Request for Qualifications (RFQ) Colorado Diversion Measurement Installation Program (DMIP)

Project Purpose and Background

The purpose of this Request for Qualifications (RFQ) is to pre-qualify Subcontractors (installers) and Vendors (manufacturers) that will be responsible for installing or manufacturing diversion measurement structures for SGM (Contractor) on behalf of the Colorado Water Conservation Board (CWCB) Diversion Measurement Installation Program (DMIP).

The CWCB DMIP is a grant program that will issue in-kind grants in the form of a measuring device and device installation to the owners (awardees) of diversions with missing or faulty measurement devices within the native Colorado River Basin [Divisions 4, 5, 6 (excluding the North River Platte Basin) and 7]. The CWCB and Contractor will select final projects for installation and will group them geographically and seasonally to issue future Requests for Bids/Quotes to pre-qualified Subcontractors and Vendors for installation and manufacturing services. See Figure 1 for the general project area.

RFQ Process

Attachment A1 is the application that interested **Subcontractors** must fill out, and **Attachment A2** is the application that interested **Vendors** must fill out. An applicant can be pre-qualified as a Subcontractor and Vendor if they meet the qualification criteria. The deadline for these applications is **February 6th, 2026, at 5 p.m**. Applications can be submitted electronically (preferred) to dmip@sgm-inc.com or mailed to:

SGM

118 W. 6th Street, Suite 200

Glenwood Springs, Colorado 81601

Attention: DMIP Team

This RFQ requires information from Subcontractors and Vendors to confirm understanding of the project's expectations and requirements, and demonstrate:

- ability to comply with requirements included in the example agreements (Attachment B1 for Subcontractors and Attachment B2 for Vendors), and
- experience related to the anticipated projects (Attachment C)

Future Bid packages will be issued to pre-qualified Subcontractors and Vendors for consideration and Bid/Quote submission. The Bid packages will include project specific details and information as outlined in Attachment C. A Work Order will be issued to the selected Subcontractor or Vendor for the project(s).

The Contractor (SGM) will work directly with awardees to facilitate the manufacturing or installation of the measurement device. Subcontractors will be provided with project details, including consideration of land access, irrigation schedules, installer availability, equipment availability and/or river flows. The Subcontractor should work with SGM and Division of Water Resources (DWR) in close coordination to ensure that the structure is installed to the DWR's standards; in most cases, the Subcontractor should provide 72-hours' notice to Contractor (SGM) prior to installation so that the DWR Water Commissioner or Division Engineer staff can choose to attend the installation. The Subcontractor will be subject to DWR's review criteria, which include photos and/or a video of the installation showing that the device is level, and ideally video footage of water running through the installed measurement device.

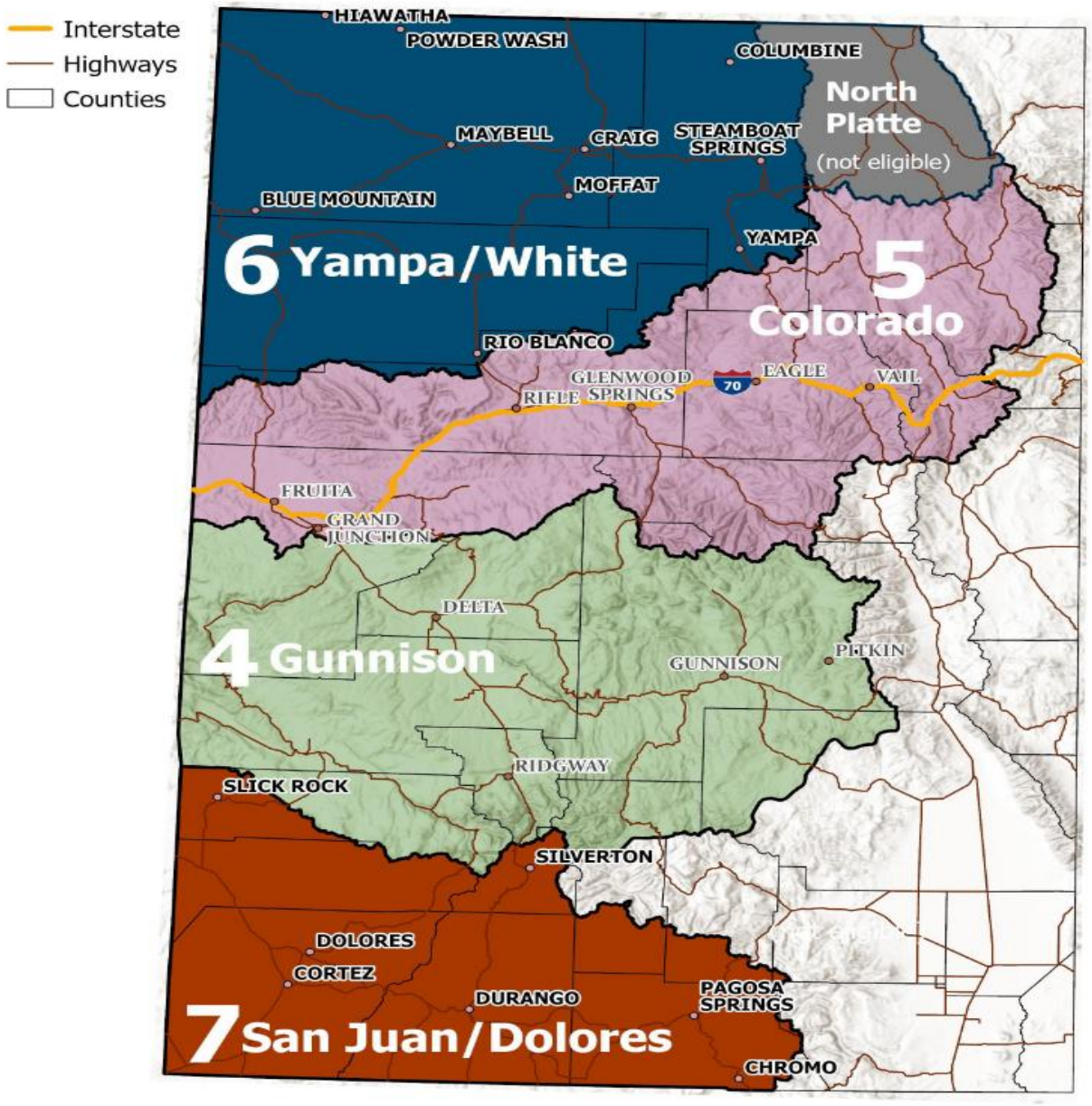


Figure 1. General Project Area (2026 will have installations in Division 6 and Division 7 ONLY)

General Project Schedule

Figure 2 provides an overall general schedule for the DMIP project in 2026. Future rounds in 2027, 2028, and 2029 will be conducted in different geographic areas.

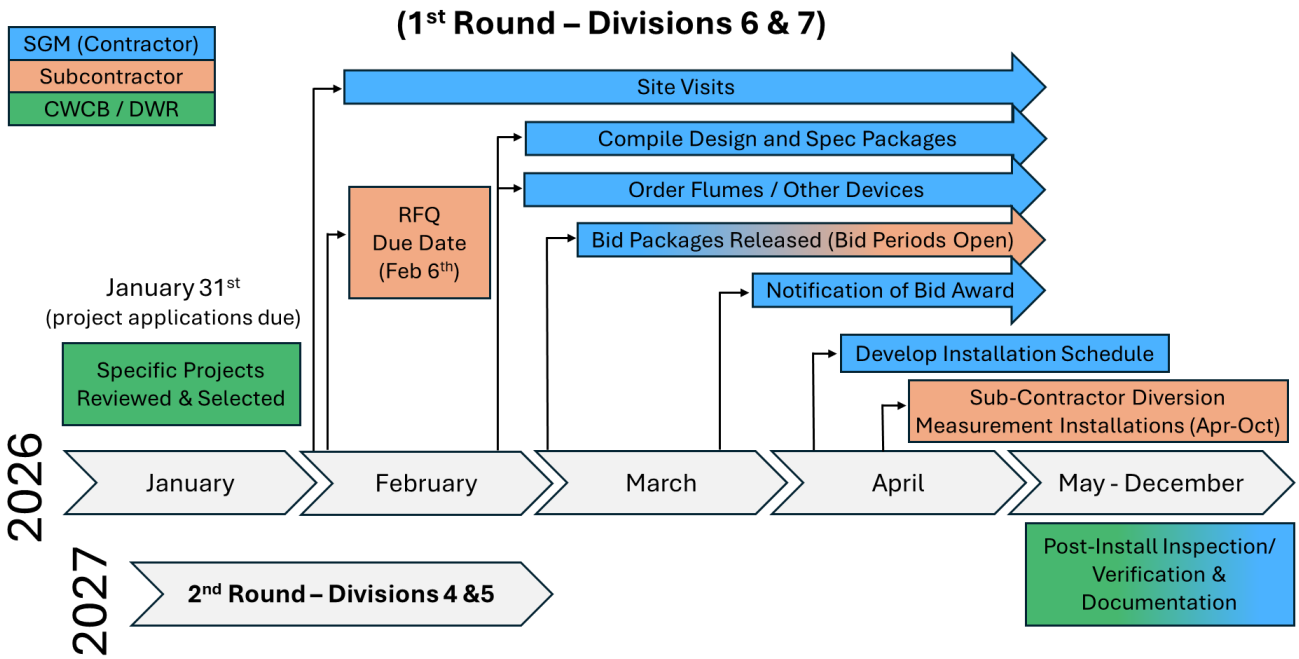


Figure 2. General Schedule for the DMIP project in 2026.

RFQ Schedule

January 9, 2026 – Issue RFQ

January 21, 2026 @ 12 p.m. – 1 p.m. – Optional Microsoft Teams meeting to review the RFQ

Microsoft Teams Need help?
Join the meeting now
Meeting ID: 237 167 659 507 78
Passcode: rt2WU28f

Dial in by phone
+1 720-617-3966, 91381982# United States, Denver
Find a local number
Phone conference ID: 913 819 82#
For organizers: Meeting options | Reset dial-in PIN

January 26, 2026 @ 5 p.m. – Deadline for Questions. Questions should be emailed to Angie Fowler @ angief@sgm-inc.com.

January 29, 2026 @ 5 p.m. – Response to Questions will be posted on the CWCB's website https://cwcb.colorado.gov/diversionmeasurement

February 6, 2026 @ 5 p.m. - Qualifications Statement and Request for Information Due (Attachment A1 or Attachment A2) to SGM at the following email address: DMIP@sgm-inc.com

February 17, 2026 – Notification of pre-qualification to Subcontractors and Vendors will be issued by Contractor.

Early-March 2026 – Request for Bids/Quotes will be issued to pre-qualified Subcontractors and Vendors

Attachments

Information provided as part of this RFQ includes:

- **Attachment A1** - Qualifications Statement and Request for Information for Subcontractors
- **Attachment A2** - Qualifications Statement and Request for Information for Vendors
- **Attachment B1** - Example Subcontractor Agreement
  - Example draft contract for review and acceptance prior to issuance of Work Orders
- **Attachment B2** - Example Vendor Agreement
  - Example draft contract for review and acceptance prior to issuance of Work Orders
- **Attachment C** – Draft Scope of Work and Project Documents
  - Typical installation details for a variety of measurement structure types
  - General specifications

Attachment A1 - Qualifications Statement and Request for Information for Subcontractors

Version 1.2 January 21, 2026

Attachment A1

QUALIFICATIONS STATEMENT for SUBCONTRACTORS

REQUESTED INFORMATION

Please provide the requested information as it applies to your organization (referred to herein as "Business") to the best of your ability. Incomplete information will not disqualify your organization. Incomplete forms will still be considered.

ARTICLE 1—GENERAL INFORMATION

Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.01 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
	1.		
	2.		
	3.		
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?	☐ Yes ☐ No ☐ Pending		

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—SYSTEM FOR AWARD MANAGEMENT (SAM) AND UNIQUE ENTITY ID REQUIREMENTS - REQUIRED

3.01 SAM. Subcontractor shall maintain the currency of its information in SAM until the Subcontractor submits the final financial report required under the Award or receives final payment, whichever is later. Subcontractor shall review and update SAM information at least annually after the initial registration, and more frequently if required by changes in its information.

3.02 Unique Entity ID (UEID). Subcontractor shall provide its Unique Entity ID to SGM and shall update Subcontractor's information at: http://www.sam.gov at least annually after the initial registration, and more frequently if required by changes in Subcontractor's information.

UEID:	

ARTICLE 4—DIVERSE BUSINESS CERTIFICATIONS

4.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
☐ None		

ARTICLE 5—SAFETY

5.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

5.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 6—FINANCIAL

6.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		☐ Attached
Date of Business's most recent audited financial statement:		☐ Attached

ARTICLE 7—SURETY INFORMATION

7.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—INSURANCE - REQUIRED

8.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 9—CONSTRUCTION EXPERIENCE

9.01 Provide information regarding the Business's previous contracting experience.

Years of experience with measurement device installation projects like those anticipated (Attachment C):			
As a general contractor:		As a joint venturer:	
Number of measurement device installation projects like those anticipated (Attachment C):			
As a general contractor:		As a joint venturer:	
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:			
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No			
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No			
Been released from a bid in the past 5 years? ☐ Yes ☐ No			
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No			
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No			
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No			
Provide full details in a separate attachment if the response to any of these questions is Yes.			

9.02 List a minimum of two and a maximum of six projects completed in the last 5 years in Schedule A and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

9.03 In Schedule B, provide resumes for key project staff.

ARTICLE 10—RATES

10.01 Provide labor and equipment hourly rates for the 2026 calendar year.

ARTICLE 11—PROJECT INTEREST

Please indicate the number of projects your organization is interested in and capable of installing in the 2026 calendar year.

Number of projects:	

ARTICLE 12—REQUIRED ATTACHMENTS

12.01 Provide the following information with the Statement of Qualifications:

- ☐ A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- ☐ B. Diverse Business Certifications if required by Paragraph 4.01.
- ☐ C. Certification of Business's safety performance if required by Paragraph 5.02.
- ☐ D. Financial statements as required by Paragraph 6.01.
- ☐ E. Attachments providing additional information as required by Paragraph 8.01.
- ☐ F. Schedule A (Previous Experience with Similar Projects) as required by Paragraph 9.02.
- ☐ G. Schedule B (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 9.03.
- ☐ H. Labor and equipment rates for the 2026 calendar year required by Paragraph 10.01.
- ☐ I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

(If Business is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

Schedule A—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule A—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Attachment A2 - Qualifications Statement and Request for Information for Vendors

Version 1.2 January 21, 2026

Attachment A2

QUALIFICATIONS STATEMENT for VENDORS

REQUESTED INFORMATION

Please provide the requested information as it applies to your organization (referred to herein as "Business") to the best of your ability. Incomplete information will not disqualify your organization. Incomplete forms will still be considered.

ARTICLE 1—GENERAL INFORMATION

Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.01 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
	1.		
	2.		
	3.		
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?	☐ Yes ☐ No ☐ Pending		

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—SYSTEM FOR AWARD MANAGEMENT (SAM) AND UNIQUE ENTITY ID REQUIREMENTS - REQUIRED

3.01 SAM. Vendor shall maintain the currency of its information in SAM until the Vendor submits the final financial report required under the Award or receives final payment, whichever is later. Vendor shall review and update SAM information at least annually after the initial registration, and more frequently if required by changes in its information.

3.02 Unique Entity ID (UEID). Vendor shall provide its Unique Entity ID to SGM and shall update Vendor's information at: http://www.sam.gov at least annually after the initial registration, and more frequently if required by changes in Vendor's information.

UEID:	

ARTICLE 4—DIVERSE BUSINESS CERTIFICATIONS

4.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
☐ None		

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:		
Business address:		
Date of Business's most recent financial statement:		☐ Attached
Date of Business's most recent audited financial statement:		☐ Attached

ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location? ☐ Yes ☐ No			
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE – REQUIRED

7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?			☐ Yes ☐ No
Does provider have an A.M. Best Rating of A-VII or better?			☐ Yes ☐ No
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—PROJECT EXPERIENCE

Years of experience manufacturing measurement devices like those anticipated (Attachment C):	
Number of measurement devices like those anticipated manufactured or sold:	
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:	
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No	
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No	
Been released from a bid in the past 5 years? ☐ Yes ☐ No	
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No	
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No	
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No	
Provide full details in a separate attachment if the response to any of these questions is Yes.	

8.01 List a minimum of two and a maximum of six projects completed in the last 5 years in Schedule A and provide indicated information to demonstrate the Business's experience with projects similar in type.

8.02 In Schedule B, provide resumes for key project staff.

ARTICLE 9—RATES

9.01 Provide labor and equipment hourly rates for the 2026 calendar year.

ARTICLE 10—PROJECT INTEREST

Please indicate the number of measurement structures your organization is interested in and capable of manufacturing in the 2026 calendar year.

Number of projects:	

ARTICLE 11—REQUIRED ATTACHMENTS

11.01 Provide the following information with the Statement of Qualifications:

- ☐ A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- ☐ B. Diverse Business Certifications if required by Paragraph 4.01.
- ☐ C. Financial statements as required by Paragraph 5.01.
- ☐ D. Schedule A (Previous Experience with Similar Projects) as required by Paragraph 8.01.
- ☐ E. Schedule B (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.02.
- ☐ F. Labor and equipment rates for the 2026 calendar year required by Paragraph 9.01.
- ☐ G. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

(If Business is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

Schedule A—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule A—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Attachment B1 - Example Subcontractor Agreement

Version 1.2 January 21, 2026

ATTACHMENT B1

COLORADO SUBCONTRACTOR AGREEMENT
DRAFT

1. The Parties. This Subcontractor Agreement ("Agreement") made on _____, 20____, is between SGM, Inc. with a mailing address of 118 W. 6th Street, Suite 200, City of Glenwood Springs, State of Colorado ("Contractor") and _____ with a mailing address of _____, City of _____, State of _____ ("Subcontractor") both of whom agree as follows:

2. The Client. The Subcontractor acknowledges that any work performed under this Agreement must be in accordance with the latest version agreement(s) ("Prime Contract") made between the Contractor and the Department of Natural Resources, Colorado Water Conservation Board, "CWCB" with a mailing address of 1313 Sherman St., Suite 719, City of Denver, State of Colorado ("Client").

3. Services Provided. Subcontractor agrees to complete the installation of water flow measurement devices into existing open channels, or pipelines as described in any project-specific Request for Bids/Quotes and Work Orders issued later under this Agreement. The following general services ("Services") apply to the anticipated work:

1. The Contractor will work directly with awardees (receiving the in-kind grant/measurement structure) to facilitate the installation, including consideration of land access, irrigation schedules, installer (Subcontractor) availability, equipment availability and/or river flows.
2. The Contractor will provide the measurement device for the Subcontractor to install.
3. The Subcontractor shall work in close coordination with the Contractor and the Division of Water Resources (DWR) to ensure that the structure is installed to DWR's standards. The Subcontractor will provide the Contractor with 72-hours' notice prior to installation to meet the required 48-hour notice of installation activity to the DWR staff.
4. The Subcontractor will ensure all work is done according to the plans, details, and applicable standards and specifications provided for each project by the Contractor.
5. The Subcontractor will be subject to DWR's review criteria which will be included in future Work Orders and include requirements including but not limited to, documenting the installation activities with photos and/or a video showing that the device is level, and footage of water running through the device.
6. The Subcontractor will be responsible for any damage to the equipment provided by others, including the Contractor, which occurs during handling and installation activities.

Each Request for Bids/Quotes will include specific project details and information, including but not limited to:

- detailed drawings
- project specifications
- maps
- project access
- access improvements
- hauling, disposal, and storage of materials
- setting of proposed device or structure to relative elevations shown on the plans

- backfill and compaction
- minor grading around structure and in the ditch
- construction stormwater erosion control Best Management Practices (BMPs)
- clean up and revegetation of the site

The anticipated project types include, but are not limited to:

1. Typical Prefabricated Flume Installation
2. Custom Concrete Structures
3. Flow Meters
4. Instrumentation & Telemetry

There could be projects that have site-specific constraints or features that would require work outside of the typical scope anticipated.

4. Rights in Work Product and Other Information - Exclusive Property of the State. Except to the extent specifically provided elsewhere in this Agreement, all State Records, documents, text, software (including source code), research, reports, proposals, specifications, plans, notes, studies, data, images, photographs, negatives, pictures, drawings, designs, models, surveys, maps, materials, ideas, concepts, know-how, and information provided by or on behalf of the Client or Contractor to the Subcontractor are the exclusive property of the State (State Materials). Subcontractor shall not use, willingly allow, cause or permit State Materials to be used for any purpose other than the performance of Subcontractor's obligations in this Agreement without the prior written consent of the Client or Contractor. Upon termination of this Agreement, for any reason, Subcontractor shall provide all State Materials to the Client or Contractor in a form and manner as directed by the Client or Contractor.

5. Subcontractor Responsibilities. Subcontractor shall be responsible for providing the following when performing their Services:

Labor – Including, but not limited to, employees, subcontractors and any other individuals or agents.

Materials – Including, but not limited to, all supplies and products.

Equipment – Including, but not limited to, machinery, accessories, or devices. The Subcontractor is not responsible for providing equipment identified in the plans or specifications as provided by the Contractor or "by others".

Travel – Including, but not limited to, ensuring that the above-mentioned are provided at the Location mentioned in each Request for Bids/Quotes.

☐ - **Other**: _____

Subcontractor shall not be responsible for any items that are not listed unless otherwise stated in this Agreement.

6. Location. The general location for the Services to be completed by the Subcontractor will be within the DWR's Division 6 and Division 7 (Exhibit A) boundaries. Specific project location details and information shall be determined later by the Contractor ("Location") and included in future Request for Bids/Quotes.

7. Commencement Date. The Subcontractor shall be permitted to begin the Services on _____, 20____ ("Commencement Date"). Subcontractor shall provide the Contractor with at least 72-hours advance notice prior to it beginning work at any site. The specific Commencement Date and project schedule will be set forth in the associated Request for Bids/Quotes and incorporated into the Work Order for each specific project.

8. Completion. The Subcontractor will be required, unless otherwise stated under the terms of this Agreement, to achieve final acceptance by the Contractor of the Services by the Specific date of _____, 20____. The specific project schedule will be set forth in the associated Request for Bids/Quotes and incorporated into the Work Order for each specific project.

9. Payment Amount. Payment for the Services shall be based on the Subcontractor's Bid(s), as accepted by the Contractor with modifications agreed to by the Subcontractor and incorporated into the Work Order for each specific project.

10. Payment Process. Payment for a given project executed by the Subcontractor shall be made by the Contractor within 45 days of invoice receipt, subject to the following prerequisites:

- The Contractor has been paid by the Client for the same work covered in the Subcontractor's invoice,
- The Contractor has issued final acceptance of the Subcontractor's work, and
- The Subcontractor has provided lien waivers acceptable to the Contractor from all its suppliers of materials or equipment incorporated into the work with a value exceeding $2,500 and all its subcontractors.

"Final acceptance" shall be a determination made in good faith by the Contractor that the Subcontractor's work on a project has been completed in accordance with the plans and specifications provided, DWR's standards, and generally accepted industry standards and practices. The Contractor shall inspect the work and reject or accept it in writing within seven (7) calendar days following notification by the Subcontractor that the work is ready for inspection.

If the Client, or other responsible party, delays in making any payment to the Contractor from which payment to Subcontractor is to be made, Contractor and its sureties shall have a reasonable time to make payment to Subcontractor. "Reasonable time" shall be determined in relation to relevant circumstances but shall in no event be less time than required for Contractor, Contractor's sureties, and Subcontractor to pursue a conclusion to their legal remedies against the Client or other responsible party to obtain payment, including, but not limited to, mechanics' lien remedies.

Contractor is entitled to set off any amounts it may owe Subcontractor under this Agreement to remedy defective or incomplete work performed by the Subcontractor under this Agreement.

11. Taxes. The Client is exempt from federal excise taxes. The Client shall not be liable for the payment of any excise, sales, or use taxes, regardless of whether any political subdivision of the state imposes such taxes on Contractor and Subcontractor. Subcontractor shall be solely responsible for any exemptions from the collection of excise, sales or use taxes that Subcontractor may wish to have in place in connection with this Agreement.

12. Assignment. Subcontractor's rights and obligations under this Agreement are personal and may not be transferred or assigned without the prior written consent of the Contractor. Any

attempt at assignment or transfer without such consent shall be void. Any assignment or transfer of Subcontractor's rights and obligations approved in writing by the Contractor shall be subject to the provisions of this Agreement.

13. Subcontracting. Subcontractor may not enter into any subcontract in connection with its obligations under this Agreement without providing advance notice to the Contractor. The Contractor may reject any such subcontract, and Subcontractor shall terminate any subcontract that is rejected by the Contractor and shall not allow any subcontractor to perform any work after that subcontractor's subcontract has been rejected by the Contractor. Subcontractor shall submit to the Contractor a copy of each such subcontract upon request by the Contractor. All subcontracts entered into by Subcontractor in connection with this Agreement shall comply with all applicable federal and state laws and regulations, shall provide that they are governed by the laws of the State of Colorado, and shall be subject to all provisions of this Agreement.

14. Compliance with Law. Subcontractor shall comply with all applicable federal and State laws, rules and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

15. Choice of Law. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this Agreement. Any provision included or incorporated herein by reference which contains conflicts with said laws, rules, and regulations shall be null and void.

16. Equal Employment Opportunity. The Equal Employment Opportunity Clause required under Executive Order 11246, as amended; Section 402 of the Vietnam Era Veterans Readjustment Assistance Action of 1974, as amended; and Section 503 of the Vocational Rehabilitation Act of 1973, as amended; and the related regulations as set forth in 41 CFR Chapter 60 are incorporated herein by reference.

17. Davis-Bacon Act. In accordance with the statute, Subcontractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. The relevant wage determination will be set forth in each project's Request for Bids/Quotes and Work Order. In addition, Subcontractor must be required to pay wages not less than once a week. The Subcontractor must also comply with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by the Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each Subcontractor or recipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

18. Insurance. The Subcontractor, along with each of its subcontractors, shall obtain and maintain, insurance as specified in this Section at all times during the term of this Agreement. All insurance policies required by this Agreement shall be issued by insurance companies as approved by the State and be obtained under the following terms and conditions before commencing Services:

A. **Coverage Types**

1. **Workers' Compensation**: Subcontractor shall carry Workers' Compensation insurance as required by the state statute, and employers' liability insurance covering all

Subcontractor and its employees acting within the course and scope of their employment.

2. **General Liability Insurance**: Subcontractor shall carry minimum primary General Liability Insurance for the following amounts:

   i. $1,000,000 Bodily Injury and Property Damage—Each Occurrence;
   ii. $2,000,000 Personal and Advertising Injury;
   iii. $2,000,000 Products - Completed Operations Aggregate; and
   iv. $2,000,000 General Aggregate (This shall apply separately to the Services provided by the Subcontractor).
   v. $5,000 Medical Expenses (Any one person)
   vi. $100,000 Damage to Premises Rented to You Limit

3. **Automobile Liability Insurance**: $1,000,000 minimum required insurance policy on all owned, hired, and non-owned vehicles of the Subcontractor for combined single limit liability for each accident affecting incurring bodily injury and/or property damage.

4. **Pollution Liability Insurance**: $1,000,000 minimum required insurance policy for each occurrence and $2,000,000 Annual Aggregate covering any environmental damage caused by the Subcontractor and subcontractors during the Work. Policy shall name the Contractor and Client as additional insureds.

5. **Additional Insurance Requirement**: The Client, Contractor, and any other entity which the Contractor is required to name as an additional insured under the Prime Contract shall be named as additional insureds under the General Liability Insurance required by this Section and any such insurance afforded to the additional insureds shall apply as primary insurance.

6. **Primacy of Coverage:** Any other insurance maintained by the Subcontractor shall be primary and noncontributory over any insurance or self-insurance program carried by Subcontractor or the Contractor or State.

7. **Cancellation:** The above insurance policies shall include provisions preventing cancellation or non-renewal, except for cancellation based on non-payment of premiums with at least 30 days prior notice to Subcontractor. Subcontractor shall forward such notice to Contractor within seven days of Subcontractor's receipt of it.

8. **Subrogation Waiver:** All insurance policies secured or maintained by Subcontractor or its subcontractors in relation to this Agreement shall include clauses stating that each carrier shall waive all rights of recovery under subrogation or otherwise against Subcontractor, Contractor, or Client, its agencies, institutions, organizations, officers, agents, employees, and volunteers.

   B. **Certificates of Insurance**. Certificates of insurance, and the required additional insured and other endorsements, including waivers of subrogation shall be furnished to Contractor within seven Business Days following the Effective Date of this Agreement and before the performance of any Services under this Agreement.

   C. **Exclusions**. The above insurance coverages are operations by or on behalf of the Subcontractor providing insurance for bodily injury, personal injury, and property

damage for the limits of liability indicated, including but not limited to, coverage for (1) the premises and operations; (2) products and completed operations; (3) contractual liability; (4) construction means, methods, techniques, sequences, and procedures, including safety and field supervision. Such coverage shall not be subject to any of the following limiting or exclusionary endorsements: subsidence or earth movement, prior acts or work, action over – precluding indemnity for passive acts of Contractor contributing to injury of a Subcontractor's employee, contractual limitation – eliminating coverage for assumed liability, supervisory or inspection service limitation, insured vs insured cross suits, clauses terminating coverage after a specific period of time, residential or habitational limitation if the Services include residential or habitational work, classification limitation voiding coverage for work not specified, defense inside limits provision, and sub-subcontractor insurance coverage exclusions for failure to satisfy coverage conditions.

19. Resolution of Disputes. Contractor and Subcontractor agree to negotiate in good faith to resolve any disputes or differences arising under this Agreement. Any dispute that cannot be resolved by negotiation will be submitted to mediation conducted in accordance with the current Construction Industry Mediation Rules of the American Arbitration Association or such other form of non-binding Alternative Dispute Resolution (ADR) as they may mutually agree upon. Contractor and Subcontractor agree that, in the event their dispute resolution procedures as described above do not resolve any disagreement among them and any party elects thereafter to institute legal proceedings, the forum for any such action relating to this Agreement shall be in the courts located in Garfield County unless required by the Client to be in the courts of its choosing. Contractor and Subcontractor hereby irrevocably consent to the jurisdiction of such courts and waive any defense, whether asserted by motion or pleading, that such courts are an inconvenient or inappropriate venue.

20. Termination. During the course of this Agreement, Contractor or Subcontractor may, at any time and for any reason, terminate this Agreement for convenience with at least 10 business day(s) notice. In the event of termination for convenience, Subcontractor shall recover only the actual cost of work completed to the date of termination in approved units of work or percentage of completion.

21. Claims. If any claim is made by the Contractor or Subcontractor in connection with a Change Order or regarding any related issue to this Agreement or the performance of Services and/or Services to be provided, either party shall have the right to submit written notice of such claim through certified mail with return receipt. After receipt of a written claim by either party of this Agreement, the parties shall have 5 business day(s) to correct the claim prior to seeking a resolution under the instructions in this Agreement.

If the Subcontractor asserts a claim which involves, in whole or in part, acts or omissions which are the responsibility of the Client or another person for whom a claim may be submitted, including but not limited to, claims for failure to pay, an extension of time, impacts, delay damages, or extra work, the Contractor shall present the Subcontractor's claim to the Client or other responsible party provided the Subcontractor presents to Contractor competent supporting evidence and in sufficient time for the Contractor to do so. The Subcontractor shall cooperate fully with the Contractor in any and all steps the Contractor takes in connection with prosecuting such a claim and shall hold harmless and reimburse the Contractor for all expenses, including legal expenses, incurred by the Contractor which arise out of the Contractor's submission of the Subcontractor's claims to the Client or other responsible party(ies). The Subcontractor shall be bound by any adjudication or award in any action or proceeding resolving such a claim.

22. Change Orders. Any material alteration or deviation from the scope of work defined in a given Work Order under this Agreement or from the requirements of this Agreement shall be executed and attached to this Agreement as a change order ("Change Order").

23. Time. Time is of the essence of this Agreement. Subcontractor shall complete its Work within the timeframes established in the Work Order executed for a given project. Contractor shall provide Subcontractor with any Contractor-provided equipment in a timely manner to facilitate the Subcontractor's ability to meet its completion time obligations, or the Contractor shall issue a reasonable time extension.

24. Delays. Should the Subcontractor delay the Contractor, Subcontractor will indemnify the Contractor and hold Contractor harmless for any damages, claims, demands, liens, stop notices, lawsuits, attorneys' fees, and other costs or liabilities imposed on the Contractor connected with said delay. Among other remedies for Subcontractor's delay, the Contractor may supplement the Subcontractor's work and deduct associated costs at Contractor's election.

