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2021 Removal Design Work Plan

Illinois Gulch Site Time-Critical Removal Action

Summit County, Colorado

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LIST OF ACRONYMS/ABBREVIATIONS

ARAR	Applicable and/or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Material
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQA	Construction Quality Assurance
CQC	Construction Quality Control
cy	cubic yards
DRMS	Colorado Division of Reclamation, Mining, and Safety
ECO	Engineering Change Order
EPA	U.S. Environmental Protection Agency
HASP	Health and Safety Plan
HDPE	high density polyethylene
lbs/day	pounds per day
mg/kg	milligrams per kilogram
NRHP	National Register of Historic Places
OSC	On-Scene Coordinator
PES	Puzzle Extension Shaft
QAPP	Quality Assurance Project Plan
RAO	Removal Action Objective
SAP	Sampling and Analysis Plan
SOW	Statement of Work
TCRA	Time-Critical Removal Action
UAO	Unilateral Administrative Order
USGS	United States Geological Survey

1.0 INTRODUCTION

This 2021 Removal Design Work Plan (“Work Plan”) was prepared in accordance with the Unilateral Administrative Order for Removal Action (“UAO”) with attached Statement of Work (“SOW”) issued to Respondent, TABR Realty Services, LLC (“TABR”) by U.S. EPA Region 8, Docket No. CERCLA-08-2020-0003 (Effective Date of September 14, 2020). The Work Plan describes environmental conditions and presents Removal Action designs that will be implemented to address certain mining-related impacts on and adjacent to properties owned by TABR¹ near the Town of Breckenridge (“Town”) in Summit County, Colorado (“Site”). The Site is located within a larger geographic area identified by EPA as the Illinois Gulch Superfund Site. Preliminary Removal Action designs were presented in the previous 2020 Work Plan (Formation, 2021) submitted to EPA on January 7, 2021. The general location of the Site and property owned by TABR are shown on Figure 1.

Investigations conducted by EPA indicate that metals concentrations in surface water affected by the Site pose potential risks to fish and other aquatic organisms, and metals concentrations in the Site waste rock and soil of adjacent residential properties may pose risks to human health (Weston, 2017). These findings resulted in EPA’s issuance of the UAO/SOW requiring TABR to implement a phased Time-Critical Removal Action (“TCRA”) at the Site.

The remainder of this Work Plan is organized as follows. Section 2.0 provides a summary of relevant background information on the Site history, setting, and environmental conditions. The objectives of the Phase 1² Removal Action work are presented in Section 3.0. A summary of all Phase 1 work to be implemented in 2021 and subsequent years is provided in Section 4.0. The designs for Removal Actions that are planned for implementation in 2021 are described in Section 5.0. Health and safety are discussed in Section 6.0. Section 7.0 describes general construction quality assurance / construction quality control (“CQA/CQC”) measures that will be implemented to ensure that the Removal Action construction activities are implemented consistent with project design criteria. References cited in this Work Plan are listed in Section 8.0.

The Phase 1 Removal Action construction activities will attain, to the extent practicable, the Applicable and/or Relevant and Appropriate Requirements (“ARARs”) EPA identified for the Phase 1 and 2 work. See Table 1 (presented in Section 3.2) and Appendix A. Design drawings and technical specifications for the Phase 1 work described herein are presented in Appendix B and a memorandum describing a Site drainage analysis is provided as Appendix C. A project-

¹ The Summit County, Colorado County Assessor identifies the owner of these claims as Transamerica Realty Services, Inc. However, the present legal owner of the claims is TABR Realty Services, LLC. On December 1, 2002, Transamerica Realty Services, Inc. became Transamerica Realty Services, LLC. Subsequently, on May 14, 2015, Transamerica Realty Services, LLC changed its name to TABR Realty Services, LLC. TABR Realty Services, LLC and its predecessors have owned property at the Site since the 1970s.

² The three Removal Action phases are described in Section 2.0.

specific Health and Safety Plan (“HASP”) for the construction work and other planned field activities during Phases 1 and 2, including COVID-19-related protocols, is provided in Appendix D.

2.0 BACKGROUND INFORMATION

The Site is situated in Iron Springs Gulch, along the Boreas Pass Road (County Road 10), approximately ½-mile southeast of the Stephen C. West Ice Arena (Figure 1). The Site includes two collapsed mine adits referenced herein as the Willard No. 1³ and Willard No. 2, the Willard waste rock pile, the Cally waste rock pile, the Puzzle Extension Shaft (“PES”) and waste rock pile, and seven privately owned residential lots on Brooks Hill Drive where TABR will conduct metals sampling to support EPA’s assessment of whether soils in said lots pose unacceptable risk to human health. The locations of these and other Site features are shown on Figure 2 along with TABR’s property ownership within the Site vicinity.

In accordance with the UAO/SOW, TABR will perform the Removal Action work activities in three phases. Phase 1 includes Removal Action design and construction work to address the Site waste rock piles, reduce the quantity of water flowing from the Willard No. 1 adit, and sampling and analysis activities to characterize metals concentrations in the residential yards of seven properties on Brooks Hill Drive. Phase 2 consists of one to two years of monitoring and bench-scale testing to evaluate the efficacy of potential passive approaches for treating the adit flows. Phase 3 will include construction and operation of a passive water treatment system. Phase 1 began in 2020 and Phase 2 monitoring will commence after Phase 1 construction activities are completed. Phases 1 and 2 will be implemented over the next three to four years. Phase 3 will be initiated following completion of the Phase 2 monitoring activities (2023 or 2024).

This Work Plan describes the Phase 1 work that will be implemented in 2021. If necessary, additional Phase 1 work will be described in subsequent Removal Design Work Plans submitted on an annual basis.

2.1 Physical Setting

The Site is located in drainages associated with Iron Springs Gulch and Illinois Gulch at an elevation of approximately 9,800 feet above mean sea level. Site winters are typically severe with heavy snowfall that will limit construction activities to the late spring through fall time frames each year.

Surface water in Iron Springs Gulch flows to the northwest through a residential area and into Illinois Gulch, approximately 1,700 feet downstream from the Willard waste rock pile. Much of the surface water in Iron Springs Gulch originates from the Willard No. 1 adit, and to a lesser extent, the Willard No. 2 adit. Illinois Gulch flows approximately 3,500 feet west-northwest from the Iron Springs Gulch confluence to join the Blue River, which flows approximately 6.5 miles northward to Dillon Reservoir, a water supply for the Denver, Colorado metropolitan area. The Blue River continues northward from Dillon Reservoir to join the Colorado River near Kremmling, Colorado.

³ The Willard No. 1 adit is also called the Willard Tunnel of the Puzzle Mine.

The Willard waste rock pile covers approximately 2.1 acres and is the largest accumulation of waste rock at the Site (Figure 2). It is located in a wet area on TABR-owned property inside of a horseshoe-shaped curve of the Boreas Pass Road (County Road 10). The waste rock was removed from underground workings of the Puzzle Mine accessed by the Willard No. 1 adit. The base of the Willard waste rock pile may be saturated due to shallow subsurface flow through the adjacent wet area. Prior to initiation of the Phase 1 work activities completed in 2020, a pond was present on the southwestern side of the waste rock pile that may have contributed to saturated conditions within the waste rock. This pond was removed in the fall of 2020 (Formation, 2021). Based on available topographic mapping (2-foot contours) and interpolation of the underlying native ground surface, the volume of the Willard waste rock pile is estimated to be approximately 20,000 cubic yards (cy). The surface of the waste rock pile includes depressions that retain water following storms and snow melt events, promoting infiltration through the waste rock.

Waste rock from the Cally adit of the Ouray Mine is located to the south of the Willard waste rock pile and is partially covered by the Boreas Pass Road embankment. The PES and associated waste rock pile are located on property owned by others in Illinois Gulch approximately 1,500 feet east of the Willard waste rock pile (Figure 2).

The Willard Nos. 1 and 2 adits are located to the east and northeast of the Willard waste rock pile, respectively (Figure 2). Water from the Willard No. 1 is heavily iron stained and flows across the top of a portion of the Willard waste rock pile and then to its northern edge. The Willard No 2 flow is also heavily ironed-stained. The two adit flows merge in a wet area, before continuing downstream in Iron Springs Gulch. The northern portion of the wet area, adjacent to the residential area, is also iron-stained due to the influence of the two adit flows. The hillside above and to the east of the Willard waste rock pile is steep and timbered. A remnant historic mining feature, the Gold Run Ditch, traverses this hillside to the east of the adits.

Seven residential properties with homes are located on Brooks Hill Drive to the north of the Willard waste rock pile (Figure 2).

2.2 Site History

The Site includes portions of the Puzzle Mine, which was formerly accessed by the Willard No. 1 adit, and the Ouray Mine, which was formerly accessed by the Cally adit (Figure 3). The underground workings of the two mines are connected. The Puzzle and Ouray mines exploited ore from the same mineralized vein and produced lead, zinc, and iron ores in the form of sulfides, sulfates, and carbonates with minor silver and gold (Lovering, 1934). Production began in 1885 with most of the production occurring between 1888 and 1900. Ore milling reportedly occurred at the Puzzle Mine site in the late 1890s and again from 1917 to 1918 (Mountain States Historical, 2004). The Willard No. 1 adit served as the main drainage tunnel and haulage way for the Puzzle Mine. It is connected to the PES, which is located in Illinois Gulch. Additional mine workings extend beyond the PES to the northeast and southeast (Figure 3) on private and public lands.

No historical information is available for the Willard No. 2 adit. It does not appear to be connected to or associated with the Puzzle and/or Ouray mines.

2.3 Cultural Resources

Cultural resource surveys at the Site and its vicinity were conducted by in 2004 and 2020, which are summarized in the 2020 RDWP (Formation, 2021). Paleowest (2020) recommended only one Site feature, the Gold Run Ditch, as eligible for the National Register of Historic Places (“NRHP”). The portion of the Gold Run Ditch within the Site is located on the steep timbered hillside between the Boreas Pass Road and the Willard No.1 and Willard No. 2 adits (Figure 2). The planned Phase 1 Removal Action construction activities are not expected to adversely affect the Gold Run Ditch.⁴

2.4 Existing Environmental Conditions

EPA and its contractors collected water and soil samples for chemical analysis and conducted X-ray fluorescence surveys of soil in 2014 and 2015. Their conclusions based on those analyses are presented below (Weston, 2017).

“The Puzzle mine/Willard adit was determined to be a primary focus under consideration for cleanup actions within the watershed at this time due to its documented impact on Illinois Gulch water quality, proximity to residential properties, accessibility to human and ecological receptors, and volume of mine waste rock. The waste pile area is approximately 2.1 acres and contains metals at concentrations many orders of magnitude above background concentrations and exceed residential regional screening levels (although not a direct indication of immediate risks to residents but serve as initial screening levels related to the potential for risks to occur). Arsenic concentrations ranged from 93.1 milligrams per kilogram (mg/kg) to 1,300 mg/kg, cadmium ranged from 0.114 mg/kg to 37.3 mg/kg, lead ranged from 166 mg/kg to 95,000 mg/kg, and zinc ranged from 42.2 mg/kg to 8,930 mg/kg. There are also observations of many wildlife species using the mine waste area, and the concentrations would be considered detrimental to wildlife if prolonged use and exposures were to occur.

Elevated concentrations of several dissolved metals, including cadmium, lead, manganese, nickel, and zinc occur in surface waters of Illinois Gulch, Iron Springs Gulch,

⁴ A possible exception is the unlikely event that the present location of the Willard waste rock is found to be unsuitable as a long-term repository based on the planned geotechnical investigation. In this case, an alternative repository location on the hillside to the southeast of the Willard waste rock pile may be used. This location could involve covering a portion of the Gold Run Ditch on TABR owned property. If a conclusion is reached that the alternative repository location will adversely affect the Gold Run Ditch, and avoidance and preservation in place is not feasible, TABR would propose to catalog (e.g, photo document) the Gold Run Ditch on TABR property as mitigation.

and in discharges from drainage, run off, and leachate from waste piles at the Willard adit waste area. Visual observations of discolored/stained run off from the mine waste area indicate contaminated wastes have migrated into downstream Illinois Gulch. Dissolved cadmium loading directly downstream of the confluence of Iron Springs Gulch and Illinois Gulch range from 0.0093 to 0.056 pounds per day (lbs/day) and dissolved zinc loading ranges from 2.58 to 11.46 lbs/day. During high flow, these loading rates are about double what they are just upstream of the confluence. Potential for uncontrolled blowouts at the collapsed Willard adits could exacerbate the high-flow scenario and be an imminent threat to downstream aquatic life. These loading rates are also double what is measured downstream by Breckenridge Ice Rink, showing some dilution occurs. Nevertheless, available water quality results from this investigation demonstrate that Iron Springs Gulch and the Puzzle mine/Willard adits are the primary contributors of heavy metals into Illinois Gulch.”

The U.S. Geological Survey (“USGS”) conducted a tracer study in the Illinois Gulch area which consisted of introducing a bromide solution into Illinois Gulch Creek and measuring its dilution at downstream locations to estimate the stream flow rates. As part of this study, stream flow rates in Illinois Gulch Creek were measured upstream and downstream of the PES. This comparison revealed a loss in stream flow in this area, suggesting that some of the Illinois Gulch Creek flow is seeping through the subsurface, entering the Puzzle Mine workings through the PES, and contributing to flow at the Willard No. 1 adit.⁵ Sampling at the adit during the tracer study revealed the presence of bromide and thus confirmed that flow from Illinois Gulch Creek is reporting to the adit. The USGS estimated that approximately half of the cadmium and zinc loads (in pounds per day) in the adit flow may originate from Illinois Gulch Creek (Runkel, 2017 and Runkel et al., 2019).

⁵ An earlier dye tracer study conducted by the Colorado Department of Public Health and Environment demonstrated that water injected into the PES contributes to flow from the Willard No. 1.

3.0 REMOVAL ACTION OBJECTIVES AND ARARS

3.1 Removal Action Objectives (RAOs)

The RAOs for implementation of the Phase 1 work during 2021 are as follows.

1. Reduce the degree of saturation at the base of the Willard waste rock pile.
2. Reduce the flow rate and potentially improve the quality of water emanating from the Willard No. 1 adit.
3. Reduce inflows to the underground workings and physical hazards associated with the PES.
4. Minimize the potential for direct human and wildlife contact with material comprising the Willard, Cally and PES waste rock piles.
5. Reduce the amount of water that infiltrates into the Willard waste rock pile due to direct precipitation and snowmelt.
6. Investigate whether there are potential human health risks associated with arsenic and/or metals in soil at residences on Brooks Hill Drive and eliminate any identified unacceptable exposure risks.

3.2 ARARs

EPA has identified ARARs for Phases 1 and 2 of the Illinois Gulch TCRA (Appendix A). “Applicable requirements” mean those cleanup standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) site. “Relevant and appropriate requirements” mean those cleanup standards that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

The Phase 1 Removal Action work activities are expected to attain the standards described within the ARARs identified by EPA (Appendix A). Table 1 below presents TABR’s analysis of how the planned Phase 1 Removal Action work elements will address each of these ARARs.

TABLE 1
ARARs Analysis
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	EPA's ARAR Determination	Relevant Action	EPA's Description	Analysis – TABR Action(s) To Attain ARAR
Federal ARARs					
1	National Historic Preservation Act (NHPA) and Implementing Regulations 16 United States Code (U.S.C.) § 470; 36 CFR Part 800	Applicable Action-Specific	Closure of the Willard waste rock pile through the creation of an onsite mine waste repository; lining of the Illinois Gulch channel adjacent to the Puzzle Extension Shaft; removal of accessible portions of the Cally adit waste rock pile; dewatering and clean out wet areas impacted by the Willard #1 and Willard #2 adit discharges; and removal of the Puzzle Extension Shaft waste rock pile and plug the Puzzle Extension Shaft.	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any historic property, such as district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). Historic properties are referred to as cultural resources.	<p>EPA Comment: “A cultural resource survey was completed for the Iron Springs Mill in 2004 and re-evaluated in 2020. Only one resource: the Gold Run Ditch, on the eastern portion of the Iron Springs Millsite, was determined to be potentially eligible for inclusion on the National Register of Historic Places. Therefore, if this resource cannot be avoided during construction of the remedy, additional survey work or a mitigation plan may be needed to ensure compliance with the NHPA.”</p> <p>The Removal Action activities are not expected to adversely affect the Gold Run Ditch, provided that the geotechnical investigation of the Willard waste rock pile confirms its suitability for location of a solids repository, as described in the Statement of Work.</p> <p>In the unlikely event that the geotechnical investigation finds the Willard waste rock pile is unsuitable for use as a repository, an alternative repository location on the hillside to the southeast may be used, which might involve covering a portion of the Gold Run Ditch. If it is not feasible to avoid this resource during construction of the repository, additional survey work or a mitigation plan may be needed. If such mitigation were to be required, TABR would propose to catalog (e.g, photo document) the Gold Run Ditch on TABR property prior to any construction.</p>

TABLE 1
ARARs Analysis
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	EPA's ARAR Determination	Relevant Action	EPA's Description	Analysis – TABR Action(s) To Attain ARAR
State ARARs					
1	Colorado Mined Land Reclamation Board Regulations ("MLRB Regulations"), Reclamation Performance Standards, 2 C.C.R. 407-1, Rule 1.1 (definitions) and Rule 3 (Reclamation Performance Standards), pursuant to the Colorado Mined Land Reclamation Act, C.R.S. § 34-32-101 <i>et seq.</i>	Relevant and Appropriate Action-Specific	Consolidation of solid waste resulting from construction activities including: closure of the Willard waste rock pile through the creation of an onsite mine waste repository; removal of accessible portions of the Cally adit waste rockpile; dewatering and clean out wet areas impacted by the Willard #1 and Willard #2 adit discharges; and removal of the Puzzle Extension Shaft waste rock pile.	The MLRB Regulations require reclamation of permitted mined lands, defined as "employment of procedures reasonably designed to minimize as much as practicable the disruption from mining operations and to provide for the establishment of plant cover, stabilization of soil, the protection of water resources, or other measures appropriate to the subsequent beneficial use of such affected lands."	The definitions in Rule 1.1 will be used, as appropriate, to guide the Removal Action design and implementation process. EPA has confirmed that only the specific sub-parts of Rule 3 identified below as State ARARs # 2 and 3, and not the entirety of Rule 3, are the relevant and appropriate MLRB performance standards that TABR must consider for design and implementation of the Phases I and II work activities.
2	MLRB Regulations Rule 3.1.5(2)	Relevant and Appropriate Action-Specific	Closure and stabilization of the Willard waste rock pile as necessary to prevent <u>uncontrolled</u> future mine discharge onto waste pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Consolidation of solid waste resulting from on-site construction activities shall ensure adequate compaction for stability and prevent leaching of toxic or acid forming materials	Waste rock will be covered with clean, non-acid forming soil materials to support revegetation and that minimizes the potential for leaching of metals from the waste rock. The material used to construct the settling pond embankment will be placed in lifts and compacted to achieve acceptable stability, as assessed via the geotechnical investigation.

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ARARs Analysis
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	EPA's ARAR Determination	Relevant Action	EPA's Description	Analysis – TABR Action(s) To Attain ARAR
3	MLRB Regulations Rule 3.1.5(1), (3), (7)	Relevant and Appropriate Action-Specific	Repairing and grading areas as necessary to prevent <u>uncontrolled</u> future mine discharge onto the closed Willard waste rock pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Any grading shall be done in a manner to control erosion and siltation and protect from slides and other damage. High walls shall be stabilized or eliminated. Grading shall create a final topography appropriate to the future land use. Slopes and slope combinations shall be compatible with the configuration of surrounding conditions and future land use.	Grading will be carried out so that the final topography of the areas affected by the Removal Action will be consistent with the property's intended post-remediation land use (undeveloped private property or open space). Erosion and siltation will be controlled through the use of best management practices such as silt fencing, straw wattles, etc. See Stormwater Management Plan, Appendix B, Sheets C6.0 through C6.4. Maximum slopes associated with the settling pond will be 3:1 in the pond and on most of the waste fill tie slopes, with 6:1 on the west side slope. There will be some 2:1 tie slopes where the regraded waste rock pile ties into the steep hillside as well as along the access driveway. See Appendix B, Sheets C3.0 to C3.2.
4	Colorado Discharge Permit System (CDPS) Regulations, 5 CCR 1002-61.3(2)(a) and (f)(ii), and CDPS general permit No. COR400000 (Stormwater discharges associated with construction activity), pursuant to CRS § 25-8-501	Applicable Action-Specific	Closure and stabilization of the Willard waste rock pile as necessary to prevent <u>uncontrolled</u> future mine discharge onto waste pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Requires implementing management controls through defined "general limitations" and "best management practices" for stormwater pollution prevention pursuant to Colorado Discharge Permit System general permit COR400000. The substantive provisions of this permit apply to stormwater discharges from small construction activities, including clearing, grading, and excavating, that result in land disturbance of equal to or greater than one acre and less than five acres.	<i>EPA Comment: "If greater than 1 acre but less than 5 acres are disturbed from the response action, the substantive requirements of this permit are applicable to the response action pursuant to 5 CCR 1002-61.3(2)(a) and (f)(ii). If less than 1 acre is disturbed from the response action, the substantive requirements of this permit are relevant and appropriate."</i> ARAR is Applicable because the area affected by the Removal Action will be approximately 3.5 acres. Stormwater best management practices will be applied during construction, as described in the Stormwater Management Plan, Appendix B, Sheets C6.0 through C6.4. The Willard repository design includes stable slopes, swales to control runoff, and a grading plan that will promote runoff while minimizing erosion of the finished, revegetated slopes. See Appendix B, Sheets C3.0 to C3.2.

TABLE 1
ARARs Analysis
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	EPA's ARAR Determination	Relevant Action	EPA's Description	Analysis – TABR Action(s) To Attain ARAR
					Mine water emanating from the Willard 1 and 2 adits will be re-routed into a fully lined settling pond that is constructed on the regraded Willard waste rock pile. The liner system will minimize or eliminate any contact of the mine water with the waste rock.
5	Colorado Fugitive Dust Control Plan/Opacity, Regulation No. 1., 5 CCR 1001-3(D)(2)(c), pursuant to Colorado Air Pollution Prevention and Control Act	Applicable Action-Specific	Conducting an activity that generates dust.	Requires use of feasible control measures to manage fugitive emissions from construction activities.	Fugitive dusts resulting from construction activities will be controlled using misting water sprays and dust suppressants per the Dust Control Plan. See Appendix B, Sheet C1.1.
6	Colorado Wildlife Enforcement and Penalties Act, CRS §33-6-128	Applicable Action-Specific & Location-Specific	Performing response activities in relevant wildlife habitat.	Prohibits willfully damaging or destroying any wildlife den or nest, or their eggs, or harassing any wildlife. "Harass" means to unlawfully endanger, worry, impede, annoy, pursue, disturb, molest, rally, concentrate, harry, chase, drive, herd, or torment wildlife. See CRS § 33-1-102(24) (Definitions).	Wildlife, including moose and a variety of birds, are known to pass through and utilize habitat within the Site. Some level of wildlife disturbance is likely to occur and is accepted given the nature of the construction activities. When such wildlife is encountered during the course of the Removal Action, however, work activities will be carried out in a manner to minimize potential adverse effects upon wildlife and/or fish. To the extent EPA deems necessary, EPA may consult/coordinate with Colorado Parks and Wildlife regarding planned response actions and potential impacts to wildlife.

TABLE 1
ARARs Analysis
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	EPA's ARAR Determination	Relevant Action	EPA's Description	Analysis – TABR Action(s) To Attain ARAR
7	Colorado Noxious Weed Act and Summit County Noxious Weed regulations, CRS § 35-5.5-101-119; 8 CCR 1206-2	Applicable Location-Specific	Performing response activities in an area with noxious weeds or where noxious weeds could develop.	Must use integrated methods established by the Summit County Commissioners to manage noxious weeds.	Response activities will be carried out in a manner to minimize the introduction or spread of noxious weeds. The Removal Action will utilize a revegetation seed mix that is based on recommendations in Chapter 3 of the Summit County Land Use Code. The seed mix will be free of noxious weed species. Summit County and Town of Breckenridge representatives have reviewed and approved the seed mix, which is identified on Sheet C6.0 of the project plan set (Appendix B of this Removal Design Work Plan).
8	Colorado Noise Abatement Statute, CRS § 25-12-103	Relevant and Appropriate Action-Specific & Location-Specific	Location of response activities is within a designated land use zone subject to noise regulation.	Requires compliance with maximum permissible noise levels for particular time periods and land use zones.	To the extent practicable, applicable standards will be met during on-site construction activities. Noise monitoring is not required. To minimize noise disruptions to the local community, construction activities will only occur between the hours of 7 am and 6 pm, Monday through Friday.
9	Colorado Environmental Covenants Statute, CRS § 25-15-317 <i>et seq.</i>	Applicable Location-Specific	Performing response activities that will leave waste in place above standards for unrestricted use or incorporating engineered features or structures.	Requires environmental covenants (ECs) or notices of environmental use restrictions (RNs) for environmental remediation projects resulting in: residual contamination at levels that have been determined to be safe for one or more specific uses, but not all uses; or incorporation of engineered features or structures requiring monitoring, maintenance, or operation, or that will not function as intended if disturbed.	To meet this ARAR, TABR will seek approval of appropriate ECs after completion of Phase III construction activities. The requirement to seek ECs on TABR-owned property is limited to the Iron Springs parcel where the repository and potential future (Phase III) water treatment operations are located. If EPA determines that ECs are necessary on other real property where TABR performs work as part of the Removal Action, EPA will seek ECs and compliance with the statute from the record owner(s) of such property.

4.0 SUMMARY OF PHASE 1 REMOVAL ACTION COMPONENTS

An overview of all Phase 1 Removal Action components is provided below. Figure 2 shows the areas and features identified in the bulleted summary below.

- Drain the existing pond to reduce saturation of the Willard waste rock pile. This component, which TABR completed in the fall of 2020, addressed RAO No. 1.
- Construct an on-Site driveway to facilitate access from the Boreas Pass Road to the Willard waste rock pile and the Willard Nos. 1 and 2 adits.
- Route Illinois Gulch creek flows through pipes in the area adjacent to the PES to limit or eliminate leakage into the PES and thence the Puzzle Mine workings. This is expected to reduce the flow rate at the Willard No. 1 adit, thus addressing RAO No. 2.
- Conduct a geotechnical investigation of the Willard waste rock pile to confirm that the foundation conditions are acceptable for in-place closure and construction of a new, lined settling pond. The investigation will also include exploration of the depth to bedrock in Illinois Gulch near the inlet of the aforementioned pipe system near the PES.
- Direct flows from the Willard No. 1 and Willard No. 2 adits to the new, lined settling pond located on the regraded Willard waste rock pile to promote the removal of iron from the adit waters.
- Remove waste rock from the PES waste rock pile to the extent practicable and transport it to the Willard waste rock repository. Cover any remaining waste rock with clean soil and revegetate.
- Install a concrete plug(s) in the PES to reduce the amount of water that enters the mine workings through the PES and exits the workings from the Willard No. 1 adit. Plugging of the PES will also reduce physical hazards. This component will address RAO Nos. 2 and 3. Plug design and construction will be implemented in consultation with the Colorado Division of Reclamation, Mining, and Safety ("DRMS").
- Remove the accessible portion of the Cally adit waste rock pile and transport it to the Willard waste rock repository.
- Remove iron-stained sediment in the areas to the north and northwest of the Willard waste rock pile to the extent practical and transport it to the Willard waste rock repository.
- Regrade the Willard waste rock pile, with incorporated waste rock removed from the PES, Cally adit, and iron-stained sediment, to promote positive drainage and prevent ponding.

Cover the Willard waste rock pile with clean soil (minimum thickness of one foot) and revegetate. This component will address RAO Nos. 4 and 5.

- Sample residential yards on Brooks Hill Drive using the methods set forth in EPA's "Lead Handbook" (EPA, 2003), analyze the samples for a suite of metals and arsenic, and provide the resulting data to EPA so that EPA may assess potential human health risks. A Sampling and Analysis Plan ("SAP") and Quality Assurance Project Plan ("QAPP") for Residential Properties that describes the proposed sampling and analysis will be submitted to EPA by April 30, 2021, per the UAO/SOW schedule. Remediate portions of the residential yards that are determined to pose potential unacceptable human health risks through soil removal/replacement and revegetation, per EPA's "Lead Handbook" protocols. This component will address RAO No. 6.

5.0 DESIGN

With notice to EPA, as required by the UAO, TABR retained Formation Environmental, LLC, (“Formation”) of Boulder, Colorado to prepare the Removal Action design. Formation subcontracted The Sanitas Group, LLC of Louisville, Colorado to assist with specific civil engineering design elements. Technical factors of importance that were considered during the design and will be taken into account during Removal Action construction include employment of standard and widely used environmental control measures (i.e., best management practices [“BMPs”] and standard construction practices and techniques). The overall disturbance area associated with the Phase 1 Removal Action is estimated to be less than four acres.

Design drawings for the Removal Action, with technical specifications where needed, are provided in Appendix B. The Removal Action design elements described in the following subsections are:

- Geotechnical Investigation
- Driveway Design
- Repository/Settling Pond Design
- Illinois Gulch Piping System Design
- PES Plug Design
- Stormwater Management.

5.1 Geotechnical Investigation

Geotechnical conditions will be investigated in two areas: 1) within and beneath the Willard waste rock pile and 2) near the inlet of the piping system to be installed in Illinois Gulch near the PES. The geotechnical investigation will be the first Removal Action field activity implemented in 2021 following the Spring snowmelt, so that its results can be incorporated, as necessary, into the Removal Action design and construction of other Phase 1 work components.

The interior and foundation materials of the Willard waste rock pile will be characterized to confirm its suitability as a long-term repository and to assess foundation conditions for the new settling pond. The investigation will be conducted by excavating test pits, observing and documenting the subsurface conditions, and collecting material samples for analysis by a geotechnical laboratory. The test pit program will be overseen by a qualified geologist or engineer. The specific objectives of the geotechnical investigation include:

- Confirming the thickness of the waste rock material;
- Evaluating the geotechnical characteristics and engineering properties of the waste rock material;

- Evaluating groundwater conditions within and beneath the waste rock pile; and
- Evaluating the geotechnical characteristics and engineering properties of the subsurface materials underlying the waste rock pile.

At least four test pits will be excavated through the Willard waste rock pile and into underlying native material, if possible. Each test pit will be logged by the field geologist or engineer who will also assign preliminary material classifications according to the Unified Soil Classification System. In particular, any soft, compressible materials encountered in the test pits will be described and sampled. Such materials could result in differential settlement of the repository leading to the formation of depressions that could hold water and/or cracks in the cover soil material. Bulk samples (i.e., 5-gallon buckets with sealable tops) and samples representative of in-situ conditions (i.e., brass sleeves) will be collected from each major distinct material type encountered in the test pits for geotechnical testing. Table 2 below summarizes the laboratory testing program, including American Society for Testing and Materials (“ASTM”) test designations.

The proposed embankment configurations of the regraded Willard waste rock pile and new settling pond (described in Section 5.3) will be evaluated for stability prior to construction using computer-based slope stability modeling. Geotechnical test results (e.g., angle of internal friction and cohesion) from samples obtained during the test-pit program will provide material characteristics needed for input into the stability analysis. The computer program Slide, Version 6, (2010) created by RocScience will be utilized for the slope stability analysis, which will consider both static (non-earthquake) and pseudo static (earthquake) conditions.

At least one test pit will be excavated in Illinois Gulch near the location of the inlet for the new piping system that will convey surface water flows past the PES. The primary purpose of the test pit(s) will be to assess the depth to bedrock and the corresponding feasibility of constructing a cutoff wall that extends to bedrock at the inlet structure. If found to be feasible, this cutoff wall that extends to the bedrock surface should direct groundwater into the piping system, potentially providing a further reduction in the amount of water that enters the mine workings through the PES.

The geotechnical data and corresponding interpretations from the geotechnical investigation, including the results of the slope stability analyses, will be presented to EPA in a Geotechnical Report that will supplement the Removal Action designs presented in this Work Plan. Though not a deliverable specifically required by the UAO/SOW, the Geotechnical Report will inform potential refinements to the designs of the Willard waste rock pile repository, settling pond, and piping system in Illinois Gulch. The need for any such refinements will be communicated to EPA through the Engineering Change Order (“ECO”) process described in Section 7.4. The Geotechnical Report will be included as an appendix to the Construction Completion Report (Phases 1 and 2), which is a required deliverable per the UAO/SOW.

Table 2 - Illinois Gulch Geotechnical Sampling & Testing Program

Field Sample Type	Test	ASTM Test Designation	No. of Tests per Material Type
Brass Liner	In-Situ Moisture and Density	ASTM D7263	2-4
Bulk	Moisture Content	ASTM D2216	2-4
Bulk/Brass Liner	Grain Size Analysis	ASTM D6913	1-2
Bulk/Brass Liner	Atterberg Limits	ASTM D4318	1-2
Bulk	Moisture Density Relationship	ASTM D698	1-2
	One-dimensional Consolidation	ASTM D2435	
Brass Liner	Undisturbed		2-4
Bulk	Remolded		0-1
	Triaxial Shear	ASTM D4767	
Brass Liner	Undisturbed		0-1
Bulk	Remolded		1-2

Notes:

Brass Liner samples will be obtained with 2 or 3-inch dia. hand drive sampler.

Bulk samples will be obtained in 5-gallon buckets with smaller portions in air-tight plastic containers to preserve in-situ moisture content.

The number of specific tests per material type will be established based on field observations.

5.2 Driveway Design

Vehicle and construction equipment access to the Willard waste rock pile, Willard No. 1 adit, and Willard No. 2 adit from Boreas Pass Road is not currently possible given the presence of wet areas and heavy vegetation over most of the Site. Therefore, a new driveway will be constructed on TABR property to provide such access for construction, post-construction monitoring, and future Phase 3 activities.

Detailed design information for the driveway is presented in Appendix B (specifically Sheets C2.0, C2.1, and C2.2). The overall length of the driveway will be approximately 800 feet. Its width at the juncture with Boreas Pass Road will be 20 feet for the first 120 feet of its length during construction, reducing to 16 feet for the remainder of the driveway length. The additional width will facilitate turning of loaded haul trucks around the initial driveway curve (Appendix B, Sheet C2.1). Following completion of the Removal Action construction activities, at the request of local jurisdictions, the first 120 feet of the driveway will be reduced in width to 16 feet to reduce the pullout width and to limit use of the intersection by passing traffic as a pull off (Appendix B, Sheet C2.2). A locking gate will be installed across the driveway near the Boreas Pass Road intersection to control Site access.

The driveway's departure point from the Boreas Pass Road was selected with input from Summit County, Town, and EPA representatives. The departure point is based on consideration of sight-line distances for oncoming traffic as well as other Summit County and Town rules and guidance. The curve radii and driveway width were selected to allow safe passage of typical 10 to 12 cubic yard (cy) dump trucks.

Construction of the driveway will require approximately 1,200 net cy of imported fill material. The selected remedial construction contractor will be tasked with identifying an appropriate borrow source and the material from that source will be subject to approval by TABR and EPA. Geotechnical testing of the proposed borrow material may be implemented at the discretion of the project manager and/or project geotechnical engineer. Import of fill to construct the driveway will necessitate material hauling on public roads from a borrow source (to be identified). The loaded trucks will enter the Site from the Boreas Pass Road. Given the heavy use of that road by the community, flaggers will be used to safely control traffic as the imported fill arrives at the Site. Waste rock from the Cally adit and PES areas will be transported to the Willard waste rock pile for incorporation into the repository. Transport of this waste rock from the PES area will require hauling on both the Illinois Gulch Road and on the Boreas Pass Road. A Traffic Control Plan consisting of construction notification signage and flaggers will also be used to safely control traffic while the PES waste rock is being moved. The contractor selected to perform this work will develop and implement the Traffic Control Plan in consultation with local regulatory authorities (e.g., Summit County). The Traffic Control Plan will describe how the Contractor's work process will comply with local regulations and standard construction practices to create safe operating conditions.

Culverts will be installed to pass drainage beneath the driveway. Dual 36-inch culverts, approximately 32 feet in length, will be installed at approximate Sta. 3+70. Eighteen-inch diameter culverts will be installed near Sta. 5+00 and Sta. 6+85 (Appendix B, Sheets C2.1 and C2.2). Culvert bedding and outfall details are shown on Appendix B, Sheet C5.0.

Cross sections and design details for the driveway were developed with input from local government representatives and are presented in Appendix B, Sheet C5.0. The driveway top surface will be sloped at 3 percent toward the inside of the curve to facilitate runoff of rainfall and snow melt. Tie slopes above and below the driveway will be sloped at a maximum of 2 (horizontal) to 1 (vertical). Organic material and topsoil will be stripped from the driveway subgrade and the remaining suitable soil will be compacted to a depth of approximately nine inches to achieve at least 95 percent of maximum dry density. The compacted soil will be overlain with six inches of road base or equally suitable material.

The new driveway will pass within a few feet of the accessible Cally waste rock pile (see “Spoils area to be removed and regraded” on Appendix B, Sheets C2.1 and C2.2). The waste rock material, estimated to comprise approximately 500 cy, will be removed and transported to the Willard waste rock pile after completion of the driveway. The waste rock will be incorporated in the repository to be constructed on the Willard waste rock pile. Any material at the Cally waste rock pile that remains within the Boreas Pass road embankment will be covered with clean soil and revegetated.

5.3 Repository/Settling Pond Design

The Willard waste rock pile will be reshaped to include the new settling pond and sloped to promote runoff of rainfall and snowmelt. Waste rock from the Cally and the PES areas, as described in Section 5.2, will be added to the top of and incorporated with the Willard waste rock as part of the reshaping process. In addition, iron-stained sediment removed from the wet area to the north of the repository location (see Figure 2, item 9) will also be incorporated into the repository. The configurations of the repository and settling pond are shown in Appendix B, Sheet C3.0. Subsequent passive treatment components (e.g. bioreactor(s)) may be constructed on the gently sloped repository surface area located to the south of the settling pond during Phase 3 of the Removal Action.

As described in Section 2.4, flows from the Willard Nos. 1 and 2 adits contain elevated levels of several metals. Iron is one of these metals, as is evident from the aforementioned iron-stained deposits in the wet area where the adit flows commingle. Iron in the adit flows is initially in the dissolved (ferrous) form but, upon contact with air, oxidizes to ferric iron and precipitates as iron hydroxide. The settling pond will provide a location to promote oxidation and removal of iron from the adit flows, which is expected to provide the following benefits:

- Iron precipitates can foul passive treatment systems, such as the system that may be constructed on-Site during Phase 3. Iron fouling tends to decrease the flow-through rate and treatment efficiency of passive treatment systems. Therefore, iron removal is a common first step in such treatment systems.
- Precipitation of iron in the new settling pond will allow:
 - the iron-stained wet area to the north of the Willard waste rock pile to dry prior to removal of the sediments, facilitating their excavation, transport, and incorporation into the repository, and
 - the iron precipitates from mine water directed to the pond to collect in a more accessible and secure location for periodic removal and disposal in an approved facility.

