Stormwater Management Plan – 304.c.(15)

Federal RGU 44-1-298 Oil and Gas Location

Loc ID #335640

December 2022

TERRA
ENERGY PARTNERS

INTRODUCTION

TEP Rocky Mountain LLC ("TEP") has developed the following Stormwater Management Plan as required by the Colorado Oil and Gas Conservation Commission ("COGCC") Rule 304.c.(15) describing the general practices and procedures TEP's stormwater management program employs during the development of an Oil and Gas Location. Additionally, this plan provides site specific stormwater management control measures that will be employed during development of the Federal RGU 44-1-298 pad to ensure compliance with COGCC, Colorado Department of Public Health and Environment, and Federal regulations.

TEP has developed a Field Wide Stormwater Management Plan (SWMP) in compliance with the CDPHE's Colorado Discharge Permit System (CDPS) and to ensure conformance to the stormwater management standards under COGCC Rule 1002.f. The SWMP will identify possible pollutant sources that may contribute pollutants to stormwater, and identify Best Management Practices (BMPs) that, when implemented, will reduce, or eliminate any possible water quality impacts. TEP has also developed a field wide Post-Construction Stormwater Management Plan (PC-SWMP) as required by COGCC Rule 1002.f.(3) to ensure that Best Management Practices (BMPs) are implemented on all subject Oil and Gas Locations under its management where the Construction Stormwater permit issued by CDPHE has been terminated. The PC-SWMP identifies possible pollutant sources that may contribute pollutants to stormwater during the post-construction and reclamation phase of operations and describes BMPs to control stormwater runoff in a manner that minimizes erosion, transport of sediment offsite, transport of pollutants offsite, or degradation of site conditions. Upon request by the COGCC or the director, TEP will provide the SWMP and / or PC-SWMP for review.

TEP is proposing to drill, complete, and operate eighteen (18) proposed directional natural gas wells from the existing Federal RGU 44-1-298 pad located on Federal surface administered by the Bureau of Land Management. The Federal RGU 44-1-298 pad is an existing Oil and Gas Location (COGCC Loc ID: 335640) with four (4) existing natural gas wells producing from the underlying Federal Lease COC-62053 and Federal Lease COC-60736. The existing Oil and Gas Location is located on resource / rangeland within Lot 35 and Lot 36 of Section 1, Township 2 South, Range 98 West, 6th P.M., within Rio Blanco County, Colorado.

The Federal RGU 44-1-298 pad will be reconstructed and expanded to accommodate the development of the eighteen (18) proposed natural gas wells. The existing access road from Rio Blanco County Road 24 will be used to access the existing Oil and Gas Location. Development of the proposed wells on the Federal RGU 44-1-298 pad will also require the construction of three (3) new off-location pipelines, one (1) to support gas gathering operations and two (2) to support transport of produced water. TEP will also utilize the existing Federal RGU 23-7-297 pad (COGCC Loc ID: 316408) as support facilities for development of the proposed wells on the Federal RGU 44-1-298 pad.

Development Phases: Each phase of development requires the implementation and maintenance of both structural and non-structural stormwater management control measures used by TEP to effectively minimize site erosion and sediment transport. The following outlines the typical development phases which are described in greater detail below.

1) Pre-Construction Phase
2) Construction Phase (pad, road, and pipeline)
3) Interim Reclamation Phase
4) Final Reclamation Phase

Please see Appendix A, Construction Layout, and Appendix B, Interim Reclamation Layout, which depict preliminary site-specific stormwater control measures planned for installation at the Federal RGU 44-1-298 pad during both initial construction and interim reclamation of the Oil and Gas Location.

SUPPLEMENTAL SITE INFORMATION

The existing 3.77-acre Federal RGU 44-1-298 pad will be reconstructed and expanded to a 5.63-acre footprint for drilling and completions operations of the eighteen (18) proposed natural gas wells. The long-term disturbance attributed to the Federal RGU 44-1-298 pad will be approximately 1.65-acres. The existing access road will be utilized during development of the proposed wells on the Federal RGU 44-1-298 pad. The existing access road will be improved during reconstruction of the Oil and Gas Location to support proposed activities. The existing access road improvements will account for 0.28-acres of disturbance with approximately 0.17-acres remaining after reclamation. The proposed pipeline corridors will account for an additional 3.56-acres of disturbance with approximately 0.05-acres (existing roads) remaining after reclamation. The total disturbance associated with development of the Federal RGU 44-1-298 pad will be approximately 9.47-acres. Approximately 1.87-acres of disturbance will remain long-term following interim reclamation of the proposed facilities and pipeline corridors. All proposed disturbance will be located on Federal surface. Please see the Plan of Development attached to the Form 2A for a detailed breakdown of disturbance acreage for all project components associated with the Federal RGU 44-1-298 pad.

Soils: The National Resource Conservation Service ("NRCS") identifies the dominate soil type within the boundary of the Federal RGU 44-1-298 pad as the Barcus channery loamy sand. This soil type is associated with alluvial fans / valleys and was derived from sandstone and shale. The typical profile from the surface to a depth of 6 inches is channery sandy loam (H1), 6-16 inches is defined as channery sand (H2), and 16-60 inches is defined as stratified very channery sand to very channery loamy fine sand (H3).

The NRCS reports that this soil is classified, under the Uniform Soils Classification System, as silty gravels / gravel-sand-silt mixtures (GM). This soil has a reported hydrologic group rating of A, having a high infiltration rate when thoroughly wet. The infiltration rate is listed as high to very high ranging from 6.00 to 20 inches per hour. The NRCS lists the Flood Frequency Class for the facility location as "None". "None" means that flooding is not probable, and the chance of flooding is nearly zero percent in any year.

The NRCS reports an erosion factor K (whole soil) of 0.05 for the site, or low susceptible to erosion by water. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Stormwater BMPs will be implemented to control soil erosion.

Vegetation Description: The primary vegetation communities within the project area includes pinyon/juniper woodlands, basin big sagebrush and Wyoming sagebrush. A comprehensive list of common plant species within the project area can be found in the Biological Survey attached to the Form 2A. Since the Federal RGU 44-1-298 pad is an existing Oil and Gas Location and is proposed for minimal site expansion, a pre-disturbance vegetation cover evaluation was not completed at the site. A vegetation assessment was however completed for the reference area, which determined that percent cover for pre-disturbance conditions is approximately 40%. Please see the vegetation assessment included in the Ryan Gulch Phase 3 Biological Survey Report attached to the Form 2A for additional details.

Weed Infestations: WestWater Engineering ("WestWater") conducted a biological survey in May 2021 which included a survey for weeds within the project area. The survey identified four (4) noxious weed species within the survey area, three (3) of which were identified near the Federal RGU 44-1-298 project area. The weeds identified near the Federal RGU 44-1-298 include Cheatgrass (State C List), Common mullein (State C List), and Diffuse knapweed (State B List). Please see the Biological Survey Report attached to the Form 2A for additional details regarding noxious weeds.

Non-Stormwater Discharges: Non-stormwater discharges are limited to application of fresh water along the existing access road and well pad. Excavation activities associated with the proposed activities are not expected to impact groundwater. Per the Sensitive Area Determination prepared by WestWater and attached to the Form 2A, the depth to ground water at the Federal RGU 44-1-298 pad is likely to be greater than 50 feet. However, any ground water encountered during excavation will be addressed in accordance with Federal and State regulations.

Receiving Waters: Piceance Creek, a perennial stream which is located northeast of the Oil and Gas Location approximately 12,660 feet, is the nearest perennial stream. An unnamed intermittent stream is located adjacent to the southwest side of the existing Federal RGU 44-1-298 pad and is the nearest surface water feature downgradient of the Federal RGU 44-1-298 pad. This unnamed intermittent stream discharges into Ryan Gulch, an intermittent stream located approximately 368 feet southeast of the Oil and Gas Location, and eventually in the Piceance Creek. Stormwater control measures include diversion ditches, sediment traps, wattles, and other control measures described below will minimize the potential for impacts to surface water features.

STORMWATER MANAGEMENT CONTROL MEASURES

Potential Pollution Sources and Locations: Stormwater management control measures will be implemented to minimize the potential for pollution. The following potential pollution source have been identified as part of planned activities on the Federal RGU 44-1-298 pad:

1) *Transport of chemicals and materials, including loading and unloading operations*

Spill prevention during loading and unloading is outlined in TEP's Piceance Basin Spill Prevention and Response Plan ("SPRP") and Integrated Spill Prevention, Control, and Countermeasures ("SPCC") Plan. TEP complies with applicable DOT requirements when transporting chemicals and materials to Oil and Gas Locations.

2) *Vehicle/equipment fueling*

Equipment is only fueled in designated fueling areas. Proper storage and transport of fuels is described below.

3) *Outdoor storage activities, including those for chemicals and additives*

Material or chemicals brought to or produced on the Oil and Gas Location will be handled properly using good housekeeping practices. TEP's SPCC and SPRP plans address storage and handling procedures including guidelines for materials handling, storage container labeling, elevation, sealing, covering, securing, and secondary containment, as described below.

4) *Produced water and drilling fluids storage*

Guidelines for storing produced water, drilling fluids, fuels, and chemicals include the following.

- All containers will be clearly labeled.

- Dry materials will be stored on pallets and covered when not in use to avoid contact with precipitation, stormwater, and wind.
- Potentially hazardous liquid materials in buckets, drums, or tanks will be stored within secondary containment, such as soil berms, steel containers or bermed visqueen, to capture accidental spills or leaks. Drums will be kept off the ground within secondary containment and stored under cover, if needed. The berms shall be constructed such that they are sufficiently impervious to prevent the material from being released beyond the confines of the containment system.
- Fuel tanks will be stored within secondary containment.
- Container lids will be securely fastened.
- In the event of a spill, procedures outlined in TEP's SPRP will be followed. Persons trained in handling spills will be available.
- Spill clean-up and containment materials (absorbent, shovels, etc.) will be readily accessible. Spills will be immediately cleaned up and contaminated materials will be properly stored on site until they can be disposed of in accordance with applicable regulations.
- Storage areas and containers will be monitored for leaks and repaired or replaced as necessary. Storage areas will be inspected regularly, and any minor spills or leaks will be cleaned up immediately.
- As necessary, covers and stormwater diversion structures will be utilized to minimize contact of precipitation and stormwater runoff with materials and wastes with potential to result in discharges causing pollution of surface waters.
- TEP's SPRP will be readily available at the field office as a reference to assist in responding to spills at locations where materials are stored or handled.
- Material Safety Data Sheets (MSDS) and product labels will be available as per TEP's Hazard Communications (HazCom) program.
- Employees will have proper training in materials handling, spill prevention and response.

5) Outdoor processing activities and machinery

A variety of operating equipment will be utilized at the Oil and Gas Location for production, storage, and transmission purposes. Equipment is inspected regularly to ensure it is operating properly and that no fluid leaks or spills are evident. Any leaks or problems with equipment will be identified and repaired immediately. Leaked or spilled fluids will be cleaned up promptly in accordance with TEP's Spill Response Plan (SPRP).

Routine equipment maintenance will be performed on-site. Any waste product from maintenance will be containerized and transported off site for proper disposal or recycling. There will be no major equipment overhauls conducted on site. Equipment will be transported off site for major overhauls.

6) Significant dust or particulate generating processes

Dust generation may occur from site construction, vehicle traffic, and high winds. Dust suppression will be performed on an as needed basis to minimize the potential for fugitive dust. Please see the Dust Mitigation Plan attached to the Form 2A for specific details on dust suppression methods.

7) Erosion and vehicle tracking from well pads, road surfaces, and pipelines;

To prevent vehicle tracking, stabilized construction entrances may be utilized as necessary to prevent tracked mud and dust from leaving a disturbed area. The use of stabilized construction entrances removes mud and sediment from the vehicle's wheels and offsite transport of soil is reduced.

Control measures will be established during site construction to prevent erosion and transport of sediment off the Oil and Gas Location. Control measures will include structural items such as diversion ditches, wattles, strawbales, sediment traps, water bars, and matting, as well as non-structural items such as timing of ground disturbance activities and dust control measures. Guidelines regarding the selection, installation or implementation, and maintenance of control measures are detailed in TEP's Stormwater Manual.

8) Waste disposal practices

Proper waste handling practices will be implemented at the Oil and Gas Location. All materials no longer needed for operations will be removed from the site and re-used or disposed of properly. Wastes will be temporarily stored in sealed containers and regularly collected and disposed of at off-site, suitable facilities. Regular disposal for garbage, rubbish, construction wastes, and sanitary waste will be maintained during operations. Please see the Waste Management Plan attached to the Form 2A for additional details on waste disposal practices.

9) Leaks and spills

Leaks and spills will be handled according to TEP's SPCC Plan and SPRP. Appropriate TEP personnel are trained on the requirements of these plans during new hire training and then annually thereafter during employment. If a spill occurs, contractors are instructed to notify their TEP point of contact immediately. If the spill or leak can be safely stopped, employees or contractors should do so. The spill should be contained and resources for spill cleanup employed as described in the SPRP.

In case of a liquid leak or spill, such as produced water or hydrocarbon product, containment strategies will be implemented to control the release. Containment strategies include, but are not limited to, utilization of spill kits, creation of diversion ditches and containment berms, installation of check dams or headgates, and removal of free liquid by vacuum truck. Contaminated soils and materials will be land farmed within bermed areas on site or will be properly stored in sealed containers until removed for proper disposal.

In case of a dry material spill or leak, the affected soil will be land farmed within bermed areas on site, if appropriate, or removed and temporarily stored in a sealed container until removed for proper disposal. If a spill occurs, prompt cleanup is required to minimize any commingling of materials with stormwater runoff.

10) Ground-disturbing maintenance activities.

If ground disturbing maintenance activities are necessary, activities will be evaluated by TEP personnel to determine the following: first, whether the scope of activities merits returning to coverage under the CDPHE Construction Stormwater Permit, or if the activities can occur under the Post-Construction Stormwater Plan; and second, whether additional control measures need to be implemented to prevent erosion before, during, or after the maintenance activities. Control measures will be selected and implemented based on the guidelines provides in TEP's Stormwater Manual.

<u>*Pollution Prevention:*</u> Structural and non-structural control measures will be implemented at the Oil and Gas Location to control stormwater and sediment erosion. The following outlines the planned structural and non-structural control measures slated for use at the Oil and Gas Location:

1) Structural Control Measures:
    a. Wattles
    b. Culvert Inlet and Outlet Protection
2) Non-structural Control Measures:

a. Minimizing surface disturbance by utilization of off-site support facilities
b. Sediment Catchment Basins
c. Diversion Ditches
d. Surface Roughening
e. Seeding and Mulching
f. Proper scheduling of construction activities

Erosion Controls: The Oil and Gas Location and existing access road will be unpaved. To prevent erosion from unpaved surfaces, TEP will apply gravel in sufficient quantities to minimize erosion potential. Hydro-mulch will be applied to the cut and fill slopes of the Oil and Gas Location and the associated stockpiles following site construction to minimize erosion potential. Once interim reclamation of the Oil and Gas Location is complete, seed and mulch will be applied to the reclaimed cut and fill slopes.

Vehicle Tracking Control: Construction sites may use vehicle tracking controls to mitigate the transport of mud/sediment adhering to vehicle tires prior to leaving the site and entering the adjacent asphalt and/or public roadways, or areas where vehicle tracking occurs shall have measures in place that contain or filter flows in order to prevent the bypass of flows without treatment. If needed, access roads may be stabilized with base course or gravel to reduce erosion, and street sweeping will be utilized to removed tracked sediment on paved roads, when necessary.

Management of Waste Materials: Locations will be maintained in a clean and orderly fashion to minimize the potential for spills, leaks, stormwater contamination, and safety hazards. Housekeeping will consist of neat and orderly storage of materials and containerized fluids. Wastes will be temporarily stored in sealed containers and regularly collected and disposed of at approved off-site disposal facilities.

Contractors and employees will maintain, as necessary, an equipment storage (lay down) or staging area for equipment and materials storage at each site. These areas will be maintained with good housekeeping and will be inspected regularly for spills, leaks, and potential contamination.

Construction trash and debris (i.e., non-hazardous solid waste) will be collected in containers and hauled off-site for disposal at an approved disposal facility. Sanitary waste will be containerized in portable toilets or other storage tanks with waste materials regularly pumped and transported off-site for disposal at approved facilities.

Drill cuttings will be managed on location within a bermed cuttings trench. Stormwater run-on that enters the cuttings trench will be pumped out and properly disposed. Drill cuttings will be sampled for compliance with Table 915-1 and will be buried on location within the cuttings trench / cut slope of the Oil and Gas Location. Please see the Waste Management Plan attached to the Form 2A for additional details on drill cuttings management.

SITE-SPECIFIC CONSTRUCTION AND STORMWATER CONTROL MEASURES

The Federal RGU 44-1-298 pad will be reconstructed and expanded to accommodate the development of the eighteen (18) new proposed natural gas wells. Site-specific stormwater control measures are depicted on Appendix A, Construction Layout Drawing, and include diversion ditches, sediment basins, wattles, surface roughening, application of mulch, and application of gravel. Additional stormwater control measures may be considered during site construction. The existing access road from Rio Blanco County Road 24 will continue to be used to access the Oil and Gas Location. The existing access road will be improved during site construction provide sufficient ingress and egress to the Oil and Gas Location. Stormwater control measures will be implemented along the access road including bar ditches, riprap,

application of surfacing materials, and others as necessary to control stormwater. The existing access road / lease road is approximate 0.07 mile in length.

To support production operations on the Federal RGU 44-1-298 pad, Williams will install one (1) eight-inch (8") steel natural gas pipeline (approx. 465 feet) from the proposed separators on the Federal RGU 44-1-298 pad to the existing sixteen-inch (16") natural gas pipeline operated by Williams located within the existing pipeline Right-of-Way adjacent to the Oil and Gas Location. The proposed tie-in point will be located on Federal surface. TEP will install one (1) six-inch (6") Coreline or FlexSteel water pipeline (approx. 3,522 feet) from proposed pump on the Federal RGU 44-1-298 pad to the existing tank battery on the Federal RGU 23-6-297 pad. TEP will also install one (1) six-inch (6") FlexPipe water pipeline (approx. 285 feet) from the proposed tank battery to an existing six-inch (6") produced water pipeline located within the adjacent pipeline ROW. TEP will install several on-location flowlines to support onsite production operations.

The proposed off-location pipelines will be installed within a fifty-foot (50') pipeline Right-of-Way located on Federal surface administered by the Bureau of Land Management.

Prior to initial pad construction, TEP will have the proposed pad location, access road, and pipeline corridors staked for construction and will hold a pre-construction onsite with the excavation and stormwater contractors to review proposed site construction. TEP's stormwater management contractor will review the preliminary erosion control plan and determine if any additional control measures are needed. Any new control measures implemented because of this review or requested by the surface owner will be documented as required by Federal and/or State regulations.

TEP's stormwater contractor will then oversee the installation of stormwater control measures (i.e. waddles, straw bales, etc.) along the outer perimeter of the proposed disturbance boundary. TEP's construction contractor will then begin removal of existing vegetation within the disturbance footprint by hydro-axing or brush hogging larger brush within the project disturbance boundary. Stormwater control measures, such as sediment traps and diversion ditches, will then be installed along the perimeter of the site prior to pad excavation.

Topsoil horizon, or the top six inches (6") of soil, within the pad disturbance footprint will then be stripped and stockpiled along the west end of the Oil and Gas Location. Topsoil will be segregated from all other subsurface materials at the site and wattles will be placed around the perimeter of the stockpile to prevent migration of organic materials from the stockpile.

Excavation of the pad will then commence and will be constructed based on Appendix A, Construction Layout Drawing. A perimeter berm will be constructed around the fill side of the pad location and around the cuttings trench. A drive over berm will be constructed at the pad entrance.

The proposed production equipment areas, and on-location flowlines will then be installed. Conductors may be installed during installation of production facilities if drilling operations are expected to commence within six (6) months of installation. Per COGCC Rule 406.e.(4), conductors for wells that have not been drilled within six (6) months of setting the conductor must be plugged per the guidelines outlined in the rule. The area beneath the proposed rig footprint, approximately forty feet (40') from the proposed cellar, will be compacted to ensure stability of the rig during drilling operations. The pad working surface will be bladed level and graveled.

The cut and fill slopes, excess stockpile, and topsoil stockpile will be hydro-mulched following completion of pad construction to minimize the potential for site degradation during the initial drilling and well completion phase of the project.

