



Harambe 2920

304.c.(15): Stormwater Management Plan

A stormwater management plan consistent with the requirements of Rule 1002.f.

1 – Introduction: Oil and Gas Location and Construction Site Details

The Harambe 2920 is a proposed oil and gas production pad located in the S2N2 of Section 32 T2N R64W, in Weld County, CO. The site is located on non-irrigated cropland on fee property owned by Newman LLC. Site description: 9 wells with associated production equipment on a 6.37 acre working pad surface area and the associated existing access road.

1.1 Nature of Construction Activity

Verdad is an energy company engaged in the exploration, development, production, and marketing of crude oil and natural gas. Verdad currently owns or leases oil and natural gas mineral rights in the Denver-Julesburg (DJ) Basin, Colorado which includes the minerals for the Harambe 2920 wells. This pad site includes site-specific access roads, well pads, flow lines, pipelines, and other supporting activities. The construction on the site will include creating stormwater and erosion controls, grading the project area to a flat surface by Cut/Fill excavation and graded generally flat with a berm along the cut slope to divert offsite flow and a berm across the fill slope to capture onsite rainfall, stabilizing it with road base material on the surface, drilling and completing wells, building production facilities, and reclaiming the areas unused for the production phase.

1.2 Sequence of Construction Activities

- Excavate and build location and access road for purposes of drilling and completing wells and building oil and gas production facilities per approved construction plan. (2 weeks)
- Drill 9 oil and gas wells as per approved Form 2s. (6 weeks)
- Build production facility and install flowlines as per approved construction plan. (8 weeks)
- Complete 9 oil and gas wells as per approved Form 2s. (9 weeks)
- Establish consistent production. (6 months)
- Perform interim reclamation on drilling pad areas not needed for production operations in order to return the reclaimed area to pre-disturbance contours and vegetation. (3 weeks)
- Wells will produce to the facility until they reach the end of their productive life. (20-30 Years)
- Plug and abandon wells, decommission the facility and perform final reclamation of the pad. (2 months)



The overall development of oil and natural gas pad sites is generally accomplished in three distinct work phases: construction, production, and abandonment. The work completed and sequence of events for each phase is briefly discussed below.

Approximately ten acres of surface terrain is disturbed during the construction of the new pad site. The construction phase includes the following sequence of activities: access road construction, stormwater control construction, well pad construction, well drilling, well stimulation, gas flow line installation, and site interim reclamation.

Oil and gas activities requiring ground surface disturbance include: access road construction and maintenance, well pad sites, facility sites, well stimulation sites, central gathering facility sites, pipelines, and excavation/other sites. Each of these activities is described as follows:

- Access road construction includes the cutting of leased land for access to well pads, facilities, and all locations that pertain to Verdad field activities. Access roads will be graveled and permanently stabilized to minimize any stormwater run-off and off-site tracking onto county roads. Access roads will be maintained as needed.
- A well pad site includes pad construction, well drilling, well completion, gas flow line installation, access road building, and well pad reclamation. Pad reclamation is accomplished by replacing the stockpiled top soil, contouring disturbed soils to conform to the surrounding terrain, and seeding of disturbed soil areas in order to reestablish coverage vegetation.
- A facility site includes pad construction, tank, production equipment and gas flow line installation, access road building, and pad reclamation. Pad reclamation is accomplished by replacing the stockpiled top soil, contouring disturbed soils to conform to the surrounding terrain, and seeding of disturbed soil areas in order to reestablish coverage vegetation.
- A well stimulation site may include pad construction to enlarge the existing well pad or a separate pad may be constructed for modular large volume tanks (MLVT) and equipment placement. Reclamation is accomplished by replacing the stockpiled top soil, contouring disturbed soils to conform to the surrounding terrain and seeding of disturbed soil areas in order to reestablish coverage vegetation.
- Pipeline construction will include trenching and temporarily stockpiling soil next to the trench during construction activity. Temporary access roads will be constructed at approved access points along the length of the pipeline. When the pipeline construction has been completed, reclamation will begin. Reclamation is accomplished by backfilling the trench with the stockpiled soil, contouring disturbed soils and temporary access roads to conform to the surrounding terrain, and seeding of disturbed soil areas in order to reestablish coverage vegetation.
- An excavation/other site is included for a variety of reasons. Excavation areas will be reclaimed by backfilling and contouring the disturbed area to conform to the surrounding terrain and seeding of disturbed soil areas in order to reestablish coverage vegetation.



The production phase includes operation and maintenance activities during oil and natural gas production. The typical equipment on a pad site during the production phase consists of wellheads, separation units, 400-barrel (typical) capacity storage tanks for oil and produced water and compressors. Oil and gas wells in the field are projected to produce for approximately 20 to 30 years.

