Improvements
  - East Wachter Avenue Conveyance Improvements
- South Bismarck Detention Pond
  - South 12th Street Interior Drainage Diversion
  - Tacoma Avenue Pond Outlet Improvements
- Associated Roadway Restorations, Municipal Utilities, and Franchise Utilities Modifications

Due to the size and multi-disciplinary nature of this project, the final project design will need to be consistent with regulation and requirements of numerous Federal, State, and local agencies. In addition, multiple design teams will be working in parallel to meet the necessary project funding timelines. As a result, early coordination and guidance will be essential to ensure efficiency on the design and review processes.

This Task is intended to develop project specific design guidelines to be utilized through the development of the SBFCP. The resultant document will present procedures, guidelines, format, and standards to be used in the design of the SBFCP. The development of these guidelines early in the process is intended to give the project sponsor, designers, and reviewers the opportunity to provide input to the general guidelines that will apply consistently throughout the project.

## Task 7 - Project Design and Control Guidelines

### **Objective:**

Services will include development of project specific design guidelines to be utilized through the development of the SBFCP. The resultant document will present procedures, guidelines, format, and standards to be used in the design of the SBFCP. The development of these guidelines early in the process is intended to give the project sponsor, designers, and reviewers the opportunity to provide input to the general guidelines that will apply consistently throughout the project.

The document will cover the following list of design disciplines:

- Geospatial Design
- Cad and Drafting
- Geotechnical Engineering and Geology Design
- Hydraulic-Hydrologic Design
- Civil-Site Design
- Levee Design
- Structural Design
- Utility Crossing Design
- Channel Bank Stabilization
- Vegetation and Clear-zone Management Design
- Mechanical
- Electrical
- Architectural/Landscaping Design
- Specifications
- Cost Engineering

This phase will include the tasks listed below with the final product being a Project Design and Control Guidelines document that will control the design of the project features.

### **Subtasks:**

#### 1. Project Management and Administration

- 1.1 Kickoff Meetings
- 1.2 Progress Meetings with Discipline Leads (3 assumed)
- 1.3 Project/Task Management

#### 2. Document Development

- 2.1 Geospatial Design - This section of the project design guidelines will define the spatial reference system, spatial reference standards, survey control requirements, datums/benchmarks, topographic mapping requirements, and related geospatial coordination methods.
- 2.2 Cad and Drafting - This section of the project design guidelines will define the CAD format, standards, delivery media and methods, naming conventions, and ownership.
- 2.3 Geotechnical Engineering and Geology Design - This section will cover items such as soil exploration methods, naming conventions, data storage, analysis/evaluation methods/cases, required factors of safety, instrumentation, and reporting.
- 2.4 Hydraulic-Hydrologic Design - This section of the project design guidelines will define the basic design and analysis methodology that will be used for the project. This will include, but not be limited to,

- modeling formats, interior flood control design methods, pump selection, riverine modeling profiles, freeboard determinations, seepage assumptions, and reporting.
- 2.5 Civil-Site Design - This section of the project design guidelines will include, but not be limited to, demolition, utility relocation, traffic control, roadway design, public utility design, plan set requirements, measurement quantities, and common feature nomenclature.
  - 2.6 Levee Design - This section of the project design guidelines will define the basic design references, standards and analysis methodology that will be used for the project. This will include, but not be limited to, minimum geometry, inspection trenches, embankment materials, floodwall connections, pre-consolidation, and other considerations.
  - 2.7 Structural Design - This section of the project design guidelines will define the basic design references, standards and analysis methodology that will be used for the project. This will include, but not be limited to, performance objectives, materials, load considerations, and design standards for each of the various related structure.
  - 2.8 Utility Crossing Design - This section define methods for gravity, pressure, and utility (fiber-optic, electrical,...) lines over, through and under the flood protection. This will include standard drawings for crossings based on similar projects and guidance for closure valve location requirements.
  - 2.9 Channel Bank Stabilization - This section will provide guidance for design of bank protection including methodologies to be used for gradation, thickness and placement guidance.
  - 2.10 Vegetation and Clear-zone Management Design - This will include provide guidance for the vegetation and obstruction free zones to be incorporated to the project.
  - 2.11 Mechanical - This section will provide guidance for the identification and selection of gates, valves, piping, HVAC, hoists, and pumps.
  - 2.12 Electrical - This section will establish the Electrical Design requirements to be followed during the project. This section of the project design guidelines will define the basic design references, standards and analysis methodology that will be used for the project. This will include guidance and reference identification for backup power requirements, controls, SCADA, and loading determinations.
  - 2.13 Architectural/Landscaping Design - This section will establish the Architectural Design requirements to be followed during the future development of the project. This section of the project design guidelines will define the basic design references and standards to be used for the project. This will include guidance for floodwall coverages, pump station aesthetics, tree replacement ratio recommendations, and planting guidance.
  - 2.14 Specifications - This section will establish the Project Specifications requirements to be followed during the project. This section of the project design guidelines will define the references and standards to be used for the project. This will include specification format, division definition, bid item guidance and sample table of contents.
  - 2.15 Cost Engineering - This section will establish the Cost Engineering requirements to be followed during the project. This section of the project design guidelines will define the references and standards to be used for the project for cost engineering purposes.