25. Inspection of Services. Subcontractor shall make the Work accessible at all reasonable times for inspection by the Contractor. Subcontractor shall, at the first opportunity, inspect all material and equipment delivered to the job site by others to be used or incorporated in the Subcontractor's Work and give prompt notice of any defect therein. Subcontractor assumes full responsibility to protect the Work done hereunder until final acceptance by the Contractor or any authorized third (3rd) party.

26. Labor Relations. Subcontractor shall maintain labor policies in conformity with the directions of the Contractor and under State laws.

27. Indemnification. Subcontractor shall indemnify, defend and hold harmless the Contractor (SGM), Client (CWCB) and their affiliated companies, and each of the aforementioned parties, respective successors, assigns, officers, directors, shareholders, employees, representatives, and agents, from all claims and liabilities for loss or damage to the property of any person including Subcontractor and bodily injury to or death of any person including Subcontractor in any way arising from Subcontractor's activities. In the event claims, losses, damages or expenses are caused by the joint or concurrent negligence of Subcontractor and Contractor, they shall be borne by each party in proportion to their respective negligence.

Subcontractor waives any right to assert immunity from these obligations under any workers' compensation or other employee benefit statute.

28. Warranty. Subcontractor warrants to Client and Contractor that any and all materials and equipment furnished shall be new unless otherwise specified and that all Services provided under this Agreement will be performed, at a minimum, in accordance with industry standards. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The warranty provided in this Section shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Prime Contract.

29. Domestic Preferences for Procurements (2 CFR 200.322). The Subcontractor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

30. Required Licenses, Permits, and Other Authorizations. Subcontractor shall secure, prior to the Effective Date, and maintain at all times during the term of this Agreement, at its sole expense, all licenses, certifications, permits, and other authorizations required to perform its obligations under this Agreement, and shall ensure that all employees, agents, and subcontractors secure and maintain at all times during the term of their employment, agency or subcontract, all license, certifications, permits and other authorizations required to perform their obligations in relation to this Agreement.

31. Clean Air Act and the federal Water Pollution Control Act. Subcontractor must comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387).

32. Procurement of Recovered Materials (2 CFR 200.323). Subcontractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in the guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

33. Buy America Domestic Procurement Preference. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply: (a) all iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States; (b) all manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and (c) all construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

34. Confidentiality. For the purposes of this Agreement, “Confidential Information” shall mean any information or material that is proprietary to a party or designated as confidential by such

party ("Disclosing Party") and received by another party ("Receiving Party") as a result of this Agreement. Confidential Information may be considered any information that is conceived, originated, discovered or developed in whole or in part by the Subcontractor in accordance with providing their Services. Confidential Information does not include (1) information that is or becomes publicly known without restriction and without breach of this Agreement or that is employed by the trade at or after the time the Receiving Party first learns of such information; (2) generic information or knowledge which the Receiving Party would have learned in the course of similar employment or work elsewhere in the trade; (3) information the Receiving Party lawfully receives from a third (3rd) party without restriction of disclosure and without breach of a nondisclosure obligation; (4) information the Receiving Party rightfully knew prior to receiving such information from the Disclosing Party to the extent such knowledge was not subject to restrictions of further disclosure; or (5) information the Receiving Party develops independent of any information originating from the Disclosing Party.

Subcontractor shall keep confidential all State Records, unless those State Records are publicly available. Subcontractor shall not, without prior written approval of the State, use, publish, copy, disclose to any third party, or permit the use by any third party of any State Records, except as otherwise stated in this Agreement, permitted by law or approved in writing by the State. Subcontractor shall provide for the security of all State Confidential Information in accordance with all policies promulgated by the Colorado Office of Information Security and all applicable laws, rules, policies, publication, and guidelines. Contractor shall immediately forward any request or demand for State Records to the State's Principal Representative.

A.) **Prime Confidential Information**. The following shall constitute Confidential Information of the Contractor and should not be disclosed to third (3rd) parties: the deliverables, discoveries, ideas, concepts, software [in various stages of development], designs, drawings, specifications, techniques, models, data, source code, source files, object code, documentation, diagrams, flow charts, research, development, processes, procedures, "know-how", marketing techniques and materials, marketing and development plans, customer names and other information related to customers, price lists, pricing policies and financial information, this Agreement and the existence of this Agreement, the relationship between the Contractor and Subcontractor, and any details of the Service under this Agreement. Subcontractor agrees not to use or reference the Contractor and/or their names, likenesses, or logos ("Identity"). Subcontractor will not use or reference Contractor or their Identity, directly or indirectly, in conjunction with any other third (3rd) parties.

B.) **Non-Disclosure**. The parties hereby agree that during the term hereof, and at all times thereafter, and except as specifically permitted herein or in a separate writing signed by the Disclosing Party, the Receiving Party shall not use, commercialize or disclose Confidential Information to any person or entity. Upon termination, or at any time upon the request of the Disclosing Party, the Receiving Party shall return to the Disclosing Party all Confidential Information, including all notes, data, reference materials, sketches, drawings, memorandums, documentation and records which in any way incorporate Confidential Information.

C.) **Right to Disclose**. With respect to any information, knowledge, or data disclosed to the Contractor by the Subcontractor, the Subcontractor warrants that the Subcontractor has full and unrestricted right to disclose the same without incurring legal liability to others, and that the Contractor shall have the full and unrestricted rights to use and publish the same as it may see fit. Any restrictions on Contractor's

use of information, knowledge, or data disclosed by Subcontractor must be made known to Contractor.

35. Notices. All notices under this Agreement shall be in writing and sent to the address of the recipient specified herein. Any such notice may be delivered by hand, by overnight courier, certified mail with return receipt, or first class pre-paid letter, and will be deemed to have been received (1) if delivered by hand – at the time of delivery; (2) if delivered by overnight courier – 24 hours after the date of delivery to courier with evidence from the courier; (3) if delivered by certified mail with return receipt – the date as verified on the return receipt; (4) if delivered by first class mail – three (3) business days after the date of mailing.

36. Injunctive Relief. Subcontractor acknowledges it would be difficult to fully compensate the Client and/or Contractor for damages resulting from any breach of this Agreement. Accordingly, in the event of any breach of this Agreement, the Client and/or Contractor shall be entitled to temporary and/or permanent injunctive relief to enforce such provisions.

37. Severability. If any term, covenant, condition, or provision of this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired, or invalidated.

38. Independent Contractor. Subcontractor shall perform its duties hereunder as an independent Subcontractor and not as an employee of the Contractor nor the Client. Neither Subcontractor nor any agent or employee of Subcontractor shall be deemed to be an agent of the Contractor or Client. Subcontractor shall not have authorization, express or implied, to bind the Contractor or Client to any agreement, liability or understanding, except as expressly set forth herein. Subcontractor and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the Contractor nor the Client and the Contractor nor the Client shall not pay for or otherwise provide such coverage for Subcontractor or any of its agents or employees. Subcontractor shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this Agreement. Subcontractor shall (i) provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, (ii) provide proof thereof when requested by the Contractor or Client, and (iii) be solely responsible for its acts and those of its employees and agents.

39. Debarment and Suspension. The Department of the Interior regulations at 2 CFR 1400—Governmentwide Debarment and Suspension (Nonprocurement), which adopt the common rule for the governmentwide system of debarment and suspension for nonprocurement activities, are hereby incorporated by reference and made a part of this Agreement. Subontractor agrees to comply with 2 CFR 1400, Subpart C.

40. Force Majeure. Neither party shall be liable for any failure to perform under this Agreement when such failure is due to causes beyond that party's reasonable control, including, but not limited to, acts of State or governmental authorities, acts of terrorism, natural catastrophe, fire, storm, flood, earthquakes, accident, and prolonged shortage of energy. In the event of such delay, any date stated herein shall be extended by a period of time necessary by both Contractor and Subcontractor. If the delay remains in effect for a period more than thirty (30) days, Contractor has the right to terminate this Agreement upon written notice to the Subcontractor.

ATTACHMENT B1

41. Attachments. The Contractor may attach any plans, schematics, drawings, details, or other information to assist the Subcontractor with the aforementioned Services which will be included with the Work Order. Any attachment made shall be made part of this entire Agreement.

42. Entire Agreement. This Agreement represents the entire agreement between the Contractor and Subcontractor. This Agreement supersedes any prior written or oral representations. Subcontractor and its subcontractors, suppliers and/or materialmen are bound to the Contractor by the Prime Contract and any contract documents incorporated therein to the same extent as Contractor is bound to the Client insofar as they related in any way, directly or indirectly, to the Services provided and covered in this Agreement.

IN WITNESS WHEREOF, this Agreement was signed by the parties under the hands of their duly authorized officers and made effective as of the undersigned date.

Contractor's Signature _____ Date _____

Print Name _____

Company Name _____

Subcontractor's Signature _____ Date _____

Print Name _____

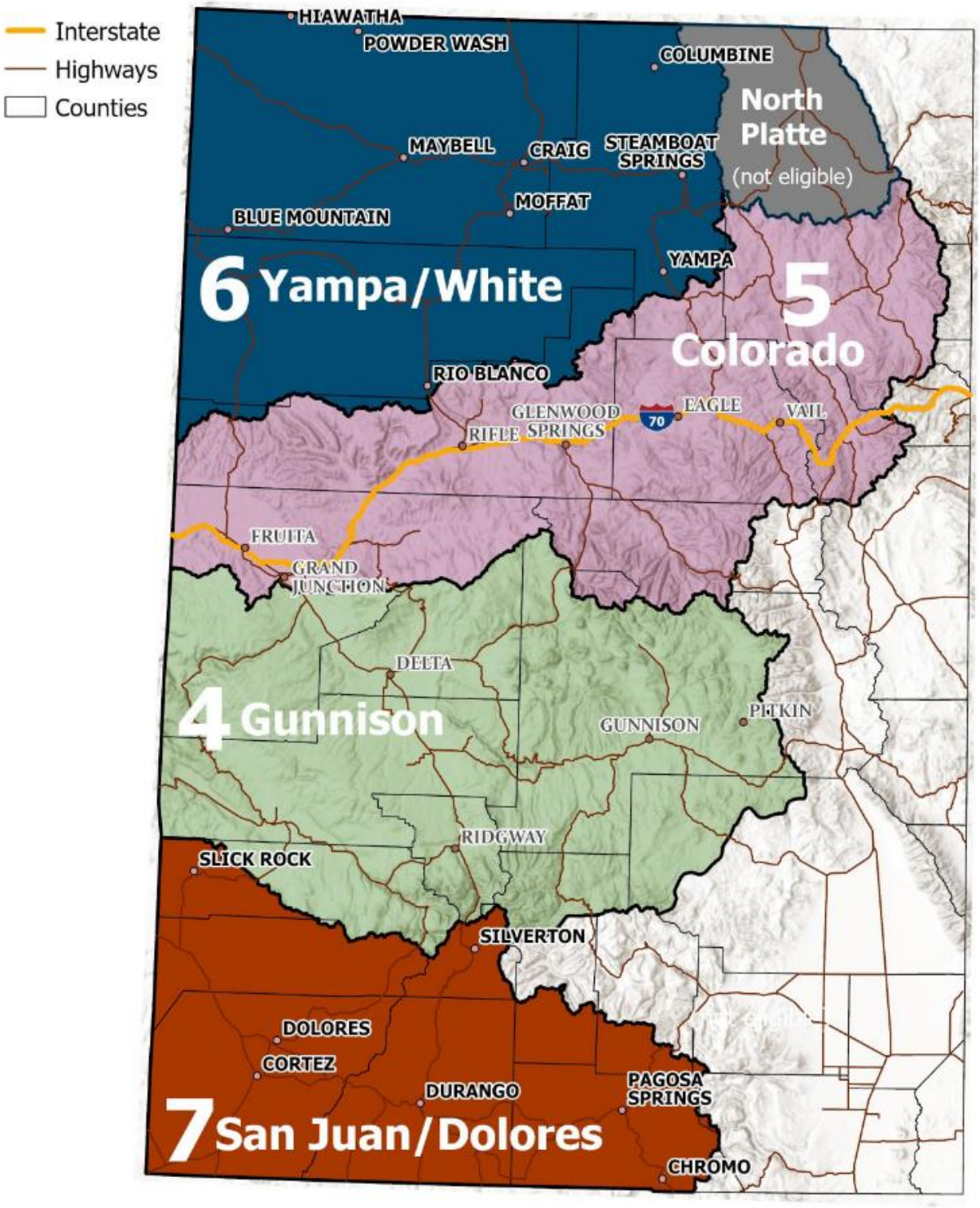
Company Name _____

ATTACHMENT B1

Exhibit A

2026 Project Location Map (Division 6 and Division 7 Only)

ATTACHMENT B1



Attachment B2 - Example Vendor Agreement

Version 1.2 January 21, 2026

Attachment B2
COLORADO VENDOR AGREEMENT
DRAFT

1. The Parties. This Vendor Agreement ("Agreement") made on _____, 20____, is between SGM, Inc. with a mailing address of 118 W. 6th Street, Suite 200, City of Glenwood Springs, State of Colorado ("Contractor") and _____ with a mailing address of _____, City of _____, State of _____ ("Vendor") both of whom agree as follows:

2. The Client. The Vendor acknowledges that any work performed under this Agreement must be in accordance with the latest version agreement(s) ("Prime Contract") made between the Contractor and the Department of Natural Resources, Colorado Water Conservation Board, "CWCB" with a mailing address of 1313 Sherman St., Suite 719, City of Denver, State of Colorado ("Client").

3. Vendor Services Provided. Vendor agrees to manufacture water flow measurement devices for purposes of measuring flow in existing open channels, piped ditches, or pumps on wells or springs as described in any project-specific Request for Bids/Quotes and Work Orders issued later under this Agreement. The following general services ("Services") apply to the anticipated work:

1. The Vendor will ensure all work is done according to the plans, details, and applicable standards and specifications provided for each Work Order.
2. The Vendor will be responsible for any damage to the measurement device it is supplying through the time of its receipt by the Contractor or Subcontractor at the project site or upon pick-up by the Contractor or Subcontractor.

3. Contractor Services Provided. The Contractor agrees to provide the following services related to the Vendors work:

1. The Contractor will work directly with awardees (receiving the in-kind grant/measurement structure) to facilitate the installation, including consideration of land access, irrigation schedules, installer (Subcontractor) availability, equipment availability and/or river flows.
2. The Contractor will provide the measurement device for the Subcontractor to install.
3. The Contractor will pay storage fees, on a case-by-case basis, as necessary for devices that are not delivered or picked up within 60-days of manufacturing.

Each Request for Bids/Quotes will include specific project details and information, including but not limited to:

- detailed drawings
- project specifications
- shipping and handling information

The anticipated project types include, but are not limited to:

1. Typical Prefabricated Flume Installation
2. Custom Concrete Structures
3. Instrumentation & Telemetry

There could be projects that have site-specific constraints or features that would require work outside of the typical scope anticipated.

4. Rights in Work Product and Other Information - Exclusive Property of the State. Except to the extent specifically provided elsewhere in this Agreement, all State Records, documents, text, software (including source code), research, reports, proposals, specifications, plans, notes, studies, data, images, photographs, negatives, pictures, drawings, designs, models, surveys, maps, materials, ideas, concepts, know-how, and information provided by or on behalf of the Client or Contractor to the Vendor are the exclusive property of the State (State Materials). Vendor shall not use, willingly allow, cause or permit State Materials to be used for any purpose other than the performance of Vendor's obligations in this Agreement without the prior written consent of the Client or Contractor. Upon termination of this Agreement, for any reason, Vendor shall provide all State Materials to the Client or Contractor in a form and manner as directed by the Client or Contractor.

5. Vendor Responsibilities. Vendor shall be responsible for providing the following when performing their Services:

Labor – Including, but not limited to, employees, Vendors and any other individuals or agents.

Materials – Including, but not limited to, all supplies and products.

Equipment – Including, but not limited to, machinery, accessories, or devices. The Vendor is not responsible for providing equipment identified in the plans or specifications as provided by the Contractor or "by others".

Travel – Including, but not limited to, ensuring that the above-mentioned are provided at the Location mentioned in each Request for Bids/Quotes, as needed.

Other: _____

Vendor shall not be responsible for any items that are not listed unless otherwise stated in this Agreement.

6. Location. The general location for the Services to be completed by the Vendor will be within the DWR's Division 6 and Division 7 (Exhibit A) boundaries. Specific project location details and information shall be determined later by the Contractor ("Location") and included in future Request for Bids/Quotes.

7. Commencement Date. The Vendor shall be permitted to begin the Services on _____, 20____ ("Commencement Date"). Vendor shall provide the Contractor with at least 72-hours advance notice prior delivering a measurement flume, if requested. The specific Commencement Date and project schedule will be set forth in the associated Request for Bids/Quotes and incorporated into the Work Order for each specific project.

8. Completion. The Vendor will be required, unless otherwise stated under the terms of this Agreement, to achieve final acceptance by the Contractor of the Services by the Specific date of _____, 20____. The specific project schedule will be set forth in the associated Request for Bids/Quotes and incorporated into the Work Order for each specific project.

9. Payment Amount. Payment for the Services shall be based on the Vendor's Bid(s), as accepted by the Contractor with modifications agreed to by the Vendor and incorporated into the Work Order for each specific project.

10. Payment Process. Payment for a given project executed by the Vendor shall be made by the Contractor within 45 days of invoice receipt, subject to the following prerequisites:

- The Contractor has been paid by the Client for the same work covered in the Vendor's invoice,
- The Contractor has issued final acceptance of the Vendor's work, and
- The Vendor has provided lien waivers acceptable to the Contractor from all its suppliers of materials or equipment incorporated into the work with a value exceeding $2,500 and all its Vendors.

"Final acceptance" shall be a determination made in good faith by the Contractor that the Vendor's work on a project has been completed in accordance with the plans and specifications provided, and generally accepted industry standards and practices. The Contractor shall inspect the work and reject or accept it in writing within seven (7) calendar days following notification by the Vendor that the work is ready for inspection.

If the Client, or other responsible party, delays in making any payment to the Contractor from which payment to Vendor is to be made, Contractor and its sureties shall have a reasonable time to make payment to Vendor. "Reasonable time" shall be determined in relation to relevant circumstances but shall in no event be less time than required for Contractor, Contractor's sureties, and Vendor to pursue a conclusion to their legal remedies against the Client or other responsible party to obtain payment, including, but not limited to, mechanics' lien remedies.

Contractor is entitled to set off any amounts it may owe Vendor under this Agreement to remedy defective or incomplete work performed by the Vendor under this Agreement.

11. Taxes. The Client is exempt from federal excise taxes. The Client shall not be liable for the payment of any excise, sales, or use taxes, regardless of whether any political subdivision of the state imposes such taxes on Contractor and Vendor. Vendor shall be solely responsible for any exemptions from the collection of excise, sales or use taxes that Vendor may wish to have in place in connection with this Agreement.

12. Assignment. Vendor's rights and obligations under this Agreement are personal and may not be transferred or assigned without the prior written consent of the Contractor. Any attempt at assignment or transfer without such consent shall be void. Any assignment or transfer of Vendor's rights and obligations approved in writing by the Contractor shall be subject to the provisions of this Agreement.

13. Subcontracting. Vendor may not enter into any subcontract in connection with its obligations under this Agreement without providing advance notice to the Contractor. The Contractor may reject any such subcontract, and Vendor shall terminate any subcontract that is rejected by the Contractor and shall not allow any Vendor to perform any work after that Vendor's subcontract has been rejected by the Contractor. Vendor shall submit to the Contractor a copy of each such subcontract upon request by the Contractor. All subcontracts entered into by Vendor in connection with this Agreement shall comply with all applicable federal and state laws and regulations, shall provide that they are governed by the laws of the State of Colorado, and shall be subject to all provisions of this Agreement.

14. Compliance with Law. Vendor shall comply with all applicable federal and State laws, rules and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

15. Choice of Law. Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this Agreement. Any provision included or incorporated herein by reference which contains conflicts with said laws, rules, and regulations shall be null and void.

16. Equal Employment Opportunity. The Equal Employment Opportunity Clause required under Executive Order 11246, as amended; Section 402 of the Vietnam Era Veterans Readjustment Assistance Action of 1974, as amended; and Section 503 of the Vocational Rehabilitation Act of 1973, as amended; and the related regulations as set forth in 41 CFR Chapter 60 are incorporated herein by reference.

17. Davis-Bacon Act. In accordance with the statute, Vendors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. The relevant wage determination will be set forth in each project's Request for Bids/Quotes and Work Order. In addition, Vendor must be required to pay wages not less than once a week. The Vendor must also comply with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by the Department of Labor regulations (29 CFR Part 3, "Contractors and Vendors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each Vendor or recipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

18. Insurance. The Vendor, along with each of its vendors, shall obtain and maintain, insurance as specified in this Section at all times during the term of this Agreement. All insurance policies required by this Agreement shall be issued by insurance companies as approved by the State and be obtained under the following terms and conditions before commencing Services:

A. **Coverage Types**

1. **Workers' Compensation**: Vendor shall carry Workers' Compensation insurance as required by the state statute, and employers' liability insurance covering all Vendor and its employees acting within the course and scope of their employment.

2. **General Liability Insurance**: Vendor shall carry minimum primary General Liability Insurance for the following amounts:

   i. $1,000,000 Bodily Injury and Property Damage—Each Occurrence;
   ii. $2,000,000 Personal and Advertising Injury;
   iii. $2,000,000 Products - Completed Operations Aggregate; and
   iv. $2,000,000 General Aggregate (This shall apply separately to the Services provided by the Vendor).
   v. $5,000 Medical Expenses (Any one person)
   vi. $100,000 Damage to Premises Rented to You Limit

3. **Automobile Liability Insurance**: $1,000,000 minimum required insurance policy on all owned, hired, and non-owned vehicles of the Vendor for combined single limit liability for each accident affecting incurring bodily injury and/or property damage.

4. **Pollution Liability Insurance**: $1,000,000 minimum required insurance policy for each occurrence and $2,000,000 Annual Aggregate covering any environmental damage caused by the Vendor and Vendors during the Work. Policy shall name the Contractor and Client as additional insureds.

5. **Additional Insurance Requirement**: The Client, Contractor, and any other entity which the Contractor is required to name as an additional insured under the Prime Contract shall be named as additional insureds under the General Liability Insurance required by this Section and any such insurance afforded to the additional insureds shall apply as primary insurance.

6. **Primacy of Coverage:** Any other insurance maintained by the Vendor shall be primary and noncontributory over any insurance or self-insurance program carried by Vendor or the Contractor or State.

7. **Cancellation:** The above insurance policies shall include provisions preventing cancellation or non-renewal, except for cancellation based on non-payment of premiums with at least 30 days prior notice to Vendor. Vendor shall forward such notice to Contractor within seven days of Vendor's receipt of it.

8. **Subrogation Waiver:** All insurance policies secured or maintained by Vendor or its Vendors in relation to this Agreement shall include clauses stating that each carrier shall waive all rights of recovery under subrogation or otherwise against Vendor, Contractor, or Client, its agencies, institutions, organizations, officers, agents, employees, and volunteers.

B. **Certificates of Insurance**. Certificates of insurance, and the required additional insured and other endorsements, including waivers of subrogation shall be furnished to Contractor within seven Business Days following the Effective Date of this Agreement and before the performance of any Services under this Agreement.

C. **Exclusions**. The above insurance coverages are operations by or on behalf of the Vendor providing insurance for bodily injury, personal injury, and property damage for the limits of liability indicated, including but not limited to, coverage for (1) the premises and operations; (2) products and completed operations; (3) contractual liability; (4) construction means, methods, techniques, sequences, and procedures, including safety and field supervision. Such coverage shall not be subject to any of the following limiting or exclusionary endorsements: subsidence or earth movement, prior acts or work, action over – precluding indemnity for passive acts of Contractor contributing to injury of a Vendor's employee, contractual limitation – eliminating coverage for assumed liability, supervisory or inspection service limitation, insured vs insured cross suits, clauses terminating coverage after a specific period of time, residential or habitational limitation if the Services include residential or habitational work, classification limitation voiding coverage for work not specified, defense inside limits provision, and sub-Vendor insurance coverage exclusions for failure to satisfy coverage conditions.

19. Resolution of Disputes. Contractor and Vendor agree to negotiate in good faith to resolve any disputes or differences arising under this Agreement. Any dispute that cannot be resolved by negotiation will be submitted to mediation conducted in accordance with the

current Construction Industry Mediation Rules of the American Arbitration Association or such other form of non-binding Alternative Dispute Resolution (ADR) as they may mutually agree upon. Contractor and Vendor agree that, in the event their dispute resolution procedures as described above do not resolve any disagreement among them and any party elects thereafter to institute legal proceedings, the forum for any such action relating to this Agreement shall be in the courts located in Garfield County unless required by the Client to be in the courts of its choosing. Contractor and Vendor hereby irrevocably consent to the jurisdiction of such courts and waive any defense, whether asserted by motion or pleading, that such courts are an inconvenient or inappropriate venue.

20. Termination. During the course of this Agreement, Contractor or Vendor may, at any time and for any reason, terminate this Agreement for convenience with at least 10 business day(s) notice. In the event of termination for convenience, Vendor shall recover only the actual cost of work completed to the date of termination in approved units of work or percentage of completion.

21. Claims. If any claim is made by the Contractor or Vendor in connection with a Change Order or regarding any related issue to this Agreement or the performance of Services and/or Services to be provided, either party shall have the right to submit written notice of such claim through certified mail with return receipt. After receipt of a written claim by either party of this Agreement, the parties shall have 5 business day(s) to correct the claim prior to seeking a resolution under the instructions in this Agreement.

If the Vendor asserts a claim which involves, in whole or in part, acts or omissions which are the responsibility of the Client or another person for whom a claim may be submitted, including but not limited to, claims for failure to pay, an extension of time, impacts, delay damages, or extra work, the Contractor shall present the Vendor's claim to the Client or other responsible party provided the Vendor presents to Contractor competent supporting evidence and in sufficient time for the Contractor to do so. The Vendor shall cooperate fully with the Contractor in any and all steps the Contractor takes in connection with prosecuting such a claim and shall hold harmless and reimburse the Contractor for all expenses, including legal expenses, incurred by the Contractor which arise out of the Contractor's submission of the Vendor's claims to the Client or other responsible party(ies). The Vendor shall be bound by any adjudication or award in any action or proceeding resolving such a claim.

22. Change Orders. Any material alteration or deviation from the scope of work defined in a given Work Order under this Agreement or from the requirements of this Agreement shall be executed and attached to this Agreement as a change order (“Change Order”).

23. Time. Time is of the essence of this Agreement. Vendor shall complete its Work within the timeframes established in the Work Order executed for a given project. Contractor shall provide Vendor with any Contractor-provided equipment in a timely manner to facilitate the Vendor’s ability to meet its completion time obligations, or the Contractor shall issue a reasonable time extension.

24. Delays. Should the Vendor delay the Contractor, Vendor will indemnify the Contractor and hold Contractor harmless for any damages, claims, demands, liens, stop notices, lawsuits, attorneys' fees, and other costs or liabilities imposed on the Contractor connected with said delay. Among other remedies for Vendor's delay, the Contractor may supplement the Vendor's work and deduct associated costs at Contractor's election.

25. Inspection of Services. Vendor shall make the Work accessible at all reasonable times for inspection by the Contractor. Vendor shall, at the first opportunity, inspect all material and equipment delivered to the job site by others to be used or incorporated in the Vendor's Work and give prompt notice of any defect therein. Vendor assumes full responsibility to protect the Work done hereunder until final acceptance by the Contractor or any authorized third (3rd) party.

26. Labor Relations. Vendor shall maintain labor policies in conformity with the directions of the Contractor and under State laws.

27. Indemnification. Vendor shall indemnify, defend and hold harmless the Contractor (SGM), Client (CWCB) and their affiliated companies, and each of the aforementioned parties, respective successors, assigns, officers, directors, shareholders, employees, representatives, and agents, from all claims and liabilities for loss or damage to the property of any person including Vendor and bodily injury to or death of any person including Vendor in any way arising from Vendor's activities. In the event claims, losses, damages or expenses are caused by the joint or concurrent negligence of Vendor and Contractor, they shall be borne by each party in proportion to their respective negligence.

Vendor waives any right to assert immunity from these obligations under any workers' compensation or other employee benefit statute.

28. Warranty. Vendor warrants to Client and Contractor that any and all materials and equipment furnished shall be new unless otherwise specified and that all Services provided under this Agreement will be performed, at a minimum, in accordance with industry standards. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The warranty provided in this Section shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Prime Contract.

29. Domestic Preferences for Procurements (2 CFR 200.322). The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

30. Required Licenses, Permits, and Other Authorizations. Vendor shall secure, prior to the Effective Date, and maintain at all times during the term of this Agreement, at its sole expense, all licenses, certifications, permits, and other authorizations required to perform its obligations under this Agreement, and shall ensure that all employees, agents, and Vendors secure and maintain at all times during the term of their employment, agency or subcontract, all license, certifications, permits and other authorizations required to perform their obligations in relation to this Agreement.

31. Clean Air Act and the federal Water Pollution Control Act. Vendor must comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387).

32. Procurement of Recovered Materials (2 CFR 200.323). Vendors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in the guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the

quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

33. Buy America Domestic Procurement Preference. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply: (a) all iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States; (b) all manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and (c) all construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project. When necessary, the Client, Contractor, or Vendor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

34. Confidentiality. For the purposes of this Agreement, “Confidential Information” shall mean any information or material that is proprietary to a party or designated as confidential by such party (“Disclosing Party”) and received by another party (“Receiving Party”) as a result of this Agreement. Confidential Information may be considered any information that is conceived, originated, discovered or developed in whole or in part by the Vendor in accordance with providing their Services. Confidential Information does not include (1) information that is or becomes publicly known without restriction and without breach of this Agreement or that is employed by the trade at or after the time the Receiving Party first learns of such information; (2) generic information or knowledge which the Receiving Party would have learned in the course of similar employment or work elsewhere in the trade; (3) information the Receiving Party lawfully receives from a third (3rd) party without restriction of disclosure and without breach of a nondisclosure obligation; (4) information the Receiving Party rightfully knew prior to receiving such information from the Disclosing Party to the extent such knowledge was not subject to restrictions of further disclosure; or (5) information the Receiving Party develops independent of any information originating from the Disclosing Party.

Vendor shall keep confidential all State Records, unless those State Records are publicly available. Vendor shall not, without prior written approval of the State, use, publish, copy, disclose to any third party, or permit the use by any third party of any State Records, except as otherwise stated in this Agreement, permitted by law or approved in writing by the State. Vendor shall provide for the security of all State Confidential Information in accordance with all policies promulgated by the Colorado Office of Information Security and all applicable laws, rules,

policies, publication, and guidelines. Contractor shall immediately forward any request or demand for State Records to the State's Principal Representative.

A.) **Prime Confidential Information**. The following shall constitute Confidential Information of the Contractor and should not be disclosed to third (3rd) parties: the deliverables, discoveries, ideas, concepts, software [in various stages of development], designs, drawings, specifications, techniques, models, data, source code, source files, object code, documentation, diagrams, flow charts, research, development, processes, procedures, "know-how", marketing techniques and materials, marketing and development plans, customer names and other information related to customers, price lists, pricing policies and financial information, this Agreement and the existence of this Agreement, the relationship between the Contractor and Vendor, and any details of the Service under this Agreement. Vendor agrees not to use or reference the Contractor and/or their names, likenesses, or logos ("Identity"). Vendor will not use or reference Contractor or their Identity, directly or indirectly, in conjunction with any other third (3rd) parties.

B.) **Non-Disclosure**. The parties hereby agree that during the term hereof, and at all times thereafter, and except as specifically permitted herein or in a separate writing signed by the Disclosing Party, the Receiving Party shall not use, commercialize or disclose Confidential Information to any person or entity. Upon termination, or at any time upon the request of the Disclosing Party, the Receiving Party shall return to the Disclosing Party all Confidential Information, including all notes, data, reference materials, sketches, drawings, memorandums, documentation and records which in any way incorporate Confidential Information.

C.) **Right to Disclose**. With respect to any information, knowledge, or data disclosed to the Contractor by the Vendor, the Vendor warrants that the Vendor has full and unrestricted right to disclose the same without incurring legal liability to others, and that the Contractor shall have the full and unrestricted rights to use and publish the same as it may see fit. Any restrictions on Contractor's use of information, knowledge, or data disclosed by Vendor must be made known to Contractor.

35. Notices. All notices under this Agreement shall be in writing and sent to the address of the recipient specified herein. Any such notice may be delivered by hand, by overnight courier, certified mail with return receipt, or first class pre-paid letter, and will be deemed to have been received (1) if delivered by hand – at the time of delivery; (2) if delivered by overnight courier – 24 hours after the date of delivery to courier with evidence from the courier; (3) if delivered by certified mail with return receipt – the date as verified on the return receipt; (4) if delivered by first class mail – three (3) business days after the date of mailing.

36. Injunctive Relief. Vendor acknowledges it would be difficult to fully compensate the Client and/or Contractor for damages resulting from any breach of this Agreement. Accordingly, in the event of any breach of this Agreement, the Client and/or Contractor shall be entitled to temporary and/or permanent injunctive relief to enforce such provisions.