When the production of a well is exhausted, it will be abandoned. Well abandonment includes plugging and capping the well and removal of surface equipment. The pad area will be reclaimed by contouring disturbed soils to conform to the surrounding terrain. The site will then be reseeded to match the surrounding vegetation.

For stormwater management purposes, construction sites have been divided into the following stormwater stages: Active Construction, Interim Stabilization, and Final Stabilization.

Details regarding the stormwater inspection stages are provided in Section 5 of this SWMP.

2 - Supplemental Site Information:

The maximum disturbance area for construction of this location is 10 acres, which includes the topsoil pile, stormwater and erosion controls and areas that have been fenced. The construction pad has a working surface disturbance 6.37 acres. The majority of the pad falls within Colby loam, 1-5% slopes soil which is well drained with low run off and erosion potential. The current land use is irrigated cropland, dominant vegetation is Field bindweed. Noxious weeds were observed from field assessment. There are no non-stormwater discharges and the closest receiving waters at this location is the De Remer Lake of Banner Lakes 610' feet to the South of the Working pad surface.

3 – Stormwater Management Control Measures

Verdad Resources LLC is a current Construction Stormwater Permittee under the general permit for stormwater discharges associated with construction activity, COR400000, operating under certification #COR404865. This oil and gas facility will be operated as part of Verdad resources' Stormwater Management Program under the Verdad Resources Stormwater Management Plan. The facility will be constructed and operated with the appropriate required pollution and erosion prevention control measures which will be managed through required periodic inspections and maintenance. The SWMP will contain all required documents and records required by the permit and related to this facility.

Construction of a pad requires the removal of vegetative cover and soil that increases peak flood flows, water velocity, and the volume of stormwater runoff. An increase in water runoff volume and velocity results in increased erosion. Erosion reduction and control will be accomplished by using the following erosion control methods as necessary. These methods include, but are not limited to, the following:

- Diversion and control of run-on water;
- Vegetation planting and maintenance; and
- Application and maintenance of mulches, blankets, tackifiers, tracking, and contouring.



- Soil Roughening
- Runoff control procedures used to mitigate and reduce the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following:
 - Check dams;
 - Earth berms;
 - Culvert protection;
 - Diversion ditches;
 - Slope drains;
 - Rock-lined ditch;
 - Inlet and outlet protection;
 - Straw wattles;
 - Sediment traps/basins

Existing vegetation cover and soil are removed only where necessary for the operation of equipment and construction of the pad.

The control and reduction of sediment contained in stormwater runoff will be accomplished by the use of sediment containment systems. Sediment containment systems are hydraulic controls that allow the deposition of suspended particles by gravity. Sediment controls used to mitigate and control sediments generated from the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following as necessary:

- Silt fences;
- Straw bale dikes;
- Straw wattles;
- Sediment traps/basins;
- Vehicle tracking pads;
- Continuous berms;
- Continuous berms with rock filters; and
- Slash berms.

If contaminated soils are excavated at a Verdad site, additional Control Measures will be employed to ensure containment of any stormwater runoff. In addition, stockpiles of contaminated soil will be removed from the site and disposed of as soon as possible.

Chemicals on location during drilling and completions will be in covered containment and storage tanks and process vessels will be in containment to prevent contact with stormwater runoff. Drill cuttings are stored in steel bins (mixing tanks) and drilling fluids are stored in tanks identified on the preliminary rig layout drawing. Completion chemicals are identified as Acid Tube and Chem tanks on the preliminary well and stimulation layout drawings.

At the time of construction, drilling and completions this location will have stormwater and erosion control measures consisting of a berm around the perimeter of the location to divert clean water away from disturbed areas and to divert onsite runoff into sediment traps. A ditch will also be installed around the location to collect and divert runoff to sediment traps at the northwest and the southwest corners of



the pad. An outlet structure and outlet protection will be installed on the Northwest corner. A diversion berm will be located along the cut slope on the northeast corner of the pad. Stormwater flows are directed into the stormwater retention area on the pad. Several Rock Socks are installed around the edges of the pad in the ditch to slow the flow of stormwater and reduce erosion. For mud control, the Operator will implement effective vehicle tracking control, such as a properly sized cattle guard or 2-inch to 4-inch stone vehicle tracking pad at the location egress to prevent transport of sediment offsite and onto the public road during all phases of operations. See construction layout drawing.