The settling pond design is presented in Appendix B, Sheets C3.0, C3.1, and C3.2. Water from the Willard No. 1 adit will continue to flow in its present natural swale to a point just east of the settling pond location where the flow will then be directed into the pond via a 12-inch pipe. A concrete box diversion structure will be placed in the Willard No. 2 adit location where the water will enter a buried 8-inch pipe that leads to the settling pond.

The settling pond will have water surface dimensions of approximately 70 feet by 155 feet with a normal water surface elevation of 9,820 ft above mean sea level ("amsl") based on the NAVD88 vertical datum. The floor of the pond will be sloped to provide a water depth of 2 feet at the inlet (east) end to a water depth of 5 feet at the outlet (west) end. The purposes of the sloped floor are to 1) provide a shallow water depth at the inlet to promote aeration and corresponding iron precipitation and 2) provide an accumulation area for iron precipitate near the outlet.

The settling pond will be fully lined to prevent seepage into the underlying waste rock material. Various liner materials were considered during the design process, including natural clay, geosynthetic clay liner ("GCL"), and several types of geomembrane such as high-density polyethylene ("HDPE"), linear-low density polyethylene ("LLDPE"), and polypropylene.

A natural clay liner was ruled out because it would not meet project requirements, primarily due to an unacceptably high level of permeability and thus leakage under typical Site conditions. Natural clay liners typically require consistent wetted conditions to prevent drying of the liner and associated cracking and leakage. Portions of the settling pond liner (i.e., those above the normal water surface elevation) will not be consistently wetted. Also, periodic draining of the pond for maintenance purposes may cause a natural clay liner to dry and crack. While a GCL liner offers generally lower permeability than a natural clay liner, that permeability is not as low as a geomembrane product.

The selection process for the most appropriate geomembrane liner system for the settling pond included consultation with representatives from liner supply vendors (Nilex Corporation, Colorado Lining) and prior experiences on other, similar projects. Within current standard geomembrane products, it was determined that an HDPE product was preferred due to its low permeability, durability, and longevity (e.g., ultraviolet resistance) in the environmental conditions present at the project site, and ability of the project team representatives to observe and inspect the installation. Details regarding the recommended liner system are provided in Appendix B, Sheet C1.1. In summary, the liner system will consist of an underlying 10 oz. non-woven geotextile cushion and a minimum 60 mil HDPE geomembrane. The liner ends will be secured in anchor trenches in the settling pond embankment.

The settling pond design includes interior embankment slopes of 3(h):1(v) with exterior slopes that vary from 6(h):1(v) on the west end to 3(h):1(v) on all other sides (Appendix B, Sheets C3.1 and C3.2). The crest width of the berm surrounding the pond will be 14 feet. The exterior maximum 6(h):1(v) section on the west side will be approximately 9 feet in height from the embankment crest to the slope toe and the exterior maximum 3(h):1(v) section on the north side will be approximately 12 feet in height from the embankment crest to the slope toe. As discussed in Section 5.1, the stability of these embankment configurations will be analyzed and confirmed prior to construction. The design for the remainder of the regraded Willard waste rock pile includes perimeter slopes of 3(h):1(v). The maximum height of the regraded waste rock pile will be approximately 10 feet.

The settling pond outlet structure will consist of a vertically oriented concrete box with inlet grate on top set at the normal water surface elevation of 9,820 ft amsl (see detail in Appendix B, Sheet C5.2). A metal catwalk will connect the outlet structure with settling pond embankment to provide access for maintenance. The outlet structure will include interior metal ladder rungs and a gap on one side in which fiberglass stop logs will be installed. The purpose of the stop logs is to provide a means to drain the pond in a controlled manner, when needed, by temporary removal of the stop logs. A 12-inch pipe will drain the outlet structure from its base and through the western settling pond embankment to the existing vegetated wet area. Water exiting the settling pond will flow through the vegetated area toward the existing culverts under Bright Hope Circle and thence down Iron Springs Gulch.

Piping for potential connection with a Phase 3 treatment system is included in the design. A 12-inch diameter PVC pipe will be installed in the southwest corner of the pond (Sheet C3.0) for future diversion of pond outflows, if necessary. The pipe inlet will be positioned at an elevation of 9,819 ft amsl and the pipe will penetrate the liner system and southwestern pond embankment. The ends of the pipe will be plugged and blind-flanged until such time that subsequent treatment works are constructed. The downstream end of the pipe will be buried at a shallow depth to protect the pipe and marked with a steel post. When the pipe is in use, the surface elevation of the sedimentation pond (normally 9,820 ft amsl) will fall to a level just below the primary outlet structure.

The 14-foot-wide embankment crest is designed to accommodate the geomembrane anchor trench and allow the settling pond to be accessed by trucks for maintenance purposes, including the use of vacuum trucks to periodically remove accumulated iron precipitates and sediment from the deeper (west) end of the pond. The settling pond will be fenced to protect the integrity of the pond liner and embankments, and to discourage entry by larger animals (e.g., moose) and human trespassers.

The repository surface will be covered with a minimum of one foot of suitable cover material with low metals concentrations to eliminate human contact with the waste rock material. Repository surfaces that will be subject to vehicular traffic will consist of granular material such as road base. All other repository surfaces will be covered with clean soil and revegetated. Approximately 2,500 cy of clean cover soil and 200 cy of road base are estimated to be required for the repository surface and other areas disturbed by the Removal Action construction work. The selected remedial construction contractor will be tasked with identifying an appropriate borrow source for the cover soil and the material from that source will be subject to approval by TABR and EPA. Geotechnical and/or chemical testing of the proposed cover soil material may be implemented at the discretion of the project manager and/or project geotechnical engineer. The cover soil will be nominally compacted by equipment travel during placement. Construction of any subsequent passive treatment system during Phase 3 will require removal and stockpiling of the clean road base and soil prior to reshaping the surface of the repository and reuse of the road base and soil, as appropriate, following construction completion.

5.4 Illinois Gulch Piping System Design

As previously discussed, studies by the USGS demonstrate that some streamflow from Illinois Gulch seeps into the PES and exits the mine workings at the Willard No. 1 adit. The Removal Action will include routing Illinois Gulch streamflow through a pipe system to reduce this seepage, which is expected to reduce the flow rate from the Willard No. 1 adit. EPA has consulted with the State of Colorado and confirmed the placement and use of a pipe system under this short segment of Illinois Gulch is acceptable. Use of a pipe system was selected over an open, concrete-lined channel based on expected longevity and effectiveness. Installation of the pipe system will be completed before any work on the PES and removal of its associated waste rock pile commences to prevent Illinois Gulch streamflow from directly entering the PES.

The pipe system design is presented in Appendix B, Sheet C4.0; details are provided on Sheets C5.0 and C5.1. The pipe system is designed to convey maximum flows of 160 cubic feet per second, which is the estimated 500-year flow rate plus a Standard Error of Prediction (33 percent). The flow rate estimate is detailed in Appendix C. The system will consist of dual 36-inch-diameter density polyethylene (HDPE) pipes with an overall length of approximately 134 feet. The system will comprise two sections separated by a drop structure in order to lessen flow velocities in the system. The more upstream section will be approximately 73 feet in length and will be sloped at approximately eight percent. The downstream section will be approximately 61 feet in length and

will be sloped at approximately two percent. A roadside swale on top of the pipe system will be used as a secondary conveyance element in the event that overtopping occurs at the pipe system inlet.

A concrete headwall/cutoff wall will be installed at the inlet to the pipe system. The headwall will extend to a depth of at least four feet below the pipe inverts to eliminate undercutting by streamflow and to promote capture of groundwater into the pipe system (Appendix B, Sheet C5.0). If found to be feasible based on the geotechnical investigation, the cutoff wall will be extended to the bedrock surface, if practicable, to further promote groundwater capture.

The drop structure will consist of a five- by ten-foot rectangular concrete box, approximately seven feet deep and with eight-inch-thick walls (Appendix B, Sheet C5.1). The difference in inlet and outlet pipe invert elevations will be approximately three feet. Access to the drop structure interior for maintenance purposes will consist of a 24-inch manhole with ladder rungs on the drop structure interior wall.

The pipe system outlet will consist of an energy dissipation basin/apron with dimensions of approximately 20 feet by 20 feet. The basin/apron will be constructed of seven- to eight-inch riprap approximately two feet in thickness. A concrete headwall/cutoff wall will be constructed at the downstream pipe terminus to anchor the pipe and eliminate undercutting.

5.5 PES Plug Design

After flows in Illinois Gulch are directed through the piping system described in the previous subsection, the PES will be plugged in accordance with Colorado DRMS' specifications. Access to the PES and its associated waste rock pile will be facilitated by placement of fill over the piping system. Accessible portions of the PES waste rock, with an estimated volume of 200 to 300 cy, will be removed and hauled to the repository constructed on the regraded Willard waste rock pile.

In consultation with DRMS staff, DRMS recommends that a "monolithic concrete plug" be constructed to close mine shafts that have collapsed at the collar and have no apparent opening, as is the case for the PES. The available historic mine maps suggest that the PES is a two-chamber shaft and, therefore, two side-by-side plugs may be required (Lovering, 1934). Section 7 of DRMS' Inactive Mine Reclamation Program's "Standard Work Specifications" presents technical specifications for "Monolithic Plug Closure" and is included in Appendix B, Sheet C1.1. Key aspects of this closure approach are summarized below.

- The plugging site will be excavated, as necessary, so that the top dimensions of each plug are eight (8) feet by twelve (12) feet or larger.
- The plug(s) will be four (4) feet thick.

- Prior to pouring concrete, two (2) feet of rockfill will be placed in the bottom of the shaft depression.
- Concrete will be required to have a minimum compressive strength of 3,000 pounds per square inch (“psi”) within seven days of pouring and 4,500 psi 28 days after pouring.
- Backfill over the completed plug(s) will be comparable to adjacent surface material and shall be mounded a minimum of one (1) foot above the surrounding area.

The contractor will consult with DRMS staff prior to and during plug installation to ensure adherence to DRMS’s guidelines and advice. TABR and the contractor will invite DRMS staff to oversee and participate as the plug(s) are constructed.

Following completion and DRMS’ approval of the plug installation, the plug(s) and any remaining waste rock in the affected area will be covered with clean soil and revegetated.

5.6 Stormwater Management

Stormwater will be managed during and following the Removal Action construction to control erosion and to minimize any movement of sediment from the construction areas. The stormwater management plan for the Removal Action is provided in Appendix B, Sheets C6.0 through C6.5. Specifically, Sheet C6.1 indicates initial stormwater BMPs to be installed prior to any construction activities, Sheet C6.2 shows stormwater BMPs that will be implemented during construction, and Sheet C6.3 depicts final stormwater BMPs at the conclusion of construction. Stormwater management plan details are provided on Sheets C6.4 and C6.5.

In general, the stormwater BMPs will consist of silt fencing, erosion control blankets, and sediment control logs (straw wattles) that will be deployed in key areas based on estimation of runoff directions and velocities. Revegetation of disturbed areas will also be implemented as a long-term erosion control measure following construction.

6.0 HEALTH AND SAFETY

The project HASP is provided in Appendix D. The intent of the HASP is to protect on-site personnel and visitors from potential hazards associated with the construction and sampling activities. Pursuant to 40 C.F.R. Part 300.150, the HASP complies with all currently applicable Occupational Safety and Health Act requirements, standards and regulations found at 29 C.F.R. Part 1910, (Occupational Safety and Health Standards); Part 1926 (Construction Standards), including the General Industry Standards found in Part 1910.

The HASP describes the following: site personnel and safety responsibilities, hazard analyses, personal protective equipment, decontamination procedures, emergency response, and safety training. Copies of the HASP will be maintained in the construction contractor's project field office.

7.0 CONSTRUCTION QUALITY CONTROL AND QUALITY ASSURANCE

CQC and CQA will be performed to assure that the project is constructed in conformance with approved plans and specifications. The information and guidelines provided in this section are intended to provide verification that the Removal Action implementation at the Illinois Gulch Site is performed in accordance with the approved design plans and specifications and any approved ECOs issued during construction.

Generally, CQC is the day-to-day tracking of construction quality whereas CQA is a periodic audit of CQC to ensure that it is properly conducted. CQC will be performed by the Removal Action construction contractor and its subcontractors, such as a geotechnical testing laboratory. CQA will be performed by TABR and its designees, including the design engineer and contractors such as a geotechnical testing laboratory different from that used for CQC purposes.

7.1 Personnel Roles and Responsibilities

Project Coordinator – TABR's Project Coordinator is Edwin Downey, CIH, CHMM. He, with support from Formation Environmental, is responsible for ensuring that TABR successfully accomplishes all relevant requirements set forth in the UAO/SOW.

Project Manager – Formation's Project Manager is Brian Hansen, P.E. Mr. Hansen is a registered Professional Engineer in the State of Colorado. He is responsible for coordinating project activities with TABR and EPA and ensuring that the project deliverables are submitted to EPA in accordance with the UAO/SOW.

Design Engineer – The project Design Engineer is Curtis Stevens, P.E. of The Sanitas Group, subcontractor to Formation. Mr. Stevens is a registered Professional Engineer in the State of Colorado. He is responsible for developing the Removal Action design drawings and technical specifications and certifying the completed project.

Geotechnical Engineer – Formation's Geotechnical Engineer is Jon Friedman, P.E. Mr. Friedman is a registered Professional Engineer in the State of Colorado. He is responsible for designing the geotechnical testing program and interpreting its results, implementing slope stability analyses, providing recommendations regarding material placement in embankments to promote long-term stability, and preparation of the Geotechnical Report.

Construction Manager - The Construction Manager, who is an employee of the construction contractor, is responsible for ensuring that the construction team follows the final design drawings and specifications. The Construction Manager will have overall responsibility for implementing the CQC program, including preparation of daily construction reports, which will document testing and construction activities. The daily reports will be provided to the Project Manager and the CQA Manager.

CQC Manager - The CQC Manager, who is an employee of the construction contractor, is responsible for overseeing all CQC testing and supporting the Construction Manager. The CQC Manager will ensure that the equipment operators are properly following the plans and specifications and that testing information is provided to the Construction Manager for inclusion in the daily construction reports.

CQA Manager - The CQA Manager will report directly to the Project Engineer. The CQA Manager, who is an employee or subcontractor of Formation, will be on-site with sufficient frequency to ensure that the TCRA is properly constructed in accordance with all plans and specifications.

Regulatory Oversight – Paul Peronard, EPA’s designated On-Scene Coordinator (“OSC”), Martin McComb, EPA’s alternate OSC, or their designee, will be responsible for providing oversight of the TCRA implementation activities. TABR will provide full and complete access to TABR property to the EPA, the State of Colorado and/or their designated representatives during periodic inspections and, to the extent practicable, accompany them during these inspections. Any deficiencies in construction or construction not in substantial compliance with the approved design, as may be modified by ECOs (see Sec. 7.4), will be noted during periodic inspections.

7.2 Construction Quality Control

The CQC will be an ongoing process of controlling and measuring material and earthwork characteristics to provide verification that the work is performed in accordance with the approved plans, specifications, and field changes. The CQC will be performed by qualified members of the construction contractor’s team and recorded in daily construction reports.

7.2.1 Materials Sampling and Materials Installation

Material quality control will consist of inspecting materials (e.g., riprap, concrete, seed mix, culverts, etc.) to ensure that they meet the project requirements.

7.2.2 Earthwork

Nuclear instrument testing of structural fill areas, such as the driveway embankments, will be performed in accordance with American Society for Testing and Materials (ASTM) D6938 to confirm in-place compacted density and moisture of fill materials as compared with ASTM D698 (Standard Proctor Compaction Curve). In general, the compacted earthen structures are required to exhibit densities equal to or exceeding 95 percent of the maximum dry density per ASTM D698. The frequency of compaction testing for compacted fill in the driveway embankments will be one test per 250 cy, or one test per lift, whichever is more frequent. Any area of embankment fill that

fails to meet the compaction acceptance criteria will be reworked until a subsequent test shows acceptable results.

CQC of geometric limits (e.g., grade and contour) for the cover will be through use of wooden grade stakes. The placement of stakes will be by a qualified surveyor using standard surveying techniques. Surveys will be implemented, as needed, during construction to verify that design lines and grades are achieved within acceptable tolerances.

7.2.3 Surveying

Survey control will be established prior to construction using the existing coordinate system and topography. Day-to-day surveying during construction to ensure that the TCRA is constructed according the approved design will be performed by a contracted surveyor. A final survey will be performed to document as-constructed conditions. The final survey will be performed to General-Order surveying accuracy by a surveyor registered in Colorado or by a qualified surveyor under the supervision of a Colorado-registered surveyor.

7.3 Construction Quality Assurance

Independent CQA inspection and testing will be performed by Formation and a subcontracted geotechnical testing firm to verify the adequacy and effectiveness of the construction. The CQA will include construction inspection and management, as necessary; periodic confirmation testing of earthwork and materials; review of material submittals, construction reporting and communications; and documentation of all CQA activities. Should CQA and CQC test results vary significantly, additional testing may be requested by the Project Manager and/or Design Engineer to validate the results.

7.3.1 Construction Inspection and Management

Formation and its subcontractor(s) will conduct CQA inspections as the construction work proceeds. Minor questions from the construction contractor will be answered by Formation's CQA Manager. The Project Manager and/or Design Engineer will be contacted, as necessary, for clarification of design intent or possible design change needs. It is anticipated that the Project Manager and Design Engineer will visit the site periodically during construction. Necessary design changes identified by the Project Manager and/or Design Engineer during construction will be documented and submitted to EPA for review through the ECO process described in Section 7.4.

The CQA Manager will coordinate all third-party site surveying needs and will coordinate CQA testing to identify the appropriate timing and locations of CQA testing in light of the required frequency, the locations of recently constructed areas, and CQC compaction tests. A qualified

individual will periodically perform CQA tests for field compaction. It is estimated that the CQA tests for embankment-fill compaction will be performed at a rate of at least 10 percent of the CQC tests. CQA compaction tests will be sufficiently distributed, both horizontally and vertically, to be representative of density conditions throughout a given fill area and to thus verify the findings of CQC compaction testing. Quality assurance surveying may be performed, as necessary, to verify the accuracy of the surveying.

7.3.2 Verification Sampling and Testing of Earthwork and Materials

Submittals for materials (e.g., culverts, etc.) and testing results will be reviewed by the CQA Manager, Project Manager, and/or Design Engineer for compliance with specifications. If alternative materials, other than the specified material, do not meet the specifications, a revised submittal will be obtained to provide conformance with specifications.

7.3.3 Review of Material Submittals and CQC Data

Submittals for materials (e.g., silt fence, seed, fertilizer, etc.) used to construct the TCRA will be reviewed by the Project Manager and/or Design Engineer for compliance with specifications. If alternative materials, other than the specified material, do not meet the specifications, a revised submittal will be obtained to provide conformance with specifications.

7.4 Engineering Change Orders

Engineering Change Orders will be developed and submitted to EPA (and the State) for review when a necessary change to the final design is identified. EPA will review the ECO and provide comments, if appropriate. If the ECO does not contain significant design changes, as determined by EPA, TABR will develop a final ECO, which will address EPA comments as appropriate. If the ECO contains significant design changes, as determined by EPA, TABR will submit a final ECO addressing EPA's comments, if appropriate, and wait for EPA approval and signature before effecting changes detailed in the ECO.

8.0 REFERENCES CITED

- EPA, 2003. Superfund Lead-Contaminated Residential Sites Handbook. OSWER 9285.7-50. August.
- Formation, 2021. 2020 Removal Design Work Plan – Illinois Gulch Site Time-Critical Removal Action, Summit County, Colorado. Prepared for TABR Realty Services, LLC. Prepared by Formation Environmental, LLC. January 7.
- Lovering, 1934. Geology and Ore Deposits of the Breckenridge Mining District, Colorado. U.S. Geological Survey Professional Paper 176.
- Mountain States Historical, 2004. Mining the Golden Horseshoe – An Inventory of Select Historic Sites Around Breckenridge, Summit County, Colorado. Prepared for the Town of Breckenridge. November.
- Paleowest, 2020. Puzzle Mine Documentation Project, Summit County, Colorado. Paleowest Technical Report 20-524. Submitted to TABR Realty Services, LLC. September 25.
- Runkel, R.L., 2017. Hydrologic & Geochemical Investigation of Illinois Gulch/Iron springs, Breckenridge, CO. Powerpoint presentation at EPA public meeting. June 29.
- Runkel, R.L., P.L. Verplanck, R.B. McClesky, K. Walton-Day, and P. Byrne 2019. Synoptic Sampling Data from Illinois Gulch and Iron Springs Near Breckenridge, Colorado, August 2016 and September 2017. U.S. Geological Survey Data Release. December 2. https://urldefense.proofpoint.com/v2/url?u=https-3A__doi.org_10.5066_P9VNIGJZ&d=DwlCAg&c=euGZstcaTDIlvimEN8b7jXrwqOf-v5A_CdpqnVfiiMM&r=ik_YiY1WSFgs6yuojUc6uiOFXe-t2jGpx9MJWUqoM8s&m=wx faj6hLivPIMu-TJmQ4dr-ifmcCwNwnnOnz3fBl1SM&s=kqzYbqpMomiZ9GqisA7x26jdIZRL-3YTmABn1I9wFGo&e=
- Weston, 2017. Combined Assessment for Site Inspection/Removal Assessment at Illinois Gulch, Breckenridge, Summit County, Colorado. Prepared for U.S. EPA Region 8 by Weston Solutions, Inc. – Region 8 Superfund Technical Assessment and Response Team. March.

FIGURES

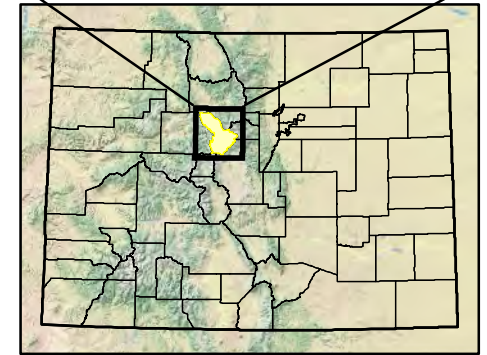
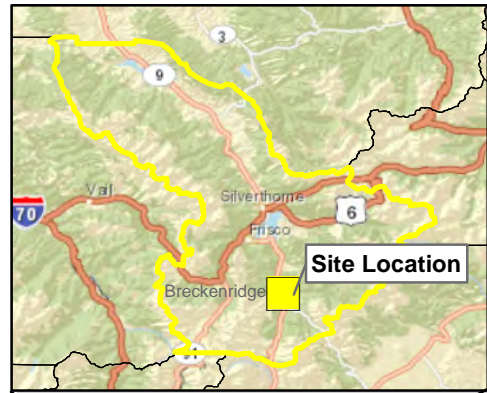


Data Sources:
Parcels - Digitized by FE from Summit County parcel viewer
<http://maps.co.summit.co.us/ArcMap1/viewer.htm>
Aerial photo: 2011 NAIP

Legend

- Adit Location
- Major Roads
- Local Roads
- Local Stream / Flow Direction
- Stream/Water Source
- Contour Interval = 50 feet
- TABR Parcels
- Other Parcels

Site Location In Summit County, Colorado



0 100 200 400 600 800 Feet

TABR REALTY SERVICES LLC

ILLINOIS GULCH SITE, SUMMIT COUNTY, CO

FIGURE 1

SITE LOCATION

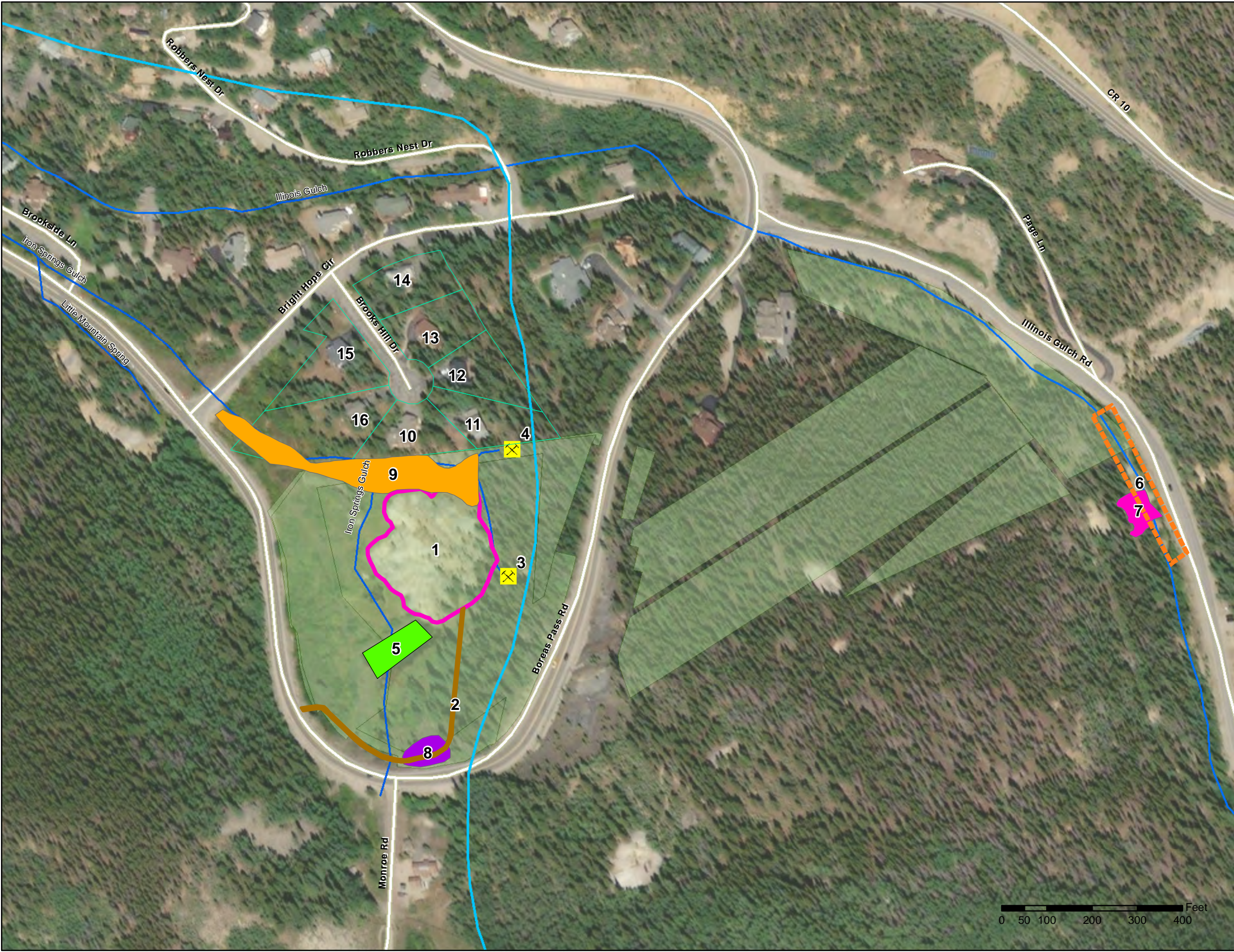
DATE: OCT 19, 2020

BY: CRL

FOR: BGH

FORMATION

ENVIRONMENTAL



Legend

- 1. Willard Waste Rock Pile
- 2. New Access Road (Location and configuration subject to revision)
- 3. Willard 1 Adit Discharge
- 4. Willard 2 Adit Discharge
- 5. Existing Pond
- 6. Illinois Gulch Adjacent to Puzzle Extension Shaft
- 7. Puzzle Extension Shaft and Waste Pile
- 8. Cally Adit Waste Rock Pile
- 9. Wet Area Affected by Orange Precipitate
- 10-16 Residential Properties to be Sampled
- Gold Run Ditch (From USGS 1908 24K Topo Map)
- Rivers / Streams
- TABR Parcels



TABR REALTY SERVICES, LLC

ILLINOIS GULCH SITE, SUMMIT COUNTY, CO

FIGURE 2

SITE FEATURES

DATE: OCT 20, 2020

BY: DKG

FOR: BGH

FORMATION

ENVIRONMENTAL



Legend

- Adit Location
- Mine Workings (approximate location)
- Major Roads
- Local Roads
- Local Stream / Flow Direction
- Rivers / Streams
- Contour Interval = 50 feet
- TABR Parcels

Extent of mine workings taken from:
 Lovering, T.S., Geology and Ore Deposits of the Breckenridge Mining District, Colorado. United States Geological Survey, Professional Paper 176, 1934.

0 65 130 260 390 520 Feet

TABR REALTY SERVICES, LLC
 ILLINOIS GULCH SITE, SUMMIT COUNTY, CO

FIGURE 3

LOCATION OF MINE WORKINGS

DATE: OCT 19, 2020	FORMATION ENVIRONMENTAL
BY: DKG FOR: BGH	

APPENDIX A

**APPLICABLE AND/OR RELEVANT AND
APPROPRIATE REQUIREMENTS (ARARS)**

APPENDIX A
Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)
Illinois Gulch Time Critical Removal Action – Phase I and II

	Citation	ARAR Determination	Relevant Action	Description	Comment	Chemical- Specific	Location- Specific	Action- Specific
Federal ARARs								
1	National Historic Preservation Act (NHPA) and Implementing Regulations 16 United States Code (U.S.C.) § 470; 36 CFR Part 800	Applicable	Closure of the Willard waste rock pile through the creation of an onsite mine waste repository; lining of the Illinois Gulch channel adjacent to the Puzzle Extension Shaft; removal of accessible portions of the Cally adit waste rock pile; dewatering and clean out wet areas impacted by the Willard #1 and Willard #2 adit discharges; and removal of the Puzzle Extension Shaft waste rock pile and plug the Puzzle Extension Shaft.	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any historic property, such as district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). Historic properties are referred to as cultural resources.	A cultural resource survey was completed for the Iron Springs Mill in 2004 and re-evaluated in 2020. Only one resource: the Gold Run Ditch, on the eastern portion of the Iron Springs Millsite, was determined to be potentially eligible for inclusion on the National Register of Historic Places. Therefore, if this resource cannot be avoided during construction of the remedy, additional survey work or a mitigation plan may be needed to ensure compliance with the NHPA.			✓

	Citation	ARAR Determination	Relevant Action	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
State ARARs								
1	Colorado Mined Land Reclamation Board Regulations ("MLRB Regulations"), Reclamation Performance Standards, 2 C.C.R. 407-1, Rule 1.1 (definitions) and Rule 3 (Reclamation Performance Standards), pursuant to the Colorado Mined Land Reclamation Act, C.R.S. § 34-32-101 <i>et seq.</i>	Relevant and Appropriate	Consolidation of solid waste resulting from construction activities including: closure of the Willard waste rock pile through the creation of an onsite mine waste repository; removal of accessible portions of the Cally adit waste rock pile; dewatering and clean out wet areas impacted by the Willard #1 and Willard #2 adit discharges; and removal of the Puzzle Extension Shaft waste rock pile.	The MLRB Regulations require reclamation of permitted mined lands, defined as "employment of procedures reasonably designed to minimize as much as practicable the disruption from mining operations and to provide for the establishment of plant cover, stabilization of soil, the protection of water resources, or other measures appropriate to the subsequent beneficial use of such affected lands."				✓
2	MLRB Regulations Rule 3.1.5(2)	Relevant and Appropriate	Closure and stabilization of the Willard waste rock pile as necessary to prevent future mine discharge onto waste pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Consolidation of solid waste resulting from on-site construction activities shall ensure adequate compaction for stability and prevent leaching of toxic or acid forming materials				✓
3	MLRB Regulations Rule 3.1.5(1), (3), (7)	Relevant and Appropriate	Repairing and grading areas as necessary to prevent future mine discharge onto the closed Willard waste rock pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Any grading shall be done in a manner to control erosion and siltation and protect from slides and other damage. High walls shall be stabilized or eliminated. Grading shall create a final topography appropriate to the future land use. Slopes and slope combinations shall be compatible with the configuration of surrounding conditions and future land use.				✓

	Citation	ARAR Determination	Relevant Action	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
4	Colorado Discharge Permit System (CDPS) Regulations, 5 CCR 1002-61.3(2)(a) and (f)(ii), and CDPS general permit No. COR0300000 (Stormwater discharges associated with construction activity), pursuant to CRS § 25-8-501	Applicable or Relevant and Appropriate. See Comment for guidance.	Closure and stabilization of the Willard waste rock pile as necessary to prevent future mine discharge onto waste pile; Stabilizing waste pile, run-on controls, grading, etc., as necessary to minimize run-on and erosion of the waste pile.	Requires implementing management controls through defined “general limitations” and “best management practices” for stormwater pollution prevention pursuant to Colorado Discharge Permit System general permit COR0300000. The substantive provisions of this permit apply to stormwater discharges from small construction activities, including clearing, grading, and excavating, that result in land disturbance of equal to or greater than one acre and less than five acres.	If greater than 1 acre but less than 5 acres are disturbed from the response action, the substantive requirements of this permit are applicable to the response action pursuant to 5 CCR 1002-61.3(2)(a) and (f)(ii). If less than 1 acre is disturbed from the response action, the substantive requirements of this permit are relevant and appropriate.			✓
5	Colorado Fugitive Dust Control Plan/Opacity, Regulation No. 1., 5 CCR 1001-3(D)(2)(c), pursuant to Colorado Air Pollution Prevention and Control Act	Applicable	Conducting an activity that generates dust.	Requires use of feasible control measures to manage fugitive emissions from construction activities.				✓
6	Colorado Wildlife Enforcement and Penalties Act, CRS § 33-6-128	Applicable	Performing response activities in relevant wildlife habitat.	Prohibits willfully damaging or destroying any wildlife den or nest, or their eggs, or harassing any wildlife. “Harass” means to unlawfully endanger, worry, impede, annoy, pursue, disturb, molest, rally, concentrate, harry, chase, drive, herd, or torment wildlife. See CRS § 33-1-102(24) (Definitions).			✓	✓

	Citation	ARAR Determination	Relevant Action	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
7	Colorado Noxious Weed Act and Summit County Noxious Weed regulations, CRS § 35-5.5-101-119; 8 CCR 1206-2	Applicable	Performing response activities in an area with noxious weeds or where noxious weeds could develop.	Must use integrated methods established by the Summit County Commissioners to manage noxious weeds.			✓	
8	Colorado Noise Abatement Statute, CRS § 25-12-103	Relevant and Appropriate	Location of response activities is within a designated land use zone subject to noise regulation.	Requires compliance with maximum permissible noise levels for particular time periods and land use zones.			✓	✓
9	Colorado Environmental Covenants Statute, CRS § 25-15-317 <i>et seq.</i>	Applicable	Performing response activities that will leave waste in place above standards for unrestricted use or incorporating engineered features or structures.	Requires environmental covenants (ECs) or notices of environmental use restrictions (RNs) for environmental remediation projects resulting in: residual contamination at levels that have been determined to be safe for one or more specific uses, but not all uses; or incorporation of engineered features or structures requiring monitoring, maintenance, or operation, or that will not function as intended if disturbed.			✓	

APPENDIX B

**DESIGN DRAWINGS AND TECHNICAL
SPECIFICATIONS**

WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2
FOR
ILLINOIS GULCH
REMOVAL ACTION
SUMMIT COUNTY, COLORADO

BEING A PORTION OF LAND LOCATED IN SECTION 5, TOWNSHIP 7
SOUTH, RANGE 77 WEST OF THE 6TH P.M., COUNTY OF SUMMIT,
STATE OF COLORADO

GENERAL NOTES

- ALL WORK SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES.
- ALL CONTRACTORS UTILIZING THESE PLANS ARE CAUTIONED TO COMPLY WITH THE REQUIREMENTS OF COLORADO CODE TITLE 9, ARTICLE 1.5, AS AMENDED, CONCERNING THE PROTECTION OF EXISTING UNDERGROUND FACILITIES FROM DAMAGE DUE TO EXCAVATIONS. THE LOCATION OF EXISTING UTILITIES AND FACILITIES ARE SHOWN BASED ON INFORMATION AVAILABLE, AND COMPLETENESS IS NOT GUARANTEED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO STARTING WORK. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER AT 811 2 DAYS IN ADVANCE OF STARTING WORK, AS REQUIRED BY COLORADO CODE.
- CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL UTILITIES AND FACILITIES PRIOR TO STARTING WORK. HAND EXCAVATION MAY BE REQUIRED. WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARDS OF THE UTILITY COMPANIES WHOSE FACILITIES ARE IN THE PROXIMITY OF THE WORK.
- CONTRACTOR SHALL VERIFY EXISTING CONDITIONS INCLUDING ALL DIMENSIONS AND INVERTS PRIOR TO THE START OF THE WORK. CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY VARIATIONS BETWEEN THESE PLANS AND THE ACTUAL FIELD CONDITIONS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR TO ANY EXISTING IMPROVEMENTS DISTURBED OR DAMAGED BY CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL MAINTAIN AND PROTECT VEHICULAR AND PEDESTRIAN TRAFFIC IN PROXIMITY OF THE WORK.
- CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND SUBMITTAL APPROVALS PRIOR TO THE BEGINNING OF WORK.
- ALL UTILITY DESIGN LOCATIONS REFER TO CENTERLINE OF UTILITY, UNLESS OTHERWISE NOTED ON THE PLANS.

EXISTING CONDITIONS SURVEY NOTES

- THE EXISTING CONDITIONS SHOWN ON THESE PLANS ARE BASED ON A TOPOGRAPHIC SURVEY PREPARED BY OTHERS AND PROVIDED TO THE SANITAS GROUP IN CAD FORMAT BY FORMATION ENVIRONMENTAL. SUPPLEMENTAL TOPOGRAPHIC DATA BASED ON GIS DATA SETS WERE PROVIDED AND INCORPORATED INTO THE PROJECT DATA SET.
- THE DISTANCE MEASUREMENTS SHOWN HEREON ARE THE U.S. SURVEY FOOT.
- ONLY SURFACE EVIDENCE OF UTILITIES VISIBLE AT THE TIME OF THE SURVEY ARE SHOWN HEREON. ANY UNDERGROUND UTILITIES MUST BE FIELD LOCATED BY THE APPROPRIATE AGENCY PRIOR TO ANY EXCAVATION, PURSUANT TO SEC. 9-1.5-103 C.R.S.

INSPECTION & TESTING NOTES

- SEE PROJECT NARRATIVE INCLUDED WITH THE OVERALL PROJECT DOCUMENT PACKAGE FOR DETAILS REGARDING REQUIRED TESTING AND INSPECTIONS.

TRAFFIC CONTROL

- UNDER NO CIRCUMSTANCES SHOULD THESE PLANS BE CONSIDERED TRAFFIC CONTROL PLANS AND ARE NOT INTENDED TO ADDRESS MAINTENANCE AND PROTECTION OF VEHICULAR AND PEDESTRIAN TRAFFIC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE TRAFFIC CONTROL PLANS FOR REGULATORY AUTHORITY REVIEW AND APPROVAL PRIOR TO WORKING WITHIN THE ROADWAY/TRAVELED WAY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND PROTECTION OF VEHICULAR AND PEDESTRIAN TRAFFIC. ALL TRAFFIC CONTROL MEASURES SHALL BE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.

