U.S. Forest Service – Monongahela and George Washington National Forests

Date/Time: Monday, November 21, 2016 @ 10:30am-12:30pm (Eastern)
Location: USFS North River Ranger District Office, Video Conference/Conference Call
Attendees

Forest Service	Clyde Thompson, Jennifer Adams, Joby Timm*, Karen Stevens, Alex Faught, Steffany Scagline, Stephanie Connolly, Kent Karriker, Adrienne Nottingham, JoBeth Brown*, Tom Bailey*, Karen Overcash*, Tom Collins*
W. Virginia University	Dr. Jim Thompson*
Galileo Project	Maria Martin*, Peter Rocco*
Dominion	Richard Gangle, Robert Hare, Leslie Hartz, Carole McCoy, Brittany Moody, Amanda Prestage, Brian Wilson, Luke Knapp, Colin Olness
ERM	Pat Robblee*, John Cassady*
Geosyntec	Alex Green, Kathleen Harris, Tony Rice, Rodolfo Sancio
Golder Associates	Andreas Kammereck
Rettew	John Stipe, Dan Fenstermacher, John Wa
Nicholas Putnam Group	Charles Delp*, Stephen Carpenter*

* Attended via video/conference call.

Note: the notes summarize discussion and content not reflected in the accompanying presentation and materials presented during the meeting. Due to technical issues, the Forest Service did not have advance copies of the presentation and materials.

Background

The primary purpose of the meeting was for Atlantic Coast Pipeline (ACP) to present and solicit Forest Service feedback on ACP's proposed *Best in Class (BIC) Steep Slopes Program as well as demonstrating how this would be applied to steep slopes in the National Forests*. The accompanying presentation and materials were distributed to Forest Service staff prior to or during the meeting. The notes summarize discussion and content not reflected in the accompanying materials.

Discussion

Robert presented the information contained in the *USFS Meeting slides pdf.*

Tom Collins (Tom C.) said the framework ACP presented is impressive but noted it did not specify one of the key components it depends on: the qualifications of the professional staff on the team implementing the geohazards program. In particular, geotechnical engineers and engineering geologists need to be heavily involved on the team in every phase of the program from siting, design, development through monitoring. The framework and its documentation need to specify the continuing involvement of geotechnical engineers and engineering geologists in the program. He suggested that without their continuing involvement, the geohazards program will not be successful. He added that site reconnaissance needs to be done to figure out the variations of the area; ACP needs to understand the slope stability and conditions of the surface materials and bedrock in order to develop site specific designs.

Robert replied that Tom C. had valid points. He said ACP's team, present in the room, has been involved in the development of the program since the beginning. He added that field surveys were completed to help inform the 6 scenarios, or "buckets" (see slide 11). The same team would be out in the field determining which of the incremental controls, when added to the minimum regulatory requirement, would be most successful. Robert indicated that the controls to be used on a site would be decided in the field by the contractor, engineer, and environmental staff, and that this selection process should provide for better outcomes than engineering the site in an office setting ahead of time. Tom C. said it is still not clear if the professionals he mentioned would play a central role in the process. Robert replied that the geotechnical engineers have played a critical role, noting geotechnical engineer Tony has been involved

since the beginning. Tom C. also expressed major concern about ACP program's selection of the appropriate "bucket" controls in the field at the time of construction. He said that site-specific designs need to be developed ahead of time through site reconnaissance with the appropriate specialists. At the time of construction some design modifications might be needed, but it is not good practice to wait until construction to develop site-specific designs for the many steep slope challenges on NFS lands. Robert explained that there would be significant analysis and discussion before going to the field; the field team would be limited to selecting from a half-dozen options that go above and beyond the regulatory requirements. The geotechnical engineer and engineering geologist will be involved.

Stephanie Connolly (Stephanie C.) said that in addition to the state and federal standards, the Forest Service has an additional layer of requirements which also need to be met. The Forest Plan Standards and Guidelines need to be woven into the documents (not just mentioned) to provide hard boundaries. The Forest Service is not seeing this so far in the Construction, Operations, and Monitoring (COM) Plan and some of the other documents that have been rolled out. If we can't meet those hard boundaries, then we come up against Forest Plan Amendments. She added that while the 30% threshold for defining steep slopes is generally a good delineation, in West Virginia slopes as low as 15% can behave the same as slopes greater than 30% based on mineralogical factors. She said there have been failures on slopes around 20% in West Virginia. The potential for failure for slopes under 30% needs to be addressed. Robert replied that ACP has considered, federal, state and where applicable local regulations and intends to choose the more conservative or protective regulation in cases where there is conflict. He said slopes under 30% could still be researched and could receive their due diligence; the program may benefit those slopes as well.

Clyde reiterated Stephanie C.'s comments and said the Forest Plan Standards and Guides outlines what we do and don't do on steep slopes. He stated that the designs need to meet the intent of the Forest Plan direction. ACP should also consider locations where high precipitation increases the likelihood of failure on slopes less than 30%. He added that while the BIC program ACP is proposing is laudable he is skeptical the techniques will work; the Forest Service has seen slope failures on lesser slopes and would be able to provide examples. ACP needs to be able to demonstrate that the techniques will work in extreme conditions. One of these examples talks about cross-trenching on over 100% slope. It's hard to imagine how that would work to get the water out of the trench. The FS wants to know beforehand that these examples have a reasonable chance of working.

Tony presented the site specific stabilization slides and associated pdfs. He mentioned he has previously presented to the Forest Service. He first discussed the site stabilization approach for MNF #1. On the *PLAN AND PROFILE* slide found in the *MP_73-20_site_specific_design_drawing pdf*, the figure at the top of the page is an overhead view based on LiDAR, the figure on the bottom is the profile. The *Sections B-B' and C-C'* slide includes illustrations of the 2 cross section profiles with the identified controls. Tony noted that the steep slopes on this site would be avoided, and that construction would take place on the ridge top.

Stephanie C: asked how the program would account for shrink-swell clay soils vs. more typical stable limestone geology. Tony said locations with the combination of inclination and geology which in combination would lead to site stability issues would have site specific design and controls would reduce the risk of movement. Stephanie C. indicated this did not answer her question but prompted Tony to continue.

Stephanie C. later identified this site (MNF #1) as a location where there is orographic uplifting resulting in higher amounts of precipitation on the western slope of the Allegheny Front. She said the Forest Service has experienced troubles with timber sales in geologies with shrink swell clays because of the combination of precipitation and terrain. Tony acknowledged that surface and ground water factors are key elements. He stressed that is why in addition to standard controls, site specific water management

controls will be identified in the field. Tony stated that when properly monitored and maintained the controls will alleviate the potential for failure.

During a discussion of different controls to discharge water from the right-of-way, Stephanie C. asked if the discharges would be monitored. Robert responded they are not required to be monitored by the State. She suggested that while the discharges may not be under a permit through state regulations, there may be concern within the Environmental Protection Act and Clean Water Act regulations that these types of discharges have the potential to convey contaminants into watersheds. The contaminants have the potential to have unintentional adverse effects on water quality. Specifically there are concerns about potential affects to fisheries and drinking water. She said these concerns need to be addressed; Robert said they would be. Tony reiterated the controls would be monitored and if they are not achieving results, something else may be tried. He added there would be multiple inspectors from the Federal Energy Regulatory Commission (FERC), states and other agencies. Carole asked what types of pollutants were of concern; Stephanie C. said she was not prepared to discuss this at this time.

During the review of the *MP85 SECTIONS B-B' AND C-C'* slide of the *MP_85_site_specific_design_drawing pdf*, Tom C. mentioned the slides do not show profiles for restoration. He also noted the slides show spoils piles at slope ratios greater than one to one. Tony said the drawings are not intended for engineering. Tom C. replied that the Forest Service wanted to see details of how the loose, excavated materials would be managed during and after construction, and, for example, how high and at what angle spoils will be piled. Tom C. said the design needs to consider the swell factor (bulking factor) particularly for excavated bedrock, and the design drawings need to reflect swell factors as well as realistic angles for spoil piles and other temporary storage of loose, excavated materials. Tom C. said the drawings are a step in the right direction but more detail is needed for site specific design, the Forest Service needs to see how this lays out on the land. Clyde acknowledged the Forest Service would likely have many detailed questions and proposed that further meetings be scheduled.

Stephanie C. asked if the controls are designed to account for large storm events; is there adaptive management, or are they more for the "average" event. She noted when using standard protocols the Forest Service is paying for the same things over and over after flood events. Tony replied the controls aren't necessarily designed for storms, they are construction and experience based controls, the spacing and location of the water control features (e.g. water bars) are to comply with the desire to maintain a stable slope, he is not sure if the capacity of an individual water bar has been calculated. Robert suggested the issue isn't necessarily over flow of water bars and controls but through the steady deterioration of the controls. From monitoring, ACP will be able to see if water features are intercepting the water and discharging it without creating additional issues. He suggested the use of collector pipes in conjunction with conveyance pipes will reduce the possibility of the drainage system clogging. Different controls can be used to address surface water from soil saturating precipitation events and precipitation that results in sheet runoff. Stephanie C. said it sounds like ACP is trying to extend the lifecycle of the conveyance controls but is not sure how long the lifecycle is. She said it sounds like ACP is applying lessons learned and while she likes the approach it is too early to determine how successful the controls will be.

Robert reiterated that monitoring is a key component of the BIC approach. He said we can't outengineer nature, but ACP can reduce risk when compared to a non-BIC approach. ACP's preference is to mitigate sooner rather than later. Kent noted the challenge is going to be documenting how effective the controls are to determine the likelihood of something not working so the agency can make a determination of effect.

Tony stated that on the GWNF2 site, the excavated spoil would be moved to the top of the hill for storage and then brought back down for backfilling the trench. This is due to the extremely steep slope exceeding the angle of repose for the excavated material.

Tom Bailey (Tom B.) reiterated Tom C.'s previous comment about the angle of repose. He asked if ACP intended to restore the slope to its original grade. Tony responded they intend to minimize grading and excavation which would limit the amount of displaced materials and then restore to the original grade. Where the displaced materials are temporarily stored depends on the site conditions. ACP's initial inclination, with respect to the GWNF site specific design location, is to pull materials and equipment from the bottom up.

Tony summarized the key points for both the MNF1 and GWNF2 sites: 1) the net load on the slopes won't change, 2) water will be intensively managed, and 3) maintenance is essential.

Moving on to the Soil Survey, the Forest Service noted they are reviewing ACP's geospatial data with the intent of submitting in to the Natural Resources Conservation Service (NRCS). The Forest Service needs to have some questions on the data answered before it can be submitted. Clyde said that the MNF checked a subset of the survey and could not find several of the pits. This issue needs further discussion and clarification.

The participants discussed topsoil segregation, with Clyde stating that the material is needed to maintain productivity. Brittany Moody said that topsoil segregation in wooded environments is difficult because they don't pull stumps, and segregating the material requires extra space. Clyde asked Brittany, Stephanie C., and Tom B. to discuss this issue further.

Note: at this point the phones in the North River Station went down. Video/conference call participants did not take part in the remaining discussion.

Action item: **Jennifer**, **Richard,** and **Galileo** (notified afterwards) coordinate meetings to discuss: (1) species conservation measures, (2) site-specific stabilization designs, and (3) topsoil segregation. *In progress.*

Regarding ACP's COM Plan, Clyde noted several additional iterations are needed.

Leslie, Clyde and Kent discussed information that is still is still needed for ACP's Biological Evaluation (BE); Jennifer and Kent noted the Forest Service told FERC what information is needed. Kent told Leslie the Forest Service needs to see the effects analysis still, and that specific avoidance and minimization measures need to be worked out, to facilitate effect determinations and Forest Plan consistency determinations. Leslie asked what was in the Mountain Valley Pipeline (MVP) BE. Jennifer said the MVP Draft Environmental Impact Statement went out to the public without information on Section 7 species which is a source of public input; there are questions about whether the BE for MVP is public.

Action item: **Jennifer** gives Tom B. soils information.

Stephanie C. asked about the status of the seismic refraction studies; Colin said ACP has been conducting the studies.

Clyde explained the timeline for Forest Service decisions. He said the objections filed per Section 218 and 219 objection processes must first be resolved. If there are objections it would take 150 days minimum to complete the process, and additional time would be needed to write the permit after the decision has been reached. How long exactly depends on the number and complexity of the objections. The Forest Service is using FERC's EIS to increase the efficiency of the process, rather than the Forest Service writing its own National Environmental Policy Act document for the potential plan amendments. Karen Stevens noted the Forest Service cannot sign a decision until the objection process is complete.

The Forest Service will be filing letter with FERC regarding the need to clarify the locations of soil pits on the MNF. ACP confirmed that the original photos were provided in the CD sent to the MNF.

Action item: **Forest Service** schedules a meeting among Forest Service Soil Scientists to discuss topsoil segregation and challenges posed by steep slopes. *Complete.*

Atlantic Coast Pipeline

U.S. Forest Service Coordination Meeting

November 21, 2016

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Purpose / Goals

- Review ACP's site-specific stabilization approach for steep slopes
- Introduce BIC Steep Slopes Program
  - How does this tie into site-specific stabilization?
- Review current status of the Geohazard Program (including the Order 1 Soil Survey)
  - Review FS comments to Geohazard and Order 1 Soil Survey Reports
- COM Plan
  - Review comments not related to stabilization techniques (i.e. steep slopes)
- Identify next steps

Site Specific Stabilization

BIC: Steep Slopes Program Introduction

- BIC is a concept or culture that is developed to go above and beyond what may be considered typical or "business as usual" with regard to stabilizing steep slopes (>30%)
- Dominion's team of subject mater experts has developed a Program to provide an enhanced level of erosion protection, which includes site specific engineering recommendations to address steep slope and landslide hazards related to construction/operation
- Characterize, assess, and classify potential hazards to better understand / define their nature and potential impacts (threats) on the pipeline and environmental resources prior to construction activities

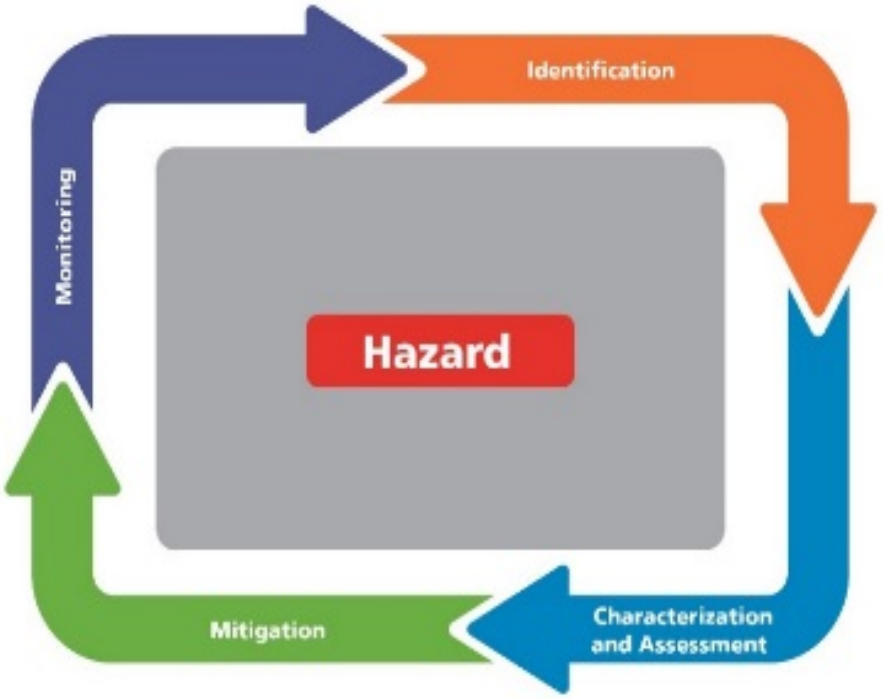
Site Specific Stabilization – cont.

BIC: Steep Slopes Program Goals

- Proactively address steep slopes and landslide hazards along the ROW that could potentially impact environmental resources
- Maintain reliable and safe operation of the pipeline(s)
- Focus on streams, wetlands, and waterbodies
- Supporting Erosion & Sediment Control (E&SC) and Storm Water Pollution Prevention Plans (SWPPPs) for construction stormwater permit(s)
- Combines environmental compliance with integrity management of the pipeline(s) when addressing steep slope and landslide hazards

Site Specific Stabilization

- Identification
  - Geohazards Study – Phase I
- Characterization and Assessment
  - Geohazards Study – Phase II
- Mitigation
  - E&SC and SWPPPs
- Monitoring
  - Continued operations



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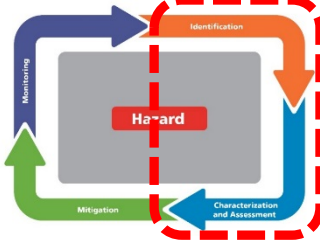
Site Specific Stabilization



- Identification
  - Geologic hazards are systematically identified along a pipeline (e.g., steep slopes, landslides, erosion hazards, etc.)
- Characterization
  - Involves an iterative process, where hazards are classified and then assessed to varying levels associated with perceived threat, in order to target specific hazards where mitigation options should be considered.

Note: Qualitative and quantitative risk assessments can be carried out throughout this step to further classify hazards and their potential impacts on the pipeline, and to help target specific areas for detailed investigation and/or to evaluate mitigation options

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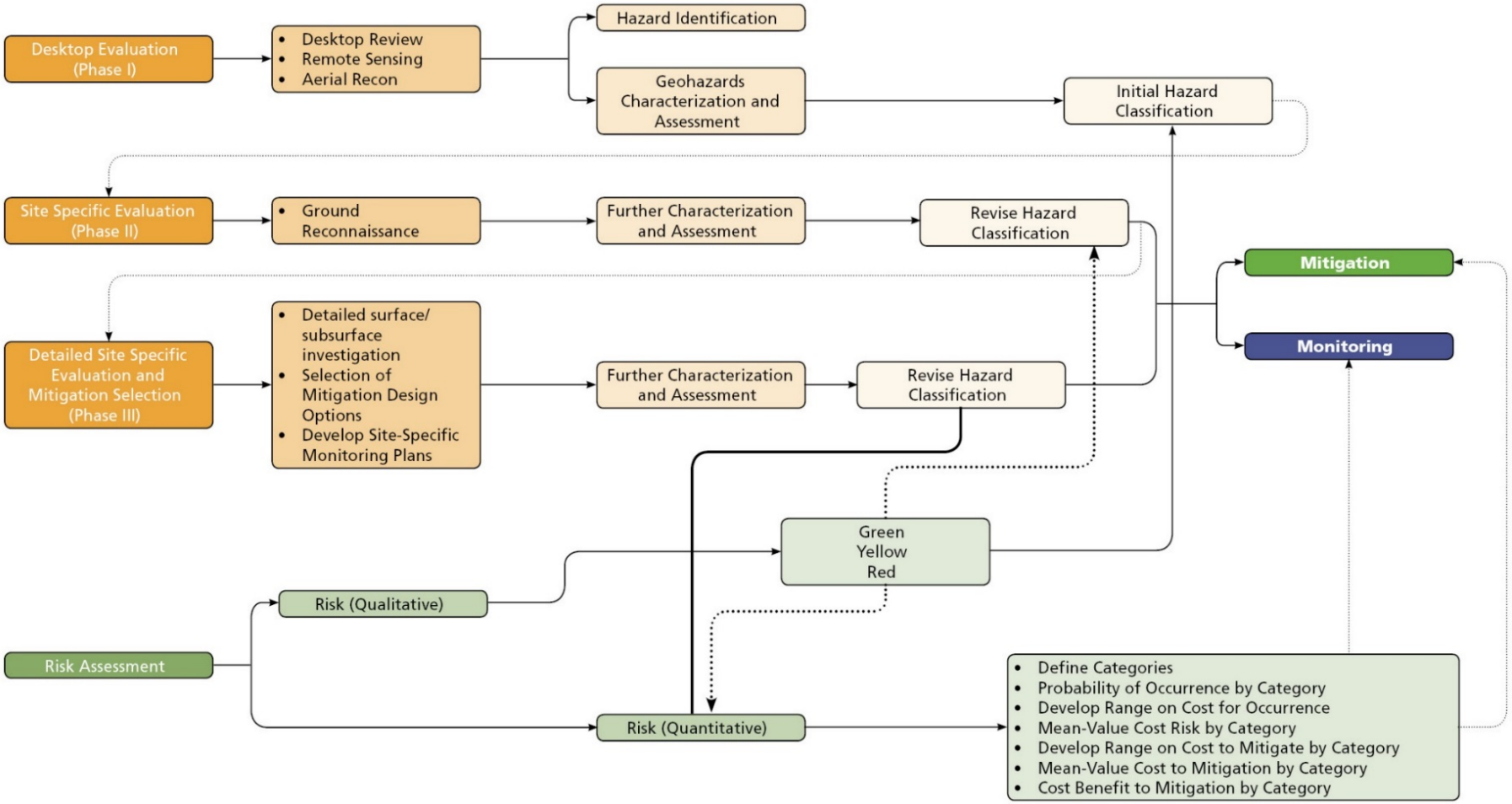
Site Specific Stabilization



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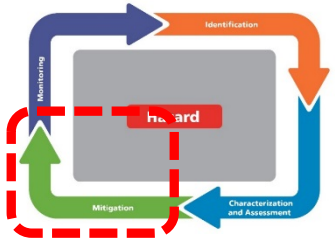
Site Specific Stabilization



- Mitigation is considered and implemented for identified targeted hazards
  - Areas for mitigation are selected based upon potential risk to the pipeline, environment, and operation and maintenance
- Site and hazard specific E&SC Plans and SWPPPs incorporate targeted mitigation

Note: site specific engineering plans, may include additional topics outside of E&SC/SWPPP plans, and are developed at this step in the process.

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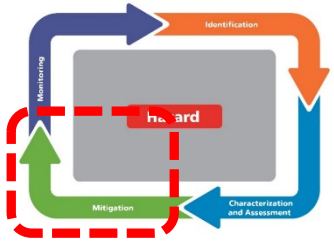
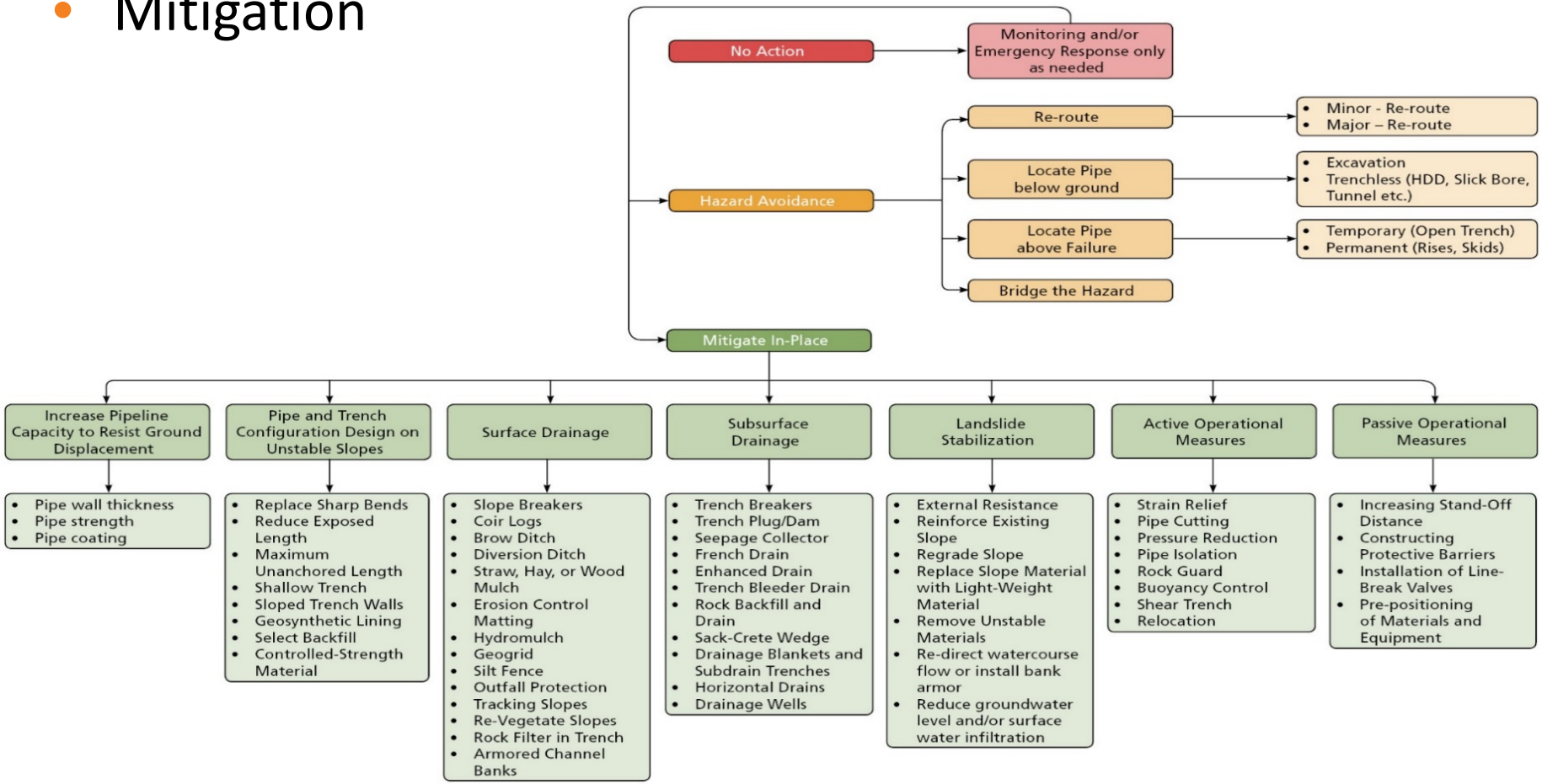
Site Specific Stabilization



- Mitigation



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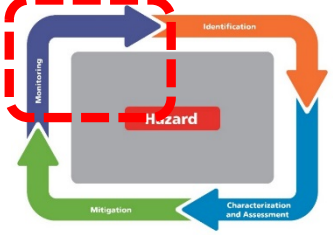
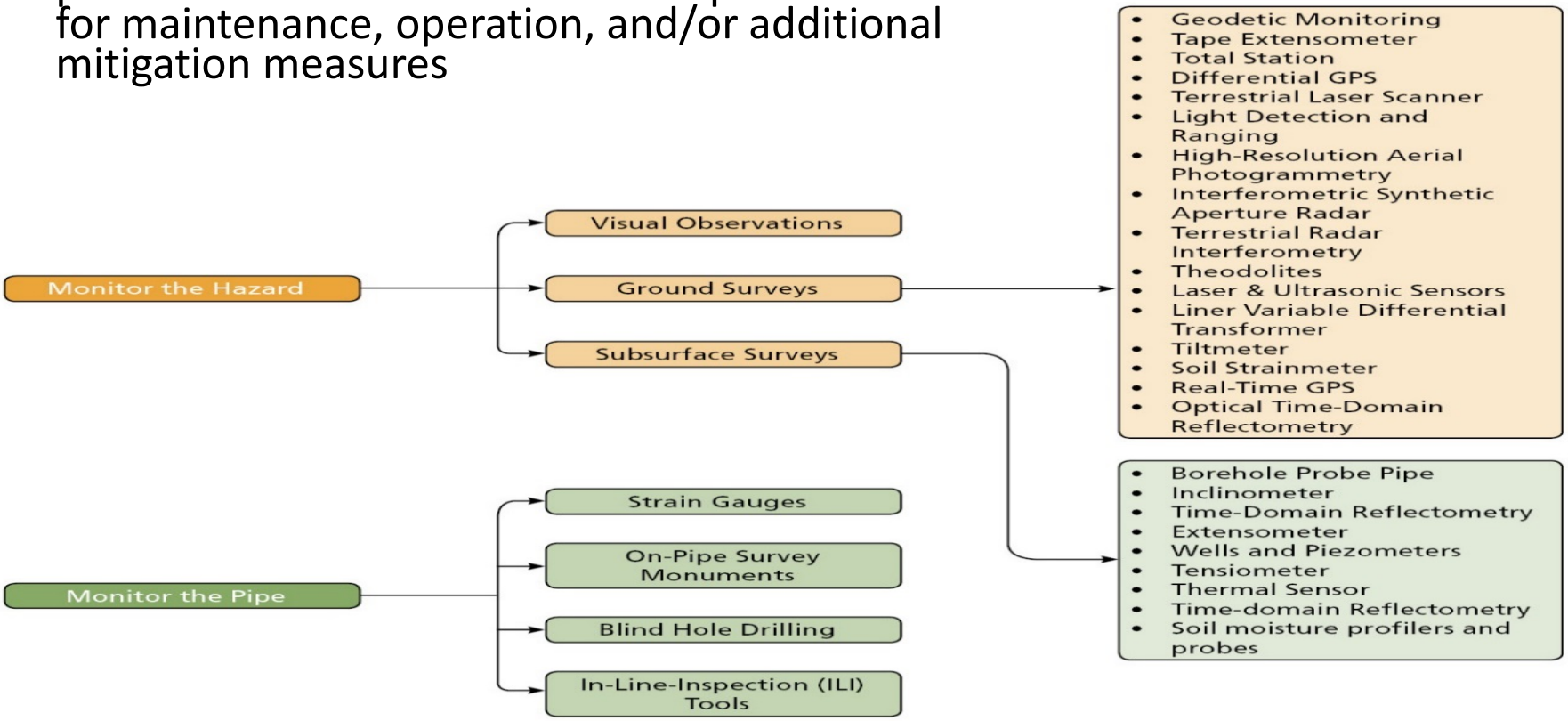
Site Specific Stabilization



- Hazards are monitored to evaluate the performance of mitigation measures and to provide information to assess the potential need for maintenance, operation, and/or additional mitigation measures



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Site Specific Stabilization

- First…define the Typical Scenarios under BIC Program:

Hundreds of unique steep slopes along the 600 mi. long alignment with a cumulative length of ~35 miles

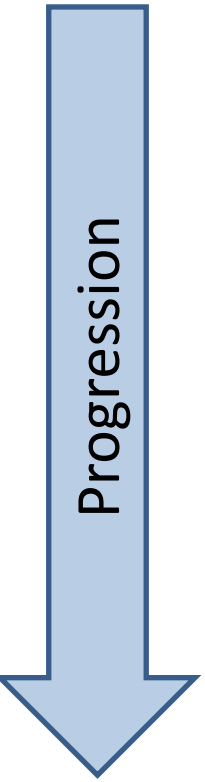
1) "A" – Steep Slopes without Evidence of Movement
2) "B" – Steep Slopes with Evidence of Active Movement
3) "C" – Steep Slopes with Sensitive Resources at toe (i.e. stream, wetland, road)
4) "D" – Steep Slopes Previously Modified by Cut/Fill
5) "E" – Steep Slopes anticipated to become Unstable after Construction
6) "F" – Steep Slopes along/near Narrow Ridge Tops

Site Specific Stabilization

- Second…identify BIC Steep Slope Hazard Mitigation Program Controls:
  - Baseline Controls:
    - ✓ Minimum regulatory requirements, and controls typically used
  - Incremental Controls (BIC focused for 6 typical scenarios):
    - ✓ Additional measures prescribed to achieve BIC objectives, outlined in Typical/Basic/Detailed designs and/or determined based on conditions encountered at time of construction

Site Specific Stabilization

- Third…build ES&C Plans/SWPPP's to support permitting/construction which are "scalable", "fit-for-purpose", and go above and beyond business as usual:



  - TYPICAL DESIGNS:
    - Typical Scenarios (A-F) with typical details provided --- baseline plus BIC
    - Approach consistent with industry standard and enhanced to meet BIC Program Goals
    - Addresses hundreds of unique steep slope locations along alignment (~35 total miles)
  - BASIC DESIGNS:
    - Site specific plan developed by BIC team
    - Triggered by targeted requests (internal, landowners, regulatory, etc.)
  - DETAILED DESIGNS:
    - Site specific plan developed by BIC team
    - Triggered to address targeted requests (internal, landowners, regulatory, etc.)
    - Site specific plan, which may include: additional investigations, engineering, special sub-contractors, (i.e. 4 suspected landslide sites)

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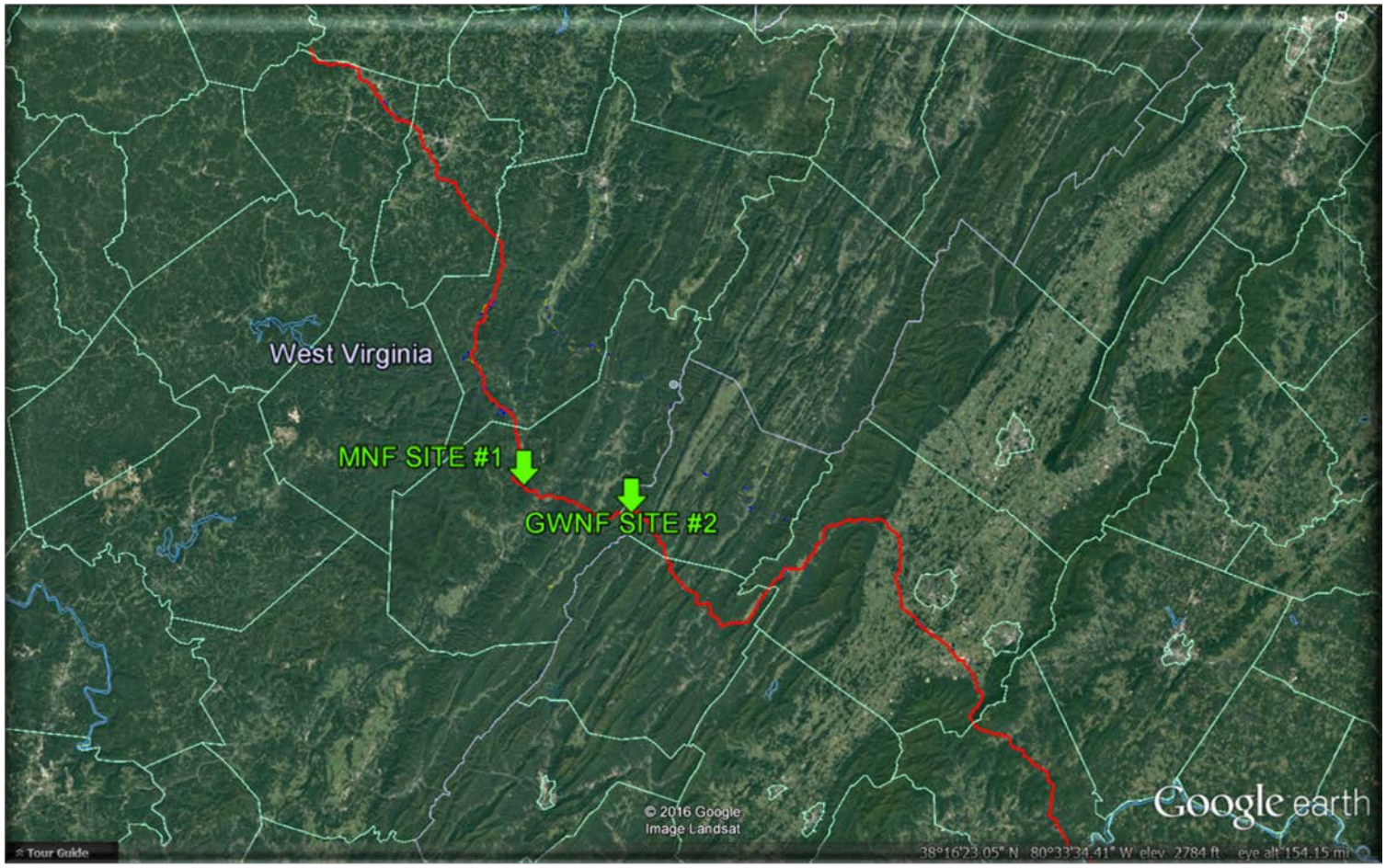
Site Specific Stabilization – cont.