During the production phase of operations, all oil storage and handling will occur in lined secondary containment. Loading connections will occur in permanent impervious lined containment. Any vehicle/equipment fueling will occur on portable temporary secondary containment. All chemical and additive storage on site will be in impervious secondary containment. Produced water and drilling fluids will be stored in impervious lined secondary containment. All compression process equipment will be on skid mounted impervious secondary containment. Dust production will be prevented by all disturbed surfaces being compacted, covered in road base or seeded and stabilized with vegetation. Tracking of sediment from the pad will be prevented by properly sized cattle guard or 2-inch to 4-inch stone vehicle tracking pad at the location egress. Road surfaces will be covered in compacted road base material to prevent any erosion from road surfaces. Waste will be stored in impervious containment until properly disposed at a facility off location. Any leaks and spills that occur outside of containment will be immediately cleaned up off of compacted road base material and any stained material will be removed and properly disposed of as well. Separation equipment will also be in lined secondary containment. The entire working pad surface will have a perimeter berm to prevent pollution from leaving the pad. Any ground disturbing maintenance activities occurring off location will be controlled with silt fence surrounding any dirt piles adjacent to the excavation and any other control measure necessary to prevent erosion and sediment from leaving maintenance site.

4- Site-Specific

This location will use a diversion ditch and berm to surround the entire disturbance area. The ditch and berm will divert water from running on to the pad and manage water that precipitates on pad. Sediment traps will be placed at the southwest and northwest corners of the disturbance area. All stormwater runoff from the disturbance area will be directed to the sediment traps to allow any sediment transported in the water to settle out. Erosion control measures will include rock socks in the ditch around the disturbance area to control the speed of water moving through the ditch and filtering sediment in the water as it passes. Other erosion control measures will include seeding and crimping straw mulch into cut/fill slopes and the topsoil pile.

During interim reclamation the northern border of the disturbance will be moved south to the new edge of the pad and the stormwater controls will be moved to the new edge of disturbance. See Oil & Gas Facility Layout drawing.

Additional stormwater control measures will be installed as needed and identified during periodic inspections.



5 - Inspections and Maintenance Procedures:

5.1 Inspections

Inspections will be conducted to document the status of erosion and sediment control structures and re-vegetation efforts. Inspection forms will document non-compliance conditions such as uncontrolled releases of mud, muddy water, or measurable quantities of sediment that are found off-site. Required actions or modifications as documented on the inspection report will be implemented in a timely manner after the inspection. Routine inspections may be conducted at pad areas during the phases of work and after a precipitation-related event. Inspection observations will be recorded on the inspection report tracked and documented. Dates that construction activity begin, cease, or is temporarily idle, as well as the site stage, will be recorded. The inspection form provides a standardized format that will be completed during inspections and includes a signature line for the inspector to ensure compliance with the regulations.

For stormwater regulation purposes, construction sites have been divided into stormwater inspection stages: Active Construction, Interim Stabilization, and Final Stabilization. For the purposes of this SWMP, only Active Construction and Interim Stabilization sites will be inspected. Each of these stormwater inspection stages is discussed below. Once a site is finally stabilized, it will be removed from this stormwater construction permit program.

Personnel responsible for inspections will be trained to evaluate stormwater management concerns, erosion and sediment control structures, and to evaluate pad and surrounding area vegetation.

5.1.1 Fourteen-day Inspection/Active Construction Stage

During construction, this phase of work is classified as the Active Construction phase, according to stormwater regulations. The inspection frequency is every 14 days during the Active Construction phase and after any precipitation or snowmelt event that causes surface erosion.

The pad perimeter, disturbed areas, and any stored materials exposed to precipitation will be inspected for evidence of, or the potential for, pollutants that may enter the drainage system. Erosion and sediment control systems identified on the site-specific maps will be inspected to ensure that they are in good condition and operating properly.

5.1.2 Monthly Inspection/Interim Stabilization Stage

Verdad has defined Interim Stabilization as being re-seeded, released back to crop land, or stabilized with non-erosive material once the pad has been completed and re-contoured to the adjoining landscape. Inspections will be conducted at least once a month.

5.1.3 Final Stabilization Stage

When a pad site has reached 80 percent vegetation for final stabilization, it will be moved from the stormwater construction inspection routine and added to the Post-Construction Stormwater Program. The Post-Construction Stormwater Program is a continuation of the Stormwater program, but with formal



inspections conducted on an annual basis until final reclamation of a location is complete. In addition to the annual inspections, all field employees are trained to identify stormwater and erosion issues and will notify the Environmental Manager of any issues.

5.1.4 Winter Conditions

Inspections will not be required at pads where snow cover exists over the entire site for an extended period as long as melting conditions do not exist. Snow cover, as well as snow melting conditions, will be documented.