PREPARED FOR:
FORMATION
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BOULDER, CO 80301

CONTACT: BRIAN HANSEN
303.396.0734

PREPARED BY:

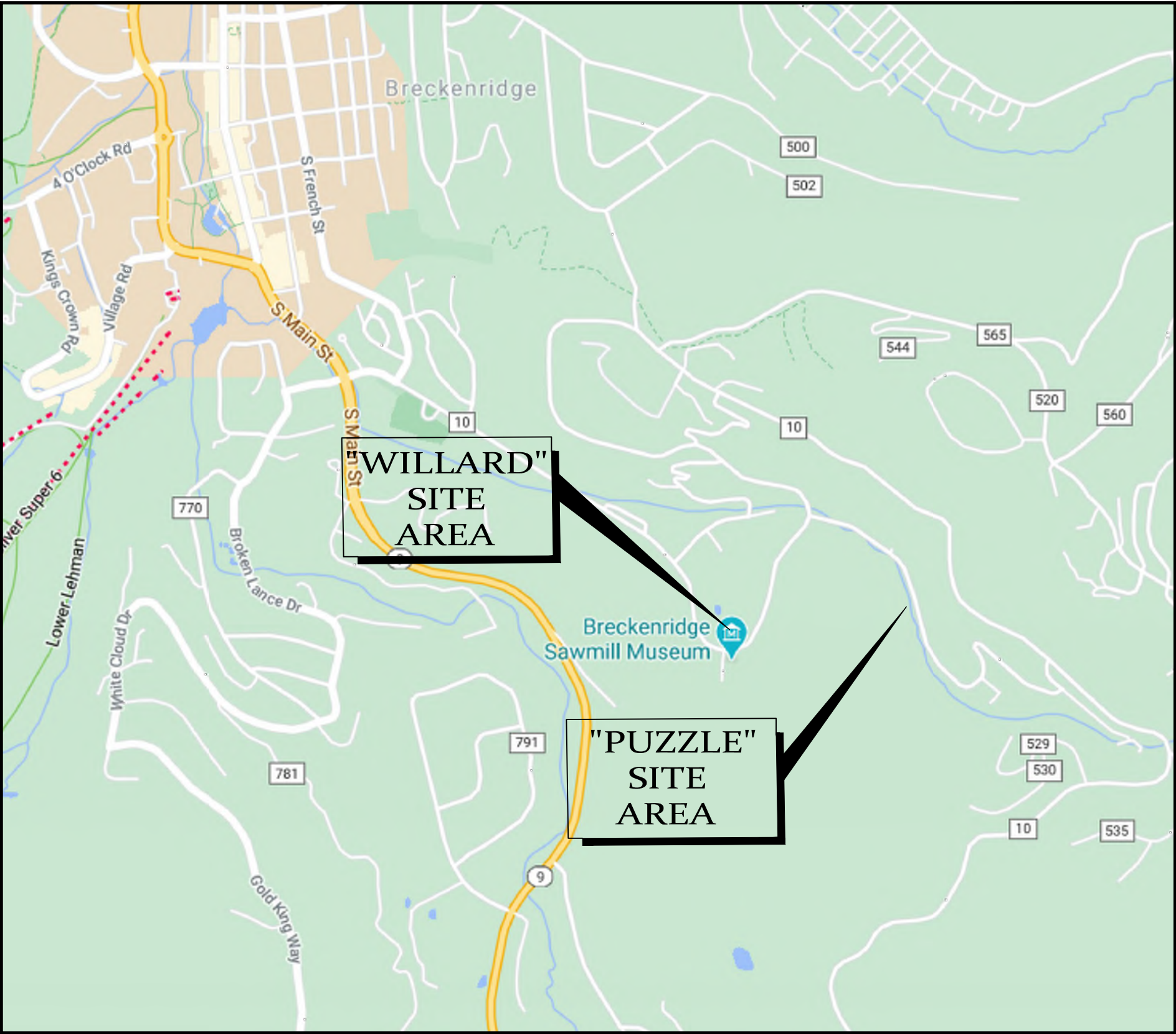


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801 MAIN STREET
LOUISVILLE, CO 80027
720.346.1656

CONTACT: Curtis C. Stevens, P.E.

VERTICAL BENCHMARK

VERTICAL DATA (TOPOGRAPHY) SHOWN ON THESE
PLANS ARE BASED ON THE NAVD 88 VERTICAL DATUM.



LOCATION MAP
N.T.S.

CIVIL SHEET INDEX	
Sheet Number	Sheet Title
C1.0	CIVIL COVER SHEET
C1.1	CIVIL NOTES & SPECIFICATIONS
C2.0	OVERALL ACCESS PLAN
C2.1	ACCESS DETAILS - INITIAL PHASE
C2.2	ACCESS DETAILS - FINAL PHASE
C3.0	FILL SITE GRADING PLAN
C3.1	SEDIMENT POND SECTION 1
C3.2	SEDIMENT POND SECTION 2
C4.0	CREEK LINING PLAN & PROFILE
C5.0	CIVIL DETAILS (1 OF 3)
C5.1	CIVIL DETAILS (2 OF 3)
C5.2	CIVIL DETAILS (3 OF 3)
C5.3	CIVIL DETAILS (4 OF 4)
C6.0	STORMWATER MANAGEMENT NOTES AND LEGEND
C6.1	INITIAL STORMWATER MANAGEMENT PLAN
C6.2	INTERIM STORMWATER MANAGEMENT PLAN
C6.3	FINAL STORMWATER MANAGEMENT PLAN
C6.4	STORMWATER MANAGEMENT PLAN STANDARD DETAILS (1 of 2)
C6.5	STORMWATER MANAGEMENT PLAN STANDARD DETAILS (2 of 2)

PREPARED BY:



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Group

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CURTIS C. STEVENS, P.E.

PREPARED FOR:

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2500 55TH STREET, SUITE 200
BOULDER, CO 80301

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WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

ILLINOIS GULCH
REMOVAL ACTION
SUMMIT COUNTY
STATE OF COLORADO

ISSUE DATE

CLIENT REVIEW 3/15/2021
EPA REVIEW 3/29/2021

DESIGNED BY: CCS
DRAWN BY: TSG
CHECKED BY: CCS

DRAWING SCALE:
HORIZONTAL: NONE
VERTICAL: NONE

COVER SHEET

PROJECT NO. B1333

C1.0

SHEET: 1 OF 19



Know what's below.
Call before you dig.

GRADING NOTES

- ALL CONTRACTORS UTILIZING THESE PLANS ARE CAUTIONED TO COMPLY WITH THE REQUIREMENTS OF COLORADO CODE TITLE 9, ARTICLE 1.5, AS AMENDED, CONCERNING THE PROTECTION OF EXISTING UNDERGROUND FACILITIES FROM DAMAGE DUE TO EXCAVATIONS. THE LOCATION OF EXISTING UTILITIES AND FACILITIES ARE SHOWN BASED ON INFORMATION AVAILABLE, AND COMPLETENESS IS NOT GUARANTEED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO STARTING WORK. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER AT 811 TWO DAYS IN ADVANCE OF STARTING WORK, AS REQUIRED BY COLORADO CODE.
- CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL UTILITIES AND FACILITIES PRIOR TO STARTING WORK. HAND EXCAVATION MAY BE REQUIRED. WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARDS OF THE UTILITY COMPANIES WHOSE FACILITIES ARE IN THE PROXIMITY OF THE WORK.
- CONTRACTOR SHALL VERIFY EXISTING CONDITIONS INCLUDING ALL DIMENSIONS AND INVERTS PRIOR TO THE START OF THE WORK. CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY VARIATIONS BETWEEN THESE PLANS AND THE ACTUAL FIELD CONDITIONS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR TO ANY EXISTING IMPROVEMENTS DISTURBED OR DAMAGED BY CONSTRUCTION ACTIVITIES.
- COORDINATES REFER TO CENTERLINE OF UTILITY, UNLESS OTHERWISE NOTED ON THE PLANS.
- ALL PROPOSED CONTOURS ARE TO TOP OF FINISHED PAVING AND LANDSCAPED AREAS UNLESS OTHERWISE NOTED.
- ADD 9800 TO ALL PROPOSED SPOT ELEVATIONS TO REACH PROJECT VERTICAL DATUM.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND PROVIDE FOR ADEQUATE DRAINAGE THROUGH THE SITE DURING THE PROCESS OF EXCAVATION, GRADING AND EMBANKMENT. THE GRADE SHALL BE MAINTAINED IN SUCH CONDITION THAT IT IS WELL DRAINED AT ALL TIMES.
- LANDSCAPE SLOPES SHALL BE 2% OR GREATER AND SHALL NOT EXCEED 2:1 (H:V) UNLESS OTHERWISE NOTED ON THESE PLANS AND APPROVED BY THE DESIGN ENGINEER.
- MATCH EXISTING GRADES AT LIMITS OF CONSTRUCTION.

DEMOLITION AND RESTORATION NOTES

- THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS IN A LAWFUL MANNER.
- MATERIAL OR DEBRIS SHALL NOT BE DISPOSED WITHIN THE PROJECT LIMITS UNLESS WRITTEN PERMISSION IS GRANTED BY THE PROPERTY OWNER. THE MANNER OF DISPOSAL WITHIN THE PROJECT LIMITS SHALL BE APPROVED BY A GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF COLORADO.
- CONTRACTOR SHALL PRESERVE AND PROTECT FROM DAMAGE PRIVATE AND PUBLIC PROPERTY.
- CONTRACTOR SHALL PROTECT FROM FROM DAMAGE ALL EXISTING TREES, INCLUDING THE ROOT STRUCTURE. ANY TREES TO BE REMOVED SHALL BE IDENTIFIED IN THE FIELD AND CONFIRMED WITH THE OWNER OR OWNER'S REPRESENTATIVE PRIOR TO REMOVAL.
- WHERE NEW CONSTRUCTION TIES INTO EXISTING CONCRETE OR ASPHALT IMPROVEMENTS, CONTRACTOR SHALL SAW CUT THE EXISTING IMPROVEMENTS TO A TRUE LINE, WITH A VERTICAL FACE AND TO MINIMUM DEPTH OF 2-INCHES OR TO THE DEPTH OF THE REINFORCING STEEL, WHICHEVER OCCURS FIRST. IF THE EDGE IS DAMAGED DURING CONSTRUCTION, IT SHALL BE RE-CUT PRIOR TO CONSTRUCTING THE NEW IMPROVEMENTS. CONCRETE SHALL BE CUT AT THE NEAREST JOINT BEYOND THE DESIGNATED SAW CUT SHOWN ON THESE PLANS.
- CONTRACTOR SHALL RESTORE DAMAGED OR INJURED PROPERTY, AT THE CONTRACTOR'S EXPENSE, TO A CONDITION SIMILAR OR EQUAL TO THAT EXISTING BEFORE THE DAMAGE OR INJURY OCCURRED, BY REPAIRING, REBUILDING OR RESTORING THE PROPERTY.
- THE CONTRACTOR SHALL RESTORE ANY EXISTING VEGETATION AND/OR SURFACE IMPROVEMENTS BEYOND THE PROJECT LIMITS DISTURBED OR DAMAGED DURING CONSTRUCTION.

SEDIMENT POND LINER REQUIREMENTS

- THE PROPOSED SEDIMENT POND SHALL BE LINED WITH A HDPE MEMBRANE LINER TO PREVENT INFILTRATION OF WATER INTO THE WASTE ROCK PILE. THE LINER SHALL MEET THE FOLLOWING SPECIFICATIONS:
 - MATERIAL SHALL BE SOLIMAX 90 MIL HIGH DENSITY POLY ETHYLENE (HDPE), BLACK, TOP SINGLE SIDED TEXTURED (OR PRE-APPROVED EQUAL).
 - MINIMUM NOMINAL THICKNESS: 60 MILS
 - MINIMUM TENSILE PROPERTIES:
 - STRENGTH AT YIELD: 132 PPI
 - ELONGATION AT YIELD: 15%
 - STRENGTH AT BREAK: 132 PPI
 - ELONGATION AT BREAK: 150%
 - MINIMUM TEAR RESISTANCE: 45 LBF
 - MINIMUM PUNCTURE RESISTANCE: 120 LBF
- POND LINER SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS WITH ALL SEAMS WELDED, BEING AT A MINIMUM MEETING THE GUIDELINES SET FORTH IN THE NILEX HDPE INSTALLATION MANUAL (OR PRE-APPROVED EQUAL SPECIFICATIONS DOCUMENT).
- LINER TERMINATIONS SHALL BE ANCHORED VIA THE ANCHOR TRENCH METHOD IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. SEE TYPICAL SECTION SHEET C5.3.
- ALL PIPE AND STRUCTURE PENETRATIONS SHALL BE SEALED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
- TESTING OF THE POND LINER INSTALLATION SHALL BE ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, BEING AT A MINIMUM THE GUIDELINES SET FORTH IN THE NILEX HDPE INSTALLATION MANUAL (OR PRE-APPROVED EQUAL SPECIFICATIONS DOCUMENT).
- THE BOTTOM OF THE LINER SHALL BE CUSHIONED WITH A PROTECTION LAYER CONSISTING OF A MINIMUM 10 OZ. NON-WOVEN GEOTEXTILE BETWEEN THE SOIL AND THE MEMBRANE.
- THE TOP BANK OF THE POND LINER SHALL BE PROTECTED WITH THE PLACEMENT OF A SACRIFICIAL SKIRT OF 40 MIL LDPE OR OTHER PREVIOUSLY APPROVED PRODUCT FROM THE ANCHOR TRENCH TO A MIN. DEPTH OF 18" BELOW THE STANDARD WATER SURFACE ELEVATION (WSEL-9826.0'). SKIRT SHALL BE EXTRUSION WELDED TO THE PRIMARY HDPE MEMBRANE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- THE POND LINER INSTALLATION SHALL BE WARRANTED FOR A MINIMUM PERIOD OF 2 YEARS BY THE INSTALLER COMMENCING WITH THE DATE OF FINAL ACCEPTANCE.
- THE LINER MEMBRANE SHALL BE WARRANTED BY THE MANUFACTURER AGAINST MANUFACTURING DEFECTS FOR A PERIOD OF 20-YEARS FROM THE DATE OF FINAL ACCEPTANCE. MANUFACTURER SHALL FURNISH THE OWNER WITH A WRITTEN WARRANTY.

PUZZLE EXTENSION SHAFT CLOSURE NOTES:

MONOLITHIC PLUG CLOSURE SPECIFICATIONS PROVIDED ON THIS SHEET ARE PER THE COLORADO DEPARTMENT OF NATURAL RESOURCES DIVISION OF MINING, RECLAMATION, AND SAFETY INACTIVE MINE RECLAMATION PROGRAM "GENERAL BID SPECIFICATIONS" DOCUMENT DATED MARCH 2009. THIS SPECIFICATION IS PROVIDED FOR REFERENCE AND ALL ASSOCIATED WORK SHALL BE COORDINATED CLOSELY WITH THE COLORADO DIVISION OF RECLAMATION, MINING, AND SAFETY (DRMS).

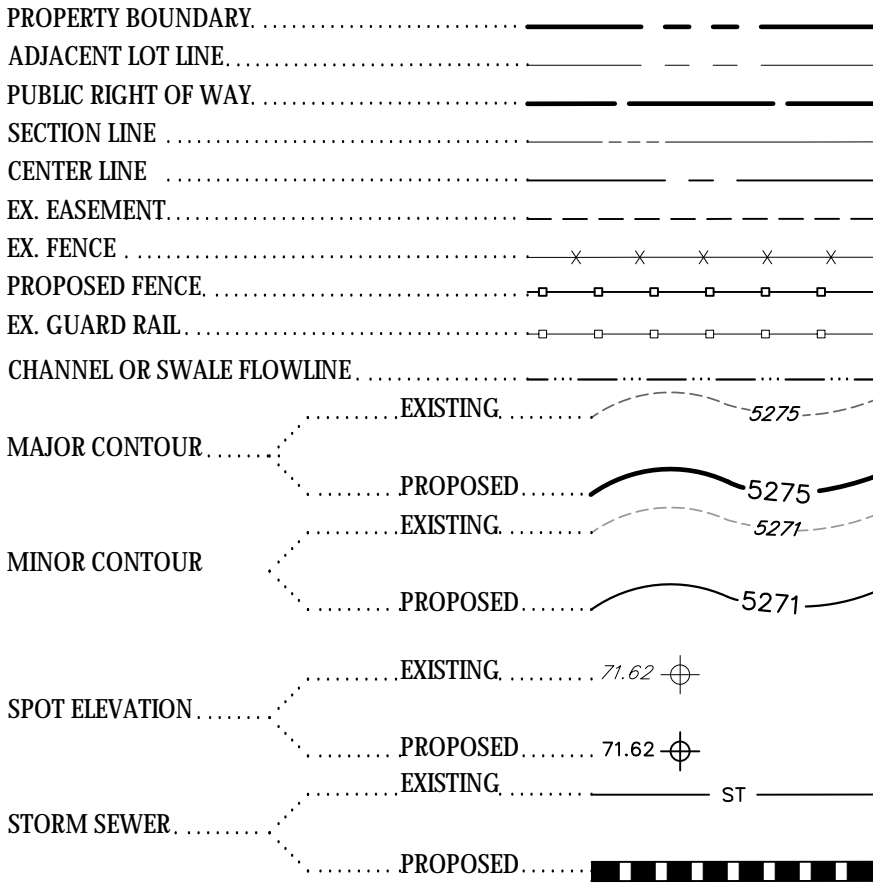
STORM SEWER NOTES:

- HDPE STORM SEWER PIPE LOCATED ON ILLINOIS GULCH SHALL BE ADS N-12 DUAL WALL PIPE OR APPROVED EQUAL MEETING AASHTO M252/ASTMF2306 WITH SMOOTH INTERIOR (MANNING'S VALUE OF 0.012). JOINTS SHALL BE WATERTIGHT MEETING ASTM D3212.
- STORM CULVERTS TO BE LOCATED UNDER PROPOSED ACCESS DRIVE SHALL AT A MINIMUM BE CORRUGATED METAL PIPE (CMP) AKA CORRUGATED STEEL PIPE MEETING AASHTO M218/ASTM A929 AND SHALL BE MANUFACTURED PER AASHTO M36/ASTMA760. COUPLING BANDS SHALL BE OF THE SAME MATERIAL AS THE PIPE AND SHALL BE MIN. 18- GAUGE.
- PROVIDE METAL FLARED END SECTIONS (F.E.S) AT ALL CMP CULVERT ENDS.
- STORM SEWER SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS FOR HIGHWAY LOADING.

STORM WATER MANAGEMENT NOTES

- THE CONTRACTOR SHALL COMPLY WITH THE SUBSTANTIVE REQUIREMENTS OF THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) CONSTRUCTION ACTIVITIES GENERAL PERMIT (CDPS PERMIT NO. C0R400000).
- ALL TEMPORARY EROSION CONTROL FACILITIES DESIGNATED AS INITIAL SHALL BE INSTALLED BEFORE ANY OTHER CONSTRUCTION ACTIVITIES TAKE PLACE. REFER TO SHEETS C6.0-C6.5 - STORM WATER MANAGEMENT PLANS AND DETAILS.
- PAVING AND LANDSCAPING SHALL BE COMPLETED AS SOON AS PRACTICAL TO CONTROL EROSION AND LIMIT SEDIMENT TRANSPORT.
- UNCONTAINED WASTE THAT MAY BLOW, WASH OR OTHERWISE BE RELEASED FROM THE SITE IS PROHIBITED.
- READY-MIXED CONCRETE, OR ANY MATERIALS RESULTING FROM THE CLEANING OF VEHICLES OR EQUIPMENT CONTAINING, USED IN TRANSPORTING OR APPLY READY-MIXED CONCRETE, SHALL BE CONTAINED ON THE SITE FOR PROPER DISPOSAL.
- ANY SEDIMENT TRACKED ONTO THE ADJACENT PARKING AREA OR PUBLIC ROADWAYS SHALL BE CLEANED AND REMOVED.
- SOIL STABILIZATION MEASURES (SEEDING, ETC) SHALL BE APPLIED WITHIN 30 DAYS TO DISTURBED AREAS THAT MAY NOT BE AT FINAL GRADE, BUT WILL REMAIN UNDISTURBED FOR 60 DAYS OR MORE.

LEGEND



ABBREVIATIONS

AC	ACRE
CL	CENTER LINE
CONC	CONCRETE
DIA	DIAMETER
DS	DOWNSPOUT
E	EASTING
ELEV	ELEVATION
EOC	EDGE OF CONCRETE
ESMT	EASEMENT
EX	EXISTING
FES	FLARED END SECTION
FL	FLOWLINE
HORIZ.	HORIZONTAL
HP	HIGH POINT
INV	INVERT
LF	LINEAR FOOT
LP	LOW POINT
MH	MANHOLE
N	NORTHING
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
PH1	PHASE 1 CONSTRUCTION
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
R.O.W.	RIGHT-OF-WAY
SAN	SANITARY
SHT	SHEET
STM	STORM
TBD	TO BE DETERMINED
TYP	TYPICAL
UTIL	UTILITY
WM	WATER METER

GENERAL EARTHWORK NOTES

- EARTHWORK ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE TO THE RECOMMENDATIONS SET FORTH BY THE PROJECT GEOTECHNICAL ENGINEER. OWNER WILL CONDUCT A GEOTECHNICAL ENGINEERING EVALUATION AT THE START OF THE PROJECT AND THE REPORT SHALL BE PROVIDED TO THE DESIGN ENGINEER AND CONTRACTOR.
- AT A MINIMUM, MATERIALS PLACED OR RELOCATED AT THE WASTE ROCK DEPOSITORY SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% AND WITHIN PLUS OR MINUS 2% OF OPTIMUM MOISTURE CONTENT PER THE MODIFIED PROCTOR TEST (ASTM D1557) OR AS DIRECTED BY THE PROJECT GEOTECHNICAL ENGINEER.
- SHOULD GROUNDWATER BE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES FOR THIS PROJECT, EXCAVATION DEWATERING IS THE RESPONSIBILITY OF THE CONTRACTOR.
- UNSUITABLE MATERIALS (MUCK) ENCOUNTERED IN THE SUBGRADE SHALL BE REMOVED TO THE DEPTH DIRECTED BY THE ENGINEER. THE EXCAVATED AREA SHALL BE BACKFILLED TO THE FINISHED GRADED SECTION WITH APPROVED MATERIAL. ALL UNSUITABLE MATERIAL SHALL BE PLACED IN THE WASTE ROCK DISPOSAL AREA OR DISPOSED OF IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, & FEDERAL REGULATIONS.
- ALL SITE BACKFILL PLACEMENT, COMPACTION, AND SUBGRADE PREPARATION SHALL BE DONE IN ACCORDANCE WITH SITE GEOTECHNICAL REPORT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH THE SITE GEOTECHNICAL REPORT AND COMPLY WITH ALL RECOMMENDATIONS.

DUST CONTROL PLAN

CONTROL OF FUGITIVE DUST EMISSIONS FROM AREAS OF ACTIVE CONSTRUCTION IS REQUIRED BY STATE REGULATIONS AND IS NECESSARY TO PROTECT THE HEALTH AND WELFARE OF NEARBY POPULATIONS. THE CONTRACTOR SHALL IMPLEMENT THE FOLLOWING MITIGATION MEASURES:

- PROVIDE MISTING WATER SPRAYS SUFFICIENT TO REDUCE AIRBORNE DUSTING FROM DEMOLITION AND/OR CONSTRUCTION EARTHWORK.
- APPLY ADDITIONAL WATER DUST SUPPRESSION APPLIED DURING DRY WEATHER.
- LIMIT DUST-GENERATING WORK ON HIGH WIND DAYS; AND
- APPLY DUST SUPPRESSANT MATERIALS ON EARTH STOCKPILES THAT WILL BE IN PLACE FOR MORE THAN 10 DAYS.

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Division of Mining, Reclamation, and Safety
Inactive Mine Reclamation Program

Section 7
MONOLITHIC PLUG CLOSURE

7.1 DESCRIPTION

This work shall consist of pouring a four feet (4') thick concrete cap over mine shafts that have collapsed at the collar and have no apparent opening. This work includes clearing and grubbing, excavation, furnishing and installing rockfill, furnishing and placing concrete, project signage, monumentation, erosion control, backfilling, and revegetating disturbed areas, according to these specifications.

7.2 RELATED WORK

Section 20 – Revegetation
Section 21 – Project Sign
Section 22 – Erosion Control

7.3 REFERENCE DOCUMENTS

ACI 301 – Specifications for Structural Concrete.
ACI 305 – Recommended Practice for Hot Weather Concreting.
ACI 306 – Recommended Practice for Cold Weather Concreting.
ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
ASTM C31 - Standard Specification for Making and Curing Concrete test Specimens in the Field.
ASTM C33 - Standard Specification for Concrete Aggregate.
ASTM C39 - Standard Test Method for Ready Mixed Concrete.
ASTM C94 - Standard Specification for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C150 - Standard Specification for Portland Cement.
ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
ASTM C1107 – Standard Specification for Non-Shrink Grout
CDOT Standard Specifications, 2005 – Section 601 – Structural Concrete.

7.4 MATERIALS

Cement shall be Type II Portland cement, conforming to ASTM C 150, unless otherwise approved by PROJECT MANAGER.
Fine and Coarse Aggregate shall conform to ASTM C 33.
Water shall be potable.
Admixtures shall conform to ASTM C 494; Calcium chloride will not be permitted.
Rockfill shall be hard and durable with a minimum diameter of twelve inches (12").
Monument Pipe shall be new, six foot (6') long, three inch (3") inside diameter Schedule 40 galvanized steel pipe.
Brass Cap will be furnished by OWNER. TABR & INSTALLED BY CONTRACTOR
Non-Shrink Grout shall be Moly Parabond, Pour Rock, or QUIKRETE.

Colorado Department of Natural Resources
Division of Mining, Reclamation, and Safety
Inactive Mine Reclamation Program

7.5 EXECUTION

7.5.1 Clearing and Grubbing

The work site shall be cleared and grubbed of vegetation, debris, loose rocks and other items which interfere with construction, except those items designated by PROJECT MANAGER to remain. All trash and debris shall be disposed of at a county approved disposal site, as approved by PROJECT MANAGER.

7.5.2 Excavation

In some cases, no excavation may be necessary since the shafts to be closed using this method have collapsed to dimensions larger than eight feet by twelve feet (8' x 12'). If the dimensions are smaller, the shaft shall be excavated to a cone shape so that the top dimensions of the plug are eight feet by twelve feet (8' X 12') or larger at the top of the plug. In all cases, unless otherwise directed by PROJECT MANAGER, the collapsed mine opening shall be excavated to expose bedrock on all sides.

7.5.3 Rockfill Installation

Prior to pouring concrete, two feet (2') of rockfill shall be placed in the bottom of the shaft depression. The rockfill shall be placed with a generally flat top such that no individual rock extends beyond two feet (2') above the lowermost portion of the rockfill.

7.5.4 Concrete Placement

The concrete shall be placed to a thickness of four feet (4'). The concrete may be mixed at the work site or delivered as "ready mix", at CONTRACTOR's option. If the concrete is mixed on site, equipment and mixing procedures shall conform to ACI 301, Chapter 7. If "ready mix" is used, it shall be mixed and transported in accordance with ASTM C 94. The concrete mix shall be designed to produce a minimum compressive strength of 4,500 psi at the 28 day test. If hot weather concreting is done, it shall conform to the requirements of ACI 305. If cold weather concreting is done, it shall conform to the requirements of ACI 306.

The concrete shall be thoroughly compacted by means of a suitable mechanical vibrator. Vibrating shall be supplemented with hand spading to work the concrete into the rockfill.

7.5.5 Field Quality Control

CONTRACTOR shall take sample specimens of the concrete in cylindrical containers in accordance with ASTM C 31 at the point of deposit as follows:

- One sampling, consisting of a minimum of four cylinders, shall be taken and paid for by CONTRACTOR.
- The samples shall be taken in accordance with ASTM C172.
- All three sample cylinders will be taken at the same time, one cylinder to be used for a seven day test and two for a 28 day test, the fourth for a fifty-six (56) day test if required by PROJECT MANAGER. The average of the twenty eight (28) day test result will be used for determining acceptance, the fifty six (56) day test may be used as a referee sample. These tests shall be performed at CONTRACTOR's expense in accordance with ASTM C39 by a materials testing laboratory of CONTRACTOR's choice which meets the approval of PROJECT MANAGER.
- PROJECT MANAGER may require additional random samples. Testing of any additional samples will be done at OWNER's expense.

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7.5.6 Monument

A new, three inch (3") I.D. (inside diameter) galvanized steel pipe shall be embedded in the concrete. The pipe shall be sufficient length to extend a minimum of one foot (1') into the concrete and two feet (2') above the final graded surface. A minimum one foot (1') diameter 3/8-inch thick galvanized steel plate shall be welded perpendicular to the bottom end of the pipe to act as an anchor in the concrete. CONTRACTOR shall grout the OWNER-provided brass cap flush to 1/4" below the top of the pipe, using a non-shrink grout such as Moly Parabond, QUIKRETE, or Pour Rock.

7.5.7 Backfill

The monolithic plug shall reach a minimum compressive strength of 3000 psi within seven (7) days before backfilling can occur. However, it will be CONTRACTOR'S responsibility to correct any closures when the concrete does not reach a minimum compressive strength of 4,500 psi at 28 days. The initial backfill may be composed of any adjacent material such as mine waste. The final backfill shall be comparable to adjacent surficial material. The backfill shall be mounded a minimum of one foot (1') above the surrounding area to insure positive drainage from the closure.

7.6 MEASUREMENT AND PAYMENT

CONTRACTOR shall supply PROJECT MANAGER with copies of receipts from concrete trucks or, if mixed on-site, shall supply copies of receipts to verify the quantities of concrete poured at each monolithic plug site. Payment will be based on the total number of cubic yards of concrete poured at all monolithic plug closure sites. The total of the lump sum bid prices for the monolithic plugs will be adjusted based upon the bid price for additional concrete. Payment shall constitute full compensation for all CONTRACTOR'S costs of whatever nature to provide a complete closure and to revegetate disturbed areas.

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ILLINOIS GULCH
REMOVAL ACTION
SUMMIT COUNTY
STATE OF COLORADO

WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

ISSUE	DATE
CLIENT REVIEW	3/15/2021
EPA REVIEW	3/29/2021
DESIGNED BY:	CCS
DRAWN BY:	TSG
CHECKED BY:	CCS

DRAWING SCALE:
HORIZONTAL: NONE
VERTICAL: NONE

CIVIL
NOTES &
SPECIFICATIONS

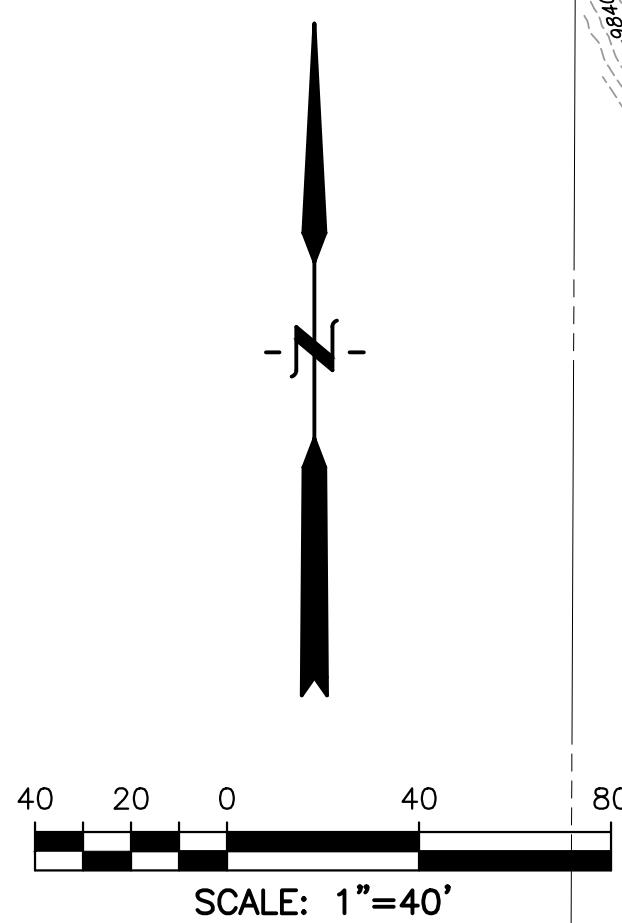
PROJECT NO. B1333

C1.1

SHEET: 2 OF 19

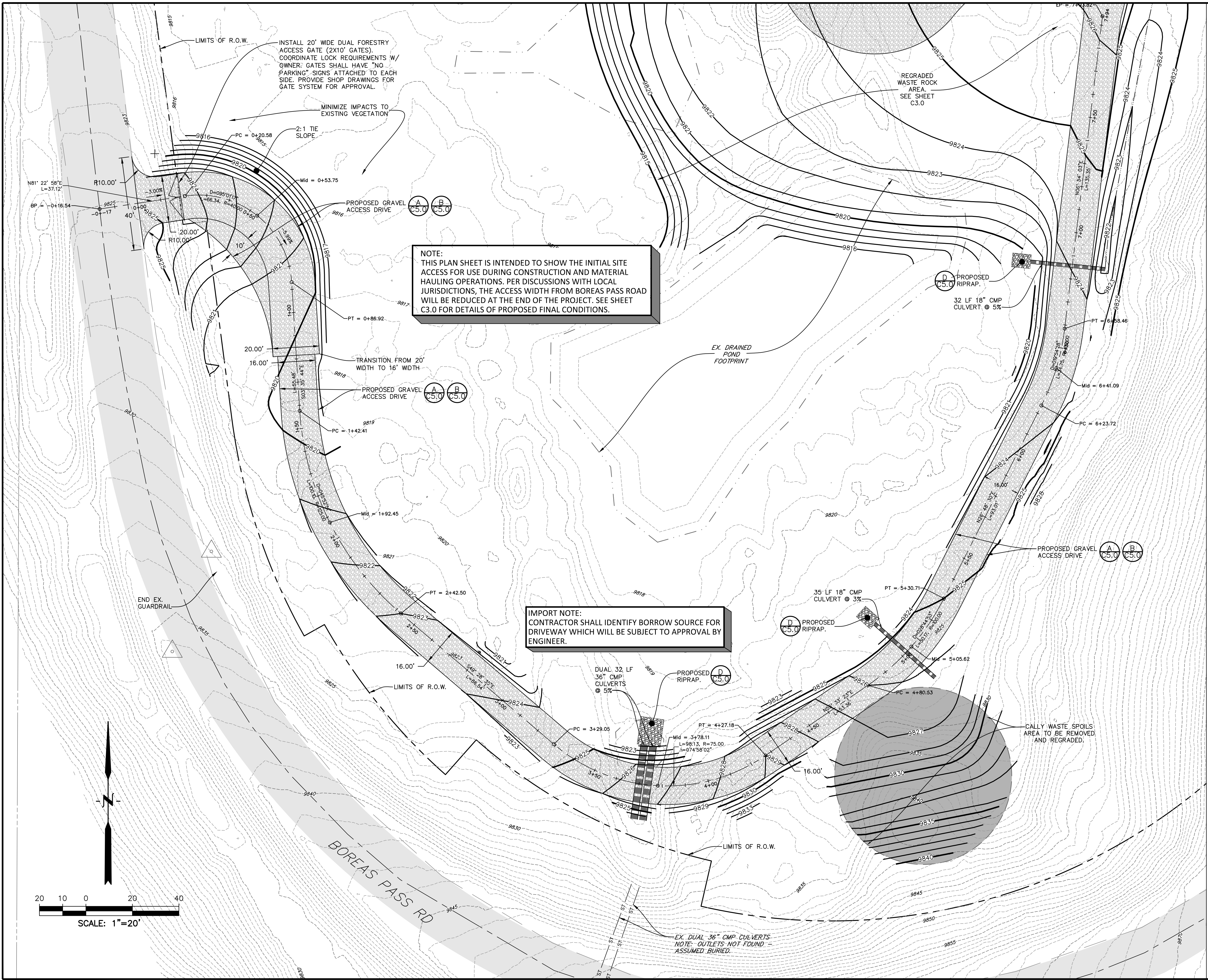


Know what's below.
Call before you dig.




SEE SHEET C3.0 FOR WILLARD WASTE ROCK PILE
IMPROVEMENTS AND MODIFICATION DETAILS.