37. Severability. If any term, covenant, condition, or provision of this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired, or invalidated.

38. Independent Contractor. Vendor shall perform its duties hereunder as an independent Vendor and not as an employee of the Contractor nor the Client. Neither Vendor nor any agent or employee of Vendor shall be deemed to be an agent of the Contractor or Client. Vendor shall not have authorization, express or implied, to bind the Contractor or Client to any agreement, liability or understanding, except as expressly set forth herein. Vendor and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the Contractor nor the Client and the Contractor nor the Client shall not pay for or otherwise provide such coverage for Vendor or any of its agents or employees. Vendor shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this Agreement. Vendor shall (i) provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, (ii) provide proof thereof when requested by the Contractor or Client, and (iii) be solely responsible for its acts and those of its employees and agents.

39. Debarment and Suspension. The Department of the Interior regulations at 2 CFR 1400—Governmentwide Debarment and Suspension (Nonprocurement), which adopt the common rule for the governmentwide system of debarment and suspension for nonprocurement activities, are hereby incorporated by reference and made a part of this Agreement. Subontractor agrees to comply with 2 CFR 1400, Subpart C.

40. Force Majeure. Neither party shall be liable for any failure to perform under this Agreement when such failure is due to causes beyond that party's reasonable control, including, but not limited to, acts of State or governmental authorities, acts of terrorism, natural catastrophe, fire, storm, flood, earthquakes, accident, and prolonged shortage of energy. In the event of such delay, any date stated herein shall be extended by a period of time necessary by both Contractor and Vendor. If the delay remains in effect for a period more than thirty (30) days, Contractor has the right to terminate this Agreement upon written notice to the Vendor.

41. Attachments. The Contractor may attach any plans, schematics, drawings, details, or other information to assist the Vendor with the aforementioned Services which will be included with the Work Order. Any attachment made shall be made part of this entire Agreement.

42. Entire Agreement. This Agreement represents the entire agreement between the Contractor and Vendor. This Agreement supersedes any prior written or oral representations. Vendor and its Vendors, suppliers and/or materialmen are bound to the Contractor by the Prime Contract and any contract documents incorporated therein to the same extent as Contractor is bound to the Client insofar as they related in any way, directly or indirectly, to the Services provided and covered in this Agreement.

Attachment B2

IN WITNESS WHEREOF, this Agreement was signed by the parties under the hands of their duly authorized officers and made effective as of the undersigned date.

Contractor's Signature _____ Date _____

Print Name _____

Company Name _____

Vendor's Signature _____ Date _____

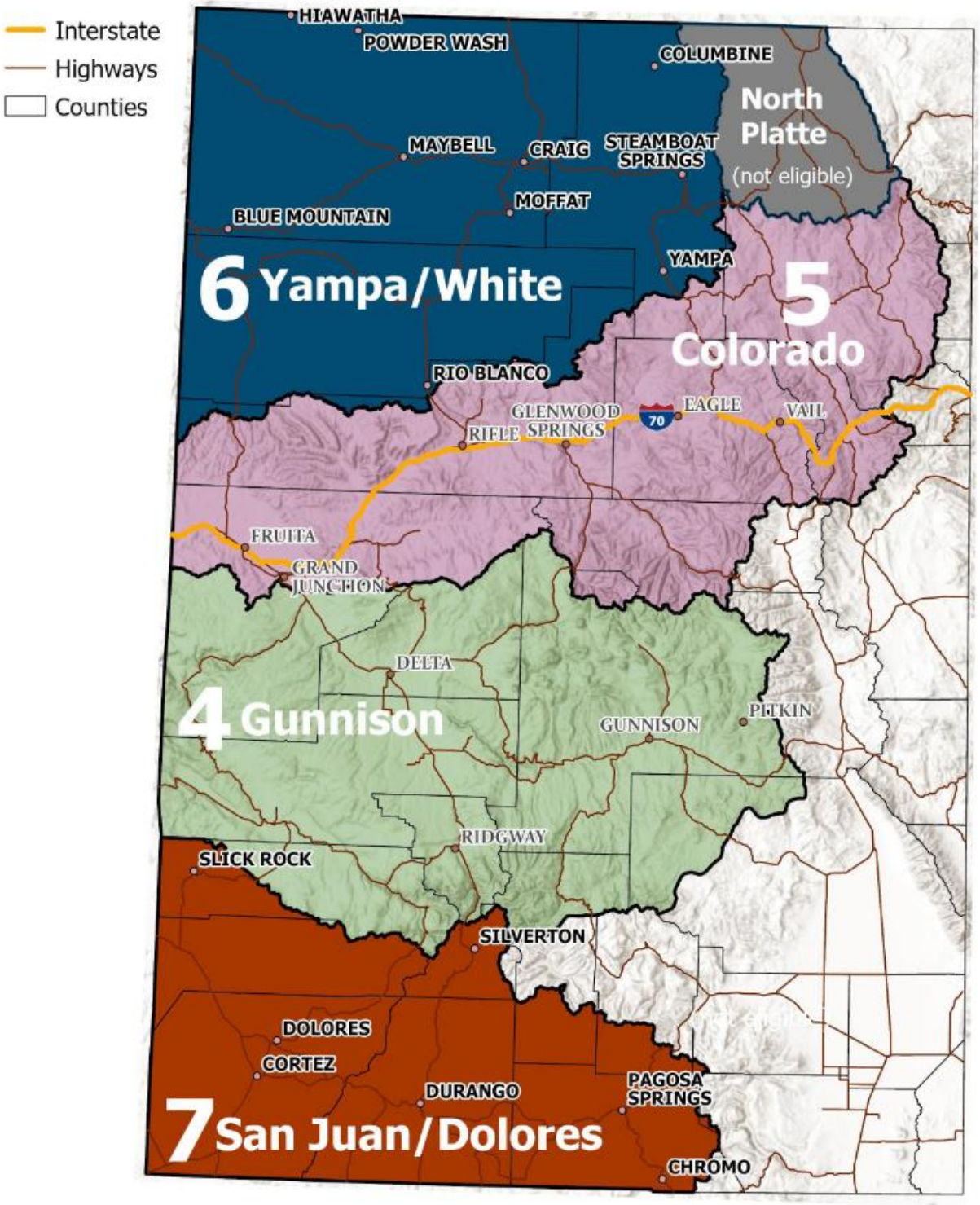
Print Name _____

Company Name _____

Attachment B2

Exhibit A

2026 Project Location Map (Division 6 and Division 7 Only)



Attachment C – Draft Scope of Work and Project Documents

Version 1.2 January 21, 2026

ATTACHMENT C

Scope of Work and Project Documents

Scope of Work

Generally, the scope of work includes installing a selected measurement device into an existing open channel or piped diversion from surface water diversions, or groundwater diversions (well pump or spring). Measurement devices may include flumes, weir plates, and in-line flow meters. Some projects may also include installation of recording and telemetry devices installed at new measurement devices. The project-specific plans and construction documents would include any access improvements needed for installation, hauling and storage of materials, setting of proposed device, flow meter, or structure to relative elevations shown on the plans, backfill and compaction, minor grading and excavation around structure and in the ditch, construction stormwater erosion control BMP's, and site clean-up and revegetation measures.

A Request for Bid Package (Bid Package) will be provided to interested subcontractors and vendors, prepared by SGM. In addition to project-specific plans, the Bid Package will include Standard Detail and Construction Specification sheets, applicable to a given project. Standard Details and Construction Specifications are included at the end of this document.

Project Types

The projects will generally fall into four (4) types:

Type 1	Prefabricated Flume Installation
Type 2	Custom Structure (Concrete or Steel)
Type 3	Flow Meter
Type 4	Instrumentation & Telemetry

There may be some projects with site-specific constraints or features that require work not outlined below. Additionally, type four (4) may be included in addition to any of the type 1-3 projects.

Type 1: Prefabricated Flume Installation

This project would typically include installing a prefabricated steel flume (various types: Parshall, Ramp, H-flume, etc.) using a leveling stand or similar anchoring system, with wing walls, entrance ramp, and other specified features into an existing ditch.

1. Civil/Site work
    - Clearing & Grubbing
    - Earthwork/site prep
    - Minor access road improvements
    - Setting flume to specific elevation, level
    - Backfill of structure
    - Basic erosion control BMPs & revegetation measures
    - Flume Foundation - Concrete Base for Leveling Stand
2. Site-specific add-ons, if needed, to be specified on each project:
    - Stilling well

- Basic concrete work (entrance ramp, grouting, etc.)
- Upstream or downstream grading of the ditch

3. Applicable Details
   - 1-Typical Flume Installation Detail
   - 2-Flume Leveling Stand
   - 6-Cathodic Protection
   - 7-Stilling Well

4. Applicable Specifications
   - DIVISION 01 - GENERAL REQUIREMENTS
     - 01 14 13 ACCESS TO SITE
     - 01 57 23 POLLUTION CONTROL
     - 01 71 13 MOBILIZATION AND DEMOBILIZATION
   - DIVISION 02 - EXISTING CONDITIONS
     - 02 42 13 STRUCTURE REMOVAL
   - DIVISION 05 – METALS
     - 05 50 00 METAL FABRICATION AND INSTALLATION
   - DIVISION 09 – FINISHES
     - 09 90 00 PAINTING METALWORK
     - 09 96 56 COAL TAR POLYAMIDE EPOXY PAINT
   - DIVISION 31 – EARTHWORK
     - 31 05 19 GEOTEXTILES
     - 31 11 00 CLEARING AND GRUBBING
     - 31 12 00 CHANNEL CLEARING AND SHAPING
     - 31 23 16 EXCAVATION
     - 31 37 00 ROCK RIPRAP
   - DIVISION 32 - EXTERIOR IMPROVEMENTS
     - 32 86 10 PARSHALL FLUME
     - 32 86 13 OTHER FLUMES

Type 2: Custom Structure Installation (Concrete or Steel)

This project would typically include a cast-in-place (or pre-cast) concrete or custom-prefabricated steel measurement structure, such as a flume or weir plate, to be installed into an existing ditch or in-line of an existing piped-section of ditch.

1. Civil/Site work
   - Clearing & Grubbing
   - Earthwork/site prep
   - Minor access road improvements
   - Setting to specific elevation
   - Backfill of structure
   - Basic erosion control BMPs & revegetation measures
2. Standard Concrete Weir Box
   - Standard detail, providing key geometry by project:

- Box Length, Width, Height
- Inlet/Outlet Pipe Sizes
- Weir Plate Specifications/Geometry/Type (Rectangular-Contracted, 90° V-Notch, etc.)

3. Standard Steel Weir Box
    - Standard detail, providing key geometry by project:
        - Box Length, Width, Height
        - Inlet/Outlet Pipe Sizes
        - Weir Plate Specifications/Geometry/Type (Rectangular-Contracted, 90° V-Notch, etc.)
4. Retrofit Measurement Structure to Existing Infrastructure
    - Pond Outlet Measurement
        - Weir plates
        - H-flumes
        - Montana Flumes
    - Retrofit Weirs to existing boxes/Structures
5. Applicable Details
    - 3-Standard Concrete Weir Box
    - 4-Standard Steel Weir Box
    - 6-Cathodic Protection
    - 7-Stilling Well
6. Applicable Specifications
    - DIVISION 01 - GENERAL REQUIREMENTS
        - 01 14 13 ACCESS TO SITE
        - 01 57 23 POLLUTION CONTROL
        - 01 71 13 MOBILIZATION AND DEMOBILIZATION
    - DIVISION 02 - EXISTING CONDITIONS
        - 02 42 13 STRUCTURE REMOVAL
    - DIVISION 03 – CONCRETE
        - 03 15 13 WATERSTOPS
        - 03 20 00 STEEL REINFORCEMENT
        - 03 30 54 CONCRETE STRUCTURES
    - DIVISION 05 – METALS
        - 05 50 00 METAL FABRICATION AND INSTALLATION
    - DIVISION 09 – FINISHES
        - 09 90 00 PAINTING METALWORK
        - 09 96 56 COAL TAR POLYAMIDE EPOXY PAINT
    - DIVISION 31 – EARTHWORK
        - 31 05 19 GEOTEXTILES
        - 31 11 00 CLEARING AND GRUBBING
        - 31 12 00 CHANNEL CLEARING AND SHAPING
        - 31 23 16 EXCAVATION
        - 31 37 00 ROCK RIPRAP

- DIVISION 32 - EXTERIOR IMPROVEMENTS
  - 32 86 10 PARSHALL FLUME
  - 32 86 13 OTHER FLUMES
  - 32 86 20 WEIR PLATES

Type 3: Flow Meter Installation

This project would typically include installing an approved Flow Meter device into an existing open channel or pipeline.

1. Civil/Site work
   - Excavation of small area for Vault or new piping
   - Careful exposure of existing piping
2. Install Flow Meter
   - Cut out existing pipe length for flow meter installation
   - Follow standard detail and specifications for required lengths
   - Connecting to existing pipe with appropriate fittings/sleeves
   - Installing Vault or Above grade Read-out and/or Valve Box
3. Site-specific add-ons, if needed, to be specified on each project:
   - Full-Pipe “Bend Configuration” to ensure full pipe at flow meter
   - Flow Setting Valves
   - Power Supply Configuration, (i.e. Battery or Solar Panel configuration)
4. Applicable Details
   - 5-Above-Ground Meter Installation
5. Applicable Specifications
   - DIVISION 01 - GENERAL REQUIREMENTS
     - 01 14 13 ACCESS TO SITE
     - 01 57 23 POLLUTION CONTROL
     - 01 71 13 MOBILIZATION AND DEMOBILIZATION
   - DIVISION 32 - EXTERIOR IMPROVEMENTS
     - 32 86 30 FLOW METERS

Type 4: Instrumentation & Telemetry Installation

These projects require specialized Instrumentation & Telemetry subcontractors. Typical work includes basic hand and power tool construction to place, assemble, install, and commission specified devices, sensors, and equipment per the plans and specifications.

1. Civil/Site work
   - Coordination with Contractor if installing equipment after their work

2. Installing Devices
    - Sensors
    - Communication Devices
    - Power Equipment & Connections
    - Follow standard detail and specifications for required lengths
    - 15-minute recording interval (min)
    - Instantaneous flow rate
    - Visually verifiable (stage, if applicable)
3. Configuring/Testing Functionality
    - Calibrating/Programming Devices to project specific requirements
    - Documenting Settings for future setup/use
    - Testing Equipment and providing Access to Data
4. Applicable Details
    - 7-Stilling Well
5. Applicable Specifications
    - DIVISION 01 - GENERAL REQUIREMENTS
        - 01 14 13 ACCESS TO SITE
        - 01 57 23 POLLUTION CONTROL
        - 01 71 13 MOBILIZATION AND DEMOBILIZATION
    - DIVISION 32 - EXTERIOR IMPROVEMENTS
        - 32 86 40 RECORDING AND TELEMETRY SYSTEMS

Design Packages (All project types)

Will be completed by SGM and provided to Subcontractors in Request for Bid Packages for all projects, and will typically include:

1. Overall Site Plan showing:
    a. Location and Project Type.
    b. Project specific dimensions, locations, relative elevations, site access, and other requirements.
    c. Relevant information that was obtained on the site visit, such as structure set elevations.
    d. Erosion Control measures.
2. Applicable Details - Standard Detail sheets provided to subcontractor by SGM, per project.
3. Applicable Specifications - provided to subcontractor by SGM, per project.
4. Project Quantities
    a. For key components only, such as structure amounts, size, linear feet of pipe, yards of concrete, etc.
    b. Most projects will not include earthwork quantities (if minor), seeding acreage, imported material, minor fittings, and other installation materials.

ATTACHMENT C

Scope of Work and Project Documents

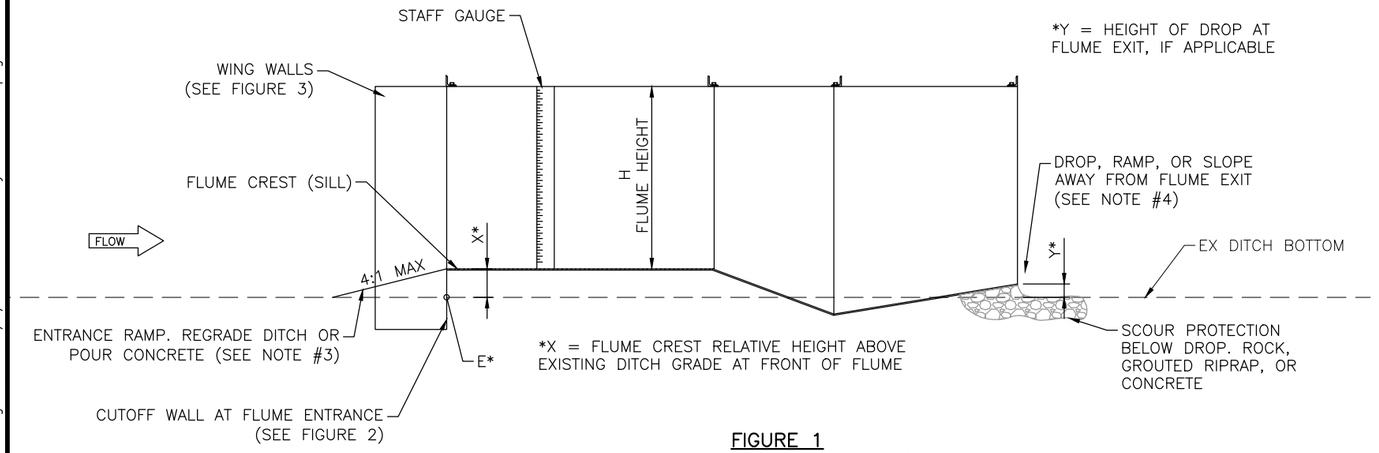
Subcontractor Responsibilities (All project types)

- SGM (Contractor) will provide the measurement device to be installed by the Sub-Contractor (AKA Installer).
- Requirement to provide 72-hr notice prior to installation to SGM (Contractor).
- Requirement to work in close coordination with SGM and DWR on structure and installation standards.
- Ensure all work is completed in accordance with the plans, details, and applicable standards and specifications provided for each project.
- Contractor is responsible for any damage to equipment provided by others during handling and installation.
- Revegetation, erosion control BMPs, and related measures shall be implemented for any construction-related activities that cause surface disturbance, compaction, and damage to- or removal of- existing vegetation that may result in erosion or wind scour, in accordance with applicable plans and specifications. Pre-approved seed mixes to be specified by Contractor and used by Subcontractor for all seeding.

ATTACHMENT C

Scope of Work and Project Documents

STANDARD DETAIL	SHEET NO.
Typical Flume Installation	1.
Flume Leveling Stand	2.
Standard Concrete Weir Box	3.
Standard Steel Weir Box	4.
Above-Ground Meter Installation	5.
Cathodic Protection	6.
Stilling Well	7.
Radar Sensor	8.



*E = EXISTING DITCH INVERT RELATIVE ELEVATION AT FLUME ENTRANCE (SEE NOTE #2)

FIGURE 1
FLUME PROFILE VIEW (SIDE)
N.T.S.

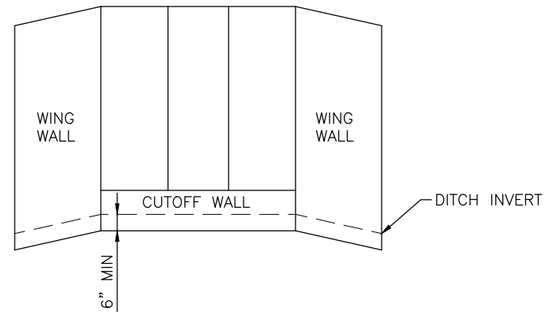


FIGURE 2
FLUME PROFILE VIEW (FRONT)
N.T.S.

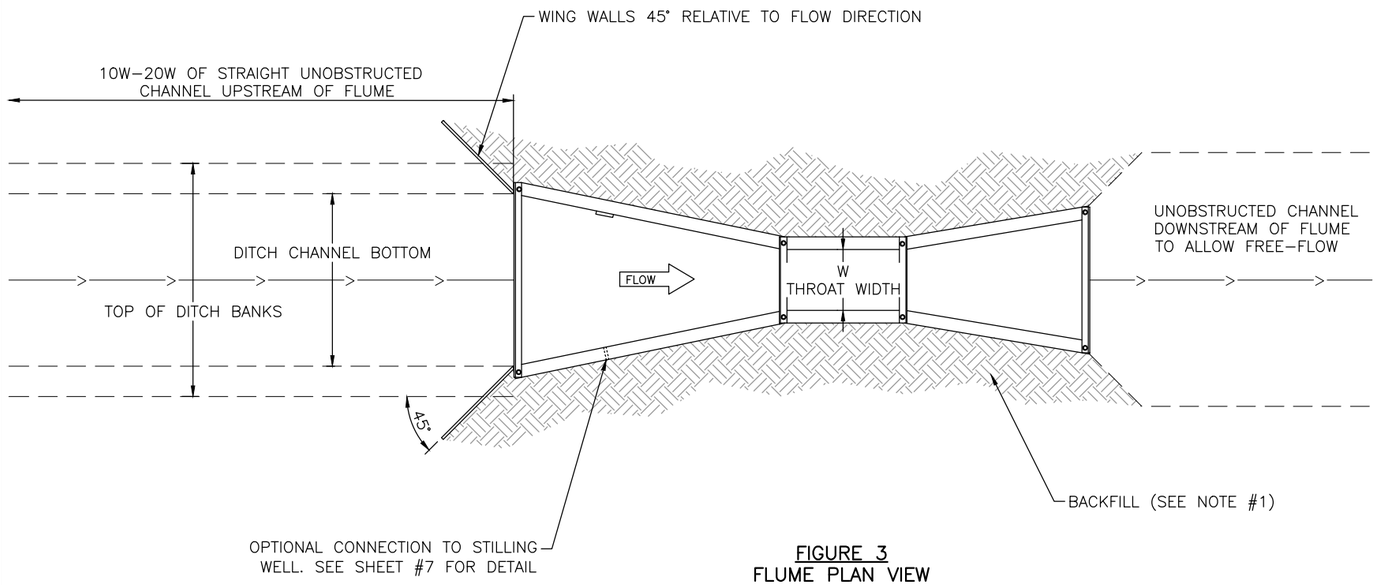


FIGURE 3
FLUME PLAN VIEW
N.T.S.

GENERAL NOTES

1. BACKFILL TO TOP OF FLUME AND COMPACT AFTER SET. USE INTERNAL BRACING
2. "E" DIMENSION REPRESENTS A RELATIVE SITE SPECIFIC ELEVATION BASED ON A PRELIMINARY SITE VISIT. CONTRACTOR TO VERIFY REFERENCE ELEVATIONS TO CONFIRM RELATIVE DIMENSIONS
3. ENTRANCE RAMP TO HAVE 4:1 OR FLATTER SLOPE, AND ONLY REQUIRED IF FLUME CREST IS SET ABOVE DITCH INVERT
4. EXIT OF FLUME MUST EITHER HAVE A DROP (Y), RAMP, OR SLOPE AWAY FROM THE FLUME TO PROMOTE FREE–FLOW CONDITIONS (PREVENT SUBMERGENCE) ACROSS ENTIRE ANTICIPATED FLOW RANGE
5. STEEL FLUMES TO BE ANCHORED IN LEVELING STAND FOR FINE–TUNE LEVELING DURING INSTALLATION AND LONG TERM STABILITY. PRECAST FLUMES MUST BE INSTALLED LEVEL (SEE FLUME LEVELING TOLERANCE IN PARSHALL FLUME SPECIFICATION SHEET) BUT DO NOT REQUIRE A LEVELING STAND. REFER TO SHEET #2 FOR LEVELING STAND DETAIL
6. CONTRACTOR (SGM) WILL PLACE REFERENCE BENCHMARK FOR SETTING FLUME CREST ELEVATION PRIOR TO INSTALLATION

TABLE 1
PROJECT SPECIFIC DIMENSIONS

DIMENSION	VALUE	UNIT
W	–	IN
H	–	IN
E	–	FT
X	–	IN
Y	–	IN

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CWCB
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#	Revision	Date	By:
1			

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Job No. 2025-367
Drawn by: GTC
Date: 1-8-2026
QC: SAK PE: SAK
File: DivMeasProj-StandardDetails

Title: Typical Flume Installation

Dwg No. 1

Of : 8

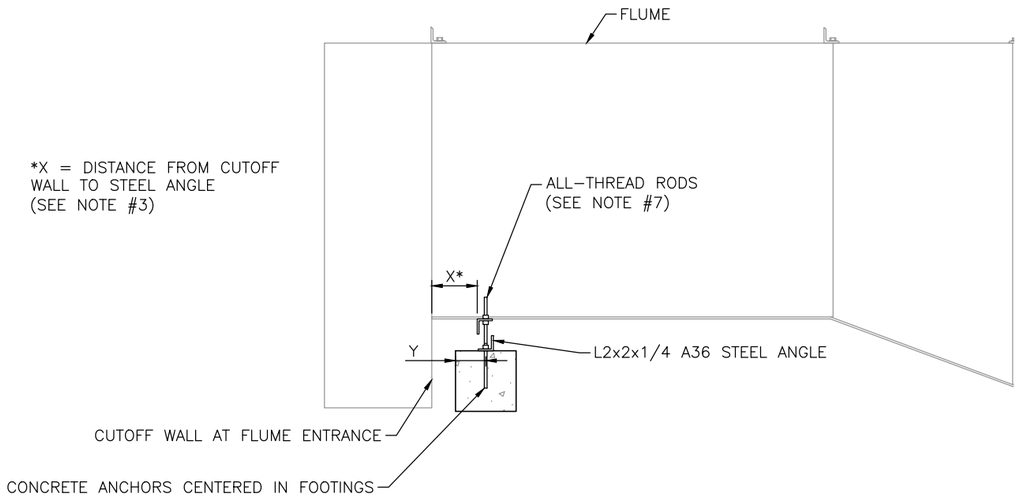
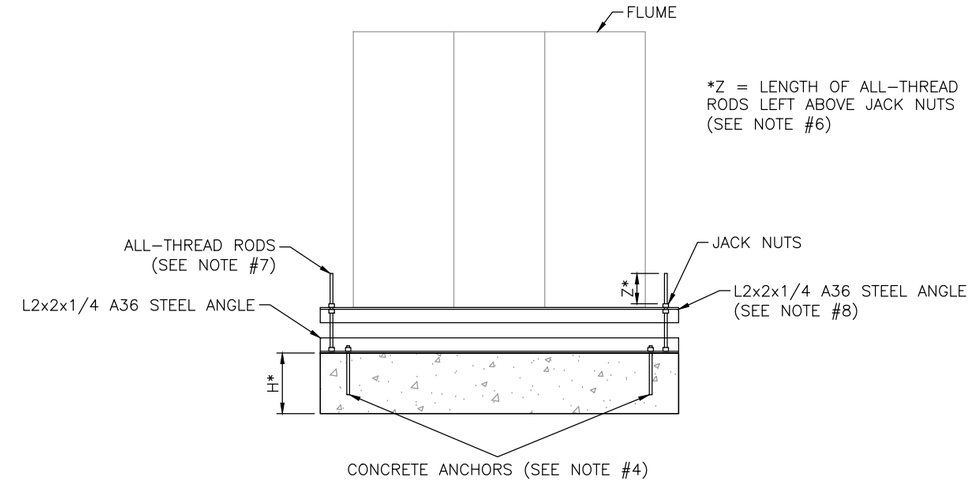
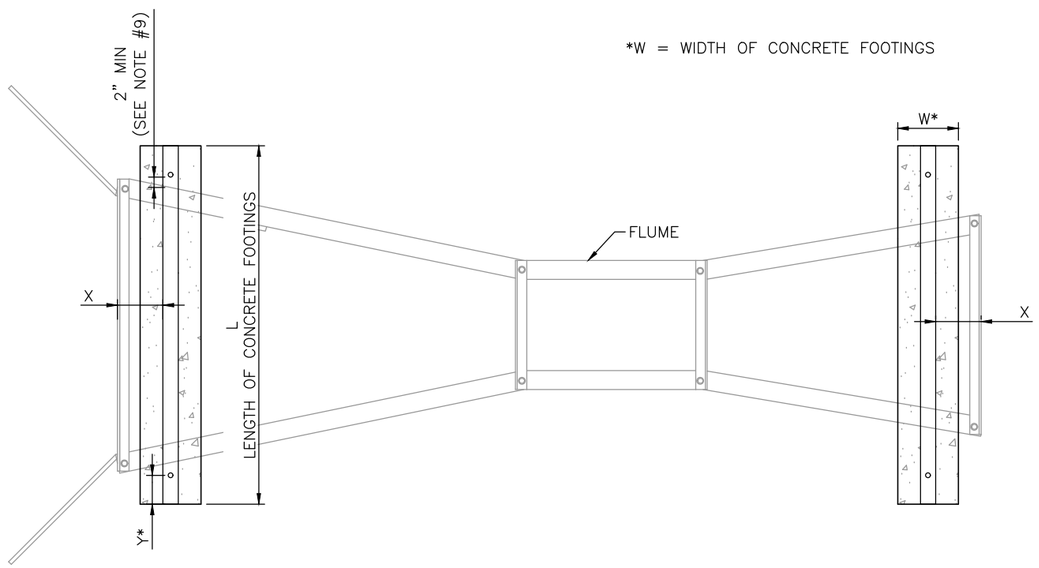


FIGURE 1
LEVELING STAND PROFILE VIEW (SIDE)
N.T.S.



*H = HEIGHT OF CONCRETE FOOTINGS (SEE NOTE #1)

FIGURE 2
LEVELING STAND PROFILE VIEW (FRONT)
N.T.S.



*Y = DISTANCE FROM EDGE OF CONCRETE FOOTINGS TO ANCHORS (SEE NOTE #5)

FIGURE 3
LEVELING STAND PLAN VIEW
N.T.S.

TABLE 1
PROJECT SPECIFIC DIMENSIONS

DIMENSION	VALUE (INCHES)
L	–
X	–
Y	–
H	–
W	–
Z	–

*LEVELING STAND ANCHORING SYSTEM ONLY APPLICABLE TO STEEL FLUMES

GENERAL NOTES

1. CONCRETE FOOTINGS TO HAVE HEIGHT OF AT LEAST 8" (H)
2. LENGTH OF CONCRETE FOOTINGS SHOULD BE AT LEAST THE WIDTH OF THE DITCH BOTTOM (L)
3. STEEL ANGLE TO BE WELDED OR BOLTED TO BOTTOM OF FLUME AT LEAST 8" FROM END OF FLUME AND CUTOFF WALL (X)
4. CONCRETE ANCHORS TO BE 3/8"X4" EXPANSION ANCHORS FOR FLUMES 36" OR SMALLER, OR 1/2"X5" FOR FLUMES LARGER THAN 36"
5. CONCRETE ANCHORS TO BE CENTERED RELATIVE TO FOOTING WIDTH (W) AND AT LEAST 3" FROM THE EDGE OF FOOTINGS (Y)
6. ALL-THREAD RODS SHOULD BE LEFT LONG ENOUGH TO ALLOW FOR AT LEAST 6" OF VERTICAL ADJUSTMENT IN THE FUTURE (Z)
7. ALL-THREAD RODS TO HAVE DIAMETER OF 3/8" FOR FLUMES 6" AND SMALLER, 1/2" FOR FLUMES 9" AND LARGER
8. TOP STEEL ANGLE OF LEVELING STAND TO BE ANCHORED TO FLUME (BOLTED, WELDED, CLAMPED, ETC.)
9. STEEL ANGLE ON BOTTOM OF FLUME TO HAVE 5/8" HOLES PRE-DRILLED AT LEAST 2" FROM OUTSIDE WALL OF FLUME

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Job No.	2025-367
Drawn by:	GTC
Date:	1-8-2026
QC: SAK	PE: SAK
File: DivMeasProj-StandardDetails	

Title:
Flume Leveling Stand

Dwg No.
2
Of : 8

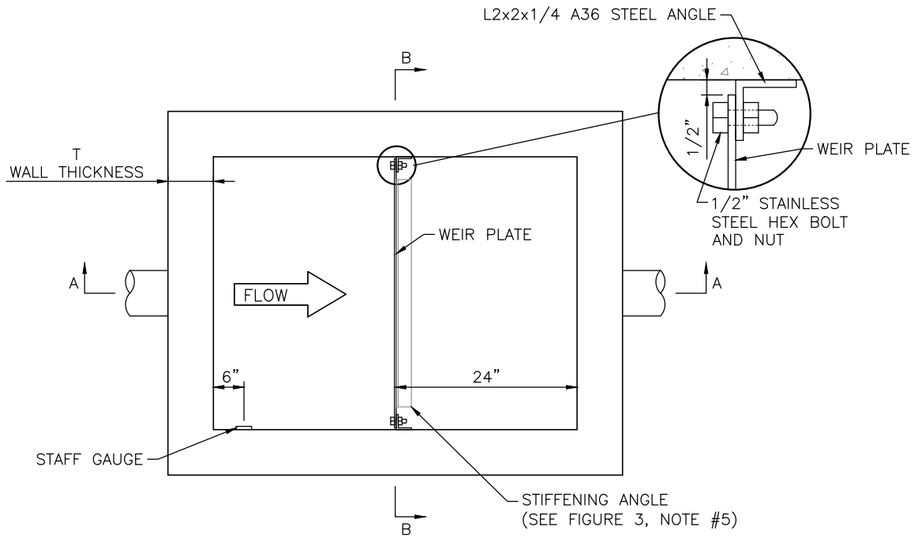

FIGURE 1
WEIR BOX PLAN VIEW
N.T.S.