Interim reclamation of the Oil and Gas Location will occur following completion of well construction. Stormwater control measures will be implemented during interim reclamation and will include diversion ditches, sediment traps, surfacing materials (as needed), and application of seed and mulch. Additional control measure may be implemented as needed to prevent off-site migration of sediment and pollutants. Stormwater control measures planned for interim reclamation are depicted on Appendix B, Interim Reclamation Layout Drawing**.**

STORMWATER MANAGEMENT PROGRAM

Oil and gas operation generally require major ground disturbing activities which may include construction of oil and / or natural gas well pads, access roads, natural gas pipelines, produced water pipelines or off-location flowlines, compressor stations, centralized exploration and production waste management facilities, and other support facilities. All construction activities will follow standard construction and engineering protocols and procedures, and the appropriate stormwater runoff, erosion, and sediment control measures (CMs) will be used to minimize the impact of ground disturbing activities. The following sections describe the relationship between the phases of construction and the implementation and maintenance of both structural and non-structural stormwater management control measures used by TEP to effectively minimize site erosion and sediment transport.

Pre-construction Phase

Preliminary site assessments are made for site planning and management (e.g., well pad dimensions, access roads, pipeline routes, etc.) and to determine needed site-specific control measures, pre-construction vegetative cover, existing drainages/outfalls, soil types, and other site-specific considerations prior to site excavation. These features are incorporated into site specific stormwater plans and are used to develop, implement, maintain, and update/revise the SWMP.

Prior to initial construction activities or ground disturbance, stormwater control measures shall be implemented at construction sites to control erosion (i.e., sequencing of construction activities, surface roughening, etc.) and sediment (i.e., stabilized construction entrances, temporary berms, diversion ditches, etc.), and to protect existing vegetation outside the perimeter of the construction site.

Construction Phase

Upon completion of pre-construction site assessments and related SWMP management (i.e., development, implementation, maintenance, updates/revisions), construction activities are scheduled or phased to control erosion and sediment and all potential pollutant sources at project sites, and to protect existing vegetation. Construction activities for the exploration and production of natural gas typically follow this general order of operation:

1) Installation of perimeter sediment control measures around the proposed site disturbance including material stockpiles to ensure adequate protection for surface waters and / or wetland areas adjacent to, or downgradient of the construction site (i.e. well pad, access road, pipeline corridor, utilities);
2) Preservation of existing vegetation adjacent to construction activities, or where feasible;
3) Clearing and grubbing of site vegetation;
4) Preserving topsoil by stripping and placing topsoil within designated areas along the perimeter of the construction site;
5) Site construction includes excavation of cut and fill slopes of the proposed access road and well pad, excavation of pipeline right-of-way, installation of utility lines and site facilities, and other ground disturbance activities;

6) Implementation of interior erosion and sediment control measures as described in the SWMP (i.e. diversion ditches, sediment traps, surface roughening, mulching, wattles, riprap, culverts, etc.);
7) Development of oil and natural gas wells through planned drilling and completion operations;
8) Installation and operation of production facilities (if not completed before D&C operations);
9) Stormwater control measure management and reporting, including daily or bi-weekly inspection depending on phase of construction.

Interim Reclamation

Disturbed areas affected by construction, drilling, completion, and/or production operations not required for long-term production operations will be temporarily stabilized after construction is complete. Interim reclamation will be initiated for areas of well pad surfaces, access roads, pipelines, etc. not needed for long-term production operations. Surfaces required for the operation of production facilities will be maintained until wells are no longer productive (approximately 30 years). The following measures may be used for interim reclamation to control stormwater runoff, minimize erosion and the transport of sediment off-site, and to control site degradation:

1) Managing debris and waste materials (i.e., well completion and drilling materials, drill pipe, excess materials and equipment, etc.) in accordance with TEP guidelines and regulatory requirements;
2) Closing cuttings trenches and / or management areas per COGCC regulations and re-contouring the disturbances to eliminate the potential for stormwater ponding;
3) Grading the construction site to reduce the working pad surface to approximately one-quarter (¼) of an acre or the area required for long-term production operations;
4) Cross-ripping disturbed areas compacted by oil and gas operations which are no longer needed following completion of such operations to alleviate compaction;
5) Stabilizing unpaved access roads with base course or gravel to minimize erosion, and implementing permanent erosion control measures (e.g., permanent vegetation, erosion control blanket, retaining walls, etc.) for adjacent slopes or ditches;
6) Installing water bars and supplemental control measures on slopes greater than 20%, as needed;
7) Installing rock check dams, or equivalent structures, in drainage channels susceptible to erosion;
8) Seeding ripped or harrowed ground disturbances with an appropriate seed mix and using stockpiled topsoil for areas of the site that will utilize vegetative final stabilization measures; and
9) Monthly inspection schedule for < 70% pre-disturbance vegetation cover. Annual inspection schedule for ≥ 70% pre-disturbance vegetation cover.

When construction of well pads, pipelines, access roads, and other production facilities are completed interim reclamation activities will be initiated. Sites located on cropland will be reclaimed in accordance with COGCC regulations and private landowner requirements. All other sites will be reclaimed in the interim using measures described above, taking into consideration the natural landscape of the surrounding undisturbed area, disturbed surface slopes, and the proximity of the site to drainages and surface waters. Please see the Reclamation Plan attached to the Form 2A for further details on site reclamation.

Final Reclamation

TEP's final reclamation phase of construction aligns with industry and regulatory standards and regulations for reclaiming lands affected by oil and natural gas construction activities and operations. Structural and/or non-structural control measures will be implemented to effectively minimize erosion, sediment transport, and the release of other pollutants at the completion of final reclamation construction activities. Final reclamation of disturbed surfaces at sites may be accomplished with the following sequence of construction activities:

1) Plugging and abandoning of wells which are no longer producing;
2) Removal of any remaining production equipment, pipeline riser, and debris from the site, and backfilling remaining pits and boreholes used for production operations;
3) Recontouring the site to approximate pre-construction contours as practicable, per COGCC regulations, landowner agreements, or land management agency requirements;
4) Closing, grading, and re-contouring access roads, and removing culverts;
5) Alleviating compaction where necessary per COGCC requirements;
6) Replacing stockpiled topsoil over the site and preparing the surface for seeding by disking or ripping; and
7) Application of approved seed mix using appropriate application method (hydro-seed, drill seed, or broadcast seed), and covering with mulch to prevent sediment erosion and promoting growth of desirable vegetation.

Sediment and erosion control measures at the site will be maintained or modified as needed until final reclamation of disturbed areas has been completed. Site-specific maps shall be updated to reflect field conditions post-construction.

Restoration control measures, including vegetation, have been designed and will be installed as permanent features. When the surface of the land has been restored (as nearly as practicable) to its condition at the commencement of construction activities all temporary non-biodegradable CMs shall be removed from the site.

INSPECTION AND MAINTENEANCE

All TEP internal site inspections are conducted in accordance with State Permit regulations and represent the minimum inspection schedule for construction sites in the Piceance Fields (at least once every 14 calendar days). More frequent inspections are often conducted on active construction sites in accordance with project needs and communication with TEP's SWMP Administrator, Construction Superintendent, and onsite contractors. Internal inspections are conducted by a TEP appointed third party Qualified Stormwater Manager (QSM).

At a minimum, the following shall be evaluated during each inspection for evidence of, or the potential for, pollutants leaving construction site boundaries; entering a stormwater drainage system; or discharging to State waters:

1) construction site perimeter;
2) all disturbed areas;
3) designated haul routes;
4) material and waste storage areas exposed to precipitation;
5) locations where stormwater has the potential to discharge off-site; and
6) locations where vehicles exit the site.

All erosion and sediment control measures identified at the site are evaluated to ensure that they are maintained and operating correctly.

Inspection Requirements:

1) Visually verify whether all implemented control measures (CMs) are in effective operational condition and are working as designed in their specifications to minimize pollutant discharges.
2) Determine if there are new potential sources of pollutants.

3) Assess the adequacy of CMs at the site to identify areas requiring new or modified control measures to minimize pollutant discharges.
4) Identify all areas of non–compliance with the Permit requirements and, if necessary, implement corrective action/work order.

BEST MANAGEMENT PRACTICES

The following Best Management Practices for stormwater management will be utilized during development of the Oil and Gas Location:

1) Stormwater control measures will be in place during all phases of development (construction, drilling, completions, interim reclamation, and production) to control stormwater runoff in a manner that minimizes erosion, transportation of sediment offsite, and site degradation;
2) Stormwater control measures will include perimeter controls and site degradation control measures; these will include a minimum 1.5-foot compacted earthen perimeter berm around the entire working pad surface and around the cuttings trench in the northwest portion of the well pad; topsoil will be stockpiled near the west end of the location within the disturbance area; there will be a system of exterior diversion ditches around the entire Oil and Gas Location; these diversion ditches will be fitted with rocked check dams and will tie into one (1) sediment catchment basins along the eastern edges of Oil and Gas Location; site degradation control measures will include grading, slope stabilization (seeding, mulching, surface roughening of the topsoil stockpile), straw wattles along the toe of all fill slopes, and the use of gravel and road base materials for surfacing; wattles will be placed around the entire perimeter of the topsoil stockpile to minimize potential for loss of organic materials;
3) Outlet protection should be used when a conveyance discharges onto a disturbed area where there is potential for accelerated erosion due to concentrated flow;
4) TEP will conduct stormwater inspections immediately after storm events;
5) Bi-weekly inspection of the pad and stormwater control measures (berms, ditches, sediment basins), and the cuttings trench (berms and precipitation buildup); when necessary, precipitation within the cuttings trench will be pumped out and sent into the TEP proposed produced water management system for disposal;
6) Stream Crossing and Road Construction - TEP will ensure that control measures are designed, installed, and adequately sized in accordance with good engineering, hydrologic, and pollution control practices; and
7) Documentation / Stormwater Management Plan - if it is infeasible to install or repair a control measure immediately after discovering a deficiency, TEP will document and keep on record in the stormwater management plan: (a) a description of why it is infeasible to initiate the installation or repair immediately; and (b) a schedule for installing or repairing the control measure and returning it to an effective operating condition as soon as possible.
8) A post-construction stormwater program will be developed for the facility as required per Rule 1002.f.(3). Stormwater control is also addressed under a field-wide Stormwater Management Plan.

APPENDIX A
FEDERAL RGU 44-1-298 DRILL PAD
CONSTRUCTION LAYOUT DRAWING
PLAN VIEW & CROSS SECTION

GENERAL NOTES

1. THE RGU 44-1-298 WELL PAD AND PIPELINE PROJECT CONSISTS OF APPROXIMATELY 9.47 ACRES OF DISTURBANCE WHICH WILL BE COVERED UNDER TERRA ENERGY PARTNERS' (TEP) ACTIVE COLORADO DISCHARGE PERMIT SYSTEM (CDPS)GENERAL PERMIT COR404628 FOR STORMWATER ASSOCIATED WITH CONSTRUCTION ACTIVITIES.

2. TEP MAINTAINS A FIELD WIDE STORMWATER MANAGEMENT PLAN (SWMP) FOR THE PICEANCE BASIN ASSET TO MAINTAIN COMPLIANCE WITH ALL ACTIVE COR400000 STORMWATER PERMITS. THIS SWMP HAS BEEN PREPARED IN ACCORDANCE WITH GOOD ENGINEERING, HYDROLOGIC AND POLLUTION CONTROL PRACTICES TO MEET THE REQUIREMENTS OF THE COR400000 CONSTRUCTION STORMWATER PERMIT AND COGCC RULE 1002.f.(2). THIS FIELD WIDE SWMP WILL BE IMPLEMENTED AT THE RGU 44-1-298 .

3. AS DEFINED IN THE CDPHE COR400000 PERMIT, GOOD ENGINEERING, HYDROLOGIC AND POLLUTION CONTROL PRACTICES: ARE METHODS, PROCEDURES, AND PRACTICES THAT: A. ARE BASED ON BASIC SCIENTIFIC FACT(S). B. REFLECT BEST INDUSTRY PRACTICES AND STANDARDS. C. ARE APPROPRIATE FOR THE CONDITIONS AND POLLUTANT SOURCES. D. PROVIDE APPROPRIATE SOLUTIONS TO MEET THE ASSOCIATED PERMIT REQUIREMENTS, INCLUDING PRACTICE BASED EFFLUENT LIMITS.

4. ALL EARTHWORK, CUTTING/FILLING, AND COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND THE PROJECT GEOTECHNICAL ENGINEER'S RECOMMENDATIONS; AND ALL EARTHWORK, SITE PREPARATION, AND QUALITY CONTROL TESTING SHALL BE DONE IN ACCORDANCE WITH RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER. TEP SHALL BE RESPONSIBLE FOR COORDINATING AND SCHEDULING TESTING.

5. IN THE EVENT THAT GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, TEP SHALL PERFORM, AS NEEDED, DEWATERING MEASURES IN ACCORDANCE WITH STATE PERMIT STANDARDS AND REQUIREMENTS.

6. IN THE EVENT THAT CONTAMINATED SOIL AND/OR GROUNDWATER ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, THE EARTHWORK CONTRACTOR MUST NOTIFIY TEP STAFF: ENVIRONMENTAL STAFF OF ANY CONTAMINATED SOILS ENCOUNTERED, AND TEP WILL COORDINATE WITH AN APPROPRIATE SPILL RESPONSE CONTRACTOR FOR ANY SAMPLING, WASTE MANAGEMENT, AND DISPOSAL OF CONTAMINATED MEDIA.

SEDIMENT AND EROSION CONTROL MEASURES

7. TERRA ENERGY PARTNERS (TEP) SHALL ASSUME RESPONSIBILITY FOR CONTROLLING EROSION AND SEDIMENTATION WITHIN THE PROJECT AREA DURING AND AFTER CONSTRUCTION ACTIVITIES. TEP WILL FOLLOW RULES AND REGULATIONS ESTABLISHED BY THE STATE OF COLORADO'S CONSTRUCTION STORMWATER PERMIT (COR400000), AND THE COLORADO OIL AND GAS CONSERVATION COMMISSION (COGCC). TEP'S MOST CURRENT PICEANCE BASIN STORMWATER MANAGEMENT PLAN SHALL BE IMPLEMENTED TO PROVIDE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES UNTIL THE REQUIRED NATIVE VEGETATION GROUND COVER HAS BEEN RE-ESTABLISHED PER STATE REQUIREMENTS. THE PROJECT EROSION CONTROL PLAN (SITE MAP) WILL SHOW THE LOCATION OF ALL EROSION AND SEDIMENT CONTROL MEASURES.

8. IN ADDITION TO COMPLYING WITH THE COLORADO DEPARTMENT OF PUBLIC HEALTH'S COR400000 CONSTRUCTION STORMWATER PERMIT, TEP'S CONSTRUCTION STORMWATER MANAGEMENT PROGRAM SHALL COMPLY WITH COGCC RULE 1002.f.(2) WHICH STATES "OIL AND GAS OPERATORS SHALL IMPLEMENT AND MAINTAINING BEST MANAGEMENT PRACTICES (BMPs) AT ALL OIL AND GAS LOCATIONS TO CONTROL STORMWATER RUNOFF IN A MANNER THAT MINIMIZES EROSION, TRANSPORT OF SEDIMENT OFFSITE, AND SITE DEGRADATION".

9. TEP SHALL INSPECT ALL SEDIMENT AND EROSION CONTROL MEASURES AND GENERAL SITE CONDITIONS AT LEAST ONCE EVERY 14 CALENDAR DAYS. POST-STORM EVENT INSPECTIONS WILL BE CONDUCTED WITHIN 24 HOURS AFTER THE END OF ANY PRECIPITATION OR SNOWMELT EVENT THAT CAUSES SURFACE EROSION. IF NO CONSTRUCTION ACTIVITIES WILL OCCUR FOLLOWING A STORM EVENT, POST-STORM EVENT INSPECTIONS SHALL BE CONDUCTED PRIOR TO RE-COMMENCING CONSTRUCTION ACTIVITIES, BUT NO LATER THAN 72 HOURS FOLLOWING THE STORM EVENT.

10. DURING WINTER MONTHS, THIS FACILITY WILL TYPICALLY QUALIFY FOR WINTER EXCLUSION AS DEFINED IN THE CDPHE COR400000 STORMWATER PERMIT. STORMWATER INSPECTIONS WILL RESUME WHEN THE FACILITY NO LONGER MEETS WINTER EXCLUSION REQUIREMENTS.

11. TEP SHALL STABILIZE THE WORKING SURFACE OF THE WELL PAD AS AN ALTERNATIVE TO CONSTRUCTING VEHICLE TRACKING CONTROLS SUCH AS MUD MATS, VEHICLE TRACKING PADS. THE STABILIZED WORKING SURFACE SHALL BE MAINTAINED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES AND THE DETAIL/SPECIFICATION PROVIDED IN THIS PLAN. DURING THE CONSTRUCTION OF THE WELL PAD, A ROCK VEHICLE TRACKING PAD MAY BE NEEDED UNTIL ALL GRADING IS COMPLETE, AND THE WELL PAD WORKING SURFACE IS STABILIZED.

12. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SUCH AS DIVERSION DITCHES, WATTLES, EARTHEN BERMS, SEDIMENT TRAPS, AND OTHER MEANS SHALL BE INSTALLED TO CONTROL EROSION AND SEDIMENT PER THESE PLANS AND TERRA ENERGY PARTNERS' STORMWATER MANAGEMENT PLAN (SWMP). DIVERSION DITCHES ARE PLANNED FOR USE WHERE STORMWATER RUN-ON ENTERS THE PROJECT AREA, AND TO CONVEY STORMWATER RUNOFF FROM THE PROJECT AREA INTO SEDIMENT TRAPPING DEVICES; SEDIMENT CONTROL LOGS MAY BE USED AROUND MATERIAL STOCKPILES OR ON THE DOWNGRADIENT SIDE OF DISTURBANCES ACCORDING TO THE SPECIFICATION LIMITATIONS; SEDIMENT TRAPS ARE PLANNED FOR USE AT ALL DISCHARGE POINTS AND WILL BE SIZED ACCORING TO THE ENGINEERED SPECIFICATION PROVIDED IN THIS PLAN; AND EARTHEN BERMS WILL BE UTILIZED ON THE PAD'S WORKING SURFACE TO CONTAIN ANY POTENTIAL POLLUTANTS DURING DRILLING/COMPLETION/PRODUCTION OPERATIONS. AS THE OPERATIONS AND PHASING OF THE PROJECT CHANGES, OTHER STORMWATER CONTROLS WILL BE INSTALLED/CONSTRUCTED AS NEEDED.

13. TEP WILL CONTROL DUST AT ALL TIMES. THE USE OF A DUST PALLIATIVE, TACKIFIER, OR TEMPORARY SEEDING/MULCHING OF DISTURBED SURFACES MAY BE USED TO HELP WITH DUST CONTROL.

14. TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON ALL DISTURBED SLOPES THAT HAVE BEEN IDLE FOR 14 DAYS OR LONGER. TEP SHALL APPLY A HIGH PERMFORMACE HYDRO-MULCH WITH MANUFACTURER SPECIFICATIONS THAT MEET THE APPLICATION NEEDS. ROLLED EROSION CONTROL PRODUCTS MAY ALSO BE USED.

15. TEP WILL PERFORM ROUTINE MAINTENANCE ON ANY CONTROL MEASURE THAT IS STILL OPERATING IN ACCORDANCE WITH IT'S DESIGN AND THE REQUIREMENTS OF THE COR400000 PERMIT, BUT REQUIRES MAINTENANCE TO PREVENT A BREACH OF THE CONTROL MEASURE.

16. TEP MUST TAKE ALL NECESSARY STEPS TO MINIMIZE OR PREVENT THE DISCHARGE OF POLLUTANTS FROM THE PERMITTED AREA AND MANAGE ANY STORMWATER RUN-ON ONTO THE SITE UNTIL A CONTROL MEASURE IS IMPLEMENTED AND MADE OPERATIONAL AND/OR AN INADEQUATE CONTROL MEASURE IS REPLACED OR CORRECTED AND RETURNED TO EFFECTIVE OPERATING CONDITION. IF IT IS INFEASIBLE TO INSTALL OR REPAIR THE CONTROL MEASURE IMMEDIATELY AFTER DISCOVERING THE DEFICIENCY, THE FOLLOWING MUST BE DOCUMENTED IN THE SWMP AND KEPT ON RECORD IN ACCORDANCE WITH THE RECORDKEEPING REQUIREMENTS OF THE PERMIT: A. DESCRIBE WHY IT IS INFEASIBLE TO INITIATE THE INSTALLATION OR REPAIR IMMEDIATELY; AND B. PROVIDE A SCHEDULE FOR INSTALLING OR REPAIRING THE CONTROL MEASURE AND RETURNING IT TO AN EFFECTIVE OPERATING CONDITION AS SOON AS POSSIBLE.