5.1.5 Precipitation Event Inspections

Active Construction site inspections will be conducted within 24 hours after a precipitation or snowmelt event that causes surface erosion. If no construction activities will occur at a pad site following a storm event, post-storm event inspections will be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. Surface erosion generally occurs when precipitation or snowmelt results in surface water flow. If the precipitation infiltrates, then no inspection is required. In order to determine if surface erosion or surface water flow resulted from a precipitation or snowmelt event, a selected few pads will be evaluated for surface erosion, off-site sediment transportation, and/or off-site release of muddy water. These selected pads may have a worst-case surface erosion or sediment transportation scenario. If the selected pad and associated areas do not indicate any off-site surface erosion, off-site sediment release and transport, or off-site muddy water releases, the remaining active and completed pads will not be inspected. Inspection results of the pads will determine or trigger the inspection of active pads. Selection of a pad is based on the following criteria:

- A pad that has a cut or fill slope that has a steeper grade than 1:4;
- A pad that has erosion and/or sediment control structures installed; and
- A pad that has vegetation or erosion situations.

5.1.6 Temporarily Idle Sites

If no construction activities will occur following a storm event at a temporarily idle site, post-storm event inspections will be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. The occurrence of any such delayed inspection will be documented in SWMP inspection records. Routine inspections will continue to be conducted every 14 calendar days.

5.2 Preventive Maintenance

Preventing stormwater from passing through pad areas where contamination may occur is a key element of preventative maintenance. Another key element of preventative maintenance is the routine inspection and repair of erosion and sediments control structures. Regular cleaning of diversion ditches and other Control Measures to keep them free of debris and sediment will be practiced. Spillways and culvert systems will also be routinely cleaned and inspected. These maintenance procedures will help to ensure that stormwater does not leave intended channels.



The following preventive maintenance procedures will be implemented to reduce or eliminate potential stormwater contamination sources that may exist on a pad:

- Storage containers, fuel tanks, and equipment used during construction activities should be visually inspected routinely for obvious leaks. These inspections should be conducted by site and contractor personnel as they perform their routine duties;
- Drums will be properly labeled so an enclosed substance can be quickly identified. Occupational Safety and Health Administration (OSHA)-approved labeling and sign systems will be followed for secondary containers;
- Erosion damage to the earthen berms, outfalls, silt barriers, collection channels, containment ponds, and any erosion and sediment controls will be repaired as soon as practical;
- Areas of stained soil will be inspected in order to identify the sources of the staining. Contaminated soil will be removed and properly disposed of at an approved facility;
- Energy dissipating material, such as riprap, will be placed at the stormwater outfalls to prevent erosion damage. Barrow ditches should be free from vegetation and debris which may cause impounding of stormwater;
- Stormwater management structures will be cleared of debris and repaired when necessary; and surface runoff controls such as curbing, culverts, and ditches will be used to control runoff; and
- Snow removal locations will be added to active construction sites starting from November and ending in April the following year. Site maps will be updated during these months to reflect the locations designated for snow placement. Snow will be contained within a perimeter Control Measures that has been established around the site; i.e., a ditch and berm.

5.2.1 Good Housekeeping

In accordance with Control Measures that provide procedures to eliminate contamination, and direct, divert, and contain stormwater, Verdad has implemented a number of housekeeping practices. These practices will help prevent soil, sediment, trash, and toxic or hazardous substances from entering navigable waters.

Housekeeping practices include regular cleaning, organization, and maintenance of pad equipment and erosion and sediment control structures throughout the project. Areas where chemicals are stored and used at the project are stored in buildings or containers where there is no potential for stormwater contact. These areas include producing pads that typically consist of wellheads, separator units, dehydration units, and 300- to 500-barrel capacity ASTs.

The following items will be addressed in order to maintain a clean and orderly pad during the development, production, and abandonment phases of work:

- Inspect pad areas routinely;
- Correct deficiencies noted during inspections;



- Clean and maintain stormwater management structures and components;
- Routine trash collection and disposal;
- Familiarize employees and contractors with spill cleanup equipment and storage locations; and
- Familiarize employees and contractors with good housekeeping procedures and pad pollution prevention procedures.

5.2.2 Material Storage

Pad sites typically include only outdoor storage of materials. The following good housekeeping practices will be followed at the material storage areas:

- Storage containers will be stored away from direct traffic to prevent accidents and will have proper labels;
- Dumpsters and trash receptacles will be enclosed in order to prevent the dissemination of refuse;
- Storage areas will be kept free of refuse;
- Chemical substances used at pads will be properly labeled and will have proper spill containment; and
- Chemical substance containers will be clearly labeled with an SDS kept on file.