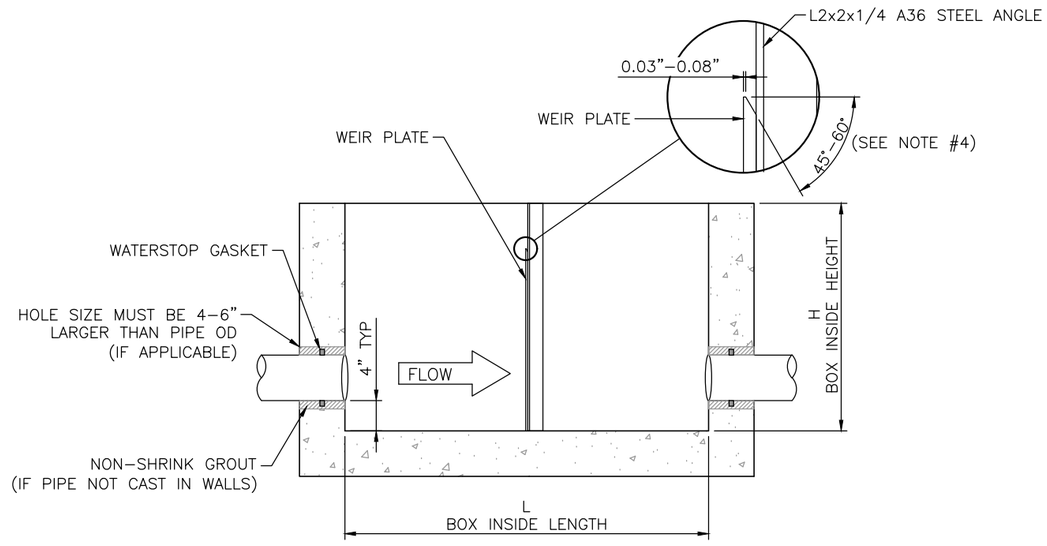

FIGURE 2
WEIR BOX PROFILE (SECTION A–A)
N.T.S.

GENERAL NOTES

1. WEIR PLATE TO BE 1/4" MIN STAINLESS STEEL
2. INLET AND OUTLET PIPE INVERTS TO BE POSITIONED 4" ABOVE BOX FLOOR
3. WEIR PLATE HEIGHT TO BE 6" LESS THAN INSIDE HEIGHT OF BOX (H)
4. DOWNSTREAM EDGE OF WEIR CREST TO BE CHAMFERED TO AN ANGLE BETWEEN 45° AND 60°, AND A THICKNESS BETWEEN 0.03" AND 0.08"
5. STIFFENING STEEL ANGLE (FIGURE 3) TO BE USED FOR WEIR PLATES 36" OR WIDER. LENGTH TO BE 6" LESS THAN INSIDE WIDTH OF BOX (W)

TABLE 1
PROJECT SPECIFIC DIMENSIONS

BOX DIMENSION	VALUE
L	– IN
W	– IN
H	– IN
T	– IN
WEIR DIMENSION	VALUE
D	– IN
Lw	– IN
θ	– DEG

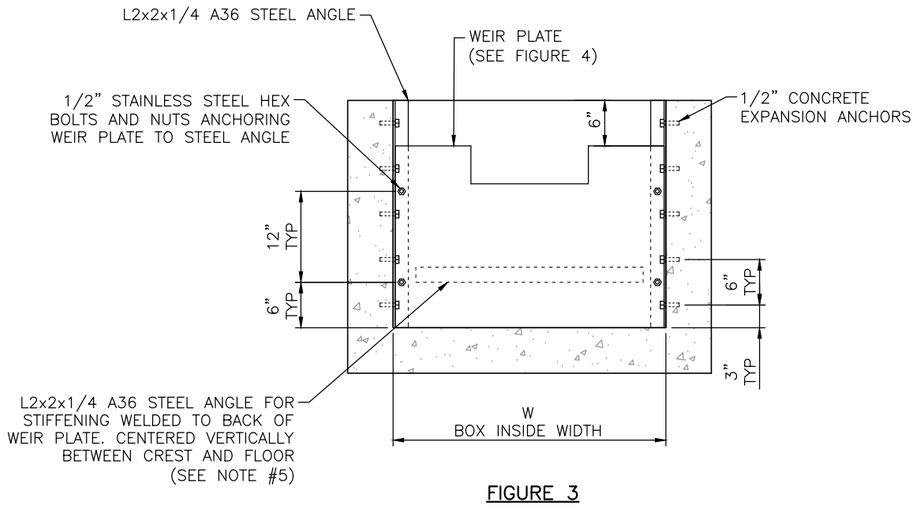

FIGURE 3
WEIR BOX PROFILE (SECTION B–B)
N.T.S.

*D = MAX HEAD ON WEIR

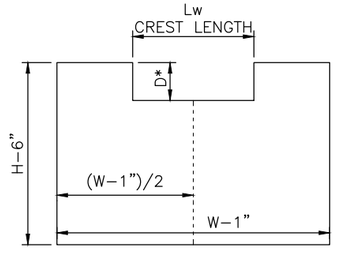

FIGURE 4
FULLY CONTRACTED
RECTANGULAR WEIR PLATE
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Job No. 2025-367
Drawn by: GTC
Date: 1-8-2026
QC: SAK PE: SAK
File: DivMeasProj-StandardDetails

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Title:
Standard Concrete Weir Box

Dwg No.
3

Of : 8

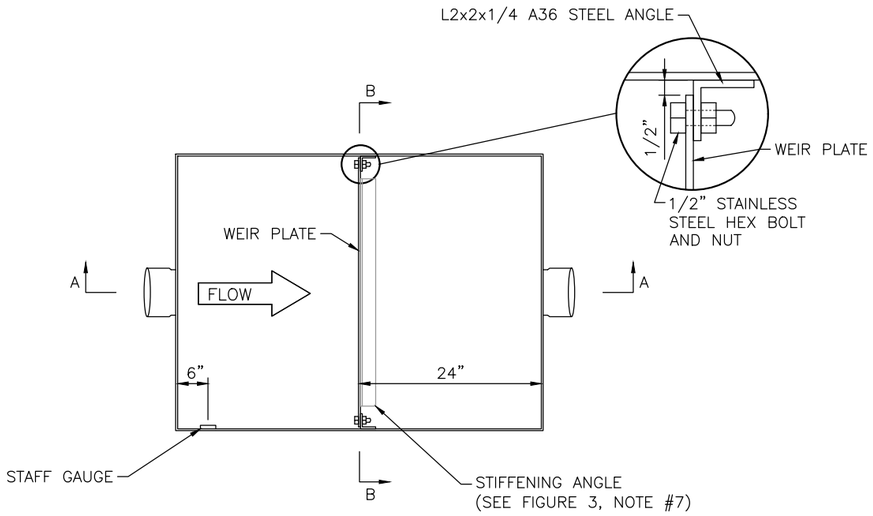

FIGURE 1
WEIR BOX PLAN VIEW
N.T.S.

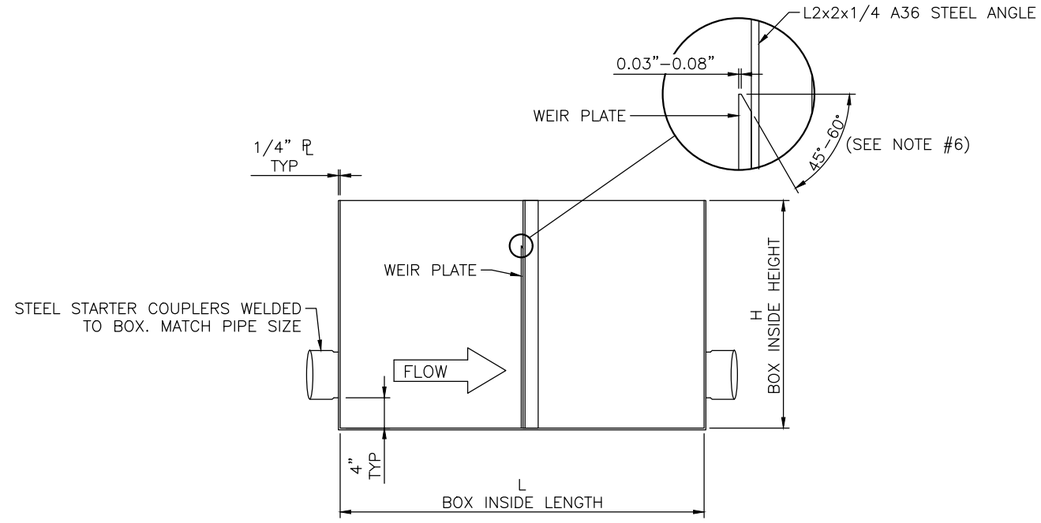

FIGURE 2
WEIR BOX PROFILE (SECTION A–A)
N.T.S.

GENERAL NOTES

1. WEIR PLATE TO BE 1/4" MIN STAINLESS STEEL
2. BOX WALLS AND FLOOR TO BE 1/4" A36 STEEL
3. STEEL ANGLE TO BE WELDED IN PLACE ON SIDE OF BOX
4. INLET AND OUTLET PIPE INVERTS TO BE POSITIONED 4" ABOVE BOX FLOOR
5. WEIR PLATE HEIGHT TO BE 6" LESS THAN INSIDE HEIGHT OF BOX (H)
6. DOWNSTREAM EDGE OF WEIR CREST TO BE CHAMFERED TO AN ANGLE BETWEEN 45° AND 60°, AND A THICKNESS BETWEEN 0.03" AND 0.08"
7. STIFFENING STEEL ANGLE (FIGURE 3) TO BE USED FOR WEIR PLATES 36" OR WIDER. LENGTH TO BE 6" LESS THAN INSIDE WIDTH OF BOX (W)
8. CATHODIC PROTECTION TO BE USED WITH A36 STEEL BOXES. SEE SHEET #6 FOR DETAIL

TABLE 1
PROJECT SPECIFIC DIMENSIONS

BOX DIMENSION	VALUE
L	– IN
W	– IN
H	– IN
WEIR DIMENSION	VALUE
D	– IN
Lw	– IN
θ	– DEG

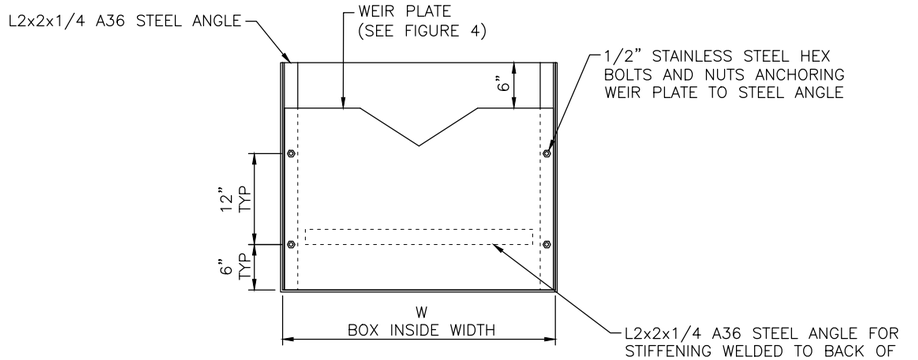

FIGURE 3
WEIR BOX PROFILE (SECTION B–B)
N.T.S.

*D = MAX HEAD ON WEIR

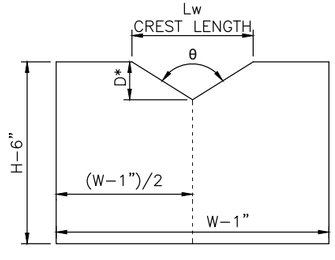

FIGURE 4
FULLY CONTRACTED
V–NOTCH WEIR PLATE
N.T.S.

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Job No. 2025-367
Drawn by: GTC
Date: 1-8-2026
QC: SAK PE: SAK
File: DivMeasProj-StandardDetails

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Title: Standard Steel Weir Box

Dwg No. 4

Of : 8

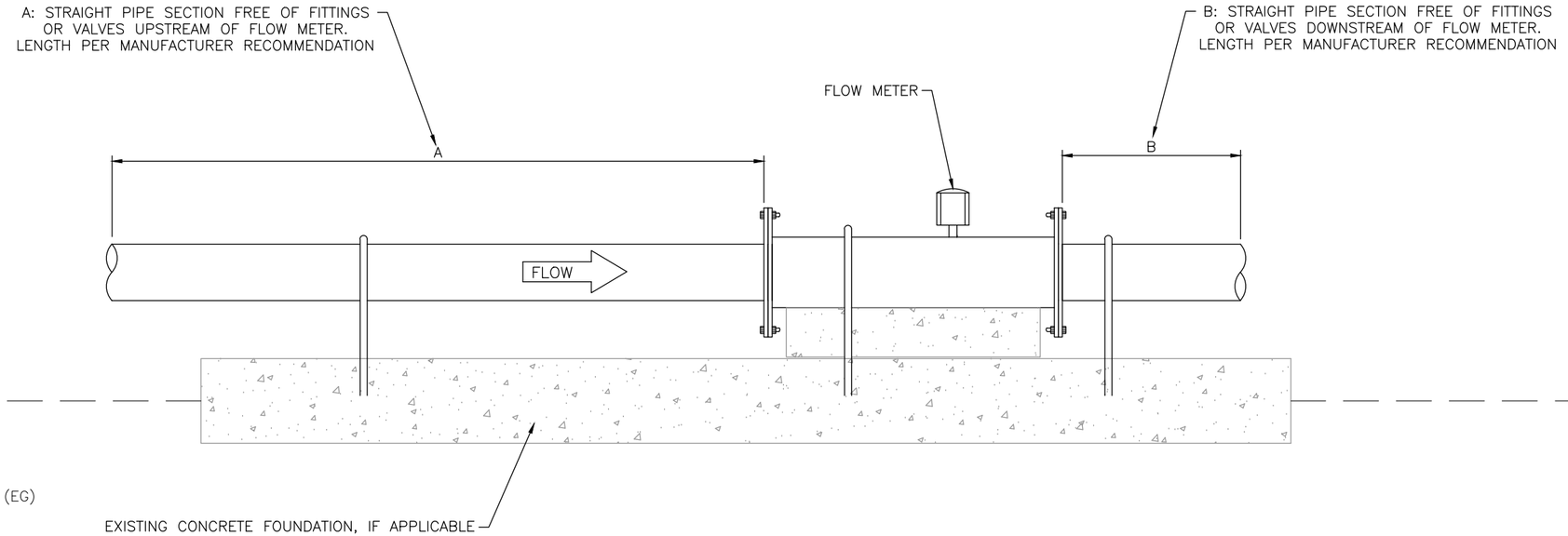

FIGURE 1
ABOVE GRADE FLOW METER
PROFILE VIEW
N.T.S.

TABLE 1
APPROVED FLOW METERS

MANUFACTURER	MODEL	A*	B*
MCCROMETER	DURA MAG	2	1

* NUMBER OF PIPE INSIDE DIAMETERS

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Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Job No.	2025-367
Drawn by:	GTC
Date:	1-8-2026
QC: SAK	PE: SAK
File: DivMeasProj-StandardDetails	

Title:
Above-Ground Meter Installation

Dwg No.
5

Of : 8

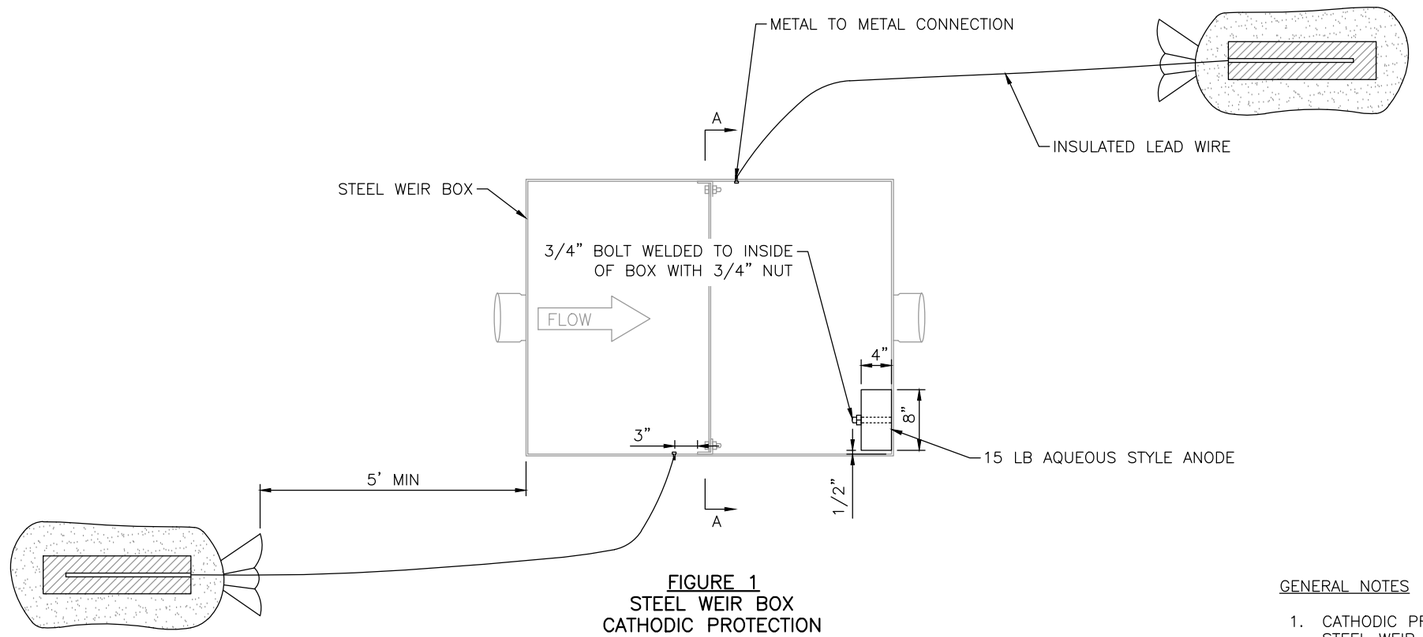

FIGURE 1
STEEL WEIR BOX
CATHODIC PROTECTION
PLAN VIEW
N.T.S.

GENERAL NOTES

1. CATHODIC PROTECTION ONLY REQUIRED FOR STEEL WEIR BOXES
2. ALL SURFACES OF STEEL BOX THAT WILL COME IN CONTACT WITH SOIL TO HAVE FUSION BONDED EPOXY COATING
3. 3/4" BOLT TO BE WELDED TO INSIDE OF BOX FOR ANCHORING AQUEOUS STYLE ANODE. BOLT TO BE AT LEAST 5" LONG TO ACCOMMODATE ANODE AND NUT

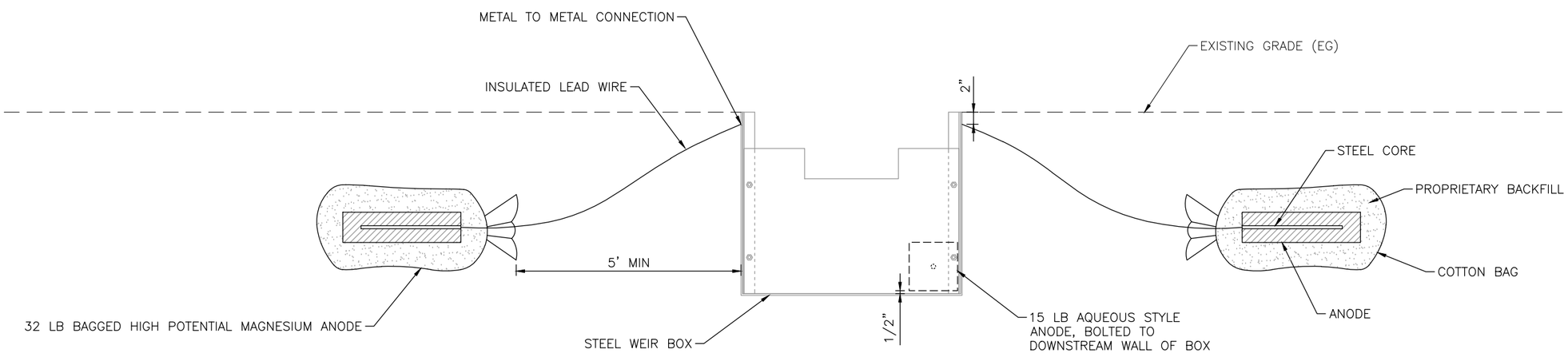

FIGURE 2
STEEL WEIR BOX
CATHODIC PROTECTION
PROFILE (SECTION A–A)
N.T.S.

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#	Revision	Date	By:
1			

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Job No.	2025-367
Drawn by:	GTC
Date:	1-8-2026
QC: SAK	PE: SAK
File: DivMeasProj-StandardDetails	

Title:
Cathodic Protection

Dwg No.
6
Of : 8

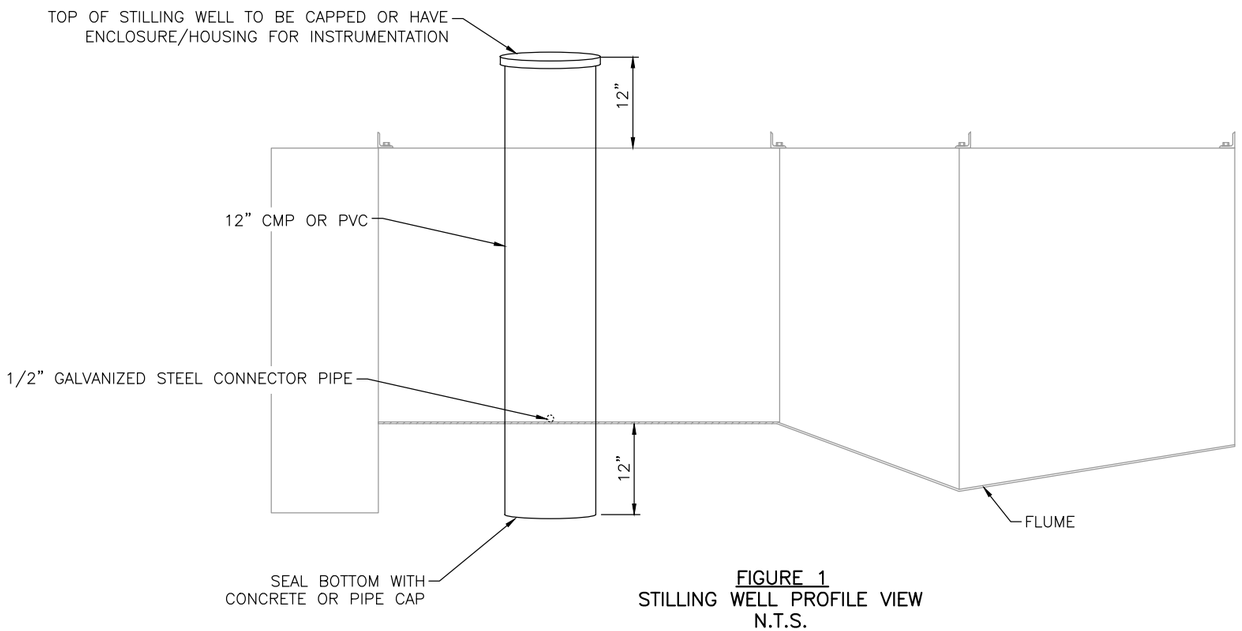

FIGURE 1
STILLING WELL PROFILE VIEW
N.T.S.

GENERAL NOTES

1. STILLING WELL TO BE 12" CMP OR PVC
2. STILLING WELL TO EXTEND 12" ABOVE TOP AND 12" BELOW FLOOR OF FLUME

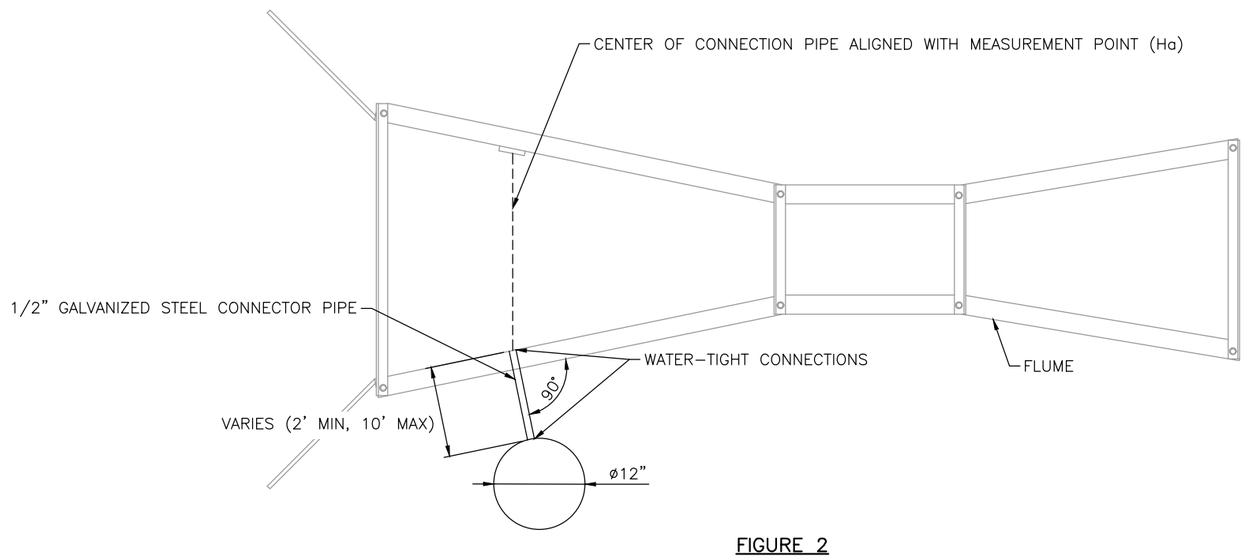

FIGURE 2
STILLING WELL PLAN VIEW
N.T.S.

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#	Revision	Date	By:
1			

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Job No.	2025-367
Drawn by:	GTC
Date:	1-8-2026
QC: SAK	PE: SAK
File: DivMeasProj-StandardDetails	

Title: Stilling Well

Dwg No. 7

Of : 8

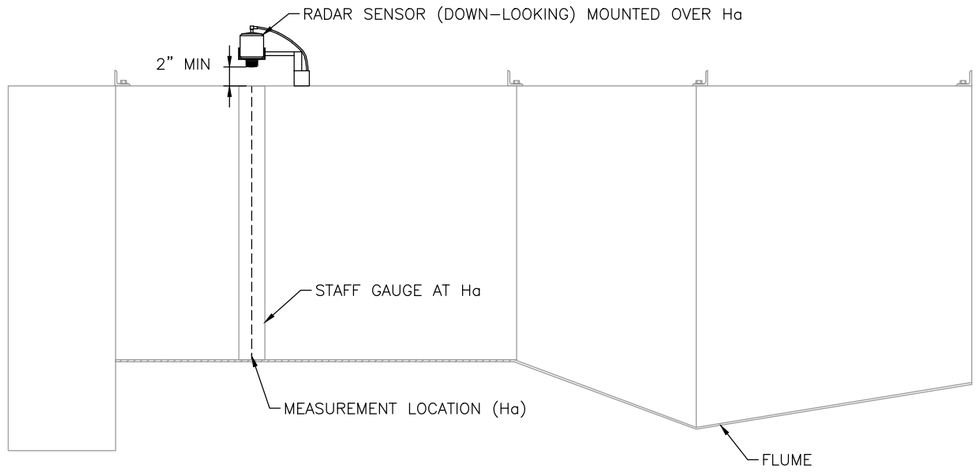

FIGURE 1
RADAR SENSOR PROFILE VIEW
N.T.S.

GENERAL NOTES

1. RADAR SENSOR TO BE MOUNTED WITH BOTTOM AT LEAST 2" ABOVE TOP OF FLUME
2. RADAR SENSOR TO BE CENTERED RELATIVE TO FLUME WIDTH AND CENTERED OVER MEASUREMENT LOCATION (Ha)

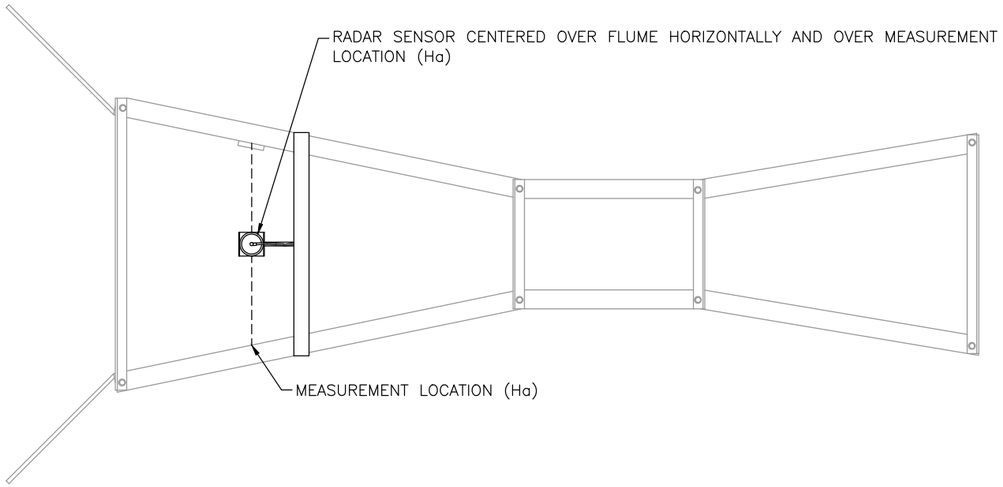

FIGURE 2
RADAR SENSOR PLAN VIEW
N.T.S.

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1			

Project Milestone: PRELIMINARY NOT FOR CONSTRUCTION

Job No.	2025-367
Drawn by:	GTC
Date:	1-8-2026
QC: SAK	PE: SAK
File: DivMeasProj-StandardDetails	

Title: Radar Sensor

Dwg No. 8

Of : 8

SPECIFICATIONS
TABLE OF CONTENTS

SECTION 01 14 13
ACCESS TO SITE

PART 1 GENERAL

1.01 SCOPE

A. The work shall consist of constructing a road to the lines and grades shown on the drawings.

1.02 PRICE AND PAYMENT PROCEDURES

A. The cost of providing access to the site will not be measured and paid for seperately but shall be included in the work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CLEARING

A. Trees, stumps, roots, brush, weeds, and other objectionable material shall be removed from the work area. The limits of clearing will be marked by means of stakes, flags, or tree markings in the field. All combustible material residues from clearing shall be burned, buried, or piled in designated disposal areas. Burning shall be performed according to local regulations.

3.02 CUTS AND FILLS

A. All excavation shall be made to the cut slopes and grades. Suitable materials from excavation are to be used in earthfills. The earthfill shall be placed in layers not to exceed 8 inches and compacted to same density as the undisturbed materials. Should the fill material be either too wet or too dry, the moisture shall be adjusted by allowing the material to dry or by adding water so that the fill material has the proper moisture content as determined by the Engineer.

B. Prior to placing any earthfill, all unsuitable material shall be removed and the surface compacted.

3.03 SURFACING

A. After completion of cuts and fills, the road surface shall be graded smooth, culverts and/or water crossings installed and then surfaced.

B. Surfacing, when specified, shall be accomplished by placing 3 inches of gravel over the road surface.

3.04 STRUCTURES FOR WATER CONTROL

A. Culverts of sizes and lengths specified shall be placed at the locations and grades as shown on the drawings. The installation shall conform to the requirements of Construction Specification, Structure for Water Control (CMP Conduit).

B. When rock riprap or grouted rock is specified, these measures will be installed to conform to the requirements of the Construction Specification for these practices.

3.05 VEGETATIVE COVER

A. Unless otherwise specified, a protective cover of vegetation shall be established on the disturbed area. The planting of vegetative materials shall conform to the requirements of Practice Specification 342, Critical Area Planting.

3.06 SPECIAL MEASURES

A. Measures and construction methods shall be incorporated as needed and practical that enhances fish and wildlife values. Special attention shall be given to protecting visual resources and maintaining key shade, food and den trees.

3.07 CONSTRUCTION OPERATIONS

A. Construction operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The owner, operator, Contractor or other persons will

conduct all work and operations in accordance with proper safety codes for the type of construction being performed with due regards to the safety of all persons and property.