SHEET: 3 OF 19



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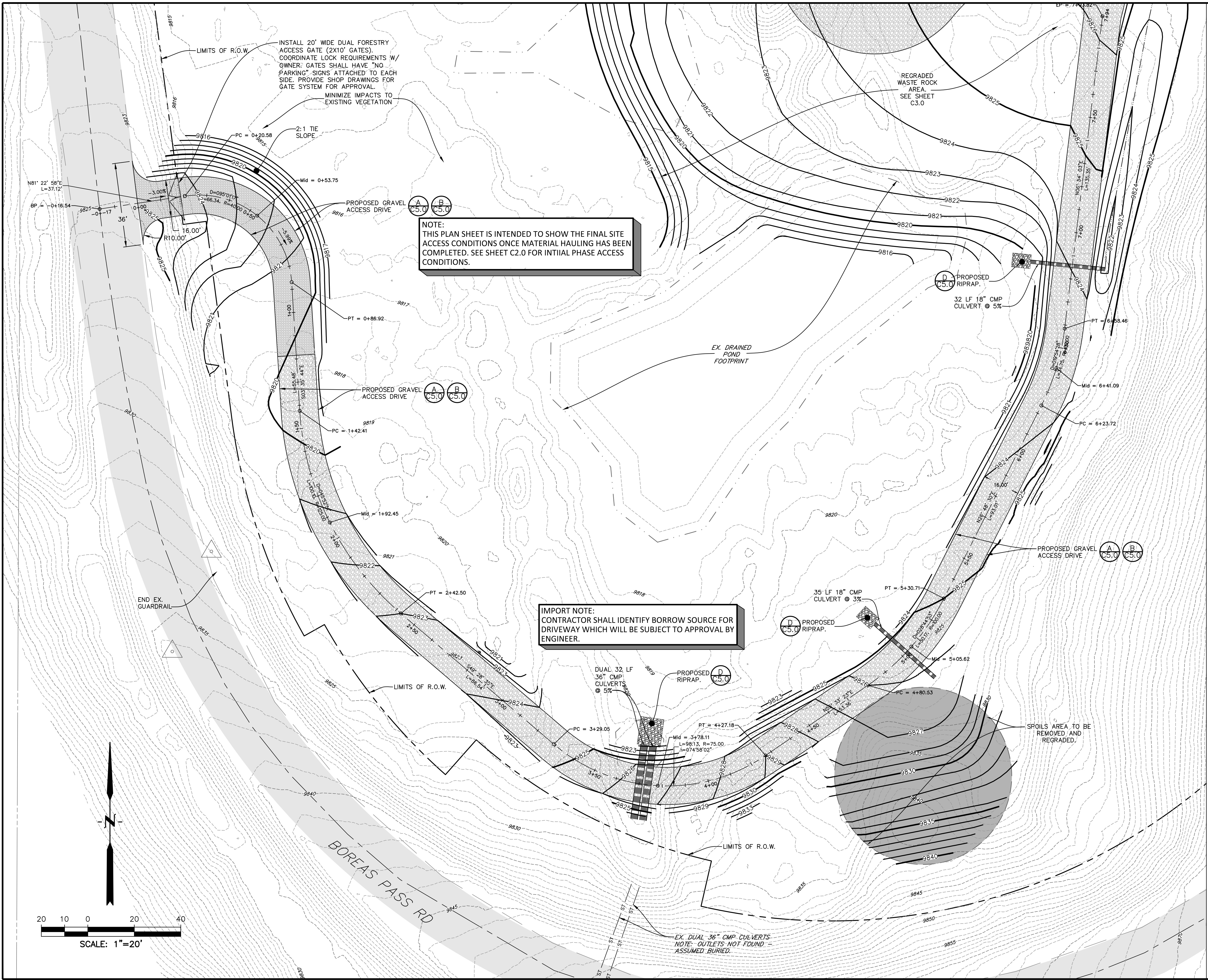
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WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

ILLINOIS GULCH REMOVAL ACTION
SUMMIT COUNTY
STATE OF COLORADO

ISSUE	DATE
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EPA REVIEW	3/29/2021
DESIGNED BY:	CCS
DRAWN BY:	TSG
CHECKED BY:	
DRAWING SCALE: HORIZONTAL: 1" = 20' VERTICAL: NONE	
WILLARD ACCESS DETAILS INITIAL PHASE	
PROJECT NO. B1333	
C2.1	
SHEET: 4 OF 19	



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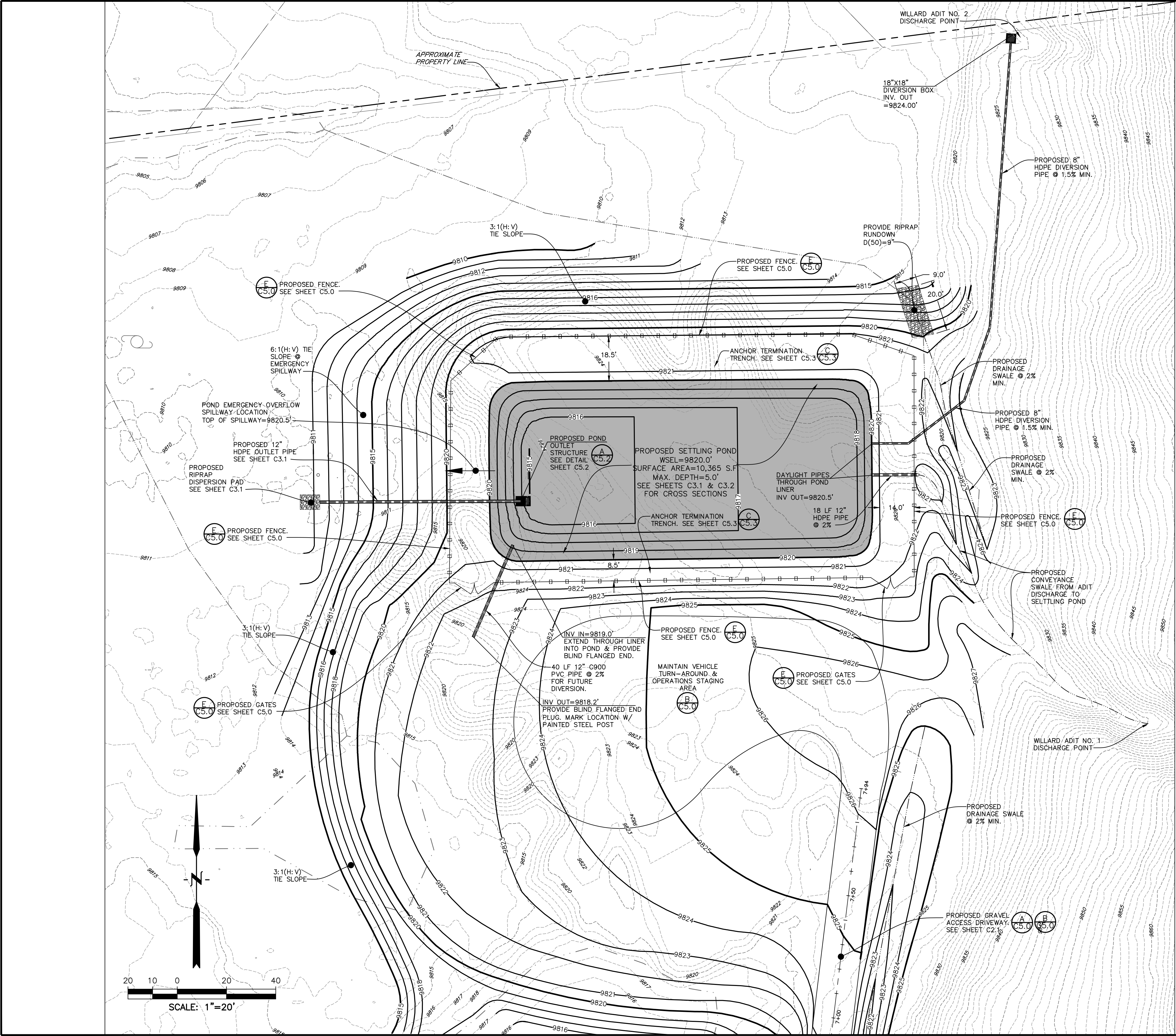
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WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

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DRAWING SCALE: HORIZONTAL: 1" = 20' VERTICAL: NONE	
WILLARD ACCESS DETAILS FINAL PHASE	
PROJECT NO. B1333	
C2.2	
SHEET: 5 OF 19	



WASTE ROCK COVER REQUIREMENTS:

ALL PORTIONS OF THE WASTE ROCK PILE AREA NOT COVERED BY THE LINED SEDIMENT POND SHALL BE COVERED WITH A MINIMUM 12" COVER. COVER MATERIAL SHALL CONSIST OF 12" OF CLEAN SOIL SUITABLE FOR PLANTING OF NATIVE GRASSES. SOIL SAMPLES SHALL BE PROVIDED FOR OWNER AND GEOTECHNICAL ENGINEER APPROVAL. AREAS SHOWN TO HAVE A GRAVEL SURFACE OVER WASTE ROCK PILE SHALL HAVE A 12" COVER CONSISTING OF 6" OF CLEAN SOIL AND 6" OF GRAVEL ROAD BASE (OR EQUAL).

CONTRACTOR SHALL IDENTIFY BORROW SOURCE FOR CLEAN COVER SOIL WHICH WILL BE SUBJECT TO APPROVAL BY ENGINEER.

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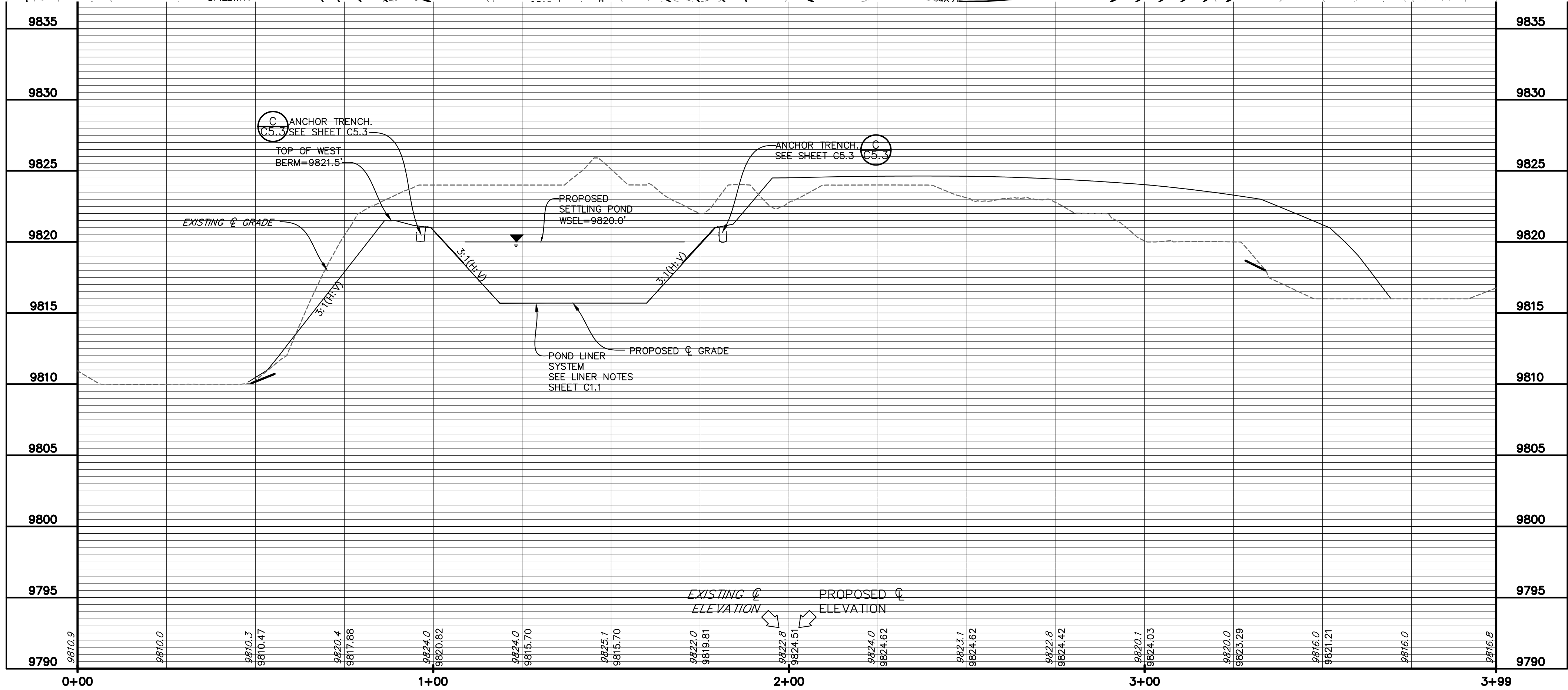
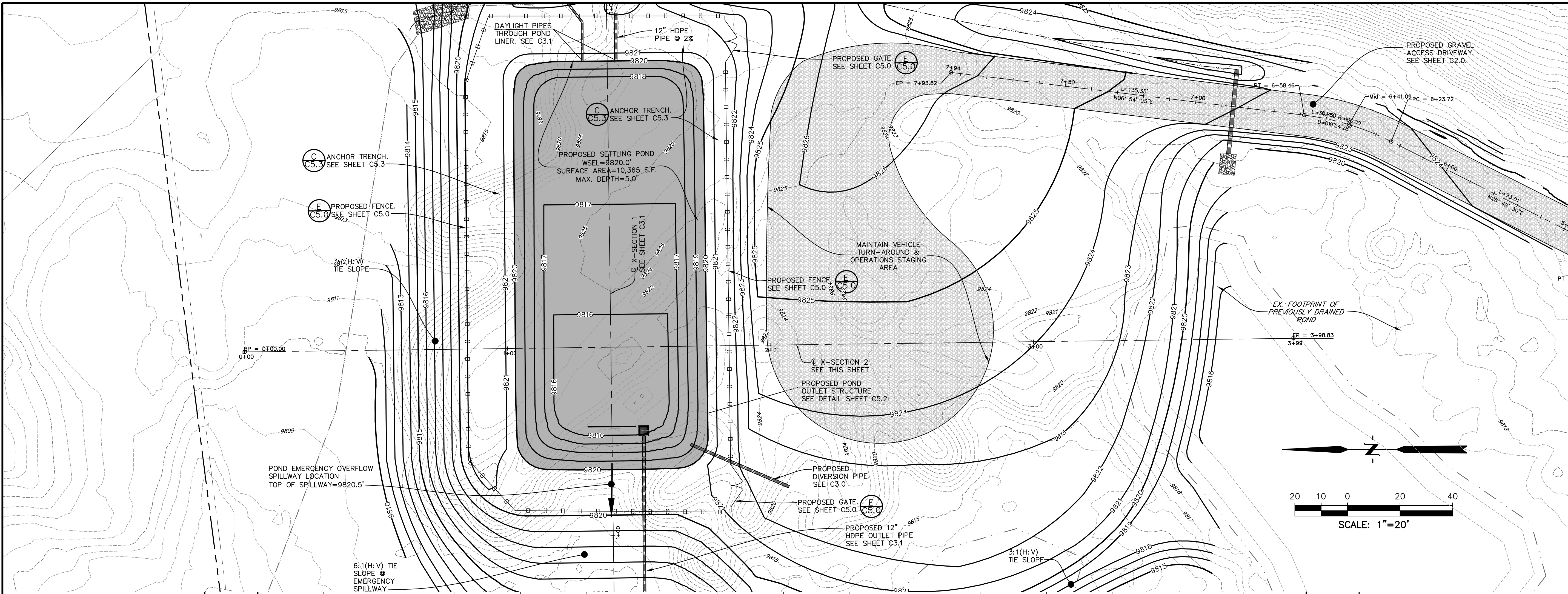
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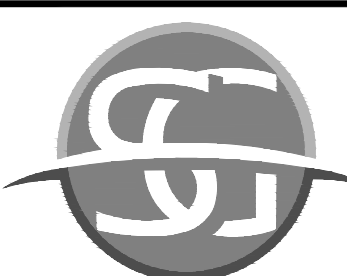
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EPA REVIEW	3/29/2021
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CHECKED BY:	
DRAWING SCALE: HORIZONTAL: 1" = 20' VERTICAL: NONE	
WILLARD FILL SITE GRADING PLAN	
PROJECT NO. B1333	
C3.0	
SHEET: 6 OF 19	



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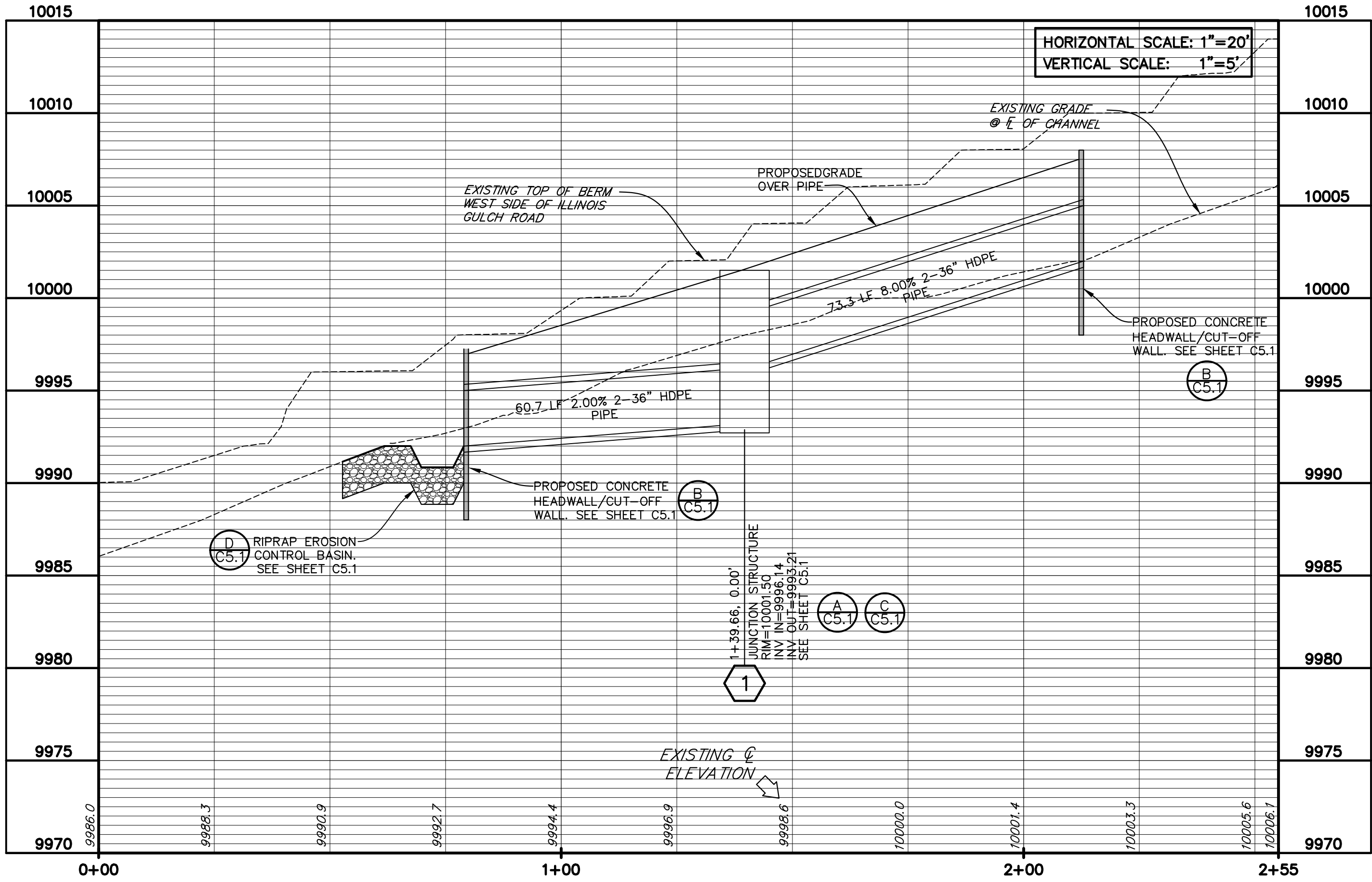
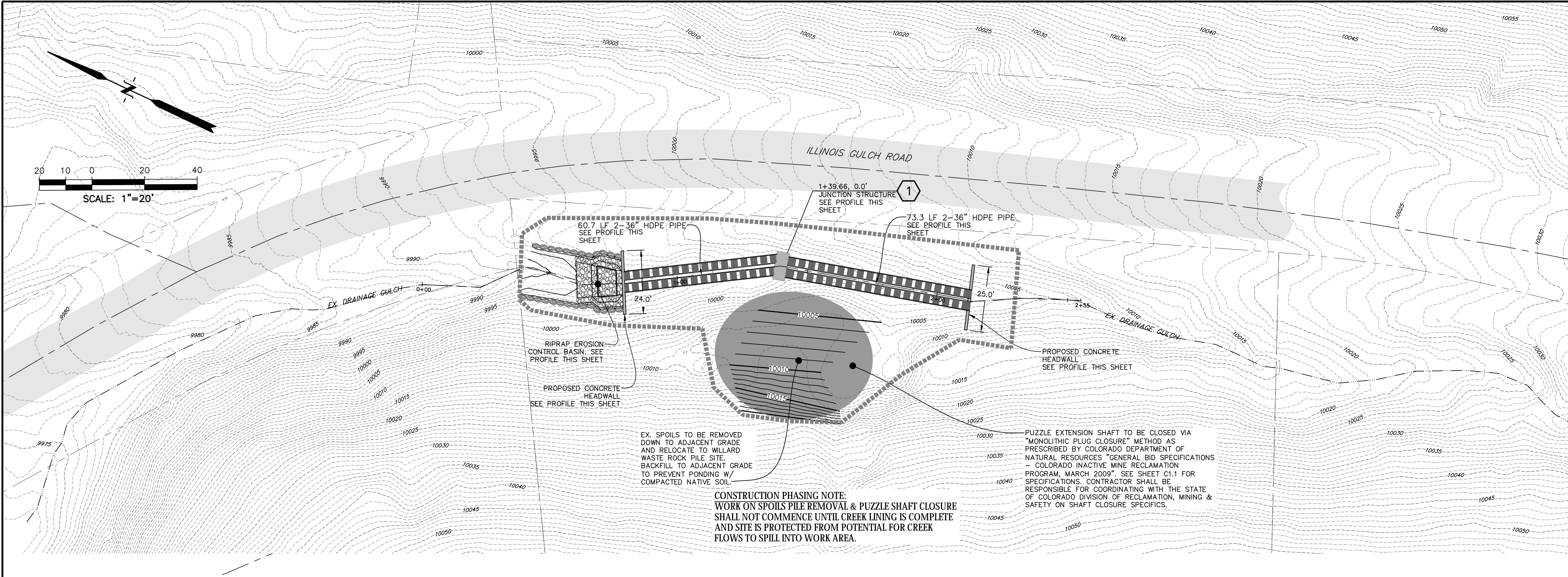
VERTICAL: 1" = 5'

SEDIMENT POND
CROSS SECTION 2

PROJECT NO. B1333

C3.2

SHEET: 8 OF 19



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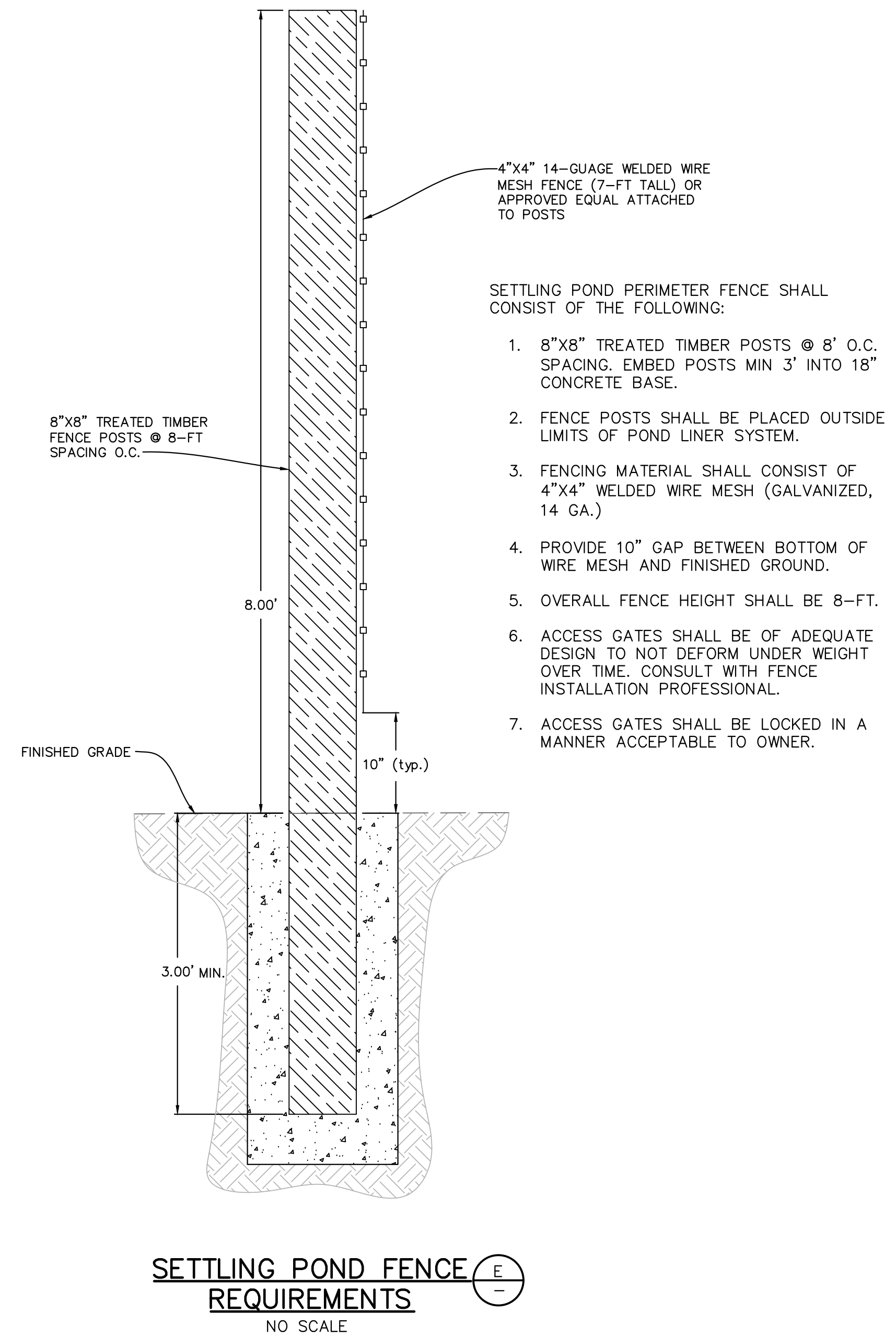
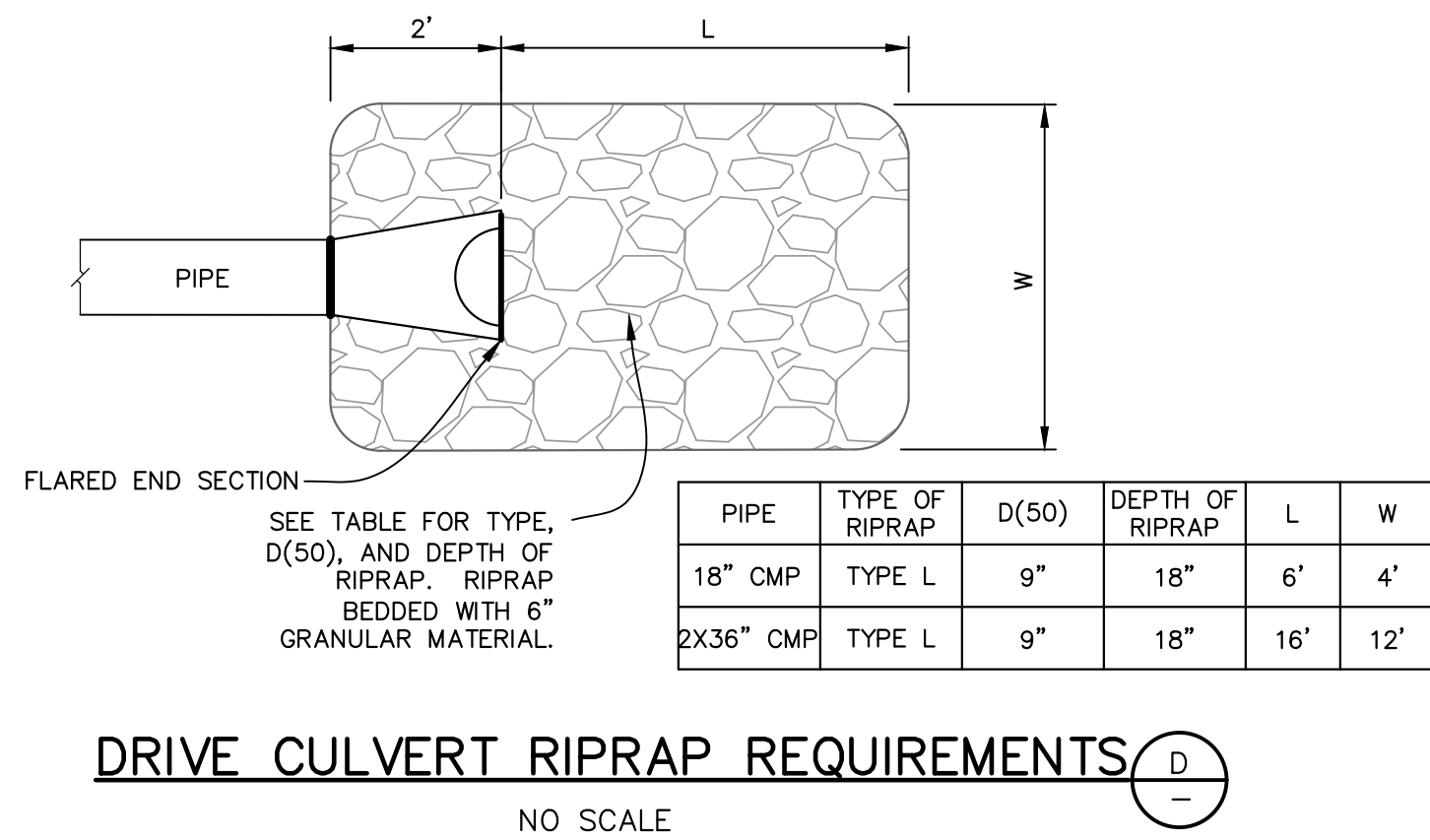
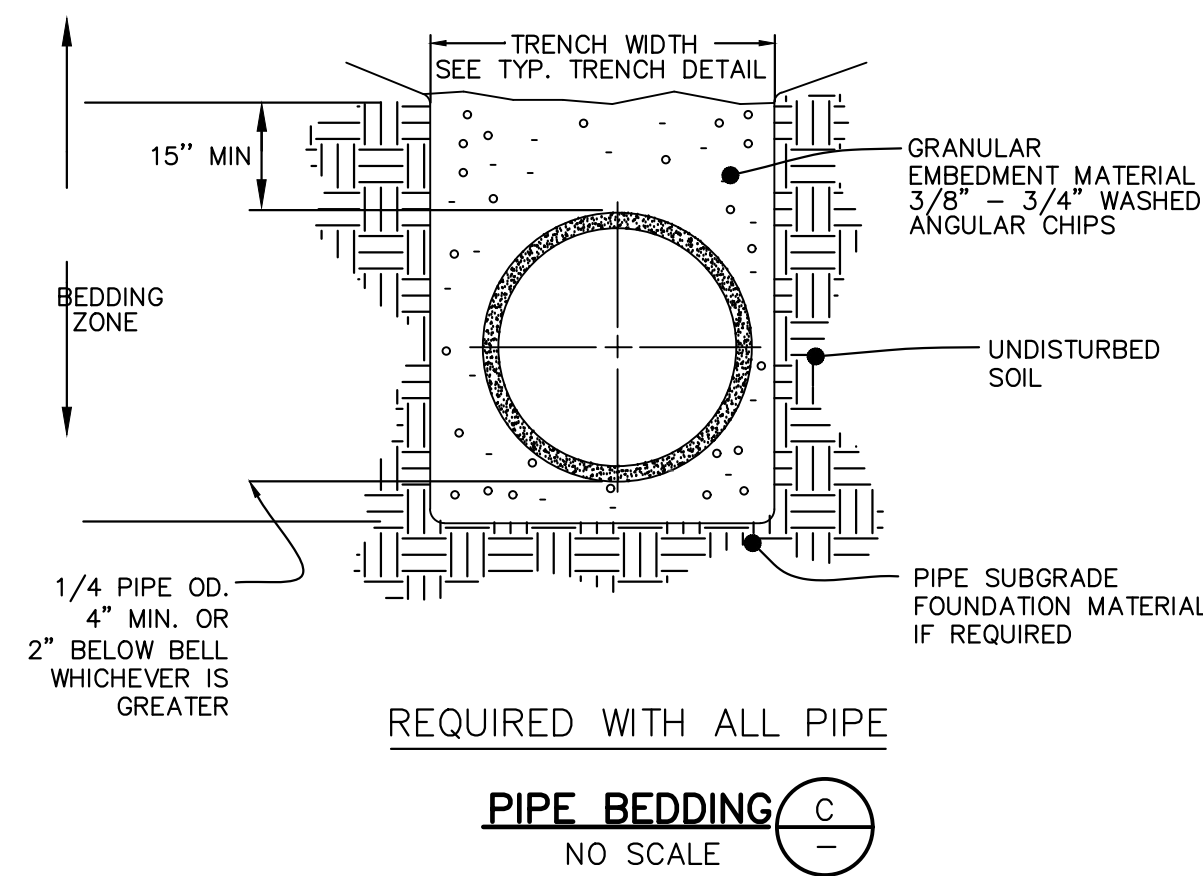
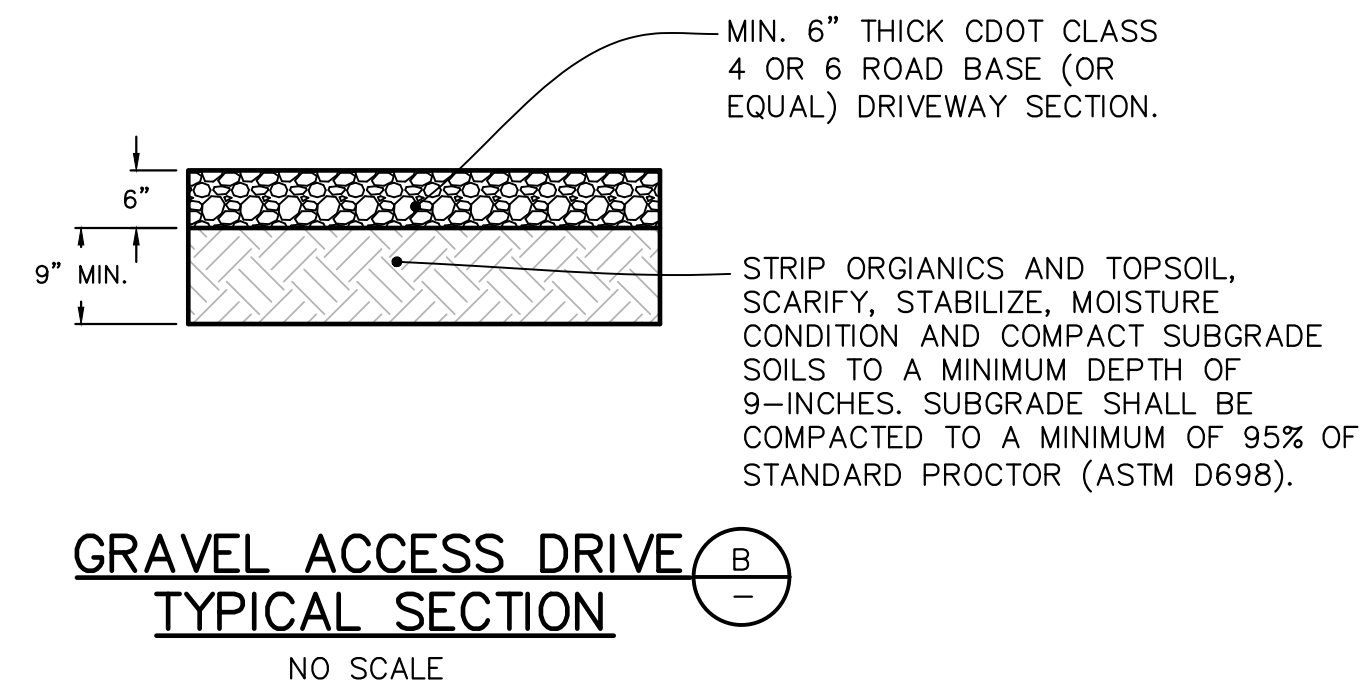
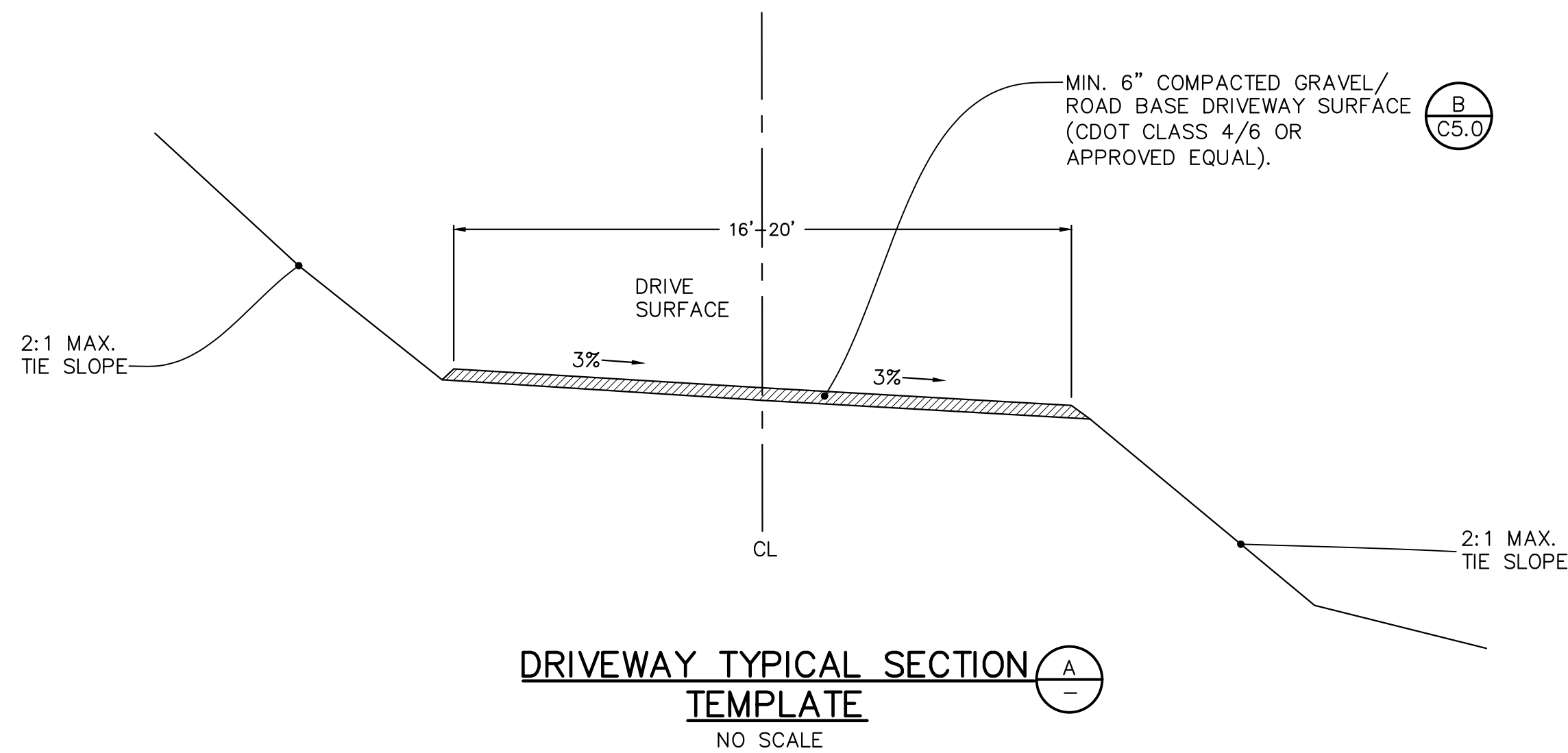
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WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

ILLINOIS GULCH
REMOVAL ACTION
SUMMIT COUNTY
STATE OF COLORADO

ISSUE	DATE
CLIENT REVIEW	3/15/2021
EPA REVIEW	3/29/2021
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DRAWN BY:	TSG
CHECKED BY:	
DRAWING SCALE: HORIZONTAL: 1" = 20' VERTICAL: 1" = 5'	
PUZZLE SITE CREEK LINING PLAN & PROFILE	
PROJECT NO. B1333	
C4.0	
SHEET: 9 OF 19	



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WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:
**ILLINOIS GULCH
REMOVAL ACTION**
SUMMIT COUNTY
STATE OF COLORADO

ISSUE DATE

CLIENT REVIEW 3/15/2021

EPA REVIEW 3/29/2021

DESIGNED BY: CCS

DRAWN BY: CCS

CHECKED BY: TSG

DRAWING SCALE:

HORIZONTAL: N/A

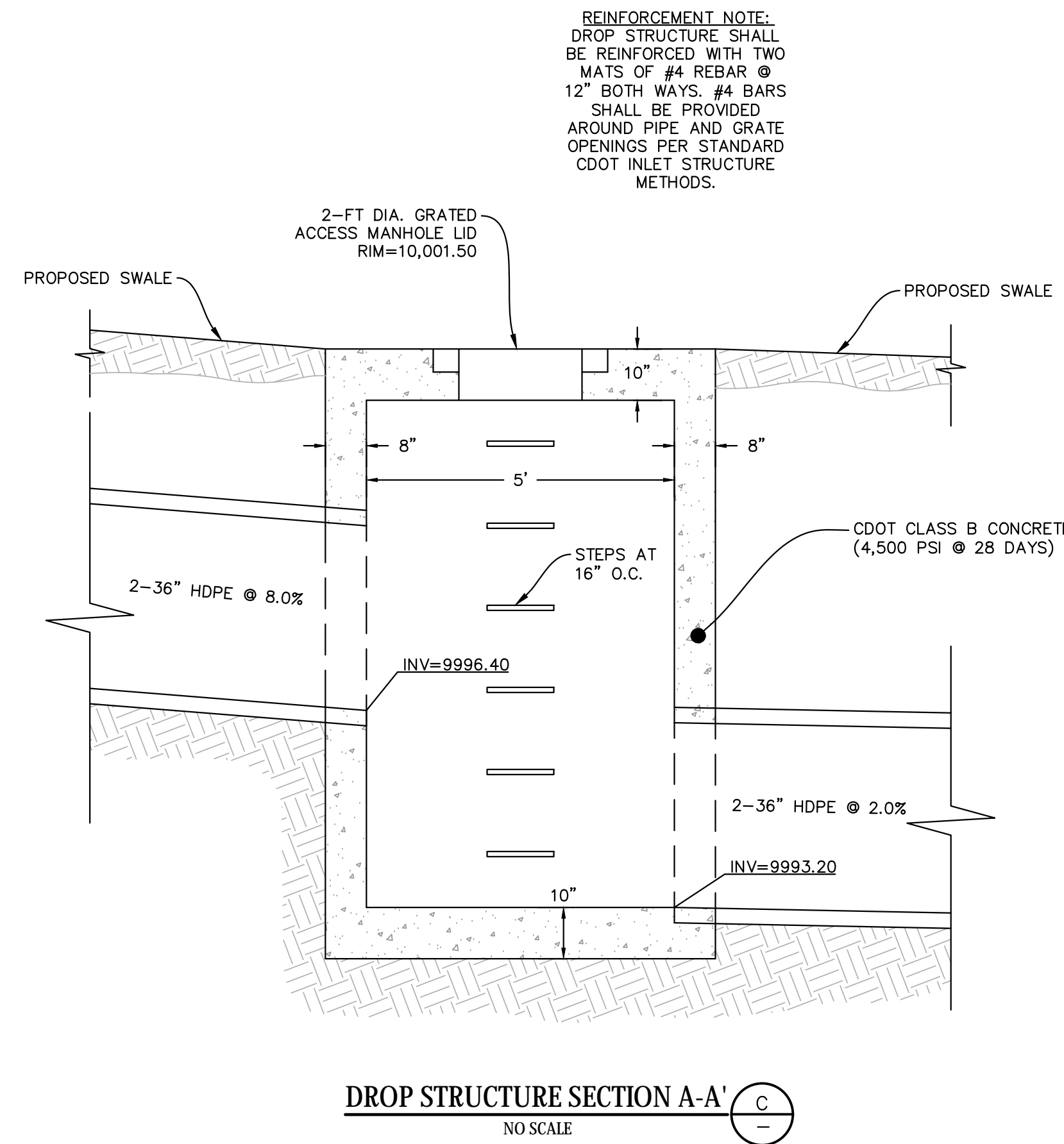
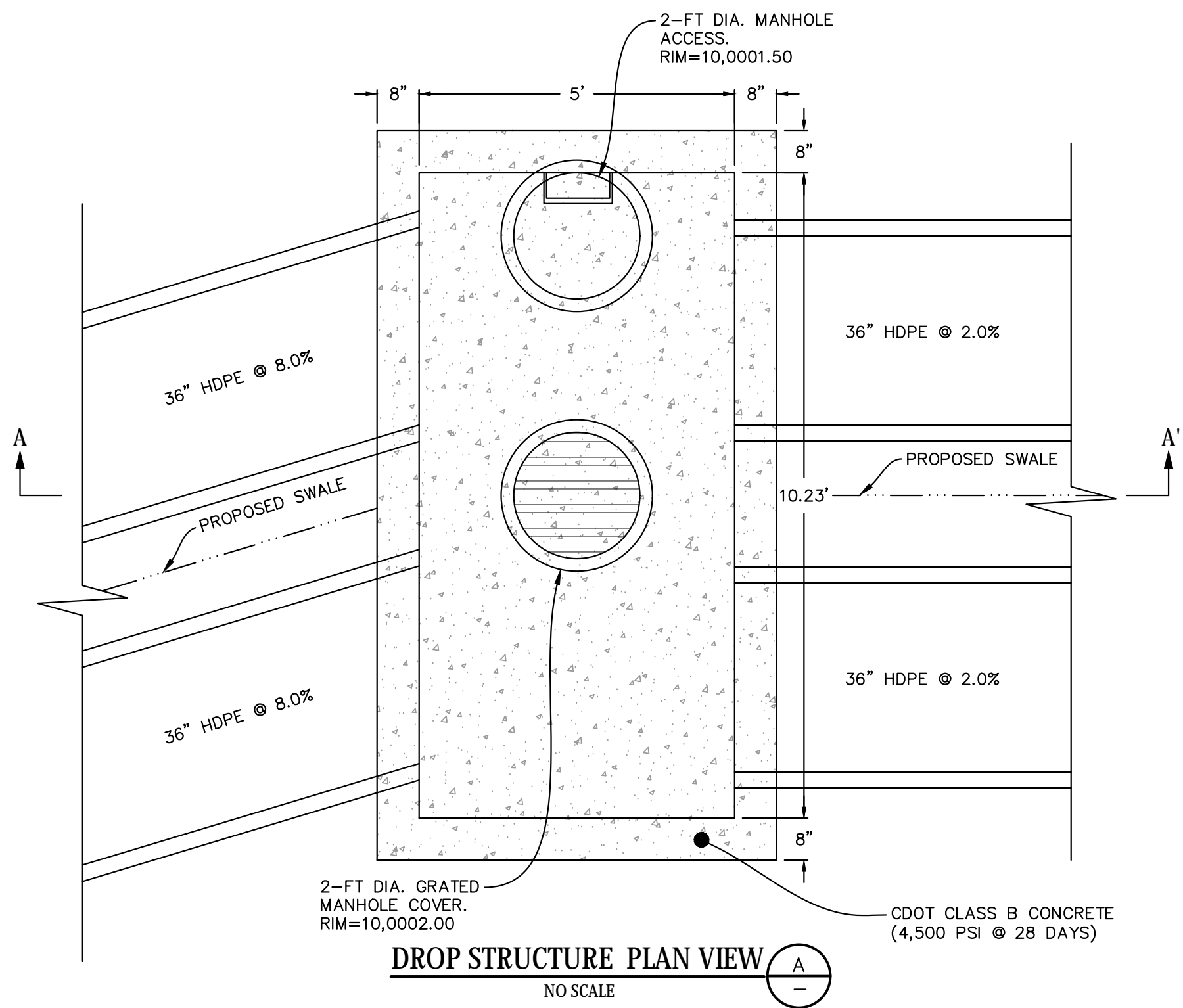
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**CIVIL
DETAILS
(1 OF 4)**

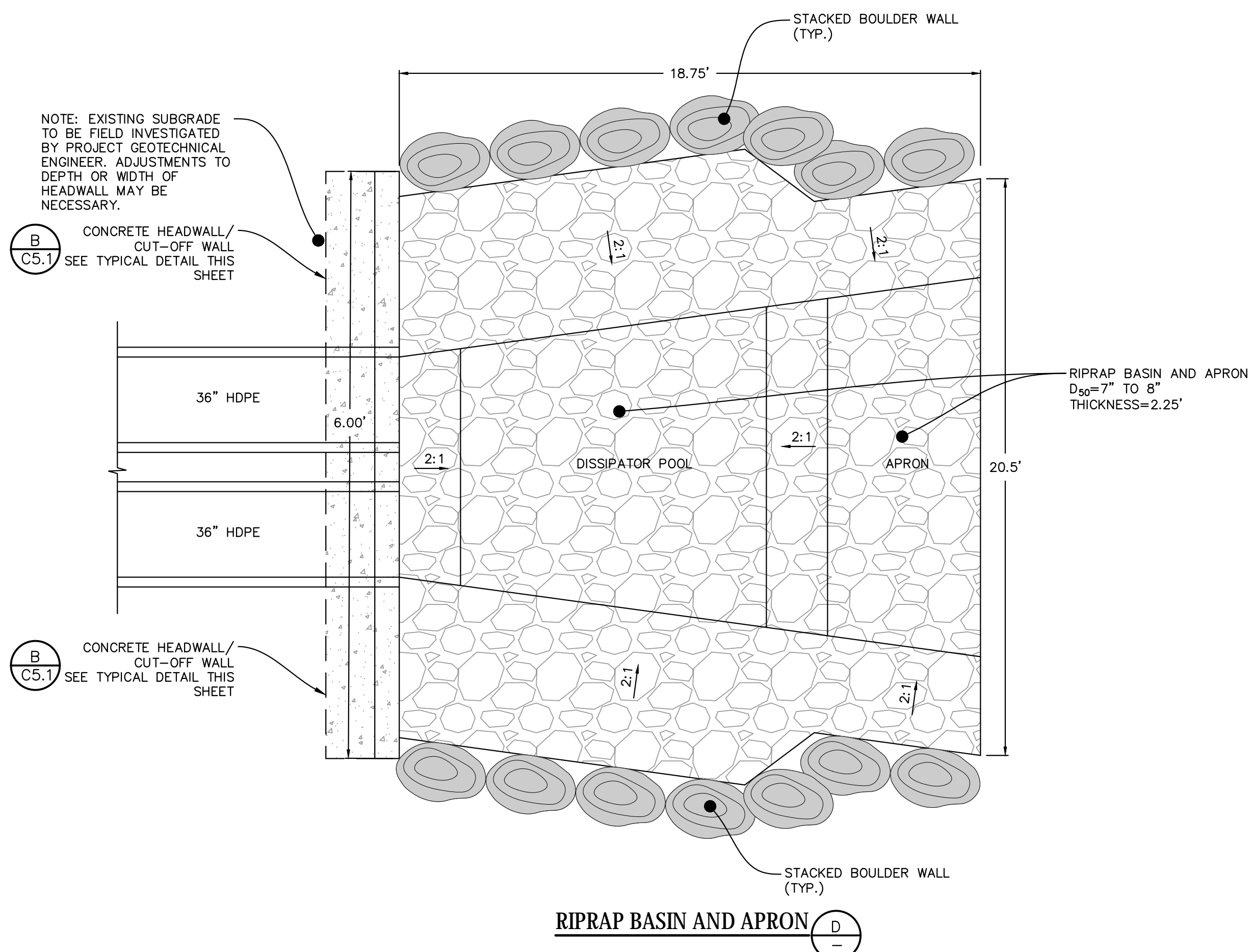
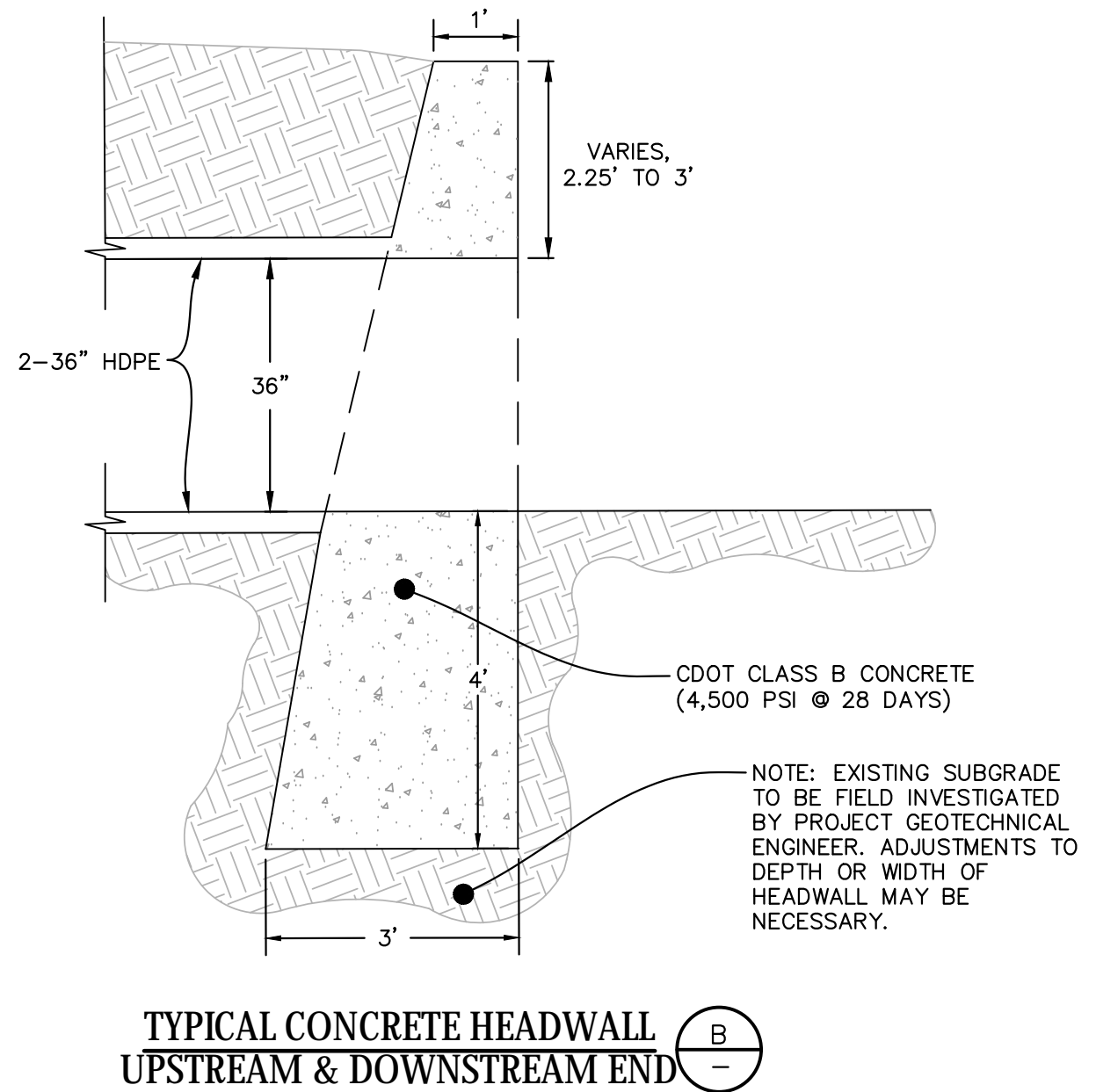
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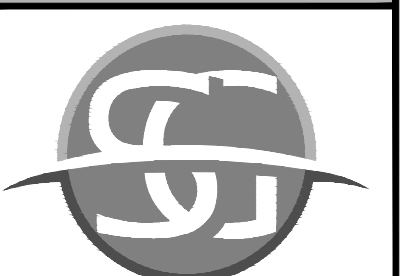
SHEET: 10 OF 19



REINFORCEMENT NOTE:
DROP STRUCTURE SHALL
BE REINFORCED WITH TWO
MATS OF #4 REBAR @
12" BOTH WAYS. #4 BARS
SHALL BE PROVIDED
AROUND PIPE AND GRATE
OPENINGS PER STANDARD
CDOT INLET STRUCTURE
METHODS.



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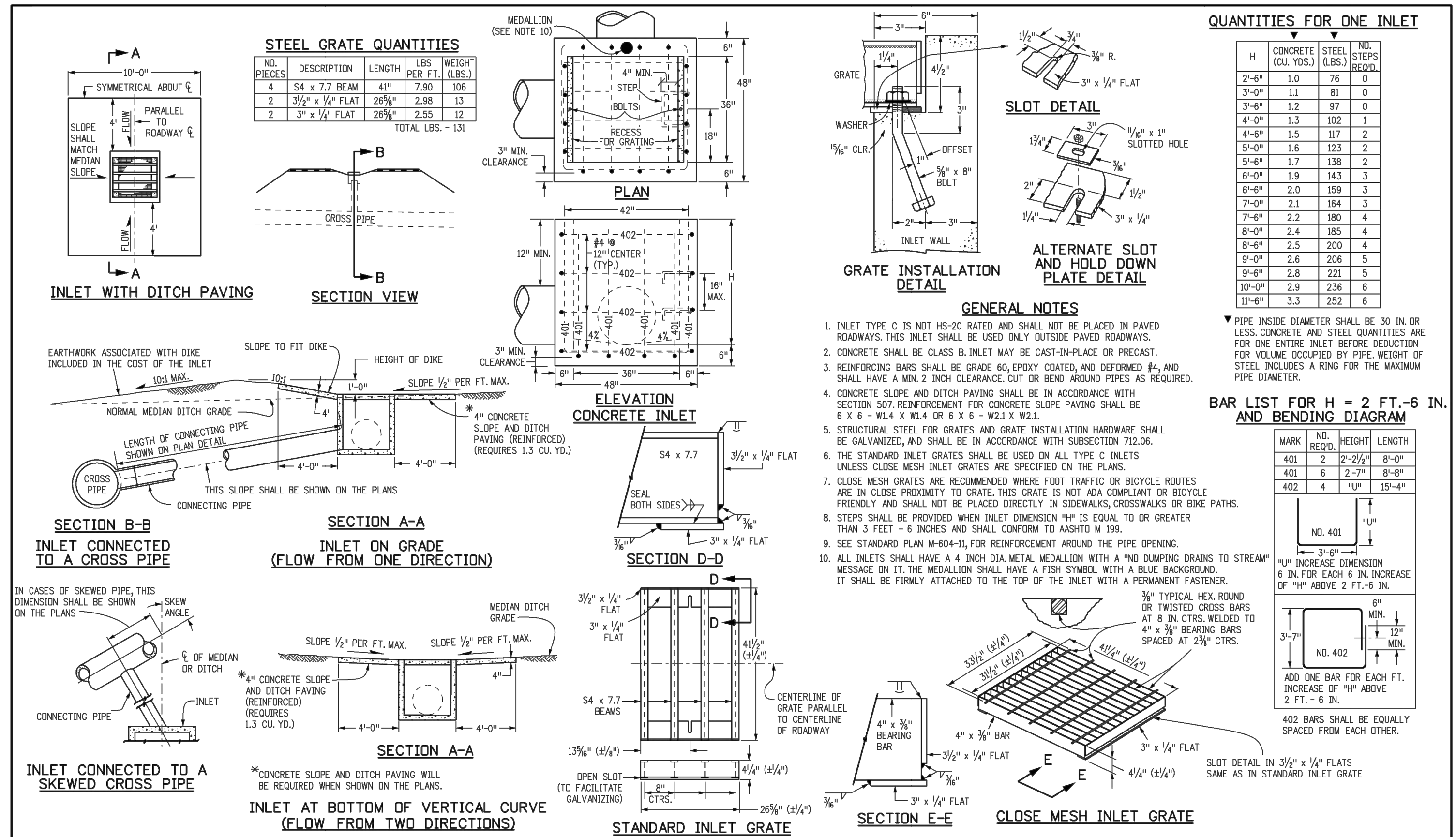
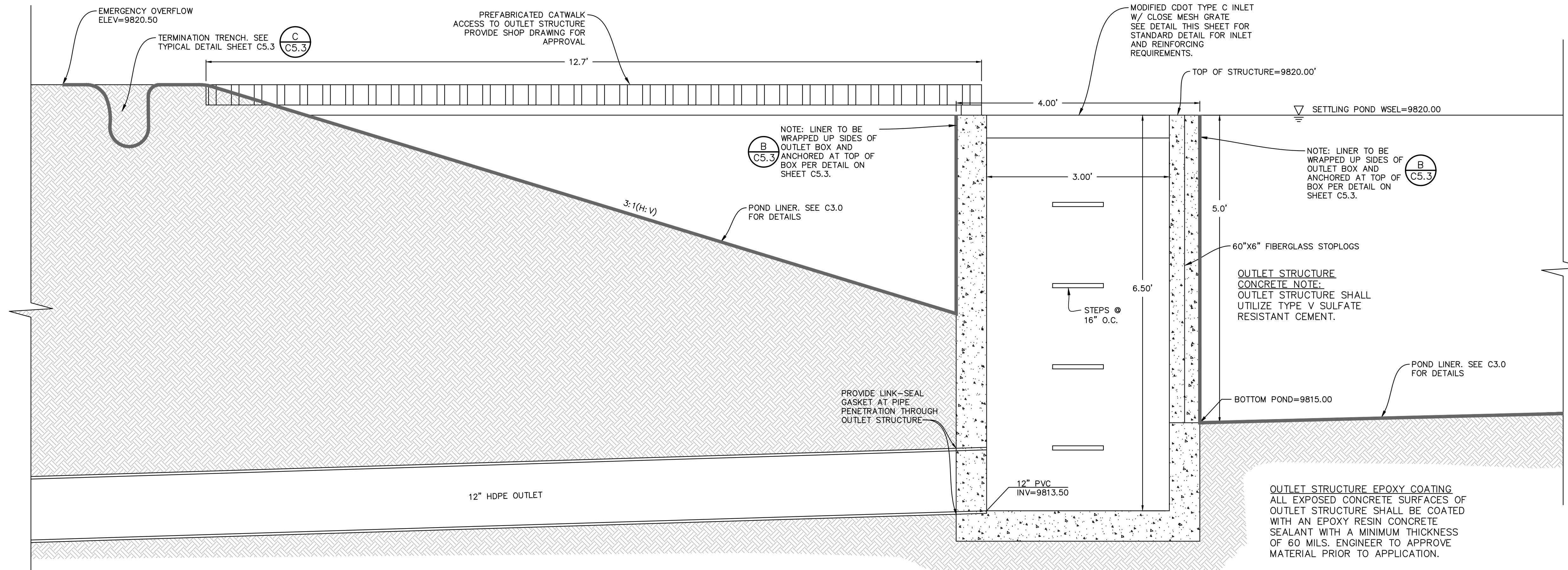
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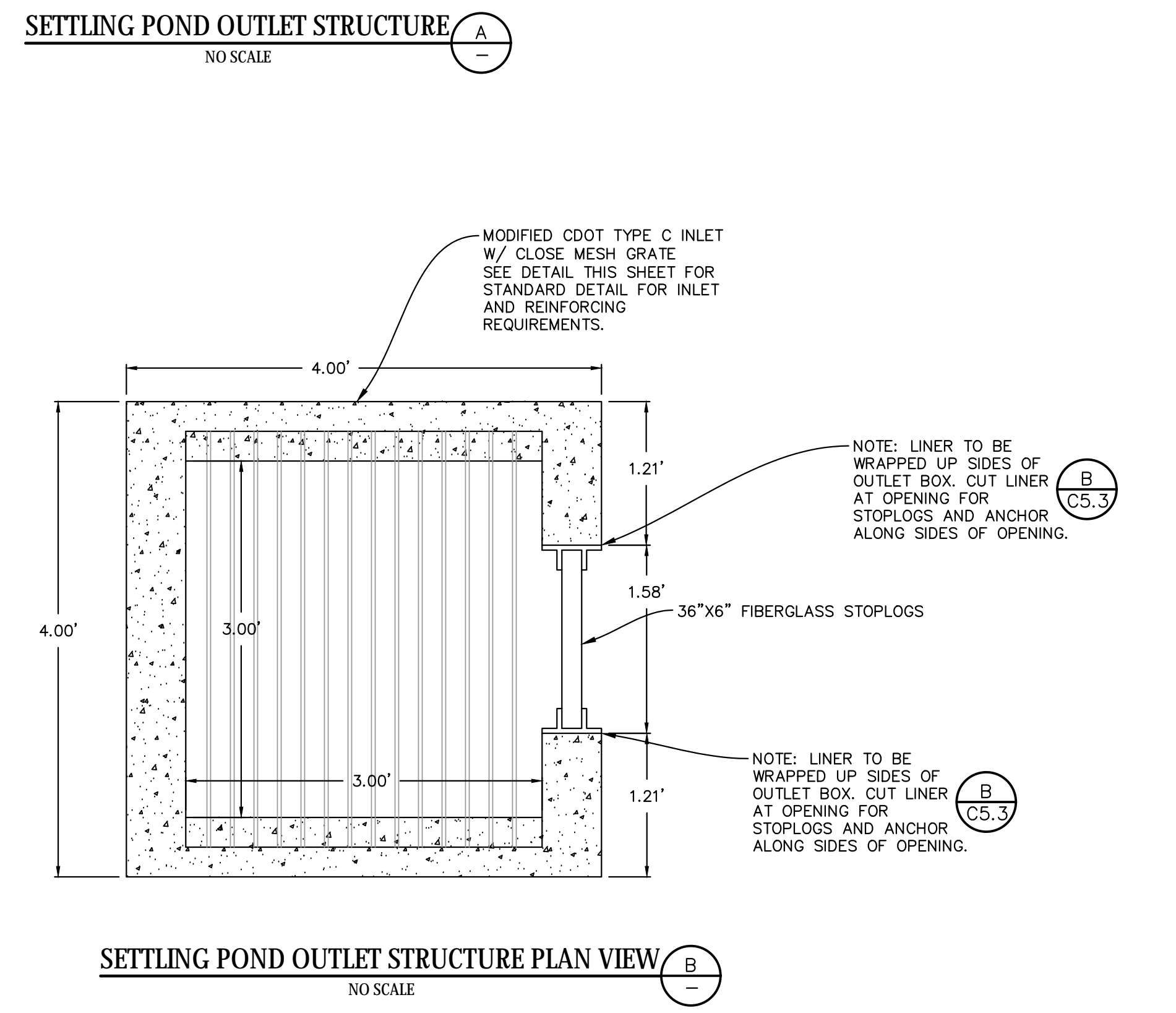
WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

**ILLINOIS GULCH
REMOVAL ACTION**
SUMMIT COUNTY
STATE OF COLORADO

ISSUE	DATE
CLIENT REVIEW	3/15/2021
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CHECKED BY:	TSG
DRAWING SCALE:	
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VERTICAL:	N/A
CIVIL DETAILS (2 OF 4)	
PROJECT NO. B1333	
C5.1	
SHEET: 11 OF 19	



Computer File Information		Sheet Revisions		Colorado Department of Transportation 2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9888 Project Development Branch JBK	INLET, TYPE C Issued by the Project Development Branch July 31, 2019	STANDARD PLAN NO. M-604-10 Standard Sheet No. 1 of 1 Project Sheet Number:
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Designer Initials: JBK	(CSD)					
Last Modification Date: 07/31/19	(CSD)					
Detailer Initials: LTA	(CSD)					
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English				



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 BOULDER, CO 80301
 CONTACT: BRIAN HANSEN
 303.396.0734

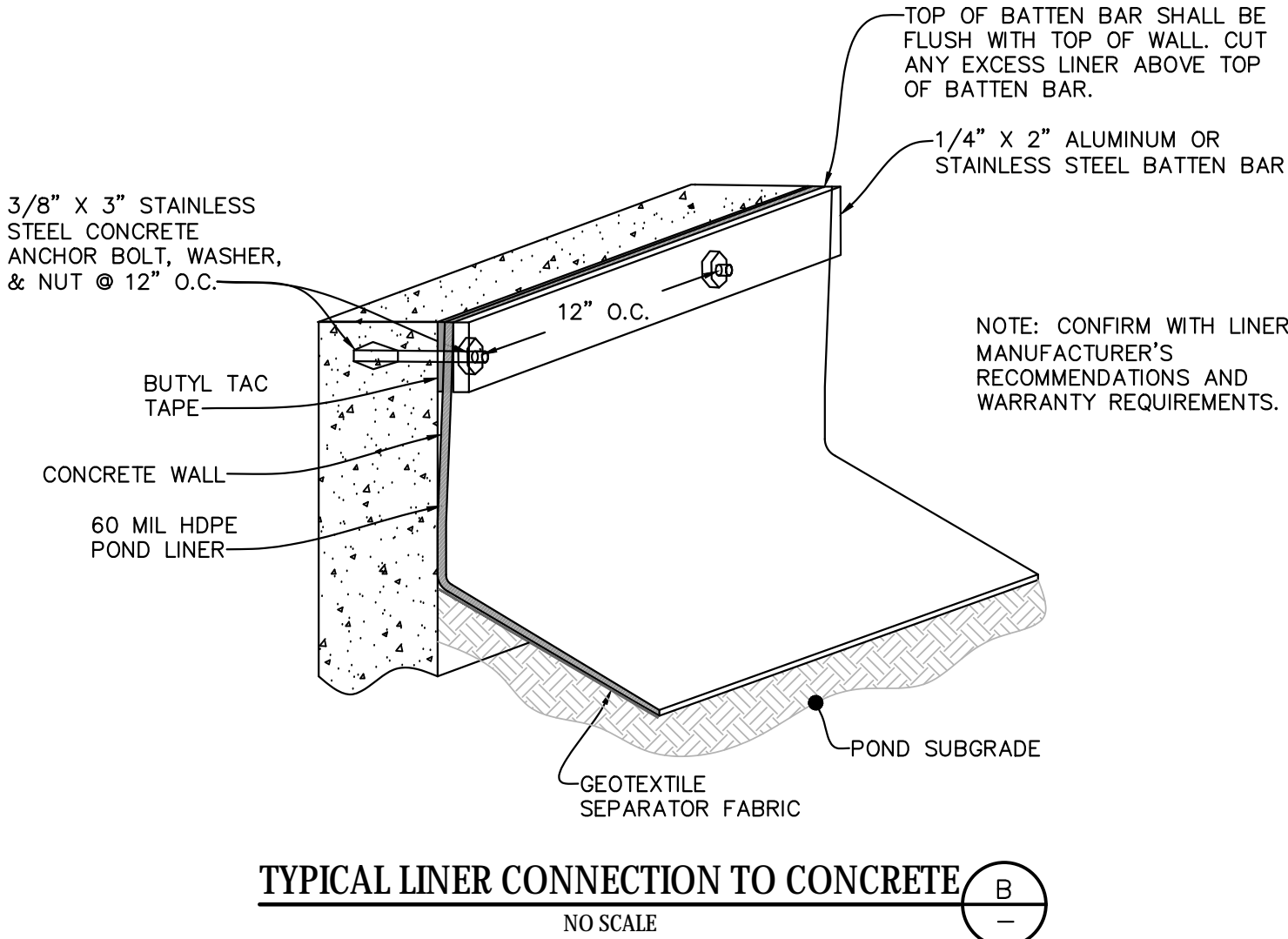
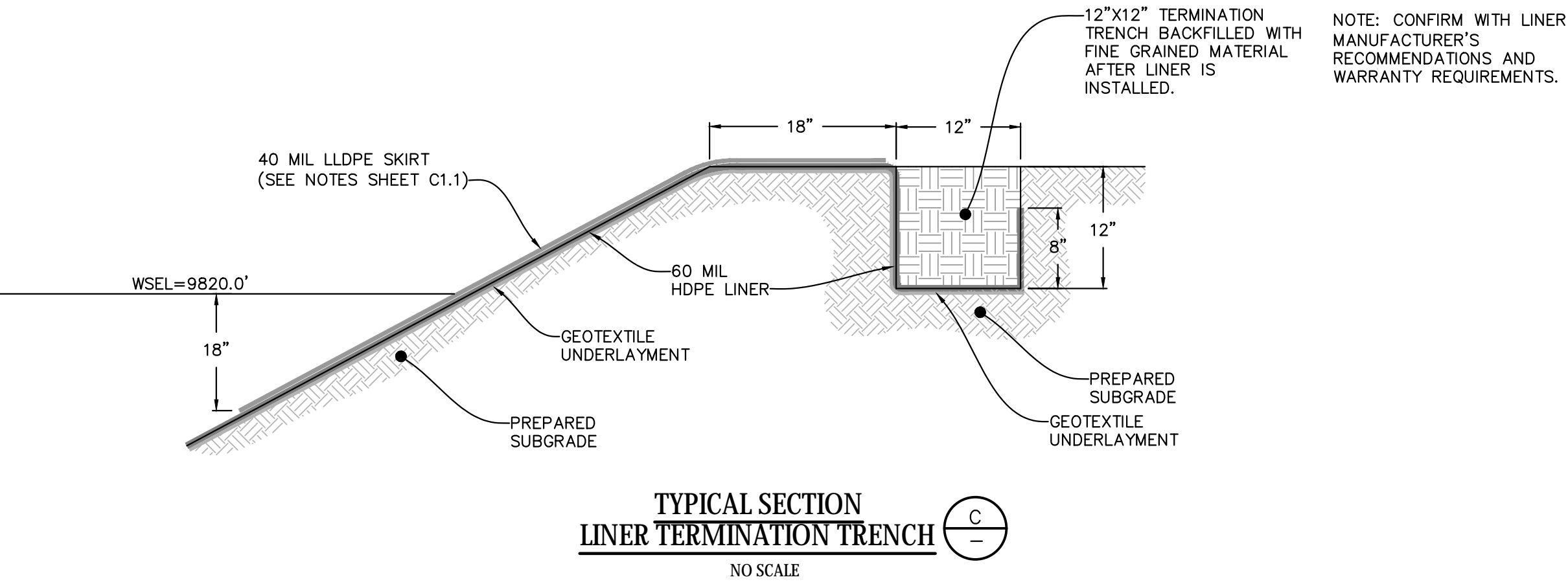
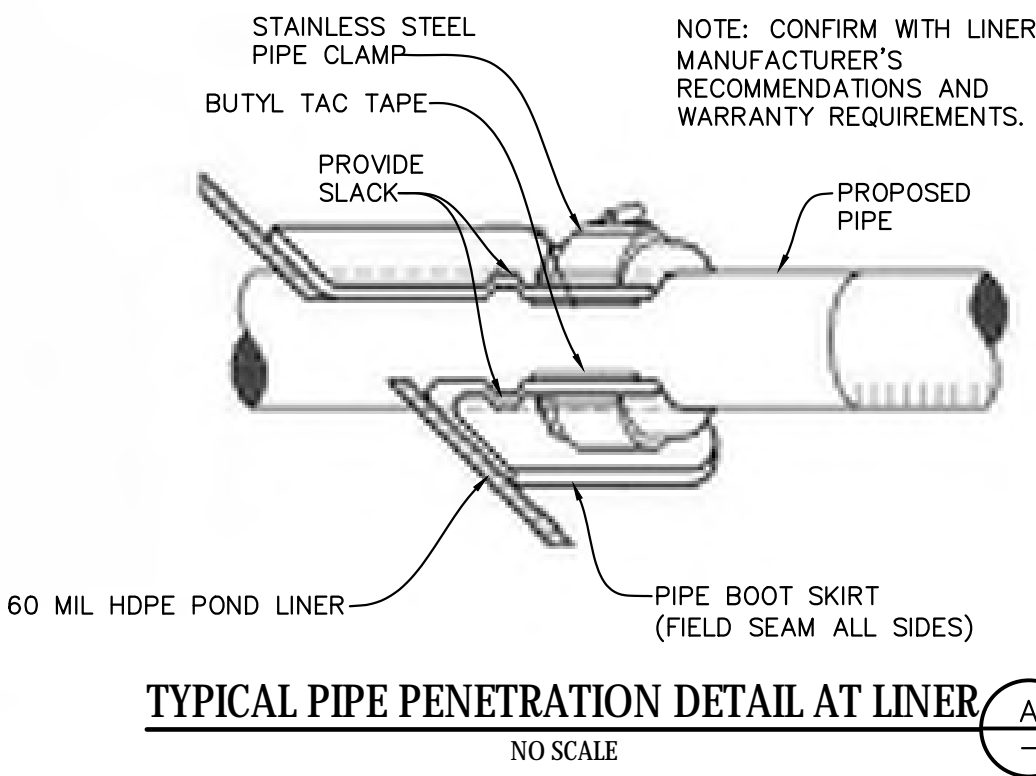
WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

**ILLINOIS GULCH
REMOVAL ACTION**

SUMMIT COUNTY
STATE OF COLORADO

ISSUE	DATE
CLIENT REVIEW	3/15/2021
EPA REVIEW	3/29/2021
DESIGNED BY:	CCS
DRAWN BY:	CCS
CHECKED BY:	TSG
DRAWING SCALE:	
HORIZONTAL:	N/A
VERTICAL:	N/A
CIVIL DETAILS (3 OF 4)	
PROJECT NO. B1333	

C5.2



PREPARED BY:



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PROJECT CONTACT:
CURTIS C. STEVENS, P.E.

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CIVIL
DETAILS
(4 OF 4)

PROJECT NO. B1333

STORM WATER MANAGEMENT PLAN

SEE SHEET C6.1 FOR "GENERAL STORM WATER MANAGEMENT NOTES" AND SHEET C6.4 FOR SUMMIT COUNTY "EROSION/SEDIMENTATION CONTROL (ESC) NOTES".

SEE SHEETS C6.4 - C6.5 FOR STORM WATER MANAGEMENT CONSTRUCTION DETAILS. CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPs) SHALL BE INSTALLED, MAINTAINED, AND INSPECTED IN ACCORDANCE WITH THE RECOMMENDATIONS SET FORTH IN SUMMIT COUNTY "EROSION/SEDIMENTATION CONTROL (ESC) NOTES" .

GENERAL NOTES

1. THIS SWMP IS INTENDED TO BE A GUIDANCE DOCUMENT TO PROVIDE INITIAL CONCEPTS FOR STORM WATER MANAGEMENT. THE ON-SITE SWMP SHALL BE CONTINUOUSLY REVIEWED AND MODIFIED, IN REDLINE, TO REFLECT ON-SITE CONDITIONS, SITE-SPECIFIC POLLUTANT SOURCES AND ACTIVITIES, AS WELL AS BEST MANAGEMENT PRACTICES (BMPs) SELECTED TO ADEQUATELY CONTROL EACH IDENTIFIED POLLUTANT SOURCE. THE DETAILED TIMING, LOCATION, INSTALLATION/IMPLEMENTATION SPECIFICATIONS AND OPERATIONS/MAINTENANCE PROCEDURES IS DEFINED BY SPECIFIC SITE OPERATIONS AND TIMING.
2. THE CONTRACTOR OR OWNER SHALL ADJUST AND/OR ADD BMPs AS NECESSARY TO CONTROL STORM WATER RUNOFF DURING CONSTRUCTION. WHEN BMPs OR OTHER SITE CONDITIONS CHANGE, THE SWMP MUST BE MODIFIED TO ACCURATELY REFLECT THE ACTUAL FIELD CONDITIONS.
3. ALL STORMWATER MANAGEMENT OPERATIONS SHALL CONFORM TO THE SUBSTANTIVE REQUIREMENTS OF THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) CONSTRUCTION ACTIVITIES GENERAL PERMIT (CDPS PERMIT NO. COR400000. THIS INCLUDES THOROUGH INSPECTIONS OF THE STORM WATER MANAGEMENT SYSTEM MUST BE PERFORMED AND DOCUMENTED AT LEAST EVERY 14 DAYS, AND WITHIN 24 HOURS OF ANY PRECIPITATION OR SNOWMELT EVENT THAT CAUSES SURFACE EROSION. SEE THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) AS WELL AS SUMMIT COUNTY SPECIFICATIONS FOR SPECIFIC INFORMATION AND GUIDANCE ON INSPECTION DOCUMENTATION AND RECORDS RETENTION FOR COMPLIANCE.

1. SITE DESCRIPTION

A. DESCRIPTION OF CONSTRUCTION ACTIVITIES

THE PROJECT SITE IS LOCATED IN SUMMIT COUNTY, COLORADO. SPECIFICALLY, THE PROJECT SITE LOCATED IN THE SOUTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 77 WEST OF THE 6th P.M., COUNTY OF SUMMIT, STATE OF COLORADO.

THE ACTIVITIES PROPOSED IN THESE CONSTRUCTION DOCUMENTS INCLUDE THE CONSTRUCTION OF A DRIVEWAY, SETTLING POND, AND RE-GRADING WASTE ROCK PILES.