Forest Service is requesting ACP develop site-specific stabilization designs for selected areas of challenging terrain (letter dated September 24, 2016):

- Anticipated hazards at each site
- How the hazards will be minimized, to include specific techniques and materials tailored to the conditions of each site
- Plan and profiles (cross section(s) perpendicular to centerline, and a longitudinal cross section along the centerline) with dimensions (feet) showing
  - 1) the original ground surface,
  - 2) the maximum extent of the cut, fill and spoil during construction,
  - 3) the post-construction reclaimed ground surface, showing reclamation backfill, reclaimed slopes, and the permanent right-of-way

- Short-term and long-term measures (i.e., construction vs. operation and maintenance periods)
- Provisions for ensuring that long-term stabilization features will remain in place and effective over the life of the project, without the need for continual maintenance
- Rationale and supporting documentation for the likelihood that the techniques and materials used at each site will be effective
- Potential resource impacts in the event of a failure, and how the potential for such impacts will be minimized

Site Specific Stabilization – cont.



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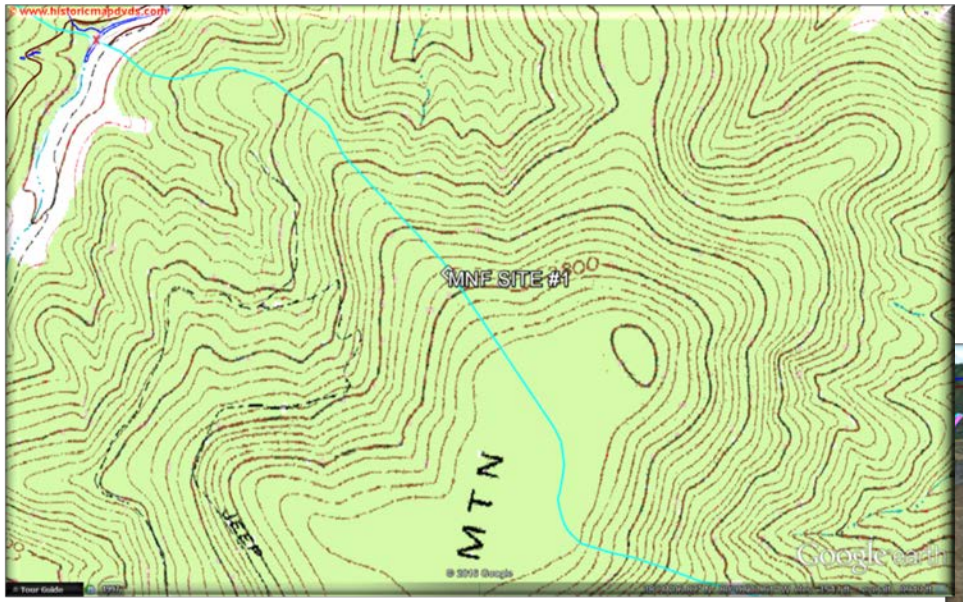
Site Specific Stabilization – cont.



MNF #1

Between ACP's Mileposts 73 and 74 where the buffered ROW will cross areas with slopes of 80-90, 90-100, and >100% and which are also present on Mauch Chunk geology. This area of concern is presented on public land and also on private land.

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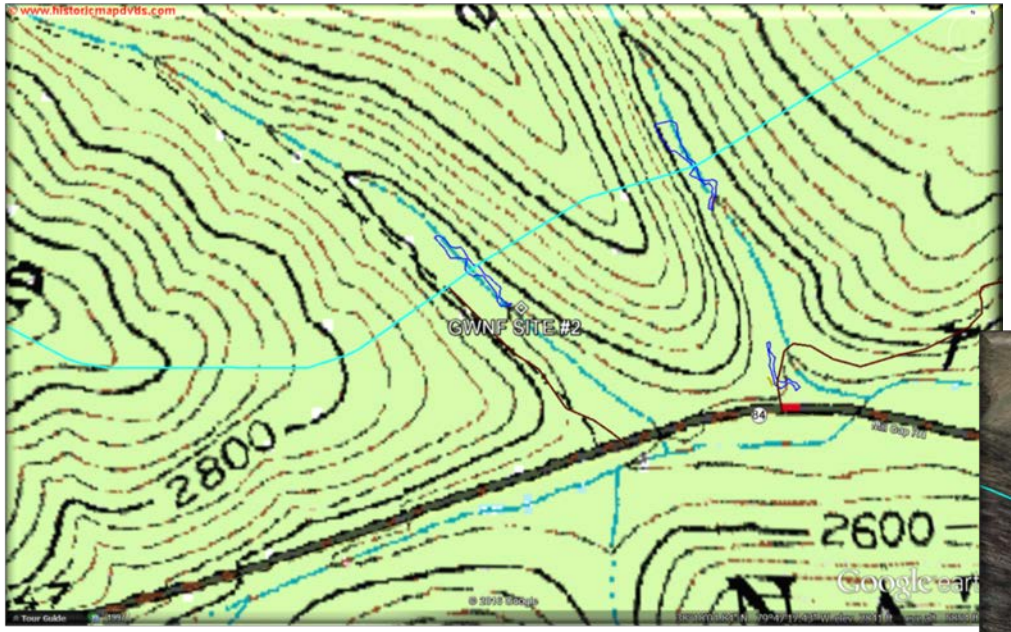
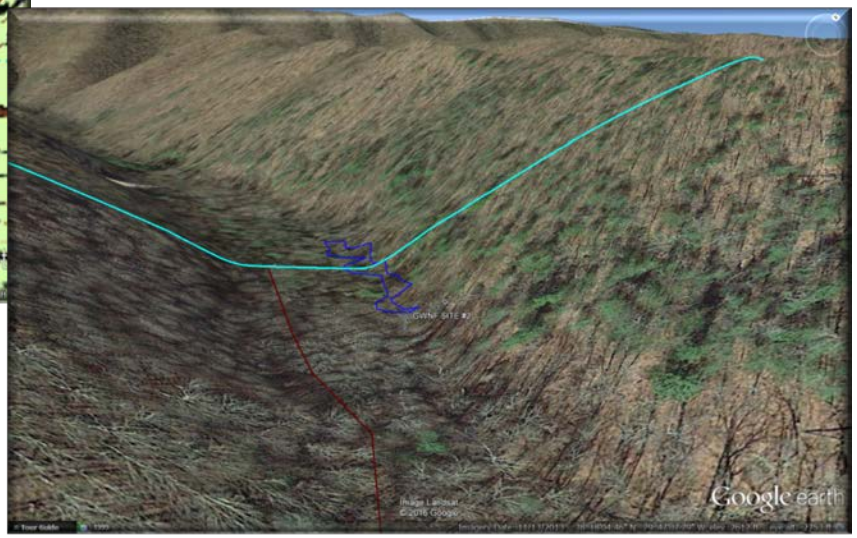
Site Specific Stabilization – cont.

- Review site specific design (handouts)
  - Plan and Profile
  - Sections
  - BIC Incremental Controls

Site Specific Stabilization – cont.



GWNF #2



From MP 84.9 to MP 85.0, the alignment ascends an extremely steep slope inclined at 46 degrees (105%) which shallows to 31 degrees (60%).

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Site Specific Stabilization – cont.

- Review site specific design (handouts)
  - Plan and Profile
  - Sections
  - BIC Incremental Controls

Geohazard Program

- Background
  - Phase 1:
    - Identify, categorize, and analyze existing slope instability hazards that may affect pipeline.
    - Identify areas for more detailed Phase 2 evaluation.
    - Preliminary desktop review of potential slope instabilities using available maps, limited LiDAR, etc.
    - Phase 1 work on Route Rev 8a completed December 2015 and report submitted.
    - Additional Phase 1 work done on Rev 11 Reroutes.

Geohazard Program

- Phase 2:
  - Refine and further characterize moderate and high hazard sites identified in Phase 1.
  - Slope inclination evaluation for slopes >30 percent.
  - Additional desktop review of available detailed data (e.g., new LiDAR), and ground reconnaissance (recon).
  - Identification of slope construction scenarios (BIC process) and slopes requiring site specific designs.
  - Preliminary Phase 2 report delivered August 2016.
  - Begin geotechnical investigation of identified features (drilling program for two sites on Supply Header TL-635).
  - Additional work pending as slope locations are accessible.
- Site specific designs to be prepared for 20+ sites.

Geohazard Program

- Order 1 Soil Survey
  - Survey Complete; 376 Test Pits - October 11, 2016
  - Order 1 Report (excluding 1.2 miles of GWNF) – August 1, 2016
  - Order 1 Addendum (1.2 mile section of GWNF) – November 11, 2016
  - Updated Order 1 Report – In Progress

Geohazard Program

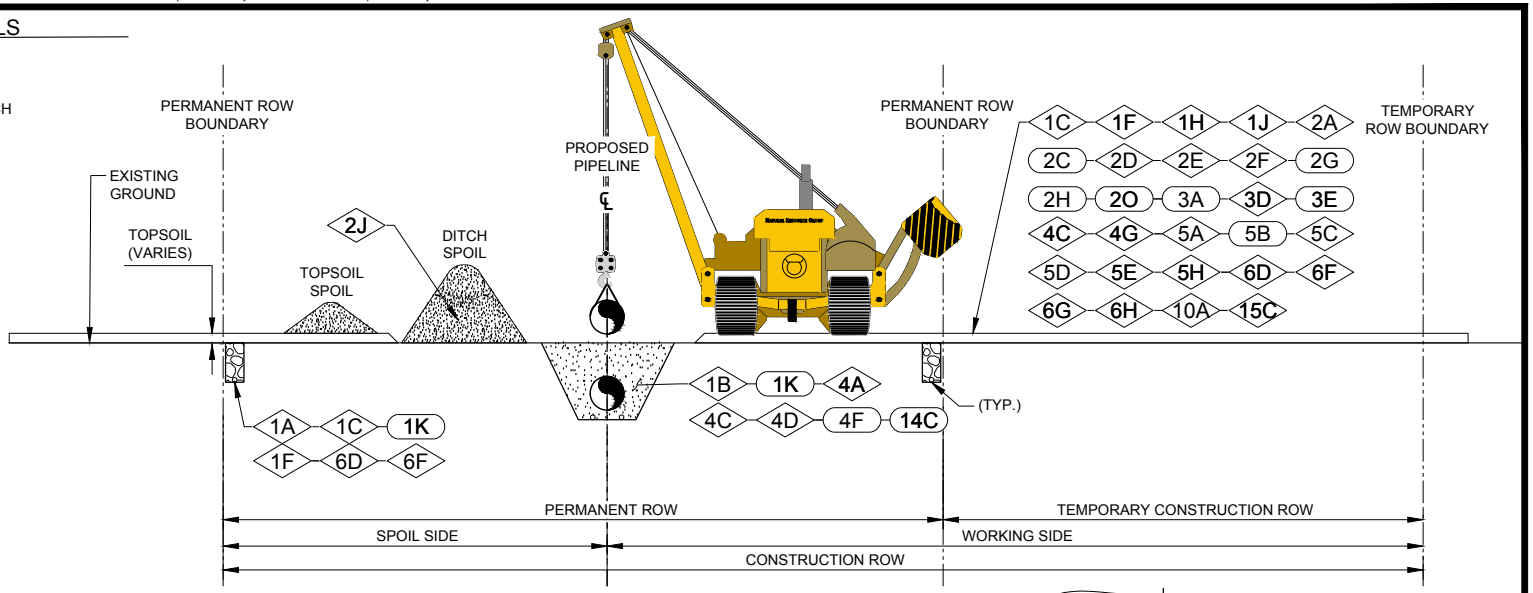
- Review / Clarify comments
- Geohazard Phase 1 & 2 Reports
- Order 1 Soil Survey Report
  - Geophysical Survey to Address Bedrock Depth in 126 Pits;
  - Add Photo Documentation
  - Add pH and Nutrient Data to Metadata
  - Address USFS Phrasing and Content Comments

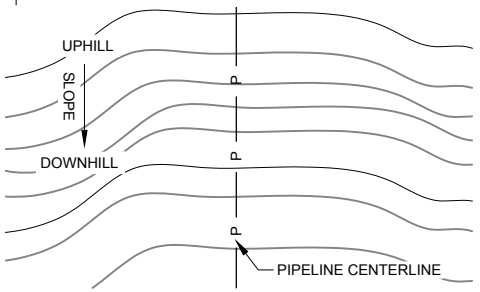
Next Steps

- Review Action Items
- Schedule next meeting(s)
- Question / Comments

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1A FRENCH DRAIN (SIMPLE)
- 1B ENHANCED DRAIN (GERMAN DRAIN), IN PIPELINE TRENCH
- 1C TARGETED SEEP DRAINS, AT INTERSEPTED SEEPS
- 1F ARMORED CHANNEL WITH DRAIN PIPE
- 1H STEEP CONVEYANCE CHANNEL
- 1I CHANGED SEEP CHARACTERISTICS
- 1K ENERGY DISSIPATION BASIN
- 2A GRADING TEMPORARY ROW SURFACE
- 2C COMPACT BACKFILL
- 2D DRY SOILS AND BACKFILL
- 2E REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL
- 2F ROCK BACKFILL (WITH DRAIN)
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2J SPOILS MANAGEMENT
- 2O BENCH AND REGRADE WITH BACKFILL
- 3A TRACK DISTURBED SLOPES
- 3D ROCK ARMORING ON DISTURBED SLOPES
- 3E COIR LOGS ON DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 4G SACK-CRETE ARMOR WITH BREAKERS
- 4H FLOWABLE FILL FOR TRENCH BACKFILL
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 5G NO WOOD CHIPS IN ROW
- 5H SURFACE WATER DIVERSIONS
- 6D ARMORED CHANNEL
- 6F RIPRAP GRADATIONS
- 6G ARMORED V-SHAPED AND U-SHAPED CHANNELS
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS
- 14C BLASTING PLAN(S)
- 15C ACCESS TO REMOTE ROW LOCATIONS





PLANAR SLOPE ORIENTATION (N.T.S.)

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. EXAMPLE SECTION SHOWS A TYPICAL SCENARIO. ACTUAL CUT/FILL CONDITIONS MAY VARY FOR EACH SITE.

LEGEND

- XX SCHEDULE A
- XX SCHEDULE B

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	2016-11-10	WORKING - DRAFT	DBC	THR	AGM	AQK

NOTES

DRAFT

PROJECT

BIC STEEP SLOPE
HAZARD MITIGATION PROGRAM

TITLE

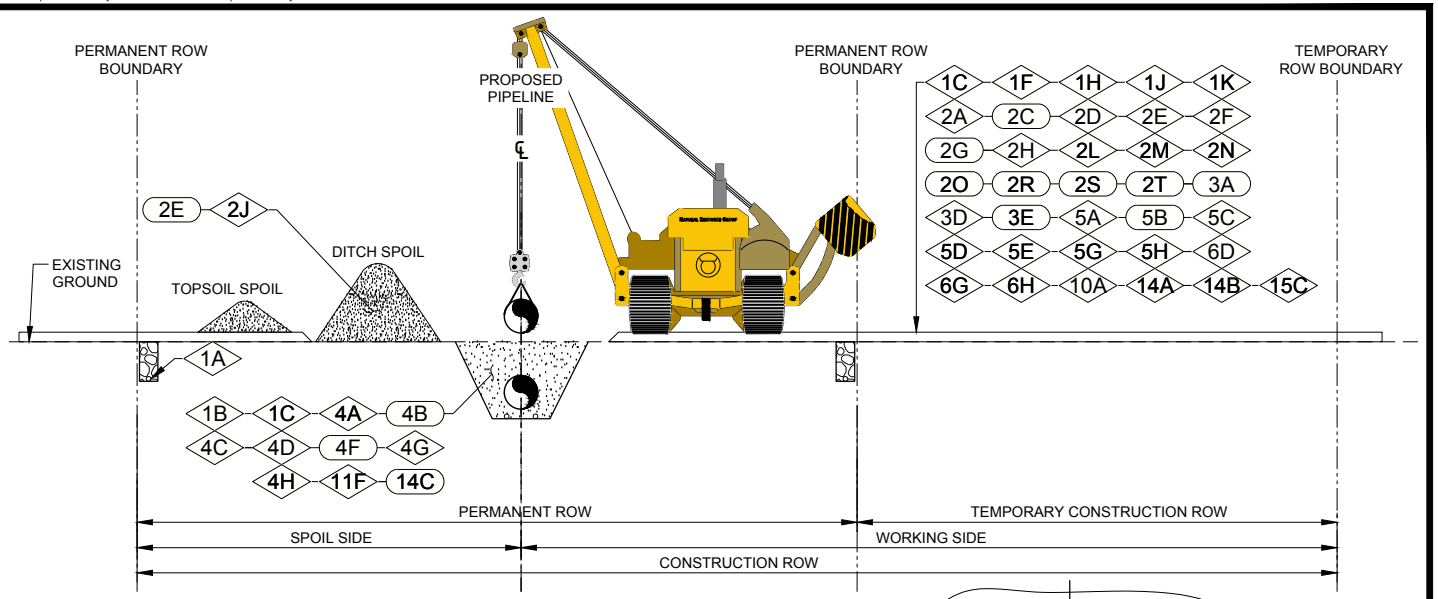
A1 – STEEP SLOPES WITHOUT EVIDENCE OF PREVIOUS MOVEMENT (PLANAR SLOPE)

Atlantic Coast Pipeline

PROJECT No.		1535050	FILE No.	TypScenarios1
DESIGN	DBC	2016-11-10	SCALE	AS SHOWN
CADD	THR	2016-11-10	FIGURE	
CHECK	AQK	2016-11-10		1 OF 2
REVIEW	AQK	2016-11-10		

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1A FRENCH DRAIN (SIMPLE)
- 1B ENHANCED DRAIN (GERMAN DRAIN)
- 1C TARGETED SEEP DRAINS
- 1F ARMORED CHANNEL WITH DRAIN PIPE
- 1H STEEP CONVEYANCE CHANNEL
- 1J SINGLE TARGETED SEEP COLLECTOR
- 1K ENERGY DISSIPATION BASIN
- 2A GRADING TEMPORARY ROW SURFACE
- 2C COMPACT BACKFILL
- 2D DRY SOILS AND BACKFILL
- 2E REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL
- 2F ROCK BACKFILL (WITH DRAIN)
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2H GRADING TO MINIMIZE BACKFILL
- 2J SPOILS MANAGEMENT
- 2L SOIL-NAIL WITH TECCO MESH
- 2L SOIL-NAIL WITH TECCO MESH
- 2M EXTERNALLY STABILIZED RETAINING WALL SYSTEMS
- 2N GEOTEXTILE REINFORCED SYSTEMS
- 2O BENCH AND REGRADE WITH BACKFILL
- 2R TYP SECTION VIEW FILL WITH ROCK UNDER DRAIN
- 2S TYP PLAN VIEW FILL WITH ROCK UNDER DRAIN
- 2T TYP FILL WITH MULTIPLE ROCK CHANNELS
- 3A TRACK DISTURBED SLOPES
- 3D ROCK ARMORING ON DISTURBED SLOPES
- 3E COIR LOGS ON DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4B TRENCH DAMS (FOAM BAGS OR FINE GRAINED SOILS)
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 4G SACK-CRETE ARMOR WITH BREAKERS
- 4H FLOWABLE FILL FOR TRENCH BACKFILL
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS (OLD ROADS)
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 5G NO WOOD CHIPS IN ROW



BEST IN CLASS (BIC) INCREMENTAL CONTROLS

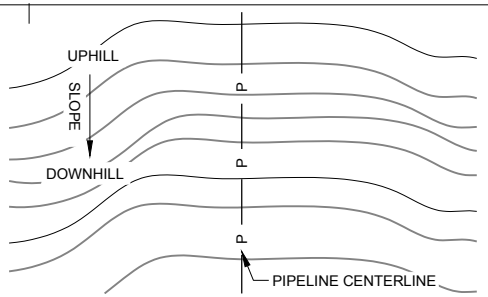
- 5H SURFACE WATER DIVERSIONS
- 6D ARMORED CHANNEL
- 6G ARMORED V-SHAPED AND U-SHAPED CHANNELS
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS
- 14A SITE SPECIFIC DETAILED ENGINEERING
- 14B MESH ROCK FALL PROTECTION
- 14C BLASTING PLAN(S)
- 15C ACCESS TO REMOTE ROW LOCATIONS

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. EXAMPLE SECTION SHOWS A TYPICAL SCENARIO. ACTUAL CUT/FILL CONDITIONS MAY VARY FOR EACH SITE.

LEGEND

- XX SCHEDULE A
- XX SCHEDULE B



PLANAR SLOPE ORIENTATION (N.T.S.)

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	2016-11-10	WORKING - DRAFT	DBC	THR	AGM	AQK

NOTES

DRAFT

PROJECT

BIC STEEP SLOPE
HAZARD MITIGATION PROGRAM

TITLE

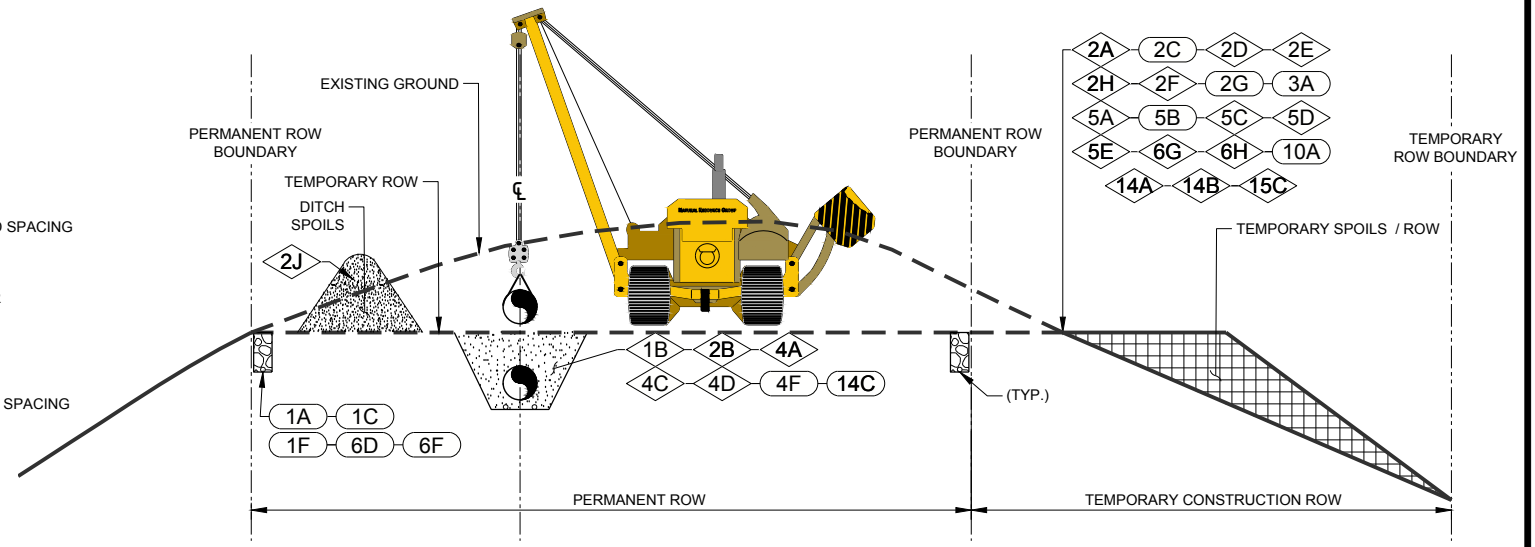
C1 – STEEP SLOPES WITH INCREASED POTENTIAL FOR INSTABILITY WHEN DISTURBED (PLANAR SLOPE)

Atlantic Coast Pipeline

PROJECT No.		1535050	FILE No.	TypScenarios2
DESIGN	DBC	2016-11-10	SCALE	AS SHOWN
CADD	THR	2016-11-10	FIGURE	1 OF 2
CHECK	AQK	2016-11-10		
REVIEW	AQK	2016-11-10		

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1B ENHANCED DRAIN (GERMAN DRAIN)
- 2A GRADING TEMPORARY ROW SURFACE
- 2B GRADING TRENCH WITH OUTBOARD WEDGE
- 2C COMPACT BACKFILL
- 2D DRY SOILS AND BACKFILL
- 2E REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL
- 2F ROCK BACKFILL (WITH DRAIN)
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2H GRADING TO MINIMIZE BACKFILL
- 2J SPOILS MANAGEMENT
- 3A TRACK DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 4H FLOWABLE FILL FOR TRENCH BACKFILL
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 5G NO WOOD CHIPS IN ROW
- 6G ARMORED V-SHAPED AND U-SHAPED CHANNELS
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS
- 14A SITE SPECIFIC DETAILED ENGINEERING
- 14B MESH ROCK FALL PROTECTION
- 14C BLASTING PLAN(S)
- 15C ACCESS TO REMOTE ROW LOCATIONS



NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. SCENARIO SHOWN WHERE RIDGE TOP IS GENERALLY CENTERED, BUT MAY VARY WITH CUT/FILL TO ONE SIDE OR THE OTHER.

LEGEND

- XX SCHEDULE A
- XX SCHEDULE B

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
1	2016-11-10	WORKING - DRAFT	DBC	THR	AGM	AQK

NOTES

DRAFT

PROJECT

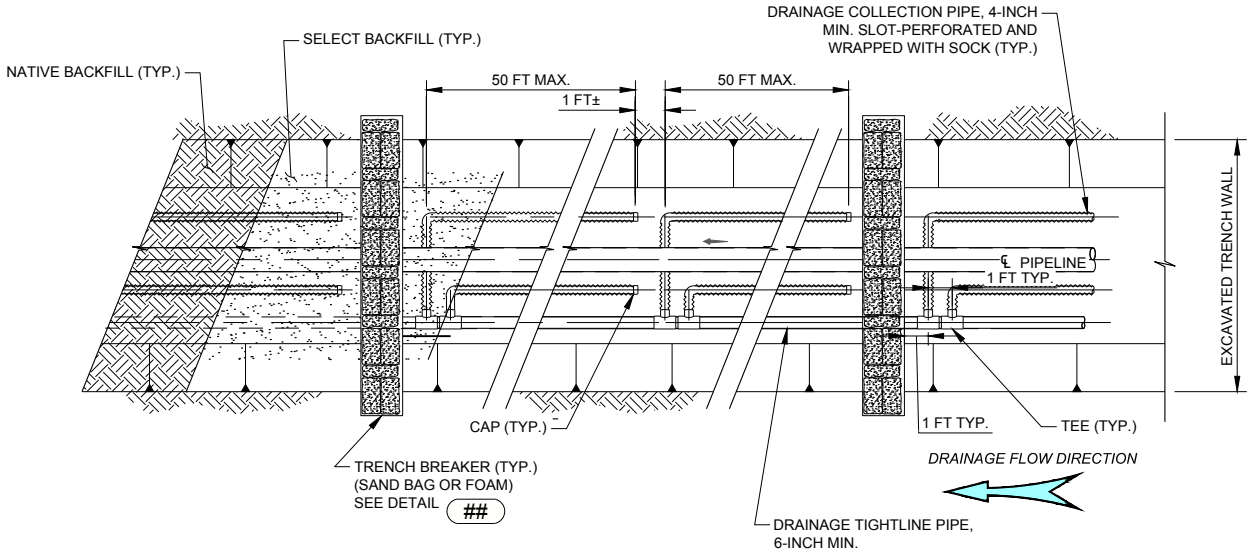
BIC STEEP SLOPE
HAZARD MITIGATION PROGRAM

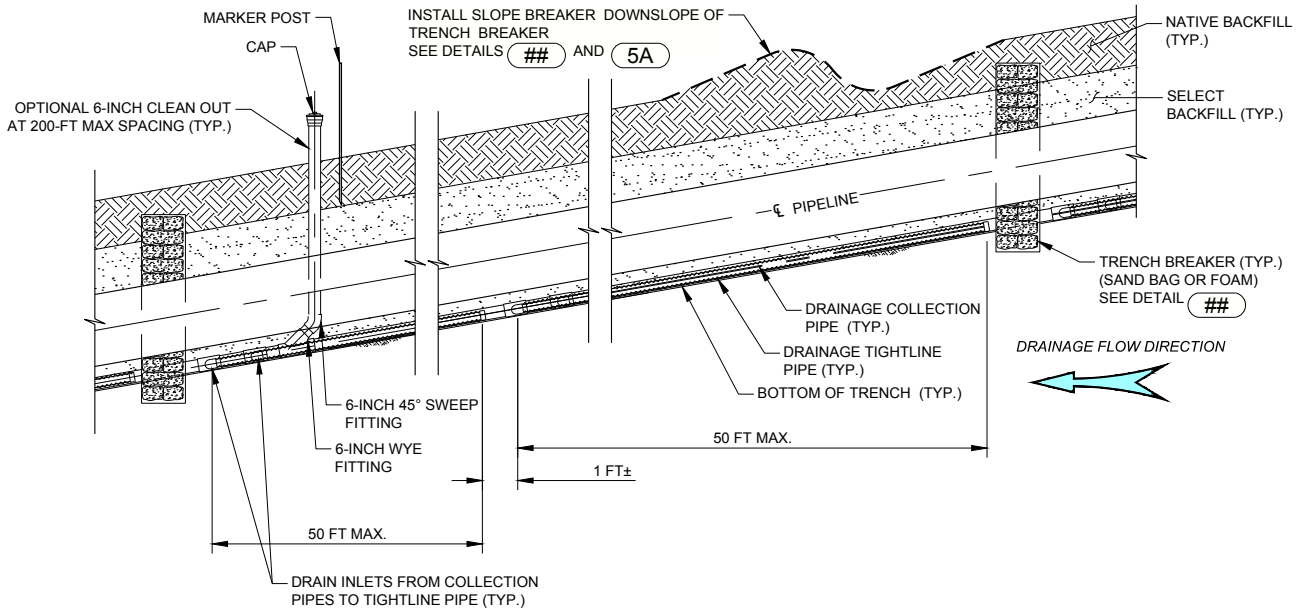
TITLE

D - STEEP SLOPES NEAR NARROW RIDGE TOPS

Atlantic Coast Pipeline

PROJECT No.		1535050	FILE No.	TypScenarios1	
DESIGN	DBC	2016-11-10	SCALE	AS SHOWN	
CADD	THR	2016-11-10	FIGURE		
CHECK	AQK	2016-11-10	1 OF 1		
REVIEW	AQK	2016-11-10			





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CLIENT
DOMINION

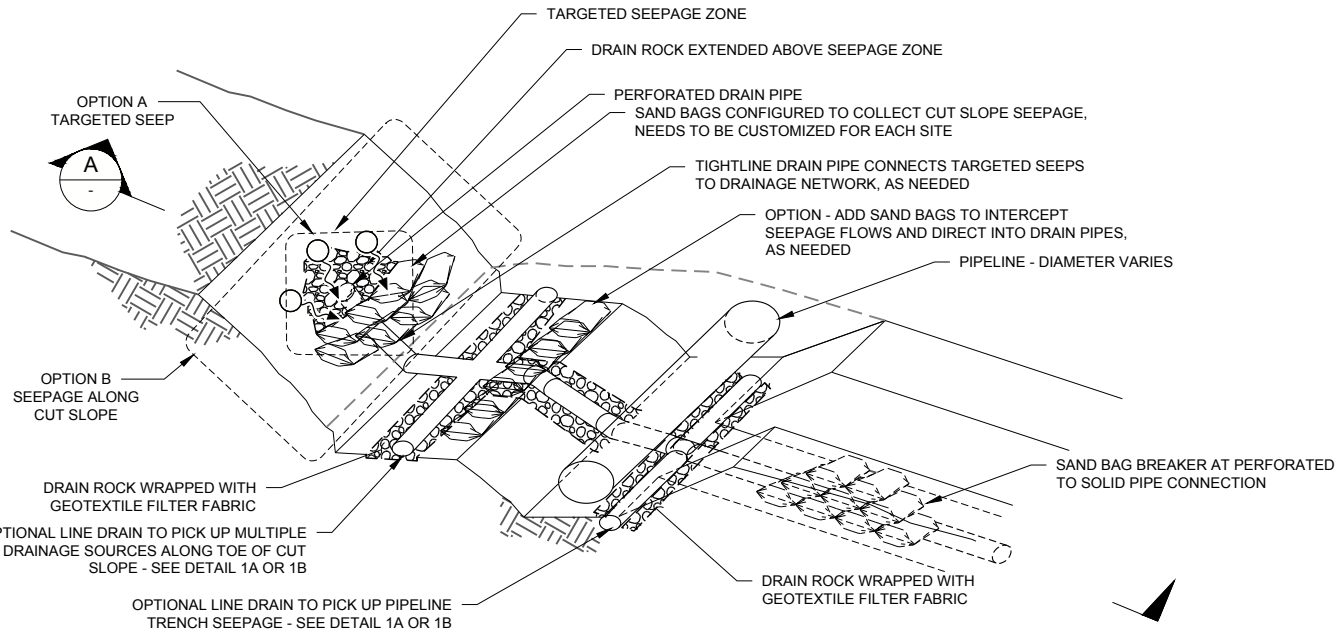
PROJECT
BIC/INCREMENTAL CONTROLS

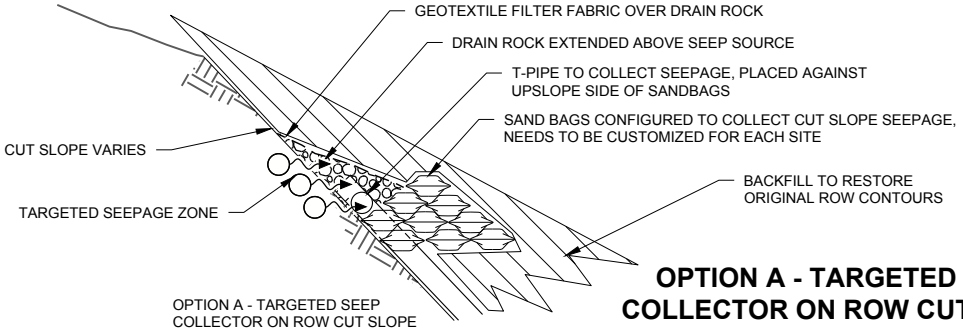
CONSULTANT
Golder Associates

YYYY-MM-DD	2014-02-06
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

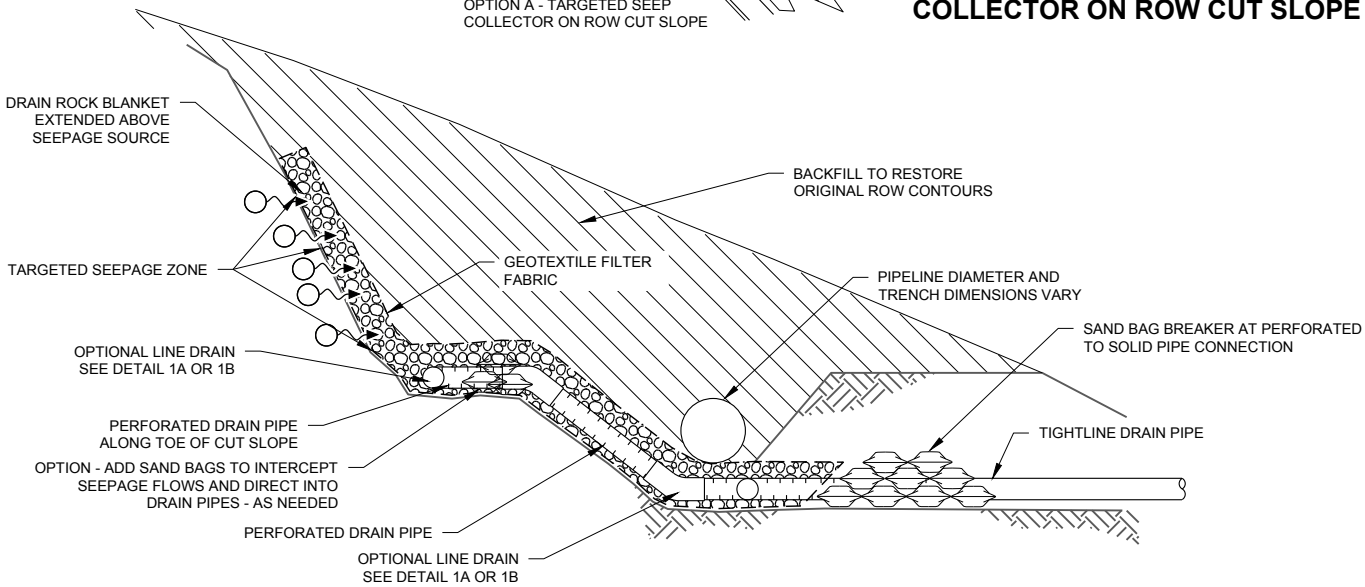
TITLE
ENHANCED DRAIN (GERMAN DRAIN)