B. The completed job shall be workmanlike and present a good appearance.

3.08 SPECIFIC SITE REQUIREMENTS

A. _____

END OF SECTION

SECTION 01 57 23
POLLUTION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. The work consists of implementing Best Management Practices (BMPs) to control erosion and minimize the production of sediment and other pollutants to water and air from construction activities.

1.02 PROCUREMENT REQUIREMENTS

A. The following BioPreferred® product categories are applicable to this specification:
   1. Mulch and compost materials
   2. Erosion control materials
   3. Fertilizers
   4. Dust suppressants
   5. Agricultural spray adjuvants

B. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

C. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver.
   2. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   3. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   4. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   5. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   6. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. For items of work for which lump-sum prices are established in the contract, payment will be prorated and provided in equal amounts on each monthly progress payment estimate. The

number of months used for prorating must be the number estimated to complete the work as outlined in the contractor's approved construction schedule. The final month's prorate amount will be provided with the final contract payment. Payment as described will constitute full compensation for completion of the work.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 PRODUCTS

2.01 MATERIAL

A. Silt fence shall conform to the requirement of Section 31 05 19 - Geotextiles.

B. Erosion and Sediment Control Measures and Works. The measures and works includes, but are not limited to, the following:

1. Staging of Earthwork Activities. Scheduling the excavation and moving of soil materials to minimize the size of areas disturbed and unprotected from erosion for the shortest reasonable time.
2. Seeding. Seeding to protect disturbed areas occur as soon as reasonably possible following completion of that earthwork activity.
3. Contractor (SGM) to provide pre-approved seed mixes to be used for seeding of disturbed areas requiring revegetation.
4. Mulching. Mulching to provide temporary protection of the soil surface from erosion.
5. Diversions. Diversions to divert water from work areas and to collect water from work areas for treatment and safe disposition. These are temporary and must be removed and the area restored to its near-original condition when the diversions are no longer required or when permanent measures are installed.
6. Stream Crossings. Culverts or bridges where equipment must cross streams. These are temporary and must be removed and the area restored to its near-original condition when the crossings are no longer required or when permanent measures are installed.
7. Sediment Basins. Sediment basins for collecting, settling, and eliminating sediment from eroding areas that impact properties and streams below the construction sites. These basins are temporary and must be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.
8. Sediment Filters. Straw bale filters or geotextile sediment fences for trapping sediment from areas with limited runoff. Sediment filters must be properly anchored to prevent erosion under or around them. Silt fences must be installed and maintained in accordance with the plans, contract documents or industry standards. These filters are temporary and must be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.
9. Waterways. Waterways for the safe disposal of runoff from fields, diversions, and other structures or measures. These works are temporary and must be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.
10. Other. Additional protection measures as specified in the plans or required by the federal, state, or local government.

PART 3 EXECUTION

3.01 CHEMICAL POLLUTION

A. The contractor must provide watertight tanks or barrels or construct a sump sealed with plastic sheets to collect and temporarily contain chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer wash water, or asphalt, produced as a by-product from the construction activities. Dispose of pollutants in accordance with appropriate state and federal regulations. At the completion of the construction work, remove tanks, barrels, and sumps and restore the area to its original condition. Sump removal must be conducted without causing pollution.

B. A spill kit must be on site and readily accessible to allow for a quick and effective response to accidental releases of fuels, oils, hydraulic fluids, and other hazardous substances. At a minimum, the spill kit should be appropriately sized for the types and quantities of materials used on-site and include absorbent pads, disposal bags, gloves, and basic instructions for use. The kit should be located near high-risk areas such as equipment fueling points or material storage areas, clearly labeled, and protected from weather damage. All site personnel should be made aware of the spill kit location and trained in its proper use, with any spills cleaned up immediately and waste disposed of in accordance with applicable state and federal regulations.

3.02 SANITARY FACILITIES

A. Sanitary Facilities, such as chemical toilets, and septic tanks must not be located next to live streams, wells, or springs. They must be located at a distance sufficient to prevent contamination of any water source. At the completion of construction activities, facilities must be disposed of without causing pollution.

B. Air Pollution
   1. The burning of brush or slash and the disposal of other materials must adhere to state and local regulations.
   2. Fire prevention measures must be taken to prevent the start or spreading of wildfires that may result from project activities. Firebreaks or guards must be constructed and maintained at locations shown on the drawings.

3.03 MAINTENANCE, REMOVAL, AND RESTORATION

A. All pollution-control measures and temporary works must be adequately maintained in a functional condition for the duration of the construction period. Remove all temporary measures and restore the site to near-original condition.

END OF SECTION

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SECTION 01 71 13
MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SCOPE

A. The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract. Mobilization will not be considered as work in fulfilling the contract requirements for commencement of work.

1.02 PRICE AND PAYMENT PROCEDURES

A. Payment will be made as the work proceeds after presentation of paid invoices or documentation of direct costs by the contractor showing specific mobilization and demobilization costs and supporting evidence of the charges of suppliers, subcontractors, and others. When the total of such payments is less than the lump-sum contract price, the balance remaining will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for completion of the work.

B. Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTIONS

3.01 EQUIPMENT AND MATERIAL

A. Mobilization includes all activities and associated costs for transportation of contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the contractor's operations at the site; premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable; and other items specified in the contract documents.

B. Demobilization includes all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site, including the disassembly, removal, and site cleanup of offices, buildings, and other facilities assembled on the site specifically for this contract.

C. This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.

END OF SECTION

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SECTION 02 42 13
STRUCTURE REMOVAL

PART 1 GENERAL

1.01 SCOPE

A. The work consists of the removal, salvage, and disposal of structures (including fences) from the designated areas.

B. Procurement of Recovered Materials (2 CFR 200.323). Subcontractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in the guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

1.02 PRICE AND PAYMENT PROCEDURES

A. Structure removal shall be included in the lump sum cost of mobilization. Such payment will constitute full compensation for all labor, equipment, tools, applicable permits and associated fees for burning and disposal of refuse, and other items necessary and incidental to the completion of the work.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed as a contract line-item number in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.03 MARKING

A. Method 1. Each structure or structure part to be removed will be marked with stakes, flags, paint, or other suitable methods.

B. Method 2. The area boundaries from which structures must be removed will be marked using stakes, flags, paint, or other suitable methods. Structures to remain undisturbed or to be salvaged will be designated by special markings.

1.04 REMOVAL

A. Method 1. Remove all structures designated for removal in the contract to the specified extent and depth.

B. Method 2. Within the areas so marked, remove all visible and buried structures identified to the specified extent and depth.

1.05 SALVAGE

A. Structures or structure parts that are designated to be salvaged must be carefully removed and neatly placed in the specified or approved storage location. Salvaged structures that are capable of being disassembled must be dismantled into individual members or sections. Such structures must be neatly and systematically matchmarked with paint before disassembly. Mark all connectors and other parts to indicate their proper location within the structure and fasten to the appropriate structural member or packed in suitable containers.

B. Material from fences designated to be salvaged must be placed outside the work area on the property that the fence was originally located. Fence wire must be rolled into uniform rolls of suitable size and neatly piled with other salvaged materials. Neatly stack posts and rails.

1.06 DISPOSAL OF REFUSE MATERIALS

A. Dispose of refuse materials resulting from structure removal in an acceptable manner and at locations approved by the Engineer. Disposal by burning must be in accordance with local rules and regulations.

END OF SECTION

SECTION 03 15 13
WATERSTOPS

PART 1 GENERAL

1.01 SCOPE

A. This specification covers nonmetallic and metallic waterstops for use in joints of concrete structures.

1.02 PRICE AND PAYMENT PROCEDURES

A. Waterstops will be not be measured and paid for separately but shall be included in work.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM B152 - Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar; 2024.

C. ASTM D395 - Standard Test Methods for Rubber Property—Compression Set; 2018 (Reapproved 2025).

D. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

E. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

F. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.

G. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2024.

H. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2020.

I. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

J. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

1.04 SUBMITTALS

A. Product Data: Certificates of Compliances and Testing Results.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Waterstops shall be packaged and stored by methods that provide protection from prolonged exposure to direct sunlight and/or excessive heat.

PART 2 PRODUCTS

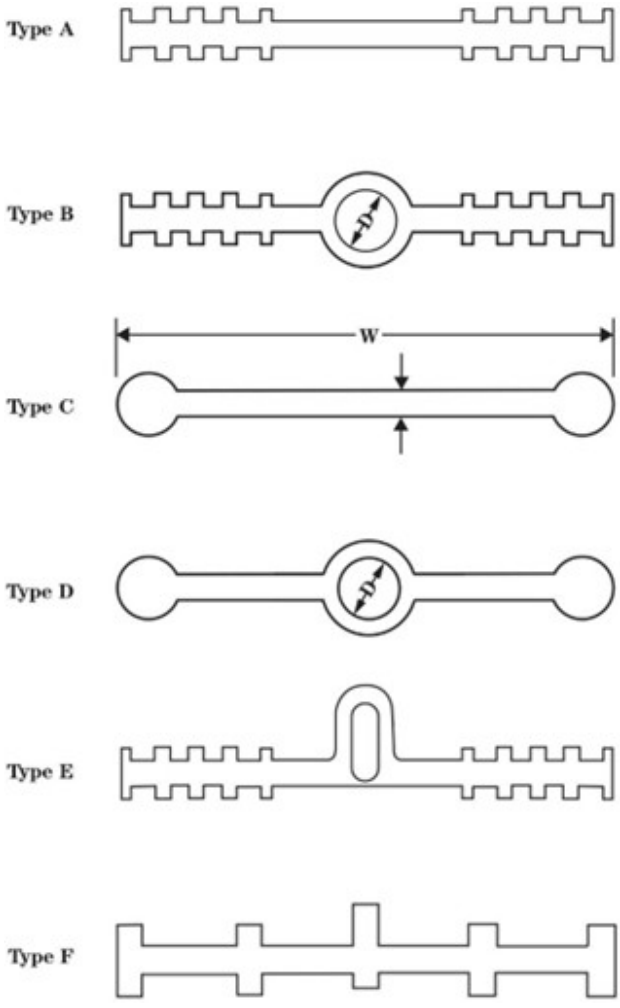
2.01 NON-METALLIC WATERSTOPS

A. Classification
   1. Classes—Nonmetallic waterstops shall be of the following classes, as specified:
      a. Class I shall be fabricated of either natural or synthetic rubber.
      b. Class II shall be fabricated of vinyl chloride polymer or copolymer.
   2. Types—Nonmetallic waterstops may be either split or solid and shall conform to the following types, as specified (see Fig. 537–1):
      a. Type A shall have ribbed anchor flanges and a smooth web. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.
      b. Type B shall have ribbed anchor flanges and a smooth web containing a hollow tubular center bulb having a wall thickness equal to at least one-half the web thickness, and the inside diameter (D) specified in the specifications or shown on the

drawings. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges.

c. Type C shall have a single, circular bulb-type anchor flange at each edge and a smooth web.
d. Type D shall have a single, circular bulb-type anchor flange at each edge and a smooth web containing a hollow tubular center bulb having a wall thickness equal to a least one- half the thickness of the web, and the inside diameter (D) specified in the contract.
e. Type E shall have ribbed anchor flanges and a web molded or extruded in the form of a round or U-shaped bulb of the dimensions specified in the contract or shown on the drawings. The web bulb shall be connected at the open-end of the U by a thin membrane having a minimum thickness of 1/64 inch and a maximum thickness of 1/5 of the web thickness and design to prevent infiltration of wet concrete into the bulb and to tear when expansion of the joint occurs. Flanges may be of uniform thickness or may have either a converging or a diverging taper toward the edges. Auxiliary positioning or nailing flanges may be provided as long as the functioning of the web bulb is not altered.
f. Type F shall have ribbed anchor flanges with at least two extra heavy ribs designed to resist displacement of the waterstop during concrete placement on each flange, and a smooth web having a positioning or nailing flange attached at the center.
g. Type G shall be of special design conforming to the details shown on the drawings.

Figure 1 - Types of Non-metallic Waterstops



3. Sizes—Waterstops of types A through F shall be of the sizes specified in the specifications or shown on the drawings and listed in Table 1 . Type G waterstops shall have the dimensions shown on the drawings.

Table 1 - Sizes of Waterstops

Size designation	Web thickness (T) (inches)	Width (W) (inches)		Size designation	Web thickness (T) (inches)	Width (W) (inches)
1	1/16	5 1/4		13	3/16	5
2	3/32	3 3/4		14	3/16	6
3	3/32	4		15	3/16	9
4	3/32	5 1/4		16	1/4	6
5	3/32	6		17	1/4	9
6	1/8	4		18	3/8	5
7	1/8	5 1/4		19	3/8	6
8	1/8	6		20	3/8	9
9	5/32	4		21	1/2	6
10	5/32	4 1/2		22	1/2	9
11	5/32	9		23	1/2	12
12	3/16	4				

B. Physical Requirements
   1. The extruded or molded material shall exhibit the properties specified herein when tested by the methods specified herein.
   2. Class I Waterstops
      a. Hardness as determined by the Shore A durometer method shall be a minimum of 60.
      b. Specific gravity shall be a maximum of 1.2.
      c. Tensile strength shall be a minimum of 2,500 pounds per square inch.
      d. Ultimate elongation shall be a minimum of 450 percent.
      e. Compression set shall be a maximum of 30 percent.
      f. Water absorption in weight measurements shall not exceed 5 percent.
      g. Decrease in tensile strength and ultimate elongation after aging shall not exceed 20 percent.
      h. There shall be no sign of failure due to brittleness at a temperature of minus 35 degrees Fahrenheit.
   3. Class II Waterstops
      a. Hardness as determined by the Shore A durometer method shall be a minimum of 60. Specific gravity shall be a maximum of 1.4.
      b. Tensile strength shall be a minimum of 1,400 pounds per square inch.
      c. Ultimate elongation of the web shall be a minimum of 280 percent, and the flanges shall be a minimum of 200 percent.
      d. There shall be no sign of failure due to flange brittleness at a temperature of 0 degrees Fahr- enheit nor of web brittleness at a temperature of minus 35 degrees Fahrenheit.
      e. Decrease in either tensile strength or ultimate elongation after accelerated extraction shall not exceed 15 percent.
      f. Results of alkali exposure:
         1) After immersion for 7 days, the sample shall exhibit no loss of weight and a maximum weight gain of 0.25 percent, and the hardness measured by the Shore A durometer method shall not vary more than 5 points either plus or minus from the untreated sample.

2) After immersion for 30 days, the sample shall exhibit no loss of weight and a maximum weight gain of 0.40 percent, and the dimensions of the treated sample shall not vary by more than 1 percent from the untreated sample.

C. Test Methods
   1. Testing shall be conducted by the methods cited herein. All cited test methods are included in ASTM as follows:
      a. Hardness shall be determined by ASTM D2240.
      b. Specific gravity shall be determined by ASTM D792.
      c. Tensile strength shall be determined by ASTM D412 for Class I waterstops and ASTM D638 for Class II waterstops.
      d. Ultimate elongation shall be determined by ASTM D412 for Class I waterstops and ASTM D638 for Class II waterstops.
      e. Compression set shall be determined by ASTM D395.
      f. Water absorption shall be determined by ASTM D570.
      g. Tensile strength and ultimate elongation after aging shall be determined by ASTM D412 for Class I waterstops and ASTM D638 Class II waterstops.
      h. Brittleness shall be determined by ASTM D746 for Class II waterstops.
   2. Accelerated extraction shall be accomplished by procedures outlined by United States Army Corps of Engineers (COE), Concrete Research Division (CRD) C572 (COE CRD-C 572) under the following conditions:
      a. Samples shall not be less than 1/16 inch nor more than 1/8 inch in thickness.
      b. The immersion medium shall be a solution prepared by dissolving 5 grams of chemically pure sodium hydroxide and 5 grams of chemically pure potassium hydroxide in 1 liter of water.
      c. The samples shall be immersed in the medium for 14 days at a temperature of 145 degrees Fahrenheit, plus or minus 5 degrees Fahrenheit.
      d. During the period of immersion, air shall be gently bubbled through the medium from a 0.25-inch diameter glass tube at an approximate rate of one bubble per second.
      e. Fresh medium shall be provided each day.
      f. Samples need not be dipped in acetone.
   3. The effects of alkalis shall be determined by COE CRD-C 572 under the following conditions:
      a. Sample shall have a maximum thickness of 0.25 inch.
      b. The immersion medium shall be as described for accelerated extraction above.
      c. Fresh medium shall be provided every 7 days.
      d. The samples shall be immersed in the medium for 30 days.
      e. Samples need not be dipped in acetone.

D. Waterstops shall be extruded or molded in such a manner that the material is dense and homogeneous throughout and free from voids, tears, thins, indentations, or other imperfections. Unless otherwise specified, waterstops shall be symmetrical in shape and uniform in dimensions and shall be furnished in continuous strips a minimum length of 50 feet. Factory splices shall have a minimum tensile strength of 50 percent of the unspliced section.

2.02 METALLIC WATERSTOPS

A. Metal waterstops shall be made of copper or galvanized steel as specified. Waterstops that require forming of the metal involving sharp bends shall be made of copper, which hall be soft and pliable so bending to an inside radius equal to its thickness without cracking will occur at temperatures less than 180 degrees Fahrenheit.

B. Metal for waterstops shall conform to the requirements of the applicable ASTM Standard:
   1. Copper: ASTM B152.
   2. Zinc-coated (galvanized) steel: ASTM A653/A653M.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 03 20 00
STEEL REINFORCEMENT

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Steel reinforcement shall be furnished and completed per the plans and project documents. Reinforcing Steel and associated materials will not be paid for separately but shall be included in the cost of the concrete structure.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.04 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).

B. ACI SP-66 - ACI Detailing Manual; 2004.

C. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2019.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

E. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a.

F. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.

G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.

H. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2016.

I. ASTM A1060/A1060M - Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2016.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

1.05 SUBMITTALS

A. Bar schedule, lists and diagrams
   1. Any supplemental bar schedules, bar lists, or bar-bending diagrams required for the fabrication and placement of steel reinforcement must be provided by the Contractor.
   2. Before reinforcement is placed, the Contractor must furnish four copies of any such lists or diagrams to the Engineer for review. Bar schedules, lists and diagrams are submitted to the Engineer for information only and are not formally reviewed and returned to the Contractor.
   3. Acceptance of the reinforcement is not based on approval of these lists or diagrams but on inspection of the steel reinforcement after it has been placed, tied, and supported and is ready to receive concrete.

PART 2 MATERIALS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) or 60 (60,000 psi)
   1. Deformed or Plain billet-steel bars.
   2. Unfinished, Epoxy-coated in accordance with ASTM A775/A775M, or Galvanized in accordance with ASTM A767/A767M as indicated in the plans.

B. Reinforcing Steel: ASTM A996/A996M, Grade 40 (40,000 psi), 50 (50,000 psi), or 60 (60,000 psi)
   1. Deformed rail-steel or axle-steel bars.
   2. Unfinished, Epoxy-coated in accordance with ASTM A775/A775M, or Galvanized in accordance with ASTM A767/A767M as indicated in the plans.

C. Dowel Bar: Plain round bars conforming to same specifications as Reinforcing Steel.

D. Fabricated Steel Mat: ASTM A184/A184M, using Grade ASTM A615/A615M , Grade 40 (40,000 psi), ASTM A615/A615M , Grade 60 (60,000 psi), or ASTM A706/A706M , Grade 60 (60,000 psi) deformed steel bars.
   1. Unfinished, Epoxy-coated in accordance with ASTM A775/A775M, or Galvanized in accordance with ASTM A767/A767M as indicated in the plans.

E. Welded Wire Reinforcement: ASTM A1064/A1064M
   1. Deformed or Plain type
   2. Unfinished, Epoxy-coated in accordance with ASTM A775/A775M, or Galvanized in accordance with ASTM A1060/A1060M as indicated in the plans.

3. Gauges, diameters, spacing, and arrangement of wires for welded steel wire fabric shall be as defined for the specified style designations.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Bars must not be bent or straightened in a manner that will injure or weaken the material. Bars with kinks, cracks, or improper bends must be rejected.

PART 3 EXECUTION

3.01 PLACING

A. Before reinforcement is placed, the surface of the bars and fabric and any metal supports must be cleaned to remove any loose, flaky rust, mill scale, oil, grease, or other undesirable coatings or foreign substances. Epoxy-coated steel reinforcement must be free of surface damage. After placement, the reinforcement must be maintained in a clean and serviceable condition until it is completely embedded within the concrete.

B. Reinforcement must be accurately placed and secured in position to prevent its displacement during the placement of concrete. Tack welding of bars is not permitted. Metal chairs, metal hangers, metal spacers, and concrete chairs may be used to support the reinforcement. Metal hangers, spacers, and ties must be placed in such a manner that they are not exposed in the finished concrete surface. The legs of metal chairs or side form spacers that may be exposed on any face of slabs, walls, beams, or other concrete surfaces must have a protective coating or finish. The coating or finish must be hot dip galvanized, epoxy coated, plastic coated, or stainless steel. Metal chairs and spacers not fully covered by a protective coating or finish must have a minimum cover of 0.75 inch of concrete over the unprotected metal part. The exception is that those with plastic coatings may have a minimum cover of 0.5 inch of concrete over the unprotected metal part. Precast concrete chairs must be manufactured of the same class of concrete as specified for the structure and must have the tie wires securely anchored in the chair or a V-shaped groove at least 0.75 inch in depth molded into the upper surface to receive the steel bar at the point of support. Precast concrete chairs must be clean and moist at the time concrete is placed.

C. High-density or structural plastic rebar accessories designed to ensure maximum concrete bond may be substituted for metal or concrete accessories in spacer applications as approved by the Engineer. Exposure of plastic rebar accessories at the finished concrete surface must be kept to a minimum. Plastic rebar accessories, when used, must be staggered along adjacent parallel bars and placed at intervals no closer than 12 inches. Plastic rebar accessories must not be used in concrete sections 6 inches or less in thickness.

D. Reinforcement must not be placed until the prepared site has been inspected and approved. After placement of the reinforcement, concrete must not be placed until the reinforcement has been inspected and approved by the responsible engineer.

3.02 SPLICING

A. Bar Reinforcement
   1. Splices of reinforcement may only be made at locations shown on the drawings and provided by the steel schedule. Placement of bars at the lap splice locations shown, when not in contact, must not be farther apart than one-fifth the shown lap length and, in all cases, no greater than 6 inches.

B. Welded Wire Reinforcement
   1. Unless otherwise specified, welded wire reinforcement must be spliced in the following manner:
      a. End-to-end. Adjacent sections must be spliced end-to-end (longitudinal lap) by overlapping a minimum of one full mesh plus 2 inches plus the length of the two end overhangs. The splice length is measured from the end of the longitudinal wires in one piece of fabric to the end of the longitudinal wire in the lapped piece of fabric.

b. Side-to-side. Adjacent sections must be spliced side-to-side (transverse lap) a minimum of one full mesh plus 2 inches. The splice length must be measured from the centerline of the first longitudinal wire in one piece of fabric to the centerline of the first longitudinal wire in the lapped piece of fabric.

3.03 FIELD BENDING

A. Reinforcing bars must not be field bent or straightened in a manner that will injure or weaken the material. Bars with kinks, cracks, or improper bends must be rejected.

B. No reinforcing bars partially embedded in hardened concrete shall be field bent, except for:
   1. Realignment of #3 through #6 bars up to about a 45° bend.
   2. Realignment of #8 through #18 bars up to about a 30° bend.
   3. Those reinforcing bars as shown on the project drawings or permitted by the Engineer.

3.04 STORAGE

A. Steel reinforcement stored at the work site must be placed on platforms, skids, or other supports. This is done to avoid contact with the ground and to protect the material from mechanical damage and corrosion.

REFERENCE INFORMATION

FIGURE 1 STANDARD REINFORCING BARS

Bar Size (English)[1]	Bar Size (Metric)[2]	Weight (lb/ft)
3	10	0.376
4	13	0.668
5	16	1.043
6	19	1.502
7	22	2.044
8	25	2.670
9	29	3.400
10	32	4.303
11	36	5.313
14	43	7.650
18	57	13.600

1/ The bar diameter (inches) equals the bar size number divided by eight. For example, the diameter of a #4 bar is 4 ÷ 8 = 0.5 inch.

2/ The metric bar size has been rounded to a whole number that represents the approximate diameter of the bar in millimeters.

FIGURE 2 RECTANGULAR WELDED WIRE REINFORCEMENT

Style designation - W-number[1,2]	Style designation - steel wire gauge (former designation)[1,2]	Weight (lb/100 ft^2)
6 x 6 – W1.4 x W1.4	6 x 6 – 10 x 10	21
6 x 6 – W2.1 x W2.1	6 x 6 – 8 x 8	30
6 x 6 – W2.9 x W2.9	6 x 6 – 6 x 6	42
6 x 6 – W4.0 x W4.0	6 x 6 – 4 x 4	58
4 x 4 – W1.4 x W1.4	4 x 4 – 10 x 10	31
4 x 4 – W2.1 x W2.1	4 x 4 – 8 x 8	44
4 x 4 – W2.9 x W2.9	4 x 4 – 6 x 6	62
4 x 4 – W4.0 x W4.0	4 x 4 – 4 x 4	85

4 x 12 – W2.1 x W0.9 2/	4 x 12 – 8 x 12	25
4 x 12 – W2.5 x W1.1 2/	4 x 12 – 7 x 11	31

1/ Style designation is defined in ACI Standard 315 of the American Concrete Institute.

2/ Welded smooth wire reinforcement with wires smaller than size W1.4 is manufactured from galvanized wire.

END OF SECTION

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SECTION 03 30 54
CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing, forming, placing, finishing, and curing Portland Cement concrete as required to build the structures shown in the plans.

B. Certain concrete structures may be exempt from Section 03 30 54 requirements, and will be noted on project details (eg. flume concrete footings).

1.02 PROCUREMENT REQUIREMENTS

A. The following BioPreferred® product category is applicable to this specification:
   1. Concrete release fluids (aka form-release agents)

B. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

C. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. For items of work for which specific unit prices are established in the contract, concrete is measured to the neat lines shown on the drawings and the volume of concrete is computed to the nearest 0.1 cubic yard. Measurement of concrete placed against the sides of an excavation without using intervening forms is made only to the neatness or pay limits shown on the

drawings. No deduction in volume is made for chamfers, rounded or beveled edges, or for any void or embedded item that is less than 5 cubic feet in volume.

B. Payment for each item of structure concrete is made at the contract unit price or the contract lump sum, whichever is applicable for that item. Such payment constitutes full compensation for all labor, material, equipment, transportation, tools, forms, falsework, bracing, and other items necessary and incidental to the completion of the work except items listed for payment elsewhere in the contract. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.04 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

D. ASTM C295 - Standard Guide for Petrographic Examination of Aggregates for Concrete; 2019.

E. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

F. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

G. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2021.

H. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2023, with Editorial Revision.

I. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.

J. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars; 2024.

K. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2020.

L. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.

M. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method); 2025.

N. ASTM C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete; 2023.

O. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011 (Reapproved 2022).

P. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.

Q. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork, and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2018 (Reapproved 2023).

1.05 SUBMITTALS

A. Concrete Job Mix:
   1. Before the concrete is placed, the contractor must furnish the Engineer, for approval, a statement of the materials and mix proportions (including admixtures, if any) intended for use.
      a. The statement must include evidence satisfactory to the Engineer that the materials and proportions will produce concrete conforming to this specification.

b. The materials and proportions so stated must constitute the job mix.

2. After a job mix has been approved, neither the source, character, or grading of the aggregates nor the type or brand of cement or admixture may be changed without prior notice to the Engineer. If such changes are necessary, no concrete containing such new or altered material may be placed until the Engineer has approved a revised job mix.

PART 2 PRODUCTS

2.01 FORMWORK

A. Forms must be of wood, plywood, steel, or other approved material. and must be mortar tight. The forms and associated falsework must be substantial and unyielding and must be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces must be smooth and free from holes, dents, sags, or other irregularities. Forms must be coated with a nonstaining form release agent before being set into place.

B. Equip metal ties or anchorages within the forms with cones, she-bolts or other devices that permit their removal to a depth of at least 1 inch without injury to the concrete. Ties designed to break off below the surface of the concrete must not be used without cones.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel must conform to the requirements of Section 03 20 00 - Steel Reinforcement.

2.03 CONCRETE MATERIALS

A. Fine and Coarse Aggregates must conform to ASTM C33/C33M.

1. Aggregates that fail to meet any requirement may be accepted only when either:
   a. The specified alternate conditions of acceptance can be proven before the aggregates are used on the job and within a period such that no work under the contract will be delayed by the requirements of such proof or,
   b. The specification for concrete expressly contains a provision of special mix requirements to compensate for the effects of the deficiencies.
2. Reactivity with Alkalies
   a. The potential reactivity of aggregates with the alkalies in cement shall be evaluated by petrographic examination as per ASTM C295, or by the results of previous tests or service records of concrete made from similar aggregates from the same source. The standards for evaluating potential reactivity shall be as described in ASTM C1778.
   b. Aggregates indicated by any of the above to be potentially reactive shall not be used except under one of the following conditions:
      1) Applicable test results of mortar bar tests made according to ASTM C1567 are available which indicate an expansion of less than 0.10 percent at 16 days.
      2) The concrete mixture complies with the appropriate testing procedures and mitigations measures established in ASTM C1778.
      3) Concrete made from similar aggregates from the same source has been demonstrated to be sound after 3 years or more of service under conditions of exposure to moisture and weather similar to those anticipated for the concrete under these specifications.
   c. Aggregates indicated to be potentially reactive, but within acceptable limits as determined by mortar bar test results or service records, shall be used only with low alkali cement, containing less than 0.60 percent alkalies expressed as sodium oxide.
3. Sulfur in Aggregate
   a. There is currently not an ASTM standard on the acceptable level of sulfur in concrete aggregate.
   b. To prevent concrete cracking from iron sulfide expansion, perform petrographic testing per ASTM C295 and use the following limits for sulfur (S) in aggregate based on the American Concrete Institute Technical Paper 113-M31 and the Concrete Society BS EN 12620:
      1) When S is less than 0.1 percent, the aggregate is acceptable.

2) When S is between 0.1 and 1.0 percent, perform further testing to determine if iron sulfide minerals such as pyrrhotite, gypsum, pyrite, or marcasite are present:
   (a) If the additional testing shows pyrrhotite, gypsum, pyrite, or marcasite are present, reject the aggregate and use an acceptable aggregate.
   (b) If the additional testing shows pyrrhotite, gypsum, pyrite, or marcasite are not present, the aggregate is acceptable.
3) Aggregate with S greater than 1 percent is not acceptable.

4. Aggregates of each class and size shall be stored and handled by methods that prevent segregation of particles sizes or contamination by intermixing with other material.
5. Acquire aggregates for entire project from same source.

B. Portland Cement:
1. Portland cement shall conform to the requirements of ASTM C150/C150M for the specific types of cement such as Type I, IA, II, IIA, II(MH), II(MH)A, III, IIIA, IV, and V Portland cement.
2. Type IS Portland blast-furnace slag cement, Type IP Portland-pozzolan cement, or Type IL Portland-limestone cement shall conform to the requirements of ASTM C595/C595M and may be used unless prohibited by the specifications.
3. When air-entraining cement is required, the contractor shall furnish the manufacturer's written statement providing the source, amount, and brand name of the air-entraining component.
4. Cement shall be stored and always protected from weather, dampness, or other destructive elements. Cement that is partly hydrated or otherwise damaged will not be accepted.
5. Acquire cement for entire project from same source.

C. Supplementary Cementitious Materials:
1. Fly ash used as a partial substitution of Portland cement must conform to the requirements of ASTM C618, Class C or F, except the requirement that the loss on ignition must not exceed 3 percent, unless otherwise specified. Lot-to-lot variation in the loss on ignition must not exceed 1 percent. When specified, fly ash must conform to one or more of the supplementary optional physical requirements listed in ASTM C618.
2. Natural pozzolan used as a partial substitution of Portland cement must conform to the requirements of ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling alkali silica reactivity.
3. Blast-furnace slag used as a partial substitution of Portland cement must conform to ASTM C989/C989M for ground granulated blast-furnace slag.
4. Silica fume used as a partial substitution of Portland Cement must conform to ASTM C1240.

D. Chemical Admixtures for Concrete:
1. Air-entraining admixtures shall conform to the requirements of ASTM C260/C260M.
2. Water-reducing and/or retarding admixtures shall conform to the requirements of ASTM C494/C494M, Types A, B, D, F, or G.
3. Plasticizing or plasticizing and retarding admixtures shall conform to ASTM C494/C494M, Types F or G.
4. Accelerating or water-reducing and accelerating ad-mixtures shall be noncorrosive and conform to the requirements of ASTM C494/C494M, Types C and E. The manufacturer shall provide long-term test data results from an independent laboratory verifying that the product is noncorrosive when used in concrete exposed to continuously moist conditions.