17. EROSION AND SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL FINAL STABILIZATION IS ACHIEVED OR UNTIL SITE CONDITIONS WARRANT THE USE OF DIFFERENT STORMWATER BMPS.

SOIL HANDLING

18. TERRA ENERGY PARTNERS (TEP) WILL SALVAGE TOPSOIL FROM AREAS OF BOTH CUT AND FILL FOR REUSE IN REVEGETATING DISTURBED SURFACES. TOPSOIL SALVAGED FROM AN AREA SHALL BE PLACED ACCORDING TO THE TOPSOIL PROTECTION PLAN SUBMITTED IN THE COGCC FORM 2A AND BLM APD, AND CARE SHALL BE TAKEN BY EQUIPMENT OPERATORS WHEN SALVAGING, STOCKPILING, AND REPLACING TOPSOIL.

19. WHEN TOPSOIL STOCKPILE LOCATIONS ARE ESTABLISHED, THESE LOCATIONS WILL BE ADDED TO THE EROSION CONTROL PLAN/SITE MAP FOR THIS PROJECT. TOPSOIL WILL BE STOCKPILED ACCORDING TO THE TOPSOIL PROTECTION PLAN AND COGCC FORM 2A AND BLM APD. AS REQUIRED, SEDIMENT AND EROSION CONTROL MEASURES WILL BE USED FOR ALL TOPSOIL STOCKPILES.

20. TEP SHALL REMOVE, STORE, AND REPLACE TOPSOIL IN A WAY THAT PREVENTS SOIL EROSION AND STORMWATER POLLUTION. TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMPs SUCH WAS WATTLES, EARTHEN BERMS, DIVERSION DITCHES, AND SEDIMENT TRAPS WILL BE INSTALLED AND PROPERLY MAINTAINED DURING SOIL EXCAVATION AND REPLACEMENT CONSTRUCTION PHASES.

21. TOPSOIL SHALL BE REPLACED AS SOON AS POSSIBLE TO PREVENT LEACHING OF NUTRIENTS AND LOSS OF MICRO-ORGANISMS.

22. TEP WILL CONTROL DUST FROM MATERIAL STOCKPILES AT ALL TIMES WITH THE USE OF WATER, A DUST PALLIATIVE, TACKIFIER, OR TEMPORARY SEEDING/MULCHING.

NO.	REVISIONS	BY	DATE

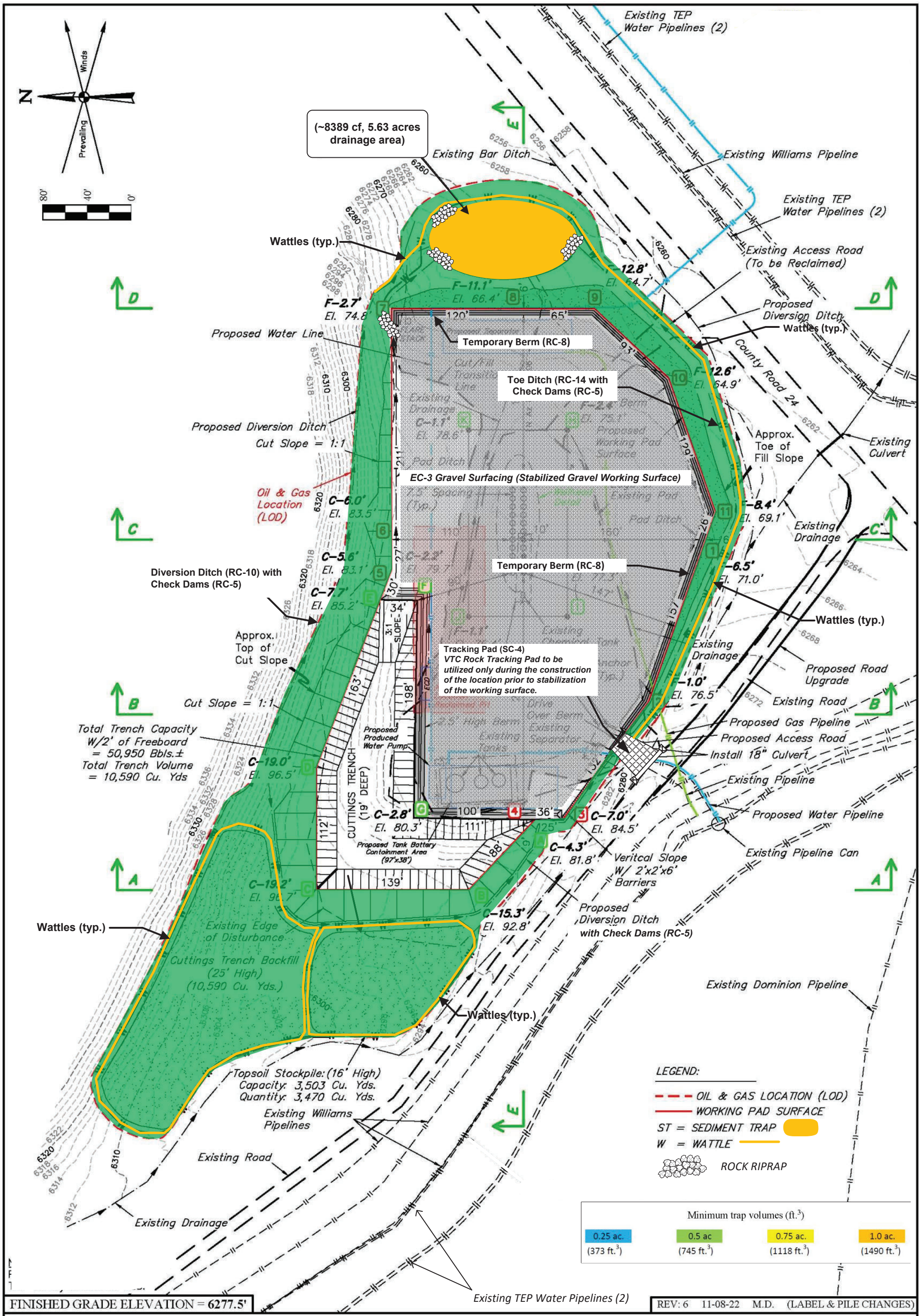
TERRA ENERGY PARTNERS

STORMWATER MANAGEMENT EC PLAN (CONSTRUCTION PHASE)

Federal RGU 44-1-298 Pad

SHEET REFERENCE NUMBER:

Sheet 1



Toe Ditch (RC-14): Installed downgradient of ground-disturbing construction activities and material stockpiles. Toe ditches will lead to a terminal sediment control measure.

AS SHOWN **Sediment Trap (SC-06)**: Sized according to TEP's control measure Manual and installed at the terminal end of diversion and toe ditches.

Diversion Ditch (RC-10): Permanent ditches to be preserved or installed along the facility's perimeter to prevent stormwater run-on which could cause erosion on slopes and the working surface.

Wattle (EC-08): Placed at the toe of slopes for sediment control and at the toe of topsoil stockpiles to prevent topsoil contamination from potential contact with subsoils.

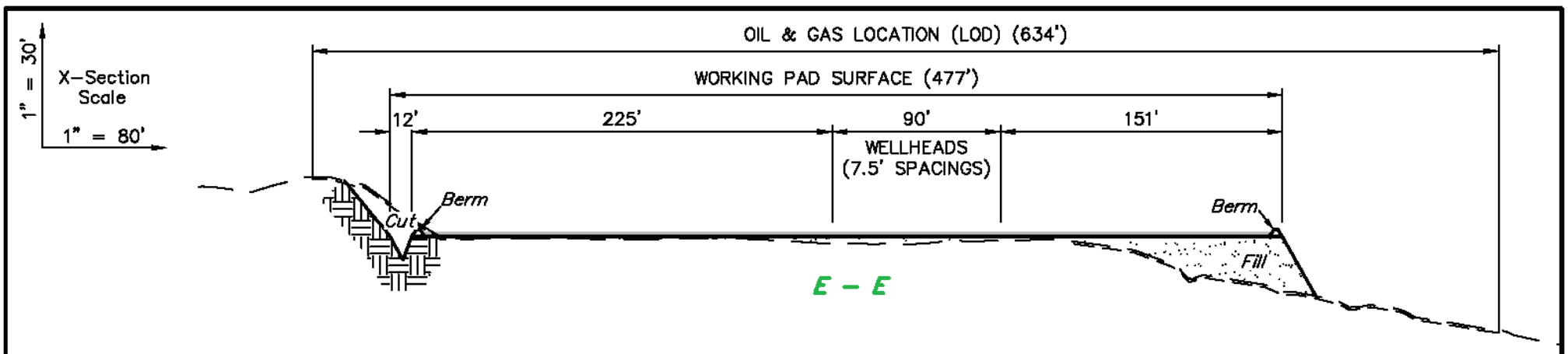
Mulching (EC-07): Will be used as a temporary stabilization practice for erosion control on topsoil stockpiles and areas of disturbance planned to be idle for longer than 14 days. Specified mulch type Flexterra HP-FGM or equivalent. Re-apply as needed per manufacturer specifications.

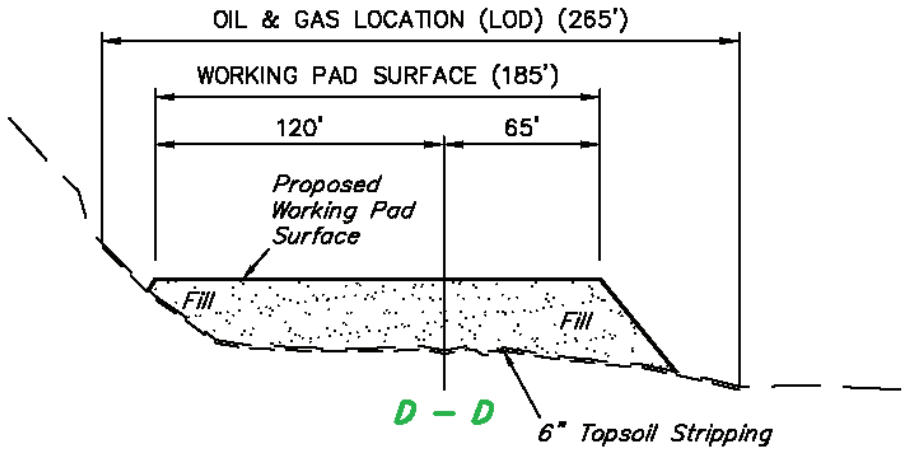
TEP Rocky Mountain LLC

FEDERAL RGU 44-1-298 PAD
LOTS 35 & 36, SECTION 1, T2S, R98W, 6th P.M.
RIO BLANCO COUNTY, COLORADO

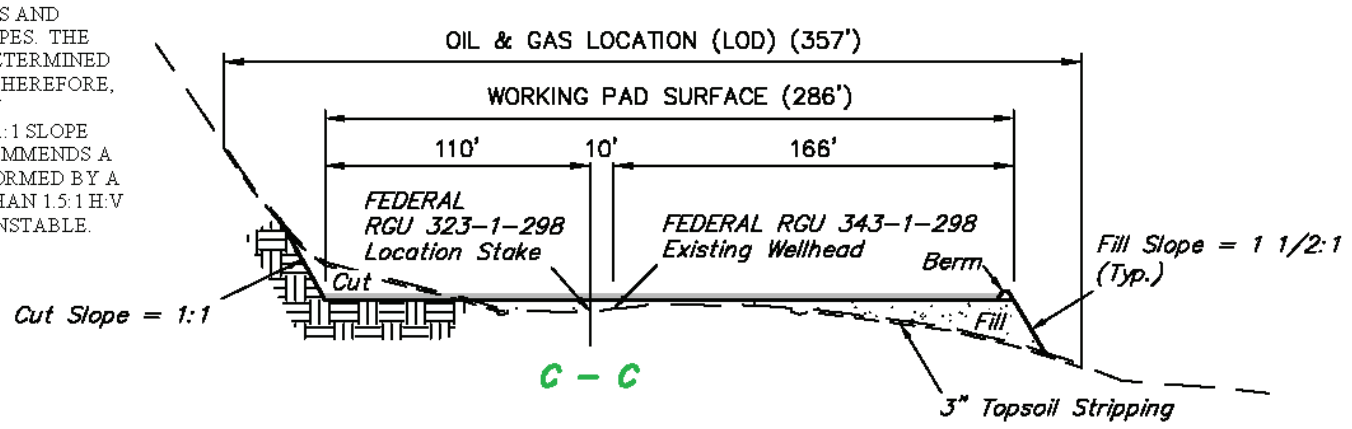
SURVEYED BY	BART HUNTING	08-18-21	SCALE
DRAWN BY	T.L.L.	07-28-21	1" = 80'

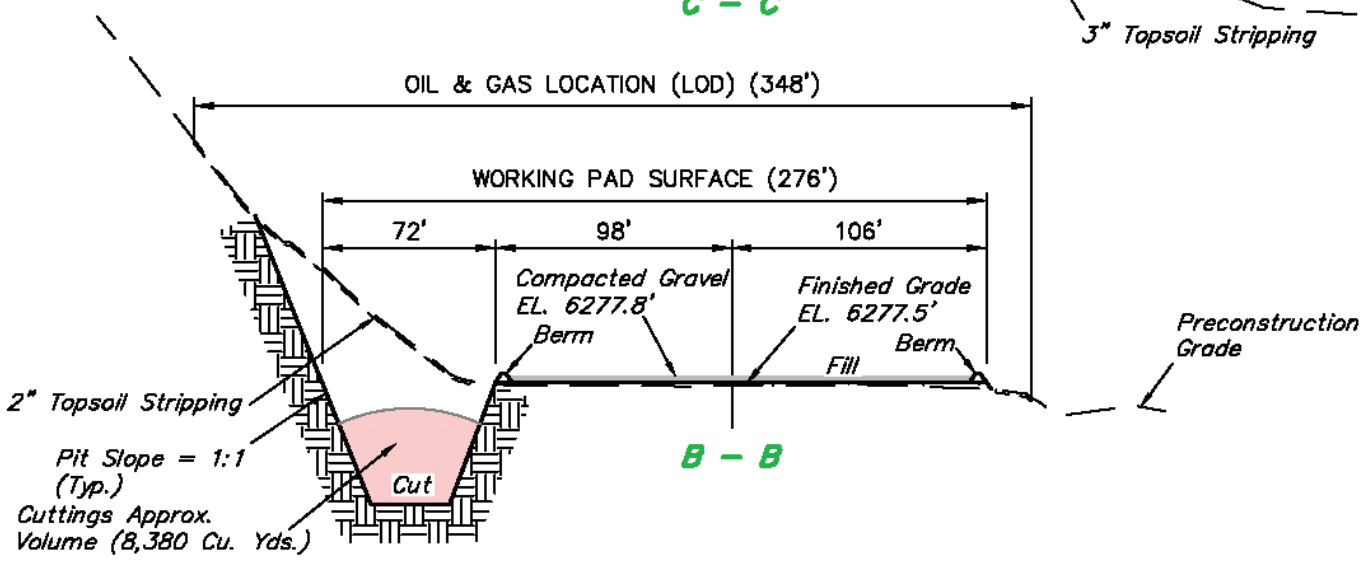
CONSTRUCTION EROSION CONTROL PLAN

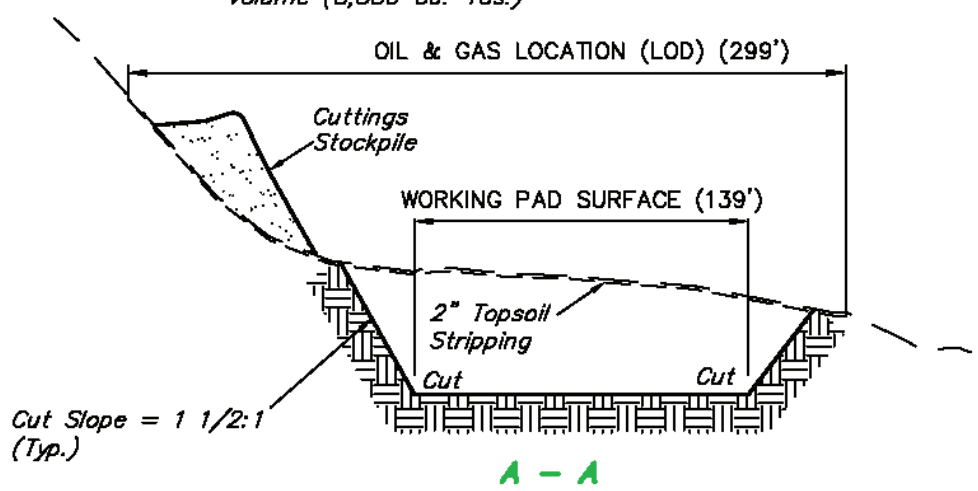




UELS, LLC WAS REQUESTED TO COMPUTE PITS AND ASSOCIATED PIT VOLUMES WITH 1:1 SIDESLOPES. THE STABILITY OF 1:1 EARTH CUTS CANNOT BE DETERMINED WITHOUT GEOTECHNICAL INVESTIGATION. THEREFORE, UELS, LLC DOES NOT ASSUME ANY LIABILITY CONCERNING THE SAFETY OR STABILITY OF 1:1 SLOPE CUTS SHOWN ON THIS PLAT. UELS, LLC RECOMMENDS A GEOTECHNICAL INVESTIGATION TO BE PERFORMED BY A QUALIFIED ENGINEER ON SLOPES STEEPER THAN 1.5:1 H:V OR LESS STEEP WHEN SOILS APPEAR TO BE UNSTABLE.







APPROXIMATE EARTHWORK QUANTITIES	
**(6") TOPSOIL STRIPPING FOR LOD (New Construction Only)	3,470 Cu. Yds.
REMAINING LOCATION	14,110 Cu. Yds.
CUTTINGS TRENCH	10,590 Cu. Yds.
TOTAL CUT	**28,170 Cu. Yds.**
FILL	14,110 Cu. Yds.
CUTTINGS TRENCH	10,590 Cu. Yds.
TOPSOIL	3,470 Cu. Yds.
TOTAL FILL	**28,170 Cu. Yds.**
EXCESS UNBALANCE	**0 Cu. Yds.**

NOTE:

- *1,350 Cu. Yds. Min. 4" of aggregate base. Gravel to increase location stability. Compacted Volume of Approximately 1,350 Cu. Yds. Gravel is to be Applied to Entire Well Pad Footprint.*
- ** *LESS PROPOSED TOPSOIL STOCKPILE AREA & EXISTING PAD.*

APPROXIMATE SURFACE DISTURBANCE AREAS		
	DISTANCE	ACRES
50' WIDE PIPELINE R-O-W DISTURBANCE (8" GAS)	±465'	±0.180
50' WIDE PIPELINE R-O-W DISTURBANCE (6" WATER)	±285'	
50' WIDE PIPELINE R-O-W DISTURBANCE (6" WATER LINE TO RGU 23-6-97)	±3,552'	±3.380
TOTAL PIPELINE R-O-W DISTURBANCE		**±3.560**

APPROXIMATE SURFACE DISTURBANCE AREAS		
	DISTANCE	ACRES
35' WIDE ACCESS ROAD UPGRADE R-O-W DISTURBANCE	±356'	±0.280
TOTAL ROAD R-O-W DISTURBANCE		**±0.280**

APPROXIMATE SURFACE DISTURBANCE AREAS		
	DISTANCE	ACRES
WORKING PAD SURFACE DISTURBANCE	NA	±3.080
CONSTRUCTION DISTURBANCE	NA	±2.550
TOTAL OIL & GAS LOCATION (LOD)		**±5.630**

TOTAL PROJECT DISTURBANCE	**±9.470**

REV: 6 11-08-22 M.D. (ADD ROWS, TOPSOIL STRIPPING, LABEL & PILE CHANGES)

NOTES:

- Fill quantity includes 10% for compaction.
- Calculations based on 6" of topsoil stripping.
- Cut/Fill slopes 1 1/2:1 (Typ. except where noted).

UINTAH ENGINEERING & LAND SURVEYING

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TEP Rocky Mountain LLC

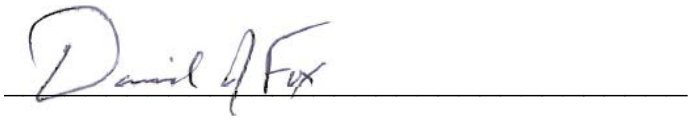
FEDERAL RGU 44-1-298 PAD
LOTS 35 & 36, SECTION 1, T2S, R98W, 6th P.M.
RIO BLANCO COUNTY, COLORADO

SURVEYED BY	BART HUNTING	08-18-21	SCALE
DRAWN BY	T.L.L.	07-28-21	AS SHOWN

CONSTRUCTION LAYOUT CROSS SECTIONS

Piceance Basin Storm Water Manual of Best Management Practices (BMPs)
Revision 4
June 2016

Reviewed and Edited By:



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EC-8 Wattles (W)

Description

A wattle (also called a fiber roll) consists of straw, flax, or other similar materials bound into a tight tubular roll. When wattles are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Applicability

Wattles may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Wattles are not effective unless trenched.
- Difficult to move once saturated.