5.2.3 Waste Removal

Waste from materials imported to the construction site will be removed for disposal/recycling to an appropriate licensed disposal/recycling facility, including sanitary sewage facilities (typically portable). No wastes of imported materials will be buried, dumped, or purposely discharged to waters of the state. There are no other pollutant sources from areas other than construction areas.

6 – Site Specific Construction and Stormwater/Erosion Control BMPs:

- This location will use a diversion ditch and berm to surround the entire disturbance area. The ditch and berm will divert water from running on to the pad and manage water that precipitates onto the disturbance area.
- Sediment traps will be placed at the southwest and northwest corners of the disturbance area. Outlet structure and outlet protection will also be placed in the northwest corner of the pad.
- All stormwater runoff from the disturbance area will be directed to the sediment traps to allow any sediment transported in the water to settle out.
- Erosion control measures will include rock socks in the ditch around the disturbance area to control the speed of water moving through the ditch and filtering sediment in the water as it passes.
- Seeding and crimping straw mulch into cut/fill slopes and the topsoil pile will prevent erosion on those slopes.
- Prior to seeding, soil roughening will be used to control the speed of water on slopes.



- During interim reclamation the north border of the disturbance will be moved south to the new edge of the pad and the stormwater controls will be moved to the new edge of disturbance.
- Operator shall install stormwater controls, constructed in a manner that is consistent with good engineering practices, that will prevent offsite migration of sediment/contaminant. Stormwater controls shall be installed prior to construction activities.
- Gas, oil, and water flowlines will be co-located to minimize potential of erosion associated with construction of any flowline.
- Operator will grade the topsoil stockpile to ensure that all surfaces can be stabilized safely and effectively.
- Operator will stabilize and maintain areas needed for production operations or for subsequent drilling operations to minimize dust and erosion to the extent possible.
- Vehicle tracking pads will be placed at the access road to prevent sediment transport from the facility by vehicles leaving the site.
- Storage tanks and production equipment will be inside of containment to prevent any produced fluids from leaving the site with stormwater.
- All chemicals on site will be in containment and/or protected from precipitation to prevent any chemical pollution from leaving the site with stormwater.
- All Stormwater control measures will be inspected at the following frequencies:
 - Storm water controls are inspected every 14 days during construction, drilling, and completions.
 - Once per month after that, until interim reclamation is completely established (approximately 2 years).
 - Once per year after that until facility abandoned.



SCALE: 1" = 100'

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED FENCE LINE/ MAX DISTURBANCE
- ACCESS ROAD
- PROPOSED BERM/ PROPOSED OIL AND GAS LOCATION
- PROPOSED DIVERSION DITCH
- WORKING PAD SURFACE
- PRODUCTION PAD SURFACE
- SURVEY QUARTER SECTION LINE
- EDGE OF DISTURBANCE

- CUT/FILL AREA
- PROPOSED DETENTION BERM

WELL HEAD DISTANCES FROM FEATURES	
FEATURES	DISTANCE
NORTH EDGE OF WPS	275.00'
SOUTH EDGE OF WPS	150.00'
EAST EDGE OF WPS	420.00'
WEST EDGE OF WPS	105.00'
ECD/VOC	355.00'
HEATER TREATERS TANKS	233.50'
SEPARATORS	143.00'

WELL NAME	PRE-CONSTRUCTION ELEVATION	POST-CONSTRUCTION ELEVATION
HARAMBE 2920 01H	4,958.74'	4,964.62'
HARAMBE 2920 02H	4,959.30'	4,964.66'
HARAMBE 2920 03H	4,959.86'	4,964.70'
HARAMBE 2920 04H	4,960.47'	4,964.70'
HARAMBE 2920 05H	4,961.11'	4,964.78'
HARAMBE 2920 06H	4,961.76'	4,964.82'
HARAMBE 2920 07H	4,962.46'	4,964.86'
HARAMBE 2920 08H	4,963.11'	4,964.90'
HARAMBE 2920 09H	4,963.73'	4,964.94'