E. Curing Compound:
1. The curing compound must meet the requirements of either ASTM C309 or ASTM C1315. If Type 1 is specified, a fugitive dye must be used.
2. All curing compounds must be delivered to the site of the work in the original container bearing the name of the manufacturer and the brand name. The compound must be

stored in a manner that prevents damage to the container and protects water-emulsion types from freezing.

F. Preformed Expansion Joint Filler:
   1. Preformed expansion joint filler shall conform to the requirements of ASTM D1752, Type I, Type II, Type III, or Type IV unless bituminous type is specified. Bituminous type preformed expansion joint filler shall conform to the requirements ofASTM D994/D994M, or ASTM D1751.

G. Waterstops must conform to the requirements of Section 03 15 13 - Waterstops.

H. Water used in mixing and curing concrete must be clean and free from injurious amounts of oil, salt, acid, alkali, organic matter, or other deleterious substances.

2.04 CLASS OF CONCRETE

A. Concrete for structure concrete is classified as follows in Table 1:

Table 1 Concrete Classification

Class of concrete	Maximum net water content (gal/bag)	Minimum cement content (bags/yd^3)
3000M	6	5.5
4000M	6	6

2.05 AIR CONTENT AND CONSISTENCY

A. Slump:
   1. Unless otherwise specified, the slump must be 3 to 5 inches.
   2. The maximum slump after adding high range water reducing agents must be 7.5 inches.

B. Air Content:
   1. If air entrainment is specified, the air content, by volume, must be 4 to 7 percent of the volume of the concrete.

C. When specified, directed, or approved by the engineer, a water-reducing, set-retarding, or other admixture must be used. High-range water-reducing agents (superplasticizers) may be used to increase workability, reduce water content, and control concrete temperature in hot weather.

2.06 DESIGN OF THE CONCRETE MIX

A. The proportions of the aggregates must be such as to produce a concrete mixture that works readily into the corners and angles of the forms and around reinforcement when consolidated, but does not segregate or exude free water during consolidation.

B. Fly ash may be used as a partial substitution for Portland Cement in an amount of no more than 25 percent (by weight) of the cement in the concrete mix, unless otherwise specified.

C. The maximum water to cement ratio is 0.5 unless otherwise specified. When more than one cementitious material is used, the maximum water to cementitious materials ratio is 0.5 unless otherwise specified.

2.07 INSPECTION AND TESTING

A. The Engineer is to have free entry to the plant and equipment furnishing concrete under the contract. Provide proper facilities for the engineer to inspect materials, equipment, and processes and to obtain samples of the concrete. All tests and inspections will be conducted so as not to interfere unnecessarily with manufacture and delivery of the concrete.

2.08 HANDLING AND MEASUREMENT OF MATERIAL

A. Materials must be stockpiled and batched by methods that prevent segregation or contamination of aggregates and ensure accurate proportioning of the ingredients of the mix.

B. Measure cement and aggregates as follows.
   1. Measure cement by weight or in bags of 94 pounds each known weight. When cement is measured in bags, no fraction of a bag may be used unless weighed.

2. Measure aggregates by weight. Base mix proportions on saturated, surface-dry weight. The batch weight of each aggregate is the required saturated, surface-dry weight plus the weight of surface moisture it contains.
3. Measure water by volume or weight to an accuracy within 1 percent of the total quantity of water required for the batch.
4. Measure admixtures within a limit of accuracy of 3 percent.

2.09 MIXERS AND MIXING

A. Concrete must be uniform and thoroughly mixed when delivered to the work site. Variations in slump of more than 1 inch within a batch are considered evidence of inadequate mixing and must be corrected by increasing mixing time or other acceptable alternative.

B. For stationary mixers, the mixing time after all cement and aggregates are in the mixer drum must be not less than 1.5 minutes. When concrete is mixed in a truck mixer, the number of revolutions of the drum or blades at mixing speed must be not less than 70 nor more than 100.

C. Unless otherwise specified, volumetric batching and continuous mixing at the construction site are permitted. To produce concrete meeting the specified proportioning and uniformity requirements, the batching and mixing equipment must conform to the requirements of ASTM C685/C685M and must be demonstrated by tests with the job mix before the concrete is placed. Concrete made by this method must be produced, inspected, and certified in conformance with sections 6, 7, 8, 13, and 14 of ASTM C685/C685M.

D. No mixing water in excess of the amount called for by the job mix may be added to the concrete during mixing or hauling or after arrival at the delivery point.

PART 3 EXECUTION

3.01 PREPARATION OF FORMS AND SUBGRADE

A. Prior to placement of concrete, the forms and subgrade must be free of chips, sawdust, debris, water, ice, snow, extraneous oil, mortar, or other harmful substances or coatings. and the temperature of all surfaces to be in contact with the new concrete must be not be less than 40 degrees Fahrenheit. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete must be removed. Clean rock surfaces by air-water cutting, wet sandblasting, or wire-brush scrubbing, as necessary, and wet immediately before placement of concrete. The earth surface must be firm and damp. Placement of concrete on mud, dried earth, or uncompacted fill or frozen subgrade is not permitted.

B. Position items to be embedded in the concrete accurately and anchored firmly.

C. All edges that will be exposed to view when the structure is completed must be chamfered unless finished with molding tools.

D. Form weepholes in walls or slabs with nonferrous material.

3.02 CONVEYING

A. Deliver concrete to the site and discharge it into the forms within l.5 hours after the introduction of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge must not exceed 45 minutes.

B. The Engineermay allow a longer time, provided the setting time of the concrete is increased a corresponding amount by the addition of an approved set-retarding admixture. In any case, concrete must be conveyed from the mixer to the forms as rapidly as practicable by methods that prevent segregation of the aggregates and ensure no loss of mortar occurs.

3.03 PLACING

A. Concrete must not be placed until the subgrade, forms, steel reinforcement, and embedded items have been inspected and approved. No concrete may be placed except in the presence of the Engineer. The contractor must give reasonable notice to the Engineer each time concrete is to be placed. Such notice must provide sufficient time for the Engineer to inspect the subgrade, forms, steel reinforcement, and other preparations for compliance with the

specifications. Other preparations include, but are not limited to, the concrete mixing plant; delivery equipment system; placing, finishing, and curing equipment and system; schedule of work; workforce; and heating or cooling facilities, if applicable. Deficiencies are to be corrected before concrete is delivered for placing.

B. Deposit the concrete as closely as possible to its final position in the forms. Work concrete into the corners and angles of the forms and around all reinforcement and embedded items in a manner to prevent segregation of aggregates or excessive laitance. Place formed concrete in horizontal layers not more than 20 inches thick. Concrete must not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation. When high-range water-reducing agents are used, the concrete must not be allowed to drop more than 10 feet. Hoppers and chutes, pipes, or "elephant trunks" must be used as necessary to prevent segregation and the splashing of mortar on the forms and reinforcing steel above the layer being placed.

C. Immediately after the concrete is placed in the forms, it must be consolidated by spading, hand tamping, or vibration as necessary to ensure a smooth surface and dense concrete. Each layer must be consolidated to ensure monolithic bond with the preceding layer. If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when spaded or vibrated, the contractor must discontinue placing concrete and must make a construction joint according to the procedure specified herein or in the plans.

D. If placing is discontinued when an incomplete horizontal layer is in place, the unfinished end of the layer must be formed by a vertical bulkhead.

3.04 CONSTRUCTION JOINTS

A. Make construction joints at the locations shown on the drawings. If construction joints are needed that are not shown on the drawings, they must be placed in locations approved by the Engineer.

B. Where a feather edge would be produced at a construction joint, such as the top surface of a sloping wall, use an insert form so that the resulting edge thickness on either side of the joint is not less than 6 inches.

C. In walls and columns, as each lift is completed, the top surface must be immediately and carefully protected from any condition that might adversely affect the hardening of the concrete.

D. Steel tying and form construction adjacent to concrete in place must not be started until the concrete has cured at least 12 hours. Before new concrete is deposited on or against concrete that has hardened, the forms must be retightened. New concrete must not be placed until the hardened concrete has cured at least 12 hours.

E. Clean the surface of construction joints of all unsatisfactory concrete, laitance, coatings, or debris by washing and scrubbing with a wire brush or wire broom or by other means approved by the Engineer. Keep the surface moist for at least 1 hour before the new concrete is placed.

3.05 EXPANSION AND CONTRACTION JOINTS

A. Make expansion and contraction joints only at locations shown on the drawings.

B. Exposed concrete edges at expansion and contraction joints must be carefully tooled or chamfered and the joints must be free of mortar and concrete. Joint filler must be left exposed for its full length with clean and true edges.

C. Hold preformed expansion joint filler firmly in the correct position as the concrete is placed.

D. When open joints are specified, construct them by the insertion and subsequent removal of a wooden strip, metal plate, or other suitable template in such a manner that the corners of the concrete are not chipped or broken. Finish the edges of open joints with an edging tool before the joint strips are removed.

3.06 WATERSTOPS

A. Hold waterstops firmly in the correct position as the concrete is placed. Joints in metal waterstops must be soldered, brazed, or welded. Joints in rubber or plastic waterstops must be cemented, welded, or vulcanized as recommended by the manufacturer.

3.07 REMOVAL OF FORMS

A. Forms must not be removed without the approval of the Engineer. Remove forms in such a way as to prevent damage to the concrete. Remove supports in a manner that permits the concrete to take the stresses of its own weight uniformly and gradually.

3.08 FINISHING FORMED SURFACES

A. Immediately after the forms are removed:
   1. All fins and irregular projections must be removed from exposed surfaces.
   2. The holes produced on all surfaces by the removal of form ties, cone-bolts, and she-bolts must be cleaned, wetted, and filled with a dry-pack mortar. The mortar will consist of one part Portland cement, three parts sand that will pass a No. 16 sieve, and just sufficient water to produce a consistency such that the filling is at the point of becoming rubbery when the material is solidly packed.

3.09 FINISHING UNFORMED SURFACES

A. All exposed surfaces of the concrete must be accurately screeded to grade and then float finished, unless specified otherwise.

B. Excessive floating or troweling of surfaces while the concrete is soft is not permitted.

C. Adding dry cement or water to the surface of the screeded concrete to expedite finishing is not allowed.

D. Joints and edges on unformed surfaces that will be exposed to view must be chamfered or finished with molding tools.

3.10 CURING

A. Prevent concrete from drying for a curing period of at least 7 days after it is placed. Exposed surfaces must be kept continuously moist for the entire period or until curing compound is applied as specified below. Moisture must be maintained by sprinkling, flooding, or fog spraying or by covering with continuously moistened canvas, cloth mats, straw, sand, or other approved material. Wood forms left in place during the curing period must be kept continuously wet. A formed surface must be thoroughly wetted immediately after forms are removed and must be kept wet until patching and repairs are completed. Water or covering must be applied in such a way that the concrete surface is not eroded or otherwise damaged.

B. Concrete, except at construction joints, may be coated with the approved curing compound instead of continued application of moisture, except as otherwise specified in the plans or contract documents. Spray the compound on the moist concrete surface as soon as free water has disappeared but do not apply to any surface until patching, repairs, and finishing of that surface are completed. The compound must be applied at a uniform rate of not less than 1 gallon per 175 square feet of surface and must form a continuous adherent membrane over the entire surface. Curing compound must be thoroughly mixed before applying and continuously agitated during application. Curing compound must not be applied to a surface requiring bond to subsequently placed concrete, such as construction joints, shear plates, reinforcing steel, and other embedded items. If the membrane is damaged during the curing period, the damaged area must be resprayed at the rate of application specified above. Any surface covered by the membrane must not be trafficked unless protected from wear.

3.11 REMOVAL AND REPLACEMENT OR REPAIR

A. When concrete is honeycombed, damaged, or otherwise defective, the contractor must remove and replace the structure or structural member containing the defective concrete or, where feasible, correct or repair the defective parts. The Engineer determines the required extent of removal, replacement, or repair. Before starting repair work, the Contractor must obtain the

Engineer's approval of the plan for repairs. The Contractor must perform all repair work in the presence of the Engineer.

3.12 CONCRETING IN COLD WEATHER

A. Concrete must not be mixed nor placed when the daily minimum atmospheric temperature is less than 40 degrees Fahrenheit unless facilities are provided to prevent the concrete from freezing. The use of accelerators or antifreeze compounds is not allowed.

B. Concrete placement in cold weather may be allowed on a case-by-case basis when a cold weather plan is provided to and approved by the engineer.

3.13 CONCRETING IN HOT WEATHER

A. The contractor must apply effective means to maintain the temperature of the concrete below 90 degrees Fahrenheit during mixing, conveying, and placing.

END OF SECTION

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SECTION 05 50 00
METAL FABRICATION AND INSTALLATION

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing, fabricating, and erecting metalwork, including the metal parts and fasteners of the composite structures.

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Steel reinforcement shall be furnished and completed per the plans and project documents. Reinforcing Steel and associated materials will not be paid for separately but shall be included in the cost of the concrete structure.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.04 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2022, with Errata (2025).

B. ASTM A31 - Standard Specification for Steel Rivets and Bars for Rivets, Pressure Vessels; 2020.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

F. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2024b.

G. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2024.

H. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

I. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.

J. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

K. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

L. ASTM A320/A320M - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service; 2024a.

M. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.

N. ASTM A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades; 1996.

O. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars; 2022.

P. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

Q. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2022a.

R. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.

S. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

T. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

U. AA ADM - Aluminum Design Manual; 2020.

V. AA DAF-45 - Designation System for Aluminum Finishes; 2003 (Reaffirmed 2009).

W. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

X. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

Y. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

Z. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

AA. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

BB. ASTM B316/B316M - Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods; 2025.

CC. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.

DD. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

EE. ASTM B766 - Standard Specification for Electrodeposited Coatings of Cadmium; 86(2015).

FF. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

GG. AWS A5.1/A5.1M - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding; 2025.

HH. AWS A5.10/A5.10M - Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods; 2023.

II. AWS A5.22/A5.22M - Specification for Stainless Steel Flux Cored and Metal Cored Welding Electrodes and Rods; 2024.

PART 2 MATERIALS

2.01 GENERAL

A. Steel must be of structural quality unless otherwise specified.

B. Castings must be thoroughly cleaned and subjected to careful inspection before installation.

C. Finished surfaces must be smooth and true to ensure proper fit.

2.02 STRUCTURAL STEEL

A. Structural Steel: ASTM A36/A36M .

B. Structural Steel; high-strength low alloy: ASTM A242/A242M .

C. Carbon Steel Plates; structural quality to be bent, formed or shaped cold: ASTM A283/A283M.

D. Carbon Steel Sheets; structural quality: ASTM A1011/A1011M , Grade 40 or ASTM A1008/A1008M , Grade 40 .

E. Carbon Steel Strip; structural quality: ASTM A1011/A1011M, Grade 36.

F. Stainless Steel: ASTM A240/A240M, ASTM A320/A320M, ASTM A276/A276M, ASTM A269/A269M, ASTM A582/A582M; Type 302, 303, 304, or 304L .

2.03 COMMERCIAL OR MERCHANT QUALITY STEEL

A. Carbon Steel Bars: ASTM A575, Grade M 1015 to Grade M 1031.

B. Carbon Steel Sheets: ASTM A1011/A1011M.

C. Carbon Steel Strips: ASTM A1011/A1011M.

D. Carbon Steel Sheets; zinc-coated: ASTM A653/A653M or ASTM A924/A924M.

2.04 ALUMINUM ALLOY

A. Unless otherwise specified, alloy 6061-T6 must be used.

B. Standard Structural Shape: ASTM B308/B308M.

C. Extruded Structural Pipe and Tube: ASTM B429/B429M.

D. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221.

E. Drawn Seamless Tubes: ASTM B210/B210M.

F. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B211/B211M.

G. Sheet and Plate: ASTM B209/B209M.

2.05 BOLTS

A. Bolts, Nuts, and Washers; carbon steel: ASTM A307.

B. Bolts, Nuts, and Washers, high-strength: ASTM F3125/F3125M.

C. Zinc Coating Requirements for Galvanized or Zinc-Coated Bolts, Nuts, and Washers:
   1. Bolts with diameter greater than 0.5 inches: ASTM A153/A153M
   2. Bolts with diamter 0.5 inches or less: ASTM B633 , Service Condition SC 3 or ASTM B766 .

D. Bolts, Nuts, and Washers; stainless steel: ASTM A320/A320M.

E. Steel; carbon steel: ASTM A307.

F. Steel; high-strength: ASTM F3125/F3125M.

2.06 RIVETS

A. Steel: ASTM A31.

B. Aluminum: ASTM B316/B316M.

2.07 WELDING ELECTRODES

A. Steel: AWS A5.1/A5.1M, except that they must be uniformly and heavily coated (not washed) and must be of such a nature that the coating does not chip or peel while being used with the maximum amperage specified by the manufacturer.

B. Aluminum: AWS A5.10/A5.10M

C. Stainless Steel: AWS A5.22/A5.22M

2.08 GALVANIZING

A. Zinc coatings shall conform to the requirements of ASTM A123/A123Mor specified in the plans.

B. ASTM A123/A123M covers both fabricated and nonfabricated products; e.g., assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from noncoated steel wire. It also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to remove excess galvanizing bath metal).

C. Items to be centrifuged or otherwise handled to remove excess zinc shall meet the requirements of ASTM A153/A153M, except bolts, screws, and other fasteners 0.5 inch or less in diameter may be coated with electro-deposited zinc or cadmium coating conforming to the requirements of ASTM B766 , coating thickness Class 5, Type III and ASTM B633 , Service Condition SC 3 .

2.09 FABRICATION

A. Fabrication of structural steel must conform to the requirements of the American Institute of Steel Construction’s Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (AISC 360).

B. Fabrication of structural aluminum must conform to the requirements in the Aluminum Design Manual available from the Aluminum Association AA ADM).

PART 3 EXECUTION

3.01 ERECTION

A. Install the frame of metal structures true and plumb. Place temporary bracing wherever necessary to resist all loads to which the structure may be subjected, including those applied by the installation and operation of equipment. Such bracing must be left in place as long as necessary for safety.

B. As erection progresses, the work must be securely bolted up or welded to resist all dead load, wind, and erection stresses. The contractor must furnish such installation, assisting with bolts, nuts, and washers as required.

C. No riveting or welding must be performed until the structure is stiffened and properly aligned.

D. Rivets driven in the field must be heated and driven with the same care as those driven in the shop.

E. Perform all field welding in conformance to the requirements for shop fabrication except those that apply to shop conditions only.

3.02 PROTECTIVE COATINGS

A. Items to be galvanized must be completely fabricated for field assembly before the application of the zinc coatings. Galvanized items must not be cut, welded, or drilled after the zinc coating is applied.

B. Items to be painted must be painted in conformance to the requirements of Section 09 96 56 - Coal Tar Polyamide Epoxy Paint for the specified paint systems.

END OF SECTION

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SECTION 09 90 00
PAINTING METALWORK

PART 1 GENERAL

1.01 SCOPE

A. The work consists of cleaning metal surfaces and applying paints and protective coatings.

1.02 PRICE AND PAYMENT PROCEDURES

A. For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds after presentation of invoices by the contractor supporting actual related costs and evidence of the charges of suppliers, subcontractors, and others for supplies furnished and work completed. If the total of such payments is less than the lump sum contract price for this item, the unpaid balance is included in the next appropriate contract payment. Payment of the lump sum contract price constitutes full compensation for completion of the work.

B. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.03 REFERENCE STANDARDS

A. AWWA C210 - Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings; 2024.

B. AWWA D102 - Coating Steel Water-Storage Tanks; 2024.

C. SSPC-Paint 16 - Coal-Tar Epoxy Polyamide (Black or Dark Red) Coating; 2023.

D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

E. SSPC-SP 2 - Hand Tool Cleaning; 2024.

F. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

G. SSPC-SP 7/NACE No.4 - Brush-Off Blast Cleaning; 2006.

H. SSPC-SP 10/NACE No.2 - Near-White Metal Wet Abrasive Blast Cleaning; 2006.

PART 2 PRODUCTS

2.01 PAINT

A. For the purpose of this specification, paints and coatings must be designated by types as defined below.

B. Materials for systems requiring two or more coats must be supplied by the same manufacturer.

C. Unless otherwise specified and before application, the contractor must furnish in writing to the engineer for approval a plan outlining procedures proposed for painting metalwork and a list of material including name of manufacturer, pertinent product identification names and numbers, and product data sheets. Data must reflect the requirements set forth in this section.

1. Type 1, Alkyd primer. Alkyd-based, rust-inhibitive primer must be lead and chromate free. Primer must have a minimum of 54 percent solids by volume. Color availability must be red, gray, and white. Primer must be able to be applied satisfactory at 2 to 3 mils dry-film thickness in one coat.
2. Type 2, Alkyd enamel (gloss). Alkyd-based enamel must be lead free. It must have a minimum of 49 percent solids by volume. Alkyd enamel must be able to be applied satisfactory at 2 to 3 mils dry-film thickness in one coat. Finish must be gloss.
3. Type 3, Alkyd enamel (semigloss). Alkyd-based enamel must be lead free. It must have a minimum of 55 percent solids by volume. Alkyd enamel must be able to be applied satisfactory at 2 to 3 mils dry-film thickness in one coat. Finish must be semigloss.
4. Type 4, Epoxy polyamide primer. Epoxy polyamide primer must be lead and chromate free. It must have a minimum of 56 percent solids by volume. Epoxy primer must be able to be applied satisfactory at 4 to 6 mils dry-film thickness in one coat. Color availability must be red, gray, and white. Epoxy primer must conform to AWWA C210 and AWWA D102.

5. Type 5, Epoxy polyamide (intermediate or finish). Epoxy polyamide must be lead free. It must have a minimum of 56 percent solids by volume. Epoxy polyamide must be able to be applied satisfactory at 4 to 6 mils dry-film thickness in one coat. Finish must be semigloss. Epoxy finish must conform to AWWA C210 and AWWA D102.
6. Type 6, Acrylic polyurethane (gloss). Acrylic polyurethane must be lead free. It must have a minimum of 74 percent solids by volume. Polyurethane must be able to be applied satisfactory at 3 to 5 mils dry-film thickness in one coat. Finish must be gloss.
7. Type 7, Acrylic polyurethane (semigloss). Acrylic polyurethane must be lead free. It must have a minimum of 58 percent solids, by volume. Polyurethane must be able to be applied satisfactory at 3 to 5 mils dry-film thickness in one coat. Finish must be semigloss.
8. Type 8, Vinyl acid wash treatment. Pretreatment primer for galvanized and nonferrous metal. Pretreatment primer must have a minimum of 8 percent solids by volume. The applied dry-film thickness of pretreatment primer must not exceed 0.5 mils. Steel primed with pretreatment primer must be top coated within 6 to 8 hours in humid conditions.
9. Type 9, Single package moisture cured urethane primer. Urethane primer must have a minimum of 50 percent solids by volume. Primer must be able to be applied satisfactory at 2 to 3 mils dry-film thickness in one coat. Color must be metallic aluminum.
10. Type 10, Coal tar epoxy. Coal tar epoxy must have a minimum of 75 percent solids by volume and conform to the requirements of Material Specification 583, Coal Tar Epoxy Paint (SSPC-Paint 16, Type I). Coal tar epoxy must be able to be applied satisfactory at 8 to 15 mils dry-film thickness in one coat.

2.02 TINTING

A. Tinting must not be performed in the field unless otherwise specified.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. All Surfaces. Thoroughly clean surfaces to be painted before the application of paint or coatings. Surface preparations required by this specification are as designated by SSPC (Steel Structures Painting Council) and are summarized by the methods listed in this section.

B. Method 1, Near white blast (SSPC-SP 10/NACE No.2). All surfaces to be coated must be prepared by removing all grease and oil using steam cleaning or solvent cleaning methods per method 5. After degreasing is completed, sand or grit blasting must be performed to remove all dirt, rust, mill scale, and other foreign material or residue. The cleaned, finished surface must be a minimum of 95 percent free of all visible foreign material or residue.

C. Method 2, Commercial blast (SSPC-SP 6/NACE No.3). All surfaces to be coated must be prepared by removing all grease and oil using steam cleaning or solvent cleaning methods per method 5. After degreasing is completed, sand or grit blasting must be performed to remove all dirt, rust, mill scale, or other foreign material or residue. The cleaned, finished surface must be a minimum of 67 percent free of all visible foreign material or residue.

D. Method 3, Brush-off blast cleaning (SSPC-SP 7/NACE No.4). All surfaces to be coated must be prepared by removing all grease and oil using steam cleaning or solvent cleaning methods per method 5. After degreasing is completed, sand or grit blasting must be performed to remove dirt, rust, mill scale, or other foreign material or residue. Mill scale, rust, and paint are considered tightly adherent if they cannot be removed by lifting with a dull putty knife.

E. Method 4, Hand tool cleaning (SSPC-SP 2). All surfaces to be coated must be prepared by removing all oil or grease using steam cleaning or solvent cleaning methods per method 5. After degreasing is completed, nonpower hand tools must be used to remove loose, detrimental foreign material. Adherent mill scale, rust, and paint need not be removed.

F. Method 5, Solvent cleaning (SSPC-SP 1). Surfaces to be coated must be prepared by removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from surfaces with solvents or commercial cleaners using various methods of cleaning, such as wiping, dipping, steam cleaning, or vapor degreasing.

3.02 PAINT SYSTEMS

A. Purpose. For the purposes of this specification, systems of painting and coating metalwork are designated as defined in this section.

B. Paint system A. Consists of the application of one primer coat of type 1 and two or more coats of type 2 (gloss) or type 3 (semigloss) to provide a minimum dry-film thickness of 6 mils.

C. Paint system B. Consists of the application of one primer coat of type 9 and two or more coats of type 2 (gloss) or type 3 (semigloss) to provide a minimum dry-film thickness of 6 mils.

D. Paint system C. Consists of the application of one coat of type 4 and one or more coats of type 5 to provide a minimum dry-film thickness of 8 mils.

E. Paint system D. Consists of the application of one coat of type 4 primer, one coat of type 5, and one coat of type 6 (gloss) or type 7 (semigloss) to provide a minimum dry-film thickness of 11 mils.

F. Paint system E. Consists of the application of one coat of type 9 and one coat of type 6 (gloss) or type 7 (semigloss) to provide a minimum dry-film thickness of 5 mils.

G. Paint system F. Consists of the application of two coats of type 10 at a dry-film thickness of 8 mils. per coat. Total system must provide a minimum dry-film thickness of 16 mils.

H. Paint system G. Consists of the application of two coats of type 4 and two coats of type 9 paint. Total system must provide a minimum dry-film thickness of 14 mils.

3.03 APPLICATION OF PAINT

A. Paint surfaces immediately after preparation or within the same day as prepared with a minimum of one coat of the primer type specified. Protect remaining surfaces not required to be painted against contamination and damage during the cleaning and painting operation.

B. Thoroughly mix paints immediately before application.

C. After erection or installation of the metalwork, all damage to shop-applied coating must be repaired and all bolts, nuts, welds, and field rivet heads must be cleaned and painted with one coat of the specified priming paint.

D. Apply initial priming coats by brush except on surfaces accessible only to spray equipment. All other coats may be applied by brush or spray. Apply each coat in such a manner to produce a paint film of uniform thickness with a rate of coverage within the guidelines and limits recommended by the paint manufacturer and as outlined in this specification.

E. The drying time between coats must be as prescribed by the paint manufacturer but not less than that required for the paint film to thoroughly dry. The elapsed time between coats in paint system F must not exceed 24 hours. If for any reason the critical recoat time is exceeded, treat the coated surface with the manufacturer's recommended tackifier solvent or brush blasted to roughen the surface.

F. The finished surface of each coat must be free from runs, drops, ridges, laps, or excessive brushmarks and present no variation in color, texture, and finish. Clean the surface of each dried coat as necessary before application of the next coat.

3.04 ATMOSPHERIC CONDITIONS

A. Paint application must not be performed when the temperature of the item to be painted or the surrounding air is less than 50 degrees Fahrenheit. Perform painting only when the humidity and temperature of the surrounding air and the temperature of the metal surfaces are such that evaporation rather than condensation results during the time required for application and drying. The surface must be dry and a minimum of 5 degrees Fahrenheit above the dew point. Surfaces protected from adverse atmospheric conditions by special cover, heating, or ventilation must remain so protected until the paint is thoroughly dry.

3.05 TESTS

A. Dry-film thickness on ferrous metal must be determined by the use of a nondestructive magnetic instrument, such as an Elcometer or Mikrotest gauge. Instruments must have been

calibrated within 1 month before use. Film thickness on nonferrous metal must be determined with film gauges during the application process. Systems with film thickness less than specified must be brought into conformance by the application of one or more additional coats of the specified material.

END OF SECTION

SECTION 09 96 56
COAL TAR POLYAMIDE EPOXY PAINT

PART 1 GENERAL

1.01 SCOPE

A. This specification covers the quality of a coal tar polyamide epoxy paint suitable for use on structural steel or concrete. Paint supplied meeting Paint Specification No. 16, Type 1, Class II, of the Steel Structures Painting Council (SSPC-Paint 16) will meet the requirements of this specification.

1.02 REFERENCE STANDARDS

A. ASTM D4 - Standard Test Method for Bitumen Content; 2018.

B. ASTM D5 - Standard Test Method for Penetration of Bituminous Materials; 2006.

C. ASTM D36 - Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus); 2014 (Reapproved 2020).

D. ASTM D605 - Standard Specification for Magnesium Silicate Pigment (Talc); 2019.

E. ASTM D609 - Standard Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products; 2022.

F. ASTM D1475 - Standard Test Method for Density of Liquid Coatings, Inks, and Related Products; 2020.

G. ASTM D1544 - Standard Test Method for Color of Transparent Liquids (Gardner Color Scale); 2018.

H. ASTM D1652 - Standard Test Method for Epoxy Content of Epoxy Resins; 2019.

I. ASTM D2415 - Standard Test Method for Ash in Coal Tar and Pitch; 2020.

J. ASTM D3721 - Standard Specification for Synthetic Red Iron Oxide Pigment; 2019.

K. ASTM D7091 - Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals; 2022.

L. SSPC-Paint 16 - Coal-Tar Epoxy Polyamide (Black or Dark Red) Coating; 2023.

PART 2 PRODUCTS

2.01 COMPOSITION AND PROCESSING

A. Composition—The paint shall be a two-component system that has the pitch, filler, and catalyst in one component and the resin in another. Each component of this paint based on the specified ingredients shall be uniform, stable in storage, and free from grit and coarse particles. The components shall contain the following types and proportions of ingredients:

Ingredient	Component A percent by weight	Component A and B typical composition percent by weight	
	min	max	
Coal tar pitch	33.0	36.0	28.2
Polyamide	11.0	12.0	9.5
Magnesium silicate	30.0	33.0	25.8
Xylene	18.0	21.0	15.4
Gelling agent and activator	2.5	2.6	2.0
Catalyst (accelerator)	1.2	1.3	1.1
Subtotal			82.0
	Component B		
Epoxy resin (100% nonvolatile)	100		18.0

Total			100.0

B. Processing—Magnesium silicate and gelling agent shall be thoroughly dispersed in component A by means of grinding equipment capable of developing substantial shear values Gellant shall be mixed with an equal weight of magnesium silicate and then dampened by stirring-in all of the alcohol; the resultant mixture shall be added to and thoroughly dispersed into component A. (The viscosity of component A is markedly influenced by the degree of dispersion of gellant and magnesium silicate.)

