DRAFT

MGP ENTERPRISE A-4 RECLAMATION PLAN

COGCC Location ID: 386457

0234949.00

Prepared For

BP America Production Company

May 2023

Woodard & Curran

215 Union Boulevard | Suite 275
Lakewood, CO 80228
800.426.4262

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FIGURES

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1. PURPOSE AND OBJECTIVES

This Reclamation Plan (Plan) has been prepared by Woodard & Curran, Inc. on behalf of BP America Production Co (BP) to describe the design for completing the reclamation of disturbances associated with the MGP Enterprise A-4 (MGP A-4) well pad located on private land approximately 20 miles west of Trinidad, Colorado in Las Animas County. This Plan was developed in response to and based on a Colorado Oil & Gas Conservation Commission (COGCC) inspection of the MGP A-4 well pad in October 2022, a follow-up from previous inspections. This Plan includes:

- Section 2 – Site background
- Section 3 – Reclamation approach
- Section 4 – Anticipated schedule and monitoring
- Section 5 – Reclamation success criteria

The primary objective of the reclamation is to stabilize the land area disturbed during well pad construction, including restoration of the natural vegetative community, hydraulic systems, visual resources, and wildlife habitats with a design that can be safely implemented given the physical hazards posed by steep terrain. The secondary objective is to accommodate the landowner's preference to leave the approximately 0.4 mile access road from Hill Ranch Road and well pad intact. To meet these potentially competing objectives, the well pad will only be regraded/contoured to the extent that the primary objective can be achieved.

2. SITE BACKGROUND

2.1 Location

MGP A-4 is a former gas-producing well (API #: 05-071-06094) located in Las Animas County, Colorado in NWNE of Section 9 T34S R66W on private land owned by Hill Ranch (herein referred to as the "Site"). Figure 1 shows the Site location.

2.2 Climate

According to the United States Environmental Protection Agency (EPA), the Site and immediate vicinity are within the Level III Ecoregion "Southern Rockies" and the Level IV Ecoregion "Sedimentary Mid-Elevation Forests." According to the Western Regional Climate Center (WRCC), for the period between February 1989 and June 2016, the annual average maximum temperature was 65.8 degrees Fahrenheit (F), the average minimum temperature was 33.4 degrees F, the average total precipitation was 17.15 inches, and the average total snowfall was 34.7 inches. According to the WRCC, the prevailing wind direction at the nearest meteorological station, located at the Trinidad Airport, is West-Southwest based on hourly data from 1992-2002.

2.3 Topography

The MGP A-4 well pad is located on a cut-out hillslope, at an elevation of approximately 6,894 feet above mean sea level (amsl). The pad itself is general flat and approximately one acre. There are two steep slopes descending from the west and south sides of the pad. According to Google Earth and field observations, the slope to the west of the well pad descends approximately 127 vertical feet over 374 horizontal feet, with an average slope of 67.2 percent and a maximum slope of 67.3 percent. The slope is approximately 315 feet across at its widest and 225 feet at its narrowest. The slope to the south of the well pad is smaller, descending approximately 26 vertical feet over approximately 80 horizontal feet. The width of the southern slope is approximately 75 feet.

2.4 Soil

According to the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), the soil type associated with the MGP A-4 well pad is the Saruche-Rombo-Rock outcrop complex, 25 to 50 percent slopes. The typical profile of Saruche is 0 to 4 inches of channery silty clay loam, underlain by 4 to 16 inches of parachannery silty clay loam, underlain by 16 to 30 inches of bedrock. The typical profile of Rombo is 0 to 4 inches of channery silty clay loam, underlain by 4 to 22 inches of channery silty clay loam, underlain by 22 to 34 inches of parachannery silty clay loam, underlain by 34 to 44 inches of bedrock. NRCS classifies the land capability as 7e, which means the soil has severe limitations that make it unsuitable for cultivation and restrict use mainly to grazing, forestland, or wildlife habitat. Subclass "e" indicates that the main hazard is the risk of erosion unless close-growing plant cover is maintained. Site soils are considered Type D Soils using the NRCS Hydrologic Soil Groups (USDA Natural Resources Conservation Service, 2022). Type D soils have high runoff potential when thoroughly wet, which translates to high erosion potential (USDA Natural Resources Conservation Service, 2007).

2.5 Operation and Reclamation History

The MGP A-4 well and well pad were drilled and completed in November 1985 and the well was plugged and abandoned (P&A) in 1993. BP acquired MGP A-4 following its P&A through the acquisition of Amoco Production Company in 1998. As of the acquisition, reclamation had not been completed. On December 19, 2019, COGCC issued a Sundry Notice providing an extension for the reclamation of the well pad. In response to the Sundry Notice, BP enlisted Wood Environment & Infrastructure Solutions, Inc. (Wood) to prepare a Reclamation Plan (Wood, 2021). The Reclamation Plan called for removal of a roadway culvert, stabilization of a roadside scour area with riprap, regrading of the well pad and outslope to a maximum of 2 horizontal:1 vertical (2H:1V), hydroseeding of disturbed areas with a mixture of native grasses and grains, fiber mulching after seeding, and covering the seeded slopes with Bionet C125 erosion control blanket (ECB).

Work to implement the Reclamation Plan commenced in the spring of 2021 by ENTACT, LLC. Implementation of the Reclamation Plan was not completed reportedly due to lack of available soil to be regraded and unsafe conditions due to the difficulty of construction equipment navigating steep slopes.

On July 22, 2021, COGCC performed a post-reclamation inspection and reported that reclamation had not been completed and determined that the well site remained out of compliance with COGCC Rule 1004.. Three subsequent COGCC inspections were performed, most recently on October 4, 2022. Notable findings from the latest inspection include:

- The well pad and access road had not been recontoured and reclaimed per COGCC Rule 1004 and culverts remain.
- The fill slope was not stabilized, and significant erosion was preventing vegetative establishment.
- Insufficient and inadequately maintained stormwater controls (straw wattles).
- Noxious weeds were observed in the pad access roadway.

In response to an issued Field Inspection Report #690203458 by COGCC on October 5, 2022, BP arranged for additional hydroseeding and best management practice (BMP) installation completed on November 1, 2022 and documented in a Sundry Notice submitted to COGCC on November 21, 2022.

2.6 Land Use

The Site is located on private land in the Raton Mesa region of southern Colorado. Both the land and the access road are owned by Hill Ranch.

2.7 Hydrology

2.7.1 Drainage Area and Soils

Wood prepared a Hydraulics Report as part of their Reclamation Plan (Wood Environment & Infrastructure Solutions, Inc., 2021). All hydraulic results were updated and/or confirmed for this Reclamation Plan. Updated topographic data was produced in 2023 via photogrammetry using a DJI Phantom 4 drone and processed with Pix4D, yielding a ground sampling distance of 0.96 inch, and horizontal and vertical accuracy under 0.3 inch. Using the updated topographic data, Woodard & Curran determined the following local watershed areas at the Site:

- 0.66 acres contribute to the well pad.
- 2.2 acres account for western slope drainage.
- 0.3 acres account for southern slope drainage.

As described in Section 2.4, Site soils are considered Type D and therefore minimal infiltration occurs during precipitation events.

2.7.2 Design Storms

The National Oceanic and Atmospheric Administration (NOAA) provides partial duration series (PDS)-based precipitation frequency estimates for any given location with 90% confidence intervals. The latitude and longitude coordinates were input to the NOAA Atlas 14 Point Precipitation Frequency Estimates online tool. Using the design-life of the erosion control products and allowance for vegetation establishment, the 5-year return interval storm was considered. Given precipitation depths at various storm durations, Intensity-Duration-Frequency (IDF) curves were developed to determine the rainfall intensity at the time to concentration (NOAA National Weather Service, 2013). See Attachment 1: Site Specific Calculations for IDF creation, hydrologic, and subsequent hydraulic calculations.

2.8 Vegetation, Wildlife, and Habitat

Woodard and Curran requested a Colorado Conservation Data Explorer (CODEX) report via the Colorado Natural Heritage Program to identify sensitive plant and animal species and natural communities within the project area. The ecosystem in the area includes Rolling Sagebrush Steppe, Evergreen Forest, and Herbaceous habitat (CODEX, 2023). There is sparce vegetation on the well pad and slope. Similar woodland and shrubland plant communities were identified using the Southwest Regional Gap Analysis Project (SWReGAP). The well pad and slope have sparse vegetation compared to the adjacent landscape. The project area is considered high priority habitat as elk and mule deer winter range, is within an Aquatic Sportfish Management Water, and supports birds, bears, snakes, lizards, and rodents (CODEX, 2023). The Riverine systems are temporarily or seasonally flooded (CODEX, 2023).

2.9 Previous Site Investigation

Wood conducted a site investigation from July 2020 through February 2021; the results from this investigation are included in Wood's 2021 Reclamation Plan (Wood Environment & Infrastructure Solutions, Inc., 2021). Section 2.9 summarizes Wood's findings as they relate to the current phase of reclamation.

2.9.1 Vegetation and Topography

The well pad was constructed by cutting into the hillside and depositing the cut material on the downslope sides. The downhill slope is roughly 2H:1V and steeper. Woodard & Curran performed an aerial survey in 2023 to gather updated topographic data; this is presented in the Construction Plans. Minimal vegetation has established on the disturbed area since the last seeding event in November 2022. There are patches of grasses and herbaceous vegetation, along with sparce juniper and gamble oak shrubs (Wood Environment & Infrastructure Solutions, Inc., 2021). The vegetation is significantly less dense or nonexistent compared with undisturbed areas adjacent to the Site.

2.9.2 Well Head

Wood located the abandoned well head during their 2021 investigation. The top of the 18-inch diameter steel well head is located approximately 8 feet below ground surface (bgs). The well head location is indicated on the Construction Plans and must be protected in place during any reclamation activities.

2.9.3 Geotechnical Analysis

Wood conducted a geotechnical investigation including digging eleven (11) test pits to refusal using an excavator. The test pits were excavated by USA Environment, now ENTACT. The depth of the fill placed from the construction of the well pad ranged from 10 to 17 feet. Test pit excavation depths ranged from 3 to 17 ft bgs when refusal was encountered. No groundwater was encountered. Wood noted that the well pad appeared to be well compacted (Wood Environment & Infrastructure Solutions, Inc., 2021).

Select soil samples were sent to the laboratory for moisture content, grain size analyses and USCS classification, Atterberg limits, direct shear, and Standard Proctor tests. The native soils were weathered from the Raton Formation rocks, consisting primarily of clayey sand or clayey gravel with cobbles and boulders. The laboratory classified the soils using the USCS and identified clayey sand (SC) and clayey gravel (GC). Fine to coarse angular cobble and boulder sized sandstone rock fragments up to 5 feet in diameter were present in the soils.

Table 1: General Subsurface Profile (Wood, 2021)

Stratum	Material Description (USCS)	Depth to Bottom of Stratum (ft)
Fill	Clayey sand and gravel (SC/GC) w/ cobbles and boulders	1 to 17
Bedrock	Weathered sandstone bedrock	17+

3. RECLAMATION APPROACH

Woodard & Curran followed a systematic approach to development of this Reclamation Plan. The Draft Standardized Methods for Well Pad Reclamation Design is provided as Attachment 2. There are four major steps in the well pad reclamation design process, described below. Below is a summary of calculations, tools, and industry standards used to guide the process.

1. Land Preparation
    a. Includes regrading, removal of debris or noxious weeds, smoothing of surface rills, etc. Provides alternative means and methods given site-specific conditions and goals.
2. Erosion Control BMP Selection
    a. Determination of Design Storm.
    b. Applicability evaluation and selection of filtration/slope check BMPs (e.g., straw wattles, compost filter sock), using simplified tables and design guidance based on site-specific conditions (Erosion Control Technology Council, 2023).
    c. Applicability evaluation and selection of Rolled Erosion Control Product (e.g., jute mat) using simplified tables and design guidance based on site-specific conditions (Erosion Control Technology Council, 2023).
    d. Creation of benches in long slopes to ensure interruption in accordance with manufacturer recommendations (see: maximum uninterrupted slope on specification sheet from erosion control product) to maximize erosion control product effectiveness.
    e. Evaluation of riprap reinforcement for drainage channels using HEC-15 Shear Stress Analysis for riprap D_{50} design.
    f. Consideration of alternative BMPs (e.g., erosion control mat, check dams, runoff diversion)
3. Soil Health Evaluation
    a. Analyze soil for: pH, Organic Matter or Total Organic Carbon, Nitrogen, Potassium, Moisture Content and perform USCS soil classification for top 3" of soil profile. See Soil Health Evaluation Fact Sheet in Attachment 2 for information regarding how to plan soil sampling and analysis.
    b. Consult with an expert and/or utilize Profile Products soil testing service to determine whether amendments (organic matter, nutrients, etc.) are needed prior to seed application, and at what rate.
4. Seeding, Mulching, and Stabilizer Evaluation
    a. Input site-specific conditions to Profile Product's PS3 online tool. The output is a recommendation of their products and application rates that will enable soil stabilization and growth. There is also an option to request a seed mix, however, it is important to confirm the seed mix with a regional or local expert.
    b. Consult regional vegetation expert/contractor for seed mix recommendation.

3.1 Site Preparation and Controls

Site preparation activities shall be conducted prior to any other work. Subsurface utilities must be verified, including the identification of the abandoned well head. The well head will remain in place throughout construction and proper controls must be implemented to provide protection. Maintenance of all access and haul routes is the responsibility of the contractor. The contractor shall fill deep ruts and repair any damage to the existing access road during construction.

3.2 Land Preparation

Stormwater runoff is the main contributor to erosion on the well pad slopes, which causes soil and seed movement, development of rills, and development of more significant gullies. To address stormwater runoff, the following site-specific corrective actions will be implemented.

3.2.1 Surface Erosion Rill Removal

Rocky Mountain Reclamation's (Laramie, WY) proprietary slope chain will be the primary tool used to remove rills from the western and southern slopes. This involves attaching a chain to a 4WD John Deer Tractor at the top of the slope and anchoring it to another tractor or heavy equipment at the bottom of the slope, where possible. The slope chain includes an attachment that looks like a playing jack with a disc on the bottom. The equipment functions to disturb the slope and till the soil. The slope chain will be deployed in a cross-slope fashion (i.e., parallel to contour) in approximately 20-foot vertical increments. As each vertical slope increment is completed, the erosion control BMPs (see Section 3.5) will be deployed above that section.

3.2.2 Regrading

1. Berm (place fill) along the western and southern edges of the well pad to limit runoff off of the well pad onto the downgradient slope in accordance with the Construction Plans.

2. Recontour the well pad to direct runoff to the existing larger gullies on the northwest and southeast slopes of the well pad in accordance with the Construction Plans.

3.3 Installation of Erosion Control BMPs

1. Place sediment retention fiber rolls (e.g., compost logs, straw wattles) along the western slope on the contour at a 20-foot spacing. See plans for layout and installation details and instructions. The fiber rolls must be installed according to the manufacturer's instructions.

2. Place sediment retention fiber rolls along the southern slope at a 15-foot spacing to the extent practicable. It is imperative that fiber rolls are installed properly.

3. Reinforce the existing drainage channels on northwest and southeast slopes of the well pad, and the proposed swale, using D_{50}=2.5-foot riprap. Given Site constraints, only place riprap where it is safe for heavy equipment (likely at top and bottom of channels). See Attachment 1: Site Specific Calculations for riprap sizing and design storm determination.

3.4 Revegetation

The primary goal of revegetation is to achieve 80% cover compared to an undisturbed native/background area. By achieving this primary goal, the slope will also be stabilized, erosion reduced, and habitat improved. Woodard & Curran has monitored the slope during Spring 2023 for signs of seeded species (seedlings). As of April 2023, no significant seedling growth has been observed since hydroseeding in November 2022. The hydroseeding completed in November 2022 was amended with Promatrix and Flexterra (WSP, 2022). Per a conversation with Profile Products (makers of Promatrix and Flexterra), Promatrix and Flexterra are not typically mixed in their application because Flexterra is a more robust version of Promatrix. Additionally, the seed mix included Kentucky Bluegrass, Timothy, and Orchardgrass, which are typically found in sub-irrigated pasture, not in a pinyon-oak community.

In accordance with COGCC guidelines, reseeding will use native species consistent with the adjacent plant community. Woodard & Curran recommends reseeding the slope before mid-June (see Section 4.2.2) using the procedure described in Sections 3.4.1 and 3.4.2.

3.4.1 Soil Health & Fertilization

Three soil samples were collected in March 2023 by Woodard & Curran: one sample on the western slope, one on the southern slope, and one from an undisturbed native area north of the western slope. The samples were collected from 0-6" within the soil profile and analyzed for organic matter (OM), nitrogen (N), phosphorus (P), and potassium (K). Based on the results of the analysis, fertilizer or other nutrient amendments are not required prior to seed application. The analytical results are provided in Attachment 1: Site Specific Calculations.

3.4.2 Seeding

Seed will be applied to all slopes: the western slope, the southern slope, and to select portions of the cut slope directly above and to the east of the well pad, depending on field conditions.

Hyroseeding shall be performed at a rate of 35 lbs/acre (total) with 25 lbs/acre using the seed mix in Table 2 and 10 lbs/acre using barley. Barley acts as a cover crop to provide slope stabilization while the slower growing vegetation germinates and establishes.

Table 2: CO Native Seed Mix

Variety/Common Name	Lbs pure live seed/Acre	Seeds/lb	Seeds/ft sq	% Seeds	% of Mix
Pastura Little bluestem	4.0	130,000	11.94	11.10%	16%
Arriba Western wheatgrass	4.5	113,840	11.76	10.94%	18%
Sandberg bluegrass	0.5	900,000	10.33	9.61%	2%
Paloma Indian ricegrass	5.0	141,000	16.18	15.05%	20%
Vaughn Side oats grama	3.0	190,000	13.09	12.17%	12%
CO native blue grama	1.0	711,000	16.32	15.18%	4%

Trailhead great basin wildrye	3.0	200,000	13.77	12.81%	12%
Critana thickspike wheatgrass	4.0	154,000	14.14	13.15%	16%
Total	25.0		107.54	100.00%	100%

3.4.3 Soil Stabilization

After seed application, the final step is to apply Flexterra at a rate of 4000 lb/acre. This step should be completed after other erosion control activities (erosion rill removal, seeding, and fiber roll installation) and is applicable to all slopes: the western slope, the southern slope, and seeded areas of the cut slope.

3.5 Slope Progression Methodology

The steps listed above will be performed in multiple intervals and repeated as the contractor moves up the slope. The purpose of this is to ensure sediment retention fiber rolls can be placed at the necessary frequency to maintain sheet flow on the slope without disturbing freshly seeded and treated areas. The order of operations for each 20-foot interval on the western slope is:

1. Utilize slope chain to smooth out surface erosion rills
2. Hydroseed
3. Install sediment retention fiber roll across width of the slope on the contour
4. Cover seed again using English Chain Harrow or Slope Chain
5. Continue this process working up the slope in 20-foot intervals
6. Apply Flexterra to entire slope
7. Avoid disturbance of the prepared seedbed areas and commence post-construction monitoring

4. ANTICIPATED SCHEDULE AND MONITORING

4.1 Monitoring Procedures

Inspections will be performed at least monthly through the third quarter of 2023 and at least quarterly thereafter to evaluate general Site conditions, uniformity of vegetation cover, presence of bare areas, identification of noxious weed infestation, location of erosive areas, and general condition of surface water and erosion control structures. Observations will be made on the overall condition of individual components (e.g., vegetation, erosion, and BMPs) of the reclaimed area. Response action recommendations will be made based on the individual component recommendations. Inspections will be documented in field logbooks and/or electronic field forms and will include photographs.

4.2 Spring 2023

4.2.1 Monitoring

The rehabilitated slope will be monitored until mid-May for presence of seedlings from the November 2022 seed application. The assessment will be made using Attachment 3: First Growing Season – Qualitative Field Assessment Form, or equivalent. Erosion will also be monitored and documented. This assessment will be made using Attachment 4: Qualitative Erosion Monitoring or equivalent.

4.2.2 Maintenance and Response Actions

The reclamation activities described in Sections 3.1 and 3.2 should be completed by June 2023 to ensure installation of BMPs prior to the monsoon season. Revegetation activities should not commence until the proper erosion control measures (regrading and installation of surface water BMPs) are implemented to limit seed vulnerability to erosion.

4.3 Post-Construction Monitoring (2023-2025)

Vegetation and erosional control BMP monitoring will be performed monthly through November 2023 and at least quarterly thereafter until reclamation success criteria is achieved (see Section 5). More frequent inspections may be warranted during the growing season and/or monsoon season. Vegetation assessments will be made using Attachment 3: First Growing Season – Qualitative Field Assessment Form, or equivalent. Erosion and BMP integrity assessment will be made using Attachment 4: Qualitative Erosion Monitoring Form, or equivalent.

Once the operator believes all disturbances meet reclamation standards, COGCC will be contacted to schedule a final abandonment inspection. If self-sustaining vegetation growth has not been observed on the slopes by two years after seeding has occurred, the reclamation approach will be reassessed in coordination with COGCC.