- If not properly staked and trenched in, wattles could be transported by high flows.

- Wattles have a very limited sediment capture zone.

- Wattles should not be used on slopes subject to creep, slumping, or landslide.

Design Criteria

Wattles should be installed along the contour to avoid concentrating flows. The maximum allowable tributary drainage area per 100 lineal feet of sediment control log, installed along the contour, is approximately 0.25 acres with a disturbed slope length of up to 150 feet.

Construction Specifications

Wattles should be either prefabricated rolls or rolled tubes of erosion control blanket. (If using an erosion control blanket roll the length of erosion control blanket into a tube of minimum 8 in. diameter and bind roll at each end and every 4 ft along length of roll with jute-type twine.)

Minor deviations from the following construction specifications are acceptable as long as performance oriented specifications are maintained. The performance oriented specification for wattles is that sediment is not observed on the down gradient side of the wattle row. If sediment is observed on the down gradient side of the wattle, the wattle should be re-installed.

See Figure EC-8-1.

1. Locate wattles on level contours where possible. However, wattles may also be used off-contour to direct runoff to an outlet sediment control BMP (i.e. a sediment trap) or used as a check dam within a diversion ditch.

2. Suggested spacing of wattles for use on permanent slopes is as follows:

    a. Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

    b. Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

    c. Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

3. Wattles may also be used on temporary slopes at a spacing determined in the field or as a single wattle placed at the toe of the slope or at the perimeter of a project.

4. Turn the ends of the wattles up slope to prevent runoff from going around the roll. When using wattles to direct runoff to another BMP, the ends of the wattles do not need to be turned up slope.

5. Stake wattles into a 2 to 4 in. deep trench with a width equal to the diameter of the wattle. If frozen conditions prevent trenching, wattles may be temporarily secured to the ground without trenching. However, when warm weather permits, wattles will be re-layed in a trench.

6. Drive stakes at the end of each wattle and space as needed to adequately secure the wattle to the ground.

7. If more than one wattle is placed in a row, the rolls should be overlapped or tightly abutted.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. Repair or replace split, torn, unraveling, flattened, saturated, or slumping rolls. If the wattle is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates must be periodically removed in order to maintain wattle effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the wattle and the adjacent ground surface.

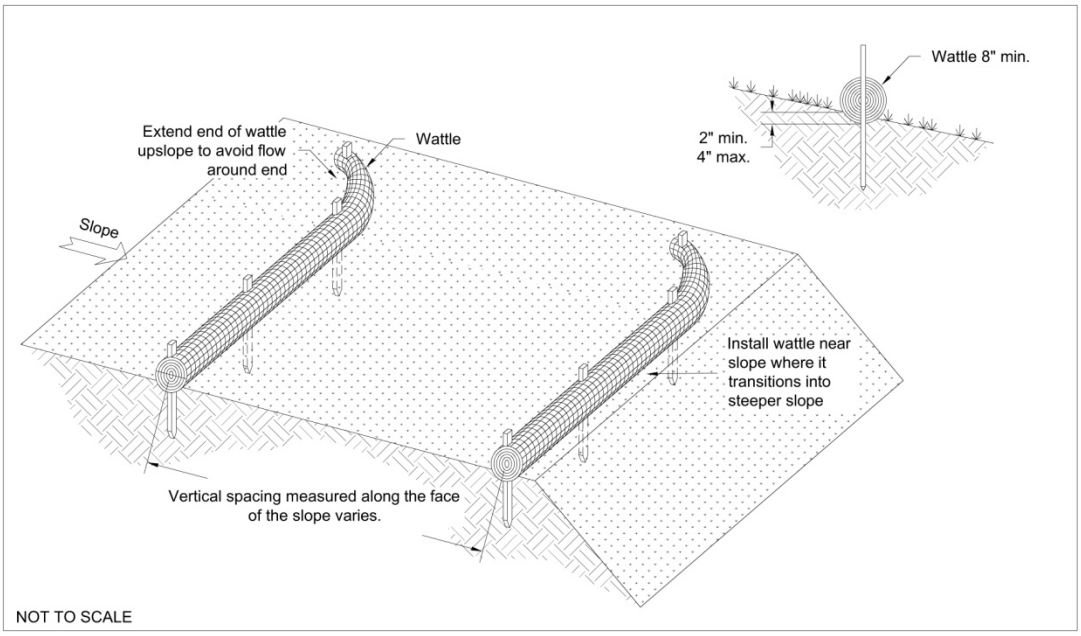
Removal/Abandonment

Site specifics will determine whether or not wattles are left in place. Standard practice for Terra Energy is to remove and properly dispose of all stakes and wattle netting, and then utilizing fiber as mulch on the surrounding areas. If mulching is not possible/permitted, the entire wattle should be removed. Wattles should always be removed when no longer needed, unless unsafe conditions or other special circumstances exist. If wattles have to be left if place, stakes will be removed if there are no safety concerns or other issues preventing their removal. If entire wattles are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

References

California Stormwater Quality Association, *Stormwater Best Management Practice(BMP) Handbook – Construction.* January, 2003. <http://www.cabmphandbooks.com/Construction.asp>

Figure EC-8-1
Typical Wattle Installation



RC-8 Temporary Berm (TB)

Description

A temporary berm is a ridge of soil located at the top or base of a sloping disturbed area, such as the perimeter of a well pad. The purpose of the temporary berm is multi-purpose, including detaining accumulated storm water for subsequent evaporation/infiltration as in SC-10 Water Quality Capture Detention Areas (WQCDA) and to divert and prevent the escapement of precipitation sheet flow.

Applicability

Temporary berms are applicable where it is desirable to divert sheet flows away from disturbed areas such as cut or fill slopes and to divert runoff to a stabilized outlet. Temporary berms are usually appropriate for drainage basins smaller than five acres, but with modifications they can be capable of servicing areas as large as ten acres. Berms are applicable for the following applications:

- At the perimeter of a well pad (particularly the outer edge) to ensure that runoff remains on the pad and is diverted to a sediment trap, if available, or remains in the WQCDA.
- Along the outside shoulder of an insloped road to ensure that runoff from the roadway drains inward and to protect the fill slope from continual disturbances during road blading and maintaining.
- Upslope of cut or fill slopes to divert flows away from disturbed areas.
- Downslope of cut or fill slopes to divert on-site runoff to a stabilized outlet or sediment trapping device, although diversions are more commonly used for this application.

Limitations

- To alleviate erosion capability, berms must be directed into a stabilized outlet or well-vegetated area or to sediment trapping devices, where erosion sediment can settle out of the runoff before being discharged to surface waters.

- If a berm crosses a vehicle roadway or entrance, its effectiveness may be reduced.

Design Criteria

See Figure RC-8-1 for design specifications.

If all or a portion of a level well pad is to be utilized as a shallow WQCDA, the perimeter berm height can be computed with:

Perimeter Berm Height (ft.) = (Surface Area of the WQCDA + Tributary Runon Surface Area) / Surface Area of the WQCDA x 1.2 inches / 12 inches/foot + 0.5 ft. (freeboard & sediment)

Where:
Area = square feet (one acre = 43560 square feet)
NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches
Cut slopes do not require a berm.

If a WQCDA is not present sheet flow will terminate at a sediment control BMP which will be designed to meet site specific capacity requirements in order to effectively manage potential pollutants of the contributing area.

Un-compacted and un-stabilized berm drainage area shall terminate into a sediment trap sized under the design criteria in this manual for SC-6 Sediment Traps, or into a SC-10 Water Quality Capture Detention Area or into a RC-14 Toe Trench.

Berms used to convey or channel precipitation as with diversion ditches shall accommodate the 2-yr storm event provided in the table below and sized using the Chezy-Manning open channel flow equation:

$Q = AV = 1.49/n \times A \times (RH)^{0.667} \times S^{-0.1}$

Where Q = Flow Rate in cubic-feet/second
A = Cross-sectional area of flow (ft.2)
V = Velocity (feet/sec)
n = Channel Roughness coefficient (dimensionless)
RH = Hydraulic Radius (dimensionless)
S = Slope (ft./ft.)

Location
Location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, and the development layout.

Flow Estimates
Peak rates of runoff values used in determining the capacity requirements may be estimated utilizing the Rational Method.

Runoff Flow Estimates Using the Rational Method for Northwest Colorado

Runoff Coefficient	Tributary Area (Acres)	2-year 24-hour Rainfall Intensity[1] (Inches/hour)	Peak Flow[2] (cfs)
0.3	1	1.42	0.426
0.4	1	1.42	0.568
0.5	1	1.42	0.71
0.6	1	1.42	0.852
0.7	1	1.42	0.994

(1) NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation at TC = 15 minutes for Northwest Colorado to be 1.42 inches/hr.

(2) Peak Flow using Rational Method: Q = C x I X A
where C = runoff coefficient; I = rainfall in inches/hour; A = tributary area in acres

(3) Runoff Volume = Peak flow in cfs x Storm Duration in seconds

Velocity and Grade
The permissible velocity for the specific soil type will determine the maximum grade. The maximum permissible velocity for sand and silt vegetated channels is 3 ft/sec, and 5 ft/sec for clay vegetated channels.

Construction Specifications

1. Prior to berm construction, remove all trees, brush, stumps and other objects in the path of the berm and till the base of the berm before laying the fill.

2. Construct the berm according to Figure RC-8-1. All newly constructed well pad perimeter berms should have a minimum height of 2 feet, however, berm height may vary depending on site specific conditions and requirements.

3. For points where vehicles will cross the berm, the slope should be no steeper than 3:1. This will prolong the life of the berm and increase effectiveness at the point of vehicle crossing.

4. All berms shall have positive drainage to an outlet, with the exception of well pad perimeter berms used as WQCDA. Field location should be adjusted as needed to utilize a stabilized safe outlet.

5. Route the berm outlet into a well-vegetated area or install a sediment trapping or filter control at the outlet, such as straw bales.

6. If the expected life span of the temporary berm is greater than 15 days, it is recommended that the berm be compacted using equipment wheel rolling and seeded.

7. Stabilization shall be in accordance with EC-5 Temporary Vegetation and/or EC-7 Mulching.

8. Where possible, berms should be constructed and fully stabilized prior to commencement of major land disturbance. This will maximize the effectiveness of the structure as an erosion and sediment control device.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. Temporary berms should be inspected for evidence of erosion or deterioration. The berm should be maintained at the original height, and any decrease in height due to settling or erosion should be repaired as soon as possible.

Removal/Abandonment

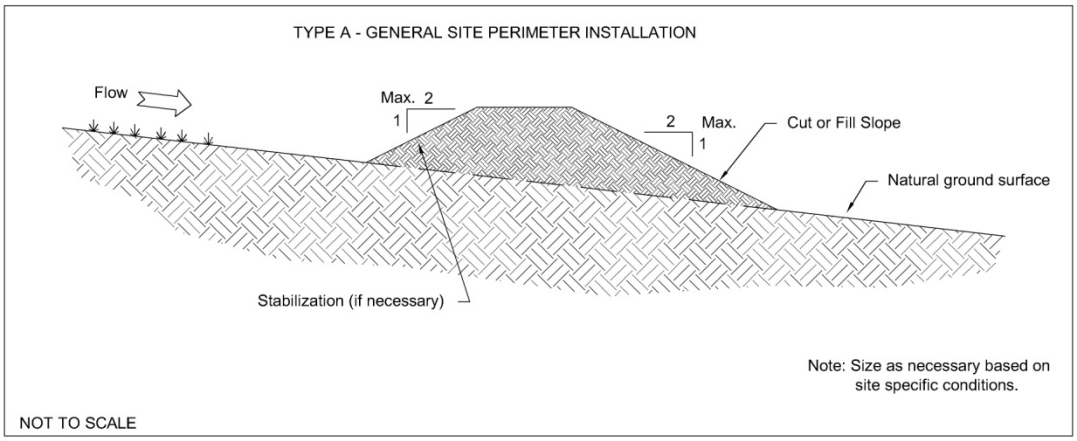
Temporary berms should remain in place and in good condition until the disturbed areas are permanently stabilized. There is no need to formally remove the berm on completion of stabilization.

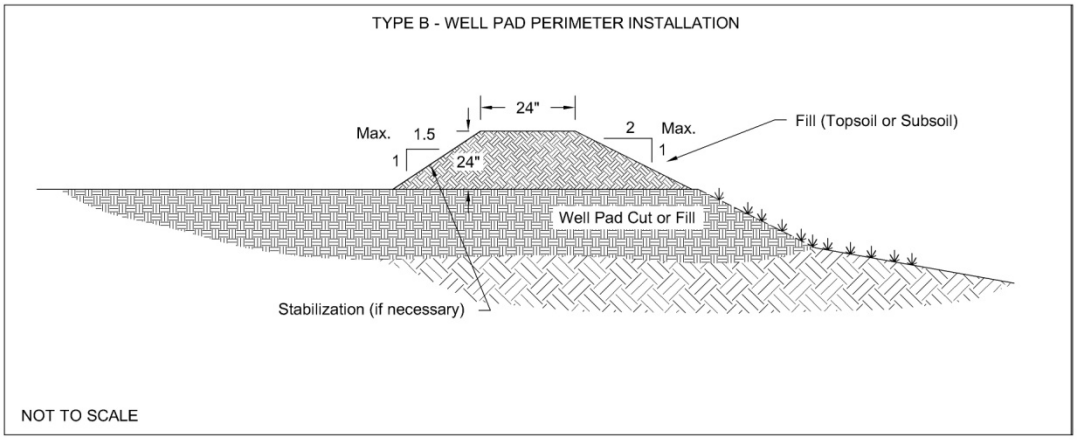
References

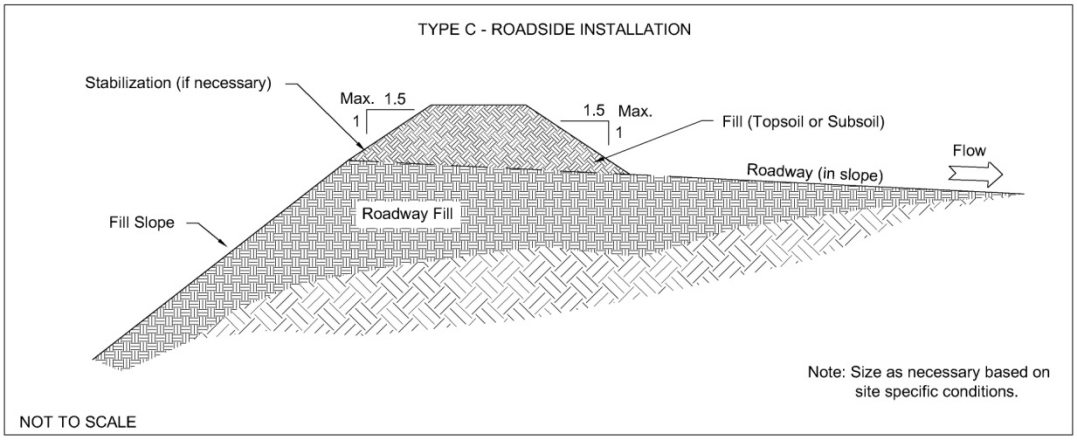
Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

New York State Department of Environmental Conservation, *New York Guidelines for Urban Erosion and Sediment Control.* New York. Fourth Edition, 1997.

Figure RC-8-1
Temporary Berm Installation
Recommended Construction Dimensions







RC-10 Diversion Ditch (DD)

Description

A diversion ditch is an excavated drainage way used to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to prevent sediment laden runoff from leaving disturbed areas by intercepting and diverting it to a sediment trapping device. The diversion ditch may or may not have an adjoining berm on the lower side. The diversion ditch may also be used as a SC-6 Sedimentation Trap or as a SC-10 Water Quality Control Detention Area (WQCDA).

Applicability

Un-compacted and un-stabilized diversion ditches are usually appropriate for drainage basins smaller than five acres, however with compaction and stabilization they can be capable of servicing areas larger than ten acres. Diversion ditches may be used in the following applications:

- To prevent runoff from entering a disturbed area.
- Intermittently across disturbed areas to shorten overland flow distances.
- To prevent sediment laden runoff from leaving a disturbed area without first being directed to a sediment trapping device.

Diversion ditches may be installed in the following locations:

- Along roadways
- Along the perimeter of a site or disturbed area
- Along the top or base of slopes

- Evenly spaced along slopes to lessen the slope-length

Limitations

- To alleviate erosion capability, diversion ditches must be directed to a stabilized outlet (such as a well-vegetated area) or to a sediment trapping device where sediment can settle out of the runoff before being discharged to surface waters.

- If possible, diversion ditches should be designed to avoid crossing vehicle pathways.

- Diversion ditches should be used with caution on soils subject to slippage.

- The area around the diversion ditch that is disturbed by its construction may need to be stabilized so that it is not subject to similar erosion as the slope that the diversion ditch is built to protect.

Design Criteria

A site specific design is only required for permanent diversion ditches with contributing drainage areas greater than 10 acres. Un-compacted and un-stabilized diversion ditches shall terminate into a sediment trap sized under the design criteria in this manual for SC-6 Sediment Traps or into a SC-10 Water Quality Capture Detention Area .

Diversion ditches shall accommodate the 2-yr storm event provided in the table below and sized using the Chezy-Manning open channel flow equation:

$Q = AV = 1.49/n \times A \times (RH)^{0.667} \times S^{-0.1}$

Where Q = Flow Rate in cubic-feet/second
A = Cross-sectional area of flow (ft.2)
V = Velocity (feet/sec)
n = Channel Roughness coefficient (dimensionless)
RH = Hydraulic Radius (dimensionless)
S = Slope (ft./ft.)

If diversion ditches are used as Sedimentation Traps, Figures RC-10-4 and RC-10-5 provide sizing tables.

The following design criteria shall only apply to permanent diversion ditches:

Location

Location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, and the development layout.

Flow Estimates

Peak rates of runoff values used in determining the capacity requirements may be estimated utilizing the Rational Method.

Runoff Flow Estimates Using the Rational Method for Northwest Colorado

Runoff Coefficient	Tributary Area (Acres)	2-year 24-hour Rainfall Intensity[1] (Inches/hour)	Peak Flow[2] (cfs)
0.3	1	1.42	0.426
0.4	1	1.42	0.568
0.5	1	1.42	0.71
0.6	1	1.42	0.852
0.7	1	1.42	0.994

(1) NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation at TC = 15 minutes for Northwest Colorado to be 1.42 inches/hr.

(2) Peak Flow using Rational Method: Q = C x I X A
where C = runoff coefficient; I = rainfall in inches/hour; A = tributary area in acres

(3) Runoff Volume = Peak flow in cfs x Storm Duration in seconds

Velocity and Grade

The permissible velocity for the specific soil type will determine the maximum grade. The maximum permissible velocity for sand and silt vegetated channels is 3 ft/sec, and 5 ft/sec for clay vegetated channels.

Construction Specifications

General

1. All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the diversion ditch.

2. The diversion ditch shall be free of bank projections or other irregularities which will impede normal flow.

3. All diversion ditches shall have uninterrupted positive grade to an outlet.

4. Diverted runoff from a disturbed area shall be conveyed to a sediment trapping device.

5. Diverted runoff from an undisturbed area shall outlet directly into an undisturbed, well vegetated and stabilized area at non-erosive velocity.

6. All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the diversion ditch.

Temporary Diversion Ditches

See Figures RC-10-1 and RC-10-2 for details.

1. The appropriate size and design of temporary diversion ditches depends on the size of the contributing drainage area and other site specific conditions.

2. Fills may be compacted, if necessary to meet site specific needs, by earth moving equipment.

3. The diversion ditch may be stabilized with vegetation, riprap, or erosion control blanket if necessary to meet site specific needs.

Permanent Diversion Ditches

See Figure RC-10-3 for details.

1. Permanent diversion ditches shall be parabolic, trapezoidal, or triangular shaped.

2. Fills shall be compacted as necessary to prevent unequal settlement.

3. The diversion ditch shall be stabilized with vegetation, riprap, or erosion control blanket as soon as possible following construction.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. Diversion ditches should be cleared of accumulated sediment and reseeded if necessary. Repair as needed in order to maintain diversion ditch capacity.