### Task Deliverables:

- ✓ Project Design and Control Guidelines Document



## South Bismarck Flood Control Project (SBFCP) Task 8 - Supplemental Opinion of Probable Costs Investigation

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

Following completion of this PCR, a potentially locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

As part of Alternative No. 6 (aka. Bismarck Expressway North Option), a new diversion pipe constructed of reinforced concrete box culvert would be installed along the north side of Bismarck Expressway from the Missouri River floodplain east to South 12<sup>th</sup> Street. This project is to mitigate flood effects from the Missouri River and to provide capacity for stormwater conveyance/diversion during storm events. In addition to the diversion pipe along Bismarck Expressway, this alternative would also include the following components.

- Reconstructed South Washington Street Closure Structure and New South Washington Street Pump Station
- Bismarck Expressway Detention Pond
- Bismarck Expressway Pump Station
- Associated Roadway Restorations, Municipal Utilities, and Franchise Utilities Modifications

This Task is intended to provide Supplemental Opinion of Probable Costs data for Alternatives No. 6 and 7 based on additional evaluations completed under parallel Scopes of Work. This evaluation is necessary to better understand the expected costs of each alternative based Supplemental Feasibility Level investigations completed since the January 2023 Project Concept Report.

## Task 8 - Supplemental Opinion of Probable Costs Investigation

### Objective:

Services will include providing an improved feasibility level Opinion of Probable Cost for both Alternatives No. 6 and 7. This OPC will incorporate changes determined necessary to the prior designs based on additional evaluations completed under parallel Scopes of Work. This evaluation is necessary to better understand the expected costs of each alternative based Supplemental Feasibility Level investigations completed since the January 2023 Project Concept Report.

### Subtasks:

#### 1. Project Design Requirement Collection, Project Management and Conceptual Planning and Estimates

##### 1.1 Collate Changes to the Project Designs Determined Necessary

- Interior Drainage Analysis
- Geotechnical
- Prelim Environmental Assessment
- Feasibility Level Project Outlet Investigation
- Project Control and Design Guidelines
- Related City of Bismarck Input
- Agency Coordination

##### 1.2 Project/Task Management

##### 1.3 Progress Meetings

##### 1.4 Follow-up Conceptual Planning and Estimates for Alternative 6

#### 2. Field Survey

##### 2.1 Roadway Corridor Utilities

- 12<sup>th</sup> Street
- West Bismarck Expressway
- South Washington
- Misc Locations

##### 2.2 Expressway and Airport Pond Areas

##### 2.3 South Washington Closure Structure Area

#### 3. Alternative Plan Updates – Alternative 6 and 7

##### 3.1 Coversheet

##### 3.2 Overview Map

##### 3.3 Topographic Survey

##### 3.4 Right-of-Way / Real Estate

##### 3.5 Environmental Sensitive Areas (Developed under Separate Tasks)

##### 3.6 Demolition/Removal Plans

##### 3.7 Channels and Crossings – Plan/Profile Sheets

##### 3.8 Grading and Paving Plans (Roadways, trails,....)

##### 3.9 Utility Relocation Plans (STS, SS, Water,...)

##### 3.10 Permanent Erosion/Bank Protection

##### 3.11 Typical Details and Sections

#### 4. Opinion of Probable Cost Development – Alternative 6 and 7

##### 4.1 Quantity Estimates

- 4.2 Unit Price Development
- 4.3 Right-of-Way / Real Estate
- 4.4 Opinion of Probable Cost

5. Feasibility Report OPC

- 5.1 Preliminary Feasibility Level Design Report OPCs
- 5.2 Presentation to City Staff
- 5.3 Incorporation of City Comments into Final Report

**Task Deliverables:**

- ✓ Final Feasibility Level Design Report OPCs



## South Bismarck Flood Control Project (SBFCP) Task 9 - Funding Assistance

### Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) has developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

In parallel with the PCR work, the Project Team performed depth-damage assessments and assessed benefit cost ratios based on the selected alternative (No. 7) in the PCR. The Project Team used these assessments as the basis for FEMA grant applications. Grant applications were submitted for the Building Resilient Infrastructure and Communities (BRIC) and the Flood Mitigation Assistance (FMA) grant programs.