5. RECLAMATION SUCCESS CRITERIA

5.1 Regulatory (Primary) Success Criteria

In accordance with the 1000 Series Rules published by the COGCC (COGCC, 2022), the following reclamation success criteria will be used to evaluate Site stability:

"Interim reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, compacted, covered, paved, or otherwise stabilized in such a way as to minimize erosion to the extent practicable, or a uniform vegetative cover has been established that reflects pre-disturbance or reference area forbs, shrubs, and grasses with total percent plant cover of at least eighty percent (80%) of pre-disturbance levels or reference areas, excluding noxious weeds. Re-seeding alone is not sufficient."

The point-intercept method, or equivalent, will be employed to verify vegetation coverage is 80% of an appropriate undisturbed reference area. Attachment 3 to this Reclamation Plan was developed for implementing the point-intercept method.

In addition, prior to closure, the Site will conform with COGCC Rule 1004, excepting any variances granted by COGCC.

5.2 Ancillary (Secondary) Success Criteria

Reclamation features supporting the success of revegetation must be functioning adequately to ensure sufficient revegetation. These features include regrading for storm water drainage routing, riprap placement, and straw wattle placement along the contour. Their integrity and function will be assessed during scheduled monitoring visits.

Success criteria for the stormwater runoff routing include:

1) Minimal new rill development on the slope.
2) No significant scouring of embankment or downstream conveyances.
3) No significant slope sluffing or soil/seed migration.
4) Routing of upstream drainage to keep off slopes.

Success criteria for the riprap placement include:

1) No significant migration of riprap.
2) No significant scouring of native soils under riprap.

Success criteria for sediment retention fiber roll placement include:

1) No significant downhill rills forming.
2) No significant scour around the sediment retention fiber rolls.

3) Effective sediment capture.

6. REFERENCES

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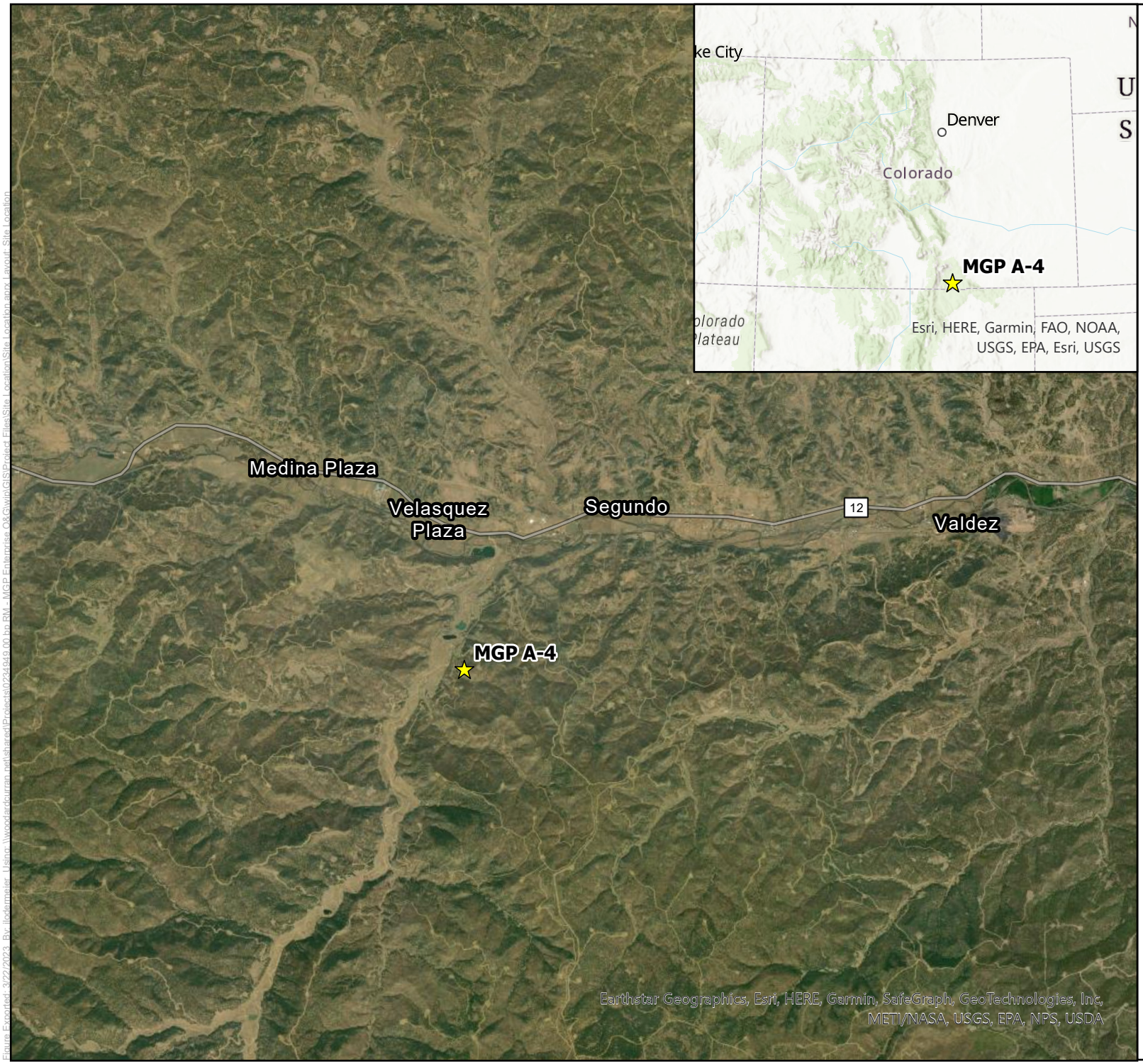
FIGURES

ATTACHMENT 1: SITE SPECIFIC CALCULATIONS

ATTACHMENT 2: DRAFT STANDARDIZED METHODS FOR WELL PAD RECLAMATION DESIGN

ATTACHMENT 3: FIRST GROWING SEASON FIELD ASSESSMENT FORM

ATTACHMENT 4: QUALITATIVE EROSION MONITORING FORM



Site Location

MGP Enterprise A-4

N

Legend

☆ Site Location

0 0.5 1 Miles

Woodard & Curran

Prepared for BP America Production Co (10000)

Project #: 0234949.00
Map Created: March 2023

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.

Figure Exported: 5/22/2023 By: tlieberman Using: W:\woodardcurran.net\shares\Projects\0234949.00 bp RM - MGP Enterprise O&G\com\GIS\Project Files\Site Location\Site Location.aprx Layout: Site Location

22x34
PLOT SCALE: 1:1

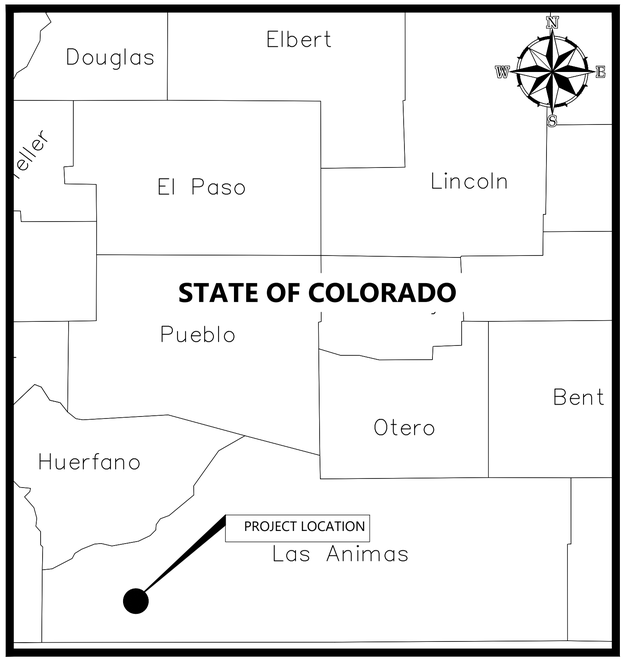
BP America Production Co (10000)

HOUSTON, TEXAS

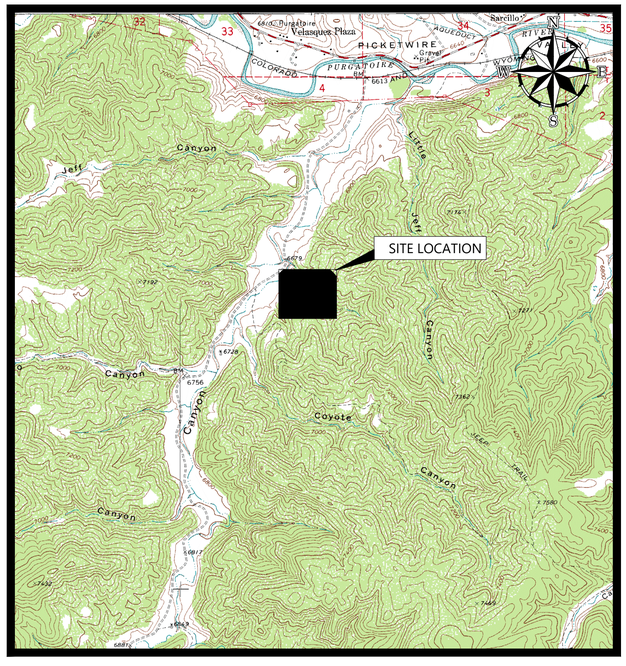
RECLAMATION OF WELL MGP ENTERPRISE A #4

NOT FOR CONSTRUCTION

APRIL, 2023



PROJECT LOCATION MAP



SITE LOCATION MAP

SOURCE: USGS TOPO QUADRANGLE

Woodard & Curran
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800.426.4262 | www.woodardcurran.com

PE SEAL:

NOT FOR CONSTRUCTION

CLIENT INFO:

REMEDIATION MANAGEMENT SERVICES COMPANY
HOUSTON, TEXAS

RECLAMATION OF WELL MGP ENTERPRISE A #4

REV	MM/DD/YY	DESCRIPTION

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CHECKED BY:	XXX
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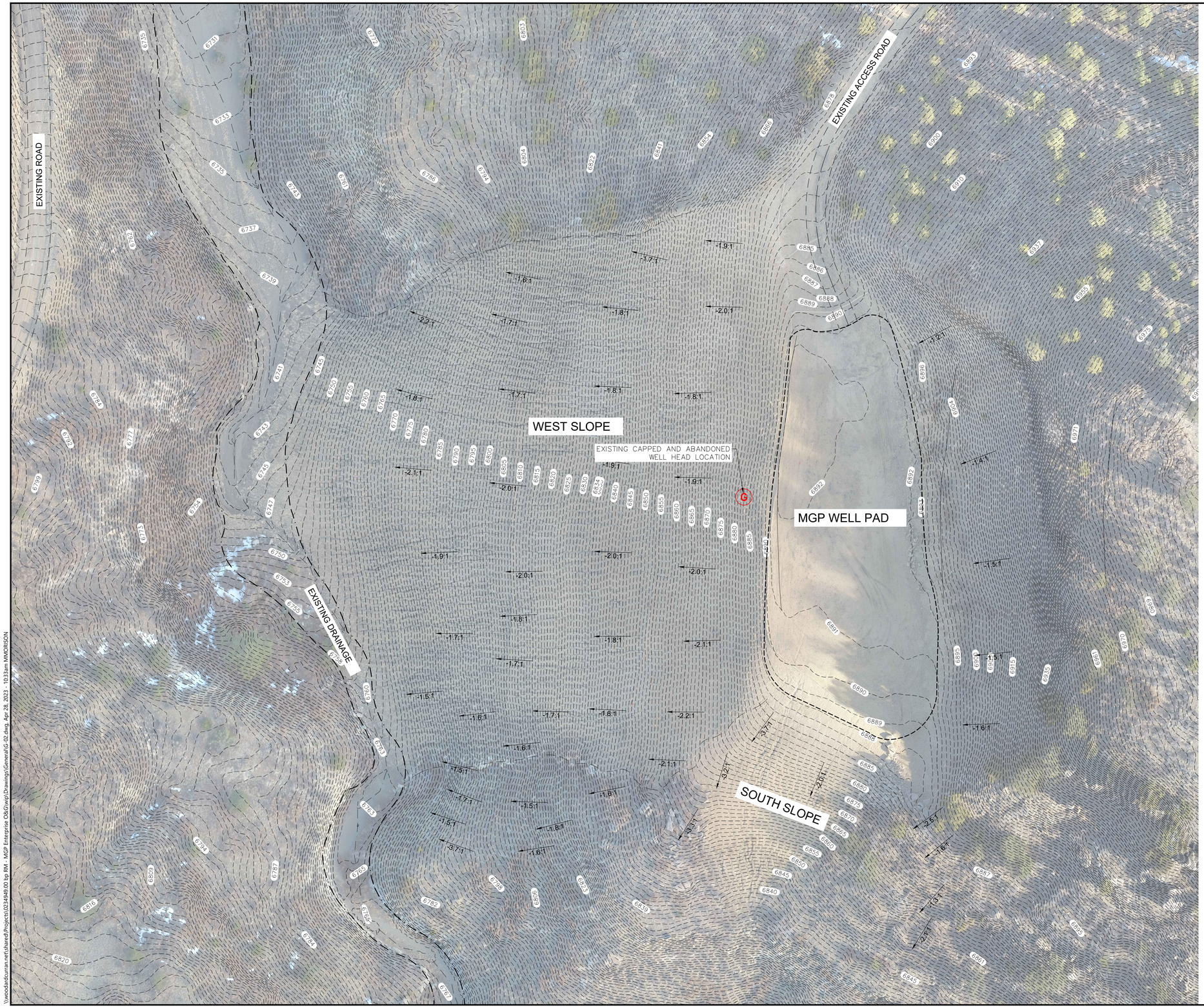

Notes: **P&A Well Location**
Latitude: 37.1050082
Longitude: -104.7803466
Northing: 1160418.55
Easting: 3209876.10

30' 0 30' 60'
BAR SCALE
1" = 30'
CHECK GRAPHIC SCALE BEFORE USING

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PE SEAL:

NOT FOR CONSTRUCTION

CLIENT INFO:

BP AMERICA PRODCUTION CO
(10000)
HOUSTON, TEXAS

RECLAMATION OF WELL MGP ENTERPRISE A #4

REV	MM/DD/YY	DESCRIPTION

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DRAWING TITLE:
GENERAL
EXISTING CONDITIONS

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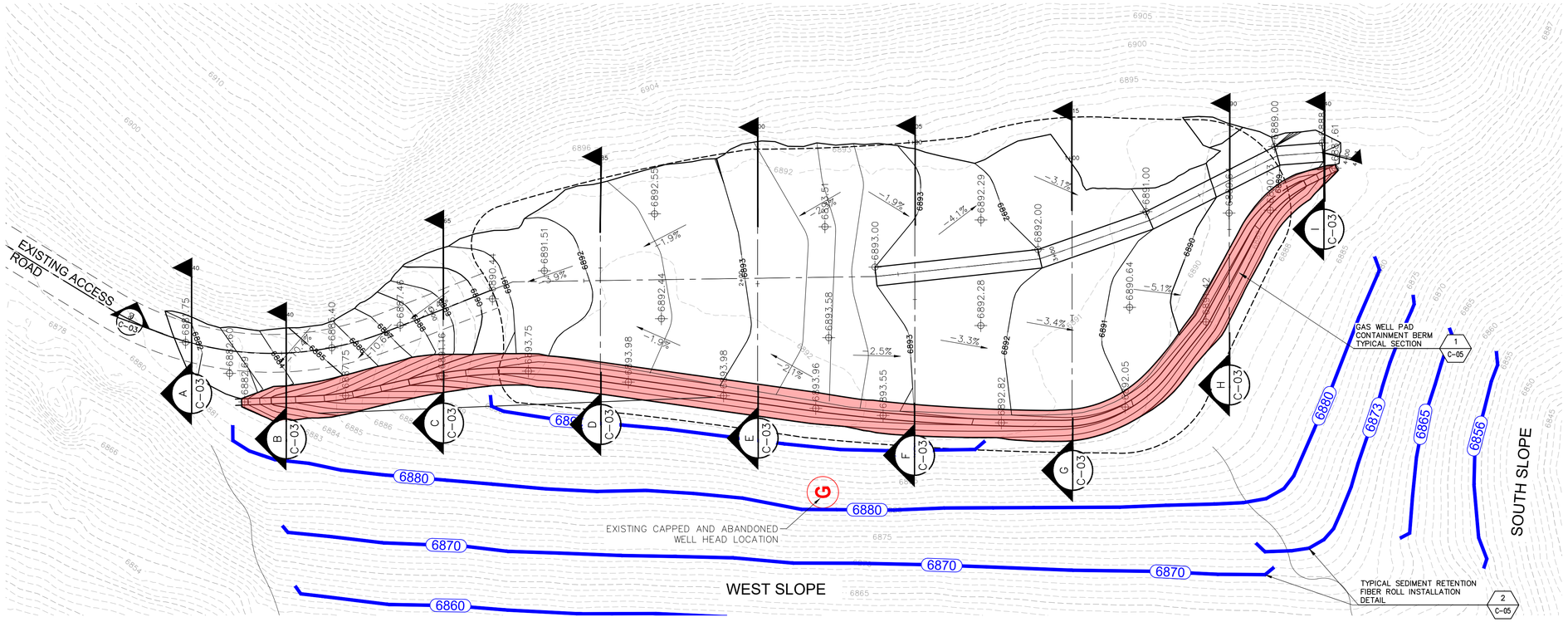

LEGEND:

- EXISTING CONTOURS
- PROPOSED CONTOURS
- SEDIMENT RETENTION FIBER ROLL
- GAS WELL PAD CONTAINMENT BERM

20' 0 20' 40'
BAR SCALE
1" = 20'
CHECK GRAPHIC SCALE BEFORE USING

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PE SEAL:

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CLIENT INFO:

BP AMERICA PRODUCTION CO
(10000)
HOUSTON, TEXAS

RECLAMATION OF WELL MGP ENTERPRISE A #4

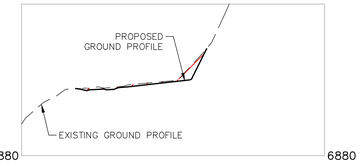
REV	MM/DD/YY	DESCRIPTION

JOB NO:	0234949
DATE:	APRIL, 2023
SCALE:	XXX
DESIGNED BY:	XXX
DRAWN BY:	XXX
CHECKED BY:	XXX
FILENAME:	C-01.dwg

DRAWING TITLE:
CIVIL

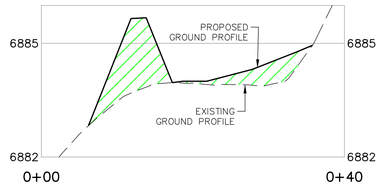
GAS WELL PAD REGRADING PLAN

DRAWING NO:
C-01
SHEET: 3 OF 8



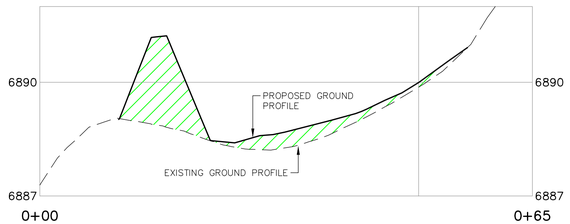
SECTION A–A–PROFILE STA. 0+00 TO STA. 0+40

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



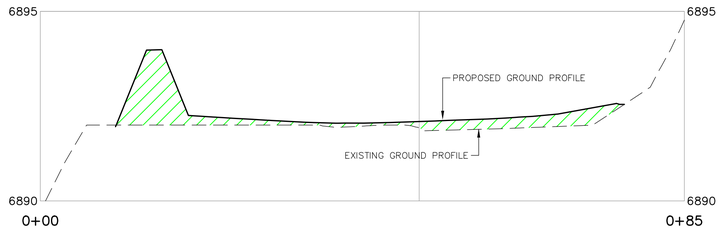
ION B–B–PROFILE STA. 0+00 TO STA. 0+

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



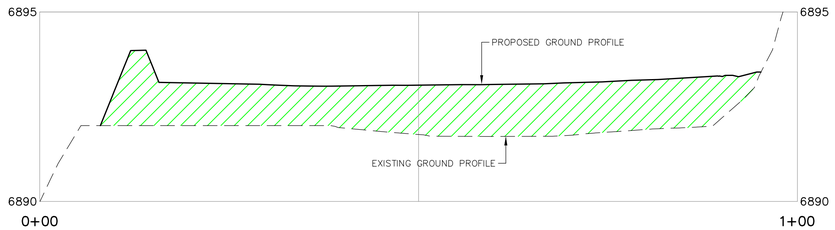
SECTION C–C–PROFILE STA. 0+00 TO STA. 0+65

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



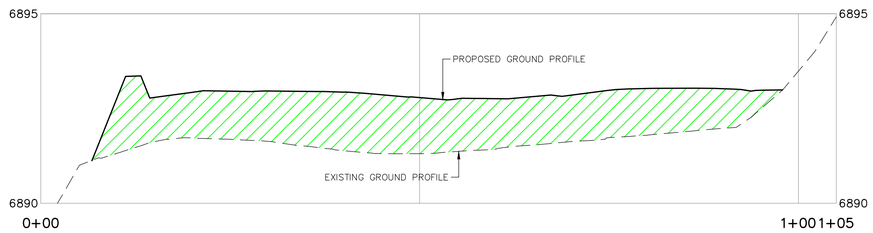
SECTION D–D–PROFILE STA. 0+00 TO STA. 0+85