Removal/Abandonment

Drainage ditches may or may not be removed. Drainage ditches collecting runoff from disturbed areas shall remain in place at least until the disturbed areas are permanently stabilized.

References

Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

New York State Department of Environmental Conservation, *New York Guidelines for Urban Erosion and Sediment Control.* New York. Fourth Edition, 1997.

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), *Field Office Technical Guide.* 2002. www.nrcs.usda.gov/technical/efotg

Precipitation-Frequency Atlas of the United States, Volume 2 Version 3.0: Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Tennessee, Virginia, West Virginia. 2004

http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume2.pdf

Figure RC-10-1
Temporary Diversion Ditch Installation

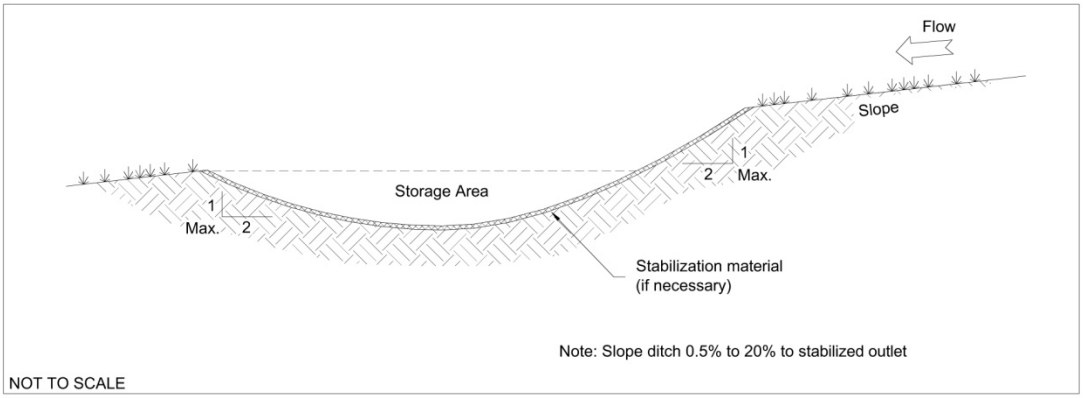


Figure RC-10-2
Temporary Diversion Ditch (with Adjoining Berm) Installation

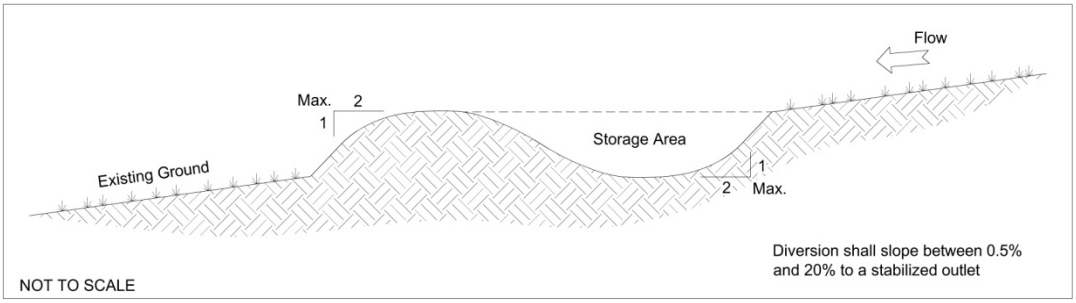


Figure RC-10-3
Permanent Diversion Ditch (with Adjoining Berm) Installation

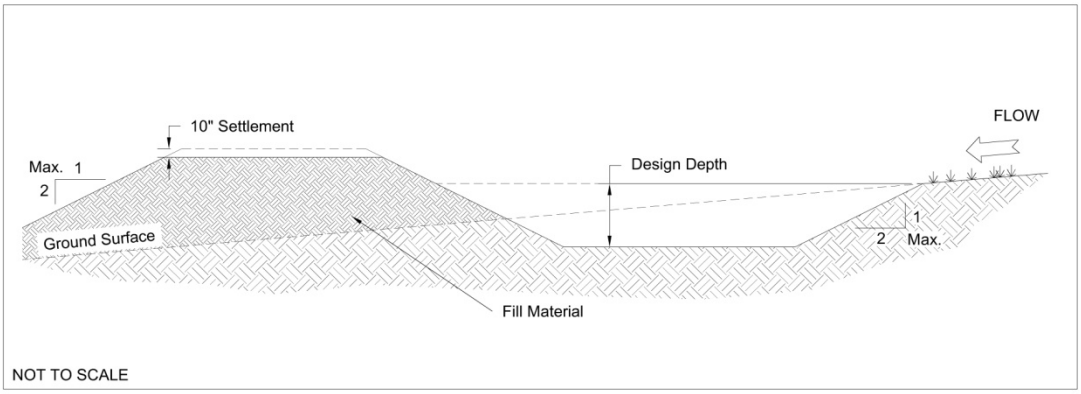


Figure RC-10-4
Diversion Ditch as Sediment Trap

Diversion Ditch As Sediment Trap Volume Computations

($ft.^3$)

2 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	30	53	80	113	150	193	240
15	45	79	120	169	225	289	360
20	60	105	160	225	300	385	480
25	75	131	200	281	375	481	600
30	90	158	240	338	450	578	720
35	105	184	280	394	525	674	840
40	120	210	320	450	600	770	960
50	150	263	400	563	750	963	1200
60	180	315	480	675	900	1155	1440
70	210	368	560	788	1050	1348	1680
80	240	420	640	900	1200	1540	1920
90	270	473	720	1013	1350	1733	2160
100	300	525	800	1125	1500	1925	2400
110	330	578	880	1238	1650	2118	2640
120	360	630	960	1350	1800	2310	2880
130	390	683	1040	1463	1950	2503	3120
140	420	735	1120	1575	2100	2695	3360
150	450	788	1200	1688	2250	2888	3600
160	480	840	1280	1800	2400	3080	3840
170	510	893	1360	1913	2550	3273	4080
180	540	945	1440	2025	2700	3465	4320
190	570	998	1520	2138	2850	3658	4560
200	600	1050	1600	2250	3000	3850	4800

3 ft. Wide Bottom Ditch with 1:1 Sideslopes

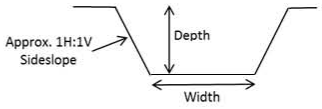
Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	40	68	100	138	180	228	280
15	60	101	150	206	270	341	420
20	80	135	200	275	360	455	560
25	100	169	250	344	450	569	700
30	120	203	300	413	540	683	840
35	140	236	350	481	630	796	980
40	160	270	400	550	720	910	1120
50	200	338	500	688	900	1138	1400
60	240	405	600	825	1080	1365	1680
70	280	473	700	963	1260	1593	1960
80	320	540	800	1100	1440	1820	2240
90	360	608	900	1238	1620	2048	2520
100	400	675	1000	1375	1800	2275	2800
110	440	743	1100	1513	1980	2503	3080
120	480	810	1200	1650	2160	2730	3360
130	520	878	1300	1788	2340	2958	3640
140	560	945	1400	1925	2520	3185	3920
150	600	1013	1500	2063	2700	3413	4200
160	640	1080	1600	2200	2880	3640	4480
170	680	1148	1700	2338	3060	3868	4760
180	720	1215	1800	2475	3240	4095	5040
190	760	1283	1900	2613	3420	4323	5320
200	800	1350	2000	2750	3600	4550	5600

4 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	50	83	120	163	210	263	320
15	75	124	180	244	315	394	480
20	100	165	240	325	420	525	640
25	125	206	300	406	525	656	800
30	150	248	360	488	630	788	960
35	175	289	420	569	735	919	1120
40	200	330	480	650	840	1050	1280
50	250	413	600	813	1050	1313	1600
60	300	495	720	975	1260	1575	1920
70	350	578	840	1138	1470	1838	2240
80	400	660	960	1300	1680	2100	2560
90	450	743	1080	1463	1890	2363	2880
100	500	825	1200	1625	2100	2625	3200
110	550	908	1320	1788	2310	2888	3520
120	600	990	1440	1950	2520	3150	3840
130	650	1073	1560	2113	2730	3413	4160
140	700	1155	1680	2275	2940	3675	4480
150	750	1238	1800	2438	3150	3938	4800
160	800	1320	1920	2600	3360	4200	5120
170	850	1403	2040	2763	3570	4463	5440
180	900	1485	2160	2925	3780	4725	5760
190	950	1568	2280	3088	3990	4988	6080
200	1000	1650	2400	3250	4200	5250	6400

Applicability: Sediment traps constructed with track hoe equipment.

Sediment Trap Configuration:



Instructions:

1. Select the appropriate bottom width table.
2. Select the tributary drainage area flowing into the sediment trap.
The eacreages are coded by color:

0.25 ac.	0.5 ac	0.75 ac.	1.0 ac.

3. Select any of the corresponding depths and length that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.75 acres
Given: My equipment can dig a 3 ft. wide ditch.

Answer: Use the 3 ft. Wide Bottom Ditch table above & select a yellow box. You can select any of the yellow corresponding depths and lengths. There are several choices. If select 1260 then your sediment trap should be at least 36 inches deep and 70 ft. long or choice 1148 and use 18 inches deep and 170 ft. length.

v2 4-29-15 djf

Figure RC-10-5
Diversion Ditch as Sediment Trap

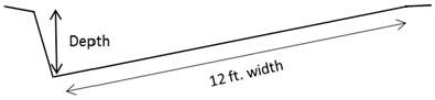
Diversion Ditch As Sediment Trap - Volume Computations

Sediment Trap Volumes

Ditch Length (ft.)	Depth (in.) (ft.3) 12	18	24
10	60	90	120
15	90	135	180
20	120	180	240
25	150	225	300
30	180	270	360
35	210	315	420
40	240	360	480
50	300	450	600
60	360	540	720
70	420	630	840
80	480	720	960
90	540	810	1080
100	600	900	1200
110	660	990	1320
120	720	1080	1440
130	780	1170	1560
140	840	1260	1680
150	900	1350	1800
160	960	1440	1920
170	1020	1530	2040
180	1080	1620	2160
190	1140	1710	2280
200	1200	1800	2400
210	1260	1890	2520
220	1320	1980	2640
230	1380	2070	2760
240	1440	2160	2880
240	1440	2160	2880
260	1560	2340	3120
270	1620	2430	3240
280	1680	2520	3360
290	1740	2610	3480
300	1800	2700	3600

Applicability: Sediment traps constructed with motor grader equipment.
(With Standard 12 ft. Wide Motor Grader Blade)

Sediment Trap Cross-Section Configuration:



Instructions:

1. Select the tributary drainage area flowing into the sediment trap.
The acreages are coded by color:

0.25 ac. | 0.5 ac | 0.75 ac. | 1.0 ac.

2. Select the corresponding depths and lengths that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.50 acres
Given: Motor Grader to cut a depth of 18 inches.

Answer: From the Table, select the green box in the 18 inch column. Move to the left of that green box and you will see the corresponding ditch length is 90 ft. The sediment trap ditch should be a minimum of 90 ft. long and 18 inches deep.

v2 4-30-15 djf

RC-14 Toe Trench (TT)

Description

A toe trench is an excavated drainage way used at the toe of slopes (usually fill slopes) to prevent runoff from leaving disturbed areas by intercepting and diverting it to a sediment trapping device. A toe trench may also serve as a SC-6 Sediment Trap and be used as a SC-10 Water Quality Capture Detention Area (WQCDA).

Applicability

Toe trenches are used along the base (toe) of slopes, such as around the perimeter of a well pad fill slope.

Limitations

- To alleviate erosion capability, toe trenches may be directed to a stabilized outlet (such as a well-vegetated area) or to a sediment trapping device where sediment can settle out of the runoff before being discharged to surface waters.
- If possible, toe trenches should be designed to avoid crossing vehicle pathways.
- Toe trenches should be used with caution on soils subject to slippage.
- The area around the toe trench that is disturbed by its construction may need to be stabilized so that it is not subject to erosion.

Design Criteria

Un-compacted and un-stabilized toe trenches shall terminate into a sediment trap or basin sized under the design criteria in this manual for SC-6 Sediment Traps. Runoff volume estimates,

derived from the Rational Method, are presented in the table below and can be used to determine the toe trench capacity. Toe trench sizing tables are provided in Figures RC-14-2 and RC 14-3.

Runoff Volume Estimates Using the Rational Method for Northwest Colorado

Runoff Coefficient	Area (Acres)	2-year 24-hour Rainfall Intensity[1] (Inches/hour)	Peak Flow[2] (cfs)	Estimated Runoff Volume[3] (ft.3)
0.3	1	0.05	0.015	1296
0.4	1	0.05	0.02	1728
0.5	1	0.05	0.025	2160
0.6	1	0.05	0.03	2592
0.7	1	0.05	0.035	3024

(1) NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches .

(2) Peak Flow using Rational Method: Q = C x I X A

where C = runoff coefficient; I = rainfall in inches/hour; A = tributary area in acres

(3) Runoff Volume = Peak flow in cfs x Storm Duration in seconds

If the toe trench is to be utilized as a WQCDA, the minimum trench depth can be computed with:

Minimum Depth (ft.) = / (Surface Area of the WQCDA + Tributary Runon Surface Area) / Area of the WQCDA x 1.2 inches (NOAA 2-yr 24-hr storm) + 0.5 ft. (freeboard & sediment)

Where:
Area = square feet (one acre = 43560 square feet
NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches
Cut slopes do not require a berm.

Example: Toe Trench as a WQCDA

Toe Trench Surface Area (WQCDA): 50 ft. long by 6 ft. wide = 300 square feet
Tributary Runon Area : 0.25 acres = 0.25 acre x 43560 square ft./acre = 10980 sq. ft.

Minimum Depth (ft.) = (300 + 10980) / 300 x 1.2 / 12 + 0.5
= 11280 / 300 x 0.1 + 0.5
= 3.76 + 0.5
Minimum Depth (ft.) = 4.26 ft.

A slope drain may be utilized to aid in draining the toe trench. Slope drain pipe diameter sizes may be determined using the slope drain sizing table below.

Pipe Slope Drains Sizing Table

Diameter inches	Estimated Flow Capacity* cfs
4	0.28
6	0.84
8	1.7
10	2.89
12	4.45
15	8.07
18	11.82
24	25.48

*Based on Chezy Manning open channel flow equation with a minimum slope of 3% for corrugated & smooth walled pipe.

Construction Specifications

See Figure RC-14-1 for details

1. All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the toe trench.

2. The toe trench shall be free of bank projections or other irregularities which will impede normal flow.

3. Toe trenches may have uninterrupted positive grade to an outlet.

4. All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the toe trench.

5. The appropriate size and design of toe trenches depend on the size of the contributing sloped area and other site specific conditions.

6. Fills may be compacted, if necessary to meet site specific needs, by earth moving equipment.

7. The toe trench may be stabilized with vegetation, riprap, or erosion control blanket if necessary to meet site specific needs.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. Toe trenches should be cleared of accumulated sediment and reseeded if necessary. Repair as needed in order to maintain toe trench capacity.

Removal/Abandonment

Toe trenches may or may not be removed. Toe trenches collecting runoff from disturbed areas shall remain in place at least until the disturbed areas are permanently stabilized.

References

Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

New York State Department of Environmental Conservation, *New York Guidelines for Urban Erosion and Sediment Control.* New York. Fourth Edition, 1997.

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), *Field Office Technical Guide.* 2002. <www.nrcs.usda.gov/technical/efotg>

Figure RC-14-1
Toe Trench Installation

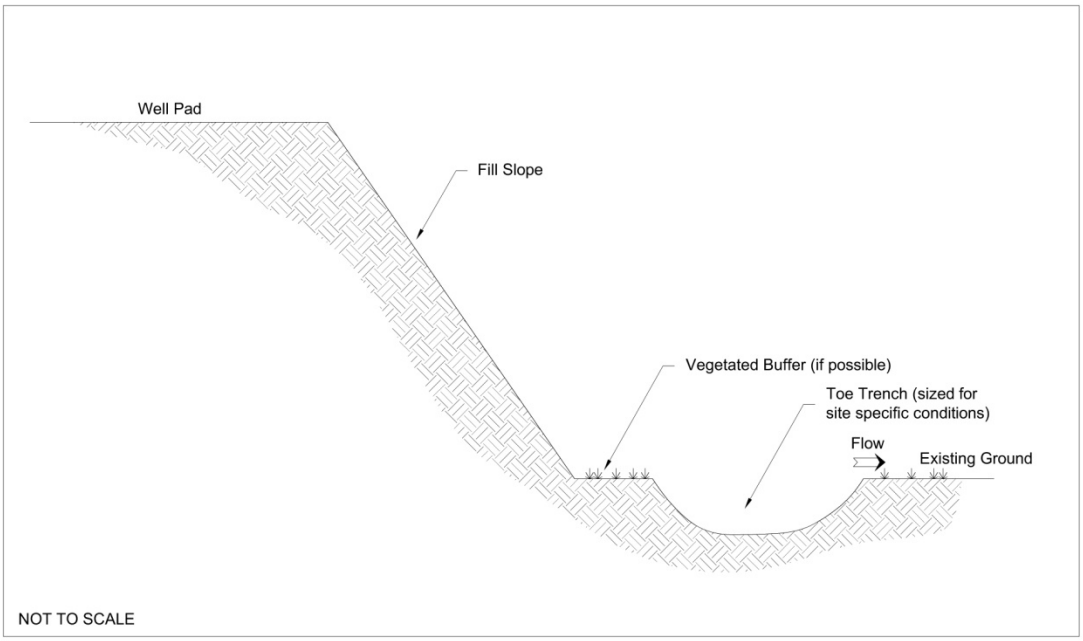


Figure RC-14-2
Toe Trench as a Sediment Trap

Diversion Ditch As Sediment Trap Volume Computations

($ft.^3$)

2 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	30	53	80	113	150	193	240
15	45	79	120	169	225	289	360
20	60	105	160	225	300	385	480
25	75	131	200	281	375	481	600
30	90	158	240	338	450	578	720
35	105	184	280	394	525	674	840
40	120	210	320	450	600	770	960
50	150	263	400	563	750	963	1200
60	180	315	480	675	900	1155	1440
70	210	368	560	788	1050	1348	1680
80	240	420	640	900	1200	1540	1920
90	270	473	720	1013	1350	1733	2160
100	300	525	800	1125	1500	1925	2400
110	330	578	880	1238	1650	2118	2640
120	360	630	960	1350	1800	2310	2880
130	390	683	1040	1463	1950	2503	3120
140	420	735	1120	1575	2100	2695	3360
150	450	788	1200	1688	2250	2888	3600
160	480	840	1280	1800	2400	3080	3840
170	510	893	1360	1913	2550	3273	4080
180	540	945	1440	2025	2700	3465	4320
190	570	998	1520	2138	2850	3658	4560
200	600	1050	1600	2250	3000	3850	4800

3 ft. Wide Bottom Ditch with 1:1 Sideslopes

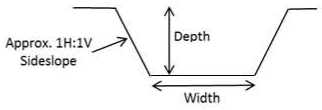
Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	40	68	100	138	180	228	280
15	60	101	150	206	270	341	420
20	80	135	200	275	360	455	560
25	100	169	250	344	450	569	700
30	120	203	300	413	540	683	840
35	140	236	350	481	630	796	980
40	160	270	400	550	720	910	1120
50	200	338	500	688	900	1138	1400
60	240	405	600	825	1080	1365	1680
70	280	473	700	963	1260	1593	1960
80	320	540	800	1100	1440	1820	2240
90	360	608	900	1238	1620	2048	2520
100	400	675	1000	1375	1800	2275	2800
110	440	743	1100	1513	1980	2503	3080
120	480	810	1200	1650	2160	2730	3360
130	520	878	1300	1788	2340	2958	3640
140	560	945	1400	1925	2520	3185	3920
150	600	1013	1500	2063	2700	3413	4200
160	640	1080	1600	2200	2880	3640	4480
170	680	1148	1700	2338	3060	3868	4760
180	720	1215	1800	2475	3240	4095	5040
190	760	1283	1900	2613	3420	4323	5320
200	800	1350	2000	2750	3600	4550	5600

4 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	50	83	120	163	210	263	320
15	75	124	180	244	315	394	480
20	100	165	240	325	420	525	640
25	125	206	300	406	525	656	800
30	150	248	360	488	630	788	960
35	175	289	420	569	735	919	1120
40	200	330	480	650	840	1050	1280
50	250	413	600	813	1050	1313	1600
60	300	495	720	975	1260	1575	1920
70	350	578	840	1138	1470	1838	2240
80	400	660	960	1300	1680	2100	2560
90	450	743	1080	1463	1890	2363	2880
100	500	825	1200	1625	2100	2625	3200
110	550	908	1320	1788	2310	2888	3520
120	600	990	1440	1950	2520	3150	3840
130	650	1073	1560	2113	2730	3413	4160
140	700	1155	1680	2275	2940	3675	4480
150	750	1238	1800	2438	3150	3938	4800
160	800	1320	1920	2600	3360	4200	5120
170	850	1403	2040	2763	3570	4463	5440
180	900	1485	2160	2925	3780	4725	5760
190	950	1568	2280	3088	3990	4988	6080
200	1000	1650	2400	3250	4200	5250	6400

Applicability: Sediment traps constructed with track hoe equipment.