PROJECT No. 1535050 | Rev. D | SHEET 1B





OPTION A - TARGETED SEEP COLLECTOR ON ROW CUT SLOPE



OPTION B - TARGETED SEEP COLLECTOR ON ROW CUT SLOPE

A
-

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
TARGETED SEEP DRAINS

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	1C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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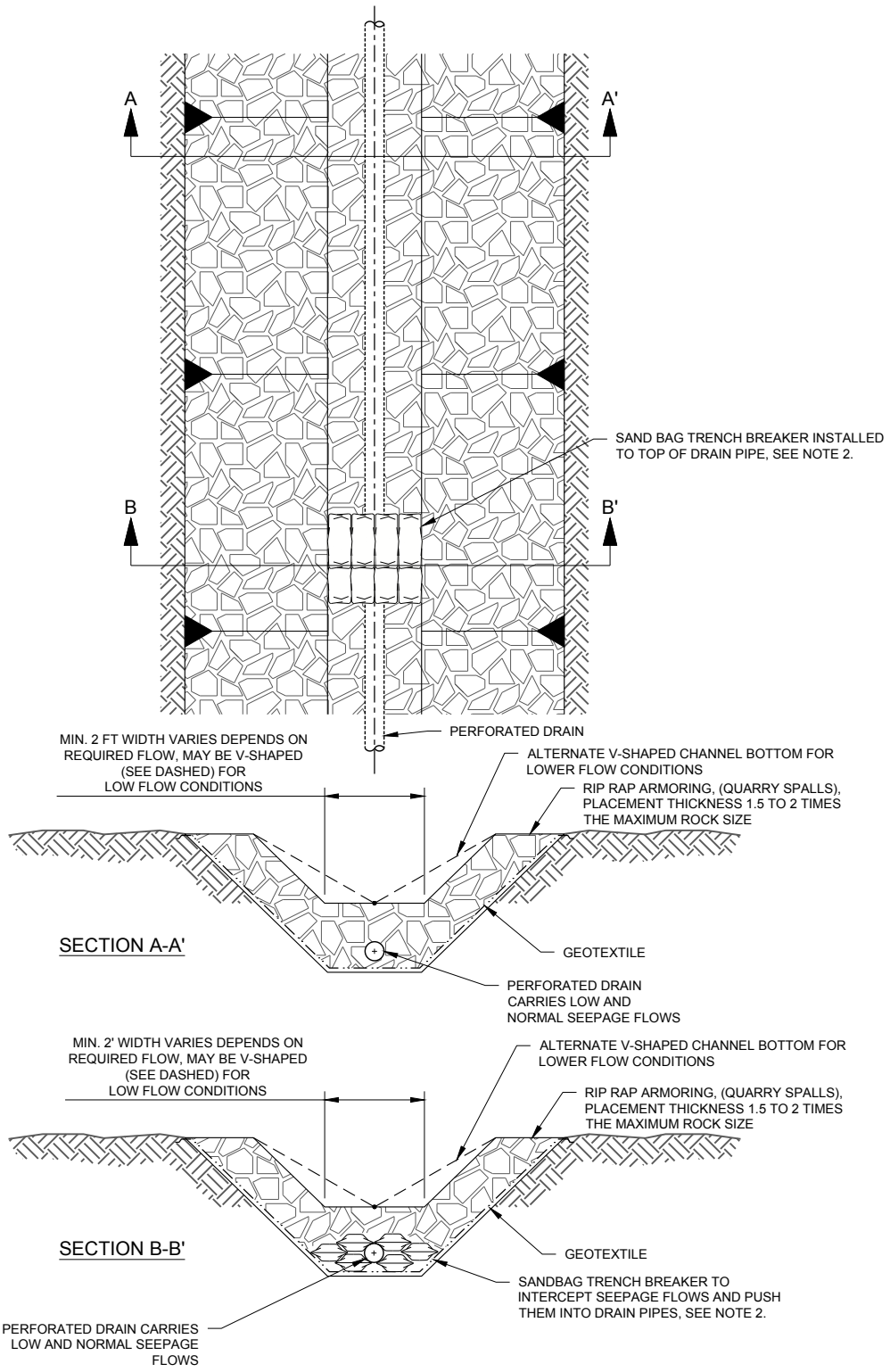

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. 100-FT MAX SPACING FOR BREAKERS.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

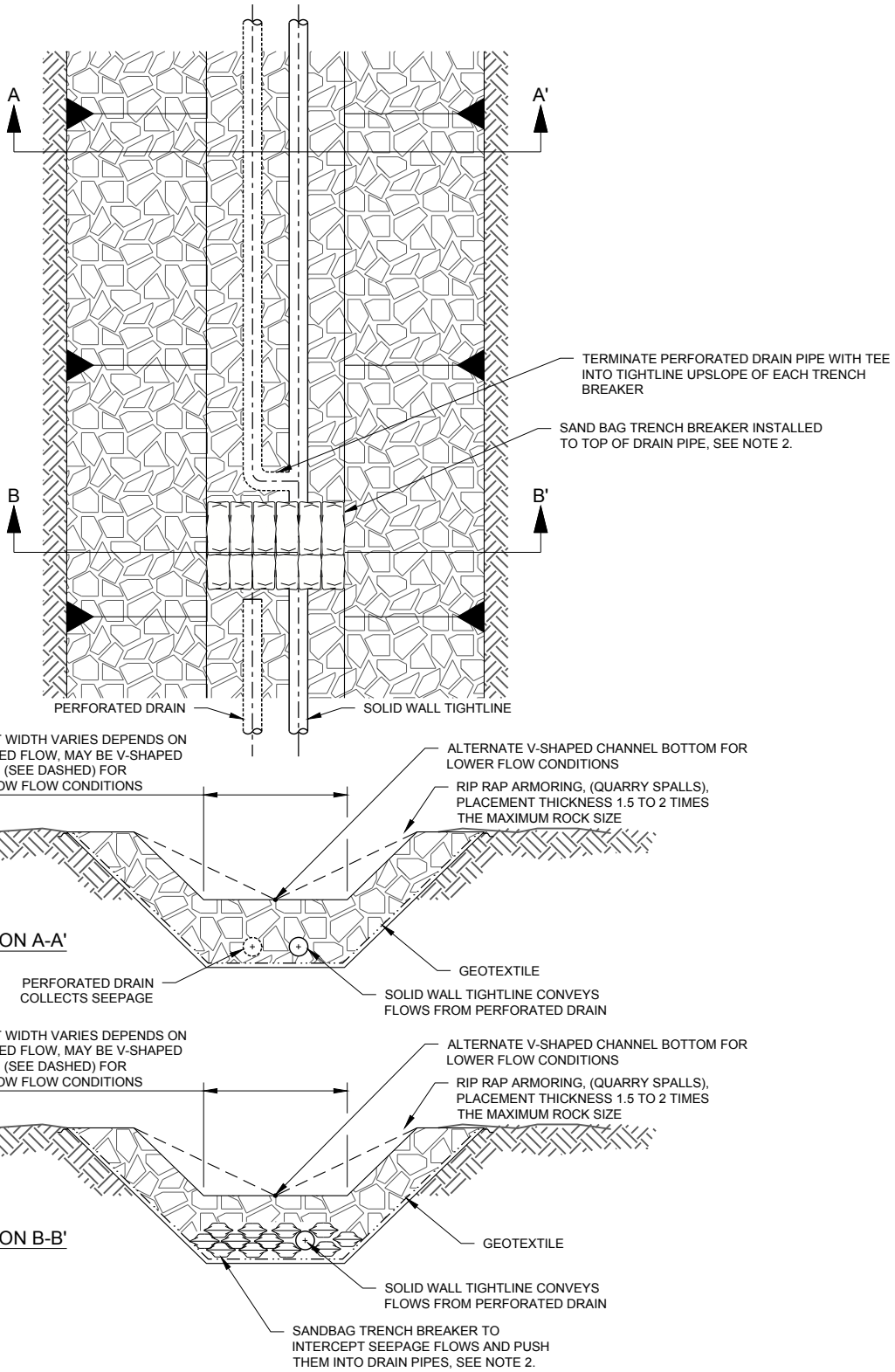
CONSULTANT

Golder Associates

YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
ARMORED CHANNEL WITH DRAIN PIPE

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	1F



NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. 100-FT MAX SPACING FOR BREAKERS.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-05-30
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
STEEP CONVEYANCE CHANNEL

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	1H

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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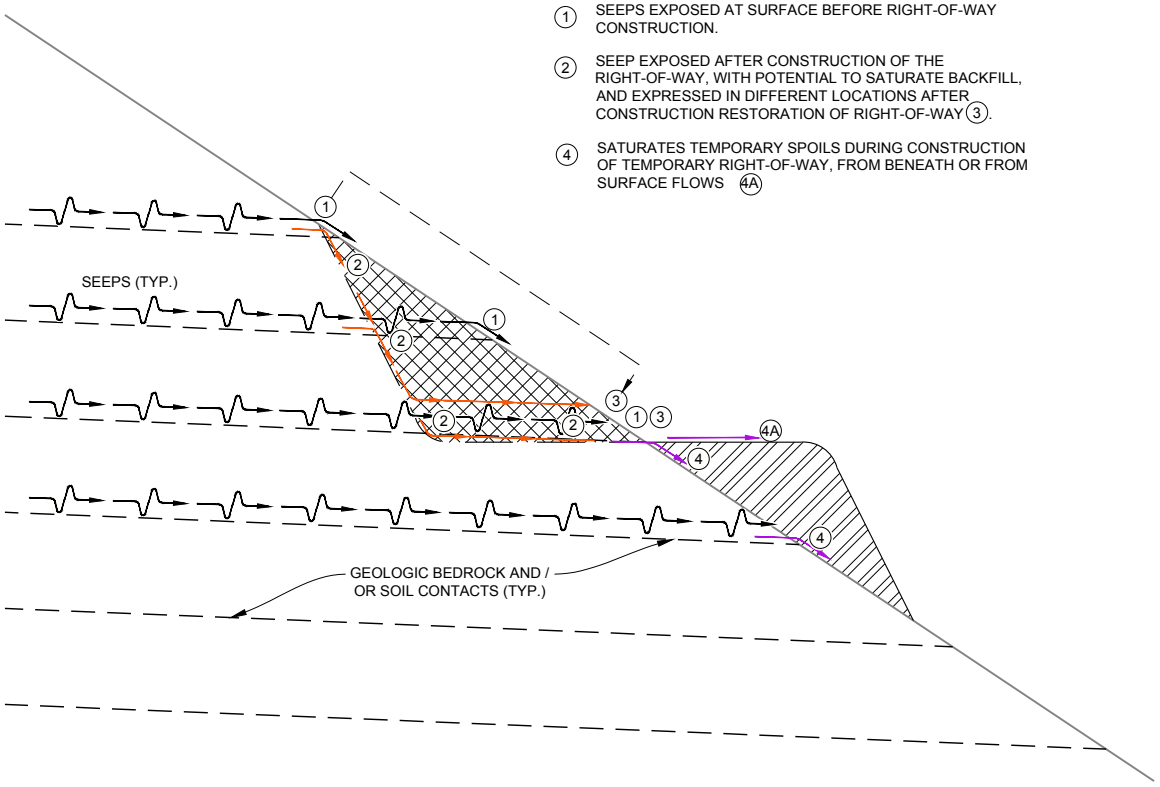
KEY

1. SEEPS EXPOSED AT SURFACE BEFORE RIGHT-OF-WAY CONSTRUCTION.
2. SEEP EXPOSED AFTER CONSTRUCTION OF THE RIGHT-OF-WAY, WITH POTENTIAL TO SATURATE BACKFILL, AND EXPRESSED IN DIFFERENT LOCATIONS AFTER CONSTRUCTION RESTORATION OF RIGHT-OF-WAY (3).
4. SATURATES TEMPORARY SPOILS DURING CONSTRUCTION OF TEMPORARY RIGHT-OF-WAY, FROM BENEATH OR FROM SURFACE FLOWS (4A)



NOTES

1. INSTALL PERMANENT AND / OR TEMPORARY SEEP COLLECTORS AT THE LOWEST OR DEEPEST CUT INTO NATIVE GROUND, AND AT CONTACTS AND TRANSITIONS BETWEEN BEDROCK OR SOIL UNITS (SEE (2)).
2. INSTALL TEMPORARY SEEP COLLECTORS TO PROTECT AGAINST SATURATION OF SPOILS (SEE (4)).
3. SEEP COLLECTORS SHOULD NOT BE LOCATED AT BACKFILL FACE AFTER RIGHT-OF-WAY RESTORATION (SEE (1)), UNLESS THAT IS THE LOWEST OR DEEPEST LOCATION OF DISTRIBUTION IN THE FINAL RIGHT-OF-WAY RESTORATION (SEE (5)).
4. ADDITIONAL MITIGATION MEASURES MAY BE NEEDED TO ADDRESS SATURATED BACKFILL AND / OR SPOILS, BASED ON SITE SPECIFIC CONDITIONS.

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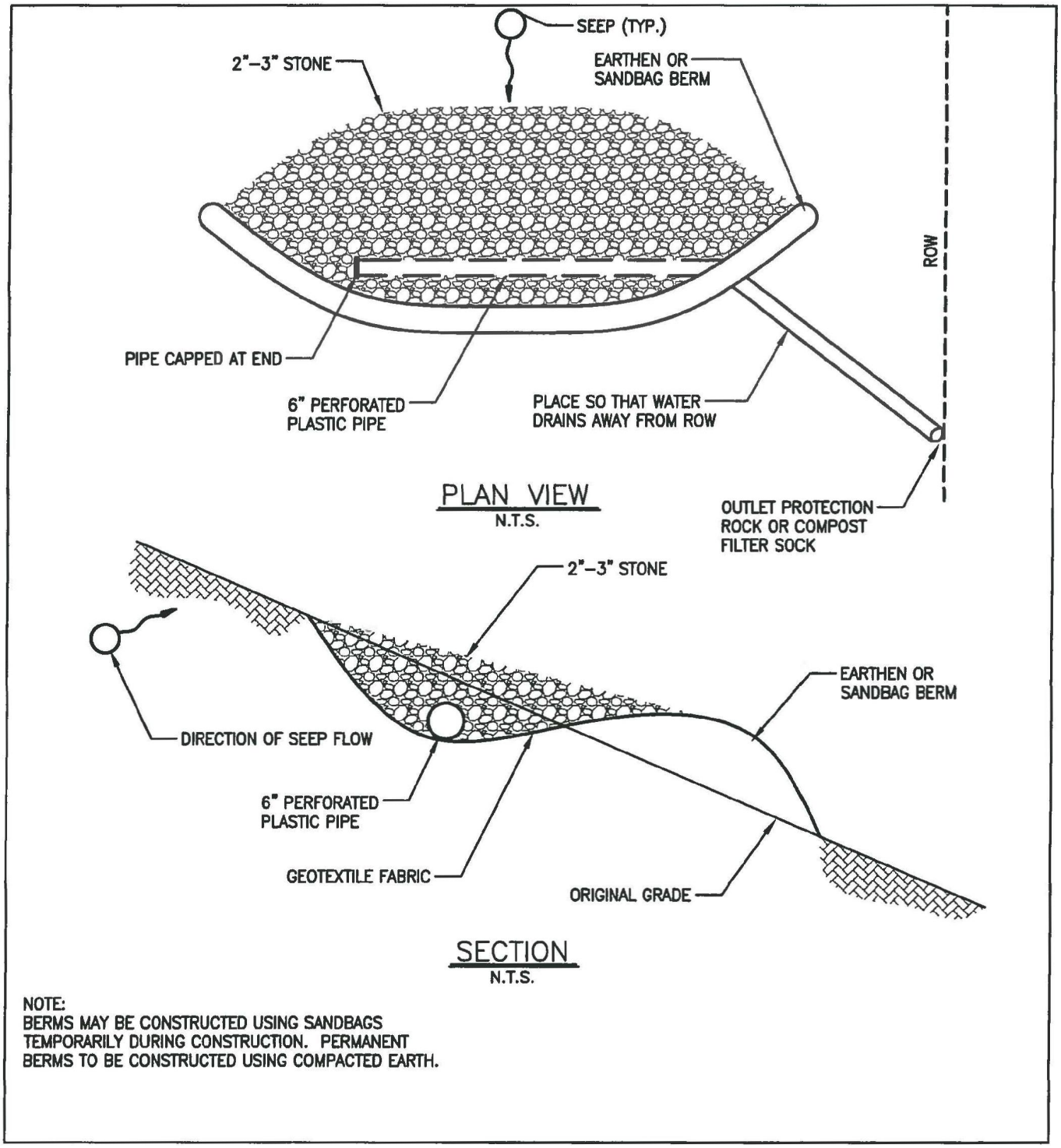
PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-06-25
PREPARED	VMR
DESIGN	VMR
REVIEW	AGM
APPROVED	AQK

TITLE
CHANGED SEEP CHARACTERISTICS

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	11



NOTE:
BERMS MAY BE CONSTRUCTED USING SANDBAGS TEMPORARILY DURING CONSTRUCTION. PERMANENT BERMS TO BE CONSTRUCTED USING COMPACTED EARTH.

REFERENCE(S)

SLOPE STABILITY POLICY AND PROCEEDURE FOR PIPELINE DESIGN, CONSTRUCTION AND RIGHT OF WAY MAINTENANCE, DOMINION TRANSMISSION, INC., ENGINEERING SERVICES REFERENCE MANUAL (SEPTEMBER 28, 2016)

DRAFT

CLIENT
DOMINION

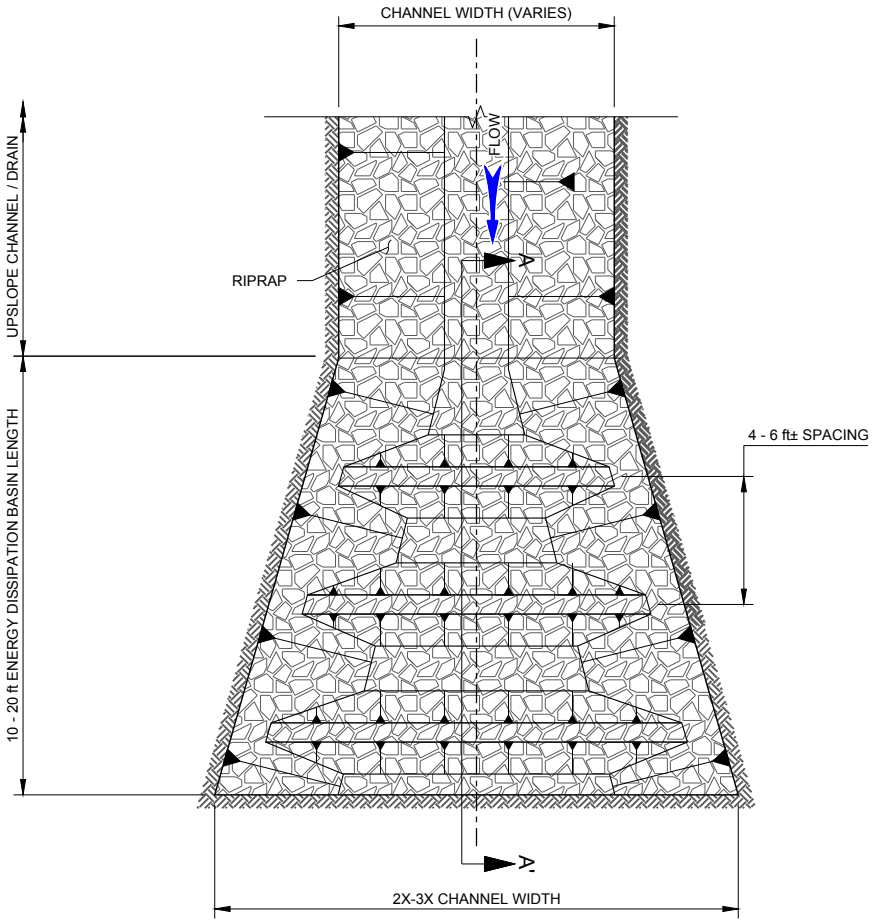
PROJECT
BIC/INCREMENTAL CONTROLS

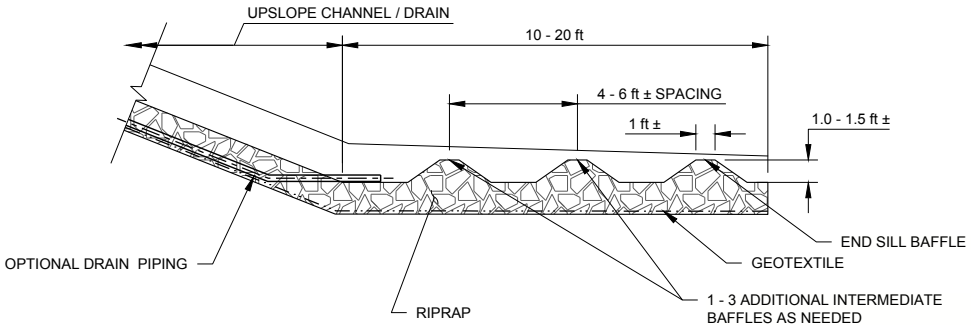
CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SINGLE TARGETED SEEP COLLECTOR

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	1J





NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. ENERGY DISSIPATION BASIN SHOULD BE CONSTRUCTED AT THE DOWNSTREAM END OF CHANNELS AND DRAINS WHERE HIGH WATER VELOCITY MAY BE EXPECTED AND/OR DEBRIS MAY TRAVEL DOWN THE CHANNEL.
3. INTERMEDIATE BAFFLES SHOULD BE CONSTRUCTED AS NEEDED TO INTERCEPT DEBRIS FROM THE CHANNEL AND BELOW STEEP CHANNELS.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-01-16
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

TITLE
ENERGY DISSIPATION BASIN

PROJECT No. 1535050 | Control | Rev. D | FIGURE 1K

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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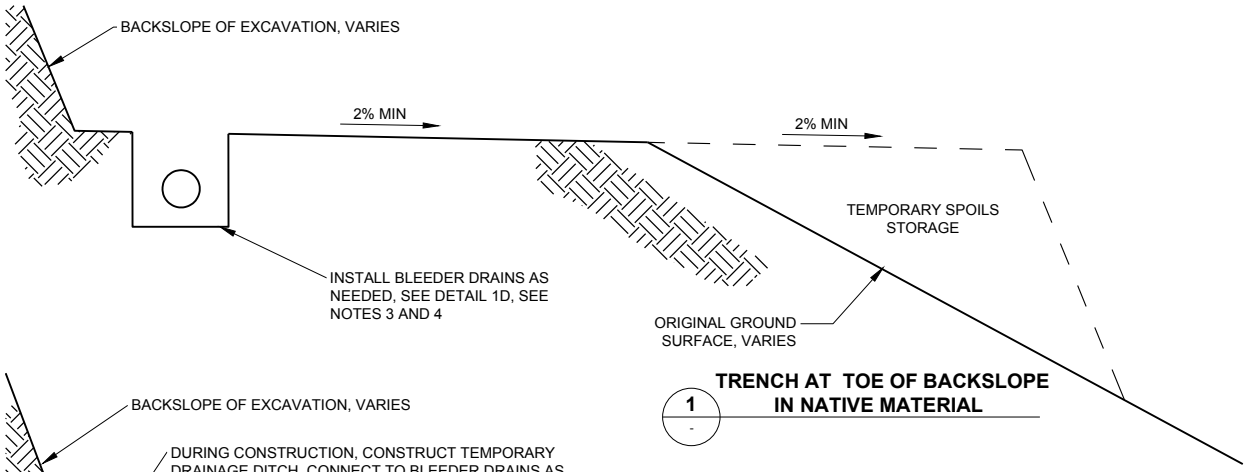
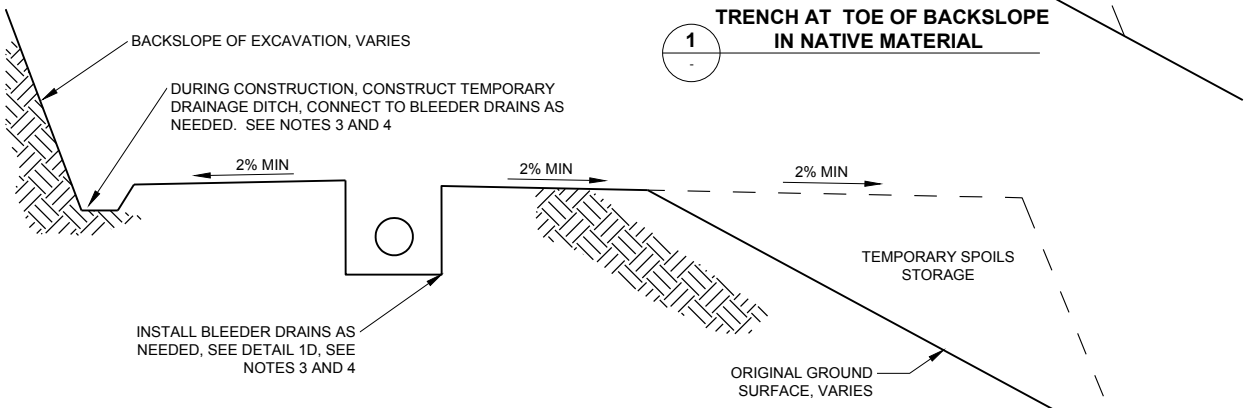
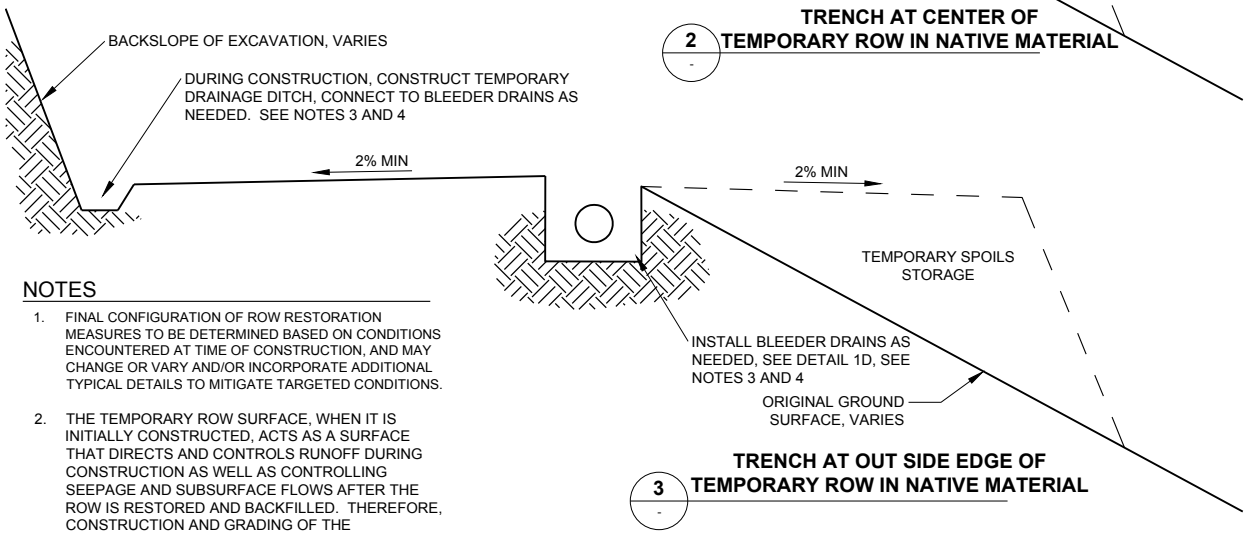


1 - TRENCH AT TOE OF BACKSLOPE IN NATIVE MATERIAL



2 - TRENCH AT CENTER OF TEMPORARY ROW IN NATIVE MATERIAL



3 - TRENCH AT OUT SIDE EDGE OF TEMPORARY ROW IN NATIVE MATERIAL

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. THE TEMPORARY ROW SURFACE, WHEN IT IS INITIALLY CONSTRUCTED, ACTS AS A SURFACE THAT DIRECTS AND CONTROLS RUNOFF DURING CONSTRUCTION AS WELL AS CONTROLLING SEEPAGE AND SUBSURFACE FLOWS AFTER THE ROW IS RESTORED AND BACKFILLED. THEREFORE, CONSTRUCTION AND GRADING OF THE TEMPORARY ROW SURFACE SHOULD BE COMPLETED TO SO AS TO MAINTAIN POSITIVE DRAINAGE (I.E. APPROXIMATELY 2% SLOPE) AWAY FROM THE PIPELINE TRENCH, AND TO OUTBOARD SIDES OF THE ROW THAT DISCHARGE ONTO NATURAL SLOPES DIRECTED AWAY FROM THE ROW, SO THAT RUNOFF ON THE TEMPORARY ROW SURFACE DOES NOT ACCUMULATE OR POND.
3. FOR TEMPORARY CONSTRUCTION WORK PERIOD, WHERE THE TEMPORARY ROW SURFACE MUST SLOPE TO AN INSIDE AREA, WHERE ACCUMULATED RUNOFF CAN POND, THEN DRAINAGE MEASURES SHOULD BE IMPLEMENTED THAT COLLECT AND EVACUATE THE PONDED WATER DURING TEMPORARY CONSTRUCTION PERIODS AND FOR PERMANENT RESTORATION.
4. FOR PERMANENT RESTORATION, CONVERT TEMPORARY DRAINAGE DITCH TO FRENCH DRAINS AND/OR TARGETED SEEP COLLECTORS, AS NEEDED. SEE DETAILS 1A, 1C, 1D AND 1E.