On August 28<sup>th</sup>, 2023, FEMA announced that the South Bismarck Flood Control Project was competitively selected for FMA grant funding and \$50,000,000 was allocated for the project. This selection made the project financially viable for the City and led to further discussions between the City and Project Team about viable project alternatives and additional funding sources. It was determined that a depth-damage assessment and benefit-cost analysis should be performed for Alternative No. 6 (aka. Bismarck Expressway North Option). It was also determined that the City should apply for North Dakota Department of Water Resources cost share and that additional funding opportunities should be investigated.

## Task 9 - Funding Assistance

### **Objective:**

The objective of this task is to provide funding assistance to the City in support of furthering the South Bismarck Flood Control Project. The Project Team will perform a Benefit-Cost Analysis (BCA) for Alternative 6 (Expressway Option). This BCA will be used in support of the FEMA Flood Mitigation Assistance (FMA) grant and North Dakota Department of Water Resources (NDDWR) cost share funding. Coordination with FEMA and the North Dakota Department of Emergency Services (NDDDES) will occur in support of the FEMA FMA grant. Coordination with other funding sources will take place in support of additional funding.

The Project Team will also provide funding assistance support to the City to develop a funding package that will assist with the design and project construction phases. The funding pursuit phase includes the production of funding application documents, supporting technical documentation, narratives of assumptions, and other information that may become necessary for funding pursuits. Funding assistance also includes responding to FEMA Region 8 technical questions, award phase questions from other agencies, and management of award documentation.

The following tasks are included:

### **Subtasks:**

#### 1. Project Management and Administration

- 1.1 Kickoff Meetings
- 1.2 Progress Meetings with Discipline Leads (3 assumed)
- 1.3 Project/Task Management

#### 2. Benefit Cost Analysis (BCA) Update for the Expressway Option

- 2.1 Depth Damage Analysis
- 2.2 Assessment of Additional Impacts – loss of services, relocation costs, disruption, etc.
- 2.3 Present Value Damage Estimates
- 2.4 Benefit-Cost Analysis documentation

#### 3. North Dakota Department of Water Resources (NDDWR) Funding

- 3.1. Cost share application
- 3.2. Assessment of using the same the Benefit-Cost Analysis documentation for both the FEMA FMA grant and the NDDWR cost-share funding in lieu of performing a separate BCA for NDDWR.

#### 4. Other Agency and Funding Consultations

- 4.1. FEMA FMA Grant coordination, RFIs
- 4.2. Assist with Alternative Funding

### **Task Deliverables:**

- ✓ Updated BCA Analysis



# South Bismarck Flood Control Project (SBFCP) Task 10 - Project Concept Report (PCR) Supplemental Feasibility Report

## Project Background

The Apex Engineering Group/Houston Engineering, Inc. Team (Project Team) have developed a *Project Concept Report* (PCR) on behalf of the City of Bismarck (City) for the South Bismarck Flood Control Project (SBFCP) (Project).

The purpose of the (PCR) was intended to summarize the current preliminary Project design efforts for the SBFCP. The PCR provided preliminary design detail, plans, and supporting data for the SBFCP features and major components. Since the design of the SBFCP was only in the early phases of the project design (approximately 10%), the PCR only contained preliminary available data on the various design disciplines. It was anticipated that additional detail from the various design disciplines would be added to the report as the project moved from preliminary to more detailed design in the future.

Following completion of the PCR, another potential locally preferred alternative was developed to a conceptual level referred to as the Bismarck Expressway North Option. This alternative was originally evaluated in the November 2022 *Summary of Alternative Evaluation* report as *Alternative No. 6 - Expressway Diversion/Pump Station, Reconstructed South Washington Street Closure Structure, and New South Washington Street 60 CFS Pump Station*. At that time, this alternative was eliminated from further consideration due to the costs exceeding the cost of the Selected Alternative No. 7. Since that time, additional evaluation of Alternative No. 6 has identified additional benefits not originally captured thus requiring that Alternative No. 6 be re-evaluated in greater detail.