B. PROPOSED SEQUENCING FOR MAJOR ACTIVITIES:

- INSTALLATION OF INITIAL BMPs
- CONSTRUCTION OF DRIVEWAY, SETTLING POND, RE-GRADING WASTE ROCK PILES
- FINAL STABILIZATION OF LANDSCAPED AREAS

C. RELEVANT AREAS

PROJECT AREA: 3.0 ACRES±
PROJECT AREA OF DISTURBANCE: 3.0 ACRES±

D. EXISTING SOIL DATA AND POTENTIAL FOR EROSION

THE EXISTING SOILS ON THE SITE ARE HYDROLOGIC GROUP A, B AND D.

E. EXISTING VEGETATION, INCLUDING PERCENT COVER

THE PROJECT SITE VEGETATION CONSISTS OF GRASSES, SHRUBS AND TREES.

TOTAL PERCENT VEGETATIVE COVER IS ESTIMATED AT APPROXIMATELY 80%.

F. POTENTIAL POLLUTANT SOURCES

SOURCES OF POTENTIAL POLLUTANTS FOR THE PROJECT SITE INCLUDE, BUT ARE NOT LIMITED TO:

- DISTURBED AND STORED SOILS
- VEHICLE TRACKING OF SEDIMENTS
- MANAGEMENT OF CONTAMINATED SOILS
- LOADING AND UNLOADING OPERATIONS
- OUTDOOR STORAGE ACTIVITIES (BUILDING MATERIALS, FERTILIZERS, CHEMICALS, ETC.)
- VEHICLE AND EQUIPMENT MAINTENANCE AND FUELING
- SIGNIFICANT DUST OR PARTICULATE GENERATING PROCESSES
- ROUTINE MAINTENANCE ACTIVITIES INVOLVING FERTILIZERS, PESTICIDES, DETERGENTS, FUELS, SOLVENTS, OILS, ETC.
- ON-SITE WASTE MANAGEMENT PRACTICES (WASTE PILES, LIQUID WASTES, DUMPSTERS, ETC.)
- CONCRETE TRUCK/EQUIPMENT WASHING, INCLUDING THE CONCRETE TRUCK CHUTE AND ASSOCIATED FIXTURES AND EQUIPMENT
- NON-INDUSTRIAL WASTE SOURCES SUCH AS WORKER TRASH AND PORTABLE TOILETS
- OTHER AREAS OR PROCEDURES WHERE POTENTIAL SPILLS CAN OCCUR

G. ALLOWABLE NON-STORM WATER DISCHARGES

THE POTENTIAL FOR NON-STORM WATER DISCHARGES FROM LANDSCAPE IRRIGATION RETURN FLOW, AND CONCRETE WASHOUT IS MINIMAL. ALL CONCRETE WASHOUT SHALL BE COMPLETED IN A SPECIFIED CONTAINED AREA. EXISTING SPRINGS MAY BE PRESENT ALONG THE LOCATION OF THE PROPOSED ACCESS DRIVE. IF SPRINGS ARE ENCOUNTERED, THEY SHALL BE MANAGEMENT IN ACCORDANCE WITH CDPS PERMIT NO COR400000 REQUIREMENTS. TEMPORARY CONSTRUCTION DEWATERING IS NOT ANTICIPATED BUT IF REQUIRED SHALL COMPLY WITH THE SUBSTANTIVE REQUIREMENTS OF CDPHE REGULATIONS.

H. RECEIVING WATERS AND OUTFALLS

STORMWATER FROM THE PROJECT SITE DRAINS TO THE NORTHWEST ALONG THE NORTH SIDE OF BOREAS PASS ROAD, AND ULTIMATELY DISCHARGES INTO ILLINOIS GULCH. THE PROJECT SITE IS LOCATED WITHIN THE BLUE RIVER DRAINAGE BASIN.

2. SITE SWMP MAP COMPONENTS

THE STORM WATER MANAGEMENT PLAN MAP INCLUDED WITH THIS PLAN SET PROVIDES THE FOLLOWING:

1. CONSTRUCTION SITE BOUNDARIES
2. AREAS OF GROUND SURFACE DISTURBANCE
3. AREAS OF CUT AND FILL AS SHOWN BY EXISTING AND PROPOSED CONTOURS
4. AREAS USED FOR STORAGE OF BUILDING MATERIALS, EQUIPMENT, SOIL OR WASTE
5. LOCATIONS OF ALL STRUCTURAL BMPs
6. LOCATIONS OF NON-STRUCTURAL BMPs AS APPLICABLE
7. LOCATIONS OF KNOWN SPRINGS, STREAMS, WETLANDS AND OTHER SURFACE WATERS (AS APPLICABLE)

3. SWMP ADMINISTRATOR

THE OWNER/CONTRACTOR SHALL DESIGNATE THE PERSON(S) WHO ARE RESPONSIBLE FOR OVERSEEING THE IMPLEMENTATION, MAINTENANCE, AND RECORD KEEPING RELATED TO THE STORM WATER MANAGEMENT.

4. IDENTIFICATION OF POTENTIAL POLLUTANT SOURCES

ALL POTENTIAL SOURCES OF POLLUTANTS (SITE DESCRIPTION SECTION F) ON THE SITE WILL BE IDENTIFIED AND EVALUATED IN ACCORDANCE WITH SUMMIT COUNTY CONSTRUCTION SPECIFICATIONS. THESE SOURCES WILL BE NOTED IN THE PROJECT SWMP LOGBOOK AND REVISIONS TO THE BMPs IDENTIFIED ON THE SWMP MAP WILL BE PREPARED PRIOR TO CONSTRUCTION.

5. BEST MANAGEMENT PRACTICES

STRUCTURAL BMPs WILL BE INSTALLED AND NON-STRUCTURAL BMPs WILL BE IMPLEMENTED PRIOR TO STARTING SITE DISTURBANCE ACTIVITIES. OFFSITE (UPSTREAM AND DOWNSTREAM) RUNOFF POTENTIAL WILL BE IDENTIFIED AND RECORDED IN THE SWMP LOGBOOK. ALL BMPs SHALL MEET THE SUBSTANTIVE REQUIREMENTS OF CDPS PERMIT NO. COR400000.

A. STRUCTURAL PRACTICES FOR EROSION AND SEDIMENT CONTROL

NEW INLET PROTECTION

ALL NEWLY CONSTRUCTED INLETS SHALL BE IMMEDIATELY PROTECTED FROM SEDIMENT WITH BMPs. THESE BMPs SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL FINAL STABILIZATION IS COMPLETE. ALL DEBRIS IN THE STORM SEWER SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE.

EXISTING INLET PROTECTION

ALL EXISTING INLETS SHALL BE PROTECTED FROM SEDIMENT WITH BMPs. THESE BMPs SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL FINAL STABILIZATION IS COMPLETE. ALL DEBRIS IN THE STORM SEWER SHALL BE REMOVED PRIOR TO FINAL ACCEPTANCE.

PERIMETER CONTROL

PERIMETER CONTROL, INCLUDING SILT FENCE, SHALL BE INSTALLED, AS NECESSARY, PRIOR TO ANY SITE DISTURBANCE. THE PERIMETER CONTROL SHALL PREVENT POTENTIAL POLLUTANTS FROM LEAVING THE CONSTRUCTION BOUNDARIES, AND MAY CONSIST OF SILT FENCE, BERMS, EROSION LOGS, EXISTING LANDFORMS, VEGETATION OR ANY COMBINATION THEREOF.

B. NON-STRUCTURAL PRACTICES FOR EROSION AND SEDIMENT CONTROL

VEGETATION

ALL DISTURBED DEVELOPMENT AREAS WITHIN THE PROJECT SITE SHALL BE SEEDED TO PREVENT WIND AND WATER EROSION FOR THE TIME THE AREA REMAINS WITHOUT DEVELOPMENT.

GRADING AND SLOPE STABILIZATION

GRADING OPERATIONS SHALL BE COORDINATED AS TO PREVENT SEDIMENT RUNOFF. TEMPORARY STABILIZATION MEASURES SHALL BE IMPLEMENTED.

STOCKPILE MANAGEMENT

ANY STOCKPILES SHALL BE LOCATED IN A CONTAINED AREA AWAY FROM SENSITIVE AREAS. STOCKPILES SHALL BE CONFINED AND HAVE BMPs INSTALLED TO PREVENT SEDIMENT FROM ENTERING THE STORM WATER RUNOFF.

SAW CUTTING

THE CONTRACTOR SHALL PROTECT ALL STORM DRAIN FACILITIES ADJACENT TO SAW CUTTING OPERATIONS. ALL WATER AND SAND PRODUCTS GENERATED BY SAW CUTTING ACTIVITIES SHALL BE VACUUMED AND PROPERLY DISPOSED OF FROM THE SITE.

PROTECTION OF TREES

THE CONTRACTOR SHALL PROTECT ALL EXISTING TREES NOT PLANNED FOR DEMOLITION.

B. NON-STRUCTURAL PRACTICES FOR EROSION AND SEDIMENT CONTROL (CONTINUED)

SEEDING AND MULCHING

SEEDING WILL BE PERFORMED WHEN THE SOIL SURFACE IS DISTURBED AND WILL REMAIN INACTIVE FOR AN EXTENDED PERIOD (30 DAYS OR LONGER). TEMPORARY & PERMANENT VEGETATIVE COVER CONSISTING OF SEED MIX NOTED BELOW MUST BE DRILL SEEDED AT 15-20 POUNDS PURE LIVE SEED PER ACRE OR 80 POUNDS PURE LIVE SEED PER ACES IS BROADCAST OR HYDRO SEEDED. MULCH CONSISTING OF STRAW APPLIED AT A RATE OF 2 TONS PER ACRE AND CRIMPED MUST BE USED TO STABILIZE THE EXPOSED SURFACE UNLESS HYDRO SEEDED IS UTILIZED.

SEED MIX SPECIFICATIONS (SUMMIT COUNTY NATIVE HIGH COUNTRY GRASS SEED MIXTURE):

SPECIES	VARIETY	PERCENT OF MIX
ELYMUS TRACHYCAULUS	SLENDER WHEATGRASS	50
POA SECUNDA	CANBY BLUEGRASS	15
POA AMPLA	BIG BLUEGRASS	10
FESTUCA OVINA	IDAHO FESCUE	10
FESTUCA OVINA	SHEEP FESCUE	10
PASCOPYRUM SMITHII	WESTERN WHEATGRASS	10
ELYMUS GMELINII	BLUE WILDRYE	5
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS	5

C. PHASED BMP IMPLEMENTATION

RELATIONSHIPS BETWEEN PHASES OF CONSTRUCTION AND IMPLEMENTATION OF BMPs WILL BE DESCRIBED IN SWMP LOGBOOK OR NOTED ON REDLINE VERSION OF THIS SWMP.

D. MATERIALS HANDLING AND SPILL PREVENTION

MATERIAL STORAGE SHALL BE LOCATED IN A CONTAINED AREA AWAY FROM SENSITIVE AREAS (SEE SHEETS C6.1 - C6.3 FOR SWMP MAPS). MATERIALS SHALL BE CONFINED AND HAVE BMPs INSTALLED TO PREVENT POTENTIAL POLLUTANTS FROM ENTERING THE STORM WATER RUNOFF.

IN THE EVENT OF A SPILL, THE FOLLOWING GENERAL SPILL RESPONSE PROCEDURES WILL BE FOLLOWED:

- SWMP ADMINISTRATOR WILL BE NOTIFIED, IF APPROPRIATE, THE CDPHE 24-HOUR SPILL REPORTING LINE (1-877-518-5608), DOWNSTREAM WATER USERS, AND OTHER AGENCIES WILL ALSO BE NOTIFIED.
- SPILL KITS WILL BE PROVIDED ON-SITE AND EMPLOYEES TRAINED IN PROPER CLEANUP PROCEDURES.
- ABSORBENTS WILL BE USED TO CLEAN UP FUEL SPILLS.

E. DEDICATED CONCRETE AND ASPHALT BATCH PLANTS

DEDICATED CONCRETE AND ASPHALT BATCH PLANTS WILL NOT BE CONSTRUCTED ON-SITE AS PART OF THIS PROJECT.

F. VEHICLE TRACKING CONTROL

SITE ACCESS MINIMIZATION

ACCESS TO THE SITE WILL BE LIMITED TO DEFINED CONSTRUCTION ENTRANCES. TEMPORARY CONSTRUCTION FENCING WILL BE MAINTAINED AROUND THE SITE TO PREVENT ACCESS FROM OTHER LOCATIONS, AS NECESSARY.

VEHICLE TRACKING

VEHICLE TRACKING CONTROL PADS SHALL BE MAINTAINED AND HAVE NEW GRAVEL INSTALLED AS NECESSARY TO PREVENT SEDIMENT BUILD UP AND TRANSFER FROM THE PROJECT SITE.

STREET CLEANING

WHENEVER SEDIMENT IS TRANSPORTED INTO THE ROADWAY, THE CONTRACTOR SHALL CLEAN THE ROADWAY IMMEDIATELY. STREET WASHING IS NOT ALLOWED, AND STORM INLET BMPs ALONG IN THE VICINITY SHALL HAVE BMPs INSTALLED PRIOR TO SHOVELING, SWEEPING, OR VACUUMING.

STABILIZED CONSTRUCTION ENTRANCE / VEHICLE TRACKING CONTROL

THE SITE ACCESS POINTS DURING CONSTRUCTION OPERATIONS SHALL HAVE A VEHICLE TRACKING CONTROL PAD INSTALLED PRIOR TO TRACKING ANY MATERIAL OFFSITE AND INTO THE PUBLIC RIGHT OF WAY.

G. WASTE MANAGEMENT AND DISPOSAL, INCLUDING CONCRETE WASHOUT

A SPECIFIC SELF-CONTAINED SITE SHALL BE PROVIDED FOR ALL CONCRETE WASHOUT AND FIELD LABORATORY OPERATIONS, AS WELL AS ASPHALT WASTE OPERATIONS. THIS AREA SHALL BE MAINTAINED TO PREVENT RUNOFF FROM TRANSPORTING MATERIAL FROM THE PROJECT SITE.

H. GROUNDWATER AND STORM WATER DEWATERING

TEMPORARY CONSTRUCTION DEWATERING MAY BE REQUIRED DURING CONSTRUCTION OF UNDERGROUND UTILITIES. PRACTICES IMPLEMENTED AT THE SITE TO CONTROL STORM WATER POLLUTION FROM GROUNDWATER AND STORM WATER DEWATERING WILL BE OUTLINED IN SWMP LOGBOOK, AS APPROPRIATE. CONTRACTOR SHALL OBTAIN REQUIRED PERMITS PRIOR TO CONDUCTING DEWATERING OPERATIONS.

6. FINAL STABILIZATION AND LONG-TERM STORM WATER MANAGEMENT

FINAL STABILIZATION WILL BE ACHIEVED WITH THE FOLLOWING POST-CONSTRUCTION STORM WATER CONTROLS:

- STORM SEWER CULVERTS AND RIPRAP SHALL BE INSTALLED AS SOON AS PRACTICABLE.
- SEED ALL DISTURBED AREAS AND INSTALL EROSION CONTROL BLANKETS.
- THE CONTRACTOR SHALL MAINTAIN SEEDING/MULCH/TACKIFIER, MOW AND CONTROL WEEDS OR APPLY HERBICIDE AS NECESSARY UNTIL STABILIZATION IS ACHIEVED AND FINAL ACCEPTANCE AND PERMIT CLOSEOUT IS ACHIEVED.
- PERMANENT SEEDED AREAS SHALL BE REVIEWED AFTER 14 DAYS BY THE SWMP ADMINISTRATOR FOR BARE SOILS CAUSED BY SURFACE OR WIND EROSION. THESE AREAS SHALL BE REGRADED, SEEDED, AND MULCHED/TACKIFIER APPLIED AS NEEDED. AREAS WHERE SEED HAS NOT GERMINATED SHALL HAVE SEED AND MULCH TACKIFIER REAPPLIED.

7. INSPECTIONS AND MAINTENANCE

THE CONTRACTOR SHALL COMPLETE AND DOCUMENT INSPECTIONS IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) CONSTRUCTION ACTIVITIES GENERAL PERMIT (CDPS PERMIT NO. COR400000. REFERENCE CDOT AND SUMMIT COUNTY SPECIFICATIONS FOR GUIDANCE ON REQUIRED PRACTICES, MAINTENANCE PROCEDURES, AND RECORD KEEPING.

8. RECORD KEEPING

RECORDS OF ALL STORM WATER MANAGEMENT ACTIVITIES INCLUDING SPILLS, LEAKS, OVERFLOWS, AND INSPECTIONS SHALL BE KEPT IN ACCORDANCE WITH SUMMIT COUNTY SPECIFICATIONS.

SWMP SHEET INDEX

SHEET NO.	SHEET TITLE
C6.0	STORM WATER MANAGEMENT PLAN NOTES AND LEGEND
C6.1	INITIAL STORM WATER MANAGEMENT PLAN
C6.2	INTERIM STORM WATER MANAGEMENT PLAN
C6.3	FINAL STORM WATER MANAGEMENT PLAN
C6.4-C6.5	STORM WATER MANAGEMENT PLAN STANDARD DETAILS

SWMP LEGEND

DISTURBANCE LIMITS AND CONSTRUCTION SITE BOUNDARY..... =====

STORM WATER FLOW DIRECTION.....	
SILT FENCE..... (SEE DETAIL D/C6.4)	SF
EROSION CONTROL BLANKETS..... (SEE DETAIL A/C6.5)	ECB
SEDIMENT CONTROL LOG..... (SEE DETAIL B/C6.4)	SCL
STABILIZED STORAGE AREA..... (SEE DETAIL G/C6.4)	SSA
VEHICLE TRACKING CONTROL..... (SEE DETAIL A/C6.4)	VTC
CONCRETE WASHOUT AREA..... (SEE DETAIL E/C6.4)	CWA
TEMPORARY SEEDING AND MULCH..... (SEE SWMP NOTES C6.0)	TS MU

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STORMWATER MANAGEMENT NOTES & LEGEND


PROJECT NO. B1333

C6.0

SHEET: 14 OF 19



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INITIAL STORMWATER MANAGEMENT PLAN	
PROJECT NO. B1333	
C6.1	
SHEET: 15 OF 19	

1333SWMP-INITIAL



SUMMIT COUNTY STANDARD NOTES FOR CONSTRUCTION PLANS:

- ALL WORK AND MATERIALS SHALL BE IN CONFORMANCE WITH ALL CURRENTLY APPLICABLE STANDARDS IN THE "SUMMIT COUNTY LAND USE AND DEVELOPMENT CODE."
- LOCATIONS OF EXISTING UTILITIES SHOWN IN PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING UTILITIES. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION OF ROAD AND DRAINAGE FACILITIES ACCORDING TO THE REQUIREMENTS OF THE UTILITY OWNER AND THE SUMMIT COUNTY ROAD AND BRIDGE DEPARTMENT.
- THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF APPROVED ROAD AND DRAINAGE PLANS ON THE JOB SITE THROUGHOUT CONSTRUCTION IS IN PROGRESS.
- IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DESIGN ENGINEER AND THE SUMMIT COUNTY ENGINEERING DEPARTMENT.
- EXISTING GROUND SHALL BE IN ACCORDANCE WITH THE APPROVED GRADING PLAN AND EROSION CONTROL PLAN. ANY PROTECT OR EXIST OF MATERIAL SHALL BE PERFORMED PRIOR TO CONSTRUCTION OF ROAD AND DRAINAGE FACILITIES ACCORDING TO THE REQUIREMENTS OF THE UTILITY OWNER AND THE SUMMIT COUNTY ENGINEERING DEPARTMENT. ANY PROTECT OR EXIST OF MATERIAL SHALL BE PERFORMED PRIOR TO CONSTRUCTION OF ROAD AND DRAINAGE FACILITIES ACCORDING TO THE REQUIREMENTS OF THE UTILITY OWNER AND THE SUMMIT COUNTY ENGINEERING DEPARTMENT.
- WHEN TO SITE CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 811 BEFORE YOU DIG.

SUMMIT COUNTY, COLORADO EROSION/SEDIMENTATION CONTROL (ESC) NOTES:

- THE MOST EFFECTIVE ESC BEST MANAGEMENT PRACTICE (BMP) IS NON-DISTURBANCE. GIVEN THAT LAND DEVELOPMENT INHERENTLY INVOLVES SOME DISTURBANCE ACTIVITIES, THE FIRST STEP IN RESPONSIBLE STEWARDSHIP IS TO LIMIT THE AMOUNT OF DISTURBANCE REQUIRED FOR SITE DEVELOPMENT. AFTER ALL DESIGN AND PLANNING CONSIDERATIONS HAVE BEEN MADE, THEN THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE ATTACHED DETAILS AND NOTES SHALL BE APPLIED WHEREVER THEY MAY BE APPROPRIATE TO PREVENT EROSION AND SEDIMENT DISCHARGE DURING YOUR PROJECT SITE.
- EROSION CONTROL BMP'S AS SHOWN HEREIN AND INDICATED ON YOUR SITE PLAN MUST BE INSTALLED AND MAINTAINED PRIOR TO THE START OF ANY GRADING PERMITS, INCLUDING YOUR VTC AND CONCRETE WASHOUT AREA.
- THE CONTRACTOR SHALL NOT DO ANY GRADING OR EROSION OR EARTHWORK BEFORE THE EROSION CONTROL INSTALLATIONS HAVE BEEN APPROVED BY THE COUNTY ENGINEER.
- EROSION CONTROL: CONTROLLING POLLUTION, EROSION, RUN-OFF, AND RELATED DAMAGE MAY REQUIRE THE CONTRACTOR TO PERFORM TEMPORARY WORK ITEMS INCLUDING BUT NOT LIMITED TO:
 - INSTALLING DITCHES, BERMS, CULVERTS, AND OTHER MEASURES TO CONTROL EXCESS WATER.
 - BUILDING DAMS, SETTLING BASINS, ENERGY DISSIPATORS, AND OTHER MEASURES TO CONTROL DOWNSTREAM FLOODING.
 - CONTROLLING GROUNDWATER FLOW DURING CONSTRUCTION.
 - COVERING OR OTHERWISE PROTECTING SLOPES UNTIL FURTHER EROSION CONTROL MEASURES ARE WORKING.
- THE CONTRACTOR SHALL BEAR FULL RESPONSIBILITY FOR TEMPORARY WATER POLLUTION CONTROL IN ALL SOURCES OF MATERIAL, DISPOSAL SITES, AND HAIL ROADS. NO STORM WATER, EXCESS WATER, OR WATER OF ANY KIND SHALL BE PERMITTED DRAINING OR OTHERWISE DISCHARGED INTO DOWNSTREAM WATERS WITHOUT APPROPRIATE CONTROLS AND REQUIRED PERMITS.
- APPROVAL OF THE ESC PLAN DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED FLOOD STORY, DRAINAGE, GRADING, OR UTILITY DESIGN ELEMENTS SHOWN ON THE ESC PLAN.
- THE EROSION/SEDIMENTATION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS FOR THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT A MINIMUM THREE ESC MEASURES DAILY, & SHALL MAINTAIN & UPGRADE THESE MEASURES AS NECESSARY TO PREVENT DOWNSTREAM WATER FROM OTHER FLOODING OF THE SITE, OR INTO INVOLVING STORM DRAINAGE FACILITIES, SUCH AS DIRT WELLS, CULVERTS, OR OTHER CHALLENGES.
- THE CONTRACTOR/DEVELOPER IS RESPONSIBLE FOR INSTALLING ROCK CONSTRUCTION DITCHES AT ANY ALL LOCATIONS USED TO ENTER OR EXIT THE PROJECT SITE. THESE MUST BE INSPECTED AND APPROVED ALONG WITH OTHER BMP'S USED AT YOUR SITE, AND SHALL BE REMOVED BEFORE PLACING ROAD SURFACING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION, INSPECTION AND MAINTENANCE OF ALL TEMPORARY EROSION CONTROL MEASURES.
- SEDIMENT BARRIERS SHALL BE INSTALLED, CLEANED AND REMOVED AFTER EACH MAJOR EVENT. REMOVE ALL SEDIMENT AND DEPOSIT ON SITE AFTER SEDIMENT BARRIERS ARE NO LONGER REQUIRED.
- CONTRACTOR SHALL NOT REMOVE TEMPORARY ESC MEASURES UNTIL 30 DAYS AFTER THE SITE IS STABILIZED. ALL DISTURBED SOIL SHALL BE PERMANENTLY STABILIZED EITHER THROUGH VEGETATION, TOP-SOIL, PAINTING, OR OTHER PRE-APPROVED METHODS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, RUB AND OTHER CONSTRUCTION DEBRIS WHICH MAY ACCUMULATE ON ROAD SURFACES ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING WATER UNDER PRESSURE. SHEDDING AND WATER SHALL BE USED WHEN WATER PRESSURE ALONE WILL NOT WASH THE CONSTRUCTION DEBRIS FROM THE STREET.
- SEDIMENT BARRIERS TO BE PLACED ON BERM OR DRAINAGE, CATCH BASIN, A BULLET UNTIL SUCH TIME THE VEGETATION ON THE SITE IS ESTABLISHED & THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.

CALL 970.668.4212 WHEN BMP'S ARE READY FOR INSPECTION PRIOR TO EXCAVATION

Summit County Engineering Department

Project Name: ILLINOIS GULCH REMOVAL ACTION

Job Number: 0X-00X

Date: 2/2/09

Drawn by: nts

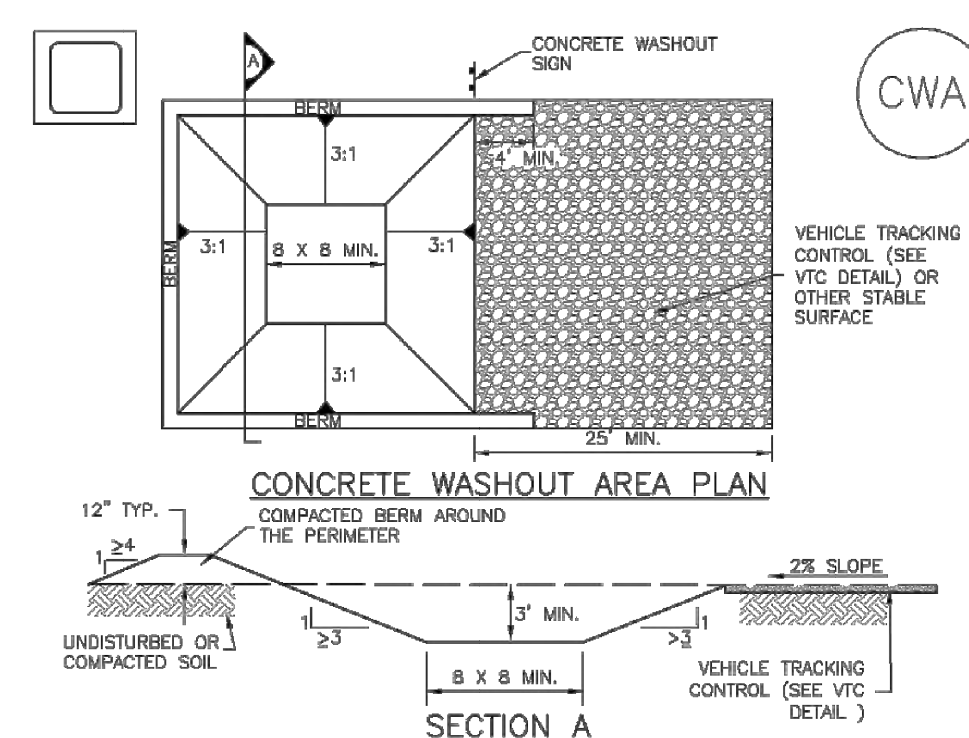
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Scale: 1" = 10'

Sheet: 1 of 1

Summit County Standard BMP's

Concrete Washout Area (CWA) MM-1



CWA-1. CONCRETE WASHOUT AREA

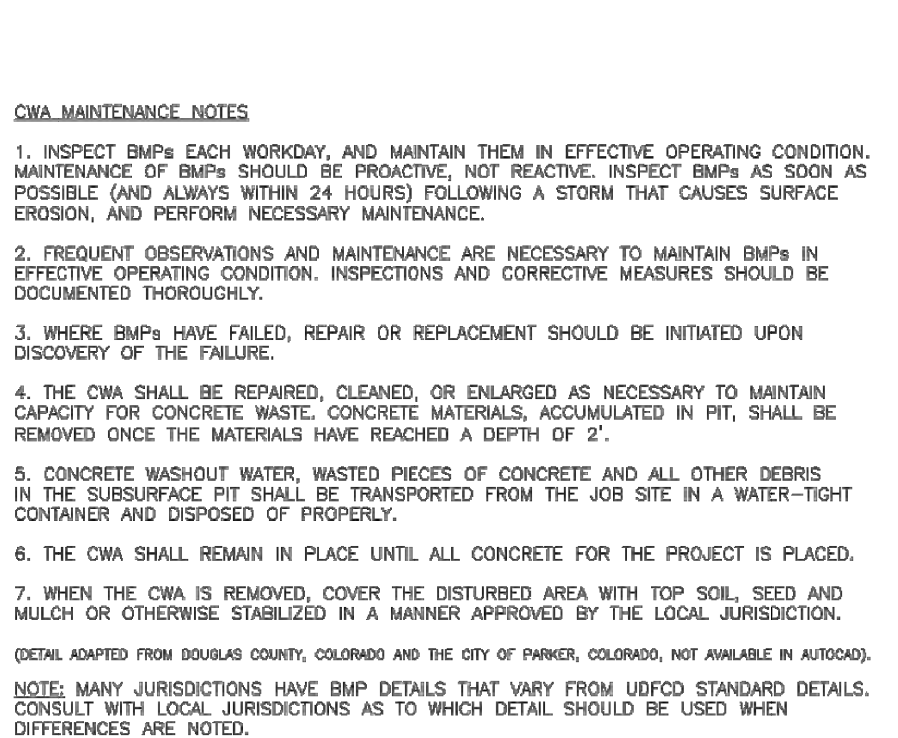
CWA INSTALLATION NOTES

- SEE PLAN VIEW FOR CWA INSTALLATION LOCATION.
- DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS IMPASSIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (1.8 MIL. MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.
- THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
- CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8" BY 8" SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.
- BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.
- VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
- SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP TRUCKS.
- USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

ALSO SEE C6.4

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 CWA-3

Concrete Washout Area (CWA) MM-1



CWA MAINTENANCE NOTES

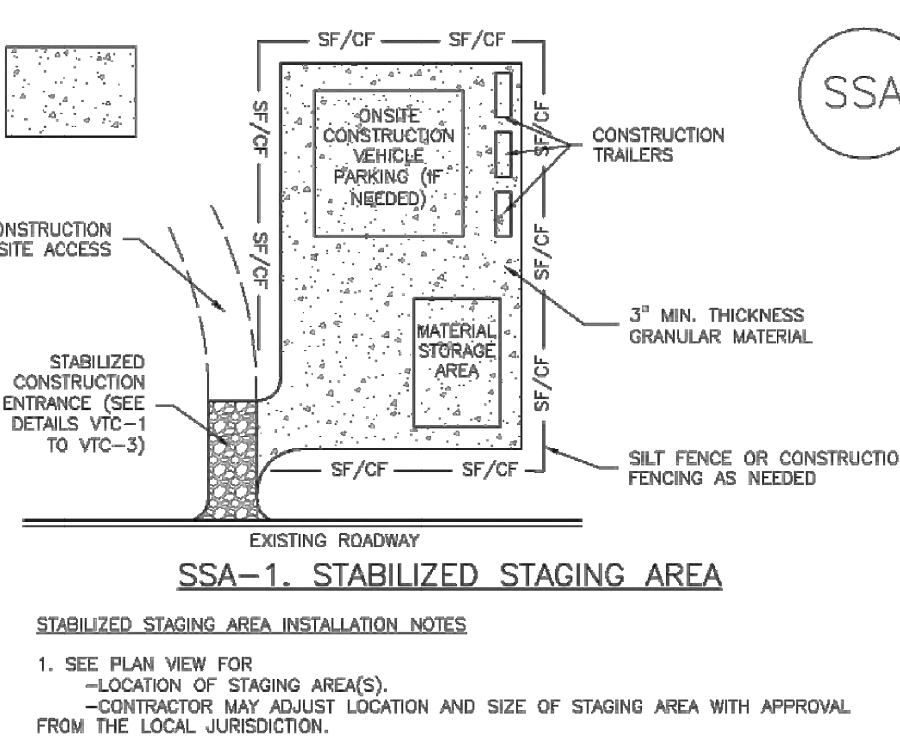
- INSPECT BMP'S EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMP'S SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMP'S AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMP'S IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMP'S HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
- CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
- THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
- WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 CWA-4

Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

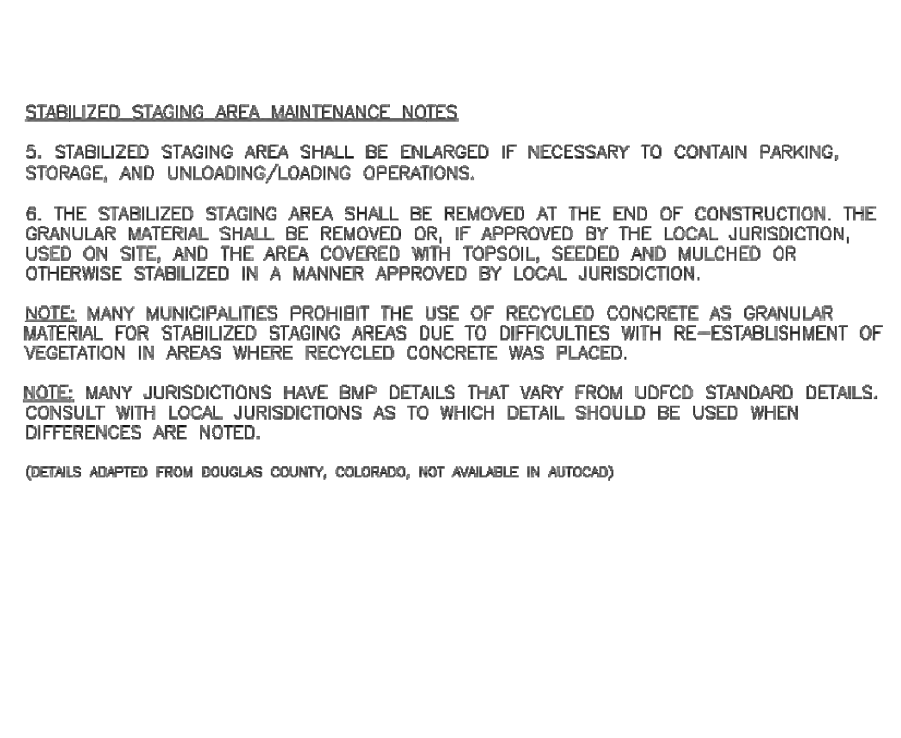
- SEE PLAN VIEW FOR LOCATION OF STAGING AREA(S). CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
- STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
- STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
- THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
- ADDITIONAL PERIMETER BMP'S MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

- INSPECT BMP'S EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMP'S SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMP'S AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMP'S IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMP'S HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SSA-3

Stabilized Staging Area (SSA) SM-6



STABILIZED STAGING AREA MAINTENANCE NOTES

- STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
- THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDING AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

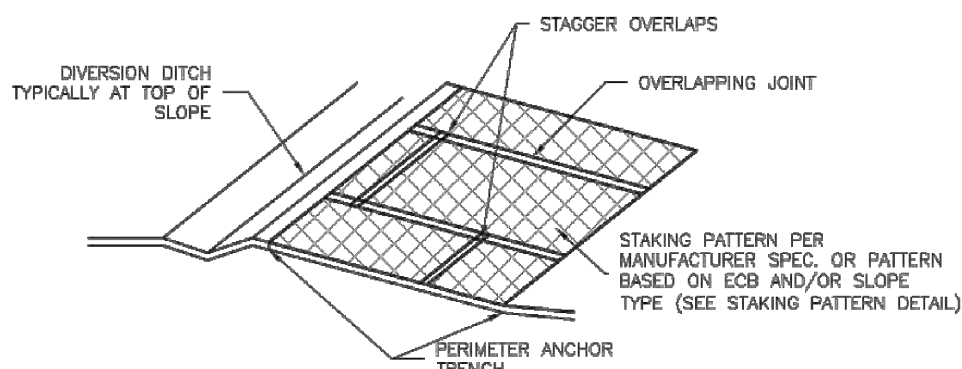
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

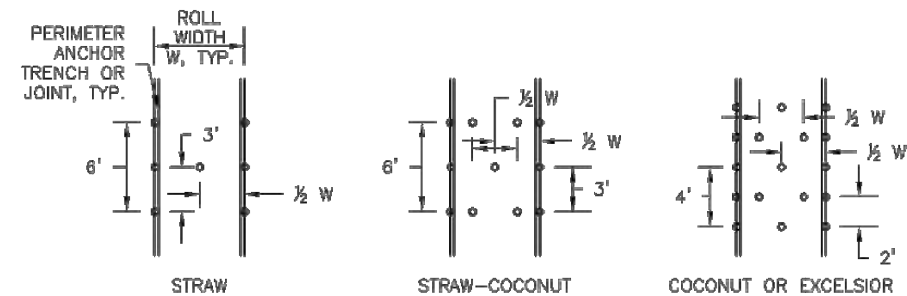
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SSA-4

Rolled Erosion Control Products (RECP)

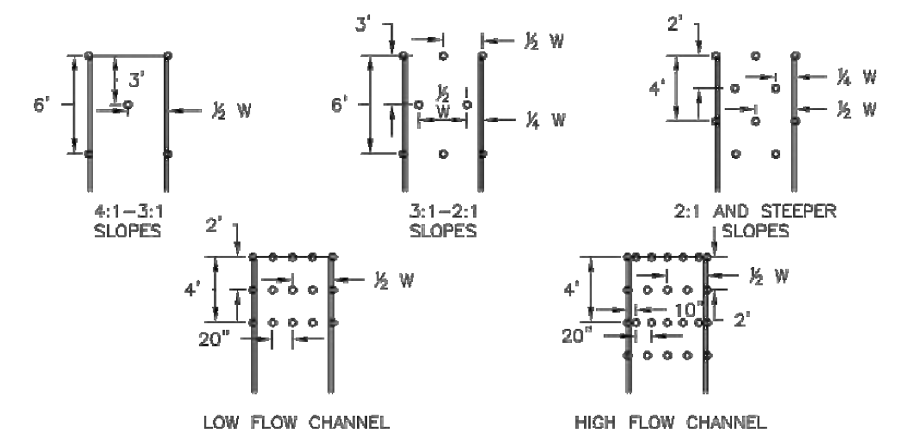
EC-6



ECB-3. OUTSIDE OF DRAINAGEWAY



STAKING PATTERNS BY ECB TYPE



STAKING PATTERNS BY SLOPE OR CHANNEL TYPE

ALSO SEE



November 2010 Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3

RECP-7

EC-6

Rolled Erosion Control Products (RECP)



EROSION CONTROL BLANKET INSTALLATION NOTES

- SEE PLAN VIEW FOR:
 - LOCATION OF ECB.
 - TYPE OF ECB (STRAW, STRAW-COCOONUT, COCONUT, OR EXCELSIOR).
 - AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.
- 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.
- IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.
- PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.
- JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.
- INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.
- OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.
- MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.
- ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBs SHALL BE RESEEDED AND MULCHED.
- DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB-1. ECB MATERIAL SPECIFICATIONS			
TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT
STRAW	—	100%	—
STRAW-COCOONUT	30% MIN	70% MAX	—
COCONUT	100%	—	—
EXCELSIOR	—	—	100%

WHEN ECBs MAY ONLY BE USED OUTSIDE OF DRAINAGE AND DRAINAGE CHANNEL. MATERIALS LISTED MAY BE ACCEPTABLE IN SOME JURISDICTIONS.