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



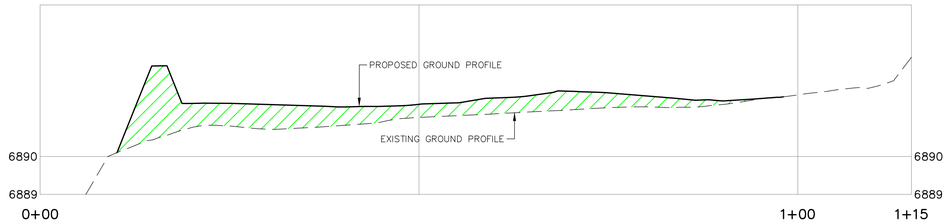
SECTION E–E–PROFILE STA. 0+00 TO STA. 1+00

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



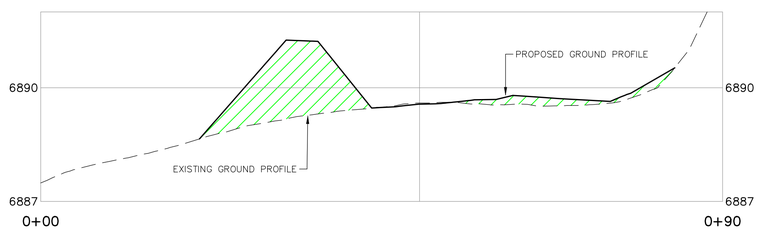
SECTION F–F–PROFILE STA. 0+00 TO STA. 1+05

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



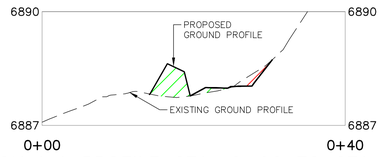
SECTION G–G–PROFILE STA. 0+00 TO STA. 1+15

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



SECTION H–H–PROFILE STA. 0+00 TO STA. 0+90

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'



SECTION I–I–PROFILE STA. 0+00 TO STA. 0+40

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'

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HOUSTON, TEXAS

RECLAMATION OF WELL MGP
ENTERPRISE A #4

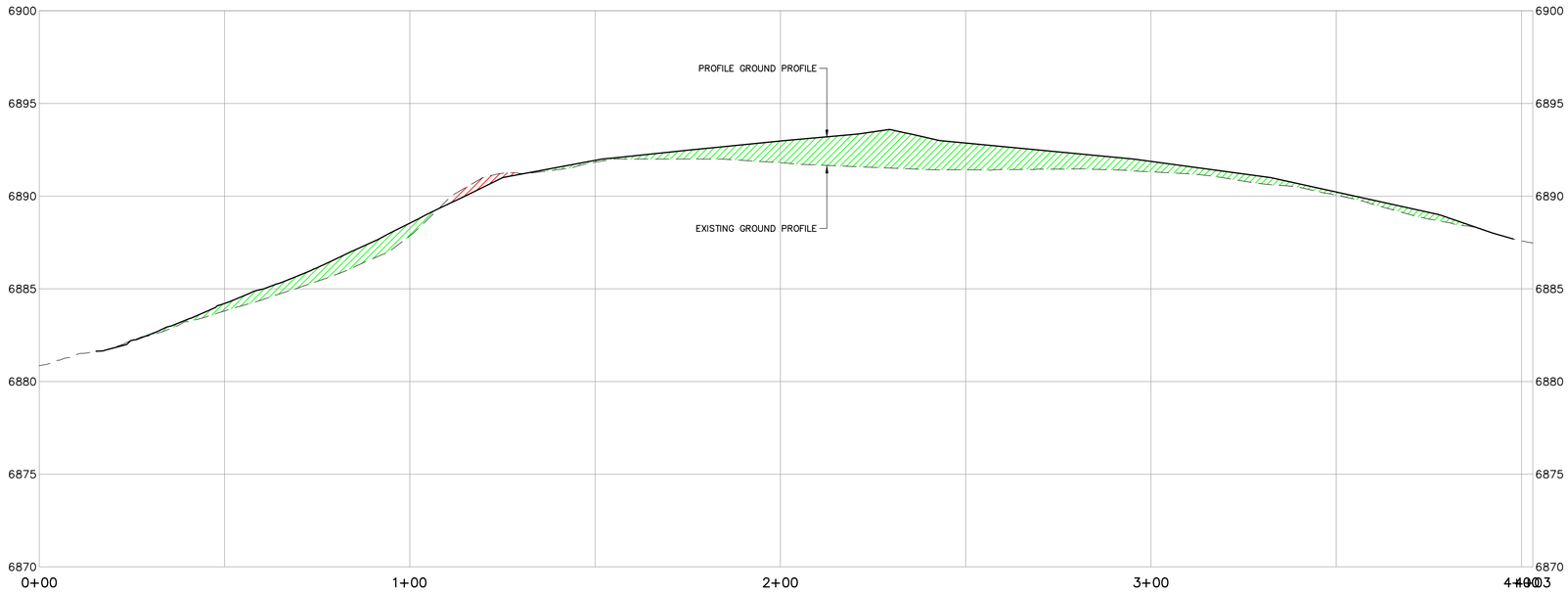
REV	MM/DD/YY	DESCRIPTION

JOB NO:	0234949
DATE:	APRIL, 2023
SCALE:	XXX
DESIGNED BY:	XXX
DRAWN BY:	XXX
CHECKED BY:	XXX
FILENAME:	C-02.dwg

DRAWING TITLE:
CIVIL

SECTIONS

DRAWING NO:
C-02
SHEET: 4 OF 8



SECTION J–J–PROFILE STA. 0+00 TO STA. 4+03

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 4'

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RECLAMATION OF WELL MGP ENTERPRISE A #4

REV	MM/DD/YY	DESCRIPTION

JOB NO:	0234949
DATE:	APRIL, 2023
SCALE:	XXX
DESIGNED BY:	XXX
DRAWN BY:	XXX
CHECKED BY:	XXX
FILENAME:	C-02.1.dwg

DRAWING TITLE:
CIVIL

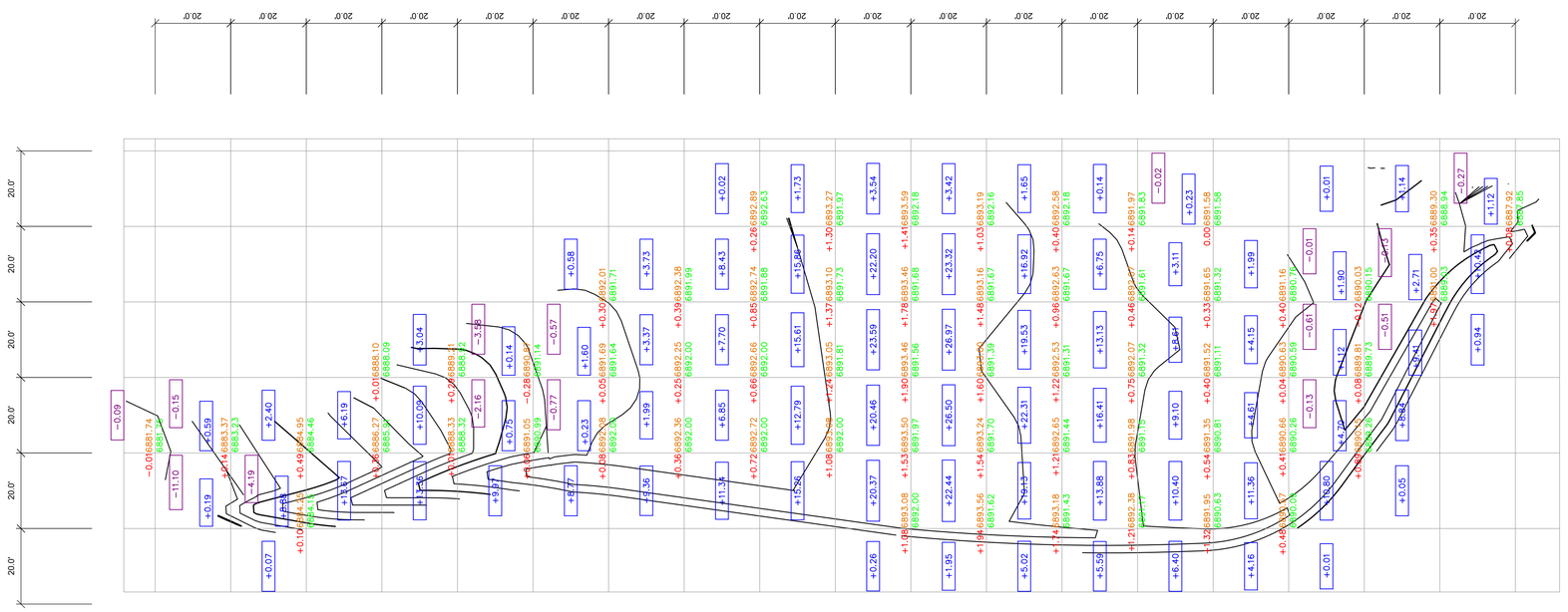
SECTIONS

DRAWING NO:
C-02.1
SHEET: 5 OF 8

22x34
PLOT SCALE: 1:1

Cut/Fill Summary

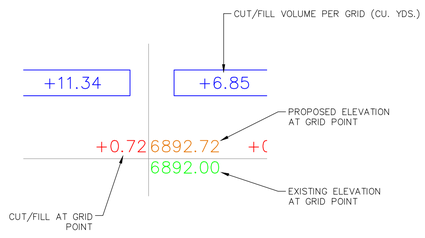
Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
VOL-EG TO FG	1.000	1.000	22990 Sq. Ft.	35 Cu. Yd.	648 Cu. Yd.	612 Cu. Yd.<Fill>
Totals			22990 Sq. Ft.	35 Cu. Yd.	648 Cu. Yd.	612 Cu. Yd.<Fill>



0.0	0.0
13.0	0.3
117.9	0.1
138.9	5.3
154.8	3.3
199.3	15.3
23.5	0.0
647.4	Fill
24.3	Cut

0.1	11.2	4.2	0.0	0.0	5.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	0.3	0.0	Cut
0.0	0.8	11.4	19.9	26.5	10.9	11.2	18.5	34.3	61.3	90.4	104.6	84.6	55.9	37.8	26.3	18.5	22.2	12.5	0.0	Fill

LEGEND:



20' 0 20' 40'
BAR SCALE
1" = 20'
CHECK GRAPHIC SCALE BEFORE USING

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RECLAMATION OF WELL MGP ENTERPRISE A #4

REV	MM/DD/YY	DESCRIPTION

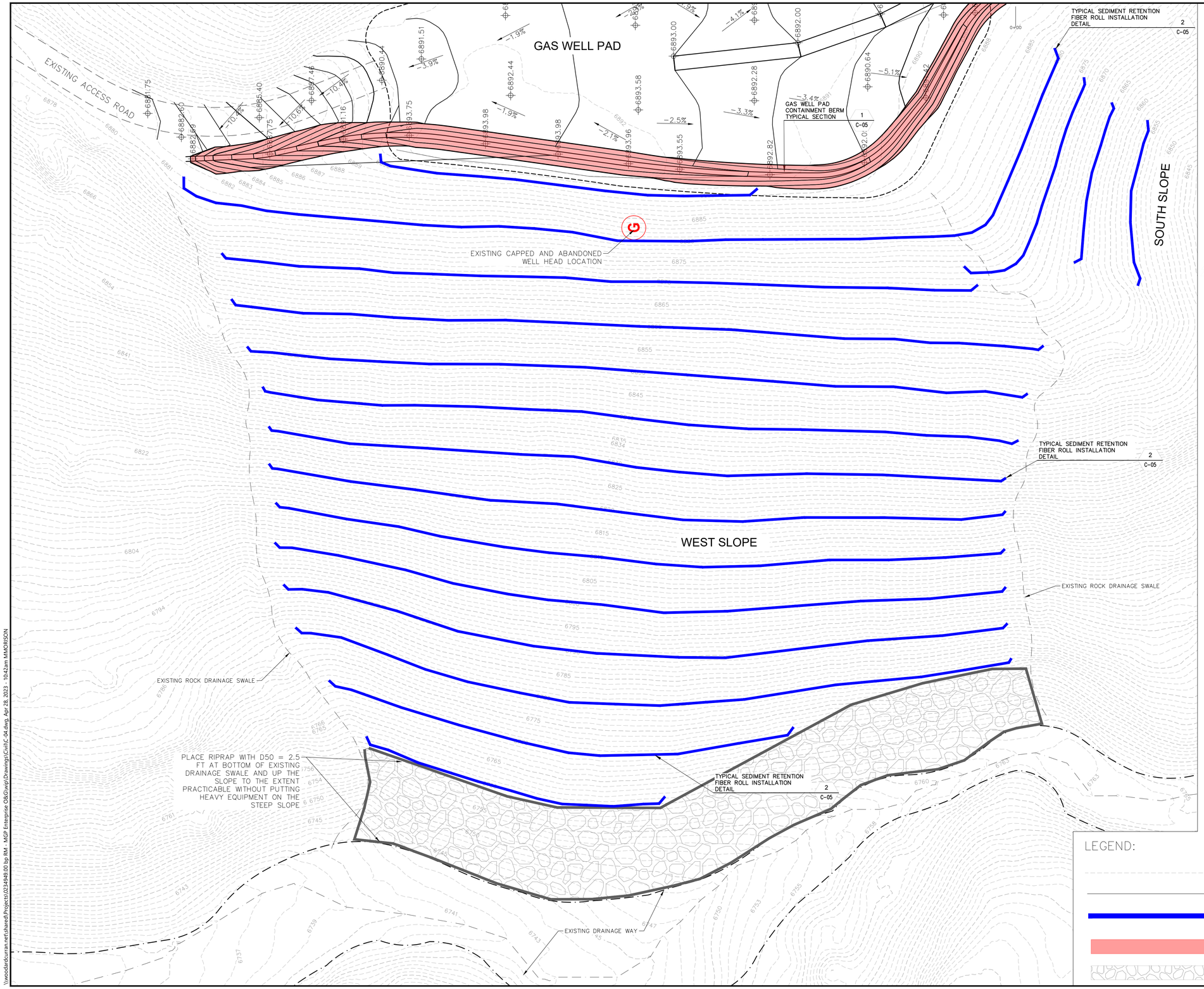
JOB NO:	0234949
DATE:	APRIL, 2023
SCALE:	XXX
DESIGNED BY:	XXX
DRAWN BY:	XXX
CHECKED BY:	XXX
FILENAME:	C-03.dwg

DRAWING TITLE:
CIVIL

VOLUMES AND CUT-FILL GRID

DRAWING NO:
C-03
SHEET: 6 OF 8

22x34
PLOT SCALE: 1:1



NOTES:
1. CONTRACTOR SHALL PREPARE SOIL PRIOR TO INSTALLATION OF ALL EROSION BMPS.

2. SOIL PREPARATION INCLUDES: USING SLOPE CHAIN TO REMOVE EXISTING EROSION RILLS, AND SEED APPLICATION.

3. CONTRACTOR SHALL START AT THE BOTTOM OF THE SLOPE AND MOVE UP THE SLOPE IN 20-FT INTERVALS IN ORDER TO PROTECT FRESHLY TREATED AND SEEDED SOIL DURING SEDIMENT RETENTION FIBER ROLLS INSTALLATION.

4. FLEXTERRA SHALL BE APPLIED AT A RATE OF 4000 LB/ACRE AFTER ENTIRE SLOPE HAS BEEN TILLED USING THE SLOPE CHAIN, SEEDED, AND COMPOST FILTER SOCK/ SEDIMENT RETENTION FIBER ROLLS INSTALLED. APPLY FLEXTERRA ACCORDING TO MANUFACTURER'S INSTRUCTIONS, ENSURING NO SHADOW EFFECTS, ETC.

LEGEND:

- EXISTING CONTOURS
- PROPOSED CONTOURS
- SEDIMENT RETENTION FIBER ROLL
- GAS WELL PAD CONTAINMENT BERM
- RIPRAP D50 = 2.5 FT.

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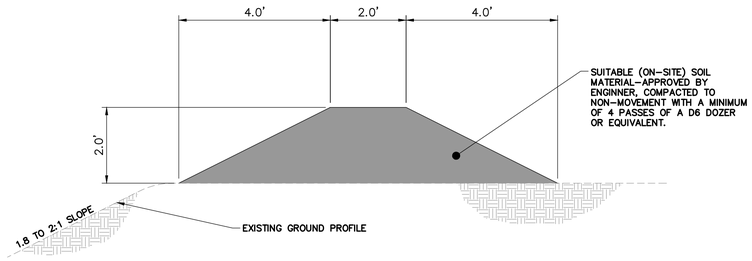
DRAWN BY:	XXX
CHECKED BY:	XXX
FILENAME:	C-04.dwg

DRAWING TITLE:
CIVIL
EROSION CONTROL PLAN

DRAWING NO:
C-04
SHEET: 7 OF 8

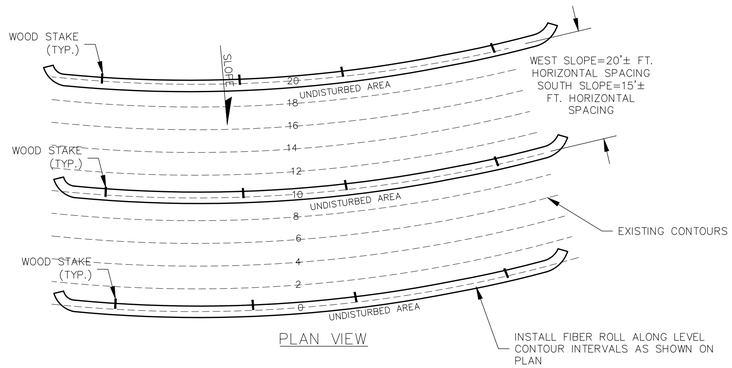


SECTION

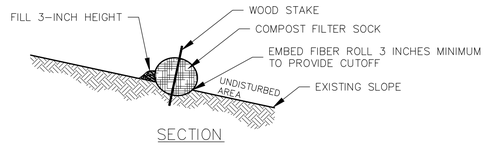
GAS WELL PAD CONTAINMENT BERM TYPICAL SECTION

1 / C-05

SCALE: NOT TO SCALE



PLAN VIEW



SECTION

1. SEDIMENT RETENTION FIBER ROLLS (SRFR) AND COMPOST SHALL MEET STANDARDS OF TABLE SHOWN ABOVE. TRAFFIC SHALL NOT BE PERMITTED TO CROSS SRFR'S.

2. SEDIMENT RETENTION FIBER ROLLS (SRFR) SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SRFR AND THE SLOPE OF ITS TRIBUTARY AREA.

3. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES ½ THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN. SEDIMENT RETENTION FIBER ROLLS (SRFR) SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SRFR'S SHALL BE REPAIRED ACCORDING TO MANUFACTURERS SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION. BIODEGRADABLE SRFR'S SHALL BE MAINTAINED UNTIL VEGETATIVE STABILIZATION.

4. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SRFR, STAKES SHALL BE REMOVED. THE SRFR MAY BE LEFT IN PLACE AND VEGETATED OF REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

5. EMBEDMENT DEPTH SHALL BE A MINIMUM OF 3 INCHES FOR ALL SRFR'S.

6. DRIVE STAKE THROUGH MIDDLE OF THE SRFR AT MAXIMUM 4-FT SPACINGS. DRIVE STAKE 12" TO 16" BELOW SOIL SURFACE. PLACE ADDITIONAL STAKES ON DOWNSLOPE SIDE OF THE SRFR AT 10-FT. SPACINGS.

7. MINIMUM STAKE DIMENSIONS SHALL BE 2"X2".

8. SEE MANUFACTURER-S RECOMMENDATIONS FOR JOINING METHOD FOR ADJACENT UNITS. A ONE FOOT OVERLAP, DIRECTED UP-GRADIENT, IS RECOMMENDED FOR MOST PRODUCTS.

9. TO PROTECT FRESHLY SEEDED SLOPES, CONTRACTOR TO AVOID DISTURBANCE OF THE AREA BELOW THE FIBER ROLL AFTER THE INSTALLATION.