2.02 QUALITY OF INGREDIENTS

A. Ingredient material shall exhibit the following properties:

1. Coal tar pitch—Coal tar pitch is a product obtained from the distillation of high temperature crude coke oven tar, which in itself is a product obtained during the destructive distillation of coal in slot ovens operated at a temperature above 700 degrees Celsius. Coal tar pitch shall have the following characteristics:

	Min	Max
Softening point, in water, °C ASTM D36	70	75
Ash, percent by weight ASTM D2415		0.5
Insolubles in carbon disulfide, percent by weight ASTM D4		20
Volatiles, percent by weight		
Under 250 °C		0.0
Under 300 °C		5.0

2. Gellant—The gellant or thixotropic-producing additive shall be an organic derivative of magnesium montmorillonite or hydrogenated castor oil. It shall be a creamy white powder having a bulking value of 15 ± 0.2 pounds per gallon and water content of 3 percent maximum.
3. Activator—The activator, if used, shall be methanol, ethanol, or propylene carbonate.
4. Catalyst—The catalyst (accelerator) shall be 2,4,6-tri (dimethyl amino methyl) phenol.
5. Epoxy resin—Epoxy resin shall be a di-epoxide condensation product of bisphenol-A and epichlorohydrin with terminal epoxide group. It shall be clear, tree of turbidity, crystals, and particulate matter with the following properties:

Property	Requirements	
	min	max
Nonvolatile content (1 to 2 grams after 1 hour at 105 ± 2 °C), % by weight	99	
Epoxide equivalent, ASTM D1652	180	200
Color, Gardner, ASTM D1544		5.0
Specific gravity, ASTM D1475	1.15	1.18
Viscosity, Brookfield, poises at 25 °C	100	160

6. Polyamide resin—Polyamide resin shall be a condensation product of a dimerized fatty acid in polyamides. It shall be clear, free of turbidity and particulate matter, with the following characteristics:

Characteristics	Requirements	
	min	max
Amine value[1/]	330	360

Color, Gardner, ASTM D1544	-	9
Specific gravity, ASTM D1475	0.96	0.98
Viscosity, Brookfield, poises at 25 °C	7	9
Nonvolatile content (1–2 grams after 1 hr at 105 ± 2 °C), % by weight	97	0

7. [1/] The amine value is defined as the milligrams of potassium hydroxide equivalent to the amine alkalinity potentiometric titration with standard perchloric acid according to the following method:
   a. Weigh the approximate amount of well mixed resin to give a titration in the range of 12 to 18 milliliters (mL) into a tared 200 mL Berzelius tall form beaker on an analytical balance. Cover the beaker with aluminum foil to minimize contact with air.
   b. From a graduated cylinder, carefully add 90 mL of solvent (suitable solvents are nitrobenzene, propylene carbonate, or acetonitrile), insert a stirring bar, cover the beaker with aluminum foil, and stir on a magnetic stirrer to dissolve the sample. Add the solvent immediately after weighing the sample. A fume hood should be used for all operations.
   c. From a graduated cylinder, add 20 mL of glacial acetic acid to the sample solution and stir for several minutes.
   d. Immerse the electrodes into the sample solution, stir for 2 minutes, and titrate potentiometrically with 0.1 N perchloric acid using the millivolt scale. Record the millivolt reading every 0.1 mL. Plot a graph showing the millivolts against the titration. The endpoint is the midpoint of the inflection on the titration curve.
   e. Conduct a blank determination on 90 mL of the solvent and 20 mL of acetic acid. The blank need only be determined once for each lot of solvent used. On the majority of lots used, the blank has been found to be zero.
   f. Calculate the amine value using the following formula:
      1) Amine value = (sample titration-solvent blank) x normality 5 x 6.1 weight of sample
8. Magnesium silicate—Magnesium silicate shall conform to ASTM D605. When a dark red coating is specified, a dark red coating shall be furnished in 50 percent or more (by volume) of the magnesium silicate is replaced by synthetic red iron conforming to ASTM D3721. The red coating shall meet all of the test requirements prescribed for the black coating except that the nonvolatile content of component A shall be an amount reflecting the greater specific gravity of the iron oxide pigment.

B. Physical Requirements

C. When tested by the methods described herein, component A shall exhibit the following properties:
   1. Viscosity, Brookfield, at 25 degrees Celsius poises 160 maximum
   2. Nonvolatile residue, percent by weight 77 minimum

D. The mixed paint shall exhibit the following properties:
   1. Sag, 14 mil wet film—None
   2. Pot life at 24 to 27 degrees Celsius, hours—4 minimum

E. The cured film shall exhibit the following properties:
   1. Penetration, 200 grams, 5 seconds, 25 degrees Celsius, hundredth centimeter units—3 maximum
   2. Odor after 48 hours curing—Pass test
      a. Flexibility on 0.5-inch mandrel—Pass test
      b. Adhesion—No delamination

2.03 TEST METHODS

A. Viscosity of component A—Fill a container having a minimum diameter of 3 inches, a minimum height of 3.75 inches, and a minimum depth of 3 inches with a representative sample of

component A. Set up a Model RVT or RVF-100 Brookfield Synochro-Electric Viscometer with a No. 7 spindle and with guard removed. Bring the sample to (and thereafter maintain) a temperature of 25 degrees Celsius and stir vigorously for 2 minutes with a stiff spatula. Immediately after stirring, lower the viscometer, immersing the spindle until half of the neck mark on the spindle is covered. Run the viscometer at 100 rpm for 1 minute and record the pointer position on the dial. If the dial reading is 40 or less, the viscosity shall be considered to be 160 poises or less. If the reading is over 40, immediately start the motor and take additional readings at 1-minute intervals. If one or more readings of 40 or less are obtained out of 10 readings, taken at 1-minute intervals, the viscosity of the material shall be considered to be within specification limits.

B. Nonvolatile content of component A—Place a stirrer (e.g., short length of stiff wire, such as a partly-straightened paper clip) into a small disposable aluminum dish of about 2 inches in diameter and weigh to the nearest 0.1 milligram. As rapidly as possible, place between 2 and 3 grams of component A into the dish and weigh immediately to the nearest 0.1 milligram. After weighing, spread the material over the bottom of the dish. Heat the dish, wire, and contents in a well-ventilated, convection-type oven maintained at 105 degrees Celsius plus or minus 2 degrees Celsius for 3 hours. After the material has been in the oven for a few minutes, and periodically thereafter, stir the material. Cool in a desiccator, weigh to the nearest 0.1 milligram, and calculate the percentage of nonvolatile on a weight basis.

C. Sag test of coal tar-epoxy paint—Prepare about 500 mL of the material by thoroughly mixing 100 mL of component B into 400 mL of component A. Determine its viscosity immediately after mixing using the same procedure as those for component A but employing a No. 5 spindle. If all of five readings recorded at 1-minute intervals are above 50, reduce the viscosity by adding xylene in small increments until a reading not greater

1. than 50 is obtained. Press a strip of 1-inch masking tape across the full width of a solvent-cleaned 3-inch by 6-inch cold-rolled steel panel. The tape should be parallel to and centered on the shorter axis of the panel. Within 5 minutes after making the final check of viscosity, apply the material to the panel to a wet film thickness at least 14 mils as determined by an Inter-chemical wet film doctor blade having a gap of about 25 mils, or by brush. Immediately after applying the material, carefully remove the masking tape and stand the panel in a vertical position (with the bare strip horizontal) in a draft-free, 24-to-27-degree Celsius location. Examine the panel after 4 hours. Sagging or running of the coating into the bare area shall constitute failure of the material to pass the sag test.

D. Pot life test of coal tar-epoxy paint—Mix 100 mL of compound B into 400 mL of component A with both components having a temperature of 24 to 27 degrees Celsius before mixing. Pour the material at once into a pint metal can, seal tightly, and maintain at 24 to 27 degrees Celsius. Examine the material 4 hours after it was mixed. For its pot life to be considered satisfactory, the mixed material must remain in a fluid condition and, when thinned with no more than 100 mL of xylene, shall be lump-free and brush able.

E. Penetration test on coal tar-epoxy film—Select and solvent spray-clean two 3-inch by 6- inch cold-rolled steel panels in accordance with ASTM D609. Draw down in accordance with a coat of the paint prepared as described herein for the sag test. Allow the film to dry 18 to 24 hours in a horizontal position at 24 to 27 degrees Celsius and at a relative humidity of not over 60 percent. Apply a second coat over and at right angles to the first coat, using freshly mixed paint prepared identically to that used for the first coat. The draw down applicator(s) shall be such as to provide a total dry-film thickness for the two coats of 20 to 25 mils, and the coats shall be of approximately equal thickness. Allow the second coat to dry in a horizontal position for 120 hours at 24 to 27 degrees Celsius. After 120 hours of curing, and daily thereafter, clamp the panel into the table of a penetrometer ASTM D5) so that the needle is over an area that is within the prescribed thickness range (as measured by ASTM D7091). Determine the penetration using a total load of 200 grams applied for 5 seconds at 25 degrees Celsius. The average of the three lowest out of five penetration readings, all taken within a 1-centimeter square, shall not exceed 0.03 of a centimeter after 120 hours of curing.

F. Odor of dried coal tar-epoxy film—Examine the paint film on one of the flexibility panels for odor after it has cured for 48 hours. The film shall be free of any odor except for a faint odor of xylene.

G. Flexibility of coal tar-epoxy film—Sand blast three steel panels (similar to those used in the penetration test) at low pressure with a clean, 30 to 50 mesh, nonmetallic abrasive until a uniform, gray-white surface with well-developed anchor pattern, is achieved. (Note: It may be necessary to blast both sides of panel, in stages, to avoid warping.) Blow off any dust with a clean air blast. Apply two coats of paint as described herein for the penetration test. Allow the film to cure in the period equal to that required to reach a penetration of 0.03 centimeter on the penetration test panel, whichever occurs first. With the film side up, and in a time interval of about 1 second, bend each of the flexibility panels double over a 0.5-inch diameter mandrel. Cracks in any of the panels visible to the naked eye shall constitute failure except that edge cracks extending no further than 0.5 inch or small local fissures emanating from air bubbles, craters, and similar imperfections shall be disregarded.

H. Adhesion of coal tar-epoxy film—Test the adhesion of the coating on an unbroken area of the flexibility panel with a sharp knife after the coating has cured for 120 hours. It shall strongly resist being removed from the metal. Also use a knife to test the intercoat adhesion of the film on a penetration panel after 120 hours curing. Any delamination of the two coats shall constitute failure.

END OF SECTION

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SECTION 31 05 19
GEOTEXTILES

PART 1 GENERAL

1.01 SCOPE

A. This specification covers the quality of geotextile, including geotextile for temporary silt

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver.
   2. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   3. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   4. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   5. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   6. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus; 2021.

B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).

E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).

G. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile- Related Products Using a 50-mm Probe; 2014.

H. ASTM D6461/D6461M - Standard Specifications for Silt Fence Materials; 2022.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Each roll of geotextile must be labeled or tagged to clearly identify the brand, class, and individual production run in accordance with ASTM D4873/D4873M. The geotextile must be shipped and transported in rolls wrapped with a cover for protection from moisture, dust, dirt, debris, and ultraviolet light. The cover must be maintained undisturbed to the maximum extent possible before placement.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Fibers (threads and yarns) used in the manufacture of geotextile must consist of synthetic polymers composed of a minimum of 85 percent by weight polypropylene, polyester, polyamide, polyethylene, polyolefin, or polyvinylidene-chloride. The fiber must be formed into a stable network of filaments retaining dimensional stability relative to each other. The geotextile must be free of defects, such as holes, tears, and abrasions. The geotextile must be free of any chemical treatment or coating that significantly reduces its porosity. Fibers must contain stabilizers, inhibitors, or both to enhance resistance to ultraviolet light. Geotextile other than for temporary silt fence must conform to the requirements in Table 1 or Table 2, as applicable. Geotextile for temporary silt fence must conform to ASTM D6461/D6461M.

B. Thread used for factory or field sewing must be of a color contrasting to the color of the fabric and made of high-strength polypropylene, polyester, or polyamide material. It must be as resistant to ultraviolet light as the geotextile being sewn.

2.02 CLASSIFICATION

A. There are two geotextile classifications, woven and nonwoven. Geotextile for temporary silt fence may be either woven or nonwoven. Silt film woven geotextile may not be used except for temporary silt fence.

B. Woven geotextiles are made from fabric that is formed by the uniform and regular interweaving of the threads or yarns in two directions. Woven fabrics must be manufactured from monofilament yarn formed into a uniform pattern with distinct and measurable openings, retaining their position relative to each other. The fabric must have a selvedge edge or otherwise be finished to prevent unraveling.

C. Nonwoven geotextiles are made from fabric that is formed by a random placement of threads in a mat and bonded by needle punching, heat bonding, or resin bonding. Nonwoven geotextiles must have distinct but variable small openings, retaining their position relative to each other when bonded. The use of heat- or resin-bonded nonwovens is restricted as specified in note 2 of Figure 592-2.

2.03 SAMPLING AND TESTING

A. The geotextile must conform to Table 1 or Table 2 or ASTM D6461/D6461M, as applicable, for the product type shown on the label. Documentation described in either (i) or (ii) below is required to verify the product meets the specified requirements:

1. Product properties as listed in the latest edition of the "Specifiers Guide," Geosynthetics (Industrial Fabrics Association International, 1801 County Road B, West Roseville, MN 55113-4061 or at http://www.geosindex.com), and that represent average roll values, are acceptable.
2. Test data from the geotextile production run for each of the specified tests listed in Table 1 or Table 2 or ASTM D6461/D6461M, as applicable.

Table 1 Requirements for Woven Geotextiles [1/]

Property	Test method	Class I	Class II	Class III	Class IV
Grab tensile strength (lb)	ASTM D4632	247 minimum	180 minimum	180 minimum	315
Elongation at failure (%)	ASTM D4632	<50	<50	<50	<50
Trapezoidal tear strength (lb)	ASTM D4533	90 minimum	67 minimum	67 minimum	112 minimum
Puncture strength (lb)	ASTM D6241	495 minimum	371 minimum	371 minimum	618 minimum
Ultraviolet stability (% retained strength)	ASTM D4355	50 minimum	50 minimum	50 minimum	70 minimum
Permittivity (sec-1)	ASTM D4491	as specified			
Apparent opening size (AOS) 2/	ASTM D4751	as specified			
Percent open area (POA) (%)	USACE 3/CWO-02215-86	as specified			

1/ All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

2/ Maximum average roll value.

3/ Note: CWO is a USACE reference.

Table 2 Requirements for Non-Woven Geotextiles 1/

Property	Test method	Class I 2/	Class II 2/	Class III 2/	Class IV 2/
Grab tensile strength (lb)	ASTM D4632 grab test	202 minimum	157 minimum	112 minimum	202 minimum
Elongation at failure (%)	ASTM D4632	50 minimum	50 minimum	50 minimum	50 minimum
Trapezoidal tear strength (lb)	ASTM D4533	79 minimum	56 minimum	40 minimum	79 minimum
Puncture strength (lb)	ASTM D6241	433 minimum	309 minimum	223 minimum	433 minimum
Ultraviolet light (% retained strength)	ASTM D4355	50 minimum	50 minimum	50 minimum	50 minimum
Permittivity sec-1	ASTM D4491	0.70 minimum or as specified			
Apparent opening size (AOS) (mm) 3/	ASTM D4751	0.22 maximum or as specified			

1/ All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

[2/] Needle punched geotextiles may be used for all classes. Heat-bonded or resin-bonded geotextiles may be used for class IV only.

[3/] Maximum average roll value.

END OF SECTION

SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SCOPE

A. The work consists of clearing and grubbing and disposal of trees, snags, logs, brush, stumps, shrubs, and rubbish from the designated areas.

1.02 PRICE AND PAYMENT PROCEDURES

A. Clearing and grubbing shall be included in the lump sum cost of mobilization.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING VEGETATION

A. Protect trees and other vegetation designated to remain undisturbed from damage throughout the duration of the construction period. Any damages resulting from the contractor's operations or neglect must be repaired by the contractor.

B. Earthfill, stockpiling of materials, vehicular parking, and excessive foot or vehicular traffic must not be allowed within the drip line of vegetation designated to remain in place. Vegetation damaged by any of these or similar actions must be replaced with viable vegetation of the same species, similar condition, and like size unless otherwise approved by the Engineer.

C. Any cuts, skins, scrapes, or bruises to the bark of the vegetation must be carefully trimmed, and local nursery-accepted procedures must be used to seal damaged bark.

D. Any limbs or branches 0.5 inches or larger in diameter that are broken, severed, or otherwise seriously damaged during construction must be cut off at the base of the damaged limb or branch, flush with the adjacent limb or tree trunk. All roots 1 inch or larger in diameter that are cut, broken, or otherwise severed during construction operations must have the ends smoothly cut perpendicular to the root. Roots exposed during excavation or other operations must be covered with moist earth or backfilled as soon as possible to prevent the roots from drying out.

3.02 MARKING

A. The limits of the areas to be cleared and grubbed will be marked by stakes, flags, tree markings, or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunk about 6 feet above the ground surface.

3.03 CLEARING AND GRUBBING

A. Clear all trees not marked for preservation and all snags, logs, brush, stumps, shrubs, rubbish, and similar materials from within the limits of the designated areas. Unless otherwise specified, all stumps, roots, and root clusters that have a diameter of 1 inch or larger must be grubbed out to a depth of at least 2 feet below the subgrade for concrete structures and 1 foot below the ground surface at embankment sites and other designated areas.

3.04 DISPOSAL

A. Dispose of all materials cleared and grubbed from the designated areas at locations shown on the drawings. The contractor is responsible for complying with all local rules and regulations and the payment of any fees that may result from disposal at locations away from the project site.

END OF SECTION

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SECTION 31 12 00
CHANNEL CLEARING AND SHAPING

PART 1 GENERAL

1.01 SCOPE

A. The work consists of clearing designated areas by the removal and disposal of trees, logs, stumps, shrubs, brush, and rubbish and the shaping of the channel.

1.02 PRICE AND PAYMENT PROCEDURES

A. For items of work for which specific lump sum prices are established by the contract, the extent of clearing and shaping is not measured or determined for payment. Payment for clearing and shaping is made at the contract lump sum price for the item and constitutes full compensation for all labor, equipment, tools, applicable permits and associated fees for burning and disposal of refuse, and all other items necessary and incidental to the satisfactory completion of the work.

B. The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING VEGETATION

A. Protect trees and other vegetation designated to remain undisturbed from damage throughout the duration of the construction period. Any damages resulting from the contractor’s operations or neglect must be repaired by the contractor.

B. Earthfill, stockpiling of materials, vehicle or equipment parking, and excessive foot or vehicle traffic must not be allowed within the drip line of vegetation designated to remain in place. Vegetation damaged by any of these or similar actions must be replaced with viable vegetation of the same species, similar condition, and like size unless otherwise approved by the Engineer.

C. Any cuts, skins, scrapes, or bruises to the bark of the vegetation must be carefully trimmed and local nursery-accepted procedures must be used to seal damaged bark.

D. Any limbs or branches 0.5 inch or larger in diameter that are broken, severed, or otherwise seriously damaged during construction must be cut off at the base of the damaged limb or branch, flush with the adjacent limb or tree trunk.

E. All roots 1 inch or larger in diameter that are cut, broken, or otherwise severed during channel shaping must have the ends smoothly cut perpendicular to the root. Roots exposed during channel shaping operations must be covered with moist soil as soon as possible to prevent them from drying out.

3.02 MARKING

A. The limits of the areas to be cleared and shaped are marked by stakes, flags, paint, tree markings, or other suitable methods or will be shown on the drawings. Trees to remain standing, undisturbed, and uninjured are designated by special markings.

3.03 CLEARING

A. Trees and other vegetation marked for clearing must be cut off as near the ground surface as conventional tools and equipment normally permit. All trees not marked for preservation and all snags, logs, brush, shrubs, stumps, and rubbish must be cleared from within the area limits identified.

3.04 DISPOSAL

A. Dispose of all woody material, vegetation, and rubbish resulting from clearing from designated areas at the locations and in a manner shown on the drawings or as specified in the contract documentsn.

3.05 SHAPING

A. Shape the channel bottom and side slopes as shown on the drawings. The resulting shaped channel surface must be reasonably smooth. Remove and dispose material excavated during the channel-shaping operation from the channel.

END OF SECTION

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 SCOPE

A. The work consists of the excavation required by the drawings and specifications, as well as the disposal of the excavated materials.

1.02 PRICE AND PAYMENT PROCEDURES

A. Excavation will be included in the price of the other project items. These types of excavations are included, other types of excavations will be paid for separately.

1.03 CLASSIFICATION

A. Excavation is classified as common excavation, rock excavation, or unclassified excavation in accordance with the following definitions.

B. Common excavation is defined as the excavation of all materials that (1) can be excavated, transported, and unloaded using heavy ripping equipment and wheel tractor-scrapers with pusher tractors or (2) can be excavated and dumped into place or loaded onto hauling equipment by excavators having a rated capacity of 1 cubic yard or larger and equipped with attachments (shovel, bucket, backhoe, dragline, or clam shell) appropriate to the material type, character, and nature of the materials.

C. Rock excavation is defined as the excavation of all hard, compacted, or cemented materials that require blasting or the use of ripping and excavating equipment larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of common excavation must be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

1. For the purpose of these classifications, the following definitions apply:
    a. Heavy ripping equipment is a rear-mounted, heavy-duty, single-tooth, ripping attachment mounted on a track-type tractor having a power rating of at least 250-flywheel horsepower, unless otherwise specified in the contract documents.
    b. A wheel tractor-scraper is a self-loading (not elevating) and unloading scraper having a struck-bowl capacity of at least 12 cubic yards.
    c. A pusher tractor is a track-type tractor having a power rating of at least 250-flywheel horsepower equipped with appropriate attachments.

D. Unclassified excavation is defined as the excavation of all materials encountered, including rock materials, regardless of their nature or the manner in which they are removed.

1.04 USE OF EXCAVATED MATERIAL

A. Method 1. To the extent they are needed, all suitable material from the specified excavations must be used in the construction of required permanent earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer. The contractor must not waste or otherwise dispose of suitable excavated material.

B. Method 2. Suitable material from the specified excavations may be used in the construction of required earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer.

1.05 DISPOSAL OF WASTE MATERIALS

A. Method 1. All surplus or unsuitable excavated materials are designated as waste and must be disposed of at the locations shown on the drawings.

B. Method 2. All surplus or unsuitable excavated materials are designated as waste and disposed of by the contractor at chosen sites away from the site of the work. The disposal must be in an environmentally acceptable manner that does not violate local rules and regulations.

1.06 EXCAVATION LIMITS

A. Excavations must comply with the Occupational Safety and Health Administration Construction Industry Standards Subpart P, Excavations, Trenching, and Shoring (29 CFR pt. 1926). All excavations must be completed and maintained in a safe and stable condition throughout the total construction phase. Structure and trench excavations must be completed to the specified elevations and to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work. Excavations outside the lines and limits shown on the drawings or specified herein are required to meet safety requirements and must be the responsibility of the contractor in constructing and maintaining a safe, stable excavation.

1.07 BORROW EXCAVATION

A. When the quantities of suitable material obtained from specified excavations are insufficient to construct the specified earthfills and earth backfills, obtain additional material from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas are as specified in the plans or as approved by the Engineer.

B. Borrow pits must be excavated and finally dressed to blend with the existing topography. They are sloped to prevent ponding and to provide drainage.

1.08 OVER EXCAVATION

A. Correct excavation in rock beyond the specified lines and grades by filling the resulting voids with Portland Cement concrete. Materials and mix proportions must be approved by the engineer. Concrete that will be exposed to the atmosphere when construction is completed must meet the requirements of concrete selected for use under 03 30 54 - Concrete Structures.

B. Concrete that will be permanently covered must contain not less than five bags of cement per cubic yard. The concrete must be placed and cured as specified by the engineer.

C. Correct excavation in earth beyond the specified lines and grades by filling the resulting voids with approved compacted earthfill. The exception to this is that if the earth will become the subgrade for riprap, rockfill, sand or gravel bedding, or drainfill, the voids may be filled with material conforming to the specifications for the riprap, rockfill, bedding, or drainfill. Before correcting an over excavation condition, the contractor must review the planned corrective action with the engineer and obtain approval of the corrective measures.

END OF SECTION

SECTION 31 37 00
ROCK RIPRAP

PART 1 GENERAL

1.01 SCOPE

A. The work consists of the construction of rock riprap revetments and blankets, including filter or bedding where specified.

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver.
   2. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   3. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   4. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   5. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   6. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.
   1. Payment is made at the contract unit price for each type of rock riprap and includes compensation for any aggregate or geotextile installed as specified for filter or bedding. Such payment is considered full compensation for completion of the work.

B. All methods.

1. The following provision applies to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.
2. No separate payment is made for testing the gradation of the test pile. Compensation for testing is included in the appropriate bid item for riprap.

1.04 REFERENCE STANDARDS

A. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate; 2018.

B. ASTM C117 - Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing; 2023.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.

D. ASTM D4992 - Standard Practice for Evaluation of Rock to be Used for Erosion Control; 2022.

E. ASTM D5121 - Standard Practice for Preparation of Rock Slabs for Durability Testing; 2022.

F. ASTM D5240 - Standard Test Method for Evaluation of the Durability of Rock for Erosion Control Using Sodium Sulfate or Magnesium Sulfate; 2020.

G. ASTM D5519 - Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials; 2025.

H. ASTM D6473 - Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control; 2024.

PART 2 PRODUCTS

2.01 ROCK RIPRAP MATERIAL

A. Rock riprap must conform to the following requirements, or, if so specified, must be obtained from designated sources. It must be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.

B. Individual rock fragments must be dense, sound, and free from cracks, seams, and other defects conducive to accelerated weathering. Except as otherwise specified, the rock fragments must be angular to subrounded. The least dimension of an individual rock fragment must be not less than one-third the greatest dimension of the fragment. ASTM D4992 provides guidance on selecting rock from a source.

C. Except as otherwise provided, the rock must be tested and must have the following properties:
   1. Rock Type 1:
      a. Bulk specific gravity (saturated surface-dry basis)—Not less than 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
      b. Absorption—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
      c. Soundness—The weight loss in 5 cycles must not be more than 10 percent when sodium sulfate is used or more than 15 percent when magnesium sulfate is used.
   2. Rock Type 2:
      a. Bulk specific gravity (saturated surface-dry basis)—Not less than 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
      b. Absorption—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
      c. Soundness—The weight loss in 5 cycles must be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.
   3. Rock Type 3:

a. Bulk specific gravity (saturated surface-dry basis)—Not less than 2.3 when tested in accordance withASTM D6473 on samples prepared as described for soundness testing.
b. Absorption—Not more than 4 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
c. Soundness—The weight loss in 5 cycles must be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

D. Methods of Soundness Testing
1. Rock cube soundness:
a. The sodium or magnesium sulfate soundness test for all rock types (1, 2, or 3) must be performed on a test sample of 5,000 ± 300 grams of rock fragments, reasonably uniform in size and cubical in shape, and weighing, after sampling, about 100 grams each. They must be obtained from rock samples that are representative of the total rock mass, as noted in ASTM D4992, and that have been sawed into slabs as described in ASTM D5121. The samples must further be reduced in size by sawing the slabs into cubical blocks. The thickness of the slabs and the size of the sawed fragments must be determined by the size of the available test apparatus and as necessary to provide, after sawing, the approximate 100-gram samples. The cubes must undergo five cycles of soundness testing in accordance with ASTM C88.
b. Internal defects may cause some of the cubes to break during the sawing process or during the initial soaking period. Do not test any of the cubes that break during this preparatory process. Such breakage, including an approximation of the percentage of cubes that break, must be noted in the test report.
c. After the sample has been dried following completion of the final test cycle and washed to remove the sodium sulfate or magnesium sulfate, the loss of weight must be determined by subtracting from the original weight of the sample the final weight of all fragments that have not broken into three or more fragments.
d. The test report must show the percentage loss of the weight and the results of the qualitative examination.
2. Rock slab soundness:
a. When specified, the rock must also be tested in accordance with ASTM D5240. Deterioration of more than 25 percent of the number of blocks must be cause for rejection of rock from this source. Rock must also meet the requirements for average percent weight loss stated below.
b. For projects located north of the Number 20 Freeze-Thaw Severity Index Isoline (Figure 1 below), unless otherwise specified, the average percent weight loss for Rock Type 1 must not exceed 20 percent when sodium sulfate is used or 25 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss must not exceed 25 percent for sodium sulfate soundness or 30 percent for magnesium sulfate soundness.
c. For projects located south of the Number 20 Freeze-Thaw Severity Index Isoline, unless otherwise specified, the average percent weight loss for Rock Type 1 must not exceed
d. 30 percent when sodium sulfate is used or 38 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss must not exceed 38 percent for sodium sulfate soundness or 45 percent for magnesium sulfate soundness.

Figure 1 - Isoline Map of the Freeze-Thaw Severity Index for Contiguous 48 United States (map is from ASTM D5312)

E. Field Durability Inspection
   1. Rock that fails to meet the material requirements stated above (if specified), may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.
   2. A rock source may be rejected if the rock from that source deteriorates in less than 5 years under similar use and exposure conditions expected for the rock to be installed under this specification, even though it meets the testing requirements stated above.
   3. Deterioration is defined as the loss of more than one-quarter of the original rock volume, or severe cracking that would cause a block to split. Measurements of deterioration are taken from linear or surface area particle counts to determine the percentage of deteriorated blocks. Deterioration of more than 25 percent of the pieces must be cause for rejection of rock from the source.

F. Grading
   1. The rock must conform to the specified grading limits after it has been placed within the matrix of the rock riprap. Grading tests must be performed, as necessary, according to ASTM D5519, Method A, B, or C, as applicable.
   2. Gradation must meet the requirements of Table 1. Nominal stone size and total thickness are as indicated in plans.

Table 1

RIPRAP GRADATION REQUIREMENTS

Stone Size d50[1] (Inches)	Percent of Material Smaller Than Typical Stone[2]	Typical Stone Dimensions[3] (Inches)	Typical Stone Weight[4] (Pounds)
6	70-100	12	85
	50-70	9	35
	35-50	6	10
	2-10	2	0.4
9	70-100	15	160
	50-70	12	85

	35-50 2-10	9 3	35 1.3
12	70-100 50-70 35-50 2-10	21 18 12 4	440 275 85 3
18	100 50-70 35-50 2-10	30 24 18 6	1280 650 275 10
24	100 50-70 35-50 2-10	42 33 24 9	3500 1700 650 35
Notes: 1. d50 = nominal stone size 2. based on typical rock mass 3. equivalent spherical diameter 4. based on a specific gravity = 2.5			

G. At least 30 days before rock is delivered from other than designated sources, the contractor must designate in writing the source from which rock material will be obtained and provide information satisfactory to the Engineer that the material meets contract requirements. The contractor must provide the Engineer free access to the source for the purpose of obtaining samples for testing.

H. Rock from approved sources must be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

I. Based on a specific gravity of 2.65 (typical of limestone and dolomite) and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are given in Table 1:

Table 1 Typical Riprap Size/Weight Relationship

Sieve Size of Rock	Approx. Weight of Rock	Weight of Test Pile
16 inches	300 pounds	6,000 pounds
11 inches	100 pounds	2,000 pounds
6 inches	15 pounds	300 pounds

J. When specified in the contract or when it is necessary to verify the gradation of the rock riprap, a particle size analysis must be performed in accordance with ASTM D5519, Test Method A or B. The analysis must be performed at the worksite on a test pile of representative rock. The mass of the test pile must be at least 20 times the mass of the largest rock in the pile. The results of the test are compared to the gradation required for the project. Test pile results that do not meet the construction specifications must be cause for the rock to be rejected. The test pile that meets contract requirements must be left on the jobsite as a sample for visual comparison. The test pile must be used as part of the last rock riprap to be placed.

2.02 FILTER AND BEDDING AGGREGATE MATERIAL

A. Drainfill and filter aggregates shall be sand, gravel, or crushed stone or mixtures thereof. Aggregates shall be composed of clean, hard, durable, mineral particles free from organic matter, clay balls, soft particles, or other substances that would interfere with the free draining properties of the aggregates.

B. Coarse aggregate may be crushed limestone or other material that has limestone particles included. Aggregates from crushed limestone shall be thoroughly washed and screened to

remove limestone dust, limestone fines, and fine soil particles. Limestone shall not be used for fine aggregates except in combination with other material, such that not more than 5 percent of the portion finer than the No. 4 sieve shall be limestone.

C. Aggregates shall be tested for soundness according to ASTM C88 and shall have a weighted average loss in 5 cycles of not more than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

D. Drainfill and filter aggregates shall conform to the specified grading limits after being placed or after being compacted when compaction is specified. Grading shall be determined by ASTM C136/C136M. The percentage of material finer than the No. 200 sieve shall be determined by the method in ASTM C117.

E. Drainfill and filter aggregates shall be stored and handled by methods that prevent segregation of particle sizes or contamination by mixing with other material.

2.03 GEOTEXTILE MATERIALS

A. Geotextiles must conform to Section 31 05 19 - Geotextiles.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed must be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it must consist of approved material and conform to the requirements of the specified class of earthfill.

B. Rock riprap, filter, bedding, or geotextile must not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved.

3.02 EQUIPMENT-PLACED ROCK RIPRAP

A. The rock riprap must be placed by equipment on the surface and to the depth specified. It must be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap must be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface.

B. Rock riprap must be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

3.03 HAND-PLACED ROCK RIPRAP

A. The rock riprap must be placed by hand on the surface and to the depth specified. It must be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks must be filled with smaller rocks and spalls. Smaller rocks must not be grouped as a substitute for larger rock. Flat slab rock must be laid on its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

3.04 FILTER OR BEDDING

A. When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material must be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material must be finished reasonably smooth and free of mounds, dips, or windrows.

END OF SECTION

SECTION 32 86 10
PARSHALL FLUME

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing and installing a Parshall flume and other appurtenances.

B. All measurement device standards, specifications, and requirements set forth by the Division 6 and Division 7 Measurement Rules (Case Nos. 22CW3102, and 24CW3042, respectively), must be met. Link to CDWR Website on Flow Measurement: https://dwr.colorado.gov/services/flow-measurement

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver.
   2. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   3. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   4. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   5. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   6. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

Table 1 Typical Riprap Size/Weight Relationship

1.03 PRICE AND PAYMENT PROCEDURES

A. Device Furnishment (Flume Only) – The number of each size of Parshall flume is counted. Payment for furnishing each size of Parshall flume must be made at the contract unit price for that type and size of flume.