ALSO SEE



RECP-8 Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3

November 2010

Rolled Erosion Control Products (RECP)

EC-6



EROSION CONTROL BLANKET MAINTENANCE NOTES

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.
- ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO AND TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

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Urban Storm Drainage Criteria Manual Volume 3

RECP-9

PREPARED BY:



The Sanitas Group

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303.481.2710

PROJECT CONTACT:
CURTIS C. STEVENS, P.E.

PREPARED FOR:

FORMATION ENVIRONMENTAL, LLC

2500 55TH STREET, SUITE 200
BOULDER, CO 80301

CONTACT: BRIAN HANSEN
303.396.0734

WORK PLAN DOCUMENTS FOR PHASE 1 / PHASE 2:

ILLINOIS GULCH
REMOVAL ACTION
SUMMIT COUNTY
STATE OF COLORADO

ISSUE DATE

CLIENT REVIEW 3/15/2021

EPA REVIEW 3/29/2021

DESIGNED BY: CCS
DRAWN BY: CCS
CHECKED BY: TSG

DRAWING SCALE:
HORIZONTAL: NONE
VERTICAL: NONE

STORMWATER MANAGEMENT
DETAILS (2 OF 2)

PROJECT NO. B1333

C6.5

SHEET: 19 OF 19

APPENDIX C
TECHNICAL MEMORANDUM – DRAINAGE ANALYSIS

21 October 2020

Technical Memorandum – Drainage Analysis

RE: Drainage Analysis – Illinois Gulch
Puzzle Extension Shaft Site
Summit County, Colorado

SG: B1333

To Whom It May Concern,

The Sanitas Group is providing this technical memorandum as a summary of our drainage analysis in support of the lining of a section of Illinois Gulch adjacent to the puzzle extension shaft.

The puzzle extension shaft site is located on the west side of Illinois Gulch Road approximately 1,130 feet southeast of Boreas Pass Road in Summit County, Colorado. USGS StreamStats was used to delineate the drainage basin and estimate peak runoff rates at the puzzle extension shaft site. StreamStats uses regional regression equations for estimation of various streamflow statistics. The USGS, in cooperation with the Colorado Water Conservation Board and the Colorado Department of Transportation, developed the regional regression equations used in Colorado, as documented in USGS Scientific Investigations Report 2009-5136 *“Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado”*. The StreamStats generated drainage basin area tributary to the puzzle extension shaft site is 2.47 square-miles and the peak runoff rates at the site are summarized in the table below.

Design Storm	Peak Flow Rate [cfs]	Standard Error of Prediction [%]
2 Year	32.5	49
5 Year	47.3	44
10 Year	57	41
25 Year	70.3	40
50 Year	83.8	39
100 Year	93.6	36
200 Year	102	36
500 Year	120	33

The proposed channel lining system consists of dual 36-inch HDPE storm sewer piping that will be designed to convey the 500-year flow rate of 120 cfs with a maximum headwater/depth ratio of 2.0. Concrete cutoff walls extending a minimum of 4-ft below the channel will be constructed at both the upstream and downstream ends of the lining system.

Technical Memorandum – Drainage Analysis
Illinois Gulch – Puzzle Extension Shaft Site
Summit County, Colorado
21 October 2020

As an additional design safety factor, the channel lining system will be designed to convey the 500-year flow plus the Standard Error of Prediction (33%), or 160 cfs. A roadside swale above the storm pipe will be used as a secondary conveyance element in the event overtopping occurs at the upstream headwall. The extents of the channel lining system including the cutoff wall locations will be determined after subsequent discussions with the design team and reviewing agencies.

If you have any questions or comments regarding the above, please feel free to contact me at 720.346.1656 or email me at cstevens@thesanitasgroup.com.

Sincerely,

The Sanitas Group, LLC



Curtis C. Stevens, P.E., CFM
Principal/Civil Engineer

Cc:

Attachments: StreatStats Reference

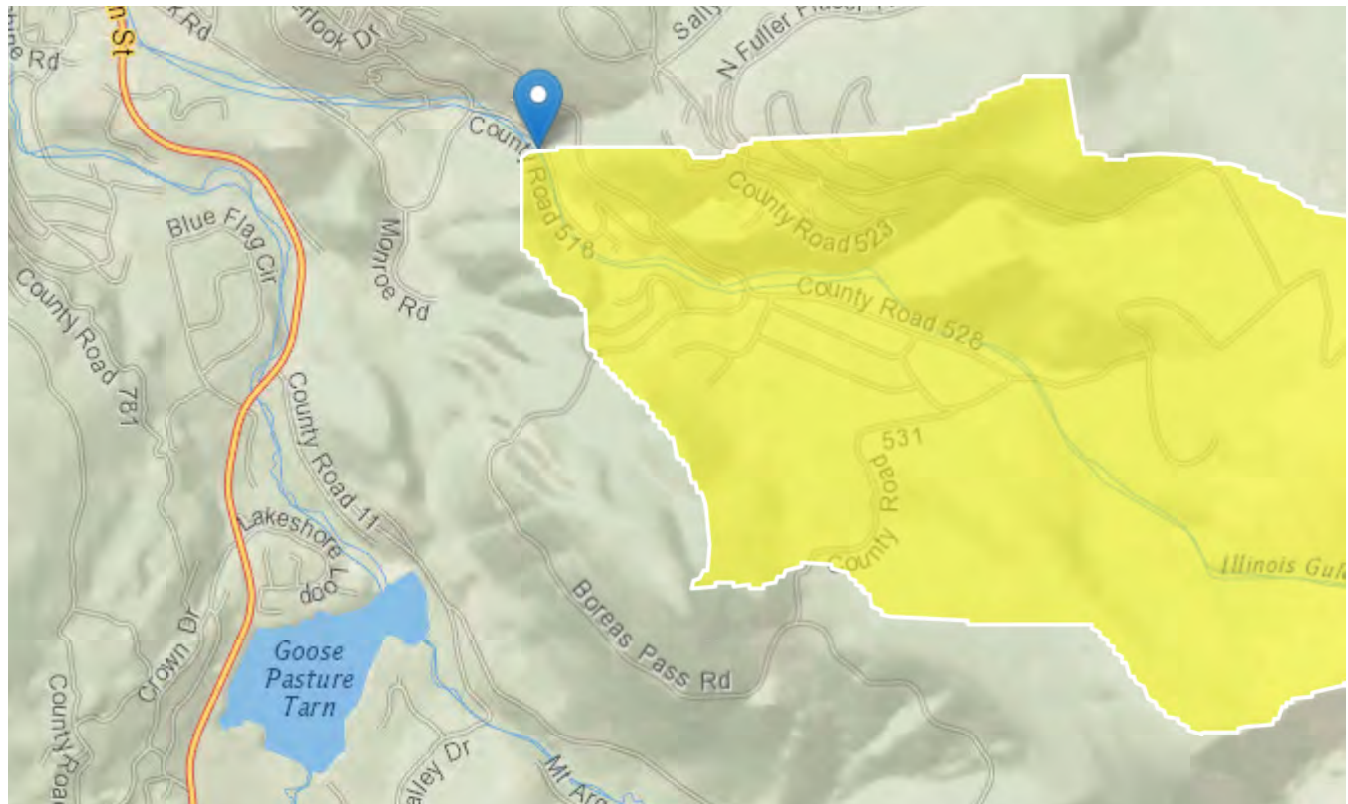
StreamStats Report

Region ID: CO

Workspace ID: C020200811225952563000

Clicked Point (Latitude, Longitude): 39.46935, -106.02395

Time: 2020-08-11 17:00:09 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.47	square miles
BSLDEM10M	Mean basin slope computed from 10 m DEM	27	percent
PRECIP	Mean Annual Precipitation	27.19	inches
TOC	Time of concentration in hours	1.57	hours

Peak-Flow Statistics Parameters[Mountain Region Peak Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	2.47	square miles	1	1060
BSLDEM10M	Mean Basin Slope from 10m DEM	27	percent	7.6	60.2
PRECIP	Mean Annual Precipitation	27.19	inches	18	47
Peak-Flow Statistics Flow Report ^[Mountain Region Peak Flow]					
PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)					
Statistic		Value	Unit	SEp	
2 Year Peak Flood		32.5	ft^3/s	49	
5 Year Peak Flood		47.3	ft^3/s	44	
10 Year Peak Flood		57	ft^3/s	41	
25 Year Peak Flood		70.3	ft^3/s	40	
50 Year Peak Flood		83.8	ft^3/s	39	
100 Year Peak Flood		93.6	ft^3/s	36	
200 Year Peak Flood		102	ft^3/s	36	
500 Year Peak Flood		120	ft^3/s	33	
Peak-Flow Statistics Citations					
Capesius, J.P., and Stephens, V. C.,2009, Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado: U. S. Geological Survey Scientific Investigations Report 2009-5136, 32 p. (http://pubs.usgs.gov/sir/2009/5136/http://pubs.usgs.gov/sir/2009/5136/)					

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Application Version: 4.4.0

APPENDIX D
HEALTH AND SAFETY PLAN (HASP)

DRAFT

Health and Safety Plan

Illinois Gulch Site Time Critical Removal Action

Summit County, Colorado

October 2020

Prepared for:

TABR Realty Services, LLC
6300 C Street SW
Cedar Rapids, IA 52944

Prepared by:



Formation Environmental, LLC
2500 55th Street, Suite 200
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LIST OF ATTACHMENTS

Attachments

- 1 HASP Addenda
- 2 Heat Stress Education Poster
- 3 Wind Chill Chart
- 4 Safety Compliance Agreement Form
- 5 Tailgate Safety Meeting Form

LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CPR	Cardiopulmonary Resuscitation
EPA	Environmental Protection Agency
F	Fahrenheit
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Health and Safety Association
PPE	Personal Protective Equipment
SPF	Sun Protection Factor
TCRA	Time Critical Removal Action
UV	Ultraviolet

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared by Formation Environmental (Formation) in support of Time Critical Removal Action (TCRA) efforts at the Illinois Gulch Site and surrounding area (hereafter referred to as “the Site”). The Site is located in Summit County, Colorado, outside of the town of Breckenridge. Site features are shown on Figure 1.

1.1 Safety Policy and HASP Scope

Formation is committed to performing its work in a manner that is protective of the safety and health of its employees, contractors, and the public, and to the prevention of harm to assets, property, and the environment. We are committed to providing a safe work environment, constantly improving our safety practices and management, and adopting “Best Practices” wherever possible. Safety is more important than project costs, schedule, or productivity. All on-Site project-related personnel, including contractors, shall be informed of the Site emergency response procedures, any potential health or safety hazards associated with the Site, and the safe work practices described in this HASP. This HASP must be reviewed and an agreement to comply with the requirements must be signed by all Formation personnel prior to performing field work at the Site.

Safety is a corporate as well as an individual responsibility. Our expectation is that every person involved with this project will:

- Accept the philosophy that all incidents are preventable;
- Take the time to do their work safely;
- Become familiar with and abide by the requirements of this HASP;
- Take personal responsibility for their role to contribute to the success of the safety program; and
- Exercise their authority to stop work on any task they deem to be unsafe.

This HASP will be present and readily available during all on-Site activities and a copy of the plan will be made available to all personnel, contractors, and authorized visitors that may enter work areas. All personnel working on or visiting work areas at the Site shall be briefed on the HASP and adhere to provisions of this plan. However, each organization and employer shall be fully responsible for the health and safety of its own employees and compliance with all applicable health, safety and environmental regulations. Non-Formation personnel will be responsible for conducting work under their own health and safety programs which shall, at a minimum, comply with the requirements of this HASP. Alternatively, non-Formation personnel may adopt and use this HASP.

1.2 Purpose of the Health and Safety Plan

The purpose of this HASP is to identify and communicate the potential hazards associated with field work on the project; prescribe procedures that reduce health, safety and environmental risks as low as reasonably practicable; specify measures that mitigate remaining risk to acceptable levels; and describe training requirements, monitoring requirements, record keeping and emergency response procedures.

This plan has been developed using the information and data available, and the current understanding of the planned work tasks for the Project. As additional information is collected or new tasks are added, this HASP may be updated to reflect new hazard analysis and new health and safety program requirements. In addition, this HASP provides for procedures to recognize and address changing conditions that may arise during field activities.

1.3 Site Description and Project Overview

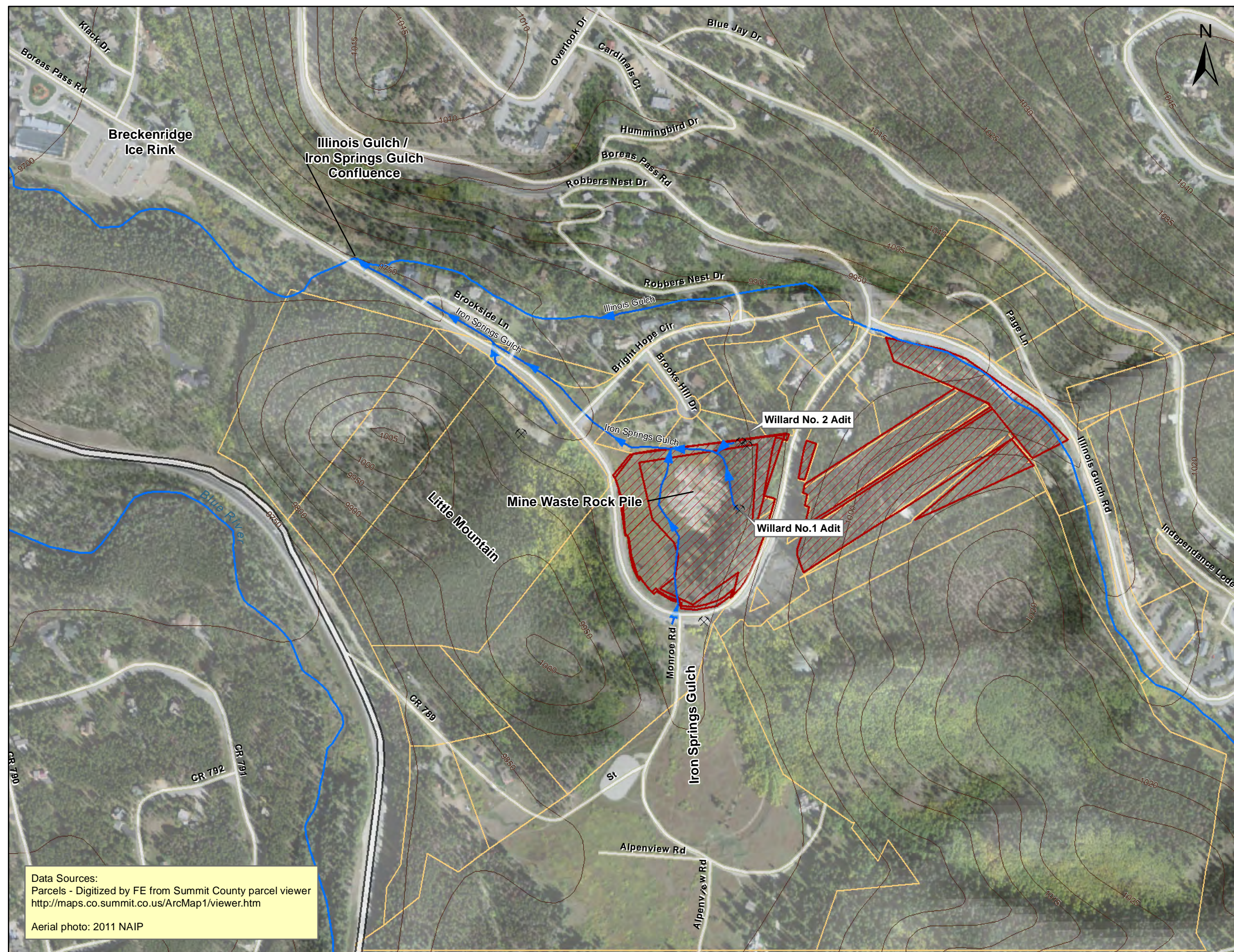
The Site is located southeast of the town of Breckenridge in Summit County, Colorado. The Site includes historical mining features located within the Iron Springs Gulch and Illinois Gulch watersheds near the intersection of Boreas Pass Road (County Road 10) and Illinois Gulch Road. Mining-related features at the site include two collapsed, flowing mine adits (Willard No. 1¹ and Willard No. 2); the Willard waste rock pile; the Cally waste rock pile; the Puzzle Extension Shaft and waste rock pile; and private residences where soil chemistry may have been affected by the Site (Figure 1). Additionally, metals concentrations in surface water associated with the Site have been measured at levels which may be hazardous to aquatic wildlife. The elevation of the Site is approximately 9,800 feet above mean sea level. Site winters are typically severe, with heavy snowfall may limit construction activities to the late spring through fall time frames each year.

Surface water in Iron Springs Gulch and Illinois Gulch flows to the northwest to their confluence approximately 1,500 feet downstream of the Willard waste rock pile. Groundwater discharging from the Willard No. 1 and Willard No. 2 adits contribute to flow in Iron Springs Gulch and generally degrade its water quality. Illinois Gulch flows approximately ¾-mile west-northwest from the Iron Springs Gulch confluence to join the Blue River, which flows approximately 6.5 miles northward to Dillon Reservoir, a water supply for the Denver, Colorado metropolitan area.









Work at the Site will consist of construction of access roads, geotechnical investigations, consolidation and reclamation of waste rock piles, plugging of a mine shaft, construction of a holding pond, soil sampling, and installation of a creek lining system.

¹ The Willard No. 1 adit is also called the Willard Tunnel of the Puzzle Mine.

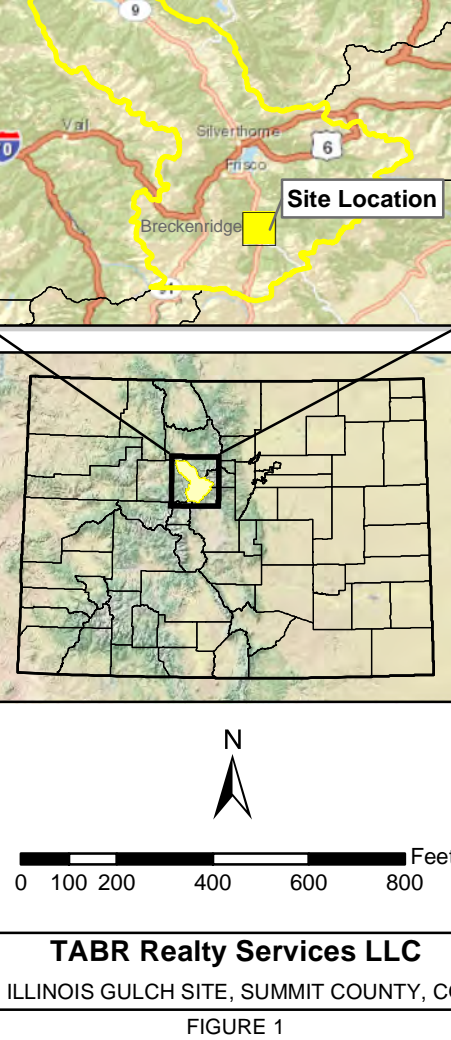
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Legend

-  Adit Location
-  Major Roads
-  Local Roads
-  Local Stream / Flow Direction
-  Stream/Water Source
-  Contour Interval = 50 feet
-  TABR Parcels
-  Other Parcels

Site Location In Summit County, Colorado



TABR Realty Services LLC
ILLINOIS GULCH SITE, SUMMIT COUNTY, CO

FIGURE 1

SITE LOCATION AND FEATURES

DATE: OCT 28, 2020	FORMATION
BY: CRL	ENVIRONMENTAL
FOR: BGH	

1.4 General Health, Safety Procedures, and Plan Revision

This HASP supplements Formation's Corporate Health and Safety Program (Formation 2018). The Project Manager and Site Safety Officer, identified in **Section 2.0**, have the right and responsibility to amend this HASP as necessary to meet the safety needs of any field task required to complete the project work.

The procedures presented herein are intended to serve as guidelines. Field work conditions may unexpectedly change as the project progresses. As such, procedures herein are not a substitute for on-site personnel exercising sound judgement and responsible safety practices. Prompt notification of changing work conditions requiring possible modification of this plan is the responsibility of the Field Supervisor. The Project Manager will update this HASP, as necessary, to reflect current project working conditions and safety needs. Additional field tasks with unique hazards or risks may also require changes to this plan. In addition, procedures and equipment specified in this plan will be reviewed and updated as new technologies and equipment are developed. In any event, no changes to this plan will be implemented without prior approval of the Project Manager.

HASP Attachment 1 will be reserved for HASP addenda. The addenda will be identified by number and will refer to the latest current revision of the plan (e.g., the first addendum to this plan will be Addendum 1). Each person with a copy of this HASP will be provided with each addendum. A list of those persons who have a copy of this plan will be kept by the Field Supervisor.

2.0 SITE PERSONNEL AND SAFETY RESPONSIBILITIES

Field work will be performed by Formation, a removal action construction contractor retained by TABR, and subcontractors of Formation and the construction contractor. The names and contact information of key project personnel are shown in Table 1. Additional emergency assistance information and phone numbers are provided in **Section 7.0**.

Table 1: Key Project Personnel

Key Personnel	Name	Affiliation	Email	Phone
Project Manager/ Engineer	Brian Hansen, P.E.	Formation Environmental	bhansen@formationenv.com	O: 303-396-0734 M: 720-635-6911
Field Supervisor/ Site Safety Officer	TBD	TBD	TBD	TBD
	TBD	TBD	TBD	TBD
Corporate Health and Safety Officer	Len Mason, P.G.	Formation Environmental	LMason@formationenv.com	O: 970-642-5078 M: 512-638-6464

2.1 Project Manager

The Project Manager will coordinate all Site activities for the project. The Project Manager will have the responsibility to interface with EPA and State of Colorado regulatory agency personnel and to ensure that appropriate reporting occurs.

The Project Manager's responsibilities include the following:

- Coordinating the work with TABR and its removal action construction contractor and serving as the primary point of contact for the work;
- Overseeing project implementation;
- Making decisions regarding additions/changes to the HASP; and
- Coordinating with the Field Supervisor/Site Safety Officer on project health and safety requirements.

2.2 Field Supervisor/Site Safety Officer

The Field Supervisor/Site Safety Officer will be designated as the person responsible for oversight of the project implementation, including all health and safety activities. The Field Supervisor will have the responsibility for implementation of the HASP during actual field operations. Responsibilities include the following:

- Conducting the pre-entry briefing with field personnel and work area visitors and providing all Project personnel with access to a copy of the HASP;

- Conducting the pre-entry briefing with field personnel and work area visitors and providing all Project personnel with access to a copy of the HASP;
- Acting as the Site Emergency Coordinator and implement the emergency response procedures including informing personnel of the proper procedures during emergencies, coordinating emergency procedures, evacuation routes, and calling the appropriate emergency contacts;
- Immediately reporting any unusual or unsafe conditions to the Project Manager;
- Verifying that all employees under his or her leadership work in a safe manner according to this HASP;
- Assuring that appropriate personnel and work area monitoring is conducted in accordance with the HASP;
- Inspecting field attire and make sure it is appropriate for the job;
- Inspecting Personal Protective Equipment and verify its use;
- Observing work party members and authorized visitors to assure they are fit for duty and for indications of impaired health due to contaminant exposure, heat stress, or other hazards;
- Conducting daily tailgate safety meetings;
- Performing Site audits to verify adherence to the requirements of the HASP;
- Evaluating whether Site conditions or changed conditions present hazards not previously predicted or expected, and modifying health and safety equipment or procedures based on data gathered at the Site;
- Making any updates or changes based on experience at the Site or new data gathered;
- Investigating and reporting all accidents, incidents, and infractions of safety rules and requirements to the Project Manager and Corporate Health and Safety Manager; and
- Suspending work or modifying work practices for safety reasons and dismissing individuals from Site work whose conduct on site endangers the health and safety of others.

2.2.1 Corporate Health and Safety Officer

The Corporate Health and Safety Officer will be responsible for supervising for the corporate health and safety program as it relates to project implementation. Specific responsibilities include:

- Establishing and overseeing the corporate health and safety program and ensuring compliance with this program and applicable federal, state and local guidelines;
- Verifying that all Formation employees participate in appropriate safety training and maintain employee records for these programs;
- Overseeing, participating in, and reviewing accident/incident and near miss reporting and investigations;

- Reporting Occupational Health and Safety Association (OSHA) reportable accidents;
- Overseeing awards and incentive program as well as enforcement and disciplinary actions for violations of Formation health and safety policy and programs;
- Reviewing and interpreting this HASP - proposed modifications that may result in less stringent precautions cannot be undertaken without approval of the Corporate Health and Safety Manager; and
- Ensuring participation of the appropriate personnel in the development of the HASP and any subsequent modifications.

2.2.2 Project Staff Responsibilities

Specific responsibilities for all field personnel involved with the Project include:

- Reviewing the HASP and attending daily safety briefings;
- Complying with the HASP and the instructions of the Site Safety Officer, and asking for clarification of any procedures regarding which he/she has questions;
- Advising the Site Safety Officer of any perceived deficiency in the HASP;
- Only doing work and using equipment or personnel protective equipment that they have been adequately trained to safely use/perform;
- Immediately reporting any unsafe conditions, or any changes in conditions or work scope not covered by the HASP;
- Immediately stopping any work they deem unsafe, and vacating any areas they deem unsafe, and reporting these conditions immediately to the Site Safety Officer; and
- Administering necessary precautions to minimize injury or exposure to themselves or other personnel;
- Notifying an office-based colleague on a daily basis, and throughout the day if working at multiple sites, where field staff are located; and
- Notifying the Field Supervisor or Health and Safety Officer of unsafe or potentially unsafe conditions, as well as of any accidents or injuries.

2.2.3 Contractors

Contractors shall bear the ultimate responsibility for all matters dealing with safety in the performance of their work. This responsibility includes the safety of all persons and property and any and all employees of contractors that may perform work on their behalf. This requirement will apply continuously regardless of time or place and will in no way be altered because Formation personnel provide general directions as to the location where work should be performed and/or samples taken. The contractor, their employees, and any and all employees of subcontractors that may perform work on their behalf may be required to work in potentially hazardous conditions. The Field Supervisor will, to the best of his or her ability, inform contractors or their representatives of any potential contaminant, electrical, fire,

explosion, health, or other safety hazards that have been identified during operations. Access to a copy of this HASP will be made available to all contractors performing project-related work at the Site.

3.0 HAZARD ANALYSIS

The major goal of the procedures defined in this HASP is to protect the workers from physical and chemical hazards that may be encountered during implementation of the work. The sections below discuss the hazards that could potentially be encountered during the course of the project.

3.1 Job Hazard Analysis and Controls

A hazard analysis of the work activities that have the potential for physical and/or chemical hazards is provided in the subsequent Table 2. Table 2 provides a step-by-step analysis of the potential hazards associated with each planned project task, and the associated measures to mitigate or control those hazards. References are provided to more detailed descriptions of the hazard mitigation measures contained elsewhere in this HASP. The applicable portions of this table should be reviewed during the daily Tailgate Safety Meetings conducted for the project.

Table 2: Job Hazard Analysis

Task	Potential Hazards	Measures to Eliminate Danger from Hazards
General Site Hazards Common to All Tasks	Unsafe conditions or practices by others	Daily tailgate safety meetings; Pre-job work area inspections; coordination of work activities between Site personnel; buddy system
	Slip, trip, fall	Wear proper footwear; watch for uneven ground, soft ground and burrows; add floodlights for night work; good housekeeping
	Heat stress	Wear appropriate attire; drink plenty of fluids; follow work/rest cycles; monitor for heat stress.
	Sunburn	Wear hat with brim or sun visor; apply sunscreen; wear sunglasses as needed
	Cold Stress	Wear appropriate attire; drink plenty of fluids; stay dry; take rests in heated vehicles; monitor for cold stress
	Native wildlife such as rodents, ticks, snakes, feral animals	Wear permethrin treated clothing in tick infested areas; at least 20% DEET insect repellent on exposed skin; avoid wildlife or feral animals if possible; perform first aid and seek medical attention in case of animal bite
Mobilization/ Demobilization	Vehicle accidents when driving to/from site	Follow safe driving practices
	Mobile Equipment (collisions, struck-by, pinning)	Physical isolation of work area; line of sight communication with drivers; use of spotters in tight quarters; backup alarms.
	Fall (from truck beds)	Use trucks with beds 4' high or less; use lift gate, use three -point stance when mounting / dismounting.

Task	Potential Hazards	Measures to Eliminate Danger from Hazards
Drilling/Geotechnical Boring	Items falling from vehicle	Inspect vehicle prior to mobilization and demobilization to make sure all equipment is securely stowed; tie down/strap equipment as appropriate.
	Strain from heavy lifting	Use proper lifting technique; share heavy loads.
	Hazards during mobilization to drill site	Drill rig tower is lowered; equipment of rig is properly secured; seatbelts are worn while rig is in motion
	Physical hazards from heavy equipment -	Wear proper field attire and personal protective equipment (PPE) such as steel-toed boots, safety glasses, and hard hats; physical isolation of work area; set up signs, signals, and barricades as needed; line of site communication; use of spotters in tight quarters; backup alarms
	Drill rig and tool failure	Complete daily inspection of drill rig and tooling prior to use; wear hard hat, steel toe boots, and safety glasses
	Buried utilities	Contact Colorado811 (811) for utility marking; contact local utility companies for location/information on buried utilities; clear boring using hand auger in questionable areas
	Overhead utilities	Utilize safe operating practices, maintain minimum clearances
	Noise from equipment	Use hearing protection as needed
	Strain from heavy lifting	Use proper lifting technique; share heavy loads; use pullies on rig to lift heavy objects
	Turning equipment	Un-necessary personnel to remain clear of work area; avoid loose clothing and jewelry; keep hands and limbs clear of turning equipment; locate emergency shut-off switch (kill switch) and confirm it is operational and drilling crew knows how to use
	Crushing and pinning injuries	Un-necessary personnel to remain clear of work area; wear hard hat, steel toe boots, leather gloves; identify work zones; keep safe distance from equipment; emergency brake set and wheels chocked; work area upslope of rig when working on slopes
	Contusion from portable tools	Use proper technique; wear gloves
	Exposure to chemical hazards	Wear proper PPE including nitrile gloves; practice good hygiene; avoid eating, drinking, or smoking in work areas
	Electrocution	Properly ground drill rig; suspend drilling during lightning; maintain minimum clearances for overhead utilities
	Fire	At least one 10-pound ABC fire extinguisher should be at rig and verified to be charged

Task	Potential Hazards	Measures to Eliminate Danger from Hazards
Construction	Release of dust	Work upwind of dust; use water to keep dust down as needed
	Mobile Equipment (collisions, struck-by, pinning)	Physical isolation of work area; line of sight communication with drivers; use of spotters in tight quarters; backup alarms.
	Physical hazards from heavy equipment	Wear proper field attire and PPE such as steel-toed boots, safety glasses, and hard hats; physical isolation of work area; set up signs, signals, and barricades as needed; line of site communication; use of spotters in tight quarters; backup alarms
	Buried utilities	Contact Colorado811 (811) for utility marking; contact local utility companies for location/information on buried utilities; clear boring using hand auger in questionable areas
	Overhead utilities	Utilize safe operating practices, maintain minimum clearances
	Noise from equipment	Use hearing protection as needed
	Exposure to chemical hazards	Wear proper PPE including nitrile gloves; practice good hygiene; avoid eating, drinking, or smoking in work areas
	Turning equipment	Un-necessary personnel to remain clear of work area; avoid loose clothing and jewelry; keep hands and limbs clear of turning equipment; locate emergency shut-off switch (kill switch) and confirm it is operational and drilling crew knows how to use
	Open excavations	Barricade open excavation with cones and caution tape; proper sloping, benching, shoring for open excavations greater than 5 feet that need to be entered; use of ladders or steps for exit of trenches greater than 4 feet deep
	Waste rock removal	Avoid digging at base of piles; barricade work areas as needed; wear proper PPE
	Contusion from portable tools	Use proper technique; wear gloves
	Electrocution	Properly ground drill rig; suspend drilling during lightning; maintain minimum clearances for overhead utilities
	Fire	At least one 10-pound ABC fire extinguisher should be at rig and verified to be charged
	Release of dust	Work upwind of dust; use water to keep dust down as needed
Soil Sampling	Exposure to chemical hazards	Wear proper PPE including nitrile gloves; practice good hygiene; avoid eating, drinking, or smoking in work areas
	Physical injuries	Wear proper PPE including gloves and eye protection
	Strain from heavy	Use proper lifting technique; share heavy loads

Task	Potential Hazards	Measures to Eliminate Danger from Hazards
	lifting	
	Crushing and pinching injuries	Wear leather gloves, keep hands and limbs free of moving equipment

3.2 Physical Hazards and Controls

Injuries that may result from physical hazards can range from simple scrapes or contusions to casualties, including fatalities due to moving heavy equipment or electrocution. Injuries resulting from physical hazards can be avoided through the adoption of safe work practices and employing caution when working with or near machinery. At the start of each day, the Field Supervisor shall inform the Project Manager of the locations and nature of the planned work. All field personnel shall be conscious of their work environment, and especially changes in conditions, and should notify the Field Supervisor or other appropriate supervisory personnel of any unsafe conditions. The Field Supervisor will be responsible for informing all workers of any physical hazards related to the Site. All field personnel should also familiarize themselves with other contractors' safety procedures. The protective measures to be implemented during completion of field activities are also identified under Section 4.0, Personal Protective Equipment.

3.2.1 Heavy Equipment

Operation of heavy equipment (tractors, graders, trucks, and dozers) presents a potential physical hazard to personnel. All PPE must meet or exceed the relevant standards set by NIOSH (National Institute for Occupational Safety and Health), ASTM (American Society for Testing and Materials), or ANSI (American National Standards Institute) for safety hard-toed boots, safety glasses or safety sunglasses, and hard hats, all of which should be worn whenever such equipment is present. Personnel should at all times be aware of the location and operation of heavy equipment and take precautions to avoid getting in the way of their operation. High visibility vests are required in areas subject to heavy equipment operation. When approaching the operator of any heavy equipment, be sure to make and maintain a clear line-of-sight contact and ensure that the operator has acknowledged the presence of personnel in his vicinity.

3.2.2 Trenching/Excavation

Trenches and excavations may pose a physical hazard to Site personnel during the collection of samples for geotechnical and/or laboratory analysis or other field work activities. All trenching and excavation work shall comply with the requirements of 29 CFR 1926, Subpart P. No worker shall enter an excavation without ensuring that the excavation and procedures comply with 29 CFR 1926. Some, but not all, requirements for safe trenching are:

- Whenever possible, workers will avoid entry into trenches or excavations.
- Any excavations and/or trenches exceeding five (5) feet in depth, and for which entry by personnel may be required, must be sloped, shored, braced or otherwise supported. Sloping angles and/or shoring/bracing requirements shall be determined after an inspection of the soils and conditions by a competent individual. The water content of the soil, the soil type, the degree of compaction, superimposed loads and vibration can affect the stability of a trench excavation. Support systems shall be planned and designed by a qualified person with previous experience successfully planning and designing safe support systems.
- Excavations and trenches will be inspected by a competent person before workers enter them. Furthermore, daily inspections shall be made and trenches shall be reinspected after every rainstorm or other potentially hazard-increasing event.
- Excavated materials (spoils) shall be stored at least two feet from the edge of the excavation, or otherwise retained, in order to prevent this material from falling into the excavation.
- When employees are required to be in trenches four (4) feet deep or more, an adequate means of exit, such as a ladder or steps, will be provided and located no more than 25 feet from any work area.
- When soil will be disturbed by heavy equipment or vehicles, wet the soil before disturbing it and continuously wet it while digging to keep dust levels down.
- Remain up wind from any dust generation.

3.2.3 Heat Stress

When personnel are working in hot environments, the Field Supervisor and all field personnel shall be trained to recognize the symptoms of heat stress and to provide initial first aid treatment if required until more qualified personnel take over. Heat stress occurs when the rate of heat gain is greater than the body's ability to remove it. It is important to understand the factors that cause overheating and mechanisms to control those factors. A heat stress education poster is included as HASP Attachment 2.

Heating of the body occurs from three sources:

- Radiant heating from heat sources or sunlight;
- Convective heating from contact with a warmer object or liquid; and
- Metabolic heating caused by activity.

Cooling occurs through three mechanisms:

- Respiration: Exhaled air is warm. As the body overheats, respiration becomes more rapid;
- Radiation: Heat is released at the surface of the skin. As the body overheats, the surficial blood vessels dilate and allow more heat to be lost; and

- Evaporation: Perspiration is released to the skin surface and evaporates. The skin is cooled by evaporative cooling.

Employee Education

Heat stress symptoms and treatment are described in Table 3.

Effects of PPE

Heat stress may occur with or without the use of PPE, which adds layers of clothing that insulate the wearer from cooling air. Chemical protective clothing generally has a vapor barrier to keep out chemical vapors. The vapor barrier also prevents evaporative cooling of perspiration. In short, PPE increases the potential for heat stress on workers.

Practical Methods to Reduce Heat Stress

These methods will be discussed during safety meetings:

- Become acclimated to heat for several days whenever possible.
- Schedule the hardest physical tasks for the coolest part of the day.
- If possible, use a portable canopy to provide shade to work or rest under.
- Wear cool clothing suitable for hot conditions. Loose fitting clothes allow for air to pass over skin to help cooling. Light colored clothing reflects heat. Large-brimmed hats worn on hot sunny days provide shade for head, face, and neck area.
- Perform Site preparations before the field team dresses out. Instrument calibrations, equipment preparation, and planning for the workday, etc., should be performed before dressing in PPE.
- Personnel should wear sunscreen containing a minimum sun protection factor (SPF) of 15 when working outdoors in the sun. Sunscreens are commonly rated and labeled with an SPF that measures the fraction of sunburn-producing UV rays that reach the skin. Sunscreen should be applied prior to beginning work and reapplied frequently.
- Take frequent breaks and consume at least one pint of cool fluid every hour. Replenish electrolytes through the consumption of diluted drinks. The body loses more water than electrolytes. Concentrated salt, electrolyte, or juices can increase susceptibility to heat stress.

Avoid beverages with caffeine, which make the body lose water and increase risk for heat illnesses.