TYPICAL SEDIMENT RETENTION FIBER ROLL INSTALLATION DETAIL

2 / C-05

SCALE: NOT TO SCALE

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JOB NO:	0234949
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CHECKED BY:	XXX
FILENAME:	C-05.dwg

DRAWING TITLE:

CIVIL DETAILS

DRAWING NO:

C-05

SHEET: 8 OF 8

22x34
PLOT SCALE: 1:1

ATTACHMENT 1: SITE SPECIFIC CALCULATIONS

MGP Well Site-Specific Calculations

Hydrology & Hydraulic Calculations

NOAA Atlas 14, Volume 8, Version 2
Location name: Weston, Colorado, USA*
Latitude: 37.105°, Longitude: -104.7802°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.236** (0.188-0.296)	**0.291** (0.232-0.364)	**0.383** (0.304-0.482)	**0.463** (0.365-0.586)	**0.578** (0.440-0.767)	**0.670** (0.497-0.904)	**0.766** (0.547-1.07)	**0.866** (0.591-1.25)	**1.00** (0.656-1.50)	**1.11** (0.706-1.68)
10-min	**0.346** (0.276-0.433)	**0.426** (0.339-0.534)	**0.561** (0.445-0.706)	**0.678** (0.534-0.857)	**0.846** (0.644-1.12)	**0.981** (0.727-1.32)	**1.12** (0.800-1.56)	**1.27** (0.865-1.83)	**1.47** (0.961-2.19)	**1.63** (1.03-2.47)
15-min	**0.422** (0.337-0.529)	**0.519** (0.413-0.651)	**0.684** (0.543-0.860)	**0.827** (0.652-1.05)	**1.03** (0.786-1.37)	**1.20** (0.887-1.62)	**1.37** (0.976-1.90)	**1.55** (1.06-2.23)	**1.79** (1.17-2.67)	**1.99** (1.26-3.01)
30-min	**0.592** (0.472-0.741)	**0.725** (0.578-0.909)	**0.952** (0.756-1.20)	**1.15** (0.906-1.45)	**1.43** (1.09-1.90)	**1.66** (1.23-2.24)	**1.90** (1.36-2.64)	**2.15** (1.47-3.09)	**2.49** (1.63-3.71)	**2.76** (1.75-4.18)
60-min	**0.739** (0.589-0.925)	**0.901** (0.718-1.13)	**1.18** (0.935-1.48)	**1.42** (1.12-1.80)	**1.77** (1.35-2.35)	**2.05** (1.52-2.77)	**2.35** (1.68-3.27)	**2.66** (1.81-3.83)	**3.09** (2.02-4.60)	**3.42** (2.17-5.18)
2-hr	**0.886** (0.712-1.10)	**1.08** (0.864-1.34)	**1.41** (1.12-1.75)	**1.69** (1.34-2.12)	**2.11** (1.62-2.78)	**2.44** (1.83-3.27)	**2.79** (2.01-3.86)	**3.17** (2.18-4.53)	**3.68** (2.43-5.45)	**4.09** (2.62-6.14)
3-hr	**0.965** (0.779-1.19)	**1.16** (0.937-1.44)	**1.50** (1.21-1.86)	**1.80** (1.44-2.25)	**2.25** (1.74-2.95)	**2.61** (1.97-3.49)	**2.99** (2.17-4.12)	**3.40** (2.36-4.85)	**3.96** (2.63-5.85)	**4.41** (2.84-6.61)
6-hr	**1.14** (0.926-1.39)	**1.33** (1.08-1.63)	**1.68** (1.36-2.06)	**2.00** (1.61-2.47)	**2.48** (1.95-3.26)	**2.90** (2.21-3.86)	**3.34** (2.46-4.60)	**3.83** (2.69-5.45)	**4.53** (3.04-6.66)	**5.09** (3.31-7.57)
12-hr	**1.37** (1.12-1.66)	**1.54** (1.27-1.87)	**1.89** (1.54-2.30)	**2.23** (1.81-2.73)	**2.77** (2.21-3.64)	**3.26** (2.52-4.33)	**3.79** (2.82-5.21)	**4.40** (3.13-6.24)	**5.28** (3.60-7.74)	**6.01** (3.95-8.88)
24-hr	**1.60** (1.33-1.93)	**1.81** (1.50-2.17)	**2.22** (1.83-2.68)	**2.62** (2.15-3.18)	**3.28** (2.64-4.27)	**3.86** (3.01-5.10)	**4.51** (3.39-6.15)	**5.24** (3.77-7.40)	**6.32** (4.35-9.21)	**7.21** (4.79-10.6)
2-day	**1.81** (1.51-2.16)	**2.11** (1.76-2.52)	**2.67** (2.22-3.19)	**3.19** (2.64-3.84)	**4.01** (3.24-5.15)	**4.71** (3.70-6.15)	**5.48** (4.15-7.38)	**6.33** (4.58-8.82)	**7.55** (5.24-10.9)	**8.55** (5.74-12.5)
3-day	**1.98** (1.66-2.35)	**2.30** (1.93-2.73)	**2.90** (2.42-3.45)	**3.46** (2.87-4.14)	**4.33** (3.52-5.53)	**5.07** (4.01-6.58)	**5.89** (4.48-7.89)	**6.79** (4.94-9.42)	**8.08** (5.64-11.6)	**9.13** (6.17-13.3)
4-day	**2.14** (1.80-2.52)	**2.46** (2.07-2.91)	**3.07** (2.57-3.64)	**3.64** (3.03-4.34)	**4.52** (3.69-5.76)	**5.29** (4.19-6.83)	**6.12** (4.67-8.17)	**7.03** (5.14-9.73)	**8.35** (5.86-12.0)	**9.43** (6.41-13.7)
7-day	**2.53** (2.15-2.96)	**2.88** (2.44-3.37)	**3.51** (2.96-4.13)	**4.09** (3.44-4.84)	**4.99** (4.10-6.28)	**5.76** (4.59-7.37)	**6.59** (5.07-8.72)	**7.50** (5.53-10.3)	**8.80** (6.22-12.5)	**9.86** (6.75-14.2)
10-day	**2.87** (2.45-3.35)	**3.25** (2.77-3.79)	**3.92** (3.32-4.59)	**4.53** (3.82-5.33)	**5.44** (4.48-6.79)	**6.21** (4.97-7.89)	**7.04** (5.44-9.24)	**7.93** (5.87-10.8)	**9.20** (6.53-13.0)	**10.2** (7.04-14.7)
20-day	**3.81** (3.28-4.39)	**4.31** (3.70-4.97)	**5.14** (4.40-5.96)	**5.86** (4.99-6.84)	**6.88** (5.68-8.42)	**7.70** (6.20-9.61)	**8.54** (6.64-11.0)	**9.42** (7.01-12.7)	**10.6** (7.60-14.8)	**11.5** (8.04-16.5)
30-day	**4.58** (3.96-5.26)	**5.19** (4.48-5.96)	**6.18** (5.32-7.13)	**7.00** (5.99-8.12)	**8.13** (6.71-9.83)	**8.99** (7.26-11.1)	**9.86** (7.69-12.6)	**10.7** (8.03-14.3)	**11.9** (8.55-16.5)	**12.8** (8.94-18.1)
45-day	**5.56** (4.83-6.34)	**6.31** (5.48-7.20)	**7.50** (6.49-8.60)	**8.45** (7.27-9.75)	**9.71** (8.04-11.6)	**10.6** (8.62-13.0)	**11.5** (9.03-14.6)	**12.4** (9.32-16.4)	**13.5** (9.76-18.6)	**14.3** (10.1-20.2)
60-day	**6.40** (5.58-7.27)	**7.27** (6.33-8.27)	**8.62** (7.49-9.84)	**9.68** (8.36-11.1)	**11.1** (9.17-13.1)	**12.0** (9.78-14.7)	**13.0** (10.2-16.4)	**13.8** (10.4-18.2)	**14.9** (10.8-20.4)	**15.6** (11.1-22.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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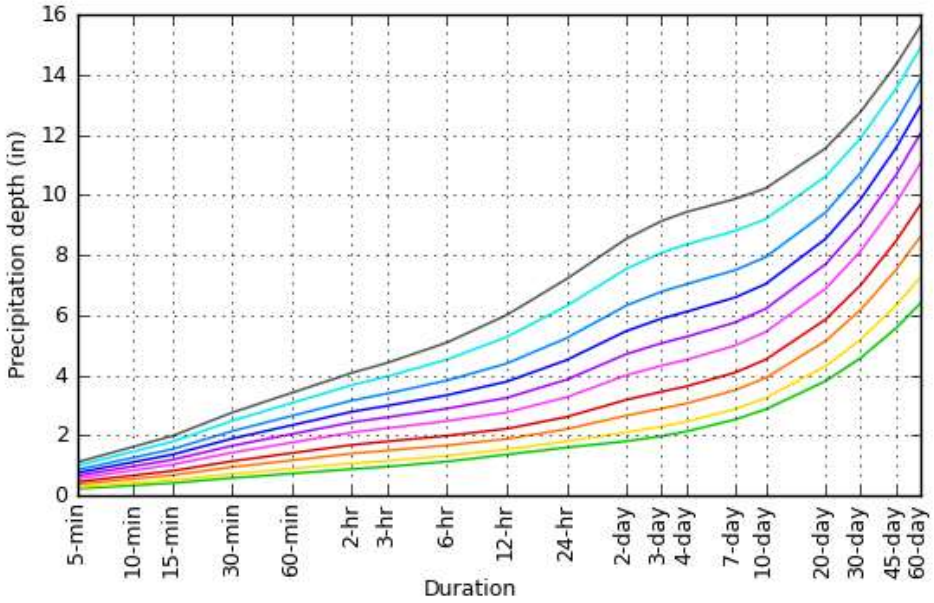
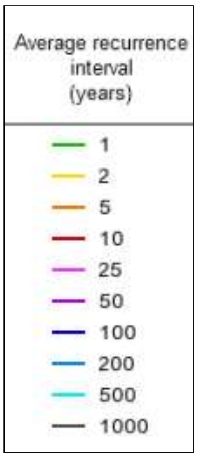
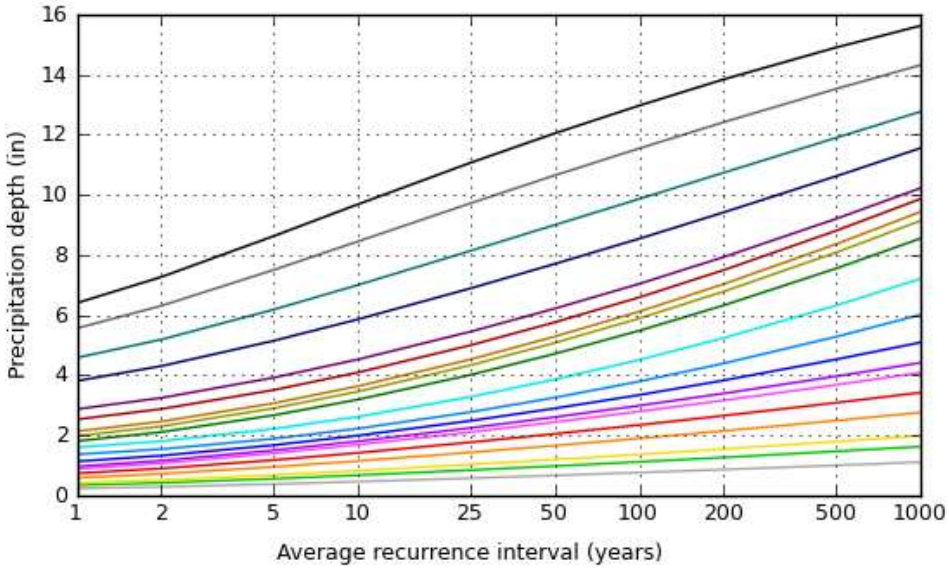
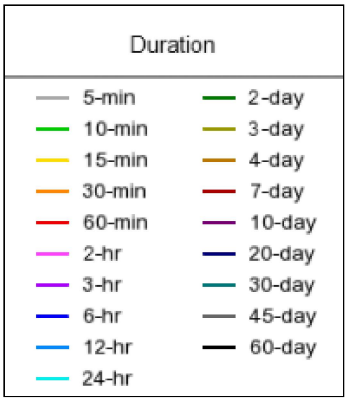
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 37.1050°, Longitude: -104.7802°









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Created (GMT): Mon Mar 13 20:14:32 2023

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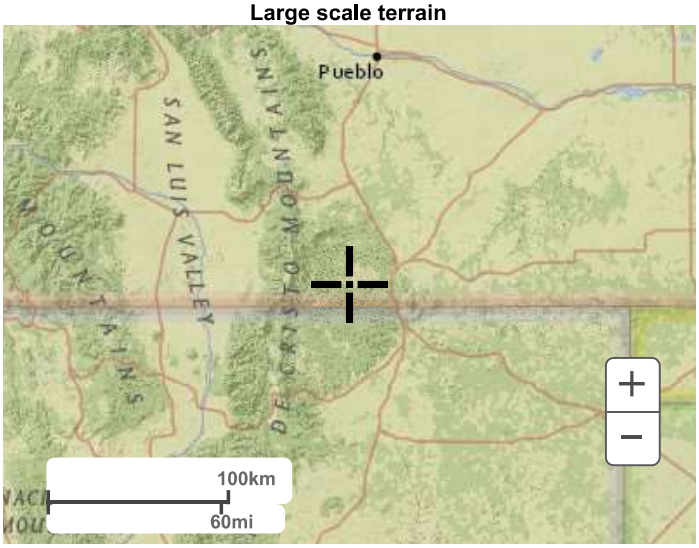
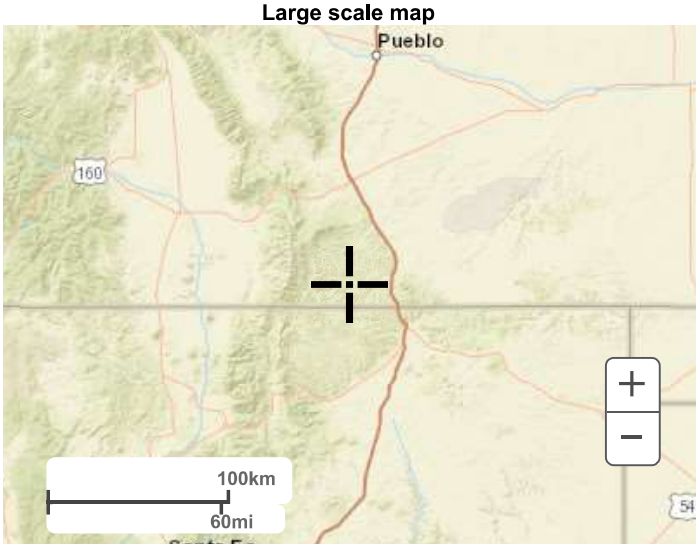
Maps & aerials

Small scale terrain

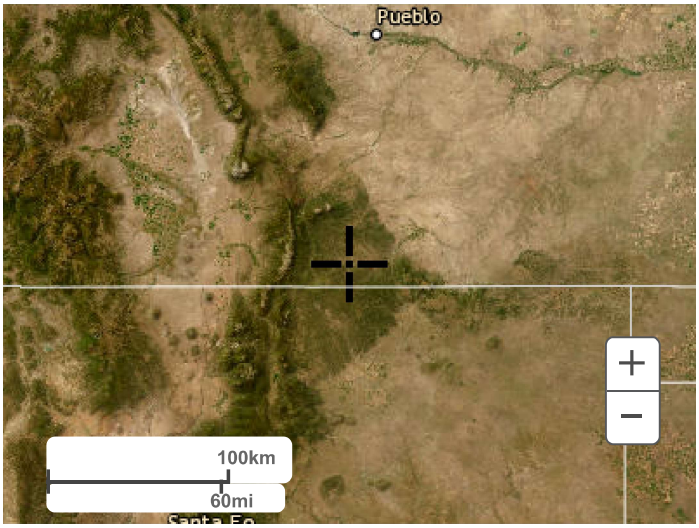
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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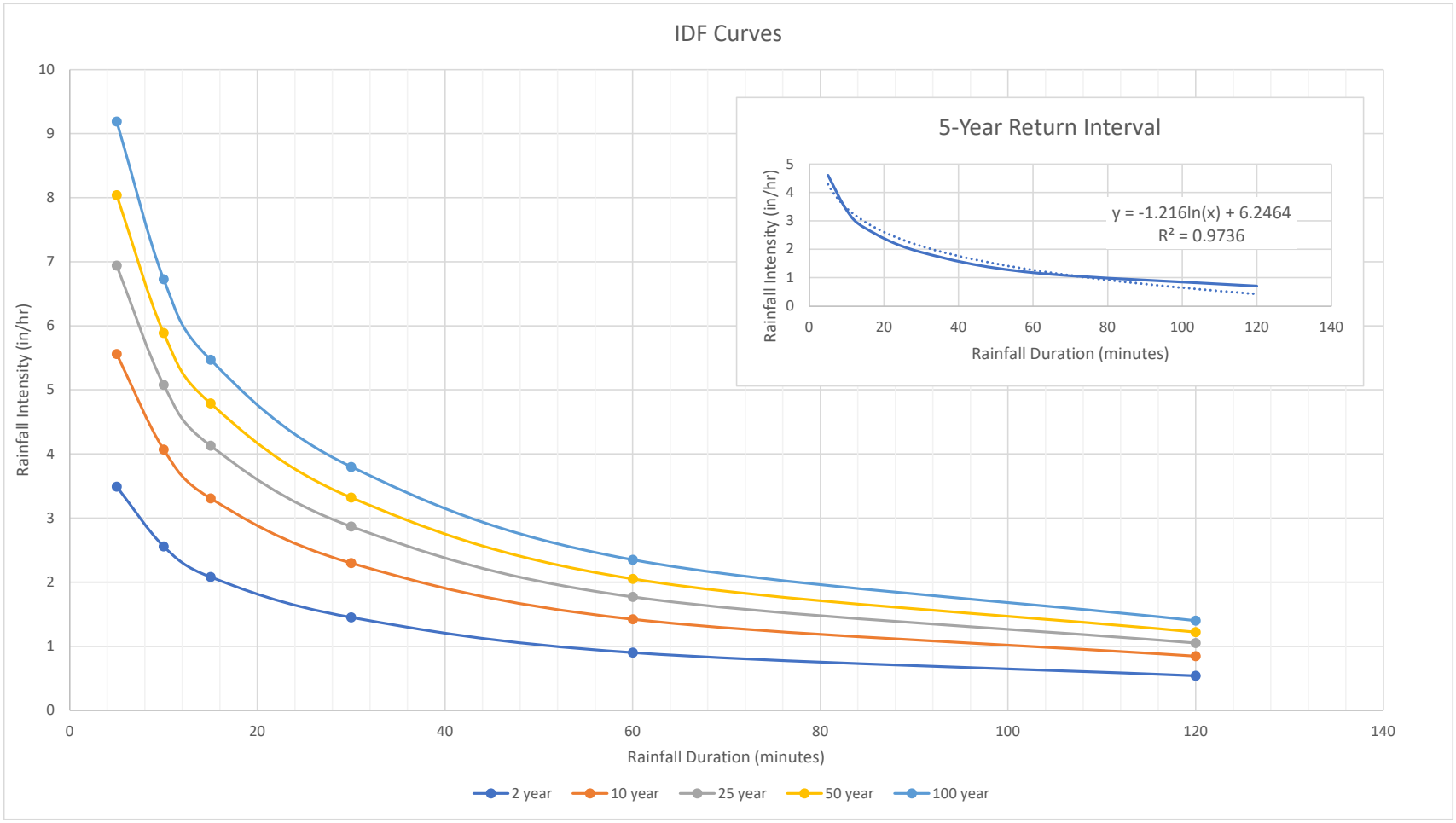

IDF Curves
Rainfall Intensity (in/hr)
Rainfall Duration (minutes)
2 year
10 year
25 year
50 year
100 year
5-Year Return Interval
y = -1.216ln(x) + 6.2464
R² = 0.9736
Rainfall Intensity (in/hr)
Rainfall Duration (minutes)

Hydraulic Calculations- Site Runoff

Drainage Basin	Area (acres)	Runoff Coefficient	Time of Concentration (Tc) Estimation						Rational Method Peak Flow	
			Flow-Regime	Length	Slope	Storm Intensity (in/hr) *(5-Year Return Interval)*	Travel Time (Tt) (min)	Time of Concentration (min)	Peak Flow (cfs)	Storm Duration (Seconds)
Rehab Slope - South	0.27	0.59	Sheet Flow	145	0.50	6.37	0.7	0.72	1.0	43
Rehab Slope - West	2.2	0.59	Sheet Flow	300	0.50	6.13	1.1	1.14	7.8	68
Rehab Slope - West 20 ft wattle	0.2	0.59	Sheet Flow	20	0.50	8.19	0.2	0.20	0.87	12
Flow Reporting to Pad	0.11	0.59	Sheet Flow	100	0.06	5.84	1.1	2.89	2.2	173
	0.55	0.59	Shallow Concentrated Flow	103	0.23	5.54	1.8		*1.8*	
Flow to NW Drainage Channel	0.22	0.59	Sheet Flow	227	0.03	5.19	2.4	2.4	1.75	144
Flow to SE Drainage Channel	0.23	0.59	Shallow Concentrated Flow	176	0.03	3.69	8.3	8.34	1.6	500

Figure 9.7-1 Runoff Coefficients	
$C_{\text{D soil type}} = 0.45(i) + .508$	0.59215

Reference: CO DOT Design Manual

Rational Method	**Q=C*i*A**
Peak Flow (Q)	cfs
Runoff Coefficient (C)	dimensionless
Rainfall Intensity (I)	in/hr
Drainage Area (A)	acres

Sheet Flow (HEC-22 Chapter 3.2.2.3)

$$T_s = \frac{K_u}{I^{0.4}}\left(\frac{n\,L}{\sqrt{S}}\right)^{0.6} \qquad (3\text{-}3)$$

where:

T_s = Sheet flow travel time, min
n = Roughness coefficient (see Table 3-2)
L = Flow length, m (ft)
I = Rainfall intensity, mm/hr (in/hr)
S = Surface slope, m/m (ft/ft)
K_u = Empirical coefficient equal to 6.92 (0.933 in English units)

Shallow Concentrated Flow (HEC-22 Chapter 3.2.2.3)

$$V = K_u\, k\, S_p^{0.5} \qquad (3\text{-}4)$$

where:

K_u = 1.0 (3.28 in English units)
V = Velocity, m/s (ft/s)
k = Intercept coefficient (Table 3-3)
S_p = Slope, percent

3-9

Table 3-3. Intercept Coefficients for Velocity vs. Slope Relationship of Equation 3-4.[6]