To assist the city in selection of the most cost-effective and efficient solution to meet the original purpose and need, a series of Supplemental Tasks were completed following the PCR. This Scope of Services is intended to develop a Supplemental Feasibility Report. This Supplemental Feasibility Report will document the findings of these additional evaluations and establish the basis for selection of final project alignments that will proceed to detailed design.

## Task 10 - Project Concept Report (PCR) Supplemental Feasibility Report

### **Objective:**

This Task is intended to develop a Supplemental Feasibility Report. This Supplemental Feasibility Report will document the findings of these additional evaluations and establish the basis for selection of final project alignments that will proceed to detailed design.

The Supplemental Feasibility Report will incorporate the findings of the following additional evaluations:

- Preliminary Environmental Assessment / Regulatory Requirements
- Geotechnical Reconnaissance and Findings
- Supplemental Groundwater Investigations
- Topographic Survey Validations
- Supplemental Hydraulic Analysis / Downstream Impact Assessments
- Recreational Facility Considerations
- Feasibility Level Project Outlet Investigation
- Supplemental Economic Evaluations
- Additional Agency Coordination / Consultations
- Project Design and Control Guidelines

The Supplemental Feasibility Report will be intended to replace the Project Concept Report and establish the basis for selection of final project alignments that will proceed to detailed design. As a result, the report will be developed to have the same sections as the original Project Concept Report with the additional data as indicated below.

### **Subtasks:**

#### 1. Executive Summary/Introduction

- 1.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 1.2 Map/Figure Updates

#### 2. River Hydrology and Hydraulic Analysis

- 2.1 No Updates Anticipated

#### 3. Interior Drainage Analysis

- 3.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 3.2 Map/Figure Updates
- 3.3 Incorporate Supplemental Hydraulic Analysis / Downstream Impact Assessments

#### 4. Geotechnical

- 4.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 4.2 Map/Figure Updates
- 4.3 Incorporate Geotechnical Reconnaissance and Findings
- 4.4 Incorporate Supplemental Groundwater Investigations

5. Environmental Evaluations

- 5.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 5.2 Incorporate Preliminary Environmental Assessment / Regulatory Requirements
- 5.3 Incorporate Additional Agency Coordination / Consultations
- 5.4 Incorporate Recreational Facility Considerations

6. Civil Design

- 6.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 6.2 Map/Figure Updates
- 6.3 Incorporate

7. Structural Design

- 7.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)

8. Mechanical Design

- 8.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)

9. Electrical Design

- 9.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)

10. Architectural and Landscape Architectural Design

- 10.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)

11. Permitting and Regulatory

- 11.1 Incorporate Preliminary Environmental Assessment / Regulatory Requirements

12. Real Estate

- 12.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)

13. Economics

- 13.1 Update to reflect final selected alternative (assumed to be Bismarck Expressway North Option for Scoping Purposes)
- 13.2 Incorporate Updated OPC
- 13.3 Incorporate Supplemental Economic Evaluations

14. Drawings and Technical Specifications

- 14.1 Incorporate Project Design and Control Guidelines Document and reference purpose.

15. Operation and Maintenance Manual

- 15.1 No Updates Anticipated

16. References

16.1 Update as appropriate

17. Appendix A – Existing South Washington Closure Structure Record Drawings

17.1 Update A2 with Survey Elevations

18. Appendix B – Summary of Alternatives

18.1 Update Alternatives Memo based on additional evaluations.

19. Appendix C – River Hydraulics and Hydraulic Analysis

19.1 No Updates Anticipated

20. Appendix D – Interior Drainage

20.1 Update D3 – Residual Floodplain Mapping

20.2 Incorporate Supplemental Hydraulic Analysis / Downstream Impact Assessments

21. Appendix E – Geotechnical Analysis

21.1 Incorporate Supplemental Incorporate Geotechnical Reconnaissance and Findings

21.2 Incorporate Supplemental Groundwater Investigations

22. Appendix F – Environmental Studies

22.1 Incorporate Preliminary Environmental Assessment / Regulatory Requirements

22.2 Incorporate Additional Agency Coordination / Consultations

22.3 Incorporate Recreational Facility Considerations

23. Appendix G – Economics

23.1 Incorporate Updated OPC Summary and Detailed OPC

23.2 Incorporate Supplemental Economic Evaluations

24. Appendix H – Preliminary Concept Plan

24.1 Incorporate Project Concept Plans – With Feasibility Level Project Outlet Investigation

**Task Deliverables:**

✓ Project Concept Report (PCR) Supplemental Feasibility Report