Sediment Trap Configuration:



Instructions:

1. Select the appropriate bottom width table.
2. Select the tributary drainage area flowing into the sediment trap. The eacreages are coded by color:

0.25 ac. | 0.5 ac | 0.75 ac. | 1.0 ac.

3. Select any of the corresponding depths and length that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.75 acres
Given: My equipment can dig a 3 ft. wide ditch.

Answer: Use the 3 ft. Wide Bottom Ditch table above & select a yellow box. You can select any of the yellow corresponding depths and lengths. There are several choices. If select 1260 then your sediment trap should be at least 36 inches deep and 70 ft. long or choice 1148 and use 18 inches deep and 170 ft. length.

v2 4-29-15 djf

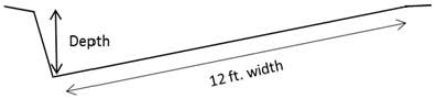
Toe Trench as a Sediment Trap
Figure RC-14-3

Diversion Ditch As Sediment Trap - Volume Computations

Ditch Length (ft.)	Sediment Trap Volumes (ft.3) Depth (in.) 12	18	24
10	60	90	120
15	90	135	180
20	120	180	240
25	150	225	300
30	180	270	360
35	210	315	420
40	240	360	480
50	300	450	600
60	360	540	720
70	420	630	840
80	480	720	960
90	540	810	1080
100	600	900	1200
110	660	990	1320
120	720	1080	1440
130	780	1170	1560
140	840	1260	1680
150	900	1350	1800
160	960	1440	1920
170	1020	1530	2040
180	1080	1620	2160
190	1140	1710	2280
200	1200	1800	2400
210	1260	1890	2520
220	1320	1980	2640
230	1380	2070	2760
240	1440	2160	2880
240	1440	2160	2880
260	1560	2340	3120
270	1620	2430	3240
280	1680	2520	3360
290	1740	2610	3480
300	1800	2700	3600

Applicability: Sediment traps constructed with motor grader equipment.
(With Standard 12 ft. Wide Motor Grader Blade)

Sediment Trap Cross-Section Configuration:



Instructions:

1. Select the tributary drainage area flowing into the sediment trap.
The acreages are coded by color:

0.25 ac. | 0.5 ac | 0.75 ac. | 1.0 ac.

2. Select the corresponding depths and lengths that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.50 acres
Given: Motor Grader to cut a depth of 18 inches.

Answer: From the Table, select the green box in the 18 inch column. Move to the left of that green box and you will see the corresponding ditch length is 90 ft. The sediment trap ditch should be a minimum of 90 ft. long and 18 inches deep.

v2 4-30-15 djf

RC-5 Check Dam (CD)

Rock Check Dam

Straw Bale Check Dam

Sand Bag Check Dam

Description

Check dams are small, temporary dams constructed across a swale or channel. Check dams can be constructed using gravel, rock, sandbags, logs, or straw bales and are used to slow the velocity of concentrated flow in a channel and thus reduce erosion. As a secondary function, check dams can also be used to catch sediment from the channel itself or from the contributing drainage area as storm water runoff flows through the structure.

Applicability

Check dams are most often used in small, open channels with a contributing drainage area of 2 to 10 acres, and side slopes of less than 2:1. Check dams may be used in the following applications:

- In swales or channels where it is not practical to line the channel or implement other flow control practices.

- Where temporary seeding has been recently implemented but has not had time to take root and fully develop.

Limitations

- Check dams should not be used in live, flowing streams unless approved by an appropriate regulatory agency.

- Leaves have been shown to be a significant problem by clogging check dams in the fall. Therefore, they might necessitate increased inspection and maintenance.

Design Criteria

No formal design is required.

Construction Specifications

1. Dams should be installed with careful placement of the construction material. Mere dumping of the dam material into a channel is not appropriate and will reduce overall effectiveness.

2. Check dams can be constructed from a number of different materials. Most commonly, they are made of rock, straw bales, or sandbags. When using rock or stone, the material diameter should be 2 to 15 inches or sized appropriately for the site specific conditions.

3. The center of the dam should be at an elevation which is lower than the edges. This design creates a weir effect that helps to channel flows away from the banks and prevent further erosion.

4. Additional stability can be achieved by implanting the dam material into the sides and bottom of the channel.

5. Check dams may be used in a series and spaced as needed to reduce flow velocity and as site conditions allow.

6. When installing more than one check dam in a channel, outlet stabilization measures should be installed below the final dam in the series. Because this area is likely to be vulnerable to further erosion, riprap, geotextile lining, or some other stabilization measure is recommended.

7. Install straw bale check dams according to SC-1 Straw Bale Barrier and Figures RC-5-1. Install rock check dams according to RC-5-2.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. During inspection, large debris, trash, and leaves should be removed. The center of a check dam should always be lower than its edges. If erosion or heavy flows cause the edges of a dam to fall to a height equal to or below the height of the center, repairs should be made immediately. Accumulated sediment should be removed from the upstream side of a check dam when the sediment has reached a height of approximately one-half the original height of the dam (measured at the center).

Removal/Abandonment

Check dams may or may not be removed depending on material of construction and site specific conditions. Check dams shall only be removed after the contributing drainage area has been completely stabilized.

References

Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

Figure RC-5-1
Straw Bale Check Dam Installation

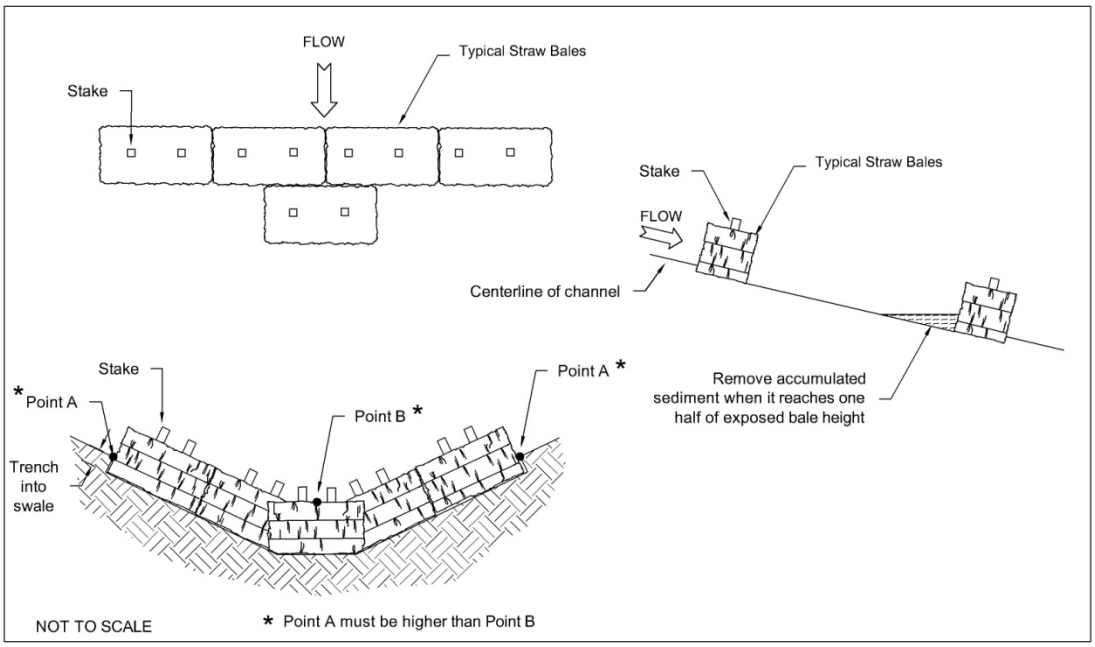


Figure RC-5-2
Rock Check Dam Installation

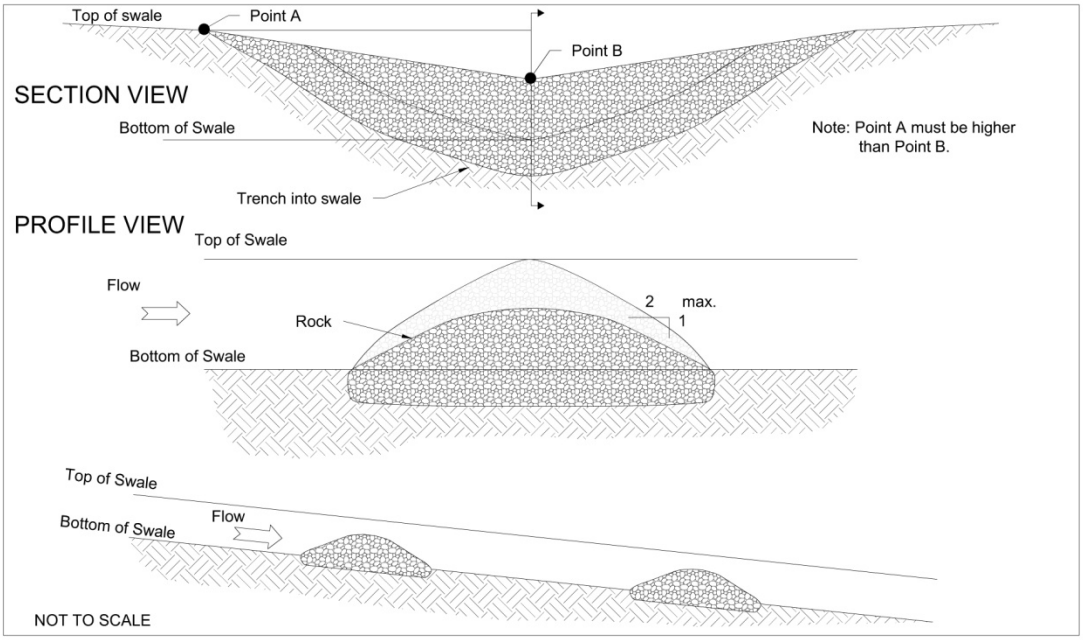
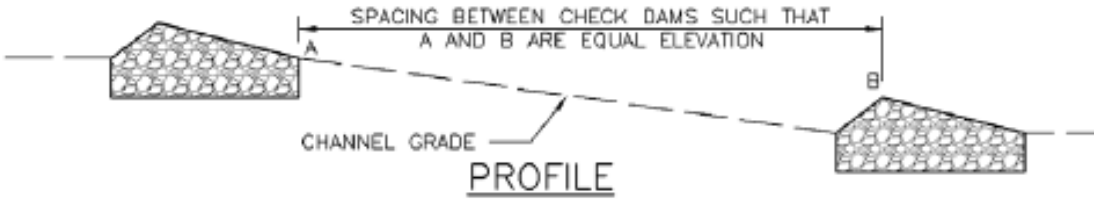


Figure RC-5-3
Check Dam Installation



SC-4 Tracking Pad

Description

A tracking pad is a layer of gravel where construction traffic leaves a site. The purpose of a tracking pad to a site is to minimize the amount of tracked mud and dust that leaves a site. As a vehicle drives over the gravel pad, mud and sediment are removed from the vehicle's wheels and offsite transport of soil is reduced. The gravel pad also reduces erosion and rutting on the soil beneath the stabilization structure.

Applicability

Typically, tracking pads are installed at locations where construction traffic leaves or enters an existing paved road. However, the applicability of site entrance tracking pads may be extended to any roadway or entrance where vehicles will access or leave the site.

Limitations

Although tracking pads are a good way to help reduce the amount of sediment leaving a site, some soil may still be deposited from vehicle tires onto paved surfaces. To further reduce the chance of these sediments polluting storm water runoff, sweeping of the paved area adjacent to the stabilized site entrance is recommended.

Design Criteria

No formal design is required.

Construction Specifications

See Figure SC-4-1 for installation details.

1. Place a matrix of 3/4" to 3" stone gravel, or reclaimed or recycled concrete equivalent, to a minimum thickness of six (6) inches and a minimum length of 50 feet over the entire width of the roadway.

2. If necessary, all surface water flowing or diverted toward the tracking pad shall be piped across the entrance.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. Stabilization of tracking pads should be maintained until the remainder of the construction site has been fully stabilized. Stone and gravel might need to be periodically added to each tracking pad to keep the entrance effective. Soil that is tracked offsite should be swept up as soon as possible for proper disposal.

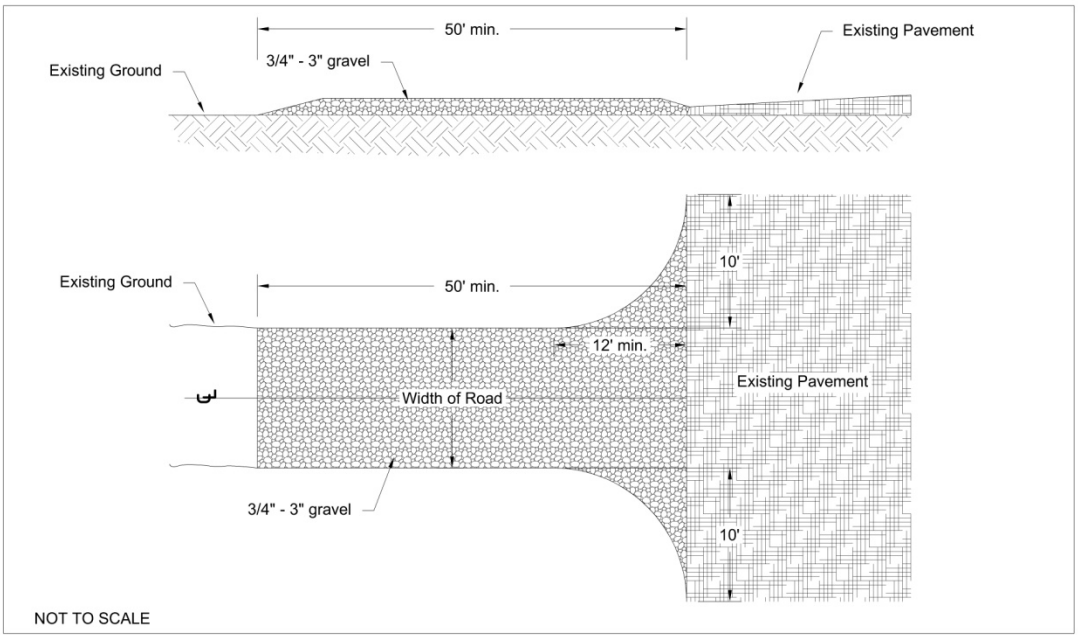
References

Colorado Department of Transportation (CDOT), *Erosion Control and Stormwater Quality Guide.* 2002. <http://www.coloradodot.info/programs/environmental/water-quality/documents/erosion-storm-quality>

Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

Horizon Environmental Services, Inc, *Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites.* Produced by Independent Petroleum Association of America (IPAA). April 2004. <http://www.dpcusa.org/enviro/rapps.html>

Figure SC-4-1
Tracking Pad Installation



SC-6 Sediment Trap (ST)

Description

Sediment traps are small ponding areas that allow sediment to settle out of runoff water. They are usually installed in a drainage way or other point of discharge from a disturbed area. Diversion ditches can be used to direct runoff to the sediment trap. Sediment traps are formed by excavating below grade and/or by constructing an earthen embankment.

Applicability

Sediment traps are generally temporary control measures used at the outlets of storm water diversion structures, channels, slope drains, or any other runoff conveyance that discharges waters containing erosion sediment and debris. Sediment traps may also be used at the inlets to culverts. Each sediment trap should be used for a drainage area less than five acres, however multiple sediment traps may be constructed in series for larger areas or areas with larger expected flows.

Limitations

- Although sediment traps allow for settling of eroded soils, because of their short detention periods for storm water they typically do not remove fine particles such as silts and clays.

- Water will remain in trap for extended periods.
- Never construct a sediment trap on a flowing stream or in wetlands.
- Unless no other options exist, sediment traps should not be constructed in ephemeral draws where the BMP will trap natural run-off along with construction site stormwater.

Design Criteria

Location

Traps are typically located at points of discharge from disturbed areas. The location will be determined by the natural terrain, drainage pattern of the runoff, and the accessibility for maintenance. Sediment traps should not be located in areas where their failure due to storm water runoff excess can lead to further erosive damage of the landscape. Alternative diversion pathways may be designed to accommodate these potential overflows.

Storage Capacity

Sediment traps shall be sized to accommodate site runoff volumes resulting from the 2-year 24-hour precipitation event as provided by regional NOAA Precipitation Atlases and calculated from the Rational Method. From the table below, the sediment trap volume has been calculated by multiplying its tributary disturbed area in acres by the runoff volume for the appropriate runoff coefficient and adding 15% for sediment accumulation. A sediment trap should be designed to maximize surface area for infiltration and sediment settling. This will increase the effectiveness of the trap and decrease the likelihood of backup during and after periods of high runoff intensity. Half of the storage volume shall be in the form of wet storage or a permanent pool. The other half shall be in the form of dry storage. When possible, the wet storage volume should be contained within the excavated portion of the trap. The volume of each sediment trap should be based on site conditions and available space.

A sediment trap can be utilized as a SC-10 Water Quality Capture Detention Area and may be designed to maximize surface area for infiltration, evaporation and sediment settling. If the sediment trap is to be utilized as a WQCDA, the minimum trap depth can be computed with:

Minimum Depth (ft.) = (Surface Area of the WQCDA + Tributary Runon Surface Area) / Surface Area of the WQCDA x 1.2 inches / 12 inches/foot + 0.5 ft. (freeboard & sediment)

Where:
Area = square feet (one acre = 43560 square feet)
NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches
Cut slopes do not require a berm.

Runoff Volume Estimates Using the Rational Method for Northwest Colorado

Runoff Coefficient	Area (Acres)	2-year 24-hour Rainfall Intensity[1] (Inches/hour)	Peak Flow[2] (cfs)	Estimated Runoff Volume[3] (ft.3)
0.3	1	0.05	0.015	1296
0.4	1	0.05	0.02	1728
0.5	1	0.05	0.025	2160
0.6	1	0.05	0.03	2592
0.7	1	0.05	0.035	3024

(1) NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches .

(2) Peak Flow using Rational Method: Q = C x I X A

where C = runoff coefficient; I = rainfall in inches/hour; A = tributary area in acres

(3) Runoff Volume = Peak flow in cfs x Storm Duration in seconds

Example: Sediment Trap as a WQCDA

Sediment Trap Surface Area (WQCDA): 50 ft. long by 6 ft. wide = 300 square feet
Tributary Runon Area : 0.25 acres = 0.25 acre x 43560 square ft./acre = 10980 sq. ft.

Minimum Depth (ft.) = (300 + 10980) / 300 x 1.2 / 12 + 0.5
= 11280 / 300 x 0.1 + 0.5
= 3.76 + 0.5
Minimum Depth (ft.) = 4.26 ft.

Construction Specifications

See Figure SC-6-1 and SC-6-2 for installation details.

1. If possible, sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

2. Area under embankment shall be cleared, grubbed and stripped of any vegetation and root mat. The pool area shall be cleared.

3. The fill material for the embankment shall be free of roots and other woody vegetation as well as over-sized stones, rocks, organic material or other objectionable material. The embankment shall be compacted by traversing with equipment while it is being constructed.

4. A spillway or slope drain may be utilize to drain the sediment trap. Slope drain pipe diameter sizes may be determined using the slope drain sizing table below. Should a spillway be desired, the spillway shall be compacted and lined with coarse angular aggregate/riprap, or local adequately sized rock to provide for filtering/detention capability and to prevent erosion of the spillway. The spillway may alternately be constructed with a small section of pipe or may consist of a level spreader, where the entire embankment is constructed at a uniform elevation. The spillway weir for each sediment trap should be at least four feet long for a 1-acre drainage area and increase by 2 feet for each additional drainage acre added, up to a maximum drainage area of 5 acres.

Pipe Slope Drains Sizing Table

Diameter inches	Estimated Flow Capacity* cfs
4	0.28
6	0.84
8	1.7
10	2.89
12	4.45
15	8.07
18	11.82
24	25.48

*Based on Chezy Manning open channel flow equation with a minimum slope of 3% for corrugated & smooth walled pipe.