Table 3: Heat Stress Symptoms and Treatment

CONDITION	COMMON SYMPTOMS	TREATMENT
Slightly elevated body temperature	Body temperature between 99 and 101° F Headache	Drink cool fluids. Rest in cool place until temperature and pulse are below 99° F and 110 beats per minute respectively.
Heat rash	Rash mainly on back	Shower at the end of the shift. Observe for signs of heat exhaustion.
Heat cramps	Muscle cramps or twitching often starting in abdominal area. Pain in hands, feet, and abdominal areas.	Remove from field work. Take off PPE. Encourage consumption of cool fluids designed to replenish electrolytes (e.g., Gatorade). Observe for signs of heat exhaustion.
Heat exhaustion	Body temperature between 99 and 102° F Headache, weakness Elevated pulse Profuse sweating Pale skin Cool wet/clammy skin Lethargic Nausea Dizziness	Act immediately. Remove to a cool shaded area. Take off PPE. Drink cool fluids, about a cup every 15 minutes unless sick to the stomach. Spray with a cool mist of water or apply wet cloth to skin. Treat as a medical emergency if the person does not feel better in a few minutes. No field work for at least 48 hours.
Heat stroke LIFE THREATENING	Temperature greater than 102° F Hot, dry pale skin with no sweating Flushed skin Irritability, confusion, seizures, unconsciousness. Rapid pulse	Treat as a medical emergency. Remove from field work. Remove PPE. Spray with a cool water mist, or apply cool wet cloth to skin, not cold water. Place ice packs under armpits and groin area until emergency medical services arrive. Written release from doctor required to return to work.

3.2.4 Ultraviolet (UV) Radiation (Sun Exposure)

Health effects regarding UV radiation are confined to the skin and eyes. Overexposure can result in adverse skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer.

Acute overexposure of UV radiation to the eyes may lead to photokeratitis (inflammation of the cornea), also known as snow blindness. Symptoms include redness of the eyes and a gritty feeling, which progresses to pain and an inability to tolerate any kind of light. This condition can also occur when working in or around water and other UV radiation reflectors. In addition, long-term exposure to sunlight is thought to cause cataracts or clouding of the lens of the eye.

Limit Exposure Time

- If possible, rotate staff to tasks with decreased sun exposure so the same personnel are not exposed all of the time.
- Try to limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun or take extra precautions when the UV index rating is high.

Provide Shade

- Try to take lunch and breaks in shaded areas.
- If possible, create shade or shelter through the use of umbrellas, tents, and canopies.
- Use fabrics such as canvas, sailcloth, awning material and synthetic shade cloth that create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing such as long-sleeved shirts with collars and long pants. The fabric should be closely woven.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion"-style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.

- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high SPF. Most dermatologists advocate SPF 30 or higher when subjected to significant sun exposure.
- Select waterproof sunscreens for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates because most sunscreens are only good for about 3 years.
- Store in a cool place out of the sun.

Remember that no sunscreen provides 100% protection against UV radiation. Other precautions must be taken to avoid overexposure.

3.2.5 Cold Stress

Personnel are subject to cold stress when working outdoors in conditions of low temperatures, especially at or below 40° Fahrenheit (F), wet conditions, and/or wind speed of 5 miles per hour or higher, and/or with lack of water, previous cold injuries, use of tobacco, fatigue and low activity. Exposure to extreme cold for a short time causes severe injury to the surface of the body. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, feet, and ears are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. A wind chill chart is shown in HASP Attachment 3.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite of the extremities can be categorized as:

- "Frost nip or incipient frostbite" which is characterized by sudden whitening of skin;
- "Superficial frostbite" which is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient; and
- "Deep frostbite" which is characterized by tissues that are cold, pale, and solid.

Hypothermia

Hypothermia is most likely to occur at very cold temperatures but it can occur even at cool temperatures if an individual becomes chilled from rain or sweat. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering, exhaustion;

- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95° F;
- Unconsciousness, glassy stare, slow pulse, and respiratory rate;
- Freezing of the extremities; and
- Death.

Field activities shall be terminated by Field Supervisor if initial signs of frostbite or hypothermia exist and activities may be terminated if equivalent wind chill temperature is below 0° F. All affected personnel shall be kept warm and receive immediate medical care.

Additional notes to remember:

- Do not rub the frostbitten part;
- Do not use ice, snow, gasoline or anything cold on the frostbitten area;
- Do not use heat lamps or hot water bottles to rewarm the part; and
- Provide a warm drink - not coffee, tea, or alcohol.

3.2.6 Inclement Weather

It is Formation's policy that field work be conducted under safe conditions. Rain, thunderstorms, and/or high wind conditions may occur during a scheduled work activity. Protective clothing for wet conditions will be utilized as necessary. Heavy rains, high winds, or other weather conditions may result in the cessation of work activities, at the discretion of the Project Manager or Field Supervisor.

Outdoor operations will be suspended when lightning is within a 30-second count of the Site (i.e., the time difference between seeing a lightning strike and hearing the sound). Equipment operators shall stop their equipment and park it safely before heading for shelter. No personnel will be left on the ground in an exposed location. Preferred shelter during thunderstorms is a permanent building. Personnel may also take shelter in trailers or low-profile rubber-tired equipment (e.g., pickups). Avoid driving pickups or any other equipment, except to help evacuate personnel.

Thunderstorms always have the potential for down bursts and hail. Weather forecasts should be monitored frequently for changing weather conditions. Work may resume after a 30-minute period without lightning occurring within the specified 30-second count.

The Field Supervisor will ensure that a dedicated watch is posted during periods of tornado watch or warning. Personnel will be evacuated to permanent structures when necessary.

3.2.7 Noise

Personnel working around large construction equipment and loud, congested areas can be exposed to excessive noise causing temporary or permanent damage to hearing. The effects of noise can include:

- Workers being startled, annoyed, or distracted;
- Physical damage to the ear; and
- Communication difficulties that may increase potential hazards.

All personnel shall wear hearing-protective devices (i.e., either ear plugs or muffs) when noise levels interfere with normal speech. Hand signals will be established by on-site personnel, as appropriate, to facilitate communications while involved in high-noise activities.

3.2.8 Dangerous Animals, Insects, and Plants

Moose are present within the dense vegetation of the project area from time to time. Their behavior is unpredictable and they may attack humans even if unprovoked. If moose are observed, workers that are not protected within vehicles or construction equipment should suspend work and leave the project area until the moose have departed.

Animal bites and insect stings are usually nuisances (i.e., localized swelling, itching, and minor pain) that can be handled with first-aid treatments. The bites of certain snakes and spiders contain sufficient poison to warrant medical attention. There are diseases that can be transmitted by insect and animal bites. Examples are Rocky Mountain spotted fever and Lyme disease (tick), and West Nile virus and equine encephalitis (mosquito). Other stinging and biting insects likely to be found at the worksite include yellowjackets and chiggers. The greatest hazard and most common cause of fatalities from animal bites, particularly from bees, wasps, and spiders, is a sensitivity reaction. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous systems, which can also result in death. The Site Safety Officer should be made aware of any known insect sting allergies and verify that an Epi-pen is available for any personnel with a severe allergy.

Venomous snakes may be present in the area. Use good judgment when walking in vegetated areas where snakes may be harder to see. Look and listen before stepping through bushes. To care for someone bitten by a venomous snake, the wound should be immediately washed, immobilized, and kept lower than the heart, if possible. Keep the calm and remove any constricting clothing or jewelry before swelling starts. Immediate medical attention shall be sought (call 911). A bite by a nonvenomous snake should be treated as a first aid case using routine procedures. If unsure whether the bite was from a venomous or nonvenomous snake, treat it as a bite from a venomous snake. Anyone that is bitten must seek medical help immediately for treatment using anti-venom. DO NOT "CUT AND SUCK" as this may make the snake bite worse and transfer poison to the person aiding the victim.

The project site is located in a geographic area where Rocky Mountain spotted fever, Lyme disease, and other tickborne infections are possible. Rocky Mountain spotted fever and Lyme disease are spread primarily by ticks. While Lyme disease is predominantly spread by the deer tick, Rocky Mountain spotted fever can be spread by many types of ticks. Ticks can be found near wooded areas, tall grass brush, and in leaf litter. Rocky Mountain spotted fever is caused by the bacterium *Rickettsia rickettsia* and is potentially fatal. Symptoms of Rocky Mountain spotted fever include fever, headache, muscle pain, nausea, vomiting, and loss of appetite. A rash often appears on the wrists, forearms, palms and/or soles of feet. Rocky Mountain spotted fever is best treated by using a tetracycline antibiotic. Although Lyme disease is rarely fatal, it can cause flu-like symptoms, arthritis, heart arrhythmias, facial palsy, severe headaches, and loss of sensation. A “bull’s eye” rash that may appear days to weeks after the bite, flu-like symptoms, swelling and pain in joints and, less commonly, heart arrhythmia, weakness in legs, facial paralysis and numbness. If employees feel they may have contracted either Rocky Mountain spotted fever or Lyme disease, they must notify the Site Safety Officer immediately.

Protection against the tick consists of wearing clothing that covers the whole body, tucking pant legs into boots or socks and tucking a long-sleeve shirt into pants. Use of repellents containing DEET is also effective. It is also important to frequently check for ticks, which can be as small as the size of a period on this page.

The most dangerous toxic effects from plants are due to ingestion of nuts, fruits, or leaves. Consequently, personnel are prohibited from eating any fruits, nuts, or other plant material, which may grow on the Site. Of more concern to response personnel are certain plants including poison ivy, poison oak, and poison sumac, which produce adverse effects from direct contact. The usual effect is dermatitis, an inflammation of the skin. The protective clothing and decontamination procedures used for chemicals reduce the exposure risk to the plant toxins. Cleaning the skin thoroughly with soap and warm water immediately after contact will reduce risk of significant adverse effects.

3.2.9 Manual Lifting

Activities may require personnel to move large, heavy objects by hand. The human body is subject to severe damage in the forms of back injury and hernia if caution is not observed when handling, lifting, or moving large heavy objects.

General rules for manual lifting include:

- Ensure secure footing;
- Place feet about one shoulder width apart;
- Bend at knees to grasp weight;
- Keep the back straight; and
- Get a good hold on the object to be lifted.

3.2.10 Slip, Trip, and Fall Hazards

Protection from slip, trip and fall hazards will be provided through standard safety procedures including good housekeeping. Removing equipment and debris and taking general precautions during Site operations will be standard operating procedures. Workers will be apprised of any potential trip hazards through regularly scheduled health and safety meetings. Whenever possible, trip and fall hazards will be eliminated or clearly identified with yellow “caution” tape. Impalement hazards to workers will be neutralized as soon as they are identified.

3.2.11 Overhead Utilities

Before Site activities begin, all overhead utilities will be identified and field verified. As necessary, utilities will be deactivated, or operational procedures and project logistics will be established to avoid overhead lines. This will be the responsibility of the Field Supervisor. The contractor(s) will be responsible for operation of equipment in a safe manner and follow the relevant regulations of 29 CFR 1926.952. These regulations include, but are not limited to:

- All electrical equipment shall be de-energized;
- Assume that all overhead lines are energized unless de-energized by the person owning the line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- No hoisted loads shall be left unattended.

These regulations require all operating equipment to be maintained at minimum safe operating distances from overhead power transmission lines as given in 29 CFR 1926.950 (Table 4). For high-voltage transmission lines, the utility company should be contacted for proper clearance.

Table 4: Minimum Safe Working Distances (Alternating Current)

Voltage Range (phase to phase) (kilovolt)	Minimum Working and Clear Hot Stick Distance (Stick Distance)
2.1 to 15	2 feet 0 inches
15.1 to 35	2 feet 4 inches
35.1 to 46	2 feet 6 inches
46.1 to 72.5	3 feet 0 inches
72.6 to 121	3 feet 4 inches
138 to 145	3 feet 6 inches
161 to 169	3 feet 8 inches
230 to 242	5 feet 0 inches
345 to 363	7 feet 0 inches ¹
500 to 552	11 feet 0 inches
700 to 765	15 feet 0 inches

The deactivation of utilities, when necessary, should be certified by the proper utility company personnel and the certification record retained.

3.2.12 Underground Utilities

Before excavation activities begin, all utilities (i.e., electrical lines, fiber optic lines, natural gas lines, water lines, sewer lines, etc.) should be identified, marked, and deactivated as needed. Colorado 811 (<https://colorado811.org/>) must be notified for utility mapping prior to any digging or excavation. The location of field work should be adjusted to avoid active underground utilities, if possible. The deactivation of utilities, when necessary, should be certified by the proper utility company personnel and the certification record retained. Location of the utilities and any deactivation will be the responsibility of the Field Supervisor.

3.2.13 Fire Prevention

Fire extinguishers (Class ABC) shall be provided in all field vehicles and shall be available on-site. All extinguishers will be inspected, serviced, and maintained. Inspections shall be recorded on the inspection tag attached to each extinguisher.

In the event of a fire, work will cease. Small fires may be extinguished by trained site personnel. If the fire cannot be extinguished, the area will be evacuated, and the local fire response team immediately notified. Only trained, experienced fire fighters will be allowed to extinguish substantial fires at the Site. Site personnel will not attempt to fight fires, unless properly trained and equipped to do so.

3.2.14 Traffic and Vehicle Operation

Vehicle traffic will maintain a safe speed while operating on the Site. Occupants of any vehicle shall wear seatbelts at all times. Cell phones use is prohibited while the vehicle is in motion. Vehicles and equipment will be equipped with the safety procedures outlined in 30 CFR Subparts H and M and, as applicable, 29 CFR 1926.601. Precautions will be made to warn foot traffic or other vehicles as necessary.

Operating a vehicle after a full day of work or when fatigued drastically decreases focus and response time and increases the risk of being involved in a vehicle accident which could result in property damage, injury, or death. Avoid driving more than 8 hours in one workday. If the number of hours driving to/from a jobsite combined with the number of hours to be worked on the site will equal more than 14 total hours, alternate arrangements should be arranged. Workers should be aware of fatigue levels while driving and should stop to rest if feeling overly tired.

3.2.15 Coronavirus

Coronavirus disease (COVID-19) is an infectious disease caused by a novel virus (i.e., one that has not been seen before). Since being identified in Wuhan, China, the disease has spread globally resulting in a pandemic. The virus that causes COVID-19 appears to spread easily and sustainably in a community (“community spread”). It is thought that individuals are most contagious when they are symptomatic; however, it appears that the individuals may be also be contagious before they display symptoms. The virus appears to be spread primarily between persons who are in close contact (within about 6 feet) through respiratory droplets that land in the mouths or noses of people nearby or are inhaled into the lungs. It is also possible that the virus is spread by touching surfaces that have the virus and then touching one’s mouth, nose, or eyes.

Formation has developed a protocol to limit the risk of transmission of COVID-19 while engaging in necessary field work. Prior to engaging in field work the Project Manager should consult the following local and state resources to determine if there are safety guidance that should be followed or restrictions that may impact and/or prevent field work being performed:

- <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
- <https://covid19.colorado.gov/>
- <https://summitcountyco.gov/1306/Coronavirus>

The best way to prevent the coronavirus disease is by avoiding exposure; however, there are indications that the virus can be transmitted by individuals who are asymptomatic (i.e., not experiencing symptoms). Sudden loss of taste and smell may indicate someone is carrying the virus while asymptomatic. The following are a list of symptoms of coronavirus disease:

- Fever
- Cough
- Shortness of breath.

Field personnel should avoid contact with individuals experiencing any of the above symptoms or who have been diagnosed as being infected with COVID-19. Additionally, field personnel should take care to practice social distancing by maintaining at least 6 feet of distance from other individuals and by the use of facemask and gloves, as practical. The state of Colorado currently has a mandate requiring all individuals to wear face masks or cloth face coverings in indoor public spaces. As of September 29, 2020, Summit County officials have implemented an order that requires a mask to be worn in all indoor public spaces, and outdoors if physical distancing of 6 feet or more is not possible. Additionally, individuals must maintain a distance of at least 6 feet when interacting with members of the public outside their immediate household. (Detailed ordinance information can be found at <https://summitcountyco.gov/1326/Public-Health-Orders-Business-Protocols>). Formation requires that all employees abide by public health orders when working at the Site. Field personnel should also do the following to protect themselves and others:

- Wash hands often with soap and water for at least 20 seconds
- If soap and water are not available, use hand sanitizer with at least 60% alcohol to disinfect hands
- Do not greet others with any form of physical contact (i.e., handshakes, hugs, etc.)
- Avoid touching one's face, eyes, mouth and nose
- Cover cough and sneeze with one's elbow
- Regularly disinfect commonly touched surfaces (e.g., vehicle interiors, steering wheel, door handles, etc.) with isopropanol (70% or greater), quaternary ammonium, hydrogen peroxide, etc. (a list of EPA-approved disinfectants for COVID-19 can be found at: <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>)
- Disinfect hotel/lodging rooms with above referenced disinfectants
- Personnel should shower thoroughly as soon as possible following completion of field activities
- New clothing should be daily, any re-worn clothing should be laundered using the warmest water setting
- Avoid dine-in eating (take-out only) and utilize food delivery or drive-through when possible
- Wear facemask and gloves when fueling vehicles
- Pay for fuel using the pump-based credit card machine if possible
- Disinfect hands after pumping fuel or entering stores/public spaces.

Consistent with the current national advisory, employees are required to wear face masks or other face coverings (e.g., bandana, buff, etc.) unless it has the potential to cause a health and safety hazard or can be demonstrated to not provide a benefit (e.g., when working at a significant distance from others). The use of mask decreases the risk of a potentially infected person for transmitting the virus to others. Ideally masks or face coverings should be worn when coming into close contact (within 6 feet) of others. This would include driving in a shared vehicle, when working in close proximity, or when entering businesses or other public spaces.

All Formation field personnel and contractors are required to be symptom free for 14 days prior to engaging in field work. Additionally, personnel who have been in close contact with someone who has 1) been exposed, 2) experienced symptoms within the last 14 days, and/or 3) has been diagnosed with coronavirus disease should not engage in field work until they have been asymptomatic for at least 14 days since their last contact with the individual and been verified to not be carrying the coronavirus by a medical professional. Personnel with compromised immune systems, underlying health conditions, or over the age of 60 should not engage in field work for during the current pandemic unless cleared with Formation's Corporate Health and Safety Officer.

If a Formation employee or contractor begins to experience any symptoms of coronavirus disease (loss of taste and/or smell, fever, cough, shortness of breath) they should immediately stop field work and self-isolate. Additionally, the following should be completed:

S:\Jobs\067-001-IronSprings\HASP\IronSpringsHASP_2020.doc

- Individual will contact their medical provider via phone/virtual visit to determine if they need to seek immediate medical care (Formation employees can utilize the 'virtual visit' feature offered by United Healthcare
[\[https://www.uhc.com/individual-and-family/member-resources/health-care-tools/virtual-visits\]](https://www.uhc.com/individual-and-family/member-resources/health-care-tools/virtual-visits))
- Individual will notify the Field-Team Lead
- Field-Team Lead will immediately notify the Project Manager
- Project Manager will immediately notify:
 - Managing Partners
 - Client representative
 - Local/county health authorities
 - Lodging management where field team is staying
- Field-Team lead will communicate (via phone) with individual to determine what they require immediately (i.e., food, medicine, etc.) and get them supplies
- Field-Team Lead will inquire if they need help communicating with their immediate family
- Field-Team Lead will notify the hotel/lodging about field member
- Field-Team Lead should frequently (at least twice per day) check in with the individual to make sure:
 - Their situation/symptoms have not changed/become worse
 - That they are comfortable
 - That they have what they need
- Partners, Project Manager, and Field-Team lead will develop a plan to:
 - Determine if other team members need to self-isolate
 - Support individual until they can be safely demobilized
 - Safely demobilize the individual.

If a Formation employee is asked to participate in fieldwork that is deemed essential, a written letter, specific to the employee (i.e. the letter will include the name of the employee for specific permission), will be drafted and made available to the employee. The employee will keep this letter on hand in case he or she is questioned by law enforcement.

3.3 Chemical Hazards

Results from previous sampling performed at the Site indicate that contaminant hazards may be encountered at the Site during field activities. In general, chemical substances in gaseous, liquid, or solid form can enter the unprotected worker by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically in different parts of the body.

In general, chemical exposure by inhalation is a concern since the lungs are extremely vulnerable to chemical agents. In addition, substances can pass through lung tissue into the

bloodstream and onto other susceptible areas of the body. Since some toxic chemicals are not detectable by human senses, their toxic effects may not produce any immediate symptoms. Respiratory protection is therefore extremely important if there is a possibility that the worksite atmosphere may contain such hazardous substances.

The skin and eyes also represent important routes of exposure. Some chemicals directly affect the skin, while others may pass through the skin into the bloodstream where they can be transported to other vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve on its moist surface and be carried to the rest of the body via capillaries located very close to the surface of the eye. Protection against skin and eye contact may be provided by:

- Wearing protective equipment (i.e., Tyvek coverall suits);
- Wearing protective safety glasses or goggles;
- Avoiding the use of contact lenses in contaminated atmospheres since they may trap chemicals against the eye surface;
- Keeping hands away from the face; and
- Minimizing contact with liquid and solid chemicals.

Inadvertent ingestion can occur as a result of personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics. These practices may provide a route of entry for chemicals and are restricted.

Potential chemical hazards related to field sampling activities are relatively minor. The data collection activities will include sampling of surface water, groundwater, soil, and vegetation (possibly) that may contain elevated concentrations of metals, salts, and other chemicals. Hazards can be minimized through practicing good hygiene and through protection from PPE. For example, protection against skin and eye contact may be provided by:

- Wearing protective equipment (i.e., nitrile or latex gloves);
- Wearing protective safety glasses or goggles;
- Keeping hands away from the face; and
- Minimizing contact with liquid and solid chemicals.

Inadvertent ingestion can occur as a result of personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics. These practices may provide a route of entry for chemicals.

The primary chemical hazards at the Site are metals in soil, sediment, and surface water. Concentrations of some contaminants have been reported at levels which may be hazardous to human health per EPA standards. Metals which have been detected in laboratory analyses

above background concentrations include aluminum, antimony, arsenic, cadmium, cobalt, copper, iron, lead manganese, mercury, gold, thallium, and zinc.

Other contaminants may be encountered during the course of the Site activities. If unusual odors or conditions are encountered, personnel should suspend work activities and contact the Field Supervisor for guidance before proceeding.

4.0 PERSONAL PROTECTIVE EQUIPMENT

4.1 Personal Protective Equipment Levels

The following sections describe the various levels of personal protection for field work at the Site. Workers engaged in field work, including support workers (i.e., supervisors, observers, etc.) will wear modified Level D protection.

The level of personal protection worn by field personnel will be defined, controlled, and implemented by the Field Supervisor. Protection may be upgraded or downgraded by the Project Manager, as deemed necessary throughout the project. Required PPE items include the following: hardhats, hard-toed boots, safety glasses, and hearing protection (when needed). Recommended safety items to be maintained in each vehicle include, but are not limited to: chock blocks, cones, spill kit, fire extinguisher, and first aid kit. Other PPE and safety items may be required depending on conditions and safety procedures.

4.1.1 Modified Level D Personal Protection

Modified Level D personal protective equipment may include the following:

- Blue jeans or natural fiber pants;
- Work gloves (disposable nitrile or cotton, depending on task);
- Approved NIOSH safety hard-toe work boots (conforming to ANSI Standard Z 41.1);
- Hard hat (conforming to ANSI Standard Z 89.1);
- Safety glasses or sunglasses (conforming to ANSI Standard Z 87.1);
- High-visibility vest;
- Hearing protection (when excessive noise greater than 85 decibels is present); and
- Disposable Tyvek coveralls, if appropriate (exchanged when heavily soiled or after breaks, at least once per work day)
- Long hair restrained; and
- No loose-fitting clothing, dangling earrings, necklaces or other jewelry.

5.0 DECONTAMINATION PROCEDURES

Decontamination and maintenance of personal protective equipment is required for proper functioning of the equipment. At a minimum, nitrile gloves and Tyvek coveralls shall be replaced daily or after breaks; if they become damaged, they shall be replaced immediately.

The decontamination areas will be established prior to initiation of field activities, and the exact decontamination procedures will be established at that time based on field conditions, space considerations, etc. In general, dry equipment doffing procedures will be used (i.e., protective equipment will be removed and containerized without water washing). Equipment should be cleaned of gross amounts of soil by brush or scraper before leaving the site. Staff should always wash hands before eating and drinking, and at the end of the workday.

6.0 EMERGENCY RESPONSE

6.1 Emergency Coordinators and Contacts

Table 5: Emergency Contacts

Emergency Assistance Agency	Phone Number
Police, Fire or Ambulance Emergency	911
Poison Control Center	800-222-1222
Breckenridge Police Department	970-453-2941
Red, White and Blue Fire Protection District	970-453-2474
Summit County Sherriff's Office	970-453-2232
St. Anthony Breckenridge Mountain Clinic	970-453-1010

6.2 Emergency Procedures

Table 6: Emergency Procedures

<i>Emergency Communication</i>	Communication will be maintained among all field personnel at all times using line of sight, cell phones and/or walkie-talkies. In addition, an emergency may be signaled by three sustained blasts of the car horn. Field personnel will be notified of the emergency and required actions.
<i>Assembly Area Location</i>	For each work site, an emergency muster point will be established. In the event of an emergency, all field personnel will respond to the person signaling the emergency or gather at the designated muster point, depending on the nature of the emergency. If evacuation is required, all personnel will drive from the site in an orderly fashion to the assembly area, which should be designated during the tailgate safety meeting. At this location personnel will assess the need for further action.
<i>Evacuation Procedures</i>	<p>During an evacuation, personnel will turn off generators or operating equipment that can be quickly turned off, leave their equipment and proceed immediately in an orderly fashion to the field vehicles and then to the assembly area. Headcounts will be taken at the field vehicles and/or at the assembly area. If personnel are not accounted for, the Emergency Coordinator will notify emergency services and first responders.</p> <p>Evacuation shall take place in an orderly fashion along existing dirt roads, if possible. In the event of fire, drive in a direction away from the fire.</p> <p>Personnel will wait in the assembly area for further instructions or until they are advised they can return to work.</p>

6.3 Locations of Emergency Centers

The field work areas are located southeast of Breckenridge, Colorado. The emergency facility nearest to the Site is St. Anthony Breckenridge Mountain Clinic. Driving directions are provided from Boreas Pass Road and Illinois Gulch Road to this facility.

<i>Hospital Name and Address</i>	St. Anthony Summit Medical Center, 340 Peak One Drive, Frisco, Colorado 80433 970-668-3300
<i>Driving Directions from Boreas Pass Road and Illinois Gulch Road Intersection to St. Anthony Summit Medical Center</i>	<ol style="list-style-type: none"> 1. Head southwest on Boreas Pass Road (1.1 miles). 2. Turn right on South French Street (1 miles). 3. Turn right on North Main Street (0.3 miles). 4. Follow Colorado Highway 9N to Peak One Drive in Frisco (7 miles). 5. Turn left onto Peak One Drive (0.4 miles). 6. Take first left (75 feet) 7. Take first right (367 feet) 8. Destination is on right. <p>Total Distance: 9.7 miles Estimated Driving Time: 17 minutes</p>



Figure 2. Directions to Nearest Emergency Facility.

6.4 Emergency Equipment Locations

The following emergency supplies and equipment will be available at the Site.

Table 7: Emergency Equipment Locations

Equipment	Quantity and Location
Cell Phone	One in each field vehicle and at the work area
First Aid Kit	One carried by each field crew and one in each vehicle when mobilizing to a work location. First aid kits will be stored and maintained at the Boulder office.
Fire Extinguisher (10-pound, Type A, B, C)	One in each field vehicle.

6.5 Fire

Limited fires may be extinguished by trained field personnel using water or fire extinguishers. In the event of fire or explosion, personnel should contact the local fire department immediately by dialing 9-1-1. When representatives of the fire department arrive, the Site Emergency Coordinator, or designated representative, should be available to advise the commanding fire officer of the location of the fire and the nature and location of any hazardous materials associated with Formation work at the site.

6.6 Injury and First Aid

If an incident or injury occurs, work will be temporarily halted until an assessment can be made of whether it is safe to continue work. The Site Safety Officer will make the decision regarding the safety of continuing work. The Site Safety Officer will conduct an investigation to determine the cause of the incident and steps to be taken to prevent recurrence in accordance with Formation requirements. In the event of an injury, the extent and nature of the victim's injuries will be assessed and first aid rendered as appropriate. If necessary, the individual may be transported to a nearby hospital. The mode of transportation and the eventual destination will be based on the nature and extent of the injury, and, if emergency services are contacted, consultation with emergency medical personnel. The Site Safety Officer must accompany the injured personnel and provide information to medical personnel as requested. In the event of a life-threatening emergency, the injured person will be given immediate first aid and emergency medical services will be contacted by dialing 911. The individual rendering first aid will follow directions given by emergency medical personnel via telephone. A person certified in first

aid/cardiopulmonary resuscitation (CPR) techniques will be present at all times during field activities. Table 8 shows treatment for common illness/injury that might occur.

Table 8: Injury Response Procedures

Type of Injury	Action Required
Heat stress	Cool the body by applying a wet cloth around the neck and move the person to a cooler environment for rest as soon as possible. Provide fluids and apply additional water for cooling as needed. Assess the severity of the heat exposure and demobilize the person, transport them to a medical facility for evaluation, or contact emergency services as appropriate.
Leg injury – e.g., twisted or broken leg or ankle	Render first aid as needed. Provide assistance to move the person to the field vehicle. Remove weight from the injured limb. If necessary, drive the field vehicle to the person to pick them up. Transport to a medical facility or contact emergency services as appropriate.
Head injury	Evaluate for potential neck injury. If potential for neck injury is suspected, do not attempt to move the person and immobilize the neck and head until emergency response personnel arrive. Control bleeding. Transport to a medical facility or contact emergency services as appropriate.
Puncture wound, contusion or laceration	Render first aid as needed. Control bleeding. If necessary, drive the field vehicle to the person to pick them up. Transport to a medical facility or contact emergency services as appropriate.

7.0 SAFETY TRAINING

Employees of Formation and their subcontractors will not participate in field activities unless they have been trained to the level required by their job function and responsibility. The specific types of training required vary with project activity. Table 9 describes the safety-related training will be required for participation in this project.

All personnel performing work must have received the Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training (29 CFR 1910.120). HAZWOPER training certificates will be maintained by the Health and Safety Officer. Those personnel must be involved in the communication and understanding of potential chemical hazards through a Hazard Communication Program in accordance with the provisions of the OSHA Regulations 29 CFR 1910.120.

Table 9: Required Safety Training

Worker Category	Assigned Individuals	Required Training
All site workers	Training conducted by Site Safety Officer	<ul style="list-style-type: none"> • Review of and familiarity with HASP and emergency response procedures; • Participation in project kickoff or induction meeting; • Participation in daily tailgate safety meetings for every day on site; and. • Familiarity with SDS for any chemicals handled during the work.

All employees of Formation will receive a copy of the HASP. They will agree to read the HASP and comply with all the health and safety requirements contained therein. All employees of Formation will sign a Safety Compliance Agreement Form, acknowledging that they have received a copy of the HASP and have read and agree to comply with the HASP. The Safety Compliance Agreement Form is included as HASP Attachment 4.

7.1.1 Safety Meetings

7.1.1.1 Daily Tailgate Meeting

Daily safety meetings will be held each morning and documented on separate field safety meeting forms included in Attachment 5. Impromptu safety meetings will be held if

unanticipated hazards are encountered or personnel require clarification on safe work procedures. Topics for discussion may include, but are not limited to:

- Discussion of current work activities and associated Job Safety Analyses for various major project tasks;
- Review of available analytical or relevant process data which relates to worker exposure;
- Review of the type and frequency of environmental and personal monitoring (if any) to be performed;
- Task-specific levels of protection and anticipated potential for upgrading;
- Identification of the closest hospital and review of the fastest route to the hospital;
- Identification of an assembly area location;
- Identification of an area to meet emergency responders;
- Review of emergency procedures; and
- Review of existing or new health and safety issue.

7.2 Fit for Duty

The Site Safety Officer has the responsibility to ensure that each individual signing the Tailgate Safety Meeting Form is fit for duty. Consumption of alcohol, use of illegal or controlled substances or certain prescription or over-the-counter medicines, altered mental state, personal injury, or fatigue can affect the fitness of an individual and interfere with the legitimate business interests of Formation at the Site. Any individual found to be unfit for duty will be prevented from entering/working at the Site for the duration of the project. The Site Safety Officer will complete a Loss/Near Loss Investigation Report Form for any individual that is found to be unfit for duty and inform the PM of the incident. Contractors who have personnel unfit for duty will be notified and provided with the opportunity to replace the impaired individuals at the Site.

8.0 HEALTH AND SAFETY PLAN REFERENCES

Formation Environmental, LLC., January 2018. Formation Environmental, LLC Health and Safety Program.

**ATTACHMENT 1
HASP ADDENDA**

**ATTACHMENT 1
HASP ADDENDA**

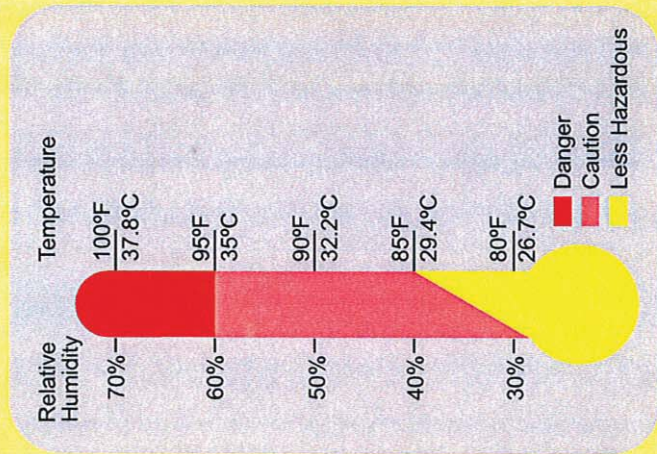
ATTACHMENT 2
HEAT STRESS EDUCATION POSTER



The Heat Equation

HIGH TEMPERATURE + HIGH HUMIDITY
+ PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If left untreated, **heat exhaustion** could progress to **heat stroke** and possible **death**.



Heat Exhaustion

What are the symptoms?

HEADACHES; DIZZINESS OR LIGHTEADEDNESS; WEAKNESS; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; UPSET STOMACH; VOMITING; DECREASED OR DARK-COLORED URINE; FAINTING OR PASSING OUT; AND PALE, CLAMMY SKIN

What should you do?

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

Heat Stroke—A Medical Emergency

What are the symptoms?

DRY, PALE SKIN WITH NO SWEATING; HOT, RED SKIN THAT LOOKS SUNBURNED; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; SEIZURES OR FITS; AND UNCONSCIOUSNESS WITH NO RESPONSE

What should you do?

- Call 911 for emergency help immediately.
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.
- Place ice packs under the armpits and groin area.

How can you protect yourself and your coworkers?

- Learn the signs and symptoms of heat-induced illnesses and how to respond.
- Train your workforce about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Build up tolerance to the heat and the work activity slowly. This usually takes about 2 weeks.
- Use the buddy system, with people working in pairs.
- Drink plenty of cool water, about a cup every 15 to 20 minutes.
- Wear light, loose-fitting, breathable clothing, such as cotton.
- Take frequent, short breaks in cool, shaded areas to allow the body to cool down.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk for heat illnesses.

What factors put you at increased risk?

- Taking certain medications. Check with your health-care provider or pharmacist to see if any medicines you are taking affect you when working in hot environments.
- Having a previous heat-induced illness.
- Wearing personal protective equipment such as a respirator or protective suit.

**ATTACHMENT 3
WIND CHILL CHART**

Wind Chill Factor

Actual air temperature °F

calm

40

30

20

10

0

-10

-20

-30

-40

Apparent temperature

Wind speed (mph)

10

34

21

9

-4

-16

-28

-41

-53

-66

20

30

17

4

-9

-22

-35

-48

-61

-74

30

28

15

1

-12

-26

-39

-53

-67

-80

40

27

13

-1

-15

-29

-43

-57

-71

-84

50

26

12

-3

-17

-31

-45

-60

-74

-88

60

25

10

-4

-19

-33

-48

-62

-76

-91

Frostbite times:



30
minutes



10
minutes



5
minutes

ATTACHMENT 4
SAFETY COMPLIANCE AGREEMENT FORM

SAFETY COMPLIANCE AGREEMENT FORM

Formation Environmental LLC

Personnel Form

PROJECT TITLE: Illinois Gulch Site Time Critical Removal Action

PROJECT NUMBER: 067-001

PROJECT TASK:

I have received a copy of the Site Health and Safety Plan (the "HASP") for the above referenced project. I have read the HASP and agree to comply with all the health and safety requirements contained therein. I understand that I may be prohibited from working on the project for violating any of the HASP requirements.

SIGNATURE: _____ **DATE:** _____

NOTE: This form must be submitted to the Field Supervisor and filed in the project files prior to beginning work onsite.

ATTACHMENT 5
DAILY TAILGATE SAFETY MEETING FORM

DAILY SAFETY MEETING ATTENDANCE FORM

Formation Environmental

Project Name: _____

Date: _____ Time: _____

Project Number: _____

Presented by: _____

Check the Topics/Information Reviewed:

- | | | |
|---|---|---|
| <input type="checkbox"/> Safety glasses, hard hat, safety boots | <input type="checkbox"/> Slips, trips, and falls | <input type="checkbox"/> Daily work scope |
| <input type="checkbox"/> Site safety plan review and location | <input type="checkbox"/> Directions to hospital/first aid | <input type="checkbox"/> Emergency protocol |
| <input type="checkbox"/> Equipment and machinery familiarization | <input type="checkbox"/> Anticipated visitors | <input type="checkbox"/> Parking and lay down |
| <input type="checkbox"/> Employee Right-To-Know/MSDS | <input type="checkbox"/> Electrical ground fault | <input type="checkbox"/> Hot work permits |
| <input type="checkbox"/> Site hazards, open pits, and excavations | <input type="checkbox"/> Public safety and fences | <input type="checkbox"/> Strains and sprains |
| <input type="checkbox"/> Vehicle safety and driving/road conditions | <input type="checkbox"/> Caution around heavy equip | <input type="checkbox"/> Noise hazards |
| <input type="checkbox"/> Portable tool safety and awareness | <input type="checkbox"/> Orderly site and housekeeping | <input type="checkbox"/> No horseplay |
| <input type="checkbox"/> Overhead utility locations and clearance | <input type="checkbox"/> Smoking in designated areas | <input type="checkbox"/> Heat and cold stress |
| <input type="checkbox"/> First aid, safety, and PPE location | <input type="checkbox"/> Leather gloves for protection | <input type="checkbox"/> Backing up hazards |
| <input type="checkbox"/> Sharp object, rebar, and scrap metal hazards | <input type="checkbox"/> Effects of the night before | <input type="checkbox"/> Accidents are costly |
| <input type="checkbox"/> Safety is everyone's responsibility | <input type="checkbox"/> Vibration related injuries | <input type="checkbox"/> Dust/vapor control |
| <input type="checkbox"/> Inner gloves/outer gloves | <input type="checkbox"/> Fire extinguisher locations | <input type="checkbox"/> Refueling procedures |
| <input type="checkbox"/> Eye wash station locations | <input type="checkbox"/> confined space entry | |
| <input type="checkbox"/> Decontamination procedures | <input type="checkbox"/> Safety Is No Accident | |
| <input type="checkbox"/> Location and operation of kill switch | | |

Discussion/Comments/Follow-up Actions:

NAME	SIGNATURE	COMPANY

Instructions:

- Conduct a daily safety meeting prior to beginning each day's site activities.
- Complete form, obtain signatures, and file with the Daily Summary.
- Follow-up on any noted items and document resolution of any action items.