Land Cover/Flow Regime	k
Forest with heavy ground litter; hay meadow (overland flow)	0.076
Trash fallow or minimum tillage cultivation; contour or strip cropped; woodland (overland flow)	0.152
Short grass pasture (overland flow)	0.213
Cultivated straight row (overland flow)	0.274
Nearly bare and untilled (overland flow); alluvial fans in western mountain regions	0.305
Grassed waterway (shallow concentrated flow)	0.457
Unpaved (shallow concentrated flow)	0.491
Paved area (shallow concentrated flow); small upland gullies	0.619

MGP Well Site-Specific Calculations

Riprap Sizing Calculations

Rip Rap Design for Channel Bottom

HEC-15 Guidance

Step 1: Calculate Flow Depth

Using Hydraflow Express

Assumptions:			
	Bottom width	2	ft
	Side Slopes	2:1	Z:1
	Total Depth	1	ft
	Slope	0.5	ft/ft
	Flow Rate	1.75	cfs
	n-value	0.07	
	Flow Depth	**0.43**	ft

$$\tau_d = \gamma d S_o \text{ (HEC} - 15 \text{ Equation 3.1)}$$

Where:

τ_d = maximum shear stress on the channel bottom (lb/ft^2)

γ = unit weight of water (lb/ft^3)

d = depth of flow in channel (ft)

S_o = channel bottom slope (ft/ft)

Step 2: Calculate Shear Stress

τd	13.4	lb/ft2
τd with 1.1 FS	14.8	lb/ft2

$$D_{50} = \frac{\tau_p}{F^* * (\gamma_s - \gamma)} \text{ (HEC} - 15 \text{ Equation 7.1)}$$

Where:

D_{50} = mean riprap size (ft)

τ_p = permissible shear stress (lb/ft^2) = τ_d for main channel and τ_b for bend

F^* = Shield's parameter, dimensionless = 0.051

γ_s = unit weight of the stone = 164 lb/ft^3

γ = unit weight of the water = 62.4 lb/ft^3

Step 3: Compute D50

D50 for τd=	**2.6**	ft
D50 for τd w/ 1.1 FS=	**2.8**	ft

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Apr 24 2023

Typical Drainage Channel Cross Section

Triangular

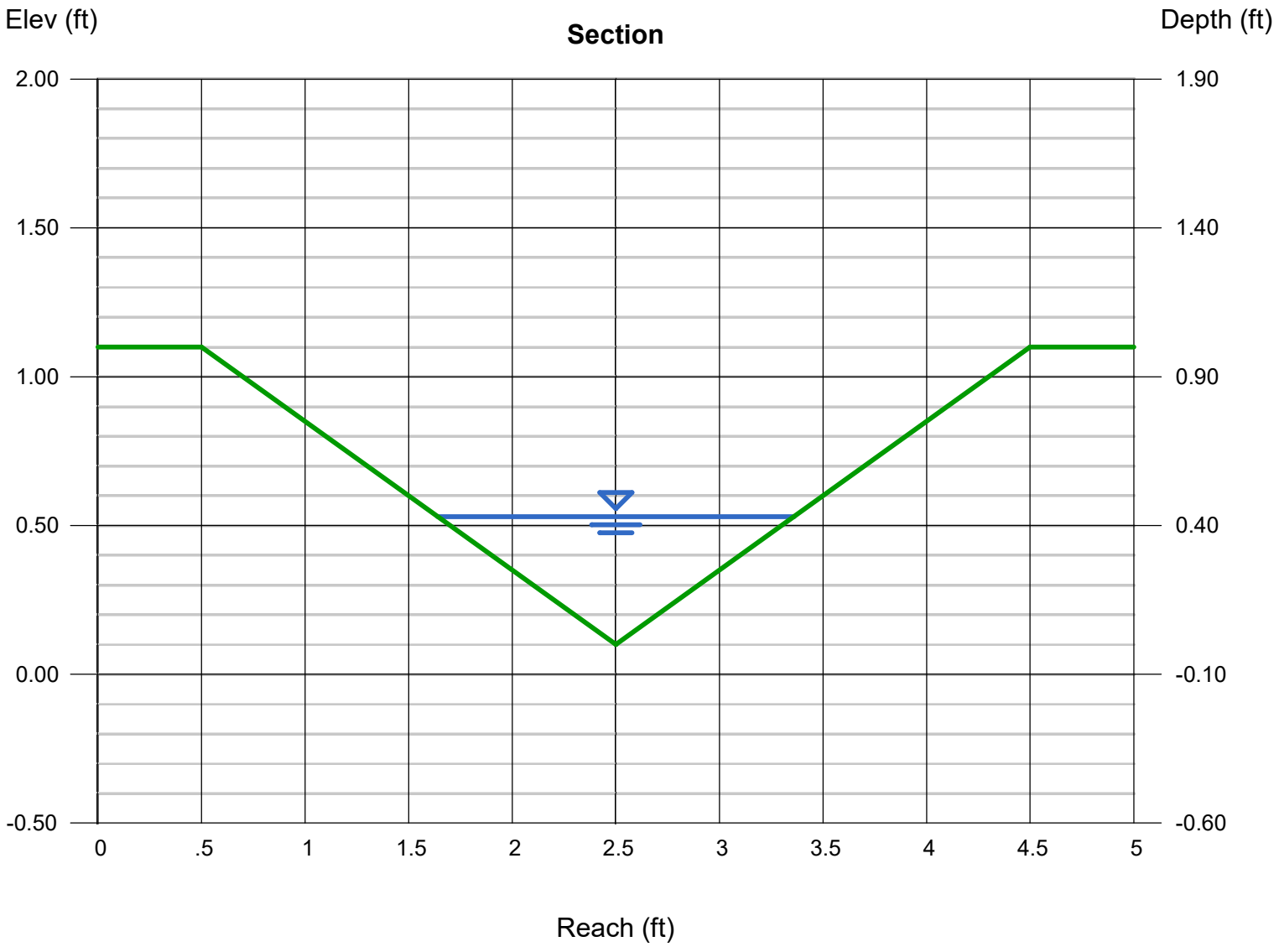
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 0.10
Slope (%)	= 50.00
N-Value	= 0.070

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.75

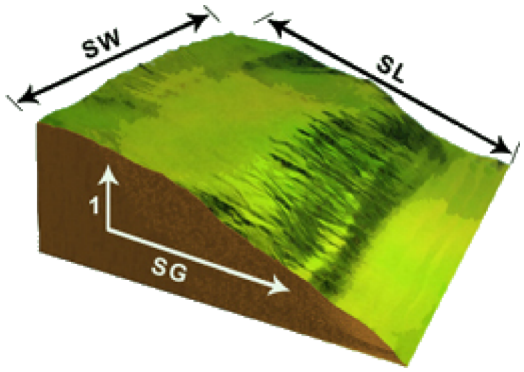
Highlighted

Depth (ft)	= 0.43
Q (cfs)	= 1.750
Area (sqft)	= 0.37
Velocity (ft/s)	= 4.73
Wetted Perim (ft)	= 1.92
Crit Depth, Yc (ft)	= 0.55
Top Width (ft)	= 1.72
EGL (ft)	= 0.78



MGP Well Site-Specific Calculations

Hydraulic Erosion Control Product Selection



Project Information

Project	6538-0001
* Project Name	MGP Well Pad
Location	Pueblo, Colorado United States
Contact	Emily Stoick
Phone	4066866917
Email	estoick@woodardcurran.com
* Project Type	Others
Estimated Start Date	06/12/2023
* Estimated Project Size (Acres)	2.2
* Project Stage	In Planning

Slope Details

Slope Name	Slope West
Functional Longevity	18 - 24 months
Supporting Practices Factor (P)	Loose With Rough Surface Greater Than 12-inch Depth (0.8)
Soil Density (Y)	92 lb/ft^3

Thawing Soils?	No
Soil Loss Limit (SLL)	0.01 in
Slope Length (SL)	300 ft
Slope Gradient (SG)	1.75 H:1 V
Slope Width (SW)	250 ft
Soil Type (K Factor)	Sandy Clay Loam (0.17)
Expected Final Cover Type	Veg. Open Space - Good Cond. (cover > 75%)
Rainfall Factor (R) ft•tonsf•in/acre•hr•year	34.29
Desired Growth Improvement Factor (G)	800%
Tank Size	1000 gal

RUSLE Parameters and Runoff Discharge

Rainfall Factor (R) ft•tonsf•in/acre•hr•year	34.29
Soil Erodibility Factor (K)	0.17
Topographic Factor (LS)	19.3836
Supporting Practices Factor (P)	0.8
Runoff Discharge	3.185 ft^3/s [1]

Product Selection

Click on a product in the list below to view application detail

HECP Product Application

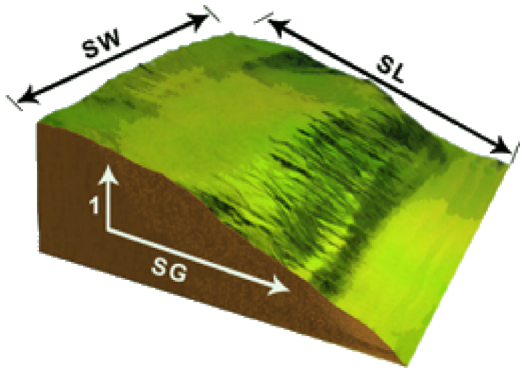
Flexterra HP-FGM

Product C-Factor	0.001

Factor of Safety (FS)	>10
Annual Soil Loss (with Product)	181 lb/acre, 0.0005 in
Annual Soil Loss (without Product)	180788 lb/acre , 0.5413 in

Functional Longevity	≤18 Months
Growth Establishment Factor	800%
Suggested Application Rate	4000 lb/acre
Job Size	1.722 acres
# of Tanks per Acre	10.53
Estimated # of Bags	145
# of Bags per Tank	8
Total # of Tanks	18.1

1. Runoff discharge is calculated using a 10-year, 24-hour rainfall intensity.
2. Slope interruption limits are for product applications on a 3H:1V slope. For applications on steeper slopes, slope interruptions limits may need to be decreased.
3. Large scale testing conducted at Utah Water Research Laboratory using a rainfall simulator on a 2.5H:1V slope, sandy-loam soil, at a rate of 5 inches per hour for a duration of 60 minutes (30 minutes for Base Hydraulic Mulches).



Project Information

Project	6538-0001
* Project Name	MGP Well Pad
Location	Pueblo, Colorado United States
Contact	Emily Stoick
Phone	4066866917
Email	estoick@woodardcurran.com
* Project Type	Others
Estimated Start Date	06/12/2023
* Estimated Project Size (Acres)	2.2
* Project Stage	In Planning

Slope Details

Slope Name	Slope South
Functional Longevity	18 - 24 months
Supporting Practices Factor (P)	Loose With Rough Surface Greater Than 12-inch Depth (0.8)
Soil Density (Y)	92 lb/ft^3

Thawing Soils?	No
Soil Loss Limit (SLL)	0.01 in
Slope Length (SL)	150 ft
Slope Gradient (SG)	1.75 H:1 V
Slope Width (SW)	90 ft
Soil Type (K Factor)	Clay Loam (0.23)
Expected Final Cover Type	Veg. Open Space - Good Cond. (cover > 75%)
Rainfall Factor (R) ft•tonsf•in/acre•hr•year	47.8
Desired Growth Improvement Factor (G)	400%
Tank Size	1000 gal

RUSLE Parameters and Runoff Discharge

Rainfall Factor (R) ft•tonsf•in/acre•hr•year	47.8
Soil Erodibility Factor (K)	0.23
Topographic Factor (LS)	11.8575
Supporting Practices Factor (P)	0.8
Runoff Discharge	0.62 ft^3/s [1]

Product Selection

Click on a product in the list below to view application detail

HECP Product Application

Flexterra HP-FGM

Product C-Factor	0.001

Factor of Safety (FS)	>10
Annual Soil Loss (with Product)	209 lb/acre, 0.0006 in
Annual Soil Loss (without Product)	208579 lb/acre , 0.6246 in

Functional Longevity	≤18 Months
Growth Establishment Factor	800%
Suggested Application Rate	4000 lb/acre
Job Size	0.31 acres
# of Tanks per Acre	10.89
Estimated # of Bags	27
# of Bags per Tank	8
Total # of Tanks	3.4

1. Runoff discharge is calculated using a 10-year, 24-hour rainfall intensity.
2. Slope interruption limits are for product applications on a 3H:1V slope. For applications on steeper slopes, slope interruptions limits may need to be decreased.
3. Large scale testing conducted at Utah Water Research Laboratory using a rainfall simulator on a 2.5H:1V slope, sandy-loam soil, at a rate of 5 inches per hour for a duration of 60 minutes (30 minutes for Base Hydraulic Mulches).

MGP Well Site-Specific Calculations

Compost Filter Sock Size and Frequency Selection

Sediment Retention Fiber Rolls (SRFRs)
General Usage and Installation Guidelines

Erosion Control Technology Council

Sediment Retention Fiber Roll (SRFR) General Usage and Installation Guidelines

July 2018
Version 2.0

Erosion Control Technology Council

Introduction

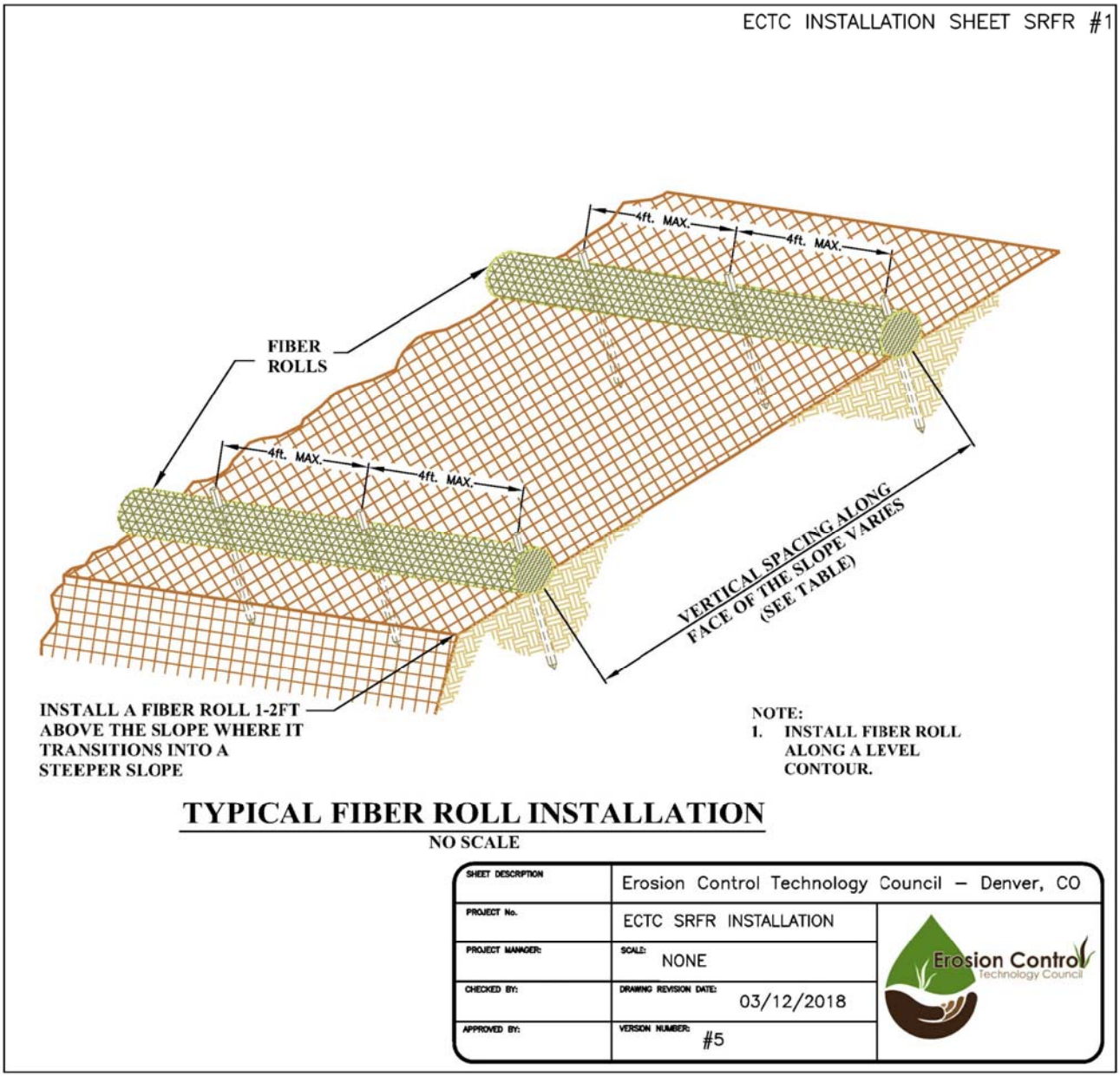
Sediment Retention Fiber Rolls (SRFRs) are a manufactured three-dimensional device of a specified filler matrix encapsulated within a flexible containment material utilized in sediment and flow control applications. SRFRs are also known as wattles, logs, socks, tubes or fiber rolls. SRFRs are available as prefabricated units; constructed into tubular configurations comprised of rice straw, wheat straw, excelsior fiber, wood fiber, coconut fiber, compost, flax or a similar matrix material. The matrix material is encapsulated within biodegradable or photodegradable netting, yielding an approximate functional life of 1 - 3 years. Functional life will vary depending on factors such as material composition and site-specific climatic conditions. SRFRs provide economical performance and utility for numerous applications such as perimeter control, inlet protection, velocity control and slope length reduction. Finally, as with any erosion control or sediment control measure, proper installation and maintenance is critical to the success of these products.

SRFRs offer many advantages when used in slope and channel applications. Once installed, SRFRs reduce flow velocity, intercept runoff and remove sediment from polluted waters. Sediment collects upstream of the unit and within the fibrous matrices of SRFRs. Plant material may also take hold upstream and within the SRFR matrix. When plant material is established, a vegetated buffer is formed providing permanent erosion control. In an unvegetated condition, SRFRs serve to shorten the effective slope length of the waterway or slope.

Table of Contents

Appropriate Applications

SRFRs are typically placed along the toe, top, face and at grade breaks of exposed and erodible slopes to shorten the slope length and spread runoff as sheet flow. SRFRs are also frequently used for inlet protection, around temporary stockpiles and even around the perimeter of a job



NOTES:

1. Install fiber roll along a level contour.
2. Some SRFRs are anchored on the down gradient side through the netting only as compared to through the center of the SRFR as shown on this detail. (See netting only stake detail – ECTC SRFR installation sheet 5)

Figure 1. Spacing of SRFRs.

Appropriate Applications (cont.)

site for sediment containment and/or filtration. SRFRs are also used in channel applications as checks to reduce flow velocity and filter sediment laden flow. SRFRs may be used in conjunction with Rolled Erosion Control Products (RECPs) and Hydraulically Applied Erosion Control Products (HECPs). If used with HECPs, SRFRs are installed prior to application of the HECP. Once SRFRs are installed, apply the HECP per the manufacturer's application rates and instructions. When used with RECPs, SRFRs are typically placed and secured after installation of the RECP. Proper installation is necessary for successful SRFR implementation. Excessive runoff and erosion may occur if SRFRs are not adequately spaced, trenched in and/or anchored. The following provides a general guide to determination of spacing and installation.

Table 1. Nominal Spacing for SRFR Slope Installations.

		Nominal Diameter Spacing (ft)			
		6" dia.	9" dia.	12" dia.	20" dia.
Slope Gradient	≤4H:1V	20	40	60	80
	3H:1V	15	30	45	60
	2H:1V	10	20	30	40
	1H:1V	5	10	15	20

Reducing Slope Length for Erosion Control

Slope length and gradient are two factors that directly affect the erodibility of a slope and introduce sediment into stormwater runoff. As many road right-of-ways are space limited, slopes along roadsides tend to be steep, leading to accelerated erosion. SRFRs provide a reliable and economical means to reduce the effective length of slopes, thus reducing erosion and sediment discharge to receiving waters.

Suggested Spacing

Primarily, the gradient of the slope will determine the distance between SRFRs on a slope, however, the soil type and overall project risk may affect the final spacing plan of the installation. See Figure 1 for illustration of typical SRFR spacing.

Typical spacing between SRFRs for slope applications is recommended in Table 1. Contact the manufacturer of the SRFR for specific recommendations.

Typical spacing between SRFRs can be calculated as follows for channel applications:

$$\text{Spacing} = \frac{\text{(Unit Nominal Diameter - Trench Depth)}}{\text{Channel Gradient}}$$

Example: Unit Nominal Diameter = 9”
Trench Depth = 2.0” (See step 3)
Channel Gradient = 0.005 ft/ft

Spacing = [(9” - 2.0”) / (12” per ft)] / 0.005 = 116.7 ft

Key Elements for Successful Product Installation

Always consult with the manufacturer for specific product installation requirements and site specific recommendations.

It is critical that the SRFRs are installed perpendicular to the expected water flow (parallel to the slope contour or across the width of the channel/ swale).

Lay the SRFRs onto an RECP, the prepared subgrade, or into the trenches in the soil; ensuring no gaps exist between the roll and the subgrade or RECP. When using HECPs, apply them after the SRFRs have been properly installed.

Wooden stakes or metal pins may be used to secure the SRFRs. If using wooden stakes the minimum dimensions of the stake should be ¾” x ¾” and long enough to provide anchoring

Key Elements for Successful Product Installation (cont.)

and stability for the SRFR. Typically, the stake length below the soil surface is between 12" - 16". Site-specific conditions such as compacted soil or rocky subgrade will dictate what is realistic and practical for an adequate installation. First, make pilot hole through the center of the SRFRs using a straight metal rod (i.e. rebar), then insert the wooden stakes (this step may not be necessary if using porous SRFRs or metal pins.)