5. If necessary, a geotextile may be placed at the stone-soil interface to act as a separator.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. The primary maintenance consideration for temporary sediment traps is the removal of accumulated sediment from the basin. Sediments should be removed when the basin reaches approximately 50 percent sediment capacity. A sediment trap should be inspected, according to the Stormwater Management Plan. Inspectors should also

check the structure for damage from erosion. The depth of the spillway should be checked and maintained below the low point of the trap embankment.

Removal/Abandonment

The structure may or may not be removed when the drainage area has been properly stabilized.

References

Colorado Department of Transportation (CDOT), *Erosion Control and Stormwater Quality Guide.* 2002. <http://www.coloradodot.info/programs/environmental/water-quality/documents/erosion-storm-quality>

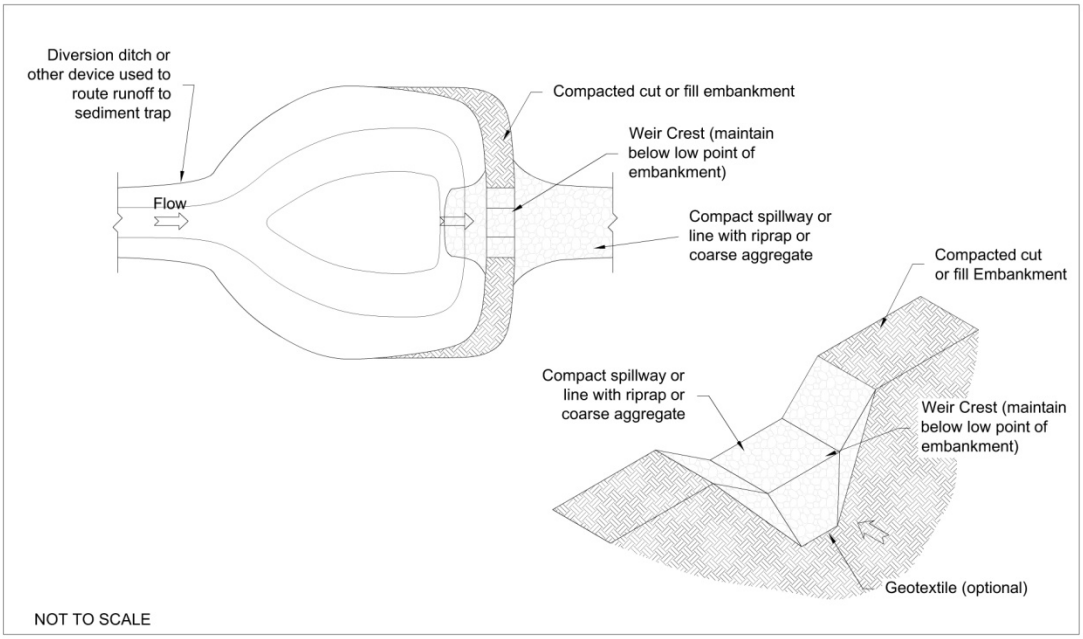
Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

Horizon Environmental Services, Inc, *Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites.* Produced by Independent Petroleum Association of America (IPAA). April 2004. http://www.dpcusa.org/enviro/rapps.html

Precipitation-Frequency Atlas of the United States, Volume 2 Version 3.0: Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Tennessee, Virginia, West Virginia. 2004

http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume2.pdf

Figure SC-6-1
Sediment Trap Installation



Minimum trap volumes ($ft.^3$)

0.25 ac.	0.5 ac	0.75 ac.	1.0 ac.
(373 $ft.^3$)	(745 $ft.^3$)	(1118 $ft.^3$)	(1490 $ft.^3$)

Figure SC-6-2
Diversion Ditch as Sediment Trap

Diversion Ditch As Sediment Trap Volume Computations
($ft.^3$)

2 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	30	53	80	113	150	193	240
15	45	79	120	169	225	289	360
20	60	105	160	225	300	385	480
25	75	131	200	281	375	481	600
30	90	158	240	338	450	578	720
35	105	184	280	394	525	674	840
40	120	210	320	450	600	770	960
50	150	263	400	563	750	963	1200
60	180	315	480	675	900	1155	1440
70	210	368	560	788	1050	1348	1680
80	240	420	640	900	1200	1540	1920
90	270	473	720	1013	1350	1733	2160
100	300	525	800	1125	1500	1925	2400
110	330	578	880	1238	1650	2118	2640
120	360	630	960	1350	1800	2310	2880
130	390	683	1040	1463	1950	2503	3120
140	420	735	1120	1575	2100	2695	3360
150	450	788	1200	1688	2250	2888	3600
160	480	840	1280	1800	2400	3080	3840
170	510	893	1360	1913	2550	3273	4080
180	540	945	1440	2025	2700	3465	4320
190	570	998	1520	2138	2850	3658	4560
200	600	1050	1600	2250	3000	3850	4800

3 ft. Wide Bottom Ditch with 1:1 Sideslopes

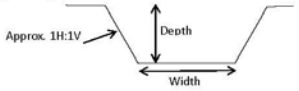
Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	40	68	100	138	180	228	280
15	60	101	150	206	270	341	420
20	80	135	200	275	360	455	560
25	100	169	250	344	450	569	700
30	120	203	300	413	540	683	840
35	140	236	350	481	630	796	980
40	160	270	400	550	720	910	1120
50	200	338	500	688	900	1138	1400
60	240	405	600	825	1080	1365	1680
70	280	473	700	963	1260	1593	1960
80	320	540	800	1100	1440	1820	2240
90	360	608	900	1238	1620	2048	2520
100	400	675	1000	1375	1800	2275	2800
110	440	743	1100	1513	1980	2503	3080
120	480	810	1200	1650	2160	2730	3360
130	520	878	1300	1788	2340	2958	3640
140	560	945	1400	1925	2520	3185	3920
150	600	1013	1500	2063	2700	3413	4200
160	640	1080	1600	2200	2880	3640	4480
170	680	1148	1700	2338	3060	3868	4760
180	720	1215	1800	2475	3240	4095	5040
190	760	1283	1900	2613	3420	4323	5320
200	800	1350	2000	2750	3600	4550	5600

4 ft. Wide Bottom Ditch with 1:1 Sideslopes

Length (ft.)	Depth (in.) 12	18	24	30	36	42	48
10	50	83	120	163	210	263	320
15	75	124	180	244	315	394	480
20	100	165	240	325	420	525	640
25	125	206	300	406	525	656	800
30	150	248	360	488	630	788	960
35	175	289	420	569	735	919	1120
40	200	330	480	650	840	1050	1280
50	250	413	600	813	1050	1313	1600
60	300	495	720	975	1260	1575	1920
70	350	578	840	1138	1470	1838	2240
80	400	660	960	1300	1680	2100	2560
90	450	743	1080	1463	1890	2363	2880
100	500	825	1200	1625	2100	2625	3200
110	550	908	1320	1788	2310	2888	3520
120	600	990	1440	1950	2520	3150	3840
130	650	1073	1560	2113	2730	3413	4160
140	700	1155	1680	2275	2940	3675	4480
150	750	1238	1800	2438	3150	3938	4800
160	800	1320	1920	2600	3360	4200	5120
170	850	1403	2040	2763	3570	4463	5440
180	900	1485	2160	2925	3780	4725	5760
190	950	1568	2280	3088	3990	4988	6080
200	1000	1650	2400	3250	4200	5250	6400

Applicability: Sediment traps constructed with track hoe equipment.

Sediment Trap Configuration:



Instructions:

1. Select the appropriate bottom width table.
2. Select the tributary drainage area flowing into the sediment trap.
The acreages are coded by color with minimum trap volumes ($ft.^3$) provided below:

0.25 ac.	0.5 ac.	0.75 ac.	1.0 ac.
(373 $ft.^3$)	(745 $ft.^3$)	(1118 $ft.^3$)	(1490 $ft.^3$)

3. Select any of the corresponding depths and length that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.75 acres
Given: My equipment can dig a 3 ft. wide ditch.

Answer: Use the 3 ft. Wide Bottom Ditch table above & select a yellow box. You can select any of the yellow corresponding depths and lengths. There are several choices. If select 1260 then your sediment trap should be at least 36 inches deep and 70 ft. long or choice 1148 and use 18 inches deep and 170 ft. length.

v3 12-7-15 djf

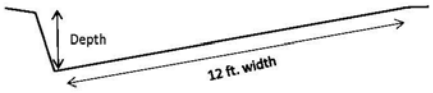
Figure SC-6-3
Diversion Ditch as Sediment Trap

Diversion Ditch As Sediment Trap - Volume Computations

Ditch Length (ft.)	Sediment Trap Volumes (ft.3) Depth (in.) 12	18	24
10	60	90	120
15	90	135	180
20	120	180	240
25	150	225	300
30	180	270	360
35	210	315	420
40	240	360	480
50	300	450	600
60	360	540	720
70	420	630	840
80	480	720	960
90	540	810	1080
100	600	900	1200
110	660	990	1320
120	720	1080	1440
130	780	1170	1560
140	840	1260	1680
150	900	1350	1800
160	960	1440	1920
170	1020	1530	2040
180	1080	1620	2160
190	1140	1710	2280
200	1200	1800	2400
210	1260	1890	2520
220	1320	1980	2640
230	1380	2070	2760
240	1440	2160	2880
240	1440	2160	2880
260	1560	2340	3120
270	1620	2430	3240
280	1680	2520	3360
290	1740	2610	3480
300	1800	2700	3600

Applicability: Sediment traps constructed with motor grader equipment.
(With Standard 12 ft. Wide Motor Grader Blade)

Sediment Trap Cross-Section Configuration:



Instructions:

1. Select the tributary drainage area flowing into the sediment trap.
The acreages are coded by color with minimum trap volumes (ft.3) provided below:

0.25 ac.	0.5 ac	0.75 ac.	1.0 ac.
(373 ft.^{3})	(745 ft.^{3})	(1118 ft.^{3})	(1490 ft.^{3})

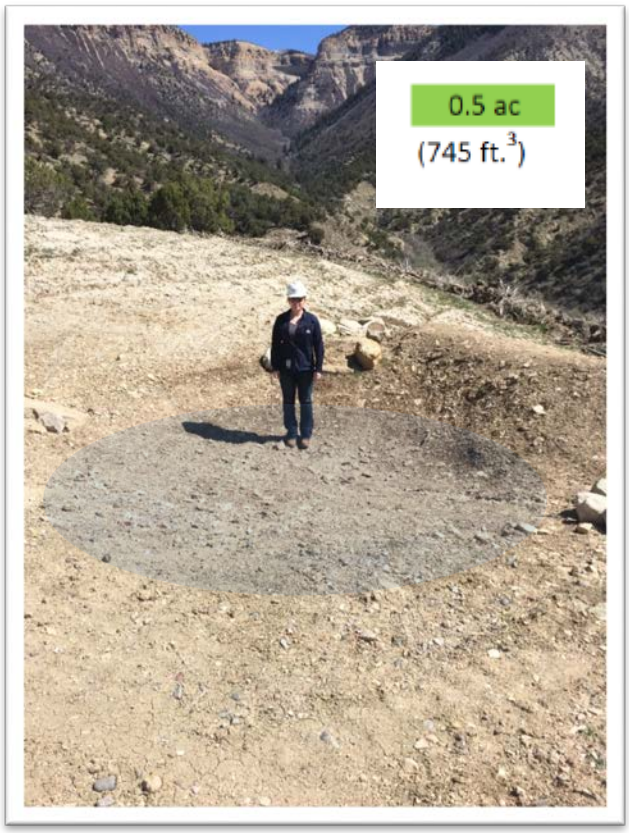
2. Select the corresponding depths and lengths that fit the color code.

Example: Tributary area to the sediment trap is approximately 0.50 acres
Given: Motor Grader to cut a depth of 18 inches.

Answer: From the Table, select the green box in the 18 inch column. Move to the left of that green box and you will see the corresponding ditch length is 90 ft. The sediment trap ditch should be a minimum of 90 ft. long and 18 inches deep.

v3 12-7-15 djf

Figure SC-6-4
Sediment Trap Capacity: Photo Perspective



SC-10 Water Quality Capture Detention Areas (WQCDA) ©

Description

Water Quality Capture Detention Areas (WQCDA) are locations where runoff/runon precipitation is captured for the purpose of flow attenuation, infiltration and evaporation. WQCDA can be very effective in removing suspended solids, through sedimentation, as well as removing soluble pollutants and for the preservation of sediment during interim construction of well pads.

Applicability

As promoted in the Urban Drainage Flood Control District's Urban Storm Drainage Criteria Manual: Volume 3 Best Management Practices, and as related to the Piceance Basin, the use of several hydrologic processes are available to reduce peak runoff flows and surface runoff volumes. Terra Energy may, when appropriate, implement these strategies outlined below. WQCDA can be located on the working surface of well pads created by grading and/or in combination with perimeter berms and/or cut slopes. Sediment traps and toe trenches can also serve as WQCDA.

1. Flow Attenuation: BMPs that capture and slowly release the water quality capture volume (WQCV) help to reduce peak discharges. In addition to slowing runoff, volume reduction may also be provided to varying extents in BMPs providing the WQCV. Additionally, sediment loss associated with runoff may be reduced, thus retaining soil for interim and permanent reclamation.

2. Infiltration: BMPs that infiltrate runoff reduce both runoff peaks and surface runoff volumes. The extent to which runoff volumes are reduced depends on a variety of factors such as whether the BMP is equipped with an underdrain and the characteristics and long-term condition of the infiltrating media. Examples of infiltrating BMPs include (unlined) sand filters, bioretention and permeable pavements. Water quality treatment processes associated with infiltration can include filtration and sorption.

3. Evaporation/Evapotranspiration: Runoff volumes can be reduced through the combined effects of evaporation and transpiration in vegetated BMPs. Plants extract water from soils in the root zone and transpire it to the atmosphere. Evapotranspiration is the hydrologic process provided by vegetated BMPs, whereas biological uptake may help to reduce pollutants in runoff.

As shown in the Evaporation Table below, annual evaporation in the Parachute area exceeds annual precipitation by over 300%. At higher elevations, this number may be lower, however is will still exceed +200%. On a monthly basis, especially during the summer months, the evaporation rate can be over eight times the precipitation rate. The table below, provides an overview of annual monthly evaporation and precipitation. The last column shows the evaporation / precipitation ratio or how much more evaporation exceeds precipitation. In all cases, evaporation is exceeding precipitation. Detention, along with subsequent evaporation may be utilized on the well pads through the use of sediment traps and berms to maximize evaporation.

Parachute, CO Area

NOAA Monthly Gross and Net Evaporation

	Monthly Evaporation Distribution[1] %	Gross Lake Evaporation[2] Prorated by Month 45.0 (in.)	Average Monthly Precipitation[3] (in.)	Net Evaporation (in.)	Evaporation/ Precipitation Ratio %
Jan	3.0	1.4	1.11	0.2	121.6
Feb	3.5	1.6	0.95	0.6	165.8
Mar	5.5	2.5	1.33	1.1	186.1
Apr	9.0	4.1	1.08	3.0	375.0
May	12.0	5.4	1.36	4.0	397.1
Jun	14.5	6.5	0.78	5.7	836.5
Jul	15.0	6.8	0.89	5.9	758.4
Aug	13.5	6.1	1.06	5.0	573.1
Sep	10.0	4.5	1.35	3.2	333.3
Oct	7.0	3.2	1.34	1.8	235.1
Nov	4.0	1.8	1.16	0.6	155.2
Dec	3.0	1.4	1.12	0.2	120.5
Total	**100.0**	**45.0**	**13.53**	**31.5**	**332.6**

(1) From the Colorado Division of Water Resources Guidelines for Substitute Water Supply Plans April 1, 2011.
(2) NOAA Technical Report NWS 33 - Map 3 'Free Water Surface Evaporation 1956 - 1970'
(3) Western Regional Climate Center - Grand Valley Weather Station

Limitations

- WQCDA are designed for extended detention times. Shorter detention for storm water will affect the removal of fine particles such as silts and clays.
- Storm water may remain in the WQCDA for extended periods.
- Never construct a WQCDA on a flowing stream or in wetlands.
- Unless no other options exist, WQCDA should not be constructed in ephemeral draws where the BMP will trap natural run-off along with construction site stormwater.
- If a WQCDA is constructed on a well pad verify that production equipment or its access is not compromised.

Design Criteria

Location
WQCDA are typically located on the well pad, as part of a toe trench or sediment trap; or at points of discharge from disturbed areas. The location will be determined by the natural terrain, drainage pattern of the runoff, volume of runoff and the accessibility for maintenance. WQCDA should not be located in areas where their failure due to storm water runoff excess can lead to further erosive damage of the landscape. Alternative diversion pathways may be designed to accommodate these potential overflows.

Storage Sizing
WQCDA shall be sized, at a minimum, to accommodate site runoff volumes resulting from the 2-year 24-hour precipitation event as provided by regional NOAA Precipitation Atlases and calculated from the Rational Method. A WQCDA should be designed to maximize surface area for evaporation, infiltration, evapotranspiration and sediment settling. This will increase the effectiveness of the hydrologic processes. Well pads WQCDAs, created by grading and/or in combination with perimeter berms and/or cut slopes, are recommended.

If all or a portion of a level well pad is to be utilized as a WQCDA, the perimeter berm height can be computed with:

Perimeter Berm Height (ft.) = (Surface Area of the WQCDA + Tributary Runon Surface Area) / Surface Area of the WQCDA x 1.2 inches / 12 inches/foot + 0.5 ft. (freeboard & sediment)

Where:
Area = square feet (one acre = 43560 square feet)
NOAA Atlas 2, Vol III reports the 2-yr 24-hr precipitation for Northwest Colorado to be 1.2 inches
Cut slopes do not require a berm.

Example: Well Pad as a WQCDA

Pad Surface Area (WQCDA): 230 ft. long by 125 ft. wide = 28750 square feet
Tributary Runon Area : 0.75 acres = 0.75 acre x 43560 square ft./acre = 32670 sq. ft.

Minimum Depth (ft.) = (28750 + 32670) / 28750 x 1.2 / 12 + 0.5
= 61420 / 28750 x 0.1 + 0.5
= 0.21 + 0.5
Minimum Depth (ft.) = 0.71 ft. or 8.5 inches

Utilization of a toe trench or sediment trap as a WQCDA should follow the design criteria in RC-14 Toe Trenches and SC-6 Sediment Traps.

Construction Specifications

1. If possible, WQCDA, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.
2. Area under embankment shall be cleared, grubbed and stripped of any vegetation and root mat. The pool area shall be cleared.
3. The fill material for the embankment shall be free of roots and other woody vegetation as well as over-sized stones, rocks, organic material or other objectionable material. The embankment shall be equipment compacted by traversing with equipment while it is being constructed.
4. WQCDA are designed to slowly release precipitation through evaporation, infiltration and evapotranspiration. A spillway or slope drain may also be utilized to aid with the drainage of the QWCDA. Slope drain pipe diameter sizes may be determined using the slope drain sizing table below. If a spillway is desired,

The spillway shall be compacted and lined with coarse angular aggregate/riprap, or local adequately sized rock to provide for filtering/detention capability and to prevent erosion of the spillway. The spillway may alternately be constructed with a small section of pipe or may consist of a level spreader, where the entire embankment is constructed at a uniform elevation. The spillway weir for each sediment trap should be at least four feet long for a 1-acre drainage area and increase by 2 feet for each additional drainage acre added, up to a maximum drainage area of 5 acres.

Slope drains used to release precipitation may utilize the sizing table below.

Pipe Slope Drains Sizing Table

Diameter inches	Estimated Flow Capacity* cfs
4	0.28
6	0.84
8	1.7
10	2.89
12	4.45
15	8.07
18	11.82
24	25.48

*Based on Chezy Manning open channel flow equation with a minimum slope of 3% for corrugated & smooth walled pipe.

6. If necessary, a geotextile may be placed at the stone-soil interface to act as a separator.

Maintenance Considerations

Inspection frequency shall be in accordance with the Storm Water Management Plan. The primary maintenance consideration for WQCDA is the management of sediment in the WQCDA. Sediments should be relocated when the sediment load begins encroaching into the 0.5 ft. of freeboard below the berm crest. A WQCDA should be inspected, according to the Stormwater Management Plan. Inspectors should also check the structure for damage from erosion.

Removal/Abandonment

The structure may or may not be removed when the drainage area has been properly stabilized.

References

Urban Drainage and Flood Control District (UDFCD), *Urban Storm Drainage Criteria Manual: Volume 3 Best Management Practices* Denver, CO, Updated November 2010.