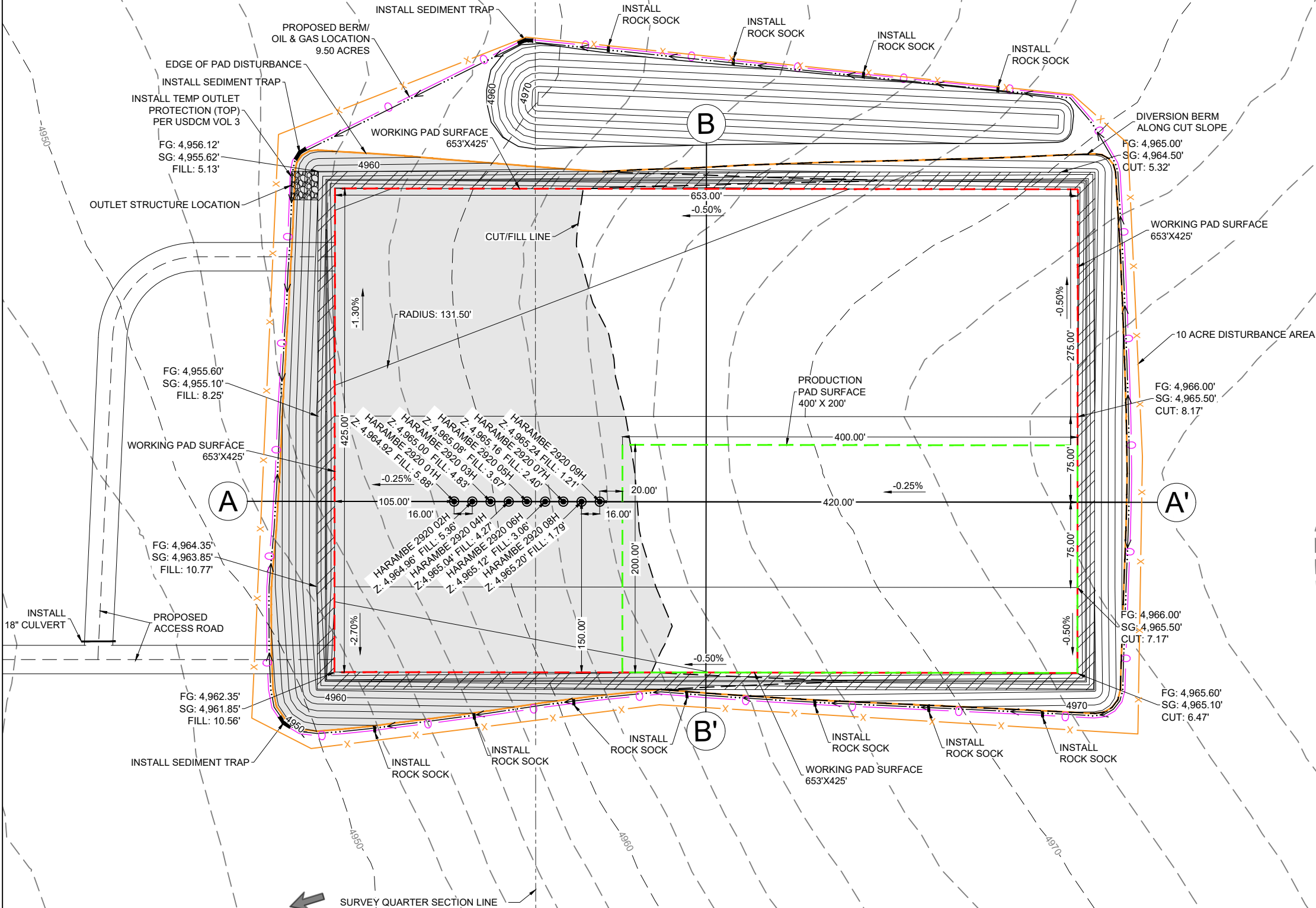
EARTHWORK QUANTITIES:

CUT:	32,020 CY
FILL:	29,990 CY
TOPSOIL (6"):	6,565 CY
EXPORT:	605 CY
FILL FACTOR:	1.15

DISTURBANCE ACREAGES:

WORKING PAD SURFACE (AC):	6.37
OIL & GAS LOCATION (AC):	9.50
ACCESS ROAD (AC):	2.134
MAX DISTURBANCE (AC):	10.00
PIPELINE & UTILITY CORRIDOR (AC):	0.98

WELD COUNTY
N1/2 SECTION 32
T2N R64W 6th PM

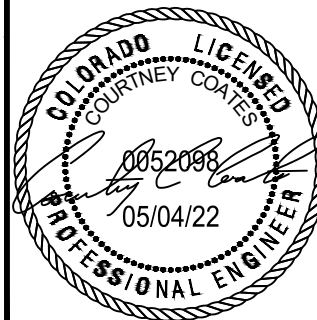


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CONSTRUCTION LAYOUT DRAWING

HARAMBE 2920

VERDAD



DATE: 05/04/22

DRAWN BY: TJM

REVIEWED BY: CCC

SCALE: 1" = 100'