SRFRs may be secured by driving stakes through the body of the unit, or by penetrating the netting of the unit on an angle. Individual manufacturers provide product/project specific recommendations for the staking of SRFRs. For either staking method, drive the stakes or pins through the SRFR or the netting only, leaving no more than 1 to 2 inches of the stake or pin exposed. Stakes or pins should be placed according to manufacturer's recommendations. On very steep or erosive slopes, additional stakes or pins may be placed on the downslope side of the roll. In very compacted soil shorter stakes or pins may be necessary.

Photo 1. SRFRs installed across the width of a swale.

CADD Drawings:

- The drawings shown in this document are available for download at ECTC.org
- DWG files are available for designers to import into CADD.
- Designers are welcome to modify the drawings for usage in their project specifications.

Installation Instructions on Bare (Unprotected) Soils

Step One: Prepare site by removing debris and obstructions and minimizing disturbances to yield a smooth, even ground surface. If seeding is required, place seed, as specified, prior to installation of SRFRs.

Step Two: Determine if an anchor trench is required. Verify manufacturer's recommendations based on site-specific characteristics and product properties. Map out the placement of SRFRs to determine location and profile of the anchor trench.

Step Three: For SRFRs that require an anchor trench, excavate an anchor trench along the area where the SRFR is to be placed. The depth and width of the anchor trench is dependent upon the soil type and dimensions of the SRFR. Typically, the anchor trench

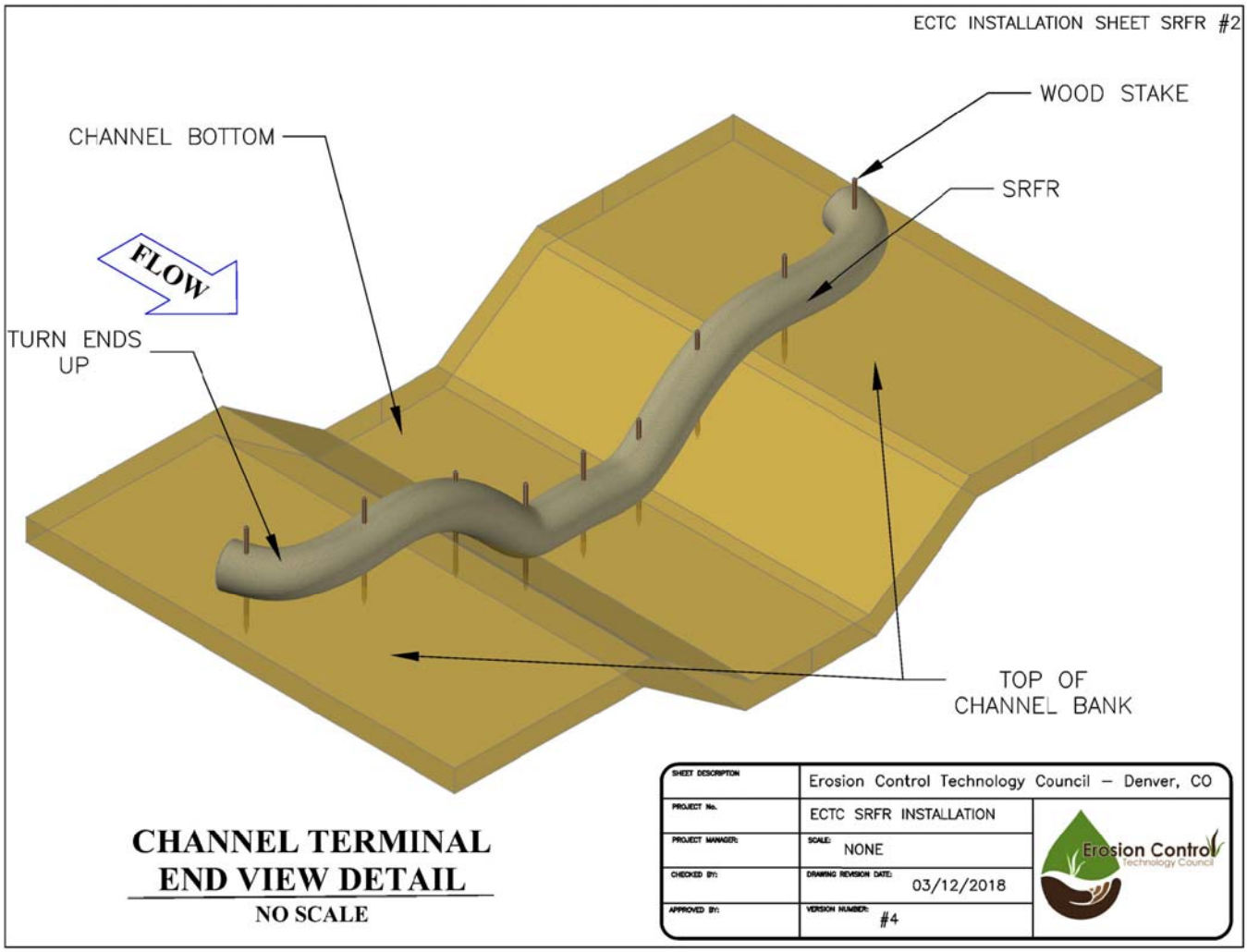


Figure 2. Terminal End Detail.

Installation Instructions on Bare (Unprotected) Soils (cont.)

should be a range of 1 to 3 inches. The anchor trench is utilized to minimize under-cutting of soil on the upstream side of the slope. The anchor trench should match the installation profile and contour of the installed device. SRFRs installed on flat surfaces as perimeter control or inlet protection may not require an anchor trench, per manufacturer's recommendation. For SRFRs that do not require an anchor trench, secure the SRFRs directly to the ground surface, as directed by Steps 5 and 6.

Step Four: Channel Applications: The SRFR should be placed across the width of the channel and perpendicular to the centerline of the channel (direction of flow). The SRFR must be installed sufficiently up the channel banks to prevent flanking or concen-

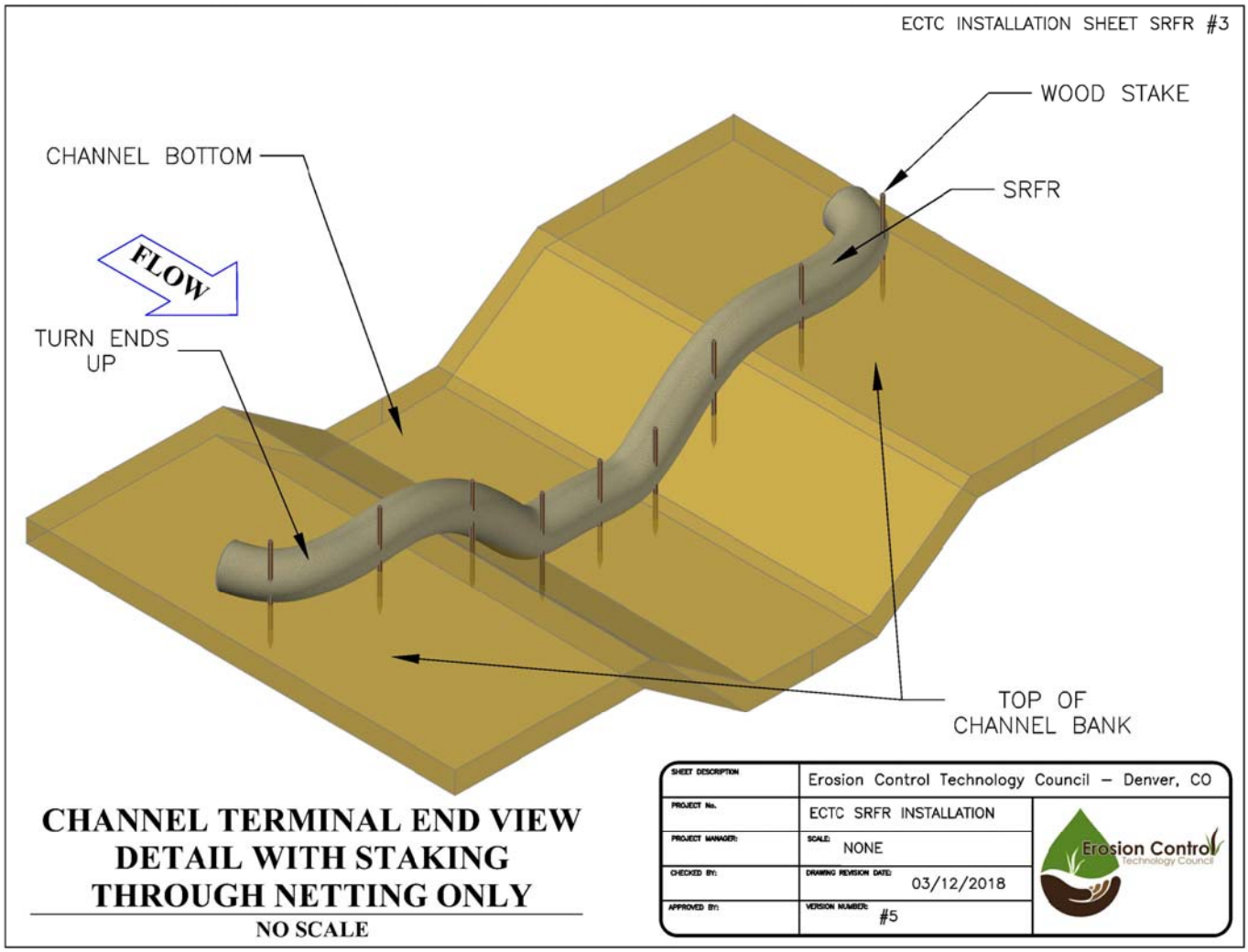


Figure 3. Terminal End Detail

Installation Instructions on Bare (Unprotected) Soils (cont.)

trated flow around the ends of the SRFR. Slope Applications: Units should be placed perpendicular to the downslope flow line. Ends of the unit should be turned upslope forty-five degrees to prohibit flanking of the installation. **See Figures 2 and 3** for examples of slope installation terminal end.

Step Five: Place the SRFR in the anchor trench. The SRFR must be installed ensuring intimate contact with

Figures 4, 5 & 6 Entrenchment and Staking Details.

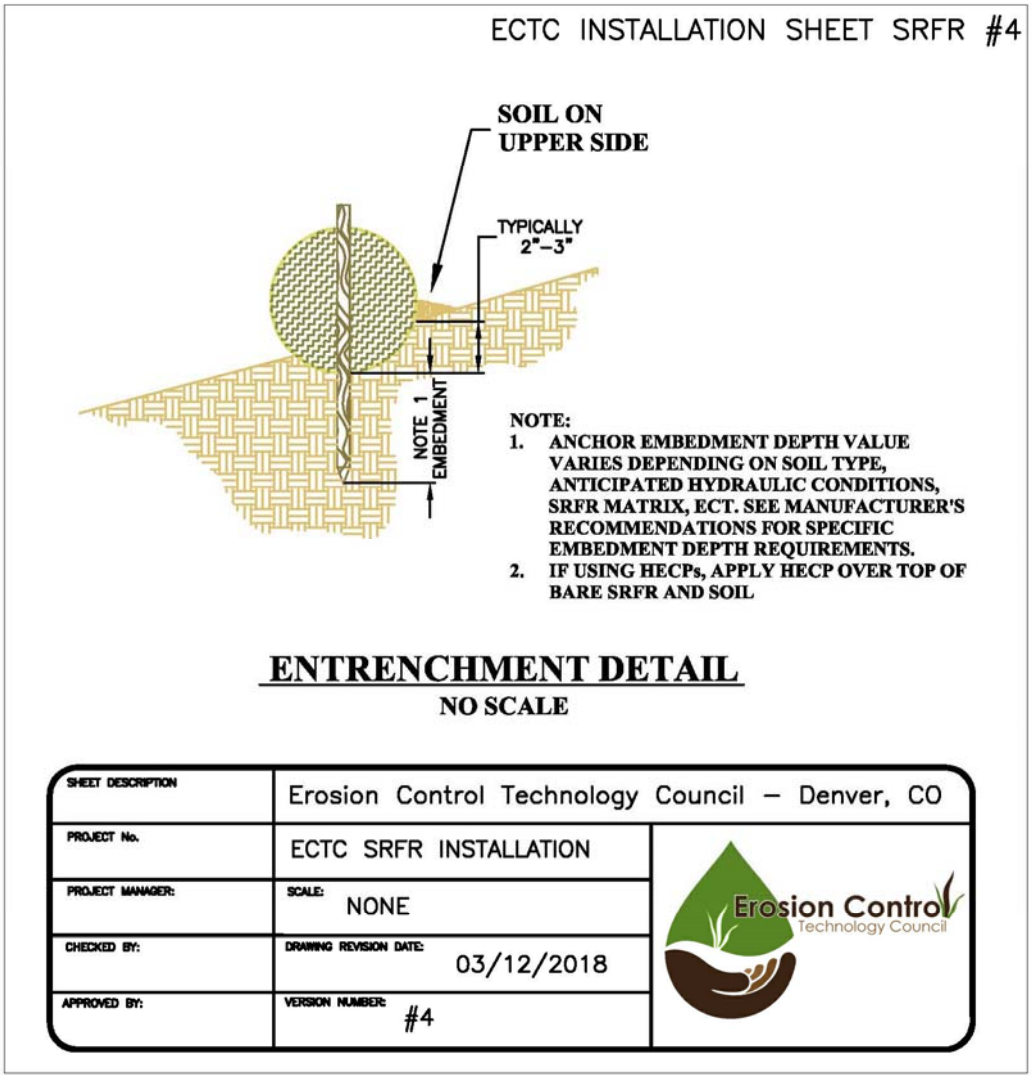


Figure 4. Stake through the middle of the SRFR.

Installation Instructions on Bare (Unprotected) Soils (cont.)

the soil surface along the entire length of the unit.

Step Six: Secure the SRFR with stakes or pins along the length of the unit. Stakes should be driven in vertically, perpendicular to a horizontal ground plane (see **Figures 4, 5 and 6**, "Entrenchment and Staking Details"). Driving stakes perpendicular to a sloped ground surface may compromise the stability of the SRFR.

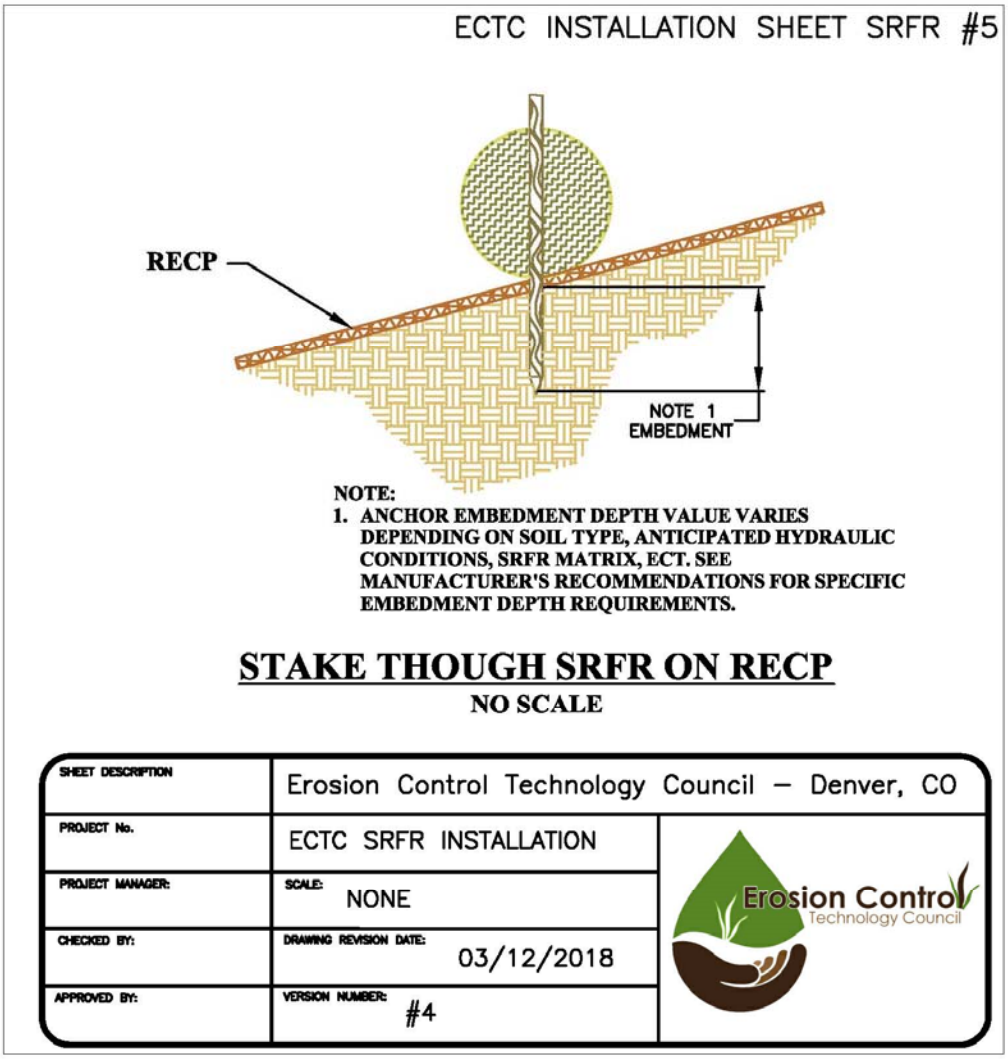


Figure 5 Stake through RECP on top of RECP/HECP.

Installation Instructions on Bare (Unprotected) Soils (cont.)

An optional method of securing the SRFR is to drive stakes on both sides of the SRFR and lace rope between the stakes securing the SRFR. After the rope is laced around the stakes, the stakes are then driven into the slope so that the rope will hold the fiber roll tightly to the slope. If metal stakes are used the rope may be laced and knotted at the bend at the top of the metal stakes. Secure ends of each SRFR. See **Figure 7** for schematics of Stake Lacing.

Figures 4, 5 & 6 Entrenchment and Staking Details (cont.)