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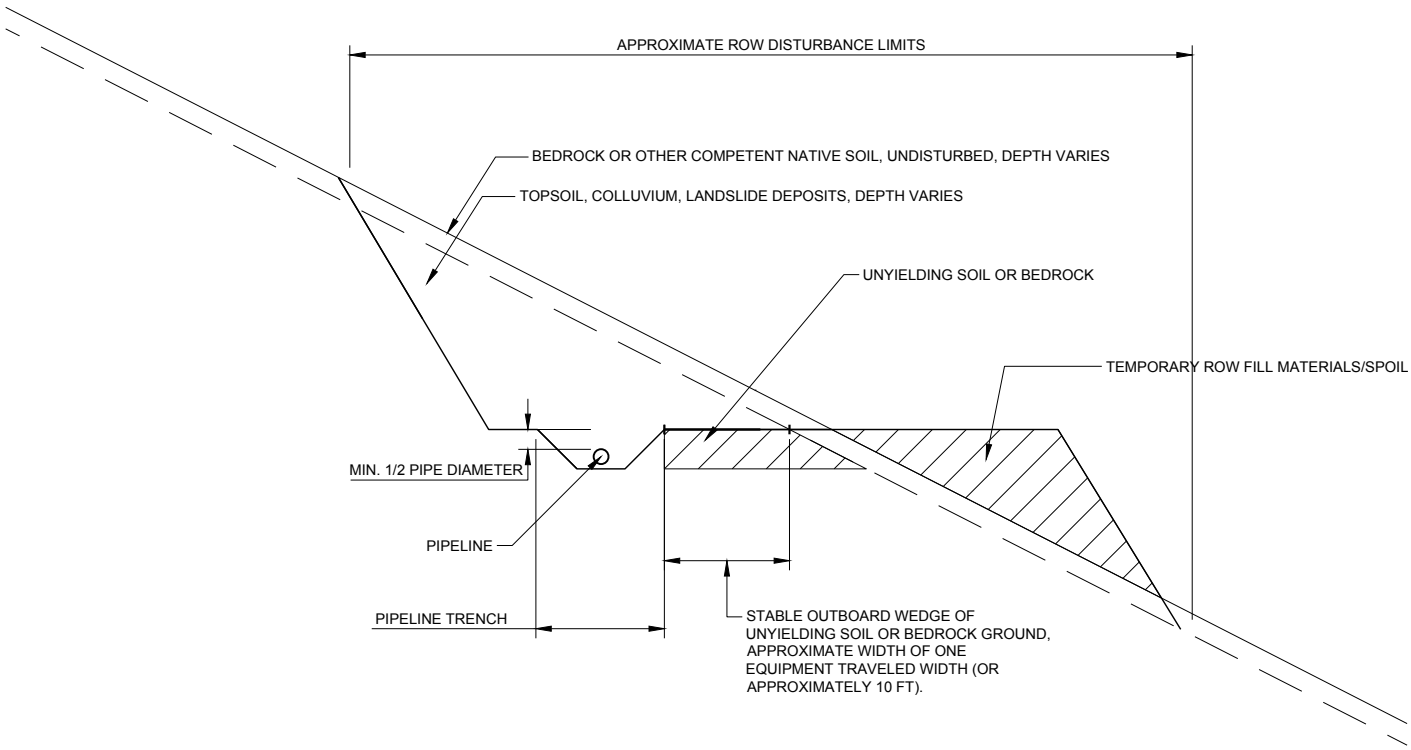
PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
GRADING TEMPORARY ROW SURFACE

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	2A



NOTE

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

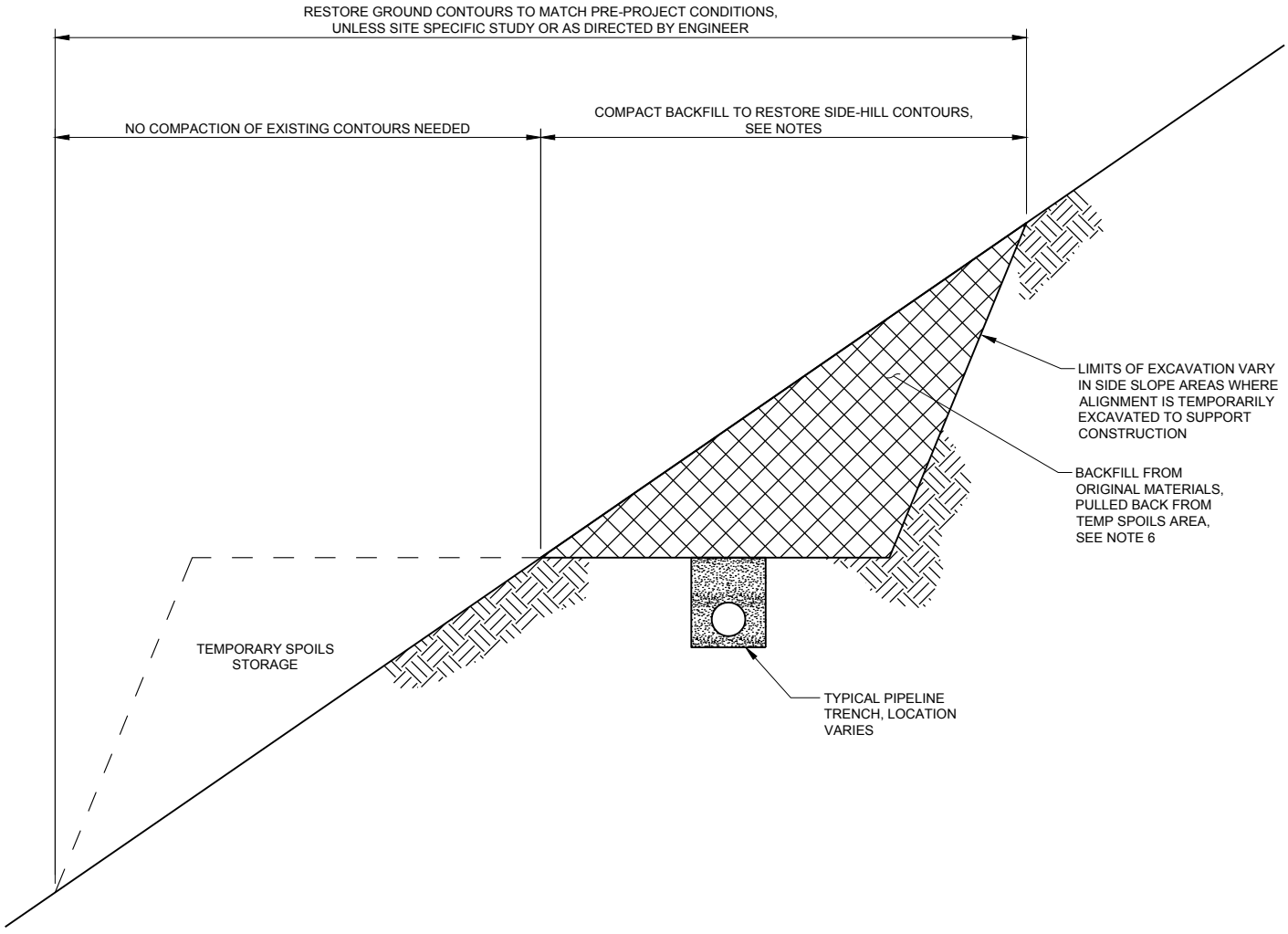
CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
GRADING TRENCH WITH STABLE OUTBOARD WEDGE

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2B



NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. RECOMMEND COMPACTING SIDE SLOPE AREAS USING “SHEEP’S FOOT” COMPACTION EQUIPMENT IN HORIZONTAL LAYERS.
3. BACKFILL MATERIALS SHOULD BE AT OR NEAR OPTIMUM MOISTURE CONTENT (DRYING SOILS OR ADDING WATER AS NECESSARY), VISUALLY DETERMINED BY A COMPETENT ON-SITE REPRESENTATIVE. SEE TYPICAL DETAIL 2D FOR DRYING BACKFILL.
4. SOILS COMPACTION SHOULD BE COMPLETED IN LIFTS SUCH THAT BACKFILL MATERIALS ARE STABLE, SHED WATER AND DO NOT EASILY BECOME SATURATED, AND ARE AT APPROXIMATELY THE MAXIMUM DRY DENSITY, VISUALLY DETERMINED BY A COMPETENT ON-SITE REPRESENTATIVE.
5. ADDITIONAL COMPACTION REQUIREMENTS MAY APPLY AT ROAD CROSSINGS, AREAS IDENTIFIED BY THE ENGINEER, OR AT OTHER LOCATIONS AS MAY BE REQUIRED BY LAWS AND REGULATIONS. SEE TYPICAL DETAIL 2I FOR COMPACTION REQUIREMENTS ACROSS ROADS.
6. BACKFILL CONFIGURATION MAY VARY TO FIT SITE CONDITIONS, AND MAY BE USED IN OTHER ROW CROSS-SECTION BACKFILL GEOMETRIES, AS DIRECTED BY ENGINEER.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
COMPACT BACKFILL

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2C

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

2. SATURATED ON-SITE SOILS MAY NEED TO BE DRIED BEFORE RE-USE AND PLACEMENT AS BACKFILL. DRYING MAY INCLUDE WIND-ROWING AND TURNING OVER IN FURROWS TO ALLOW FOR AIR EXCHANGE AND EVAPORATION TO DRY THE MATERIALS, OR ADDITION OF ADD-MIXTURES TO DRY THE SOILS.

3. THE USE OF ADD-MIXTURES TO SATURATED SOILS SHOULD BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO USE.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
DRY SOILS AND BACKFILL

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2D

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

2. WHERE THE PLACEMENT OF SPOILS ON THE SITE MAY INITIATE OR EXACERBATE LANDSLIDES OR RESULT IN SLOPE INSTABILITY, THE MATERIALS SHOULD BE REMOVED FROM THE SITE AND SPOILED AT A SAFE AND OFF-SITE LOCATION.

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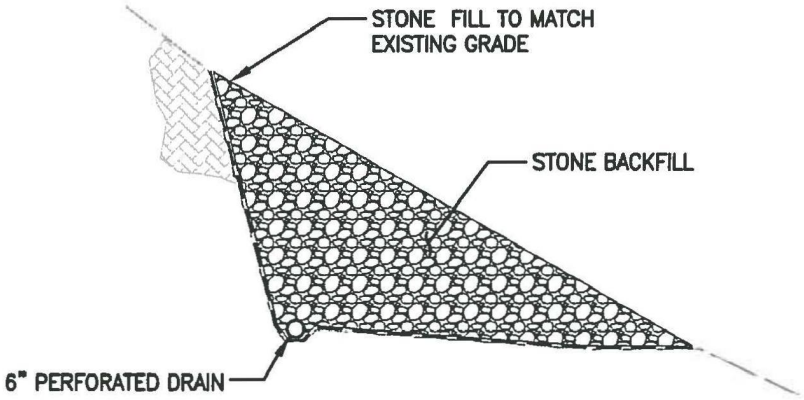
PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

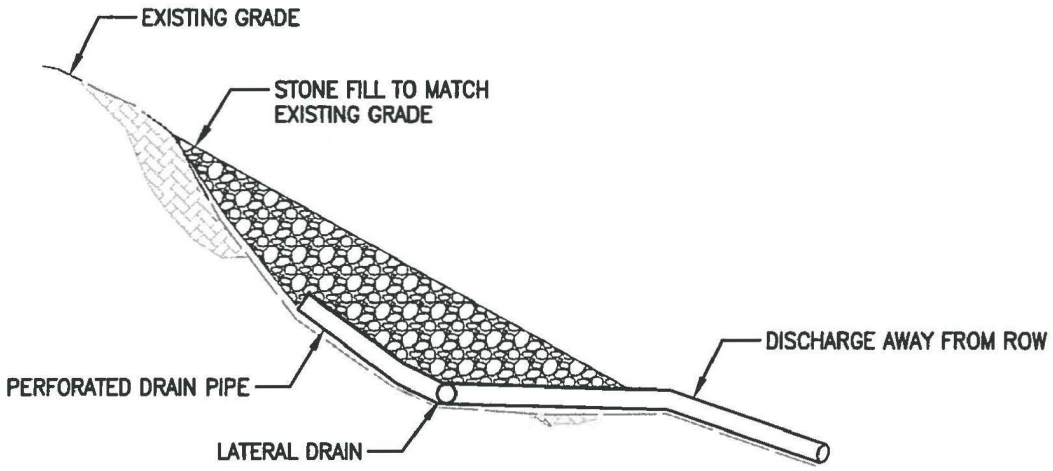
YYYY-MM-DD	2014-01-16
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

TITLE
REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL

PROJECT No.	Control	Rev.	FIGURE
1535050		D	2E



STONE WITH DRAIN TO RESTORE FAILING SLOPE
N.T.S.



SMALL SLIP REPAIR WITH LATERAL
N.T.S.

REFERENCE(S)

SLOPE STABILITY POLICY AND PROCEEDURE FOR PIPELINE DESIGN, CONSTRUCTION AND RIGHT OF WAY MAINTENANCE, DOMINION TRANSMISSION, INC., ENGINEERING SERVICES REFERENCE MANUAL (SEPTEMBER 28, 2016)

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
ROCK BACKFILL (WITH DRAIN)

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2F

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. RESTORATION OF ROW SURFACES SHOULD GENERALLY RE-CONSTRUCT THE GROUND SURFACE TO MATCH THE PRE-PROJECT CONTOURS.
3. CHANGES IN THE FINAL GRADING MAY BE NEEDED TO ADDRESS SPECIFIC TARGETED GEOTECHNICAL OR HYDROTECHNICAL OR GEOLOGIC ENGINEERING ISSUES (I.E. CORRECT DRAINAGE PROBLEMS, MINIMIZE DELIVERY OF WATER TO LANDSLIDE SITES, ETC.).
4. FINAL GRADING TO BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO COMPLETION.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
GRADING TO MATCH EXISTING CONTOURS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2G

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. MINIMIZE THE PLACEMENT OF BACKFILL MATERIALS WHEN RESTORING AND RE-CONSTRUCTING LANDSLIDE SITES, IN ORDER TO REDUCE THE IMPOSED LOAD ON LANDSLIDE SITES.
3. MINIMIZE THE PLACEMENT OF SPOILS FROM GRADING WORK IN OTHER AREAS ALONG THE ROW THAT MAY OVERLAP OTHER LANDSLIDES, IN ORDER TO REDUCE THE POTENTIAL FOR INITIATING NEW LANDSLIDES.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-02-06
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

TITLE
GRADING TO MINIMIZE BACKFILL OVER LANDSLIDE

PROJECT No. 1535050 | Rev. D | SHEET 2H

TEMPORARY PLACEHOLDER

NOTES:

1.

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PROJECT
BIC/INCREMENTAL CONTROLS

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YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SPOILS MANAGEMENT

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2J

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

modification: -	M:%	substitute for: GE-1006e ed. 06.01.14 replaced by:

TECCO® G65/4
System drawing

drawn	29.07.16	hb
checked	29.07.16	hb
approved	29.07.16	RO

GEOBRUGG AG
CH-8590 Romanshorn

GE-1006e

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PROJECT
BIC/INCREMENTAL CONTROLS

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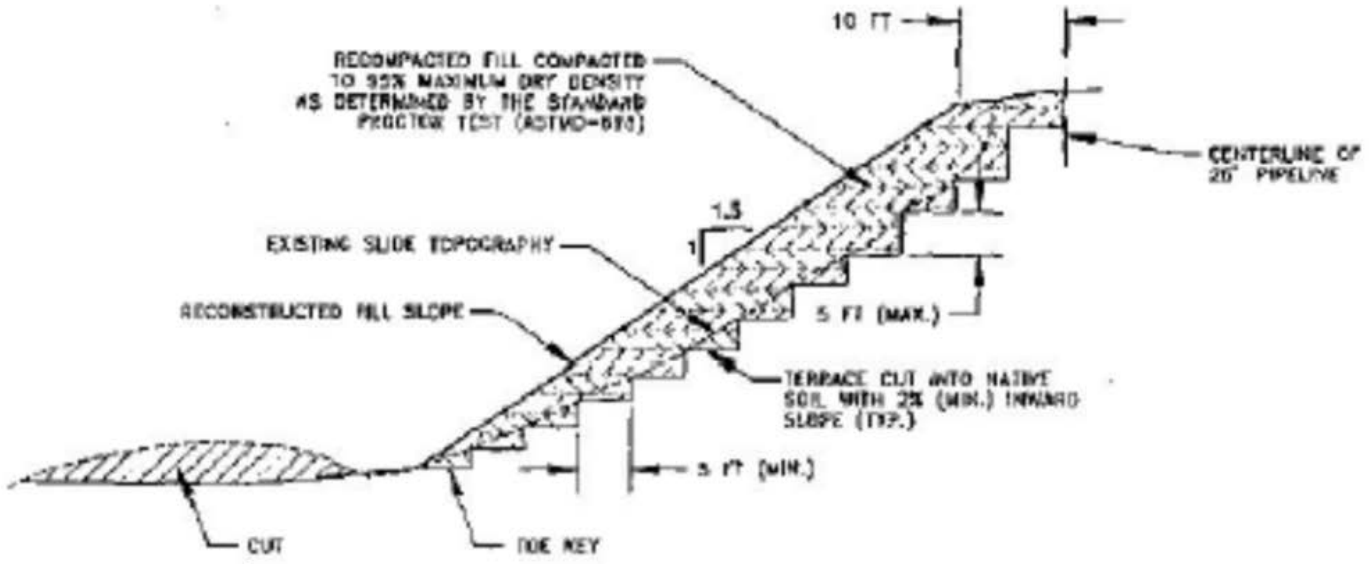
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SOIL-NAIL WITH TECCO MESH

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2L



DRAFT

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
BENCH AND REGRADE WITH BACKFILL

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	20

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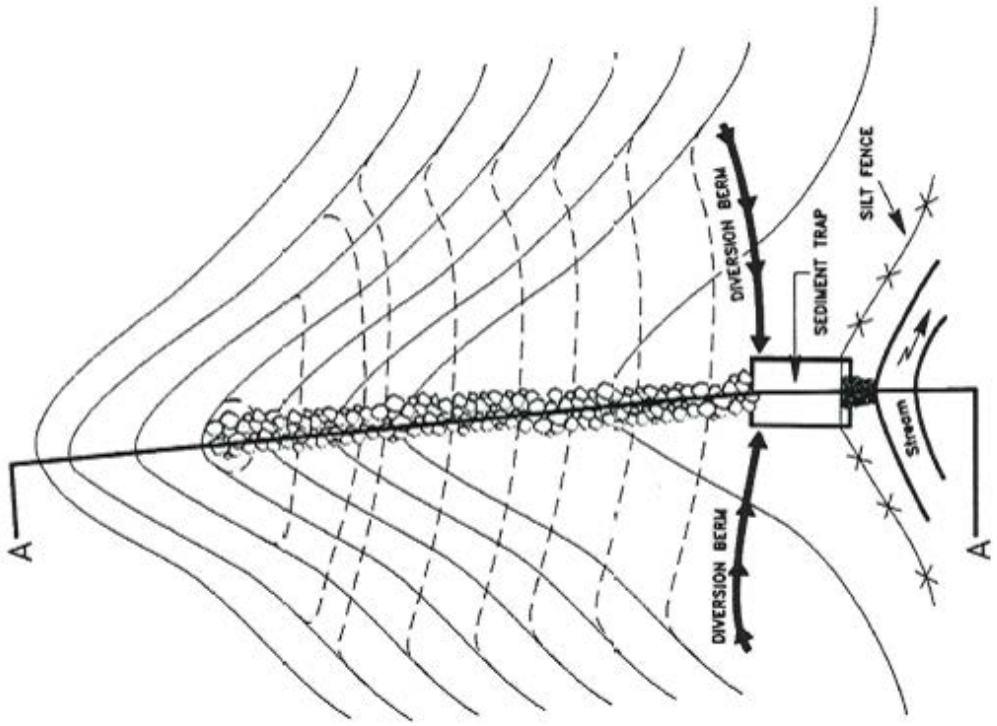

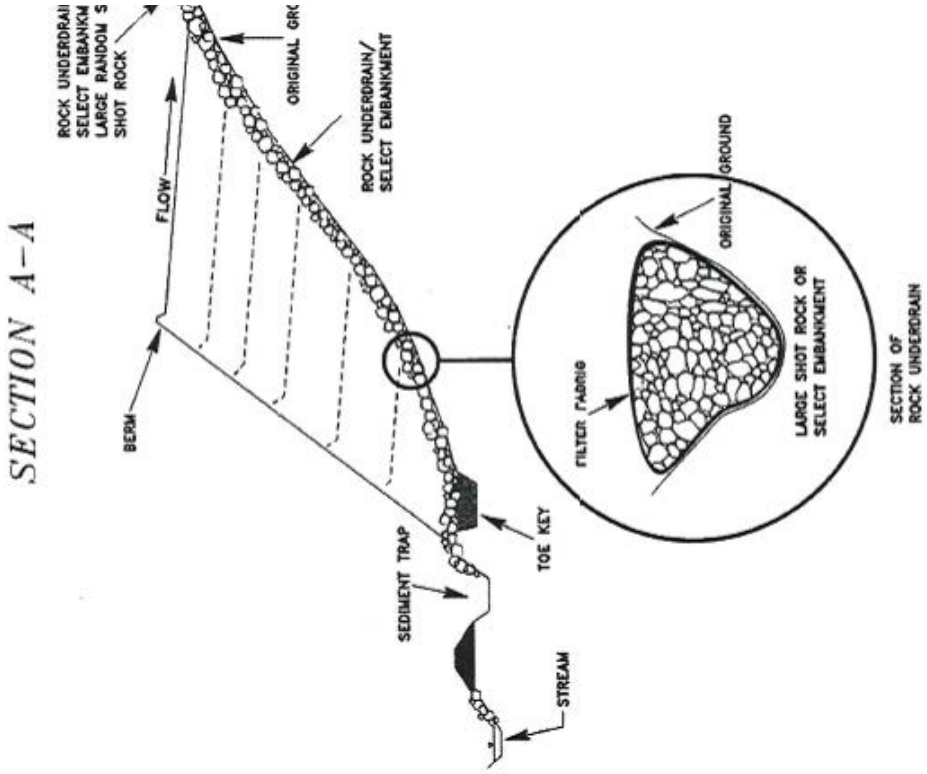

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TYP SECTION VIEW FILL WITH ROCK UNDER DRAIN

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2R

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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TEMPORARY PLACEHOLDER

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PROJECT
BIC/INCREMENTAL CONTROLS

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YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TYP PLAN VIEW FILL WITH ROCK UNDER DRAIN

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2S

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A
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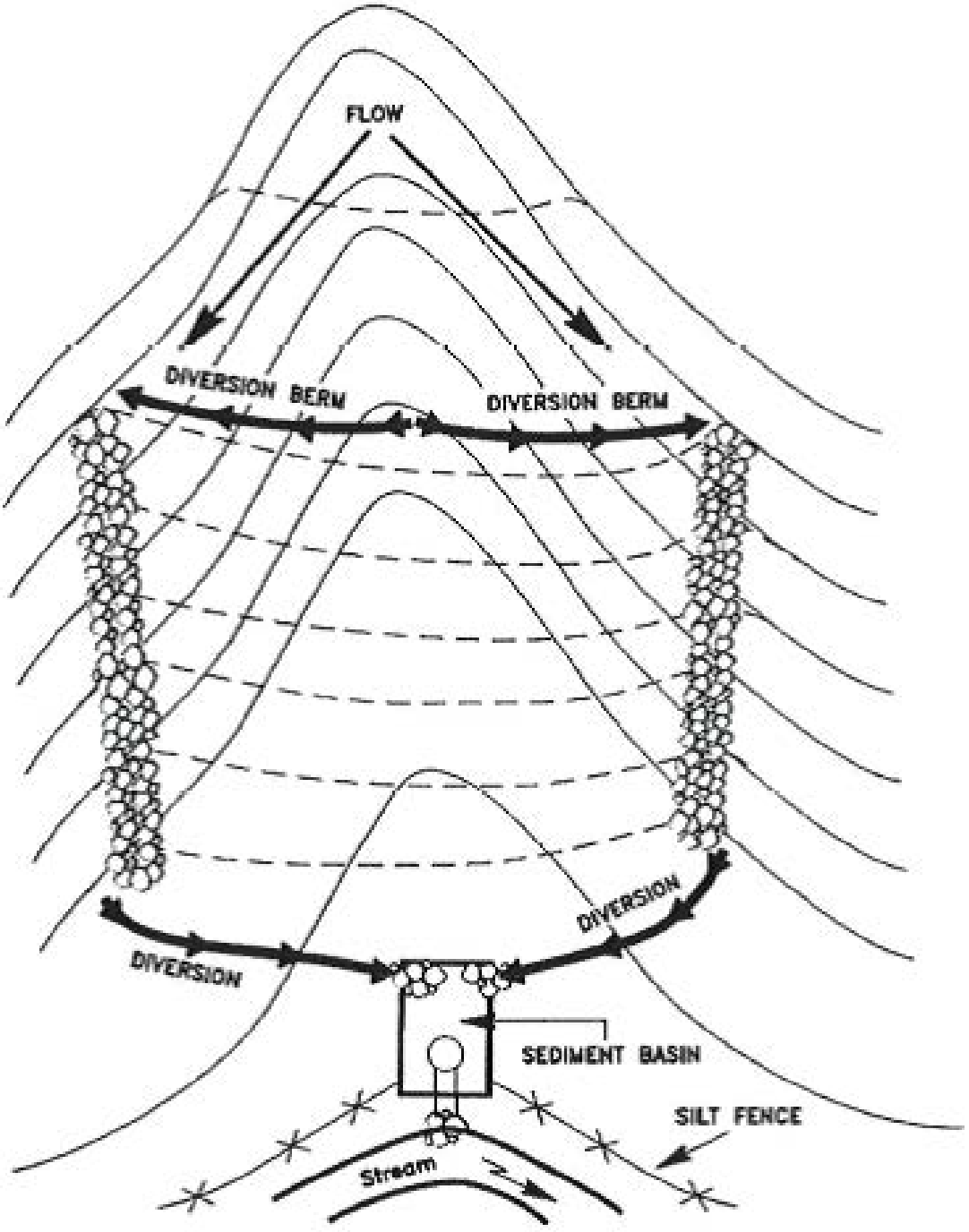

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TYP FILL WITH MULTIPLE ROCK CHANNELS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	2T

Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 2T TYP FILL WITH MULTIPLE ROCK CHANNELS.dwg

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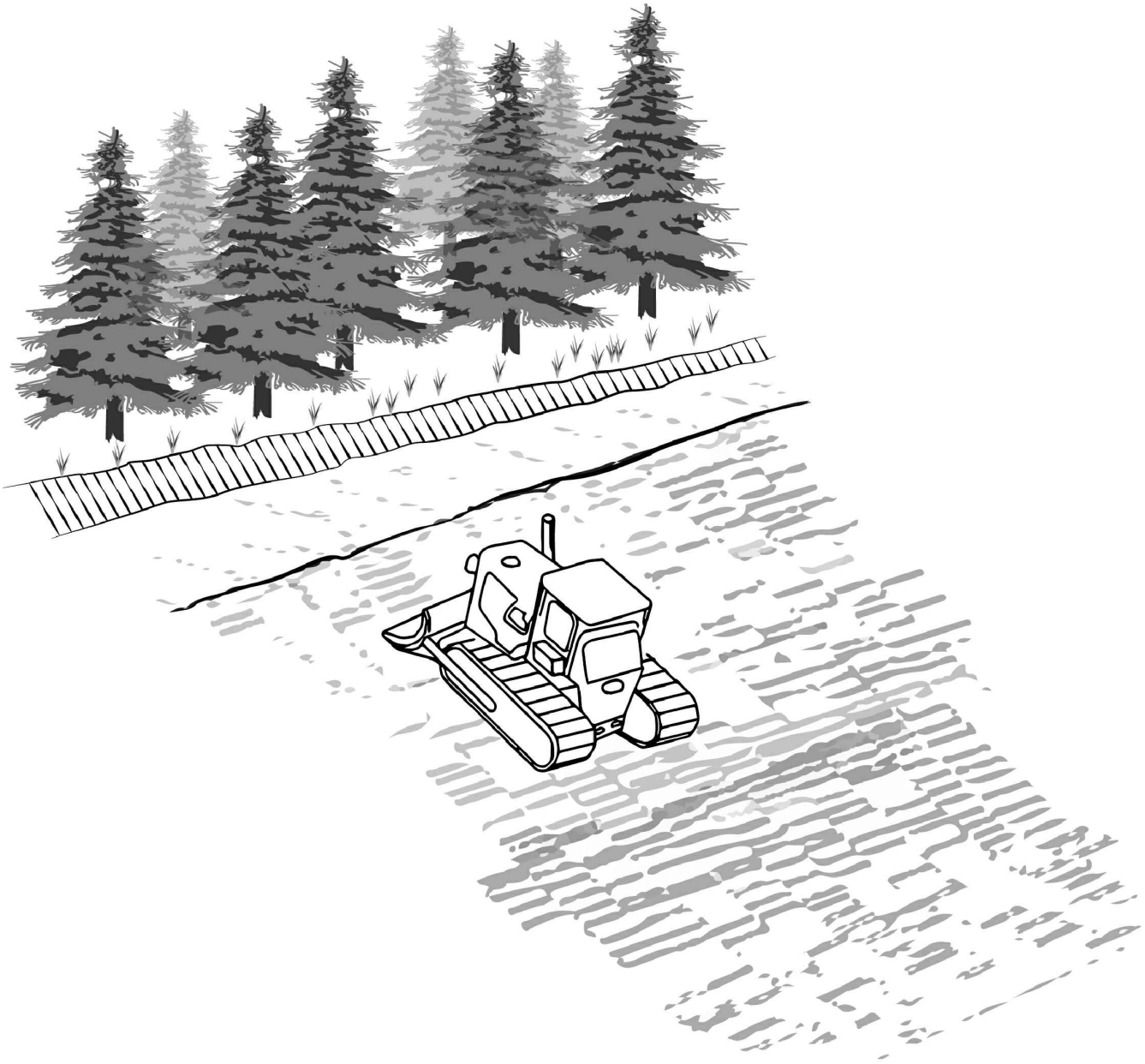
0 1 in



NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. TRACKING SLOPES IS DONE BY RUNNING TRACKED MACHINERY UP AND DOWN THE SLOPE, LEAVING TREAD MARKS PERPENDICULAR TO THE SLOPE.
3. IF A BULLDOZER IS USED, THE BLADE MUST BE UP.
4. CARE SHOULD BE EXERCISED ON SOILS HAVING HIGH CLAY CONTENT TO AVOID OVER COMPACTION.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TRACK DISTURBED SLOPES

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	3A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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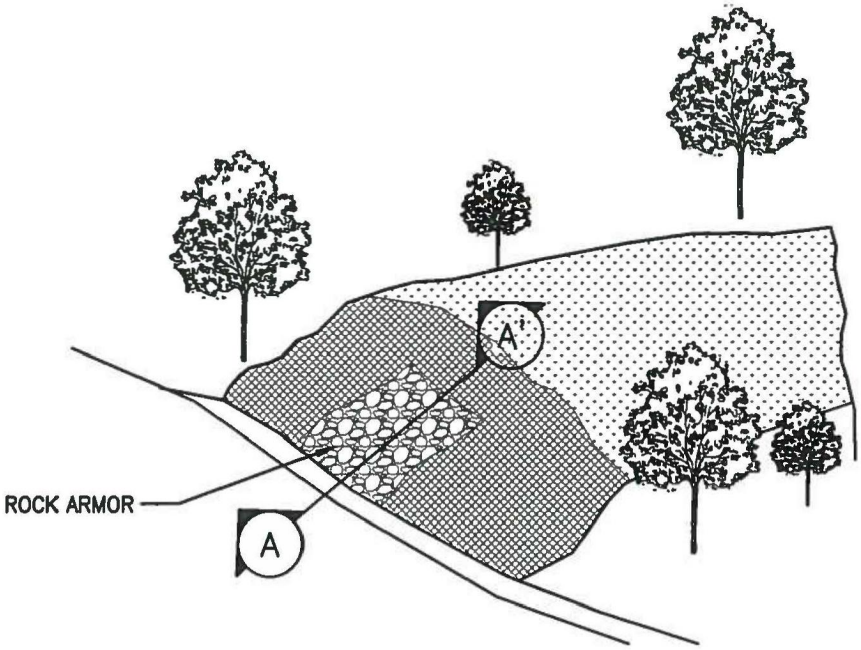
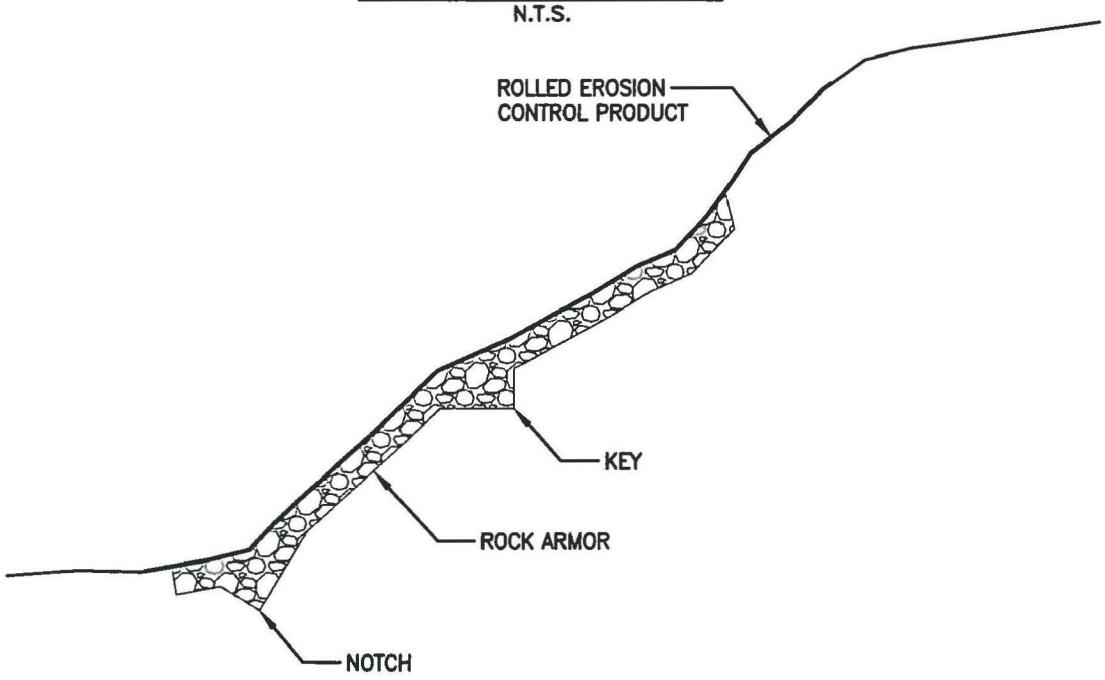
Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 3A TRACK DISTURBED SLOPES.dwg



PERSPECTIVE VIEW
N.T.S.



A–A' ROCK ARMOR ON STEEP SLOPE
N.T.S.