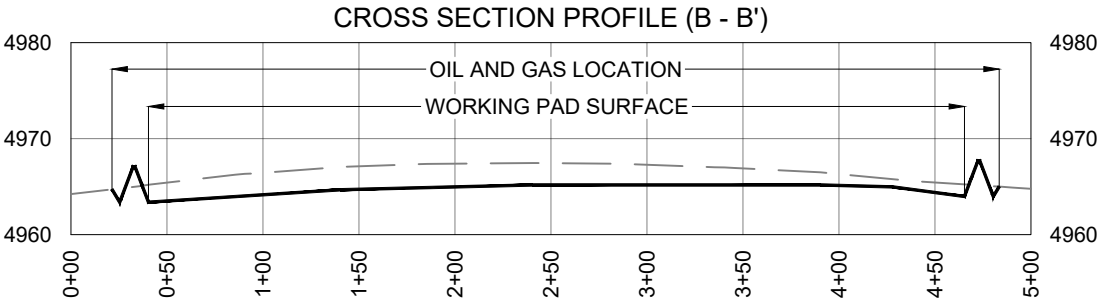
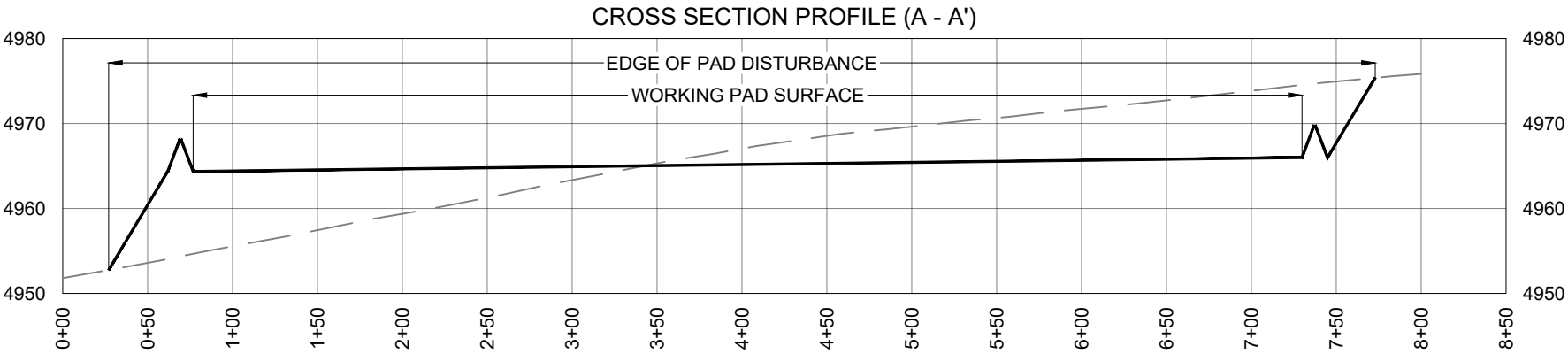
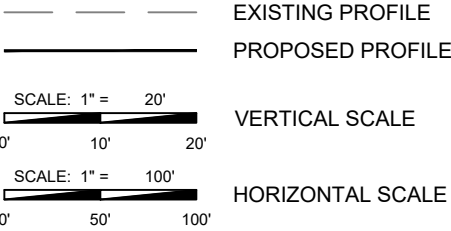
SHEET: 1 OF 2

REVISION:

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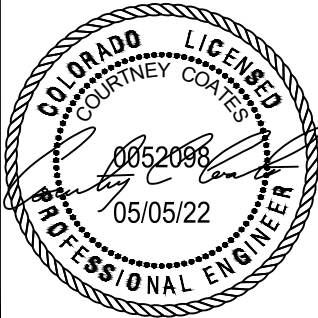


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CONSTRUCTION LAYOUT PROFILES

HARAMBE 2920

VERDAD



DATE:	05/05/22
DRAWN BY:	TJM
REVIEWED BY:	CCC
SCALE:	1" = 100'
SHEET:	2 OF 2
REVISION:	
XXX	XXXX/XX
XXX	XXXX/XX
XXX	XXXX/XX

- EXISTING 2' CONTOUR
--- EXISTING 10' CONTOUR
--- PROPOSED 2' CONTOUR
--- PROPOSED 10' CONTOUR
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--- ACCESS ROAD
--- PROPOSED BERM/
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--- PRODUCTION PAD SURFACE
--- INTERIM RECLAMATION
--- SURVEY QUARTER SECTION LINE
--- EDGE OF DISTURBANCE
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--- PROPOSED DETENTION BERM
--- PROPOSED RETENTION AREA
--- PROPOSED DRAINAGE