Horizon Environmental Services, Inc, *Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites.* Produced by Independent Petroleum Association of America (IPAA). April 2004. <http://www.dpcusa.org/enviro/rapps.html>

EC-21 Hydraulic Mulching/Seeding (HMLCH/HVEG)

Description

Hydraulic mulching (hydro-mulching) and hydraulic seeding (hydro-seeding) is a temporary erosion control practice in which materials such as grass, hay, wood chips, wood fibers, straw, gravel, and seed are hydraulically applied to exposed or recently planted soil surfaces. This practice stabilizes soils by minimizing rainfall impact and reducing storm water runoff velocity. When hydro-mulching and hydro-seeding are used in combination, the mulch aids in plant growth by holding seeds, fertilizers, and topsoil in place, preventing birds from eating seeds, retaining moisture, and insulating plant roots against extreme temperatures.

Hydraulic application of mulch and seed can be done quickly and efficiently with the correct equipment and ingredients.

Applicability

Hydro-mulching and hydro-seeding are often used in steep areas where regular mulching/seeding is difficult because of environmental constraints. Hydraulic application of mulch and seed can be used on slopes as steep as 1:1.

Limitations

- Hydro-mulching might delay seed germination because the cover changes soil surface temperatures.
- The mulch and seed itself is subject to erosion and may be washed away in a large storm.

- Maintenance is necessary to ensure that hydro-mulch and hydro-seed provides effective erosion control.
- Hydraulic application of mulch and seed must be done when no rainfall is expected, preferably within a 24-hour time period.

Design Criteria

No formal design is required.

Construction Specifications

1. Site preparation:
    a. Prior to mulching/seeding, install the necessary temporary or permanent erosion control practices and drainage systems within or adjacent to the area to be mulched/seeded.
    b. Slope, grade, and smooth the site to fit needs of the selected products.
    c. Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.
2. Hydraulic mulching/seeding:
    a. For steep slopes an Erosion Control Mulch (ECM) consisting of a hydraulic matrix such as a Bonded Fiber Matrix (BFM) or Flexible Growth Medium (FGM) may be used. A BFM refers to a continuous layer of elongated wood fiber strands that are held together by a water-resistant bonding agent to form a water-absorbing crust.
    b. The ECM shall be a hydraulically-applied, flexible erosion control blanket composed of long strand, thermally refined wood fibers, crimped, interlocking fibers, and performance enhancing additives. The ECM shall require no curing time period and upon application shall form an intimate bond with the soil surface to create a continuous, porous, absorbent and erosion resistant blanket that allows for rapid germination and accelerated plant growth.
3. Installation:
    a. Strictly comply with manufacturer's installation instructions and recommendations. Use approved hydro-spraying machines with fan-type nozzle (50-degree tip) whenever possible to achieve best soil coverage. Apply ECM from opposing directions to soil surface to assure 95% soil surface coverage. Slope interruption devices or water diversion techniques are recommended when slope lengths exceed 100 ft (30m).

Maintenance Considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. Areas should be identified where mulch and seed has loosened or been removed. Such areas should be reseeded (if necessary) and the cover replaced. If

washout, breakage, or erosion occurs, surfaces should be repaired, reseeded, and re-mulched. Inspections should be continued until vegetation is firmly established.

References

California Stormwater Quality Association, Stormwater Best Management Practice (BMP) Handbook – Construction. January, 2003. <http://www.cabmphandbooks.com/Construction.asp>

Environmental Protection Agency (EPA), *National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control.* Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

EC-3 Gravel Surfacing (GS)

Description

Gravel is used to stabilize the surface of roads, well pads, or other facilities by reducing erosion (particularly on steep slopes), limiting dust from passing vehicles, and reducing the amount of mud that may develop during wet weather.

Applicability

Gravel may be used for any road, well pad, or other facility, particularly "soft" sections, steep grades, highly erosive soils, or where all-weather access is needed. Gravel may be used as "fill" material in ruts or as a full structural section over the entire area.

Limitations

- Rutting and washboarding may develop if the surface gravel is too thin, has poor gradation, has little or no binding characteristic, or has a low percentage of fractured stone.

- Flat-blading to maintain the roadway must be done properly to avoid changes in gravel thickness, road slope, and road grade.

Design Criteria

No formal design is required.

Construction Specifications

1. Maintain a road cross-slope with insloping, outsloping, or a crown to rapidly move water off the road surface. Also maintain a slight slope of well pads or around other facilities.

2. Gradation of gravel shall be in accordance with applicable specifications (BLM, forest service, private landowner, etc…) or may be as shown in Figure EC-3-1. This figure shows the typical gradation ranges of aggregates used in construction, how the materials, ranging from coarse to fine, best perform, and the approximate limitations to the desirable gradation ranges. Ideally, aggregate surfacing material is (1) hard, durable, and crushed or screened to a minus 2 inch size; (2) well graded to achieve maximum density; and (3) contains clayey binder to prevent raveling.

3. Gravel may be placed with a minimum thickness of four inches, however the amount of gravel used is dependent on the soil conditions and anticipated traffic. Figure EC-3-1 may be used as a guide. Geotextile or geogrid subgrade reinforcement is sometimes used over soft soils to separate the gravel from the soil, keep it uncontaminated, and extend the useful life of the gravel.

4. Gravel may be compacted during construction and maintenance to achieve a dense, smooth surface and thus reduce the amount of water that can soak into the ground.

5. "Spot" stabilize local wet areas and soft areas with coarse rocky material as needed.

6. Stabilize the surface in sensitive areas near streams and at drainage crossings if necessary to minimize surface erosion.

7. Control excessive road dust.

8. Blend coarse aggregate and fine clay-rich soil (when available) to produce a desirable composite surface material that is coarse yet well-graded with fines for binder.

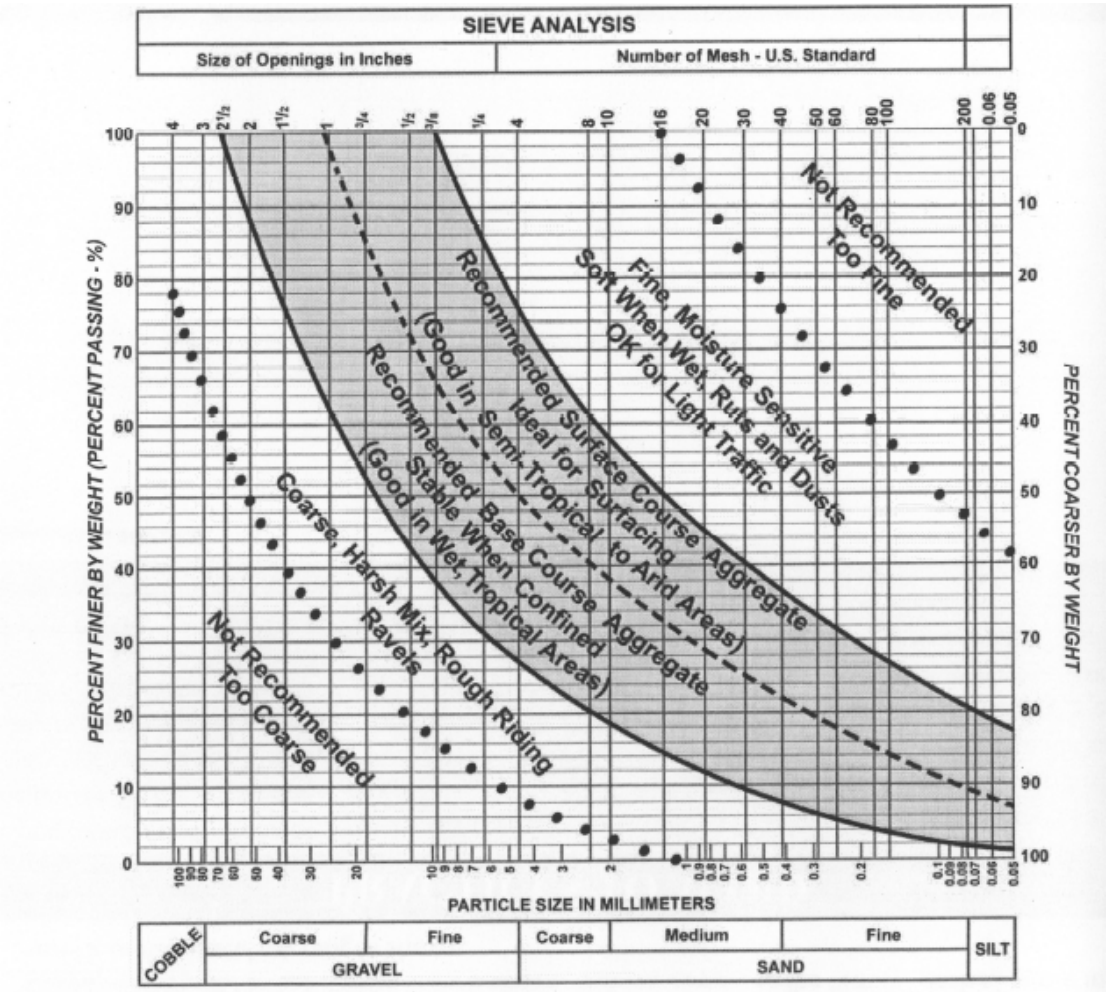
Maintenance Considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. The gravel applied to the surface must be maintainable in order to prevent and control rutting and erosion. The surface should be periodically smoothed and reshaped with a grader blade (flat-blading). This should be done when the gravel is moist. Maintain the proper slope and grade while flat-blading. Also be sure to avoid plugging roadside ditches or altering other adjacent drainage structures, as this may cause them to not function properly. Flat-blading may also cause road gravel to be pushed off the main roadway and onto the shoulders. To avoid this, blade toward the center of the road.

References

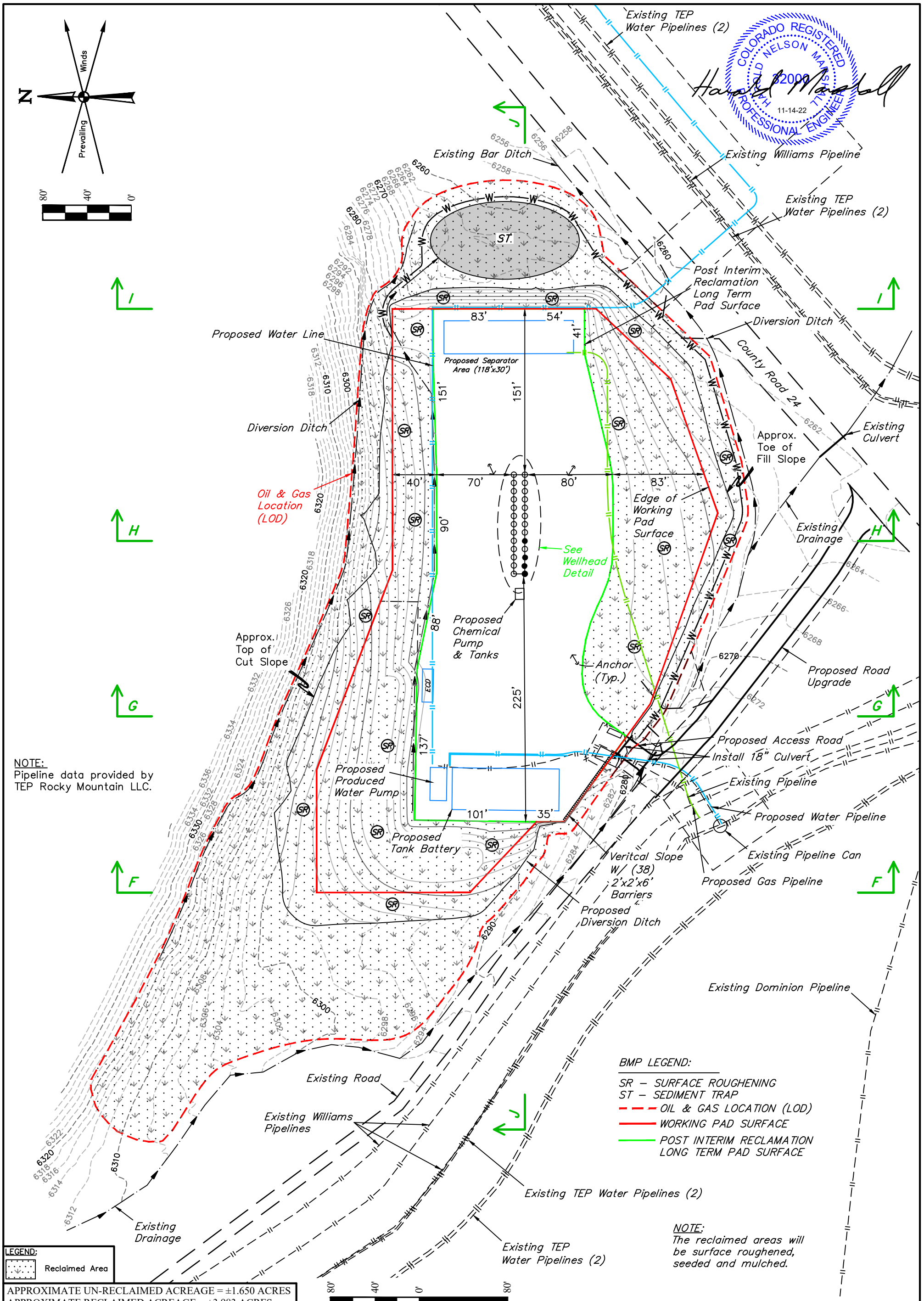
Keller, Gordon, and James Sherar, *Low-Volume Roads Engineering, Best Management Practices Field Guide.* United States Department of Agriculture (USDA), Forest Service, US Agency of International Development (USAID), 2005. http://www.blm.gov/bmp/field%20guide.htm

Figure EC-3-1
Gradation and Performance of Surfacing Materials



NOTE: Gradation Ranges Shown Are Approximate.

APPENDIX B
FEDERAL RGU 44-1-298 DRILL PAD
INTERIM RECLAMATION LAYOUT
PLAN VIEW & CROSS SECTION



NOTE:
Pipeline data provided by TEP Rocky Mountain LLC.

BMP LEGEND:

SR – SURFACE ROUGHENING
ST – SEDIMENT TRAP
OIL & GAS LOCATION (LOD)
WORKING PAD SURFACE
POST INTERIM RECLAMATION LONG TERM PAD SURFACE

NOTE:
The reclaimed areas will be surface roughened, seeded and mulched.

LEGEND:
Reclaimed Area

APPROXIMATE UN-RECLAIMED ACREAGE = ±1.650 ACRES
APPROXIMATE RECLAIMED ACREAGE = ±3.983 ACRES
TOTAL ACREAGE = ±5.633 ACRES

REV: 4 11-14-22 M.D. (REMOVE EQUIP., RECLAMATION & LABEL CHANGE)

NOTES:

- Contours shown at 2' intervals.

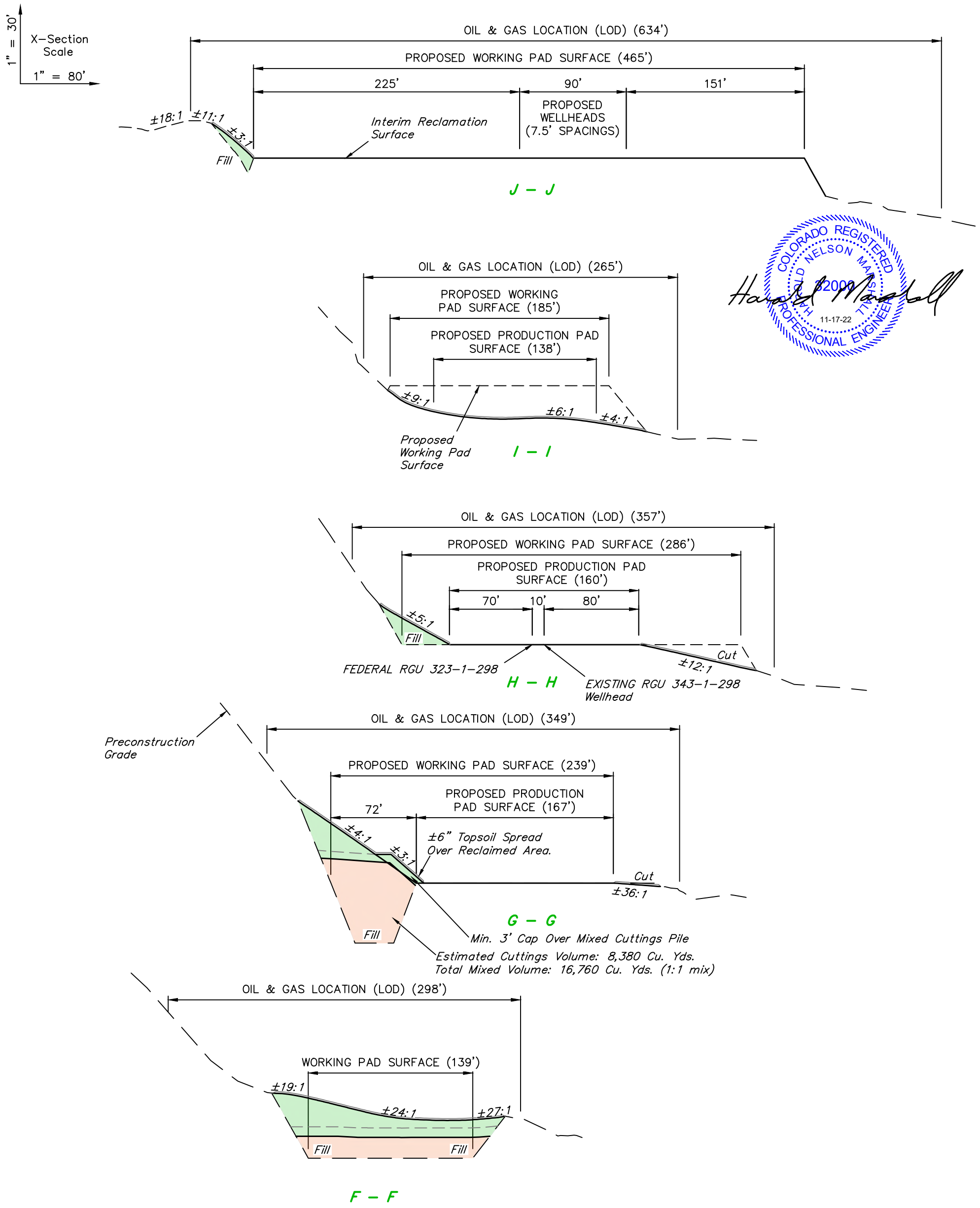
TEP Rocky Mountain LLC

FEDERAL RGU 44-1-298 PAD
LOTS 35 & 36, SECTION 1, T2S, R98W, 6th P.M.
RIO BLANCO COUNTY, COLORADO

SURVEYED BY	BART HUNTING	08-18-21	SCALE
DRAWN BY	T.L.L.	10-19-21	1" = 80'

INTERIM RECLAMATION LAYOUT-PLAN VIEW

UINTAH ENGINEERING & LAND SURVEYING
UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017



COLORADO REGISTERED HAROLD NELSON MARSHALL 32000 PROFESSIONAL ENGINEER
11-17-22

NOTE:
TRENCH BACKFILL MATERIAL = 10,590 Cu. Yds.

APPROXIMATE EARTHWORK QUANTITIES	
RAW CUTTINGS	8,380 Cu. Yds.
CLEAN FILL MATERIAL	8,380 Cu. Yds.
TOTAL MIXED CUTTINGS (1:1)	**16,760 Cu. Yds.**

APPROXIMATE EARTHWORK QUANTITIES	
TRENCH BACKFILL REMAINING (AFTER MIXING)	2,210 Cu. Yds.
CUTTINGS CAP	692 Cu. Yds.
TOTAL REMAINING BACKFILL (TO BE SPREAD EVENLY OVER PAD)	**1,518 Cu. Yds.**

NOTE:
Reclaim Slopes Vary as Shown.

APPROXIMATE SURFACE DISTURBANCE AREAS		
	DISTANCE	**ACRES**
INTERIM RECLAMATION AREA	NA	±1.650
TOTAL SURFACE USE AREA		**±1.650**

REV: 3 11-14-22 M.D. (LABEL CHANGE, ADD CAP & NEW EARTHWORK CALCS.)

TEP Rocky Mountain LLC

FEDERAL RGU 44-1-298 PAD
LOTS 35 & 36, SECTION 1, T2S, R98W, 6th P.M.
RIO BLANCO COUNTY, COLORADO

SURVEYED BY	BART HUNTING	08-18-21	**SCALE**
DRAWN BY	T.L.L.	10-19-21	AS SHOWN

INTERIM RECLAMATION CROSS SECTIONS

UINTAH ENGINEERING & LAND SURVEYING
UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017