B. Installation - Payment for installing each size of Parshall flume must be made at the contract unit price for that type and size of flume. Such payment constitutes full compensation for all

labor, equipment, materials, and other items necessary and incidental to the completion of the work including furnishing and installing anchor systems and all specified appurtenances and fittings. This includes any shipping and handling necessary to transport the flume from the manufacturer to the project site.

C. Compensation for any item of work described in the contract (including those described in the plans, details, and specifications) but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

1.04 REFERENCE STANDARDS

A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012 (Reapproved 2021).

PART 2 MATERIALS

2.01 MATERIALS

A. Parshall flumes - may be constructed of galvanized steel, precast concrete, or mild steel. Mild steel flumes must either be painted (prepared/sanded, automotive paint) or include a cathodic protection system (see NRCS-NAT Metal Fabrication and Installation Specification Sheet).
   1. Depending on material, flumes must be constructed of the following material thickness, depending on flume size:

Flume Size (throat width)	Steel Thickness	
	Galvanized	Mild
3” – 30”	12 ga.	3/16”, (1/4” >18” throat)
36” – 48”	10 ga.	¼”
> 48”	3/16”	¼”

B. Leveling Stand
   1. Footer components must be concrete (pre-cast, or cast-in-place)
   2. Steel components:
      a. Angle iron, mild steel, and no smaller than 2”x2”x1/4”
      b. All-thread rods, nuts, bolts, washers – shall be galvanized or stainless steel

C. Wingwalls & Cutoff Wall
   1. Prefabricated – shall be of the same material, thickness, and finish as flume.
   2. If installed on site – smooth-faced material surface (ex. steel, concrete, grouted-in flat surface rock or other material).

D. Entrance Ramp
   1. Prefabricated – shall be of the same material, thickness, and finish as flume.
   2. If installed on site – should either be cast-in-place concrete, or steel of the same material, thickness, and finish as flume

E. Scour Pad (Exit side)
   1. Scour pad must be constructed of concrete (cast-in-place, grouted cobbles, or grouted riprap.

F. Staff Gauge - shall be steel with a durable porcelain enamel finish, white background and black gradation marks every 1/100th foot and tenth foot.

PART 3 EXECUTION

3.01 FLUME GEOMETRY DATA

Figure 1 – Parshall flume dimensions (U.S. BOR Water Measurement Manual)

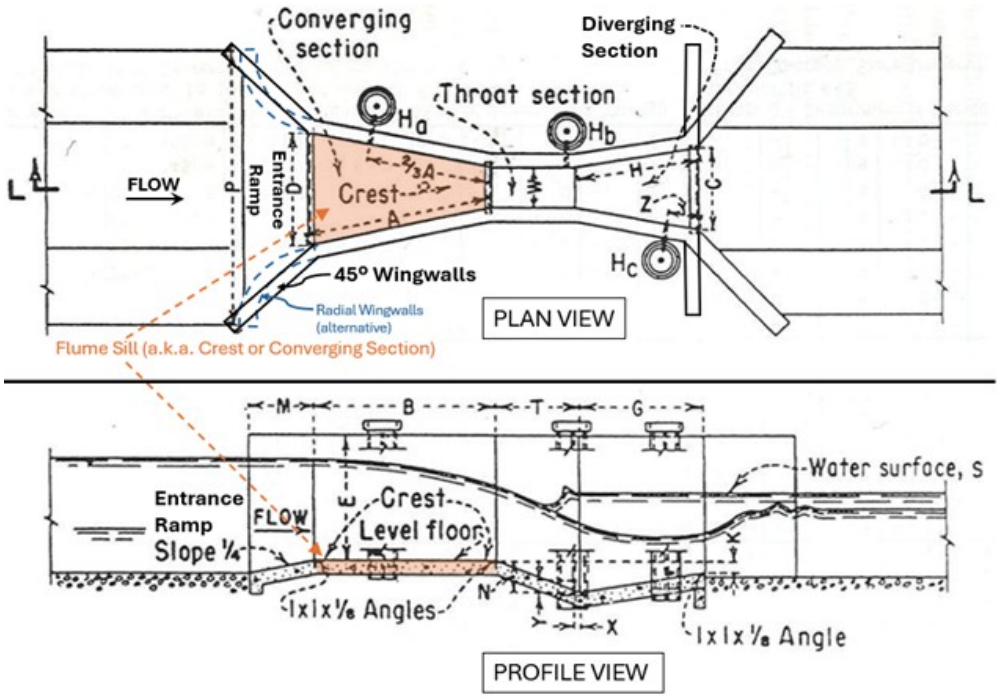

Figure 2 – Parshall flume dimensions table (U.S. BOR Water Measurement Manual)

	W		A		⅔A		B		C		D		E		T		G		H		K		M		N		P		R		X		Y		Z	
	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
2i	0	1 11/32	1	2 23/32	0	9 17/32	1	2	0	3 11/32	0	6 25/32	0	6 to 9	0	3	0	8	0	8 1/8	0	3/4	–	–	0	1 1/8		–	–		0	5/16	0	1/2	0	1/8
		2 11/32	1	4 21/32		10 7/8	1	4		5 5/16		8 25/32	6 to 10			4 1/2		10		10 1/8		7/8	–	–		1 11/16		–	–			3/8		1		1/4
		3 11/32	1	6 3/8	1	1/4	1	6		7		10 3/8	1 to 1½			6	1	0	1	5/32		1	–			2 1/4		–	–			1 1/2		1½		1/2
3i	0	6	2	7/16	1	4 3/16	2	0	1	3 1/2	1	3 3/8	2	0	1	0	2	0	–		0	3	1	0	0	4 1/2	2	11 1/2	1	4	0	2	0	3	–	
		9	2	10 3/8	1	11 1/8	2	10	1	3	1	10 3/8	2	6	1	0	1	6	–			3	1	0		4 1/2	3	6 1/2	1	4		2		3	–	
	1	0	4	6	3	0	4	4 7/8	2	0	2	9 1/4	3	0	2	0	3	0	–			3	1	3		9	4	10 3/4	1	8		2		3	–	
	1	6	4	9	3	2	4	7 7/8	2	6	3	4 3/8	3	0	2	0	3	0	–			3	1	3		9	5	6	1	8		2		3	–	
	2	0	5	0	3	4	4	10 7/8	3	0	3	11 1/2	3	0	2	0	3	0	–			3	1	3		9	6	1	1	8		2		3	–	
	3	0	5	6	3	8	5	4 3/4	4	0	5	1 7/8	3	0	2	0	3	0	–			3	1	3		9	7	3 1/2	1	8		2		3	–	
	4	0	6	0	4	0	5	10 5/8	5	0	6	4 1/4	3	0	2	0	3	0	–			3	1	6		9	8	10 3/4	2	0		2		3	–	
	5	0	6	6	4	4	6	4 1/2	6	0	7	6 3/8	3	0	2	0	3	0	–			3	1	6		9	10	1 1/4	2	0		2		3	–	
	6	0	7	0	4	8	6	10 3/8	7	0	8	9	3	0	2	0	3	0	–			3	1	6		9	11	3 1/2	2	0		2		3	–	
	7	0	7	6	5	0	7	4 1/4	8	0	9	11 3/8	3	0	2	0	3	0	–			3	1	6		9	12	6	2	0		2		3	–	
	8	0	8	0	5	4	7	10 1/2	9	0	11	1 3/4	3	0	2	0	3	0	–			3	1	6		9	13	8 1/4	2	0		2		3	–	
4i	10	0	–		6	0	14	0	12	0	15	7 1/2	4	0	3	0	6	0	–		0	6	–		1	1 1/2	–		–		0	9	1	0	–	
	12	0	–		6	8	16	0	14	8	18	4 3/4	5	0	3	0	8	0	–			6	–		1	1 1/2	–		–			9	1	0	–	
	15	0	–		7	8	25	0	18	4	25	0	6	0	4	0	10	0	–			9	–		1	6	–		–			9	1	0	–	
	20	0	–		9	4	25	0	24	0	30	0	7	0	6	0	12	0	–		1	0	–		2	3	–		–			9	1	0	–	
	25	0	–		11	0	25	0	29	4	35	0	7	0	6	0	13	0	–		1	0	–		2	3	–		–			9	1	0	–	
	30	0	–		12	8	26	0	34	8	40	4 3/4	7	0	6	0	14	0	–		1	0	–		2	3	–		–			9	1	0	–	
	40	0	–		16	0	27	0	45	4	50	9 1/2	7	0	6	0	16	0	–		1	0	–		2	3	–		–			9	1	0	–	
	50	0	–		19	4	27	0	56	8	60	9 1/2	7	0	6	0	20	0	–		1	0	–		2	3	–		–			9	1	0	–	

3.02 WINGWALLS AND CUTOFF WALLS

A. Entrance-side wingwalls and cutoff wall – shall be mounted at 45° from entrance flow direction, upstream. Wingwalls shall be installed to direct all flow into flume, prevent piping and/or flow-around up to the top of flume (or desired measurable flow rate), and maintain laminar flow conditions at flume entrance.

*Alternatively, radial wingwalls are acceptable.

1. Entrance-side wingwalls must match height of flume and extend a minimum of 6-inches below flume sill (floor of convergence section).
   a. Cutoff wall should extend a minimum of 6-inches below flume sill.

b. Cutoff wall should seal to wingwalls and flume sill entrance.

2. Wingwalls shall be fabricated and installed such that all flow-faces (directing water into convergence of flume) are either 45° from ditch flow direction (Figure 1), or radial. No surface faces in flume entrance shall be perpendicular to ditch flow direction.

B. Exit-side wingwalls and cutoff wall - are required when specified on the plans.
   1. Exit-side wingwalls and cutoff wall should also match flume height;
   2. Extend a minimum of 6-inches below flume floor at exit;
   3. Seal to wingwalls.

3.03 ENTRANCE RAMP

A. 1. Entrance Ramp required when flume sill is elevated above ditch channel to create smooth transition and maintain laminar flow conditions into flume entrance.
   1. Maximum slope of entrance ramp 4:1 (h:v).
   2. Entrance ramp should lead directly into convergence section of flume with no lip or vertical drop.

3.04 FOUNDATION & LEVELING STAND

*Note: Alternate designs of leveling stand shall not be used unless prior approval by engineer on case-by-case basis.

A. Sub-Grade Foundation for leveling stand footers should be undisturbed naturally compacted earth when possible. If needed, sub-grade may be an optimum moisture, compacted material: 95% of ASTM D698 Standard Proctor Density. Native may be used when free of large (>6”) rocks and organic matter.

B. Parshall flumes constructed of steel must be installed using an anchoring system such as the leveling stand, as shown in the standard detail Drawing No. 2 – Flume Leveling Stand and further specified below.

C. Precast concrete Parshall flumes shall be installed without a leveling stand, within the specified levelness tolerance.

D. Concrete Components – Concrete footings used in the leveling stand shall conform to Construction Specification 32-Concrete Structure, unless exempted by engineer per project detail.

E. Flumes shall not be bedded or encased in concrete. This includes other anchoring methods that do not allow vertical adjustments to be made to the flume.
   1. Leveling stand components used to set flume elevation and fine-tune level, may be backfilled and covered, but shall remain accessible by hand-digging or similar methods. Access to leveling components allows for releveling and/or elevation adjustments in the event of settling, submergence, channel overtopping, or other events that may require vertical adjustments to be made to the flume.

F. Upon installation, leveling stands should be installed in a manner that flume set elevation can be adjusted by a minimum of 6 inches vertically upward.

3.05 DEVICE ACCEPTANCE

A. Dimensional Tolerances
   1. Flume internal dimensions:
      a. Throat width must be within 1/16 inch.
      b. Sidewalls of flume throat must be parallel and vertical.
      c. All other internal flume dimensions must be within 1/8 inch.
   2. Wingwall angle: +/- 3° (42° - 48°) relative to upstream flume entrance lip.

3.06 INSTALLATION REQUIREMENTS & ACCEPTANCE

A. Flume Levelness – the Parshall flume’s sill (or convergence section, shown on Figure 1) must be installed level front-to-back and side-to-side.

1. Sill Levelness Tolerance: Any two points of flume crest must be within a 0.02-foot difference.

B. Set Elevation – Prior to installation, engineer (SGM) to set benchmark stake near flume location and provide vertical offset from benchmark stake, to establish the set elevation at which the flume sill is to be installed.
   1. Flume sill must be installed within .05’ of set elevation.

C. Approach Conditions:
   1. Approach channel conditions must include 10X to 20X flume’s throat widths of straight ditch channel of consistent width and grade, and calm (laminar) flow conditions.
   2. Any baffling or energy dissipation structures installed in approach channel shall be installed at a minimum distance of 10X the maximum measuring head (stage) upstream of the flume entrance.

D. Exit Conditions – Exit channel conditions must be conducive to free-flow conditions (non-submergence) across required measurable flow range.

E. Entrance-side Wingwalls:
   1. If wingwalls are not prefabricated, they may be installed at site from smooth-faced material surface (ex. steel, concrete, grouted-in flat surface rock or other material).
   2. There shall be no vertical faces of wingwalls installed perpendicular to ditch flow.

***FOR ADDITIONAL INSTALLATION DETAILS, SPECIFICATIONS, AND CONSIDERATIONS, PLEASE SEE PARSHALL FLUME STANDARD DETAIL DRAWING.**

END OF SECTION

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SECTION 32 86 13
OTHER FLUMES

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing and installing “non-Parshall” type flumes, such as “Montana”, “H”, “Cutthroat”, “Ramp” and other flumes.

B. All measurement device standards, specifications, and requirements set forth by the Division 6 and Division 7 Measurement Rules (Case Nos. 22CW3102, and 24CW3042, respectively), must be met. Link to CDWR Website on Flow Measurement: https://dwr.colorado.gov/services/flow-measurement

C. This specification makes references to the “Parshall Flume” requirements. Refer to 32 86 10 - Parshall Flume for additional requirements.

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver.
   2. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   3. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   4. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   5. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   6. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Device Furnishment (Flume Only) – The number of each type and size of flume is counted. Payment for furnishing each type and size of flume must be made at the contract unit price for that type and size of flume.

B. Installation - Payment for installing each type and size of flume must be made at the contract unit price for that type and size of flume. Such payment constitutes full compensation for all labor, equipment, materials, and other items necessary and incidental to the completion of the work including furnishing and installing anchor systems and all specified appurtenances and fittings. This includes any shipping and handling necessary to transport the flume from the manufacturer to the project site.

C. Compensation for any item of work described in the contract (including those described in the plans, details, and specifications) but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 MATERIALS

2.01 GENERAL REQUIREMENTS

A. “Other flumes” may be constructed of one of the following:

B. Galvanized Steel – 12 ga minimum

C. Mild Steel: 3/16” (small and medium flumes); 1/4” large flumes (determined by SGM)

D. Mild steel flumes must be painted per Section 09 90 00 - Painting Metalwork or include a cathodic protection system.

E. Concrete – refer to specification: NRCS-NAT-32-Concrete Structure

PART 3 EXECUTION

3.01 “OTHER” FLUMES GEOMETRY

A. Montana Flumes
   1. Follow requirements of Parshall flume, without the portion of the flume constructed downstream from the end of the converging section.
   2. No submergence can occur for the required measurable flow range.

3.02 H-FLUMES

A. Dimensional data for H flumes will be provided as part of the project plans & details on a project specific basis.

B. Approach Conditions: Entrance conditions must include 3X to 5X H-Flume height of straight ditch channel of consistent width and grade, and calm (laminar) flow conditions.

C. Exit Conditions: No submergence can occur for the required measurable flow range.

D. Same requirements as Parshall Flume for:
   1. Entrance Wingwalls
   2. Leveling Stand (unless cantilevered from headwall)
   3. Entrance Ramp
   4. Scour Pad
   5. Staff Gauge
   6. Levelness
   7. Set Elevation

3.03 RAMP FLUMES

A. Ramp flumes may be selected in cases where very little drop (or flume elevation opportunity) exists, or a large measurable flow range is required.

B. Dimensional data for Ramp flumes will be provided as part of the project plans & details on a project specific basis.

C. Same requirements as Parshall Flume for:
   1. Entrance Wingwalls
   2. Leveling Stand
   3. Entrance Ramp
   4. Staff Gauge

5. Levelness
6. Set Elevation

3.04 CUTTHROAT FLUMES

A. Cutthroat flumes may be selected in cases where very little drop (or flume elevation opportunity) exists.

B. Dimensional data for Cutthroat flumes will be provided as part of the project plans & details on a project specific basis.

C. Same requirements as Parshall Flume for:
   1. Entrance Wingwalls
   2. Leveling Stand
   3. Entrance Ramp
   4. Staff Gauge
   5. Levelness
   6. Set Elevation

3.05 WINGWALLS AND CUTOFF WALLS

A. Refer to Parshall Flume specification.

3.06 ENTRANCE RAMP

3.07 MONTANA FLUMES, H-FLUMES, AND CUTTHROAT FLUMES – REFER TO PARSHALL FLUME SPECIFICATION

A. May not apply to all Ramp Flumes.

3.08 FOUNDATION & LEVELING STAND

A. All steel flumes must be installed with an anchoring system, such as a leveling stand shown in the standard detail and further specified below.

B. Concrete Components – Concrete footings used in the leveling stand shall conform to Construction Specification 32-Concrete Structure, unless exempted by engineer per project detail.

3.09 DEVICE ACCEPTANCE

A. Dimensional Tolerances
   1. Flume internal dimensions:
      a. Throat width (or control section width) must be within 1/16 inch.
      b. Sidewalls of flume in control section must be vertical (tolerance = 0.5° from vertical).
      c. All other internal flume dimensions must be within 1/8 inch, and within +/- 3°.
   2. Wingwalls
      a. Angles +/- 3°.

3.10 INSTALLATION REQUIREMENTS & ACCEPTANCE

A. Flume Levelness – the flume's sill (highest crest surface) must be installed level front-to-back and side-to-side.
   1. Sill Levelness Tolerance: Any two points of flume crest must be within a 0.02-foot difference.

B. Set Elevation
   1. Prior to installation, engineer (SGM) to set benchmark stake near flume location and provide vertical offset from benchmark stake, to establish the set elevation at which the flume sill is to be installed.
      a. Flume sill must be installed within .05' of set elevation.

C. Approach Conditions
   1. Approach channel conditions vary by flume type, but generally 10X to 20X flume throat width will be required of straight ditch channel of consistent width and grade, and calm (laminar) flow conditions.

2. Approach channel conditions for H-Flumes require 3X to 5X of flume height, to be straight ditch channel of consistent width and grade, and calm (laminar) flow conditions.
3. Any baffling or energy dissipation structures installed in approach channel shall be installed at a minimum distance of 10X the maximum measuring head (stage) upstream of flume entrance.

D. Exit Conditions
1. Exit channel conditions must be conducive to free-flow conditions (non-submergence) across required measurable flow range.
2. Flume exit shall be armored (ex. exit wing walls with scour pad or grouted riprap) to prevent channel erosion, scour, and undermining of the flume.

E. Entrance-Side Wing Walls:
1. If wingwalls are not prefabricated, they may be installed at site from smooth-faced material surface (ex. steel, concrete, grouted-in flat surface rock or other material).
2. There shall be no vertical faces of wing walls installed perpendicular to ditch flow direction.

END OF SECTION

SECTION 32 86 20
WEIR PLATES

PART 1 GENERAL

1.01 SCOPE

A. The work consists of furnishing and installing a Weir Plate.

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Device Furnishment (Weir Plate Only) – The number of each type and size of weir plate is counted. Payment for furnishing each type and size of weir plate must be made at the contract unit price for that type and size of weir plate.

B. Installation - Payment for installing each type and size of weir plate must be made at the contract unit price for that type and size of weir plate. Such payment constitutes full compensation for all labor, equipment, materials, and other items necessary and incidental to the completion of the work including furnishing and installing anchor systems and all specified appurtenances and fittings. This includes any shipping and handling necessary to transport the weir plate from the manufacturer to the project site.

C. Compensation for any item of work described in the contract (including those described in the plans, details, and specifications) but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 PRODUCTS

2.01 MATERIAL

A. Weir Plates may be constructed of one of the following:
   1. 48” wide & Smaller: 3/16” Stainless Steel (minimum)
   2. Wider than 48”: 1/4” Stainless Steel (minimum)

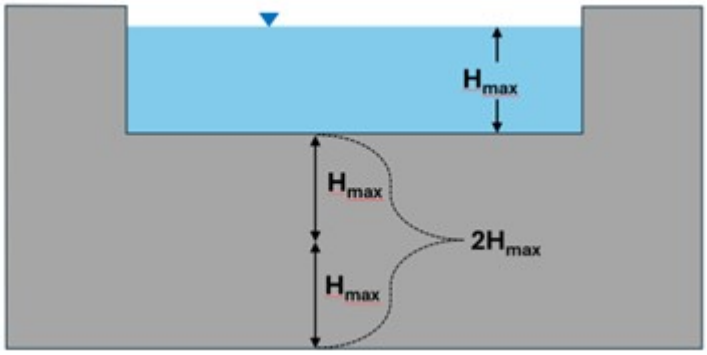
B. Reinforcement/Stiffening
   1. Weir Plates wider than 48” across shall have a 2”x2”x1/4” angle on the downstream side of the plate, parallel to the floor, centered between the floor and crest of the weir.

PART 3 EXECUTION

3.01 VERTICAL CONTRACTION

A. Sufficient vertical contraction is required for all sharp-crested weir types and sizes, based on the maximum measurement head (Hmax).
   1. To achieve sufficient vertical contraction, the vertical length from the bottom of the weir plate up to the weir crest (opening or invert of the “V” for V-Notch Weirs) must be greater than or equal to two times Hmax (2Hmax). See Figure 1 below:

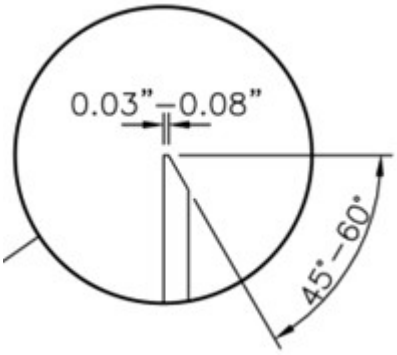
Figure 1. Weir



3.02 WEIR BLADE CHAMFER

A. Weir plate must be chamfered on the downstream edge of the plate at a consistent 45-60º angle to create a thin crest between .03” and .08” in thickness. See Figure 2 below:

Figure 2



3.03 REQUIRED CONDITIONS

A. The upstream face of the weir plates and bulkhead should be plumb, smooth, and normal to the axis of the channel.

B. The entire crest should be level for rectangular and trapezoidal shapes, and the bisector of the V-notch angles should be plumb.

C. The edges of the weir opening should be located in one plane, and the corners should have proper specified angles.

D. The upstream edges of the weir opening plates must be straight and sharp. Edges of plates require machining or filing perpendicular to the upstream face to remove burrs or scratches and should not be smoothed off with abrasive cloth or paper. Avoid knife edges because they are a safety hazard and damage easily.

E. The measurement of head on the weir is the difference in elevation between the crest and the water surface at a point located upstream from the weir a distance of at least four times the maximum head on the crest.

F. Additional requirements and limitations to different types of weirs may apply.

3.04 INSTALLATION REQUIREMENTS & ACCEPTANCE

A. Set Elevation - Device must be installed within .05’ of relative elevation to provided benchmark (if provided)

B. Levelness Check - Weir plates must be installed level. The ends of the crest must be no more than 0.005-foot difference in elevation.

END OF SECTION

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SECTION 32 86 30
FLOW METERS

PART 1 GENERAL

1.01 SCOPE

A. This specification covers the furnishing, installation, and testing of electromagnetic flow meters.

B. All measurement device standards, specifications, and requirements set forth by the Division 6 and Division 7 Measurement Rules (Case Nos. 22CW3102, and 24CW3042, respectively), must be met. Link to CDWR Website on Flow Measurement: https://dwr.colorado.gov/services/flow-measurement

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Device Furnishment (Meter Only) – The number of each type and size of meter is counted. Payment for furnishing each type and size of meter must be made at the contract unit price for that type and size of meter.

B. Installation - Payment for installing each type and size of meter must be made at the contract unit price for that type and size of meter. Such payment constitutes full compensation for all labor, equipment, materials, and other items necessary and incidental to the completion of the

work including furnishing and installing anchor systems and all specified appurtenances and fittings.

C. Compensation for any item of work described in the contract (including those described in the plans, details, and specifications) but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Compensation for any item of work described in the contract but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 MATERIALS

2.01 APPROVED METER TYPES

A. Electromagnetic Flow Meters (Mag Meter)
   1. Full-Spool Mag Meters
   2. Insertion Mag Meters

B. Ultrasonic (Clamp-on) Flow Meters – to be specified on a project-basis

C. Area Velocity Flow Meters (AVFM) – to be specified on a project-basis

D. *Propeller/paddle flow meters – not allowed

2.02 PERFORMANCE REQUIREMENTS (REFER TO MANUFACTURER'S DETAIL/SPECIFICATION SHEET)

2.03 FLOW RANGE/CALIBRATION

A. Accuracy requirements: ±5% of reading

2.04 INSTALLATION REQUIREMENTS & ACCEPTANCE

A. For full-pipe flow meters (Mag Meters, Ultrasonic Flow Meters), meter must be installed in location that ensures full-pipe conditions across all flow rates.

B. Flow meters shall be installed in accordance with manufacturer recommendation and project-specific designs.

   *For additional installation details, specifications, and considerations, please see to Above-Ground Meter Installation Standard Detail Drawing.

2.05 POWER & OUTPUT REQUIREMENTS (REFER TO MANUFACTURER’S RECOMMENDATIONS FOR THE FOLLOWING)

A. Power supply
   1. Permanent on-site AC or DC power should be used to power flow meter, see manufacturer’s requirements for connection.
   2. DC Solar array may be specified on project specific basis.
   3. Battery-only power should only be used if AC or DC power is not available at the site.
   4. Flow monitoring units – must be in GPM or CFS.
   5. Display – Read out must include totalizing and instantaneous flow measurements
   6. Datalogger – 15-minute minimum logging interval.

END OF SECTION

SECTION 32 86 40
RECORDING AND TELEMETRY SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. A recording device may be required for any measuring device (project) pursuant to terms and conditions of a water court decree, the terms and conditions of a well permit, or as may be reasonably required by the Division Engineer.

B. For projects that require a recording device: The work consists of furnishing and installing recording and telemetry systems per the required performance characteristics as defined in the project documents.

C. All measurement device standards, specifications, and requirements set forth by the Division 6 and Division 7 Measurement Rules (Case Nos. 22CW3102, and 24CW3042, respectively), must be met. Link to CDWR Website on Flow Measurement: https://dwr.colorado.gov/services/flow-measurement

1.02 PROCUREMENT REQUIREMENTS

A. Domestic Preferences for Procurements (2 CFR 200.322).
   1. The Vendor, as appropriate and to the extent consistent with law, shall provide a preference for the purchase, acquisition, or use of goods, products, or materials purchased in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

B. Buy America Domestic Procurement Preference.
   1. As required by Section 70914 of the Bipartisan Infrastructure Law, all of the iron, steel, manufactured products, and construction materials used under this Agreement are to be produced in the United States, unless subject to an approved waiver. The following requirements apply:
      a. All iron and steel used in the project are produced in the United States – this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
      b. All manufactured products used in the project are produced in the United States – this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent (%) of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of manufactured product has been established under applicable law or regulation; and
      c. All construction materials are manufactured in the United States – this means that all manufacturing processes for the construction material occurred in the United States.
   2. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project.
   3. The Buy America preference does not apply to tools, equipment and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project.
   4. The Buy America preference does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.
   5. When necessary, the Client, Contractor, or Subcontractor may apply for, and the Department of Interior may grant, a waiver from these requirements, subject to review by the Made in America Office.

1.03 PRICE AND PAYMENT PROCEDURES

A. Device Furnishment – The number of each type of Recording and Telemetry Device is counted. Payment for furnishing each Recording and Telemetry Device must be made at the contract unit price for that type of Recording and Telemetry Device.

B. Installation - Payment for installing each type of Recording and Telemetry Device must be made at the contract unit price for that type of Recording and Telemetry Device System. Such payment constitutes full compensation for all labor, equipment, materials, and other items necessary and incidental to the completion of the work including furnishing and installing electronics stations and all specified appurtenances and fittings. This includes any shipping and handling necessary to acquire all devices and materials from the manufacturer to the project site.

C. Compensation for any item of work described in the contract (including those described in the plans, details, and specifications) but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

PART 2 MATERIALS

2.01 SYSTEM COMPONENTS AND FUNCTIONALITY

A. Systems may include:
   1. Recording Device only
      a. With built-in datalogger
      b. Separate datalogger
   2. Recording and Telemetry Device
   3. Electronics Station: Parts, materials, and electrical components such as:
      a. Station enclosure
      b. Mast and fittings
      c. Power Supply
      d. Antennas, cables, fittings
      e. Solar panel or array, and charge controller
      f. Batteries
      g. Other parts, materials, and supplies, as needed

B. Calibration / Visual Verification
   1. Recording device must include a means to verify that the recording device is properly calibrated, such as:
      a. A display (local or telemetry-accessible) with readout of raw stage/flow rate, stage offset/flow rate adjustment (calculation), and adjusted stage/flow rate.
      b. A means to adjust the stage offset or flow rate calculation while on site (calibration).

C. Telemetry Devices shall utilize one of the following network communication methods:
   1. Cellular
   2. Wi-Fi
   3. Satellite
      a. Functionality: Remote access with the ability to see live sensor readouts, view and apply or adjust sensor offsets, and ability to download data logs.

2.02 APPROVED DEVICE TYPES:

A. Recording Devices
   1. Radar Sensors (down-looking stage sensor)
   2. Shaft-Encoders, ex. Stage Discharge Recorder (beaded cable with pulley wheel, float and counterweight attached to a Shaft Encoder, installed in stilling well)
   3. Pressure Sensors

B. Vented pressure sensor, or;
      a. Absolute pressure sensor pair: One for water stage measurement, and one for barometric pressure compensation (requires post-processing).
   2. Bubbler Level Sensors (installed in stilling well)
   3. Flow Meters:

a. Electromagnetic Flow Meter
    1) Full spool meter, insertion meter, but no propeller or paddle-wheel meters allowed.
b. Area Velocity Flow Meter - measures stage and velocity (requires datalogger programmed with flow calculation specific to measurement device).

C. Dataloggers
1. Stand-alone Datalogger
2. Self-logging sensors (ex. self-logging pressure sensor, Stage Discharge Recorder)
3. Flow meter panel (built-in datalogger)

D. Telemetry Devices
1. Stand-alone cell modem connected to datalogger
2. Datalogger with built-in telemetry device (ex. datalogger-cell modem, datalogger-Wi-Fi unit)
3. Satellite Telemetry Unit
    a. Activated Service – included with Telemetry Device (ex. SIM card, Wi-Fi network connection with static public IP address, satellite telemetry service plan).
    b. Service costs to be passed along to measurement device owner, administered by device manufacturer or by installer (provided they are an authorized service provider/dealer).

2.03 USER MANUALS & GUIDES

A. As a part of the project, installer must provide the User Manuals for the devices installed.

B. Installer to provide a written document describing the instrumentation and electronics installed with project-specific information on how to use and read the devices installed, and any other pertinent information for use and maintenance of the equipment.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Recording Device sensor must be installed (anchored) in an appropriate manner at the correct measurement location for a given measurement device.

B. Power source for electronic devices (such as solar power supply), is appropriately sized and charging components (if included) are functional and are providing the appropriate amount of charge voltage to maintain battery charge to power the system.

C. Electronics are fuse-protected with appropriately sized fuses to prevent damage to electronics in the event of electrical shorts.

D. Earth grounding – All electronics are properly earth-grounded to prevent damage to prevent electronics

3.02 DEVICE ACCEPTANCE

A. Upon installation completion, all Recording and Telemetry Devices must be tested, and results documented by installer and provided to SGM. Testing and documentation shall include:
1. Recording Device Functionality:
    a. Calibration and accuracy (can be in the form of adjustable offset parameter within datalogger program).
    b. Measurement interval (15-minute minimum)
2. Datalogger and Station Functionality
    a. Datalogger is programmed to record subject parameter at 15-minute interval (minimum)
    b. Datalogger program includes proper calculation for flow rate specific to the subject measurement device
    c. Adjustable offset parameter for calibration of Recording Device
3. Telemetry System Connectivity and Functionality

a. Network connectivity shall be tested, showing live sensor readouts with the ability to apply or adjust sensor offsets, and the ability to download logged data.

4. Installer must provide Recording Device and Telemetry system access information to the measurement device owner, SGM, the Water Commissioner and/or the Division Engineer to access all data from such Recording Device and Telemetry system.

END OF SECTION