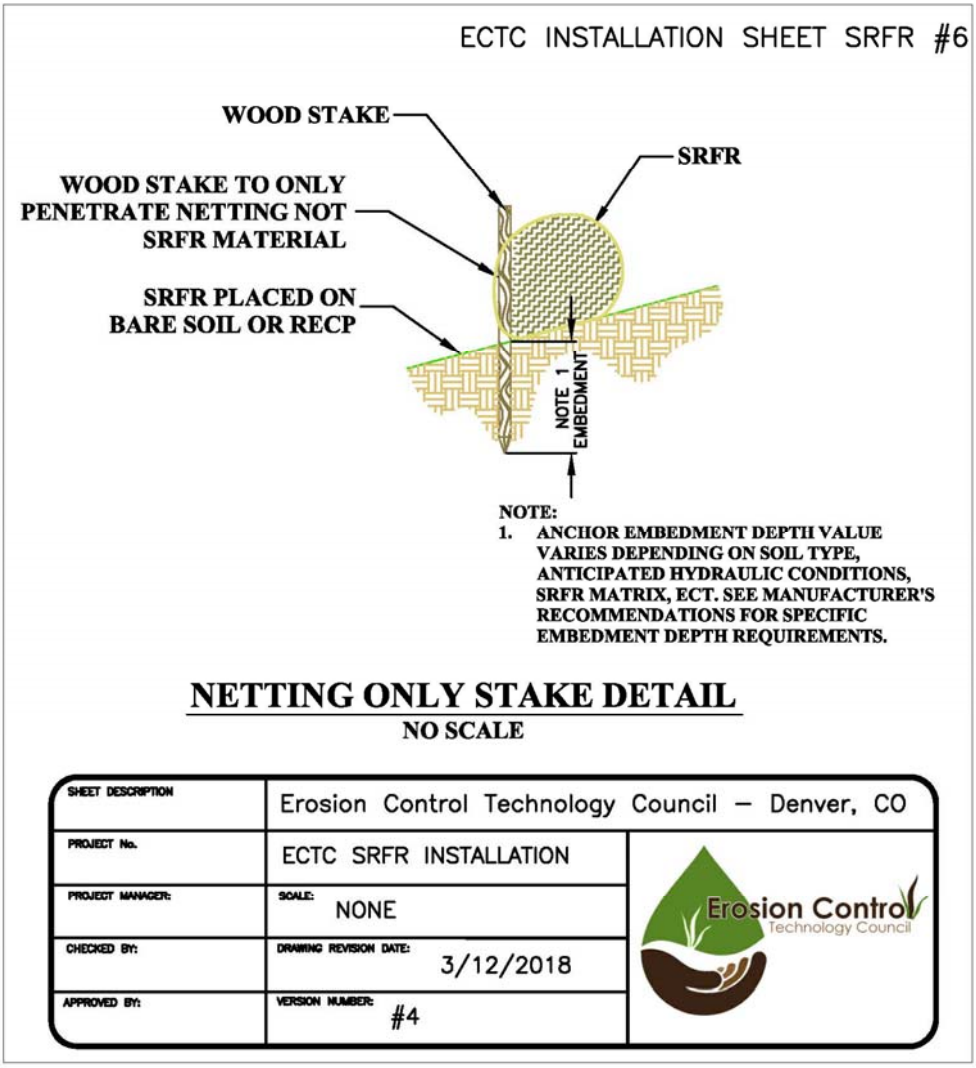


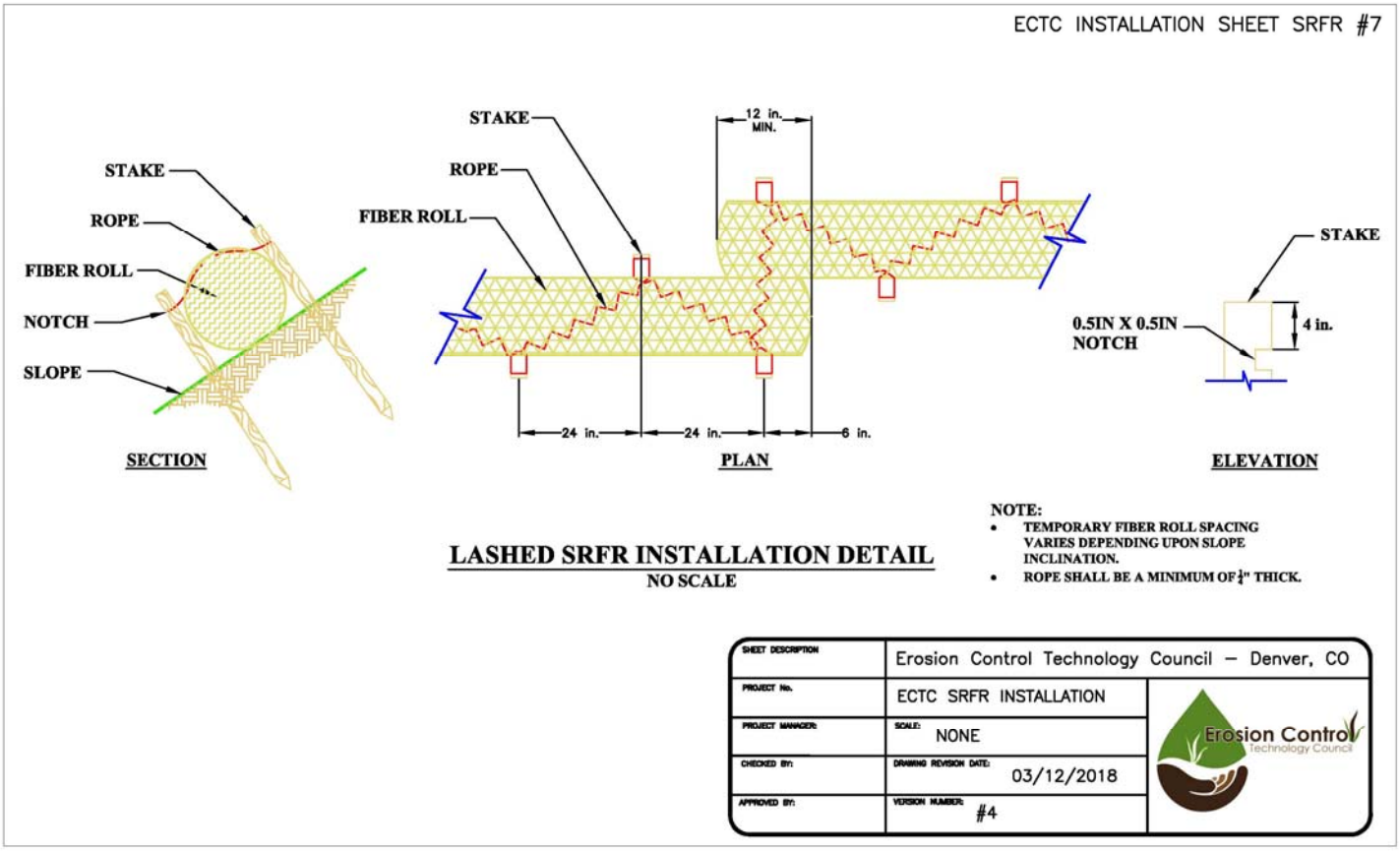
Figure 6. Stake through netting only on soil.

Installation Instructions on Bare (Unprotected) Soils (cont.)

Step Seven: See manufacturer's recommendations regarding joining methods for adjacent units. A one foot overlap, directed up-gradient, is recommended for most products; however, abutting and securing with a common stake is recommended for some of the more porous SRFRs. **Figures 8, 9 & 10** show details for these methodologies.

Step Eight: For trenched SRFRs, place soil on up-slope side of the roll and compact well. The compacted up-slope soil is placed to act as a sealant of the SRFR-soil interface in order to prevent undermining the SRFR. See Figure 4 for Entrenchment Detail.

Step Nine: For slope applications, the terminal ends of the SRFRs should be turned 45 degrees upslope and secured by stakes to prevent water flow around the terminal ends of the SRFRs. See Figure 2 for Terminal End Detail.



Figures 7 Schematics of Stake Lacing

Figures 8, 9 and 10 Joining Methods of Adjacent SRFRs.

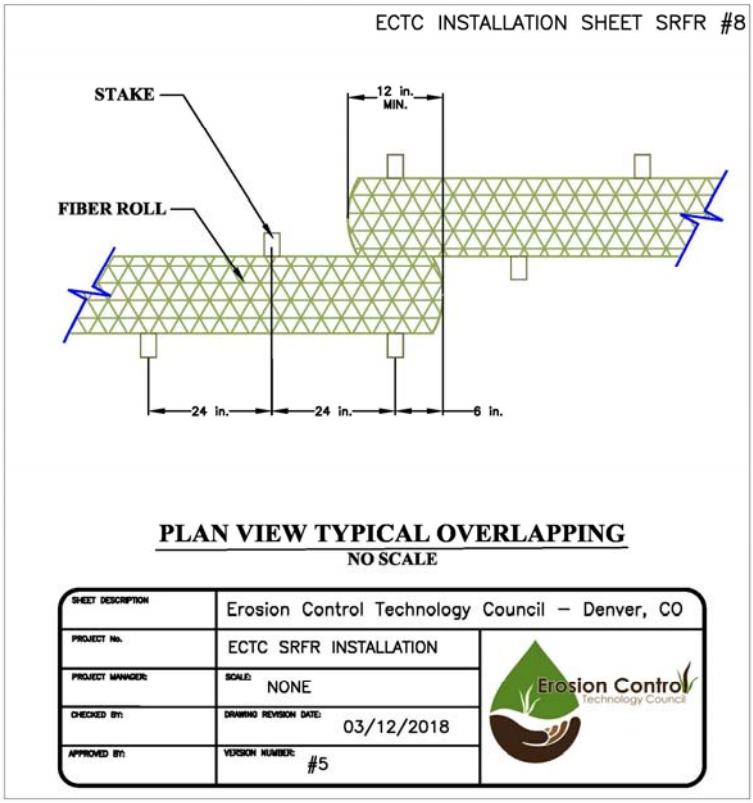


Figure 8. Overlapping SRFRs with laced stakes.

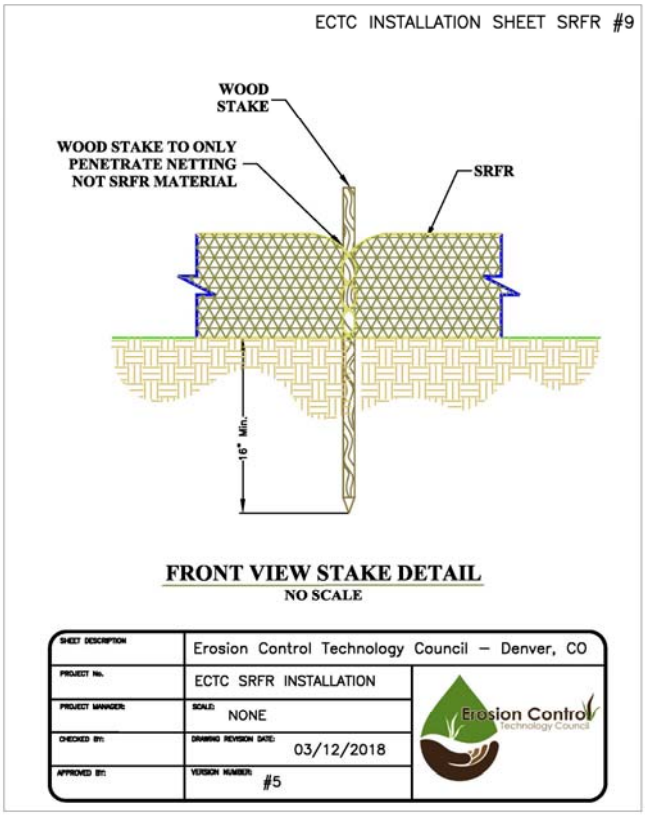


Figure 9. Abutting SRFRs with a common stake.

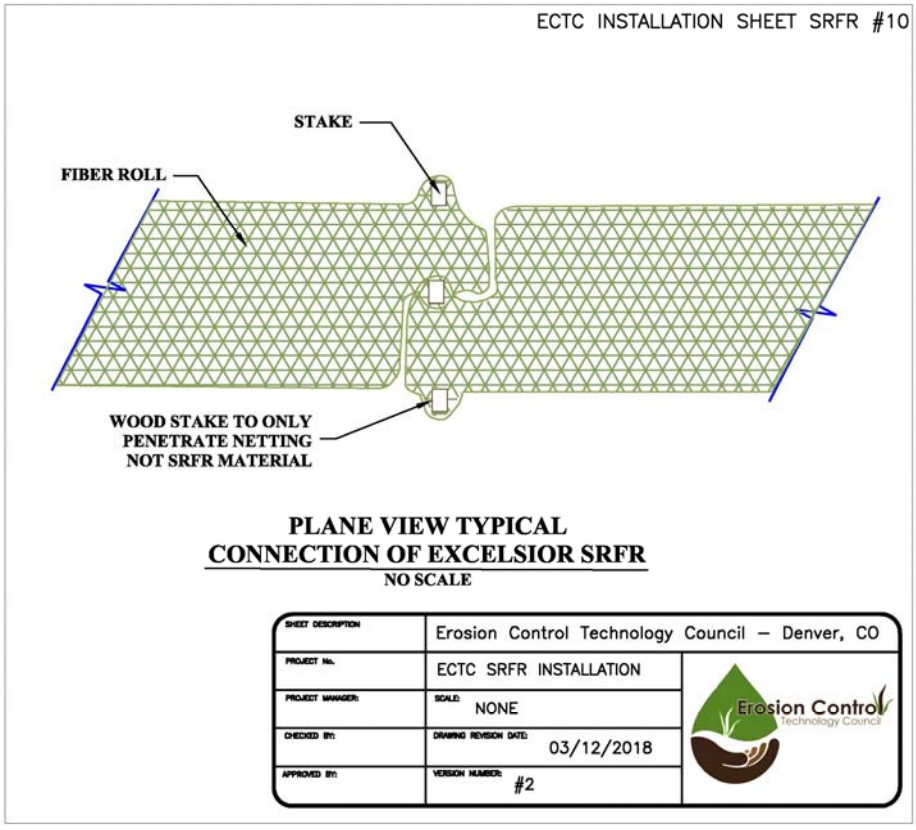


Figure 10. Typical connection of a wood SRFR.

Installation Instructions in Conjunction with RECP / HECP

For placement in conjunction with an HECP, install SRFR as directed in Step One through Step Eight above; then install the HECP as directed by manufacturer's instructions.

For placement in conjunction with RECPs, install RECPs as per manufacturer's instructions, then install SRFRs on top of RECP ensuring intimate contact with the RECP along the entire length of the unit. Secure SRFR(s) as directed in Steps Five through Seven.

Maintenance and Installation

Refer to the manufacturer for maintenance guidelines as this document is only intended for typical installation recommendations. For the most effective SRFR installation, use guidelines as recommended by the manufacturer. Manufacturers may also provide site specific recommendations.

About ECTC

The Erosion Control Technology Council (ECTC) is committed to promoting cost-effective erosion and sediment control solutions through leadership, standardization and education. ECTC assists agencies, engineers, designers, contractors and other entities in the proper application, installation and specification of erosion control technologies while establishing guidelines for product quality, testing and performance.

ECTC's mission has grown even more important as new end-users look for guidance in employing RECPs, HECPs and SRFRs to comply with more stringent erosion/sediment control regulations.

Erosion Control Technology Council

Education and Standardization for a Growing Industry

Phone: +1 (720) 353-4977

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Erosion Control Technology Council

MGP Well Site-Specific Calculations

Soil Results

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Date: 4/10/2023

CLIENT: Woodard & Curran-TREC
Project: 1234949.000
Lab Order: S2303317

CASE NARRATIVE

Report ID: S2303317001

Entire Report Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Samples SS-Background-20230321, SS-South Slope-20230321 and SS-West Slope-20230321 were received on March 23, 2023.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, August 1998
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Pace Analytical (Formerly Inter-Mountain Laboratories) except as indicated in this case narrative.

Qualifiers by sample

Control - Soil Texture Analysis/Clay - Spike Recovery outside accepted recovery limits
Control - Soil Texture Analysis/Sand - Spike Recovery outside accepted recovery limits
S2303317-001 - Saturated Paste Cations by EPA 200.7/Calcium - RPD outside accepted recovery limits
S2303317-001 - Saturated Paste Cations by EPA 200.7/Sodium - RPD outside accepted recovery limits

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Date: 4/10/2023

Definitions

RL	Reporting Limit

Qualifiers

*	Value exceeds Maximum Contaminant Level
A	Check MSA specifications
B	Analyte detected in the associated Method Blank
C	Calculated Value
D	Report limit raised due to dilution
E	Value above quantitation range
G	Analyzed at Pace Gillette, WY laboratory
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL
ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte below method detection limit
X	Matrix Effect

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Woodard & Curran-TREC
225 Union Blvd. Ste 475
Lakewood, CO 80228

Report ID: S2303317001

Project: 1234949.000
Date Received: 3/23/2023

Date Reported: 4/10/2023
Work Order: S2303317

Lab ID	Sample ID	Depths	Organic Matter LOI	pH	Electrical Conductivity	Calcium PE	Magnesium PE	Potassium PE	Sodium PE
		Inches	%	s.u.	dS/m	meq/L	meq/L	meq/L	meq/L
S2303317-001	SS-Background-20230321	0-6	7.2	6.7	0.41	3.06	1.5	<0.3	<1
S2303317-002	SS-West Slope-20230321	0-6	6.7	7.0	0.69	2.95	2.7	<0.3	2
S2303317-003	SS-South Slope-20230321	0-6	4.2	7.9	0.29	1.36	0.8	<0.3	<1

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman
Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Woodard & Curran-TREC

225 Union Blvd. Ste 475
Lakewood, CO 80228

Report ID: S2303317001

Project: 1234949.000
Date Received: 3/23/2023

Date Reported: 4/10/2023
Work Order: S2303317

Lab ID	Sample ID	Depths	Sand	Silt	Clay	Texture	Available Potassium	AB-DTPA Iron	AB-DTPA Zinc	Total Phosphorus	Nitrate(as N)
		Inches	%	%	%		ppm	ppm	ppm	mg/Kg	ppm
S2303317-001	SS-Background-20230321	0-6	31.5	35.1	33.5	Clay Loam	280	22.1	0.9	280	1.2
S2303317-002	SS-West Slope-20230321	0-6	<0.1	46.5	53.5	Silty Clay	218	12.4	4.8	100	3.8
S2303317-003	SS-South Slope-20230321	0-6	<0.1	49.0	51.0	Silty Clay	217	12.9	1.5	190	<0.1

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman
Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Woodard & Curran-TREC
Work Order: S2303317
Project: 1234949.000

Date: 4/10/2023
Report ID: S2303317001

ABDTPA Metals by ICP Sample Type **MBLK** Units: ppm

ABDTPA BLK (04/06/23 12:16) RunNo: 209307

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Iron	ND	1.5					
Zinc	ND	0.5					

ABDTPA Metals by ICP Sample Type **LCS** Units: ppm

ABDTPA QC (04/06/23 12:13) RunNo: 209307

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Iron	43.9	1.5	62.3		70.5	70 - 130	
Zinc	7.7	0.5	9.35		82.5	70 - 130	

ABDTPA Metals by ICP Sample Type **MS** Units: ppm

S2303317-002AS (04/06/23 12:09) RunNo: 209307

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Iron	16.8	2.5	5.5	12.4	79.0	70 - 130	
Zinc	10.0	0.5	5.5	4.8	94.7	70 - 130	

ABDTPA Metals by ICP Sample Type **DUP** Units: ppm

S2303317-001AD (04/06/23 12:04) RunNo: 209307

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Iron	19.9	2.5	22.1	10.1		20	
Zinc	0.9	0.5	0.9	5.02		20	

Available Metals - ppm Sample Type **MBLK** Units: ppm

AVA BLK (04/06/23 11:50) RunNo: 209306

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Potassium	ND	44					

Available Metals - ppm Sample Type **LCS** Units: ppm

AVA QC (04/06/23 11:48) RunNo: 209306

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Potassium	266	44	296		90.1	75 - 125	

Available Metals - ppm Sample Type **DUP** Units: ppm

S2303317-001AD (04/06/23 11:30) RunNo: 209306

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Available Potassium	271	1	280	3.04		20	

Pace Analytical
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ANALYTICAL QC SUMMARY REPORT

CLIENT: Woodard & Curran-TREC **Date:** 4/10/2023
Work Order: S2303317 **Report ID:** S2303317001
Project: 1234949.000

Nitrogen - Nitrate - Calcium Chloride Extraction Sample Type **MBLK** Units: ppm

MBLK (04/06/23 13:09) RunNo: 209296

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Nitrate	ND	0.1					

BLANK (04/06/23 13:36) RunNo: 209296

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Nitrate	ND	0.1					

Nitrogen - Nitrate - Calcium Chloride Extraction Sample Type **LCS** Units: ppm

LCS (04/06/23 13:12) RunNo: 209296

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Nitrate	2.6	0.1	2.5		102	80 - 120	

Nitrogen - Nitrate - Calcium Chloride Extraction Sample Type **DUP** Units: ppm

S2303317-001AD (04/06/23 13:31) RunNo: 209296

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Nitrogen-Nitrate	1.0	0.1	1.2	15.7		20	

Electrical Conductivity - Soil Sample Type **LCS** Units: dS/m

CONTROL (04/04/23 10:10) RunNo: 209208

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Electrical Conductivity	3.26	0.01	3.37		96.7	80 - 120	

Electrical Conductivity - Soil Sample Type **DUP** Units: dS/m

S2303317-001A (04/04/23 10:07) RunNo: 209208

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Electrical Conductivity	0.39	0.01	0.41	4.99		20	

Soil Texture Analysis Sample Type **LCS** Units: %

CONTROL (04/06/23 08:19) RunNo: 209266

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Sand	15.3	0.1	32.5		47.0	75 - 125	S
Silt	50.0	0.1	40.2		125	75 - 125	
Clay	34.7	0.1	27.2		128	75 - 125	S
Texture	ilty Clay Loar	0					

Soil Texture Analysis Sample Type **DUP** Units: %

S2303317-001A (04/06/23 08:16) RunNo: 209266

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Sand	28.4	0.1	31.4	10.2		23.9	
Silt	36.9	0.1	35.1	5.00		20	
Clay	34.7	0.1	33.5	3.67		20	
Texture	Clay Loam	0	ND			0	

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Woodard & Curran-TREC **Date:** 4/10/2023
Work Order: S2303317 **Report ID:** S2303317001
Project: 1234949.000

Organic Matter by Loss on Ignition Sample Type **LCS** Units: %

CONTROL (04/04/23 08:46) RunNo: 209290

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Organic Matter	2.4	0.1	2.16		110	75 - 125	

Organic Matter by Loss on Ignition Sample Type **DUP** Units: %

S2303317-001A (04/04/23 08:43) RunNo: 209290

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Organic Matter	7.2	0.1	7.2	0.133		20	

pH-Soil Sample Type **LCS** Units: s.u.

CONTROL (04/04/23 08:09) RunNo: 209208

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
pH	7.2	0.1	7.1		102	96 - 104	

pH-Soil Sample Type **DUP** Units: s.u.