REFERENCE(S)

SLOPE STABILITY POLICY AND PROCEEDURE FOR PIPELINE DESIGN, CONSTRUCTION AND RIGHT OF WAY MAINTENANCE, DOMINION TRANSMISSION, INC., ENGINEERING SERVICES REFERENCE MANUAL (SEPTEMBER 28, 2016)

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

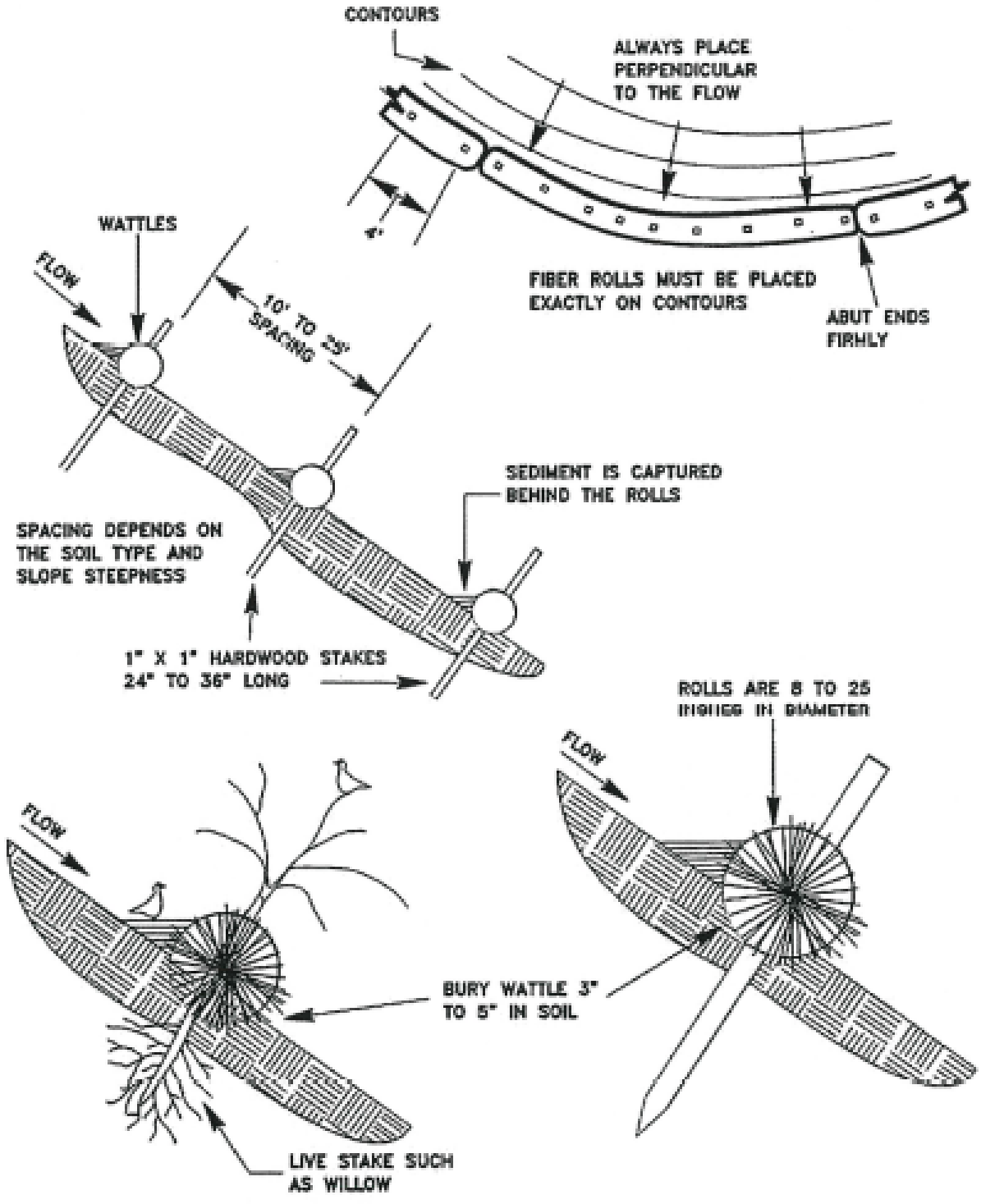
TITLE
ROCK ARMORING ON DISTRUBED SLOPES

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	3D

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

0 1 in

Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 3D ROCK ARMORING ON DISTRUBED SLOPES.dwg



REFERENCE(S)

EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL, WEST VIRGINIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER AND WASTE MANAGEMENT (2006)

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
COIR LOGS ON DISTURBED SLOPES

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	3E

Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 3E COIR LOGS ON DISTRUBED SLOPES.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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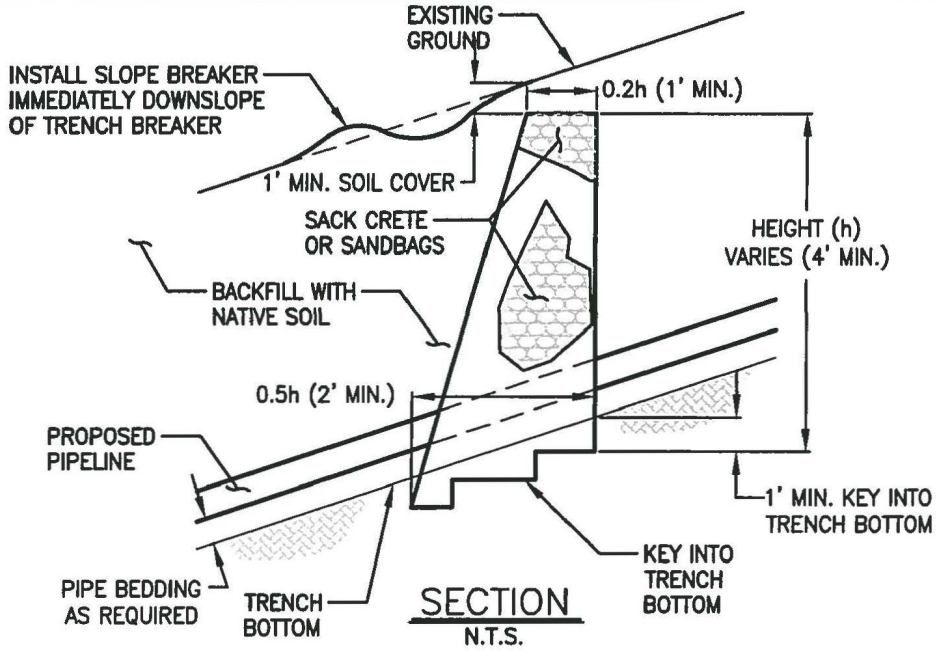

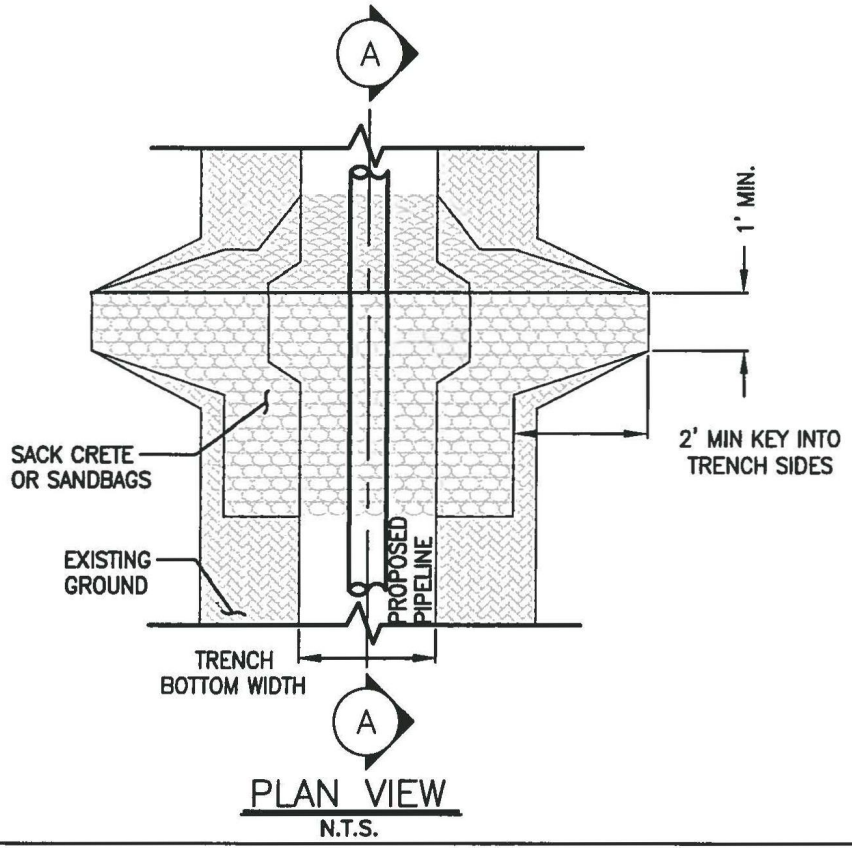

REFERENCE(S)

SLOPE STABILITY POLICY AND PROCEEDURE FOR PIPELINE DESIGN, CONSTRUCTION AND RIGHT OF WAY MAINTENANCE, DOMINION TRANSMISSION, INC., ENGINEERING SERVICES REFERENCE MANUAL (SEPTEMBER 28, 2016)

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TRENCH BREAKERS (FOAM AND SANDBAGS)

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	4A

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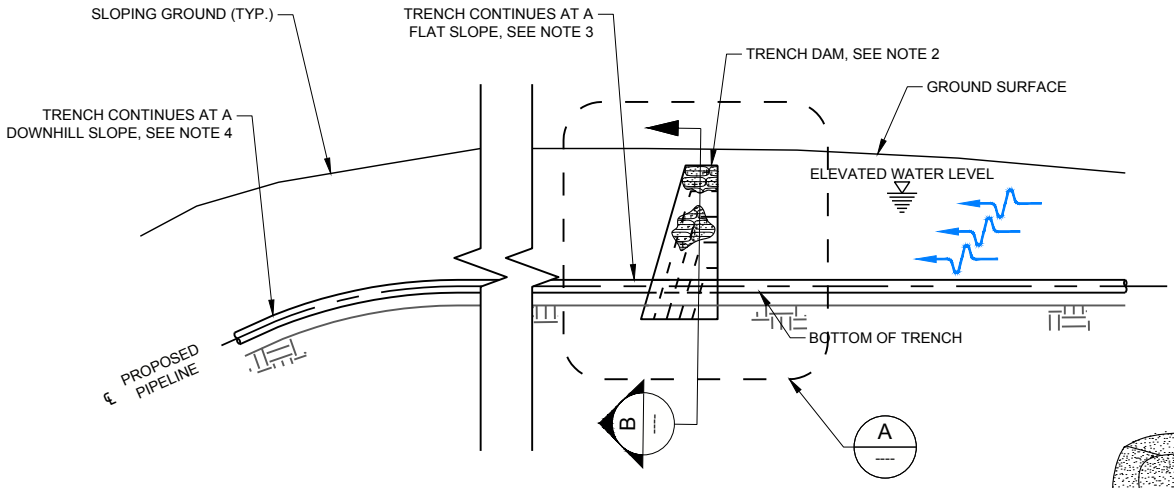
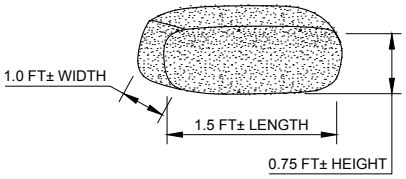
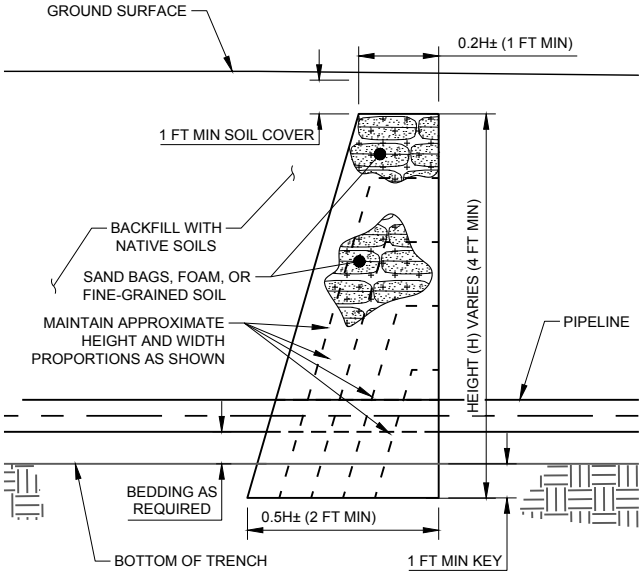
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A



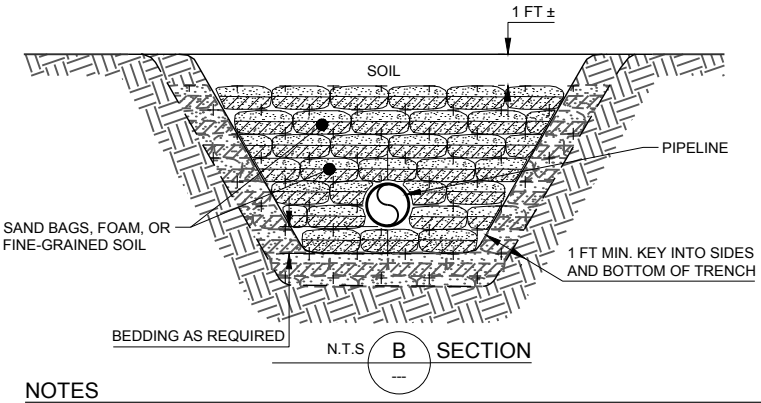
TRENCH DAM CONFIGURATION
N.T.S.



SAND BAG DETAIL
N.T.S.



N.T.S A ---- TRENCH DAM DETAIL



N.T.S B ---- SECTION

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. THE PURPOSE AND INTENT OF TRENCH DAMS IS TO STOP THE FLOW OF WATER IN THE TRENCH WHERE ELEVATED WATER SURFACES MAY EXIST (SUCH AS STREAM CROSSINGS OR PONDED AREAS).
3. INSTALL TRENCH DAM IN LOW / FLAT TERRAIN AREAS THAT MAY HAVE ELEVATED WATER LEVELS. THE PURPOSE OF THE TRENCH DAM IS TO STOP FLOW OF WATER FROM RUNNING DOWN THE FLAT TRENCH.
4. INSTALL TRENCH DAM AT THE TOP OF SLOPES AT AREAS THAT MAY HAVE ELEVATED WATER LEVELS. THE PURPOSE OF THE TRENCH DAM IS TO STOP FLOW OF WATER FROM RUNNING DOWN THE TRENCH ON THE HILL SLOPE.
5. AT LOCATIONS WHERE DAMS ARE SPECIFIED ON DETAILS, PLANS OR AS DIRECTED BY COMPANY REPRESENTATIVE, SOFT PLUGS (UNEXCAVATED SECTIONS ALONG TRENCH-LINE) MAY BE LEFT IN PLACE TO PERFORM FUNCTION OF PERMANENT DAMS PRIOR TO PIPE PLACEMENT.
6. THE TRENCH SHALL BE DEWATERED THROUGH A SEDIMENT TRAP, FILTER BAG, OR DEWATERING STRUCTURE.
7. PERMANENT TRENCH DAMS SHALL BE INSTALLED BEFORE THE TRENCH IS BACKFILLED.
8. TRENCH PLUGS SHALL BE INSTALLED AT THE BANKS OF ALL PERENNIAL STREAM CROSSINGS IMMEDIATELY AFTER TRENCH EXCAVATION. THE PLUGS MAY BE TEMPORARILY REMOVED DURING PIPE PLACEMENT, BUT THEN REPLACED.
9. THE TRENCH SHALL BE DEWATERED THROUGH A SEDIMENT TRAP, FILTER BAG, OR DEWATERING STRUCTURE REFER TO TRENCH DEWATERING DETAIL (TWD).
10. PERMANENT TRENCH DAMS SHALL BE INSTALLED BEFORE THE TRENCH IS BACKFILLED.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

DRAFT

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
TRENCH DAMS (FOAM, BAGS, OR FINE GRAINED SOILS)

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	4B

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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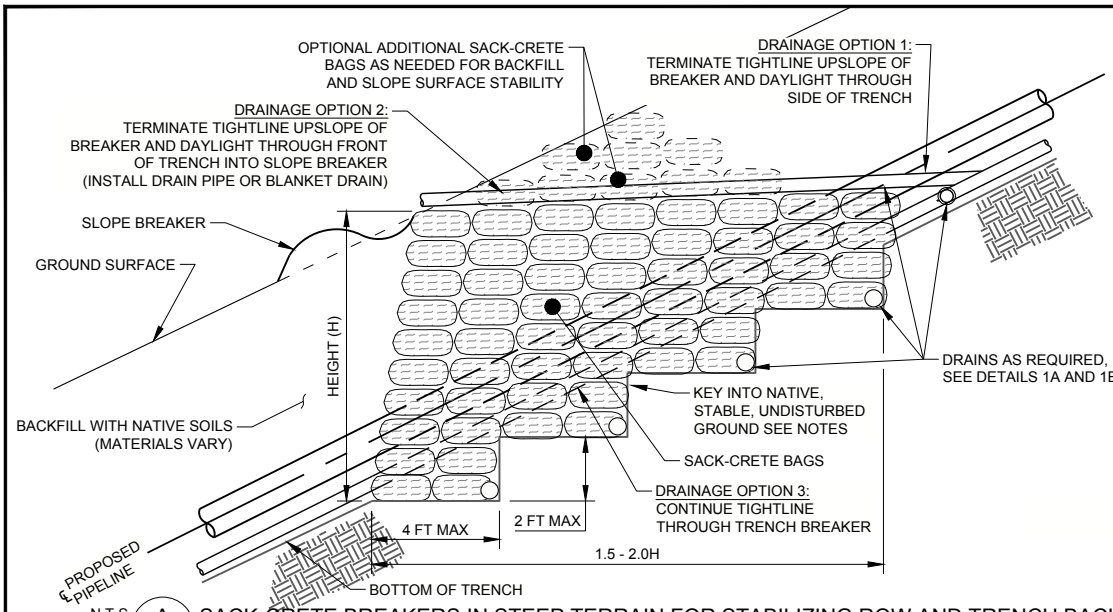
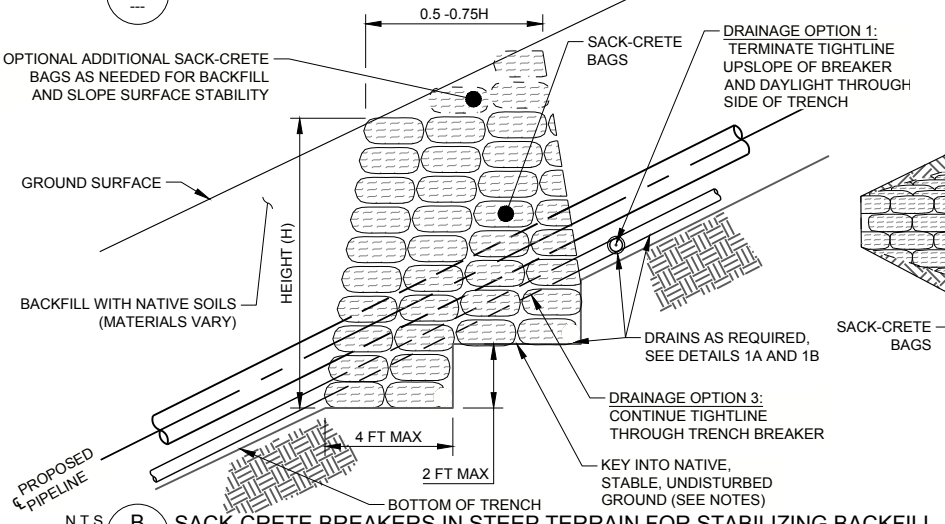
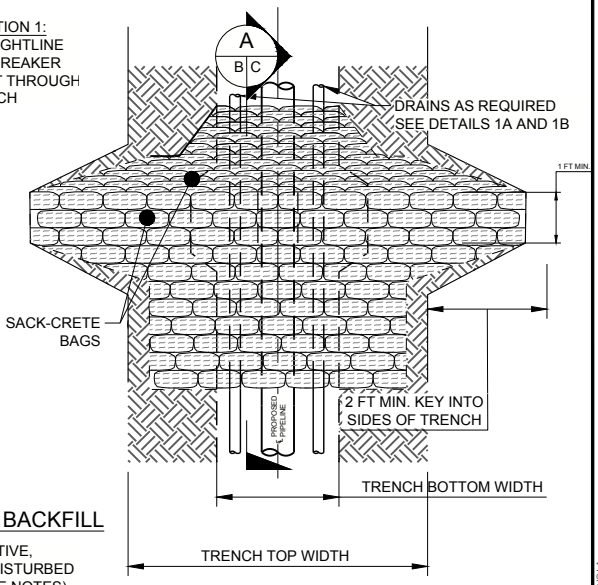


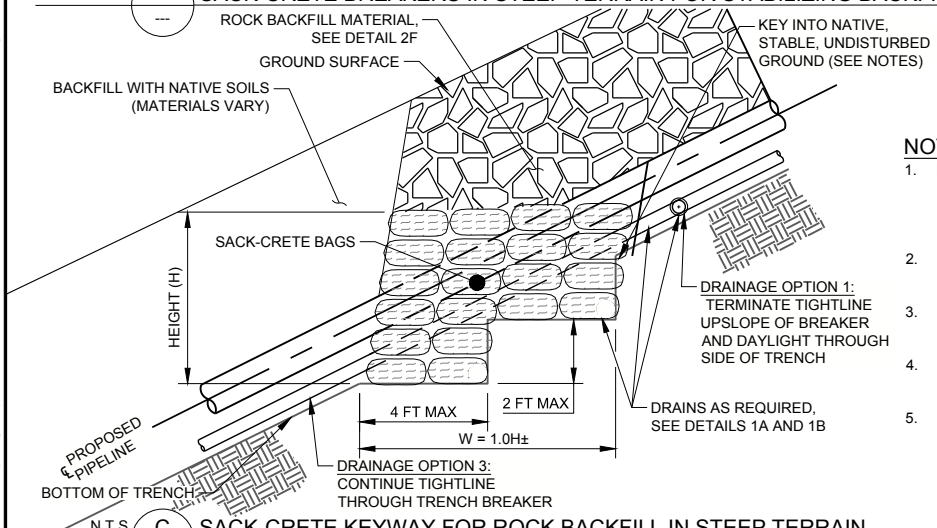
N.T.S A SACK-CRETE BREAKERS IN STEEP TERRAIN FOR STABILIZING ROW AND TRENCH BACKFILL



N.T.S B SACK-CRETE BREAKERS IN STEEP TERRAIN FOR STABILIZING BACKFILL



PLAN VIEW
N.T.S.



N.T.S C SACK-CRETE KEYWAY FOR ROCK BACKFILL IN STEEP TERRAIN

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ADD OR EXTEND KEYS OR PLACE ADDITIONAL SACK-CRETE BAGS AS NECESSARY TO MAINTAIN STABILITY.
4. DRAINAGE OPTION TO BE SELECTED AT THE TIME OF CONSTRUCTION BASED ON CONDITIONS ENCOUNTERED.
5. EXCAVATE KEY WITH OUTBOARD SLOPE, AND INCLUDE DRAINAGE MEASURES THAT EVACUATE ACCUMULATED SEEPAGE.

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CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

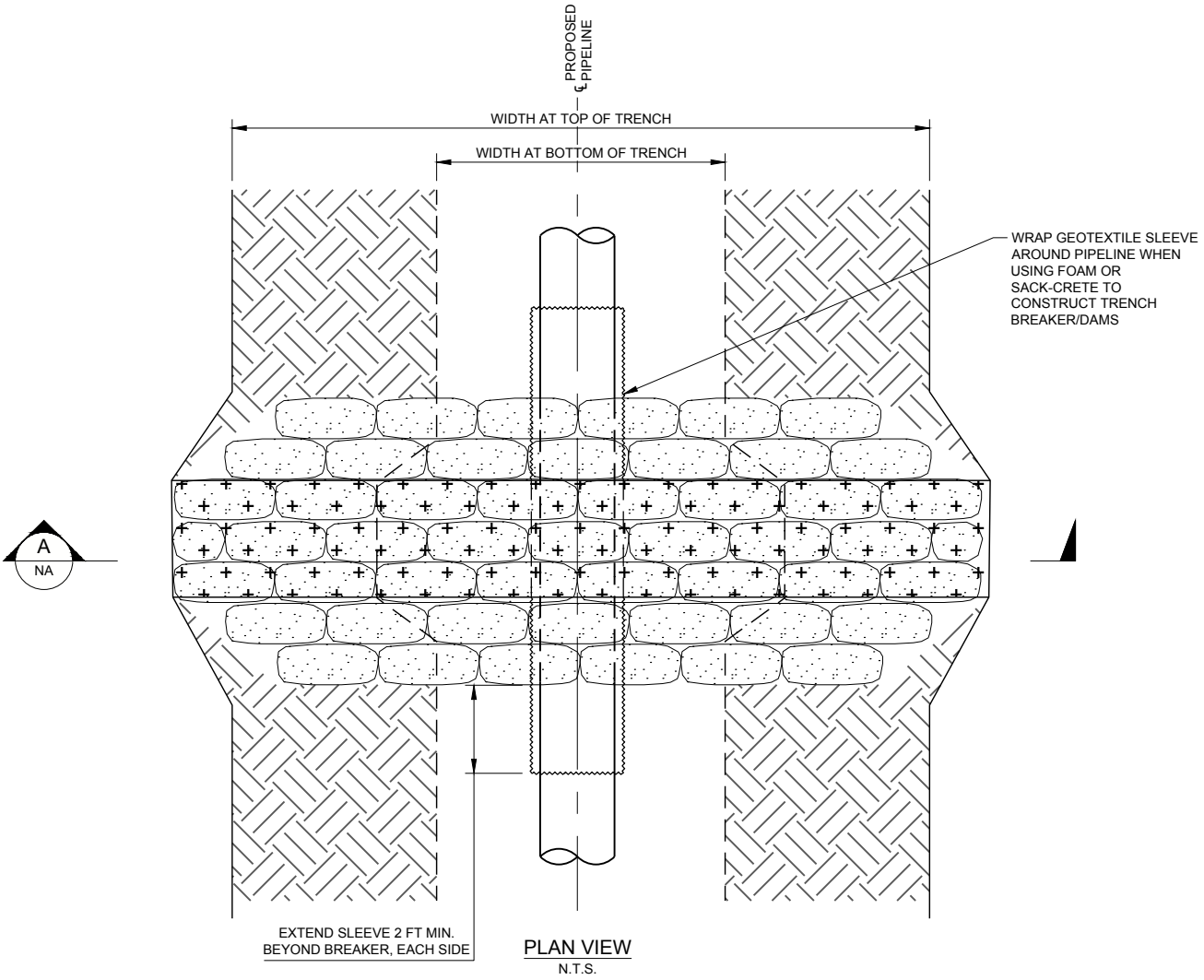
YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
SACK-CRETE BREAKERS (STRUCTURAL BREAKER)

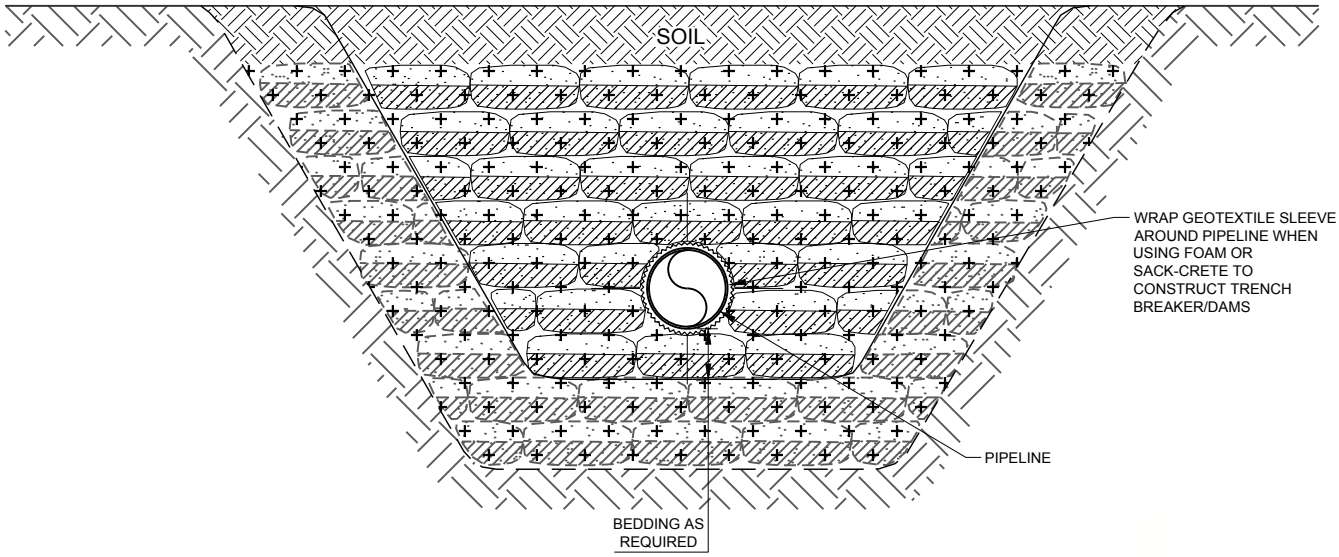
PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	4C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

Path: \\redmond.golder.gds\geomatics\Typ Details\Typical Details - Hydrological\ | File Name: 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER).dwg



PLAN VIEW
N.T.S.



N.T.S A ELEVATION

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-02-28
PREPARED	BJV
DESIGN	BJV
REVIEW	AGM
APPROVED	AQK

TITLE
SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	4D

Path: \\redmond.golder.gds\geomat$\geomatics\1TypDetails\Typical Details - Hydrological\ | File Name: 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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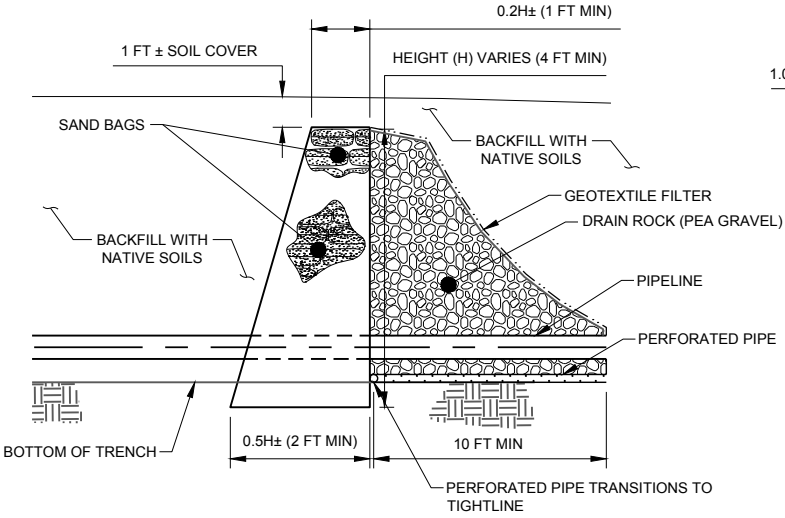
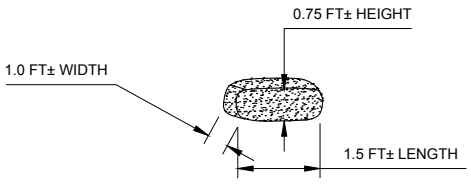


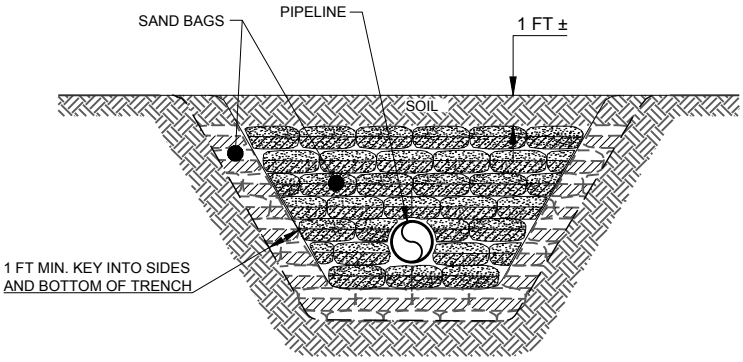
TRENCH BREAKER PROFILE VIEW

SCALE: N.T.S.



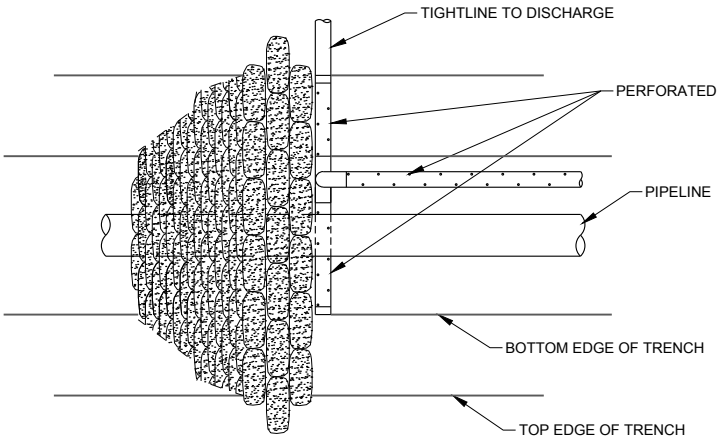
SAND BAG DETAIL

SCALE: N.T.S.



TRENCH BREAKER SECTION VIEW

SCALE: N.T.S.



TRENCH BREAKER PLAN VIEW

SCALE: N.T.S.

NOTES:

1. FINAL CONFIGURATION OF REPAIR TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

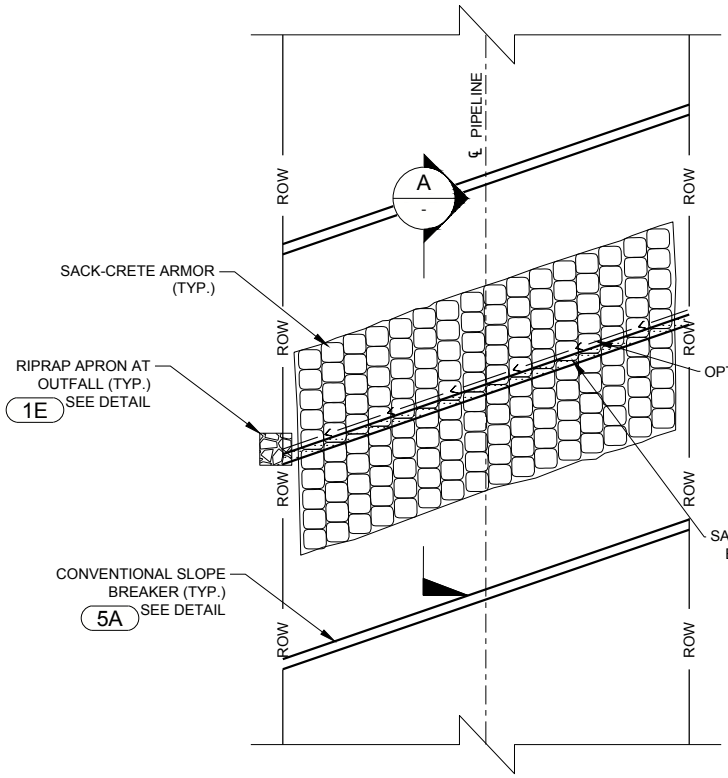
YYYY-MM-DD	2014-06-25
PREPARED	VMR
DESIGN	VMR
REVIEW	AGM
APPROVED	AQK

TITLE
TRENCH BREAKER WITH DRAINAGE

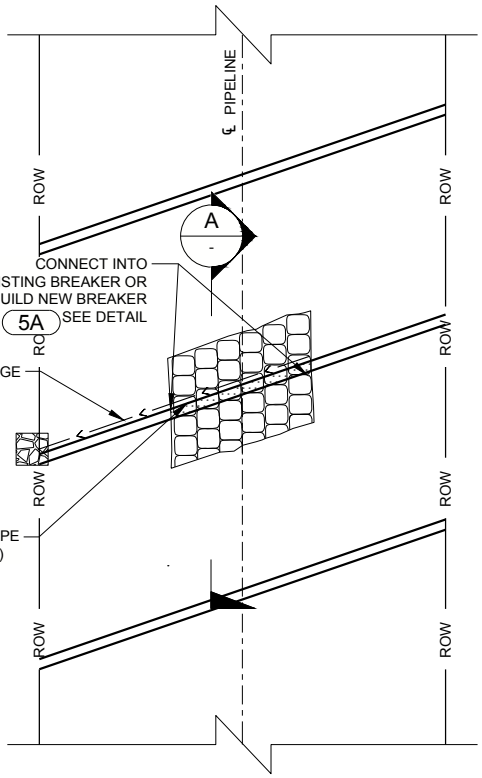
PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	4F

Path: \\redmond.golder.gds\geomatics$\geomatics\TypDetails\Typical Details - Hydrological\ | File Name: 4F TRENCH BREAKER WITH DRAINAGE.dwg

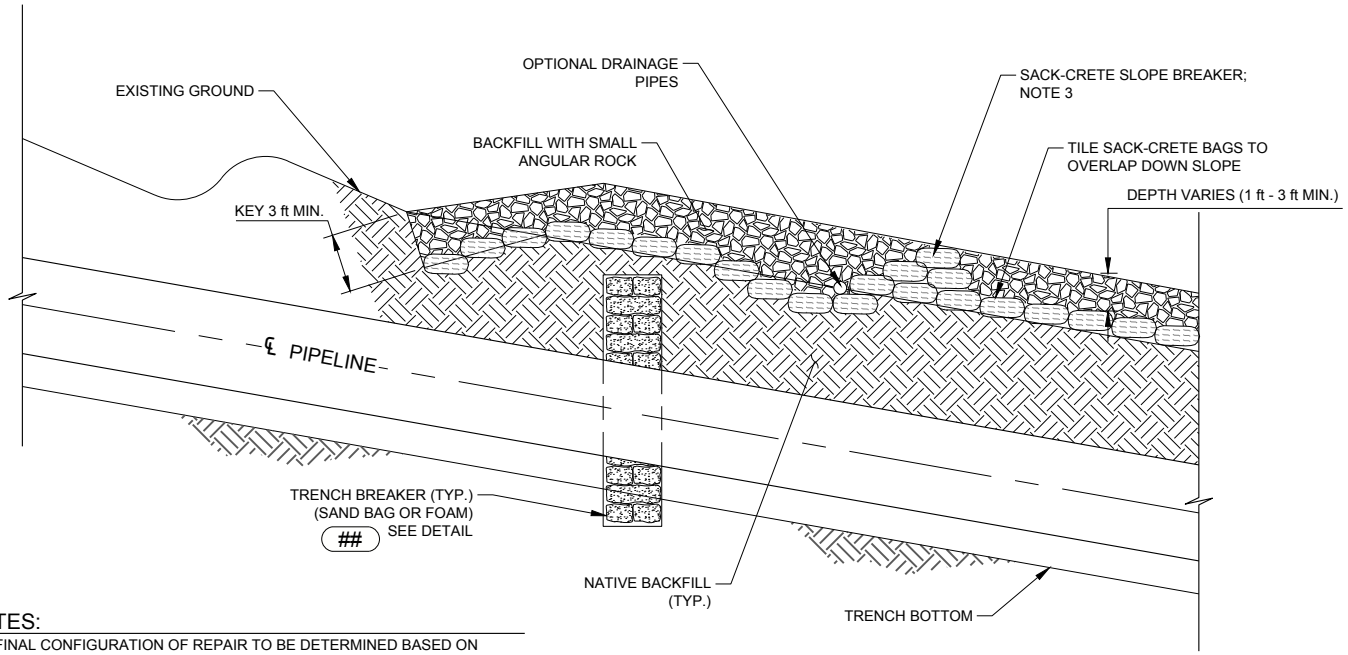
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A



OPTION A - EXTEND FULL WIDTH OF ROW



OPTION B - TARGETED REPAIR AREA



A -- SECTION

NOTES:

1. FINAL CONFIGURATION OF REPAIR TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. CONSTRUCT SLOPE BREAKER USING SACK-CRETE BAGS (1-4 HIGH) AND SLOPE ALONG ROW TO CONNECT TO EXISTING BREAKERS OR BUILD NEW BREAKERS TO INTERCEPT AND/OR DIVERT SURFACE RUNOFF TO TARGETED LOCATIONS.