WELL HEAD DISTANCES FROM FEATURES	
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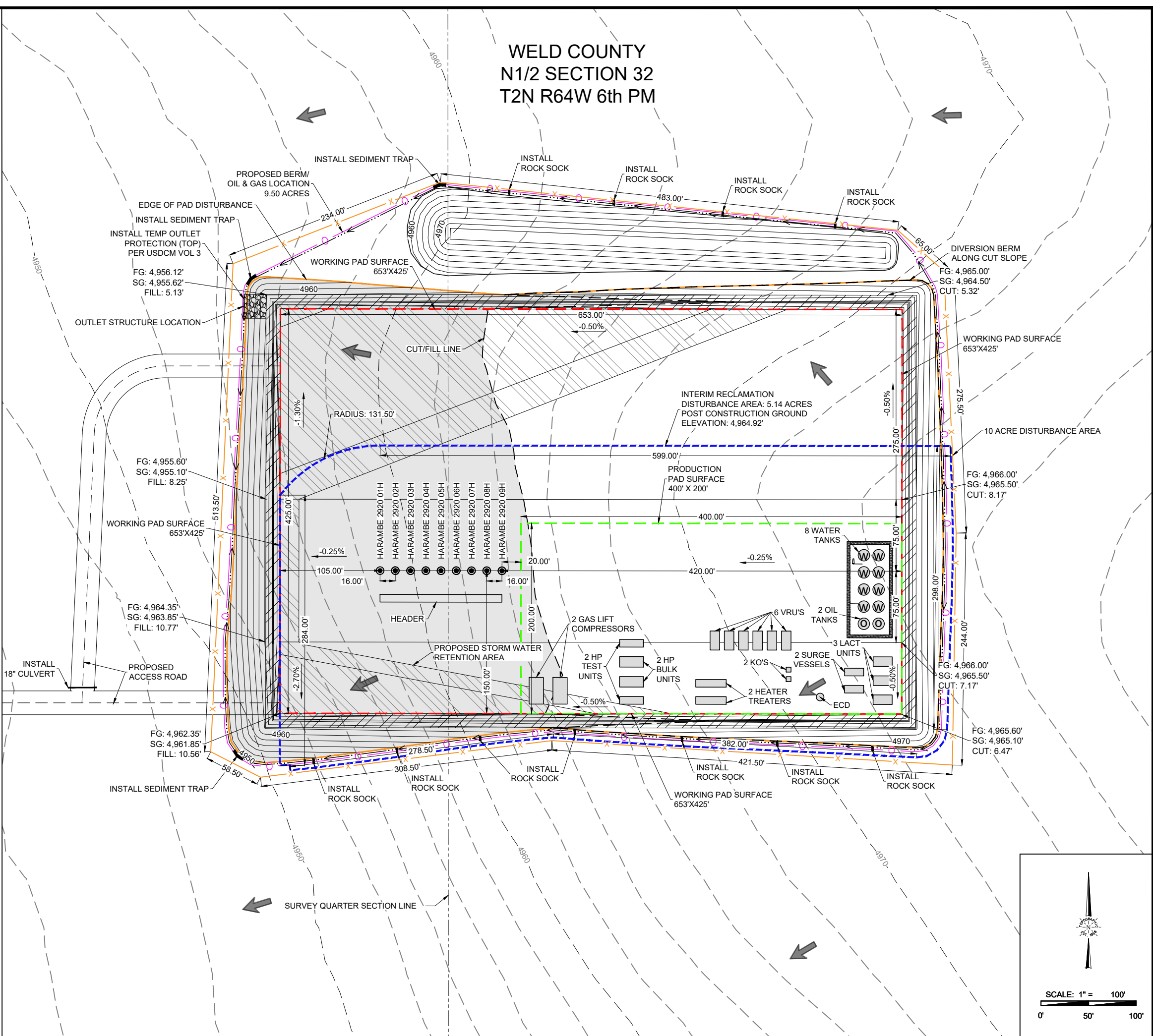
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OIL & GAS LOCATION (AC):	9.50
ACCESS ROAD (AC):	2.134
MAX DISTURBANCE (AC):	10.00
UNRECLAIMED AREA (AC):	5.14
RECLAIMED AREA (AC):	4.86
PIPELINE & UTILITY CORRIDOR (AC):	0.98

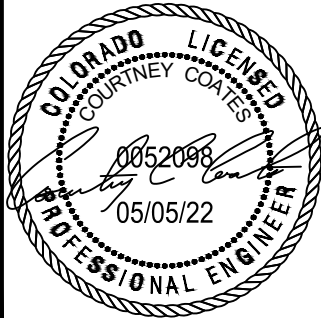


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OIL AND GAS FACILITY LAYOUT DRAWING

HARAMBE 2920

VERDAD



DATE:	05/05/22	DRAWN BY:	TJM	REVIEWED BY:	CCC	SCALE:	1" = 100'	SHEET:	1 OF 1	REVISION:	XXX	XXX	XXX
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