S2303317-001A (04/04/23 08:06) RunNo: 209208

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
pH	6.9	0.1	6.7	2.06		20	

Saturated Paste Cations by EPA 200.7 Sample Type **MBLK** Units: meq/L

SAR BLK (04/06/23 14:02) RunNo: 209309

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	ND	0.11					
Magnesium	ND	0.2					
Potassium	ND	0.3					
Sodium	ND	1					

Saturated Paste Cations by EPA 200.7 Sample Type **LCS** Units: meq/L

SAR QC (04/06/23 14:00) RunNo: 209309

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	23.2	0.11	26		89.1	80 - 120	
Magnesium	11.8	0.2	13.4		88.3	80 - 120	
Potassium	1.5	0.3	1.51		98.8	80 - 120	
Sodium	17	1	17.2		101	80 - 120	

Saturated Paste Cations by EPA 200.7 Sample Type **DUP** Units: meq/L

S2303317-001AD (04/06/23 12:45) RunNo: 209309

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Calcium	1.89	0.11	3.06	47.4		20	R
Magnesium	1.2	0.2	1.5	17.0		20	
Potassium	ND	0.3	ND			20	
Sodium	1	1	ND			20	R

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Woodard & Curran-TREC
Work Order: S2303317
Project: 1234949.000

Date: 4/10/2023
Report ID: S2303317001

Total (3050) Metals by ICP - 6010C Sample Type **MBLK** Units: mg/Kg

MB-20552 (04/06/23 19:23) RunNo: 209324 PrepDate: 04/04/23 0:00 BatchID: 20552

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Phosphorus	ND	10					

Total (3050) Metals by ICP - 6010C Sample Type **LCS** Units: mg/Kg

LCS-20552 (04/06/23 19:25) RunNo: 209324 PrepDate: 04/04/23 0:00 BatchID: 20552

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Phosphorus	110	10	125		85.8	80 - 120	

Total (3050) Metals by ICP - 6010C Sample Type **MS** Units: mg/Kg

S2303317-002AS (04/06/23 20:59) RunNo: 209324 PrepDate: 04/04/23 0:00 BatchID: 20552

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Phosphorus	200	10	125	100	79.0	75 - 125	

Total (3050) Metals by ICP - 6010C Sample Type **MSD** Units: mg/Kg

S2303317-002AMSD (04/06/23 21:02) RunNo: 209324 PrepDate: 04/04/23 0:00 BatchID: 20552

Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
Phosphorus	200	10	200	0.0959	78.8	20	

Total (3050) Metals by ICP - 6010C Sample Type **DUP** Units: mg/Kg

S2303317-001AD (04/06/23 20:50) RunNo: 209324 PrepDate: 04/04/23 0:00 BatchID: 20552

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Phosphorus	250	10	280	11.0		20	

Laboratory Management Program (LaMP) Chain of Custody Record
Soil, Sediment and Groundwater Samples

BP Site Node Path: _____ Req Due Date (mm/dd/yy): _____ Rush TAT Yes _____ No

BP/RM Facility No: MGP Lab Work Order Number: _____

Lab Name:	Pace National	BP/ARC Facility Address:	MGP	Consultant/Contractor:	Woodard & Curran
Lab Address:	1673 Terra Avenue, Sheridan, WY 82801	City, State, ZIP Code:	Trinidad, CO	Consultant/Contractor Project No:	234949.000
Lab PM:	Crystal Herman	Lead Regulatory Agency:	CDPHE	Address:	215 Union Blvd. Ste 275, Lakewood, CO 80228
Lab Phone:	307-672-8945	California Global ID No.:		Consultant/Contractor PM:	Kirk Silver
Lab Shipping Accnt:		Enfos Proposal No:		Phone: 908-930-2301	Email: ksilver@woodardcurran.com
Lab Bottle Order No:		Accounting Mode:	Provision ____ OOC-BU ____ OOC-RM ____	Send/Submit EDD to:	Kirk Silver & C. Michael Jackson
Other Info:		Stage	Activity	Invoice To:	BP-RM ☒ BP-Other ____

BP/RM PM:	C. Michael Jackson	Requested Analyses	Report Type & QC Level
PM Phone:	713-437-9285		Limited (Standard) Package X
PM Email:	c.jackson@bp.com		Limited Plus Package ____
			Full Package ____

Lab No.	Unique Sample ID, must follow format of SAMPLENAMEYYYYMMDD Examples: MW01_20190101; BH01_3-5_20190101	Time	Depth Unit (in)	Grab (G) or Composite (C)	Total Number of Containers	Matrix	Analysis	N, P, K	pH	Ca, Mg	Na	Fe	Zn	Organic matter	Texture	Electrical Conductivity	Comments
	SS-Background-20230321	1150	0-6	C	1	S		X	X	X	X	X	X	X	X	X	
	SS-West Slope-20230321	1200	0-6	C	1	S		X	X	X	X	X	X	X	X	X	
	SS-South Slope-20230321	1205	0-6	C	1	S		X	X	X	X	X	X	X	X	X	

Sampler's Name:	Emily Boswell	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company:	Woodard & Curran	Emily Boswell WC	3/22/23	0900	Dodd Cordero	3/22/23	0900
Ship Method:	Fed Ex Ship Date:	3/22/23 Dodd Cordero	3/22/23	1800	Daniel L PACE	3/23/23	1108
Shipment Tracking No:							

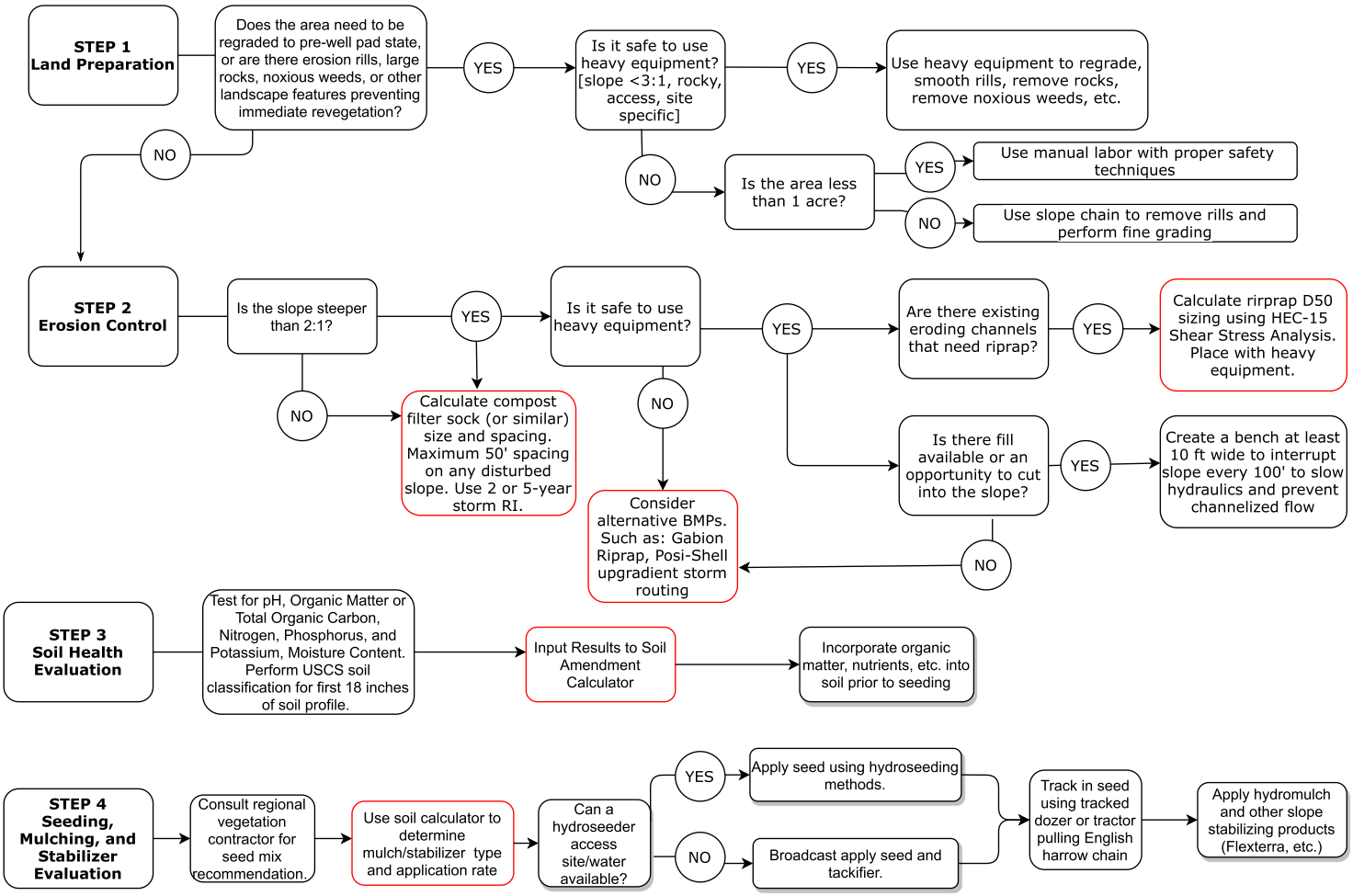
Special Instructions: Electrical conductivity by Saturated paste method

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes (No) | Temp Blank: Yes (No) | Cooler Temp on Receipt: 10.4 °F/C | Trip Blank: Yes (No) | MS/MSD Sample Submitted: Yes / No

No ice

ATTACHMENT 2: DRAFT STANDARDIZED METHODS FOR WELL PAD RECLAMATION DESIGN

Decision Flow Chart for Well Pad Reclamation



MONITOR 2-3 GROWING SEASONS FOR EROSION & VEGETATION ESTABLISHMENT

ATTACHMENT 3: FIRST GROWING SEASON FIELD ASSESSMENT FORM

FIRST GROWING SEASON – QUALITATIVE FIELD ASSESSMENT FORM

MGP A-4 Well Pad

Site: Evaluation Area______________________________Date____________

Seeding Date/Season_______________Seed Mix Used________Evaluators_______________________

Mulch Species Evaluation
- □ Observed Species:
- □ Only a few scattered plants
- □ Low-Density Un-Evenly Distributed
- □ Low-Density Evenly Distributed
- □ Well-Established and Common/Abundant

Seedling Evaluation
- □ Seedlings Evident and more than 40 per square meter
- □ Seedlings Present, but scattered and less than 40 per square meter
- □ Seedlings Present at adequate density, but appear to be desiccated/dried out (possibly dead)
- □ Seedlings widely scattered and overall very few present

- □ Enough Seedlings Present for a good stand of seeded species in 1-2 years
- □ Enough Seedlings Present for a good stand of seeded species in 2-4 years
- □ Possibly Not Enough Seedlings Present for a good stand of seeded species in 2-4 years
- □ Probably Not Enough Seedlings Present for a good stand of seeded species in 2-4 years

- □ Seedlings robust, well-established and some (many) with flowering heads
- □ Seedlings 2-5 inches tall, well-established and only a few (or none) with flowering heads
- □ Seedlings small (mostly 1-2 inches tall), but will probably survive
- □ Seedlings small (mostly 1-2 inches tall), apparently stressed and not likely to survive

Weed Abundance

□	Few 1	2	3	4	5	6	7	8	9	10	Abundant/Dominant
□	Few 1	2	3	4	5	6	7	8	9	10	Abundant/Dominant
□	Few 1	2	3	4	5	6	7	8	9	10	Abundant/Dominant
□	Few 1	2	3	4	5	6	7	8	9	10	Abundant/Dominant
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□	Few 1	2	3	4	5	6	7	8	9	10	Abundant/Dominant

Organic Matter □ Well-Integrated OR □ Patches of Non-integrated organic matter present on soil surface

Mowing □ Area Mowed OR □ Area Not Mowed

Herbicide Application □ No Evidence of Herbicide Application OR □ Herbicides Apparently Applied

Soil Conditions
- □ Fine, dark-colored and powdery
- □ Light-colored, fine texture
- □ Light-colored, mixed texture
- □ Light-colored, mixed texture and rocky

Erosion
- □ No apparent erosion problems
- □ Some sheet-wash erosion noted
- □ Rills present in places (Not a problem)
- □ Rills present (Need storm water control)
- □ Gullies present (Need storm water control)

Recommendations
- □ Area is adequate, without issues and does not require maintenance at this time
- □ Apparently no need to re-seed the area
- □ Give the area one more year to develop
- □ Weeds should be mowed
- □ Plan to spot spray noxious weeds during the next 1-2 years
- □ Re-till and re-seed the area at the next available opportunity
- □ Other____

COMMENTS:

Observed Species — Evaluation Area_____Date_____

(**m**=major species; **x**=other species)

Present	Scientific Name	Common Name	
ACCEPTABLE SPECIES:			
□	***Achillea millefolium***	**Common yarrow**	Revegetation Mix 1
□	*Agropyron cristatum*	Crested wheatgrass	
□	*Agropyron intermedium (=Thinopyrum intermedium)*	Intermediate wheatgrass	
□	*Agrostis palustris*	Creeping bentgrass	Revegetation Mix 4
□	*Agrostis stolonifera*	Redtop, Spreading bent	
□	*Antennaria rosea*	Rose pussytoes	
□	*Arctostaphylos uva-ursi*	Kinnikinnick	
□	***Artemisia frigida***	**Fringed Sagebrush**	Revegetation Mix 1
□	*Artemisia ludoviciana*	Cudweed, Louisiana sagewort	
□	*Artemisia tridentata*	Big Sagebrush	
□	*Aster ascendens (=Symphyotrichum ascendens)*	Western American-aster	
□	*Astragalus vexilliflexus*	Milkvetch	
□	*Bromus anomalus*	Nodding brome	
□	*Bromus inermis*	Smooth brome	
□	***Bromus marginatus*** *(=Bromus carinatus)*	**Mountain brome**	Reveg Mixes 1,2 & 3
□	***Calamagrostis canadensis***	**Bluejoint**	Revegetation Mix 3
□	***Carex nebrascensis***	**Nebraska sedge**	Revegetation Mix 3
□	***Deschampsia caespitosa***	**Tufted hairgrass**	Revegetation Mix 3
□	***Elymus lanceolatus (=Agropyron dasystachyum)***	**Thickspike wheatgrass**	Reveg Mixes 1,3 & 4
□	*Elymus repens (=Agropyron repens)*	Quackgrass, Creeping wildrye	
□	***Elymus trachycaulus (=Agropyron trachycaulum)***	**Slender wheatgrass**	Reveg Mixes 1,2 & 3
□	*Epilobium ciliatum*	Willow-herb	
□	***Festuca idahoensis***	**Idaho or Bluebunch Fescue**	Reveg Mixes 1 & 2
□	*Festuca ovina*	Sheep fescue	
□	*Festuca rubra*	Red fescue	Revegetation Mix 4
□	***Festuca scabrella***	**Rough fescue**	Reveg Mixes 1 & 2
□	*Fragaria virginiana*	Virginia strawberry	
□	*Heterotheca villosa*	Golden-aster	
□	***Juncus balticus***	**Baltic rush**	Revegetation Mix 3
□	*Juniperus communis*	Common juniper	
□	*Juniperus scopulorum*	Rocky Mountain juniper	
□	***Linum lewisii***	**Common blue flax**	Revegetation Mix 1
□	*Lotus corniculatus*	Bird's-foot trefoil	
□	*Melilotus officinalis*	Yellow sweetclover	
□	*Pascopyrum smithii (=Agropyron smithii)*	Western wheatgrass	Revegetation Mix 2
□	*Penstemon procerus*	Littleleaf or Pincushion beardtongue	
□	*Pentaphylloides floribunda (=Dasiphora fruticosa)*	Shrubby cinquefoil	
□	*Phacelia hastata*	Silverleaf scorpion-weed	
□	***Phleum pratense***	**Common timothy**	
□	***Poa ampla*** *(=Poa juncifolia)*	**Big bluegrass**	Revegetation Mix 2
□	***Poa compressa***	**Canada bluegrass**	Reveg Mixes 1 & 4
□	***Poa palustris***	**Fowl bluegrass**	Revegetation Mix 3
□	***Poa pratensis***	**Kentucky bluegrass**	Revegetation Mix 4
□	*Populus balsamifera (=Populus trichocarpa)*	Black cottonwood	
□	*Potentilla pensylvanica*	Pennsylvania cinquefoil	

□	*Prunus virginiana*	Chokecherry	
□	***Pseudoroegneria spicata (=Agropyron spicatum)***	**Bluebunch wheatgrass**	Revegetation Mix 2
□	*Rosa woodsia*	Wood's rose	
□	*Salix geyeriana*	Geyer's willow	
□	*Shepherdia canadensis*	Russet or Canada buffaloberry	
□	*Solidago missouriensis*	Missouri goldenrod	
□	***Stipa viridula***	**Green needlegrass**	Revegetation Mix 2
□	*Triticum aestivum x Secale cereale*	Triticale	Revegetation Mix 2

UNDESIRABLE WEEDY SPECIES:

□	*Alyssum alyssoides*	Pale or Yellow alyssum
□	*Alyssum desertorum*	Dwarf alyssum
□	*Bromus japonicus*	Japanese brome
□	*Bromus tectorum*	Cheatgrass
□	*Camelina microcarpa*	Littleseed falseflax
□	*Capsella bursa-pastoris*	Shepherd's purse
□	*Chenopodium album*	Goosefoot, Lamb's-quarters
□	*Cirsium vulgare*	Bull thistle
□	*Descurainia richardsonii*	Richardson tansy mustard
□	*Descurainia sophia*	Flixweed
□	*Filago arvensis*	Fluffweed
□	*Helianthus annuus*	Annual sunflower
□	*Lactuca serriola*	Prickly lettuce
□	*Lappula redowskii*	Western stick tight or stickseed
□	*Lepidium perfoliatum*	Clasping pepperweed
□	*Polygonum aviculare*	Prostrate knotweed
□	*Salsola tragus*	Russian thistle
□	*Silene latifolia (=Lychnis alba)*	White cockle or campion
□	*Sisymbrium altissimum*	Tumbling hedge mustard
□	*Sisymbrium loeselii*	Hedge mustard
□	*Taraxacum officinale*	Common dandelion
□	*Thlaspi arvense*	Field pennycress, Fanweed
□	*Tragopogon dubius*	Common salsify or Goat's-beard

NOXIOUS WEED SPECIES:

□	*Cardaria draba*	Whitetop
□	***Carduus nutans***	**Musk thistle**
□	***Centaurea maculosa***	**Spotted knapweed**
□	***Cirsium arvense***	**Canada thistle**
□	*Convolvulus arvensis*	Field bindweed
□	*Euphorbia esula*	Leafy spurge
□	*Kochia scoparia*	Kochia, Summer cypress
□	*Lepidium latifolium*	Perennial pepperweed,Tall whitetop
□	*Linaria dalmatica*	Dalmatian toadflax
□	***Linaria vulgaris***	**Yellow or Common toadflax, Butter-and-eggs**
□	*Sonchus arvensis*	Sowthistle
□	***Verbascum thapsus***	**Common mullein**

ATTACHMENT 4: QUALITATIVE EROSION MONITORING FORM

QUALITATIVE EROSION MONITORING FORM

EROSION INSPECTION **Site:** **Date:**

Average Slope (%): **Aspect:** **Evaluators:**

Evidence of Soil Movement
☐ None
☐ Deposition Areas infrequent and/or shallow (<3″ deep)*
☐ Deposition Areas common and/or (>3″ deep)

Evidence of Surface Litter Movement
☐ None
☐ <5% of litter translocated and redeposited
☐ 5 - 25% of litter translocated and redeposited
☐ >25% of litter translocated and redeposited

Erosion Recommendations
☐ 0 No Action – Site Complete
☐ 1 Minor Action – Site Stable
☐ 2 Small Areas on Site Require Action
☐ 3 Significant Action Required

Evidence of Coarse Fragment Movement
☐ None
☐ <5% of coarse fragments translocated and redeposited
☐ 5 - 25% of coarse fragments translocated and redeposited
☐ >25% of coarse fragments translocated and redeposited

Presence of Rills
☐ None
☐ Infrequent and <2″ in depth
☐ At intervals >10 feet and 2-6″ in depth
☐ At intervals <10 feet and 2-6″ in depth

Potential Instability (Check all that apply)
☐ No signs of instability
☐ Saturated areas present
☐ Uplifted areas present at toe of slope
☐ Significant tension cracks present
☐ Signs of surface displacement
☐ Significant depressions/subsidence

Presence of Gullies
☐ None
☐ Gullies present
Estimated Size: Width _____
Depth _____
☐ Frequent, at intervals <10 feet
☐ Infrequent, at intervals >10 feet
☐ Active Erosion

Comments:

BLM Erosion Classification Summary (Acceptable Score is equal to or <45) SCORING Item Number	Number of Points Awarded
Item 1 - Recent Soil Movement - (Maximum of 14 points)	
Item 2 – Surface Litter Movement - (Maximum of 14 points)	
Item 3 – Surface Rock Fragment Movement - (Maximum of 14 points)	
Item 4 - Pedestalling - (Maximum of 14 points)	
Item 5 – Flow patterns - (Maximum of 15 points)	
Item 6A – Depth of Rills - (Maximum of 7 points)	
Item 6B – Frequency of Rills - (Maximum of 7 points)	
Item 7A – Depth of Gullies - (Maximum of 7 points)	
Item 7B – Frequency of Gullies - (Maximum of 8 points)	
Total BLM Points	
BLM Classification STABLE	

BMP QUALITATIVE MONITORING

Site: **Date:** **Evaluators:**

Evidence of Check Dam Failure
☐ None
☐ Yes - Describe

Evidence of Sediment Accumulation in Check Dams
☐ None Observed
☐ Deposition areas infrequent and/or shallow (<3″)
☐ Deposition areas common and/or 3 inches deep

BMP Recommendations
☐ 0 No Action – Site Complete
☐ 1 Minor Action – Site Stable
☐ 2 Small Areas on Site Require Action
☐ 3 Significant Action Required

Condition of Dozer Basins
☐ No Basins
☐ Basins performing
☐ Erosion between basins
☐ Vegetation growth in basins

Condition of Grade Control Structures
☐ No Structures
☐ Structures controlling erosion
☐ Structures not controlling erosion
☐ Structures need repair

Evidence of Brush Barrier Failure or Movement
☐ None observed
☐ Small Amount of Movement
☐ Significant Amount of Movement
☐ Barrier requiring immediate repair or replacement

Condition of Mulch
☐ None Observed
☐ Adequately Controlling Erosion
☐ Other Erosion control measures required

Comments or Sketches Regarding Maintenance or Repairs that may be Required:

Woodard & Curran

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