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CONSULTANT
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YYYY-MM-DD	2014-08-07
PREPARED	VMR
DESIGN	VMR
REVIEW	AGM
APPROVED	AQK

TITLE
SACK-CRETE ARMOR WITH BREAKERS

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	4G

TEMPORARY PLACEHOLDER

NOTES:

1.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
FLOWABLE FILL FOR TRENCH BACKFILL

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	4H

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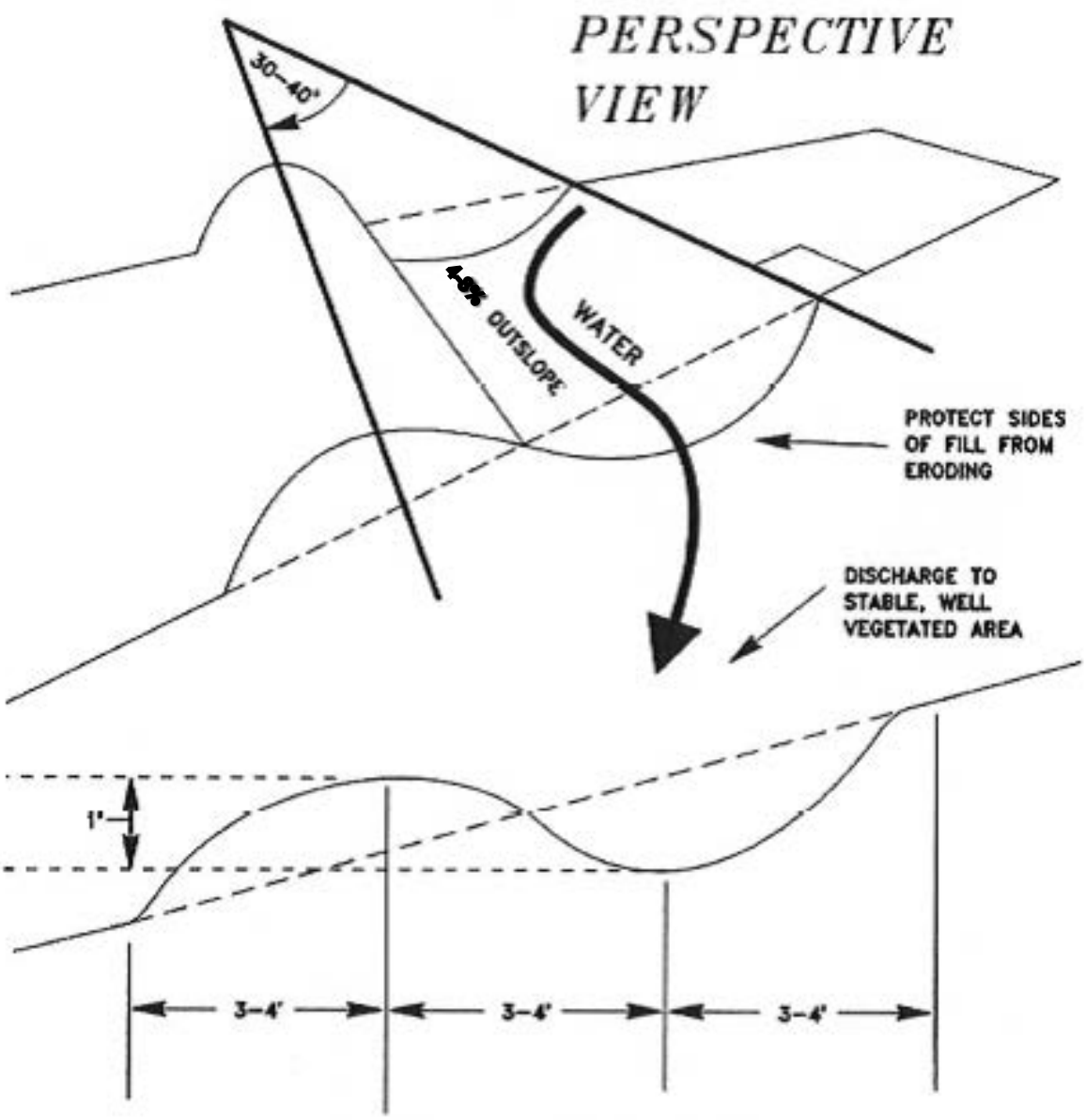
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A



REFERENCE(S)

EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL, WEST VIRGINIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER AND WASTE MANAGEMENT (2006)

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

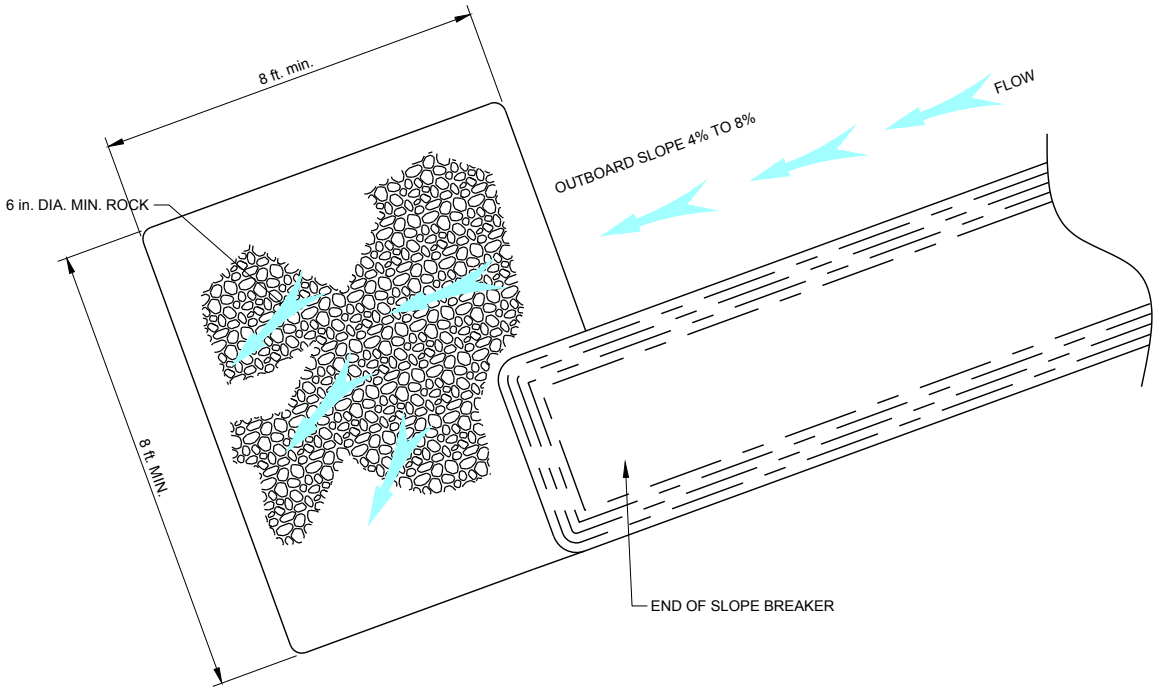
YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SLOPE BREAKERS (TEMP AND PERMANENT)

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	5A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 5A SLOPE BREAKERS (TEMP AND PERMANENT).dwg



NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

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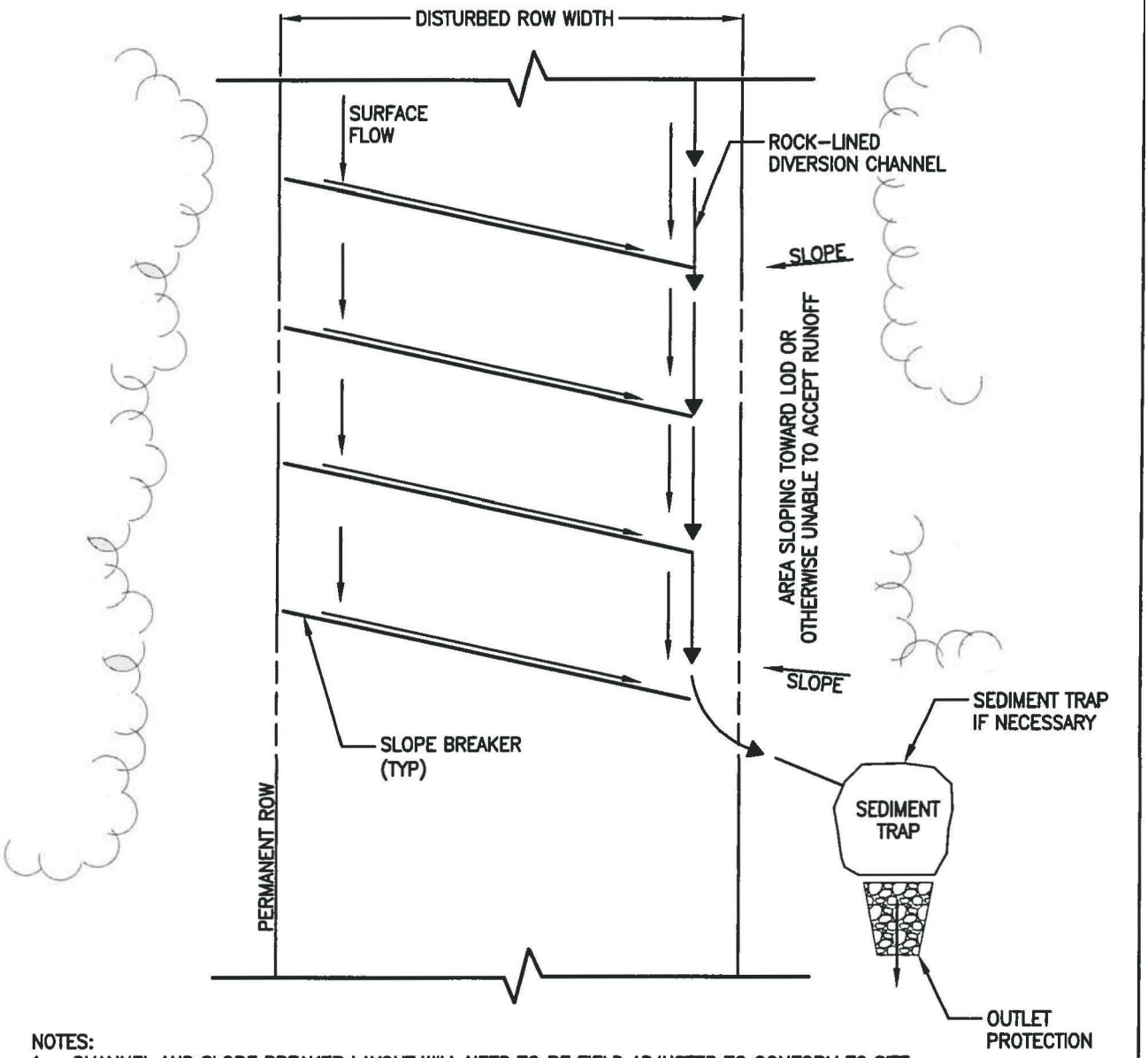
PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-01-16
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

TITLE
SLOPE BREAKER ARMORED OUTLET

PROJECT No.	Control	Rev.	FIGURE
1535050		D	5B



NOTES:

1. CHANNEL AND SLOPE BREAKER LAYOUT WILL NEED TO BE FIELD ADJUSTED TO CONFORM TO SITE CONDITIONS
2. CHANNEL MAY REQUIRE STONE CHECK DAMS, ROLLED EROSION CONTROL PRODUCTS AND OTHER SITE SPECIFIC EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY
3. SEDIMENT TRAP MAY BE REQUIRED WHERE SUFFICIENT VEGETATIVE COVER EXISTS DOWNSLOPE OF DIVERSION CHANNEL
4. SEDIMENT TRAP WILL REQUIRE SIZING BY AN ENGINEER

REFERENCE(S)

SLOPE STABILITY POLICY AND PROCEEDURE FOR PIPELINE DESIGN, CONSTRUCTION AND RIGHT OF WAY MAINTENANCE, DOMINION TRANSMISSION, INC., ENGINEERING SERVICES REFERENCE MANUAL (SEPTEMBER 28, 2016)

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SLOPE BREAKERS WITH DIVERSION CHANNELS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	5C

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

2. SPECIAL CARE AND CONSIDERATION IS REQUIRED TO CONSTRUCT DRAINAGE MEASURES FOR EXISTING, PERMANENT, AND TEMPORARY ACCESS ROADS ON A SITE-SPECIFIC BASIS. ACCESS ROADS MAY COLLECT RUNOFF FROM UPSLOPE AREAS AND DELIVER WATER TO THE ROW, PIPE TRENCH, OR TO OTHER GEOTECHNICAL, GEOLOGIC, OR HYDROTECHNICAL AREAS OF CONCERN. RECOMMENDED DRAINAGE MEASURES FOR ACCESS ROADS INCLUDE THE FOLLOWING:

   A. DRAINAGE MEASURE MAY REQUIRE SITE SPECIFIC DESIGN WITH REGARD FOR SLOPE, DRAINAGE AREA, EROSION PROTECTION , DISCHARGE ARMORED PAD, CHECK DAMS, ETC.

   B. INSTALL WATER BARS (I.E. SLOPE BREAKERS) EVERY 100-200 FEET ALONG THE ACCESS ROAD, PROVIDED THAT WATER IS NOT DISCHARGED ONTO OR ABOVE GEOTECHNICALLY SENSITIVE AREAS (LANDSLIDES, AREAS OF FILL, POTENTIALLY UNSTABLE SLOPES, ETC.) OR THE ROW.

   C. INSTALL INBOARD SLOPES WITH BAR DITCH (LINED OR ARMORED AS NECESSARY) UPSLOPE OF GEOTECHNICALLY SENSITIVE AREAS AND/OR THE ROW TO CONVEY WATER TO A STABLE DISCHARGE POINT.

   D. INSTALL FRENCH DRAINS AS NEEDED TO COLLECT WATER IN AREAS WHERE WATER BARS AND BAR DITCHES CAN NOT BE USED OR WOULD RESULT IN DIRECTING WATER INTO THE ROW OR PIPE TRENCH. FRENCH DRAINS SHOULD CONVEY COLLECTED WATER IN A TIGHTLINE (SOLID WALL PIPE) TO A STABLE DISCHARGE POINT.

   E. INSTALL EROSION PROTECTION FOR CONCENTRATED FLOWS AND DISCHARGE POINTS/OUTLETS AS NECESSARY (I.E. CHANNEL LINING, RIPRAP APRON, ETC.).

   F. DO NOT ALLOW WATER DELIVERED FROM ACCESS ROADS TO CROSS OR ENTER THE PIPE TRENCH.

   G. SPECIAL STUDY MAY BE REQUIRED FOR COMPLEX SITES OR AREAS OF CONCERN.

3. CHANGES IN THE FINAL GRADING MAY BE NEEDED TO ADDRESS SPECIFIC TARGETED GEOTECHNICAL OR HYDROTECHNICAL OR GEOLOGIC ENGINEERING ISSUES (I.E. CORRECT DRAINAGE PROBLEMS, MINIMIZE DELIVERY OF WATER TO LANDSLIDE SITES, ETC.)

4. FINAL GRADING TO BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO COMPLETION.

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PROJECT
BIC/INCREMENTAL CONTROLS

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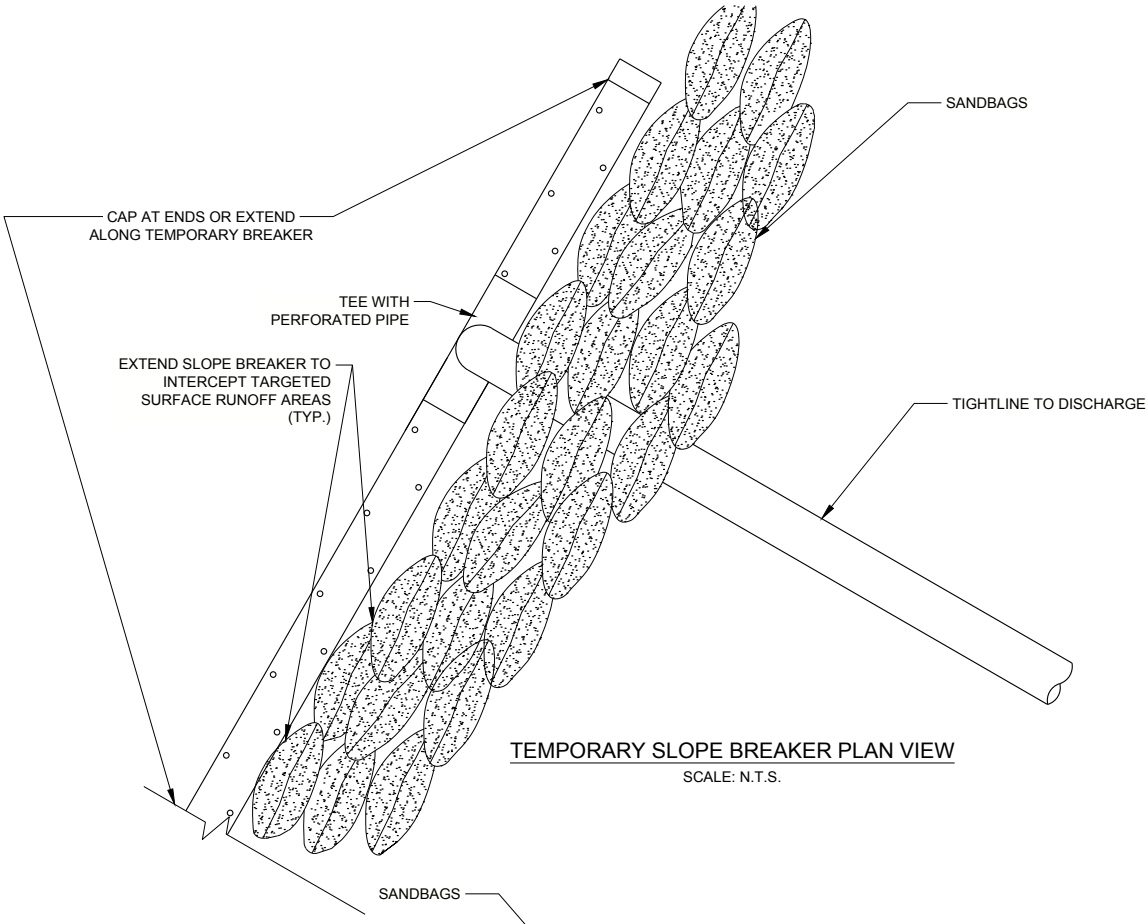
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

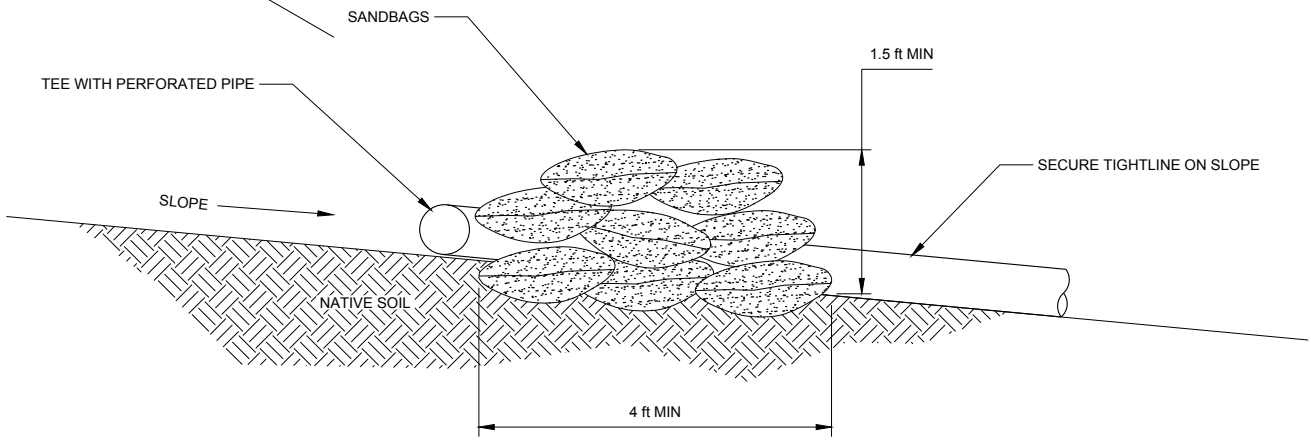
TITLE
ACCESS ROADS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	5D



TEMPORARY SLOPE BREAKER PLAN VIEW

SCALE: N.T.S.



TEMPORARY SLOPE BREAKER PROFILE VIEW

SCALE: N.T.S.

NOTES:

1. FINAL CONFIGURATION OF REPAIR TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-06-25
PREPARED	VMR
DESIGN	VMR
REVIEW	AGM
APPROVED	AQK

TITLE
TEMPORARY SLOPE BREAKER WITH DRAIN PIPE

PROJECT No.	ISSUED FOR	Rev.	SHEET
1535050		D	5E

Path: \\redmond.golder.gds\geomatics$\geomatics\typdetails\Typical Details - Hydrological\ | File Name: 5E TEMPORARY SLOPE BREAKER W PIPE.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A
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NOTES:

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PROJECT
BIC/INCREMENTAL CONTROLS

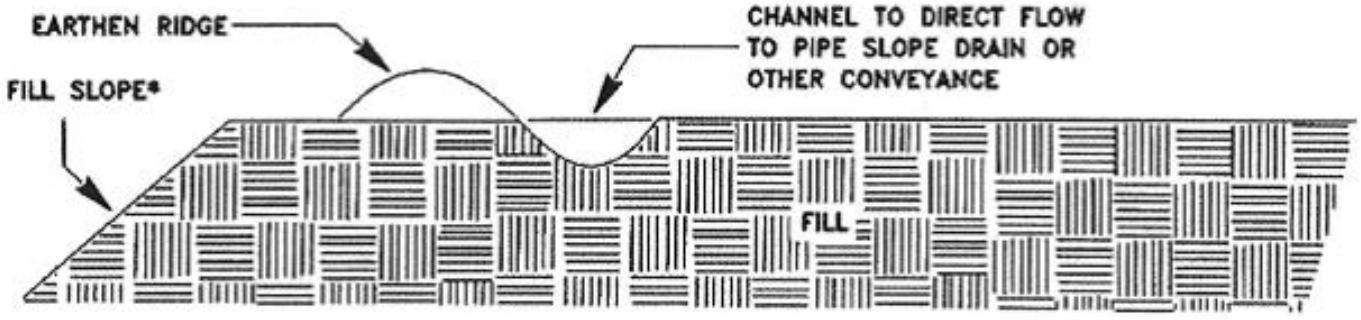
CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

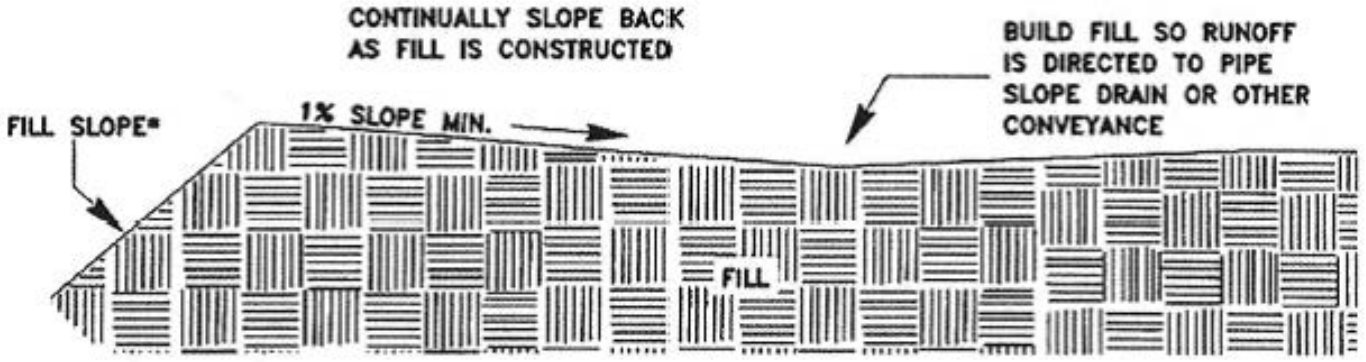
TITLE
NO WOOD CHIPS IN ROW

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	5G



TEMPORARY BERM

*SEED AND MULCH FILL SLOPE EVERY 10 FEET OF FILL OR EVERY 7 DAYS, WHICHEVER COMES FIRST



GRADING

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
SURFACE WATER DIVERSIONS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	5H

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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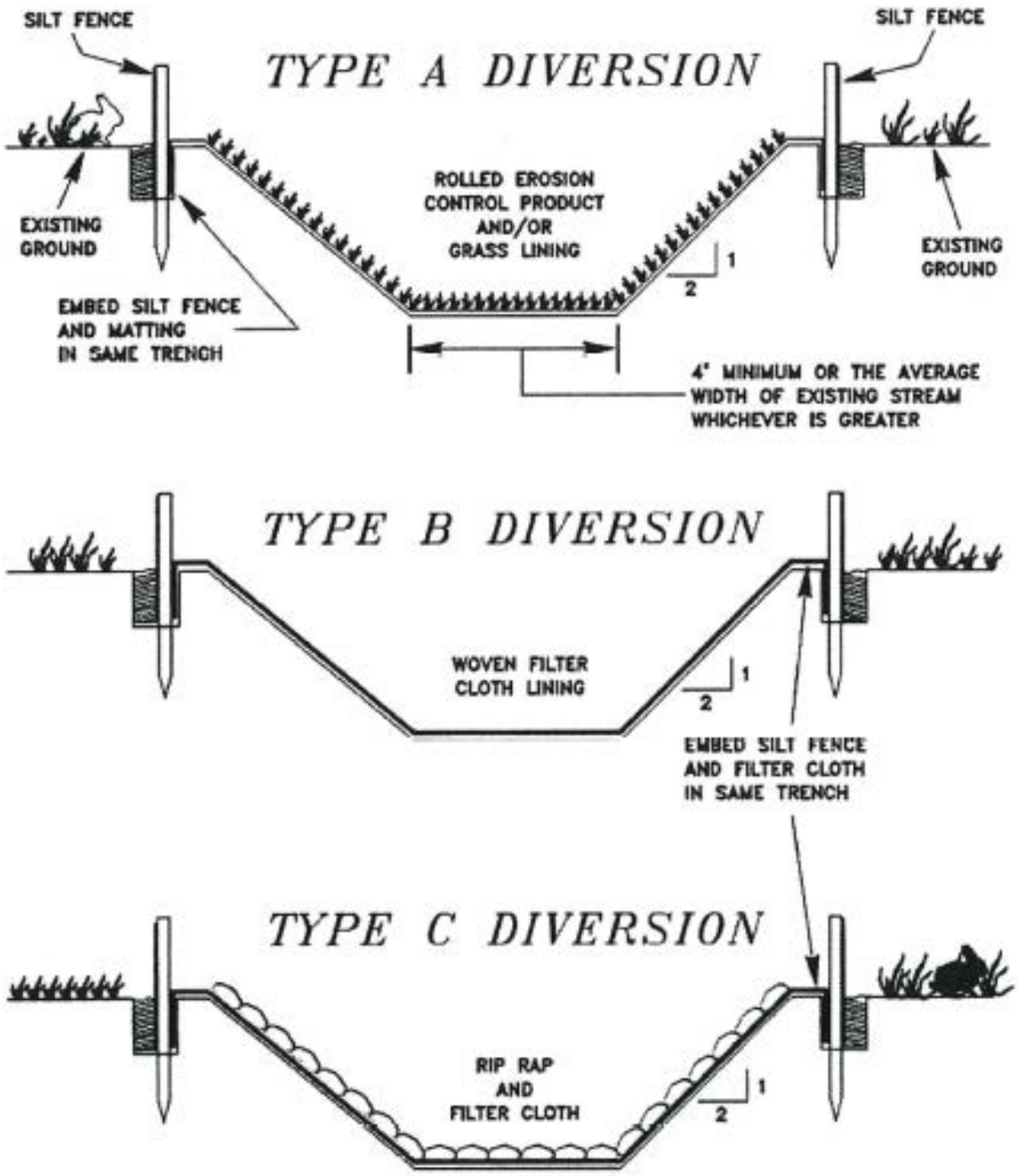

REFERENCE(S)

EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL, WEST VIRGINIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER AND WASTE MANAGEMENT (2006)

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PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
ARMORED CHANNELS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	6D

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

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Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 6D ARMORED CHANNEL.dwg

NOTES

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE TARGETED CONDITIONS.

NSA No.	GRADING ROCK SIZE (INCHES)			FILTER BLANKET REQUIEMENTS		VMAX (ft./SEC.)
	MAX.	d_{50}	MIN.	SIZE NSA NO.	PLACEMENT THICKNESS	
R-1	1.5	0.75	NO.8	FS-1	N/A	2.5
R-2	3	1.5	NO.1	FS-1	N/A	4.5
R-3	6	3	NO.2	FS-1	3	6.5
R-4	12	6	NO.3	FS-2	4	9
R-5	18	9	NO.5	FS-2	6	11.5
R-6	24	12	NO.7	FS-3	8	13
R-7	30	15	NO.12	FS-3	10	14.5

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

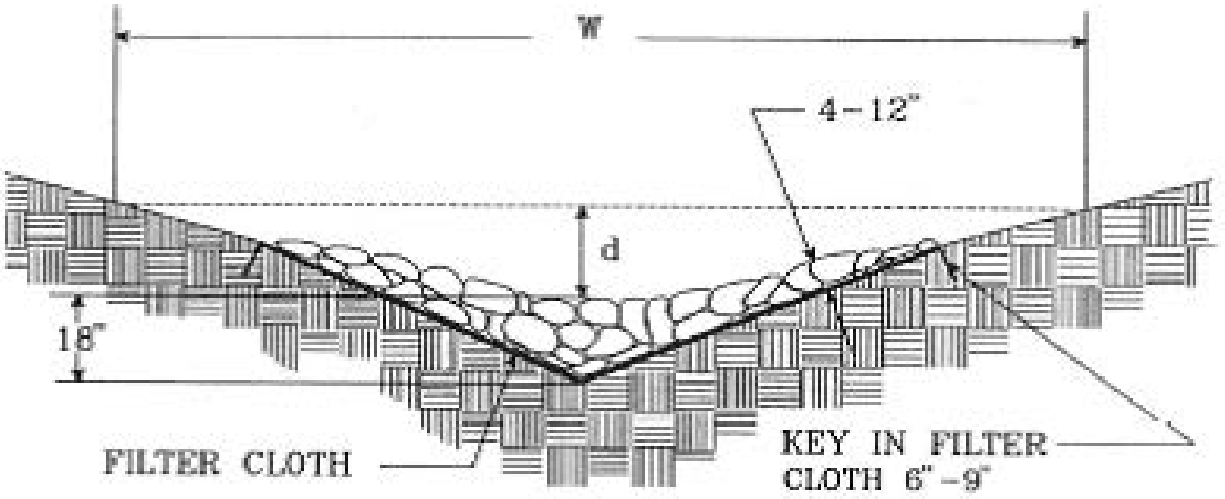
CONSULTANT

Golder Associates

YYYY-MM-DD	2014-02-06
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

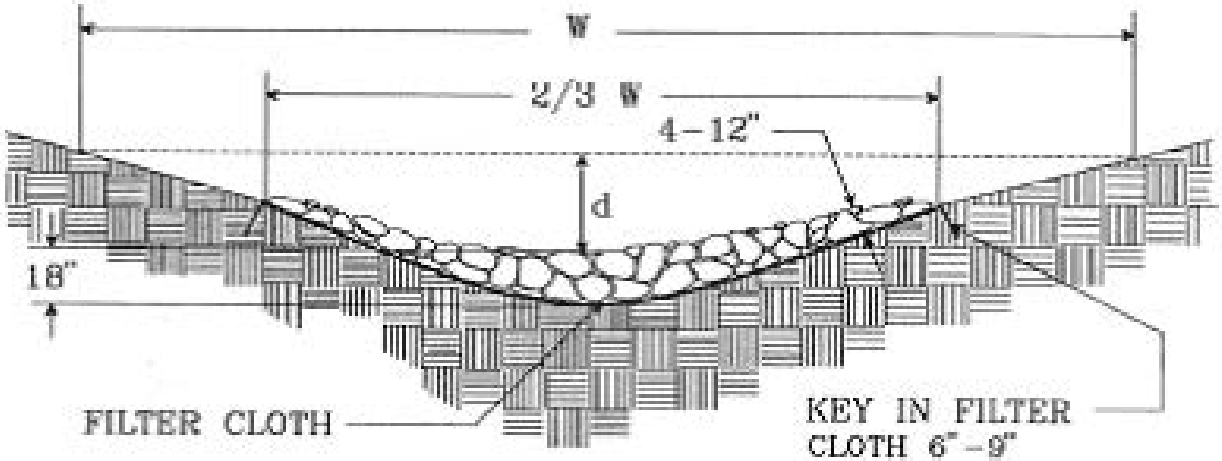
TITLE
RIPRAP GRADATIONS

PROJECT No. 1535050 | Rev. D | SHEET 6F



V-SHAPED WATERWAY WITH STONE CENTER DRAIN

NOTE: A GRANULAR FILTER MAY BE SUBSTITUTED FOR FILTER CLOTH.



PARABOLIC WATERWAY WITH STONE CENTER DRAIN

NOTE: A GRANULAR FILTER MAY BE SUBSTITUTED FOR FILTER CLOTH.

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DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
ARMORED V-SHAPED AND U-SHAPED CHANNELS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	6G

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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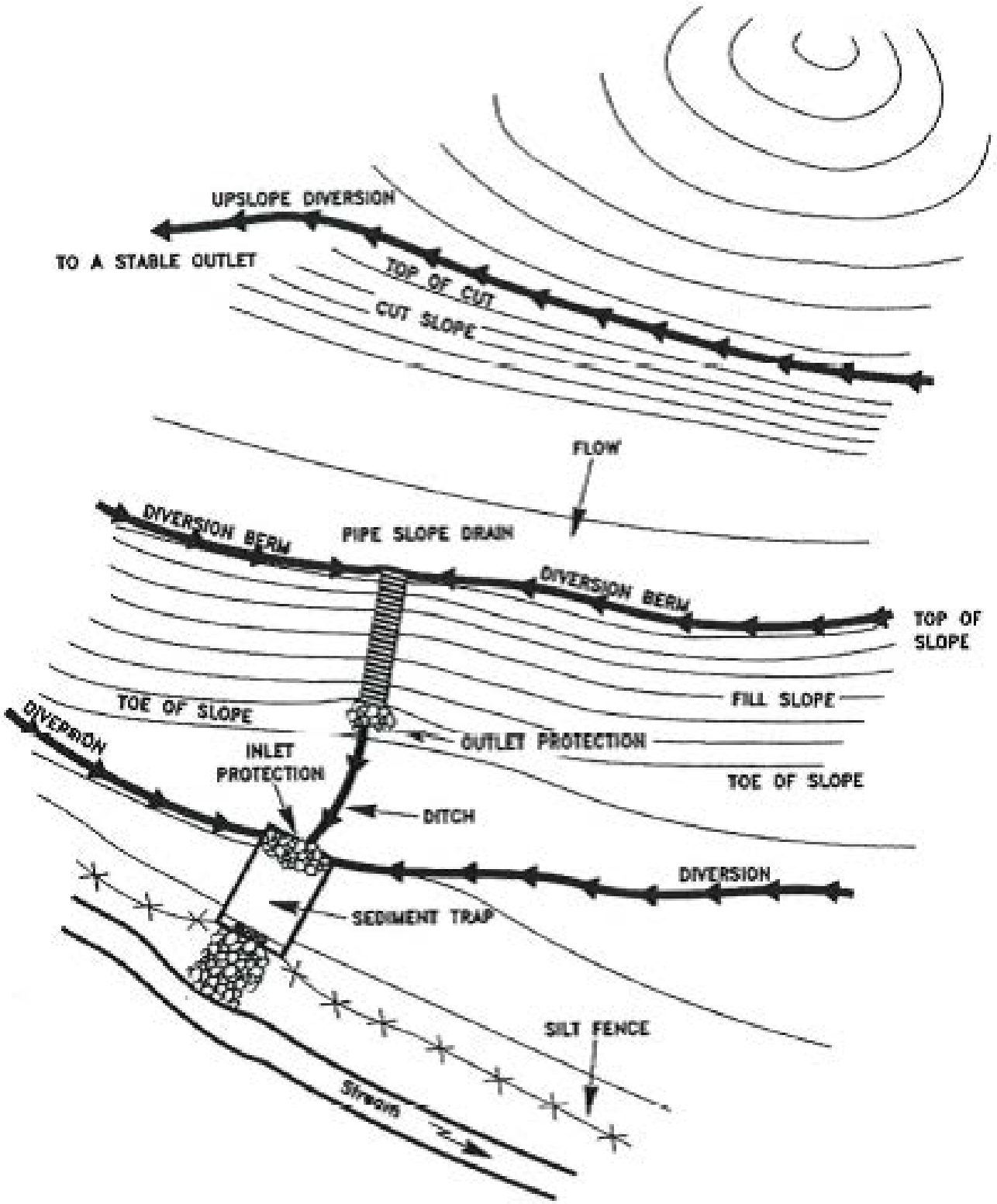

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
TYP SURFACE WATER CONTROL LAYOUT

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	6H

Path: \\redmond\geomat$\geomatics\DOMINION\TypDetails\Typical Details - Hydrological\ | File Name: 6H TYP SURFACE WATER CONTROL LAYOUT.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A
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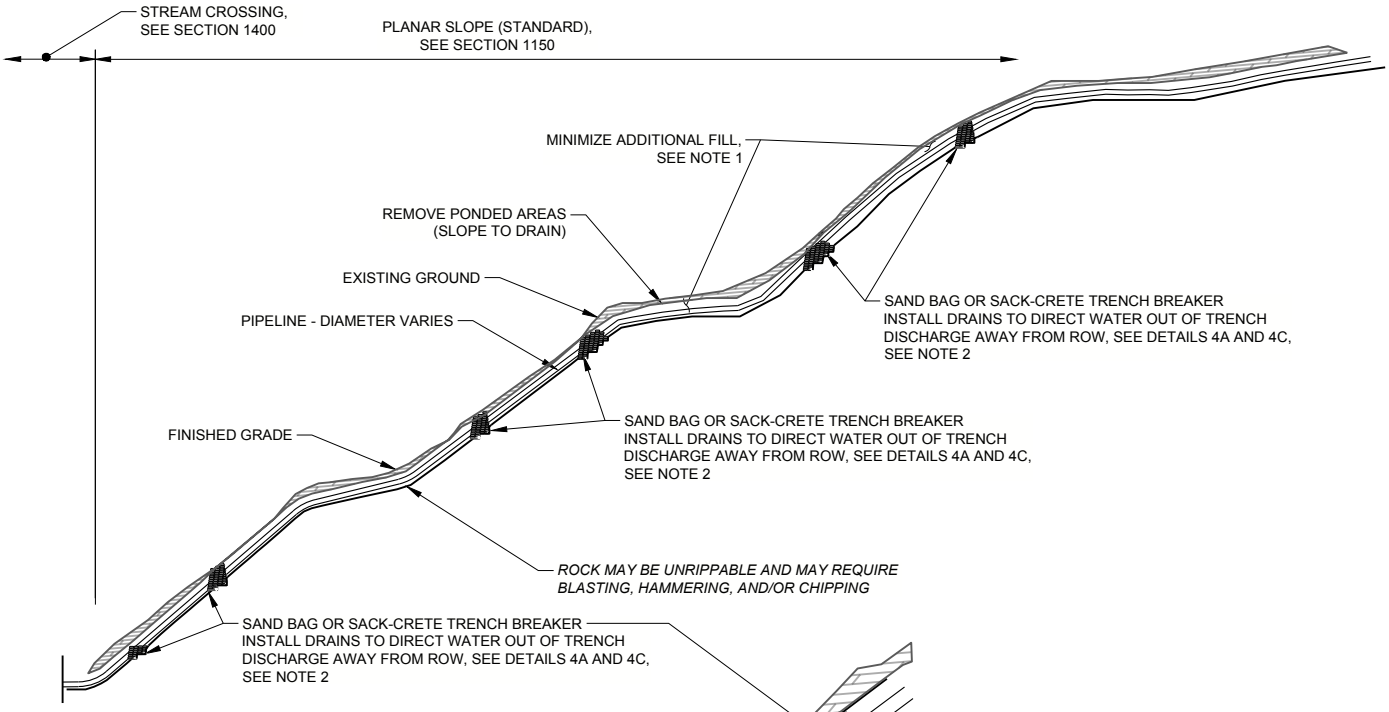
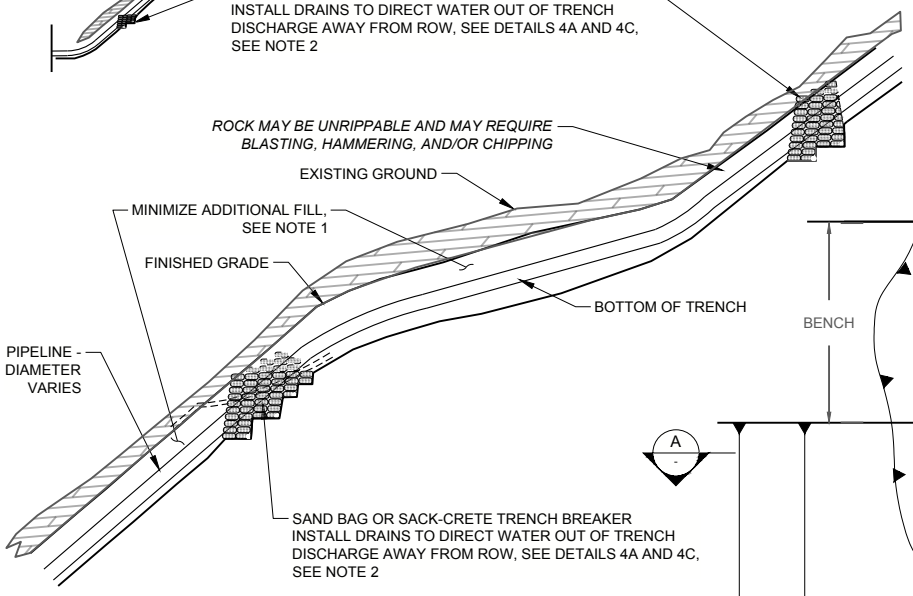
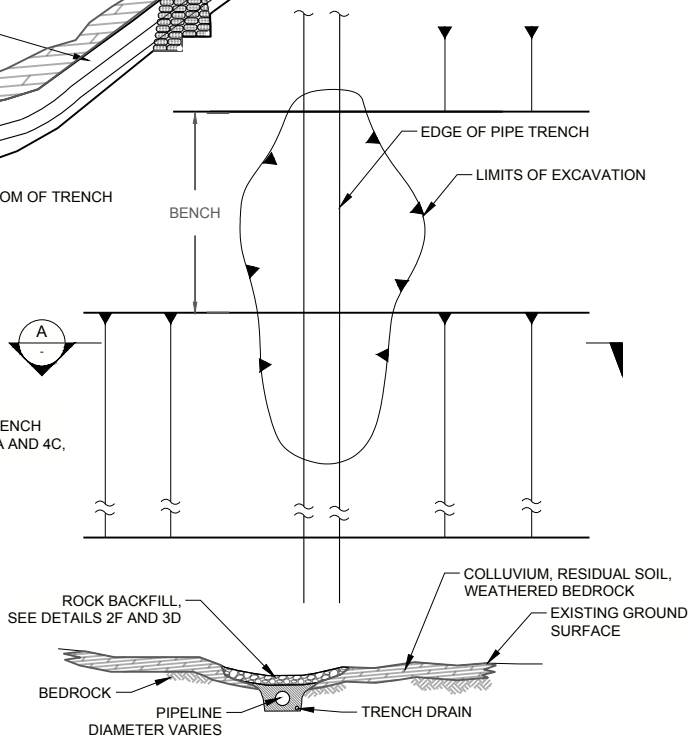






A - **OPTION**

NOTES

1. TRENCH EXCAVATIONS INTO BEDROCK IN AREAS MAY RESULT IN INSUFFICIENT AMOUNTS OF BACKFILL AND PADDING/BEDDING DUE TO LARGER, ANGULAR SPOIL MATERIAL. ROCK GUARD MATERIALS MAY BE REQUIRED TO PROTECT THE PIPELINE.
2. TRENCH EXCAVATIONS INTO BEDROCK IN SLOPED TERRAIN (PLANAR SLOPES & INCLINED RIDGES) WILL REQUIRE TRENCH BREAKERS WITH SUFFICIENT MASS AND GEOTECHNICAL PROPERTIES TO RETAIN BACKFILL SOILS AND/OR ROCK MATERIALS. USE OF FOAM BREAKERS IS NOT RECOMMENDED. SANDBAG OR SACK-CRETE BREAKERS ARE RECOMMENDED.
3. ALTERNATING LAYERS OR WEAKER BEDROCK AND STRONGER BEDROCK MATERIALS OFTEN CREATES A "BENCHED" OR "STAIR-STEPPED" APPEARANCE TO EXISTING HILL SLOPES, ILLUSTRATED IN THE FIGURE SHOWN ON THIS SHEET. MINIMIZE BACKFILL IN THESE SITUATIONS, AND WARP THE SLOPES AT THE ROW BOUNDARIES TO MEET TO EXISTING TERRAIN, BUT MAINTAIN A MORE UNIFORM, POSITVELY DRAINING SLOPE ACROSS THE ROW. BUILDING BENCHES ALTERNATING WITH FILL ACROSS THE ROW TO MATCH THE EXISTING TOPOGRAPHY IS NOT RECOMMENDED.

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-02-06
PREPARED	REDMOND
DESIGN	BJV
REVIEW	AQK
APPROVED	AQK

TITLE
BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS

PROJECT No. 1535050 | Rev. D | SHEET 10A

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

0 1 in

Path: \\redmond.golder.gds\GEOMATS\GEOMATICS\TypDetails\Typical Details - Hydrological\ | File Name: 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS.dwg

TEMPORARY PLACEHOLDER

NOTES:

1.

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	11F

Path: \\redmond\geomat$\geomatics\DOMINION\TypScenarios\ | File Name: 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A
0 1in

TEMPORARY PLACEHOLDER

NOTES:

1.

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

TITLE
BLASTING PLAN(S)

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	14C

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

0 1 in

Path: \\redmond\geomat$\geomatics\DOMINION\TypScenarios\ | File Name: 14C BLASTING PLAN(S).dwg

TEMPORARY PLACEHOLDER

NOTES:

1.

DRAFT

CLIENT
DOMINION

PROJECT
BIC/INCREMENTAL CONTROLS

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-11-04
PREPARED	REDMOND
DESIGN	AQK
REVIEW	AQK
APPROVED	AQK

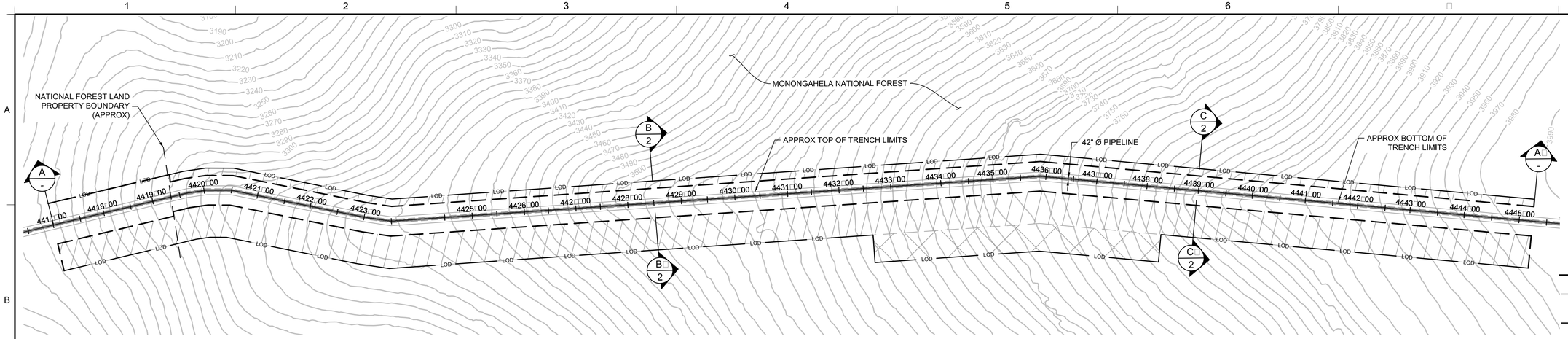
TITLE
ACCESS TO REMOTE ROW LOCATIONS

PROJECT No.	PHASE	Rev.	FIGURE
1535050	500	D	15C

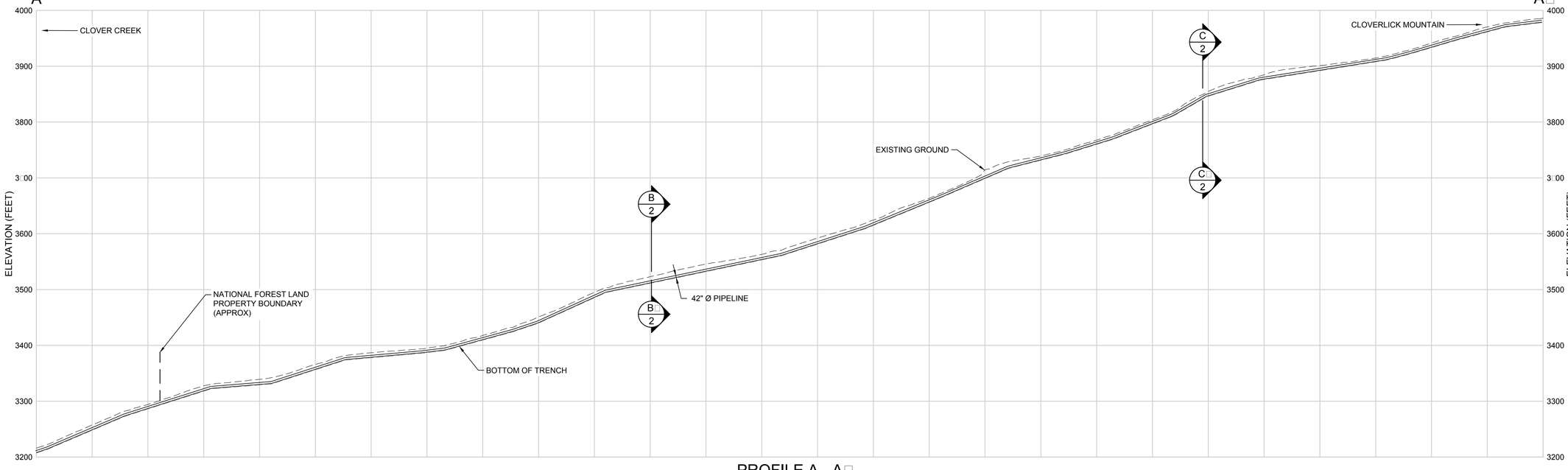
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A

0 1 in

Path: \\redmond\geomat$\geomatics\DOMINION\TypScenarios\ | File Name: 15C ACCESS TO REMOTE ROW LOCATIONS.dwg



PLAN



PROFILE A - A□

LEGEND

- 2650 — EXISTING GROUND ELEVATION CONTOUR (FT, MSL)
- LOD — LIMIT OF DISTURBANCE
- PERMANENT (ROW)
- TEMPORARY (ROW)
- EXTRA WORK SPACE

0 100 200
SCALE IN FEET

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 1□, US SURVEY FOOT, CENTRAL MERIDIAN 81 W.
2. STATIONING SHOWN IS SLOPE STATIONING.
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY GAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
5. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.

□. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS □□0□□

TITLE: GEOHAZARD MITIGATION SITE-SPECIFIC DESIGN PLAN AND PROFILE A-A□

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP □3.20 TO □3.50 (AP-1)

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000□.13
CHECKED BY:	LB/TR	FILE:	TXG000□13D01
REVIEWED BY:	RS	DRAWING NO.:	1 OF 2
APPROVED BY:	TR		

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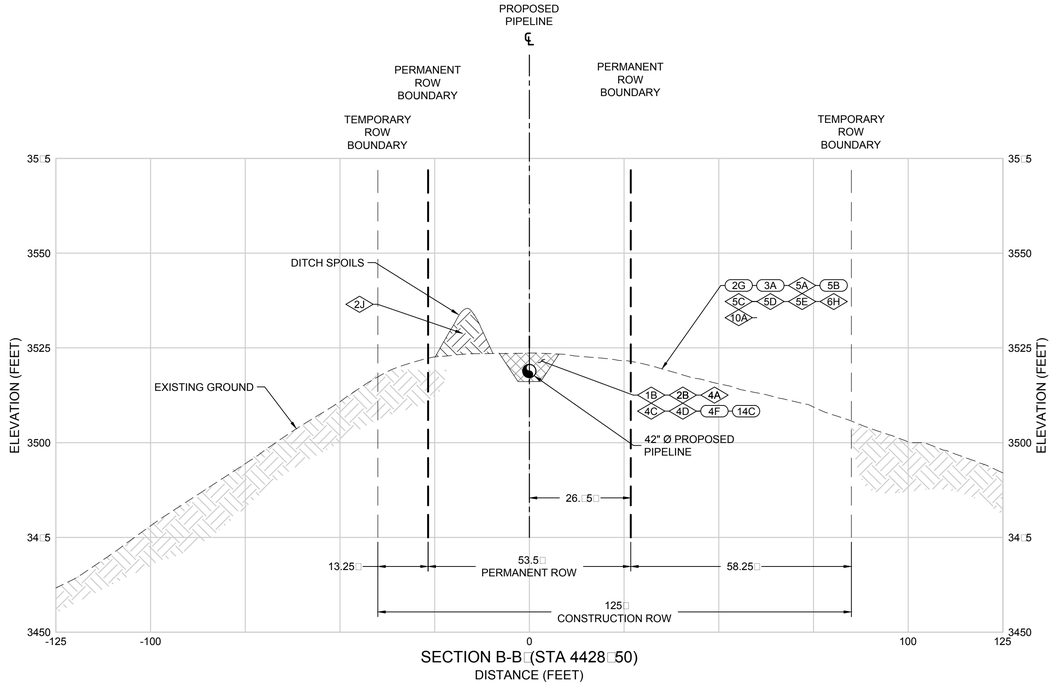
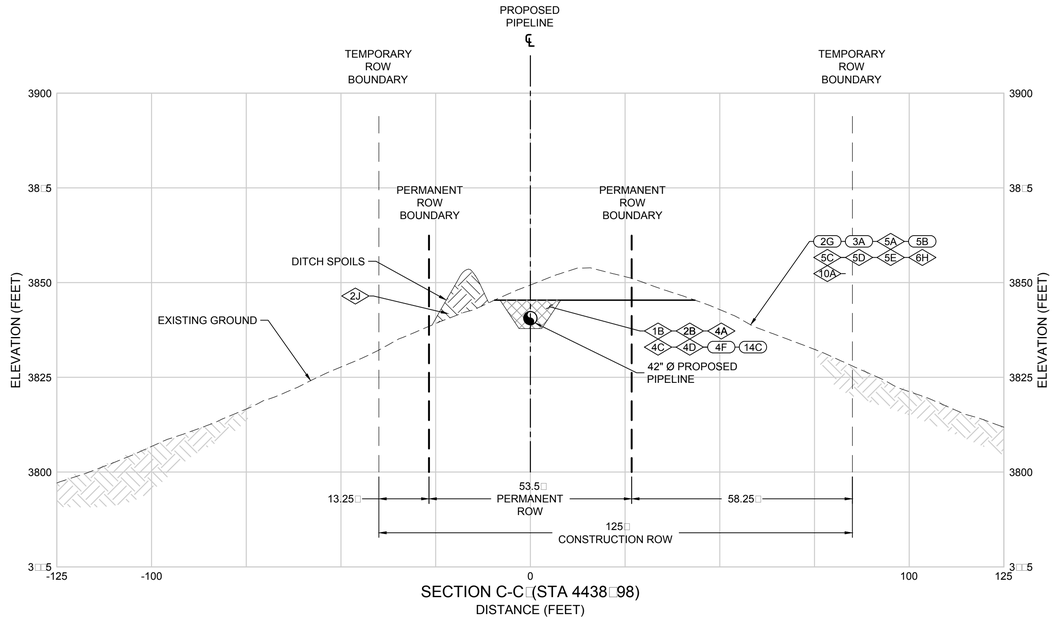


SECTION B-B (STA 4428+50)
DISTANCE (FEET)



SECTION C-C (STA 4438+98)
DISTANCE (FEET)

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

1B	ENHANCED DRAIN (GERMAN DRAIN)
2A	GRADING TEMPORARY ROW SURFACE
2B	GRADING TRENCH WITH OUTBOARD WEDGE
2G	GRADING TO MATCH EXISTING CONTOURS
2J	SPOILS MANAGEMENT
3A	TRACK DISTURBED SLOPES
4A	TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
4C	SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
4D	SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
4F	TRENCH BREAKER WITH DRAINAGE
5A	SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
5B	SLOPE BREAKER ARMORED OUTLET
5C	SLOPE BREAKERS WITH DIVERSION CHANNELS
5D	ACCESS ROADS
5E	TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
6H	TYP SURFACE WATER CONTROL LAYOUT
10A	BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
14C	BLASTING PLAN(S)

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 20 40
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE-SPECIFIC DESIGN SECTIONS B-B AND C-C

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP 3.20 TO 3.50 (AP-1)

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000-13
CHECKED BY:	LB/TR	FILE:	TXG000-13D02
REVIEWED BY:	RS	DRAWING NO.:	2 OF 2
APPROVED BY:	TR		

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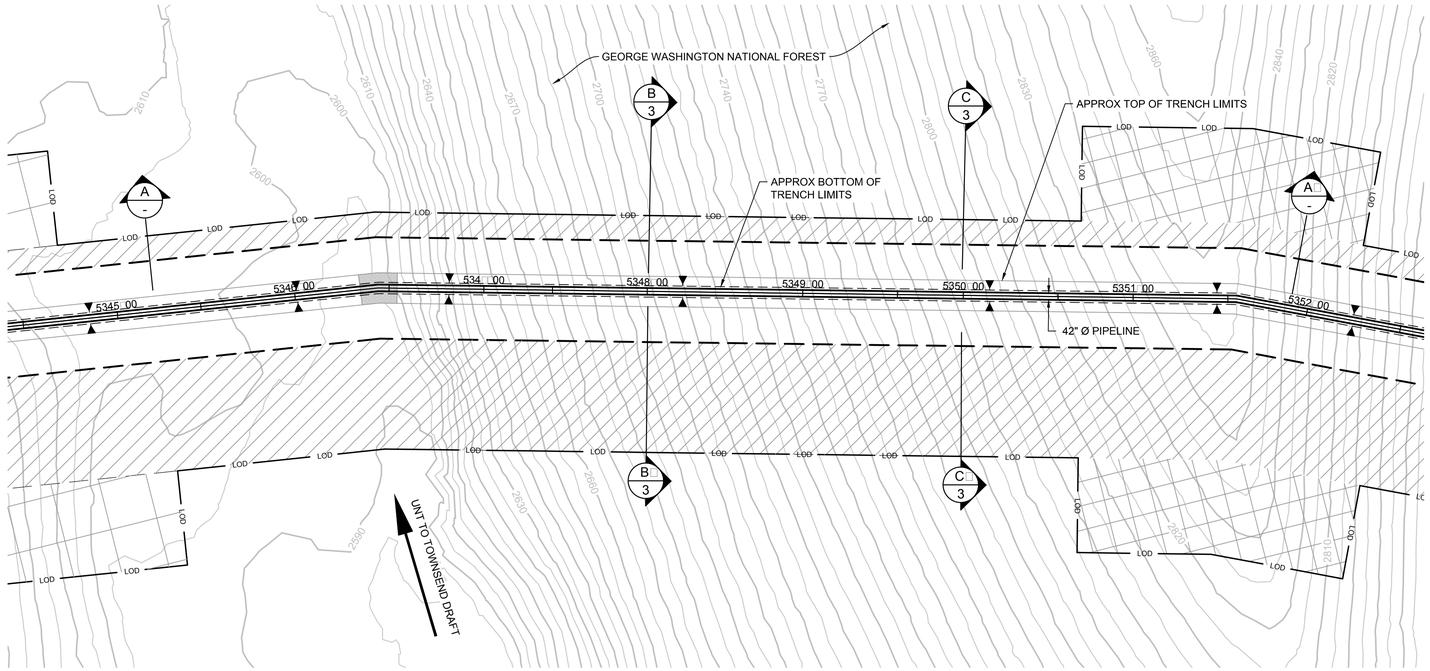
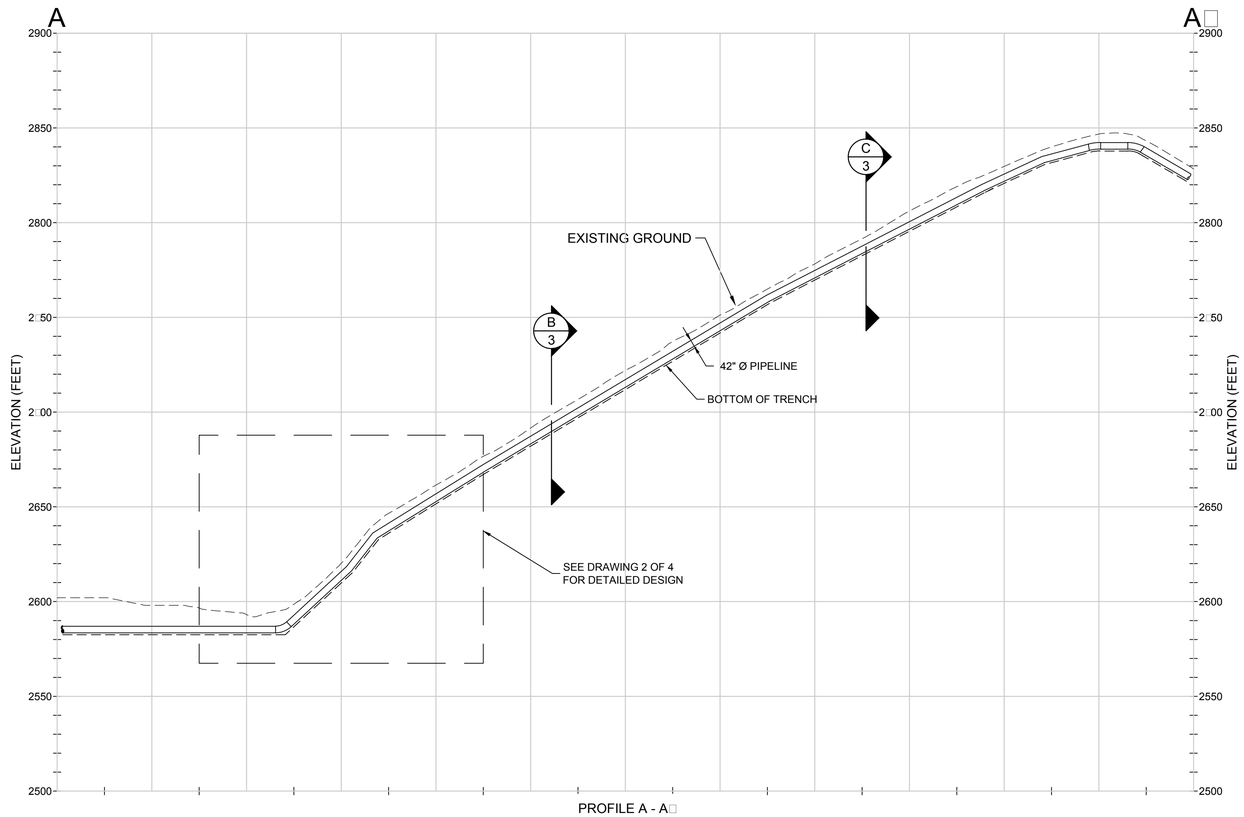


PLAN



PROFILE A - A□

LEGEND

- EXISTING GROUND ELEVATION CONTOUR (FT, MSL) — 2650
- LIMIT OF DISTURBANCE — LOD
- PERMANENT (ROW)
- TEMPORARY (ROW)
- EXTRA WORK SPACE

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 1□, US SURVEY FOOT, CENTRAL MERIDIAN 81 W.
2. STATIONING SHOWN IS SLOPE STATIONING.
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY GAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
5. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.

□. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 40 80
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS □□0□□

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN
PLAN AND PROFILE A-A□

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000□13
CHECKED BY:	LB/TR	FILE:	TXG000□13D03
REVIEWED BY:	RS	DRAWING NO.:	1 OF 4
APPROVED BY:	TR		

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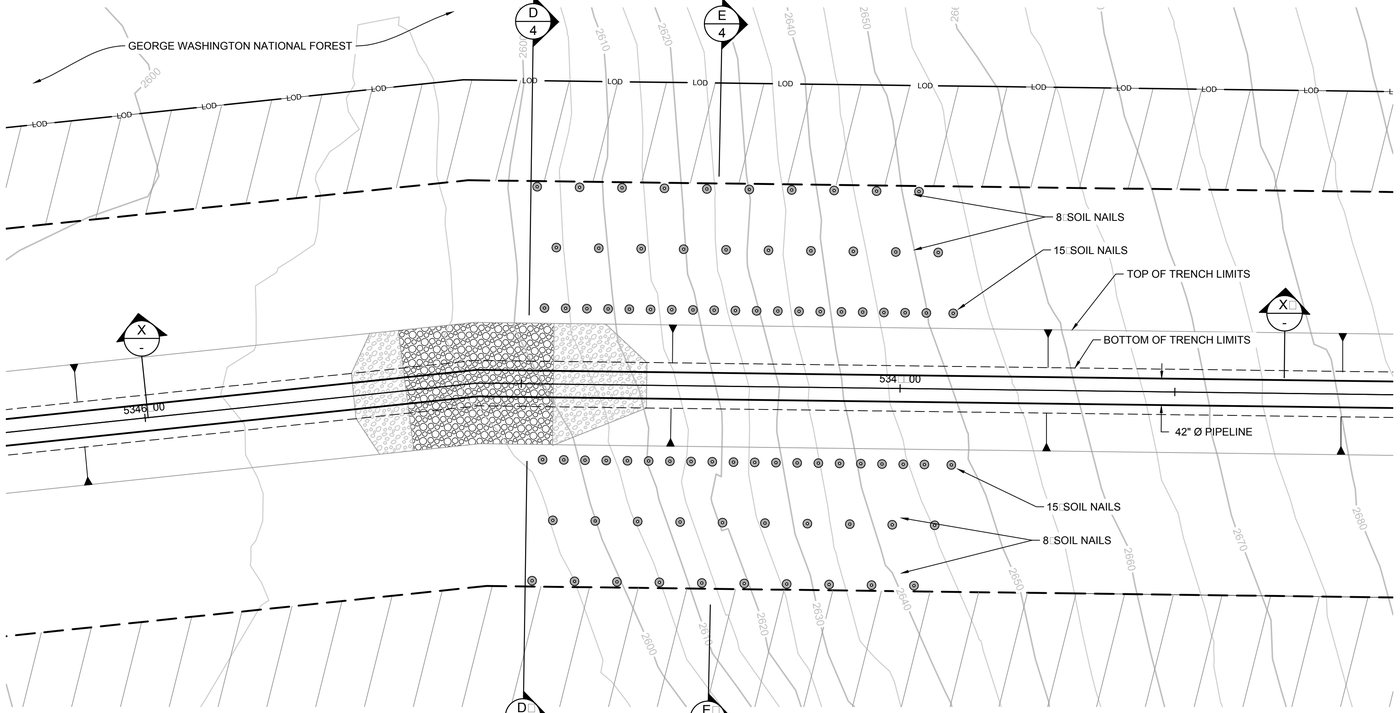


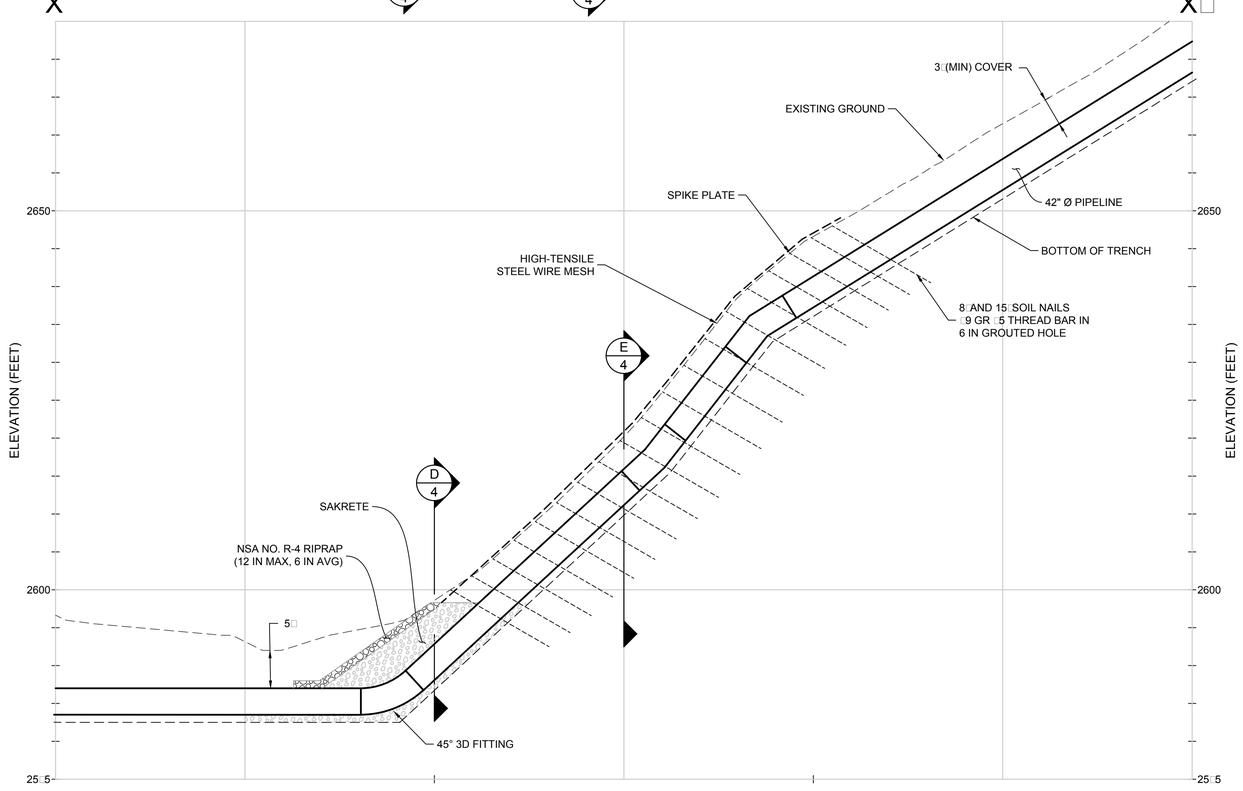
LEGEND

- 2650 — EXISTING GROUND ELEVATION CONTOUR (FT, MSL)
- LOD — LIMIT OF DISTURBANCE
- PERMANENT (ROW)
- TEMPORARY (ROW)
- EXTRA WORK SPACE

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 1□, US SURVEY FOOT, CENTRAL MERIDIAN 81 W.
2. STATIONING SHOWN IS SLOPE STATIONING.
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY GAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
5. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.

□. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.



0 10 20
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS □□0□□

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN - DETAILED PLAN AND PROFILE X-X□

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000□.13
CHECKED BY:	LB/TR	FILE:	TXG000□13D05
REVIEWED BY:	RS	DRAWING NO.:	2 OF 4
APPROVED BY:	TR		

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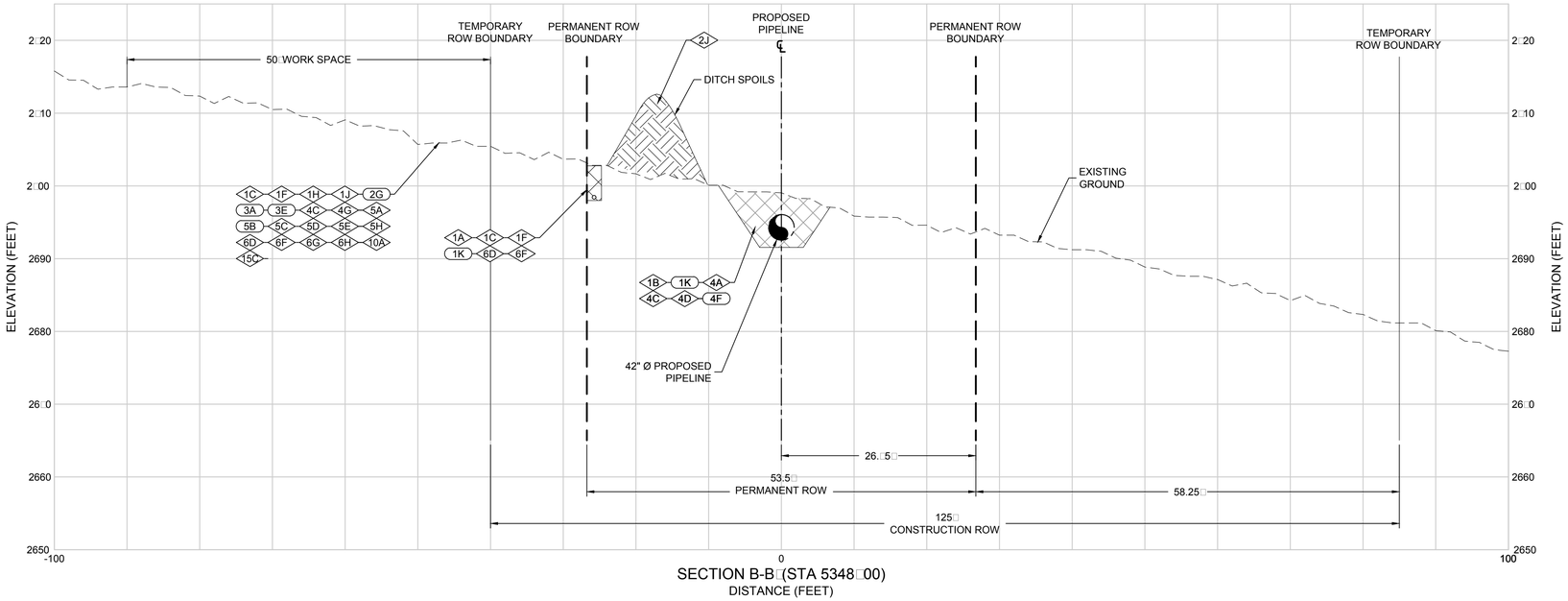
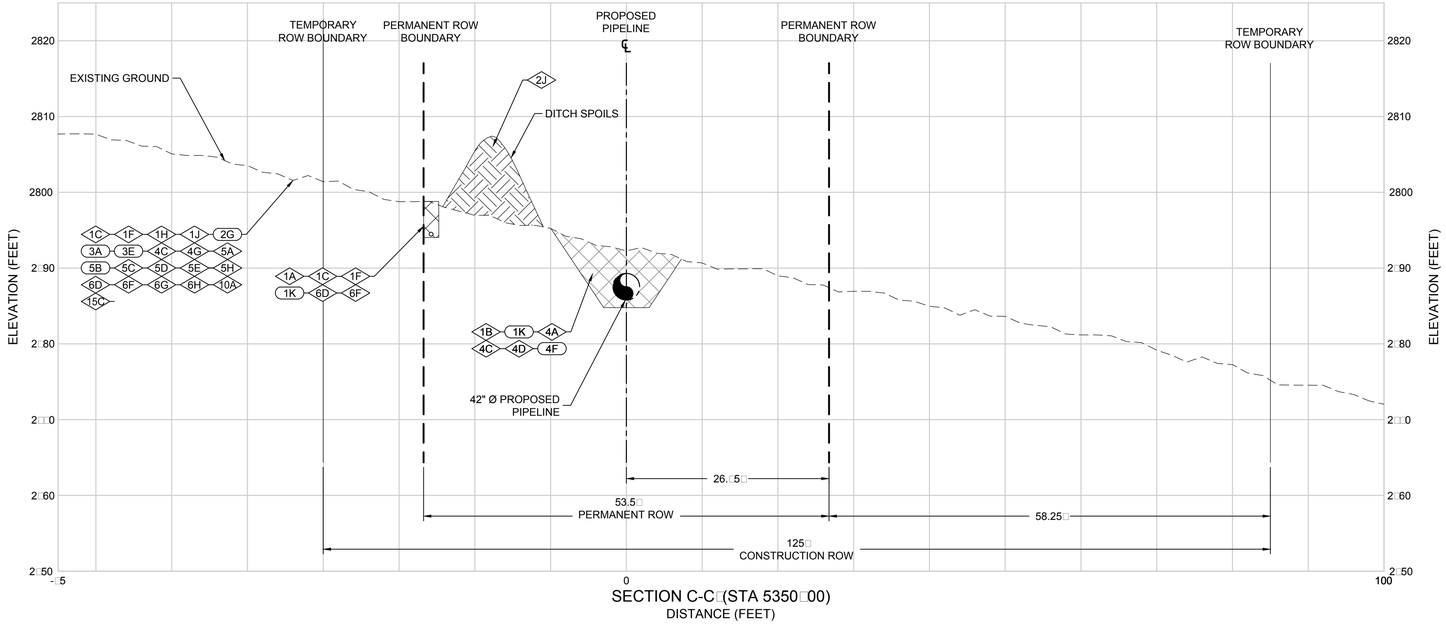


SECTION B-B' (STA 5348+00)



SECTION C-C' (STA 5350+00)

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

1B	ENHANCED DRAIN (GERMAN DRAIN)
1C	TARGETED SEEP DRAINS, AT INTERSEPTED SEEPS
1F	ARMORED CHANNEL WITH DRAIN PIPE
1H	STEEP CONVEYANCE CHANNEL
1I	CHANGED SEEP CHARACTERISTICS
1J	SINGLE TARGETED SEEP COLLECTOR
1K	ENERGY DISSIPATION BASIN
2G	GRADING TO MATCH EXISTING CONTOURS
2J	SPOILS MANAGEMENT
3A	TRACK DISTURBED SLOPES
3E	COIR LOGS ON DISTURBED SLOPES
4A	TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
4C	SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
4D	SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
4F	TRENCH BREAKER WITH DRAINAGE
4G	SACK-CRETE ARMOR WITH BREAKERS
5A	SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
5B	SLOPE BREAKER ARMORED OUTLET
5C	SLOPE BREAKERS WITH DIVERSION CHANNELS
5D	ACCESS ROADS
5E	TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
5H	SURFACE WATER DIVERSIONS
6D	ARMORED CHANNEL
6F	RIPRAP GRADATIONS
6G	ARMORED V-SHAPED AND U-SHAPED CHANNELS
6H	TYP SURFACE WATER CONTROL LAYOUT
10A	BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
15C	ACCESS TO REMOTE ROW LOCATIONS

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 10 20

SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants

GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: MP85 SECTIONS B-B' AND C-C'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000.13
CHECKED BY:	LB/TR	FILE:	TXG000.13D04
REVIEWED BY:	RS	DRAWING NO.:	3 OF 4
APPROVED BY:	TR		

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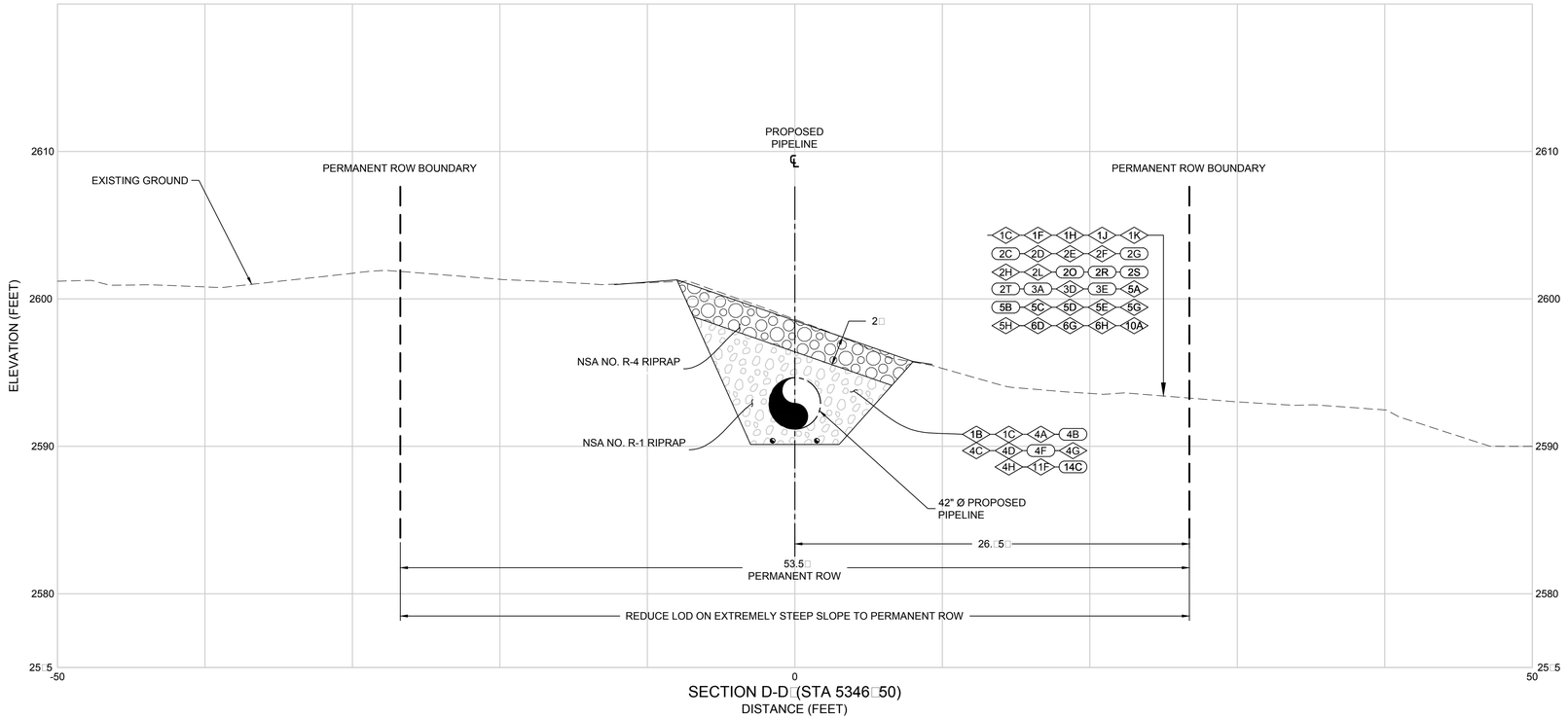
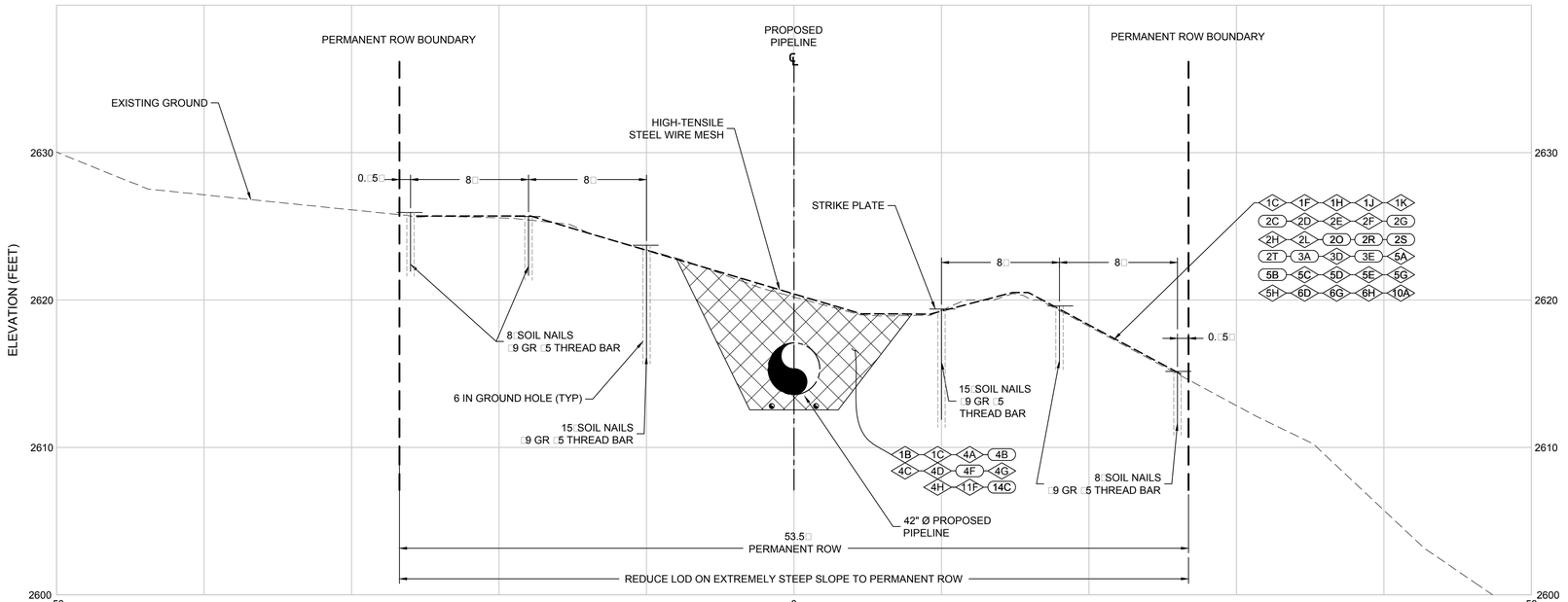


BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1B ENHANCED DRAIN (GERMAN DRAIN)
- 1C TARGETED SEEP DRAINS, AT INTERSEPTED SEEPS
- 1F ARMORED CHANNEL WITH DRAIN PIPE
- 1H STEEP CONVEYANCE CHANNEL
- 1I CHANGED SEEP CHARACTERISTICS
- 1J SINGLE TARGETED SEEP COLLECTOR
- 1K ENERGY DISSIPATION BASIN
- 2B GRADING TRENCH WITH OUTBOARD WEDGE
- 2C COMPACT BACKFILL
- 2D DRY SOILS AND BACKFILL
- 2E REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL
- 2F ROCK BACKFILL (WITH DRAIN)
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2H GRADING TO MINIMIZE BACKFILL
- 2L SOIL-NAIL WITH TECCO MESH
- 2O BENCH AND REGRADE WITH BACKFILL
- 2R TYP SECTION VIEW FILL WITH ROCK UNDER DRAIN
- 2S TYP PLAN VIEW FILL WITH ROCK UNDER DRAIN
- 2T TYP FILL WITH MULTIPLE ROCK CHANNELS
- 3A TRACK DISTURBED SLOPES
- 3D ROCK ARMORING ON DISTURBED SLOPES
- 3E COIR LOGS ON DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4B TRENCH DAMS (FOAM BAGS OR FINE GRAINED SOILS)
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 4G SACK-CRETE ARMOR WITH BREAKERS
- 5G NO WOOD CHIPS IN ROW
- 4H FLOWABLE FILL FOR TRENCH BACKFILL
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 5G NO WOOD CHIPS IN ROW
- 5H SURFACE WATER DIVERSIONS
- 6D ARMORED CHANNEL
- 6G ARMORED V-SHAPED AND U-SHAPED CHANNELS
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS
- 14C BLASTING PLAN(S)



NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 5 10
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS □□0□□

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN - SECTIONS D-D□ AND E-E□

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

DESIGN BY:	LB/TR	DATE:	NOVEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG000□13
CHECKED BY:	LB/TR	FILE:	TXG000□13D0□
REVIEWED BY:	RS	DRAWING NO.:	4 OF 4
APPROVED BY:	TR		

PRELIMINARY
NOT FOR CONSTRUCTION

P:\ACAD\PROJECTS\AA\ATLANTIC COAST PIPELINE\GEOHAZARD ANALYSIS\MITIGATION DESIGN\F SERVICE SITE DESIGN\TXG000 1210\DRAWINGS\TXG000 1300

ACP SITE SPECIFIC STABILIZATION MEETING

Date/Time: December 8, 2016 @ 3:00pm- 5:00pm US Eastern Standard Time
Location: Conference Call/GoTo Meeting
Attendees:

Forest Service	Jennifer Adams, Kent Karriker, Pam Edwards, Karen Stevens, Stephanie Connolly, Steffany Scagline, Angela Parish, Pauline Adams, Tom Bailey, Tom Collins
Federal Energy Regulatory Commission (FERC)	Robert Kopka
Merjent	Kim Jessen, Jeff Mackenthun, Kate Mize
Dominion	Richard Gangle, Brian Wilson, Brittany Moody, Greg Park, Leslie Hartz, Robert Hare, Colin Olness
Geosyntec	Alex Green, Tony Rice, Kathleen Harrison, Logan Brandt, Rodolfo Sancio
Golder Associates	Andreas Kammereck
W. Virginia University	Jim Thompson
Galileo Project	Maria Martin, Peter Rocco

Introduction & Background
The Forest Service (FS) reviewed the materials presented on the November 21, 2016 meeting and scheduled this meeting to further discuss Atlantic Coast Pipeline's (ACP) Best in Class (BIC) approach to stabilizing terrain on steep slopes.

Discussion
Effectiveness of controls: The FS asked for specific/targeted evidence of the effectiveness of the BIC controls to stabilize terrain on conditions similar to that found in the two forests. Kent noted the FS has asked for this documentation several times, starting with their comments on the draft resource report. The FS needs assurances the BIC approach has a reasonable chance of preventing the types of slope failures seen recently. Pam said the FS understands some of this information might be proprietary and there may be a small sample size, but whatever information that Dominion has would be useful. After Dominion asked about the type of evidence the FS would like, she indicated that the FS ideally would like to see peer reviewed data and research, preferably quantifiable comparisons of the different controls if that is available. Jim added ACP likely put some thought into selecting the BIC controls, so whatever evidence they used to determine the controls might also be helpful. He noted that peer-reviewed studies may be limited in number, so case studies may have to be used. Any case studies presented should represent an exhaustive cross-section of successes and failures.

Colin indicated that he understands what type of information the FS is looking for. He suggested, however, that it may be difficult to compile because individual pipeline owners track effectiveness for their own projects and do not make that information available to the public. Andreas said the BIC controls are industry standard and were selected based on practical

experience and work done over decades in a variety of terrains. Golder Associates considered their experience with other pipeline clients in West Virginia during BIC program development. He noted that identifying the problems and problem locations was more in the purview of Geosyntec and that Golder Associates was brought in to help identify controls to address the specific topography, soil, geology and hydrologic conditions found here. He said there are places in the project area where the FS could see these controls installed.

Stephanie C. expressed appreciation for Andreas' summary. Citing research concluding that frequently used and generally accepted silt fences are not effective, Stephanie C. said the FS may not be willing to accept the BIC controls just because everyone else uses them, the FS needs evidence. General acceptance does not necessarily equate to effectiveness. Pam said the FS understands there is some variability based on whether controls are installed correctly and maintained, but information to support the effectiveness is needed.

Robert K. suggested that if the FS has pipelines on National Forest System (NFS) lands FS could go into the field to review the effectiveness of controls. He said FERC has inspection reports available and in his experience has not seen a project cause a major landslide. He noted that erosion and slips are normal occurrences on pipeline construction sites. Kent replied the FS has seen issues on NFS lands. Jim suggested the burden of proof is on ACP, not the FS. Robert K. suggested that ACP could coordinate a field trip for FS to inspect pipelines in the area.

Stephanie C. stated that the FS does not monitor the pipelines for the companies that have special use permits on the Forest. She stated that these lines are decades old and were constructed in a time period where Forest Management Plans did not exist. This comparison of our existing pipelines and this proposal is not relevant to our current discussions with complying with the MNF current Forest Plan and laws like the Clean Water Act.

Colin noted Andreas recently presented a summary of lessons learned to the Interstate Natural Gas Association of America (INGAA). Andreas clarified the presentation was more about a program to identify and mitigate site conditions rather than a summary of effectiveness of controls. He will further investigate options for collecting data on effectiveness that can be correlated, if any, to the site conditions on the NFS lands. Jim and Stephanie suggested geology and the Order 2 Soil Survey information could help with the correlation.

Action: **Andreas** provides his INGAA report.
Action: **ACP** considers how to provide documentation of erosion control effectiveness and slope stability effectiveness.

Site selection criteria: Kent said the FS wants to know how ACP identified the 24 sites proposed for the site-specific design portion of the BIC program. Colin said the 24 sites did not fit into the

6 typical BIC scenarios presented in the materials submitted for the November 21 meeting. Tony said approximately 500 locations with slopes greater than 30% or longer than 100 feet were screened for inclusion in the BIC program. Site specific designs within the BIC program were selected because they have evidence of active movement or the potential for increased instability when disturbed. He said the BIC controls would not be limited to the 24 sites; the controls would be used on any slope greater than 30%.

Jim asked what constitutes evidence of movement and what goes into the determination that a slope may be become unstable. Tony said screening for evidence of movement was conducted using aerial images, LiDAR and field reconnaissance. Evidence of active movement included: evidence of tension cracking, timber deformation, bulging and poor drainage. Geologic formation, soils and slope were analyzed to identify potential for site instability. Jim mentioned the presence of colluvium could also be a sign. Tony agreed, but said ACP primarily looked at the features he mentioned. Colin mentioned there were two sites in the George Washington Jefferson National Forest (GWJ) undergoing more site specific investigations.

Action: **Tony** provides additional narrative on how ACP identified the 24 locations for the site-specific design portion of the BIC program.

Design plans: Using GoTo Meeting, Tom C. commented on the slides in his presentation. *See the presentation for his comments*. Colin noted the design plans were not in final form and ACP intended to schedule a meeting to solicit FS feedback before the designs were updated. Tom C. said the FS would like to see design narrative based on site conditions and a construction narrative that includes a discussion of the construction sequence and operations in relation to the plans and drawings. He also would like to know what the post reclamation profile would look like, in some cases it may not be possible to restore to the original slope. Stephanie noted that due to clay mineralogy in some parts of the MNF, the excavated soil expands and may not fit back in the trench. Also, sediment basins are often inadequate in areas with this type of mineralogy. She asked how the BIC program accounts for differences in texture and mineralogy. Colin indicated that those aspects would be addressed.

Action: **ACP** provides Tom C with the most recent alignment sheets.
Action: **Jennifer** closes the loop on whether the location identified in slide 16 is still under consideration.
Action: **ACP** updates the design plans.
Action: **Jennifer** and **Richard** coordinate a workshop to further discuss the design plans.

In-field expertise: Stephanie C. said a lot of planning and thought was put into the BIC class program and asked if subject matter experts from Golder Assoc. would be in the field during construction to guide implementation. She specifically noted the Golder Assoc. has this expertise

about the BIC controls and asked if that firm would have representatives in the field during construction, because she noted that until Golder Assoc. became involved, ACP was not displaying this type of detail or steep slope methodology in their previous presentations or filed documents. She has concerns that this level of understanding on the designs and BIC is not universal amongst all contractors. Colin said the geotechnical experts would be in the field during construction; this is written into sign-off forms.

Action: **ACP** incorporates discussion of geotechnical presence during construction phase into the Construction, Operations, and Maintenance (COM) Plan.

Material safety data sheets (MSDS): Stephanie C. referred to her comments regarding water quality made on November 21, 2016. She said agency stakeholders are interested in finding out what the water quality from the water diversion features would be. To help inform those discussions and define parameters for water quality testing, the FS would like MSDS for the pipeline, construction, rehabilitation, and maintenance related materials brought on site. Pam said this list would include fertilizers, foam materials, and pipeline coatings. Richard said ACP has not identified every potential material that would be used during the project, but noted there could be hundreds of MSDSs. Richard continued that this is an unrealistic expectation prior to construction, as it would depend on the exact manufacturer and make of every material brought onsite. MSDS for any material brought onsite are maintained onsite during the project, but cannot be identified so far in advance. He said that they could identify materials associated with the trench breakers. Jennifer said this conversation could be continued; and suggested the MSDS be attached to the COM Plan.

Kent and Stephanie asked for a full description of the structures and techniques maintenance program, and they noted that lack of maintenance likely would lead to failure. Pam clarified that the FS is asking for information about maintenance related to slope stability, not routine vegetation maintenance. Colin indicated that he thought such maintenance information was covered in the BIC portion of the COM plan.

Other discussion FS staff asked several questions that were not discussed during the call. Those questions include:

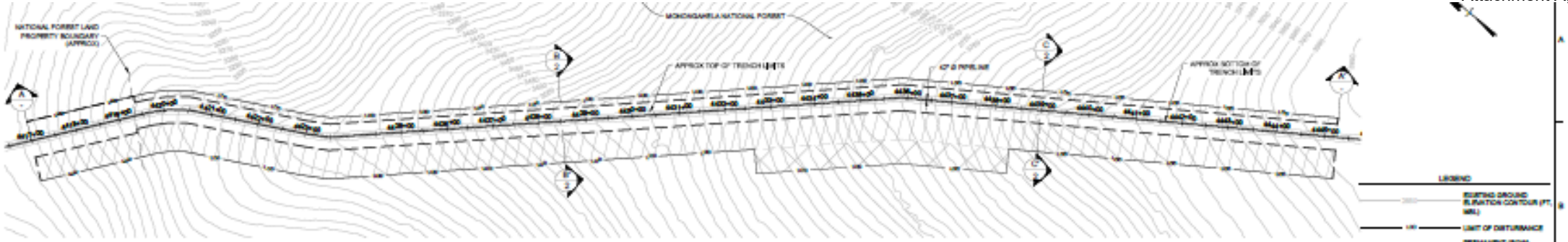
- Stephanie C. asked what criteria are used to determine the location of trench breakers and associated bleeder drains.
- Tom requested a narrative account of the construction sequence to accompany the drawings. He said that the design needs to account for swell factors, imported material for trench fill, and disposal of excess material. It may not be possible to restore the original contour.
- Pauline requested that ACP give the FS an opportunity to confirm the final route alignment, based on USFWS adjustment to buffer the small whorled pogonia site near a

stream crossing, before final site specific drawings are created. Talking about the differences in ROW alignment from the 11May16 version to the Rev11a version based on GIS shapefiles.

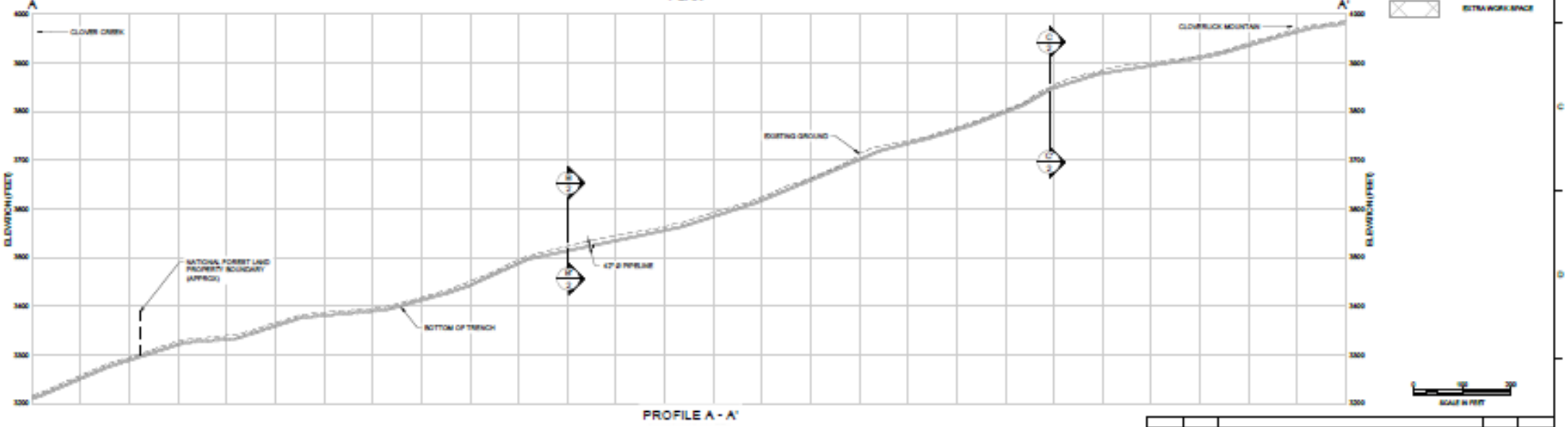
Action: **Stephanie C and Pam** compile a list of questions on BIC and site specific design plans.

Pam said the FS review of literature related to these controls suggested that maintenance is important. She said it critical for ACP to communicate what will be done to maintain the BIC control features and avoid failures that might result in pollutant release or slope instability.

Action: **ACP** updated the COM Plan to include discussion of controls maintenance and other topics discussed.



PLAN



PROFILE A - A'

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 17, US SURVEY FOOT, CENTRAL MERIDIAN 81 W.
2. STATIONING SHOWN IS SLOPE STATIONING.
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY QAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY MBORNA.
5. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
7. STANDARD EROSION AND SEDIMENT CONTROLS (NCS & EC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

REV	DATE	DESCRIPTION	BY	APP
A	11/2018	INTERNAL REVIEW COMMENTS	JJA / KH	TR

Atlantic Coast Pipeline

Geosyntec

GEOHAZARD MITIGATION SITE-SPECIFIC DESIGN
PLAN AND PROFILE A-A'

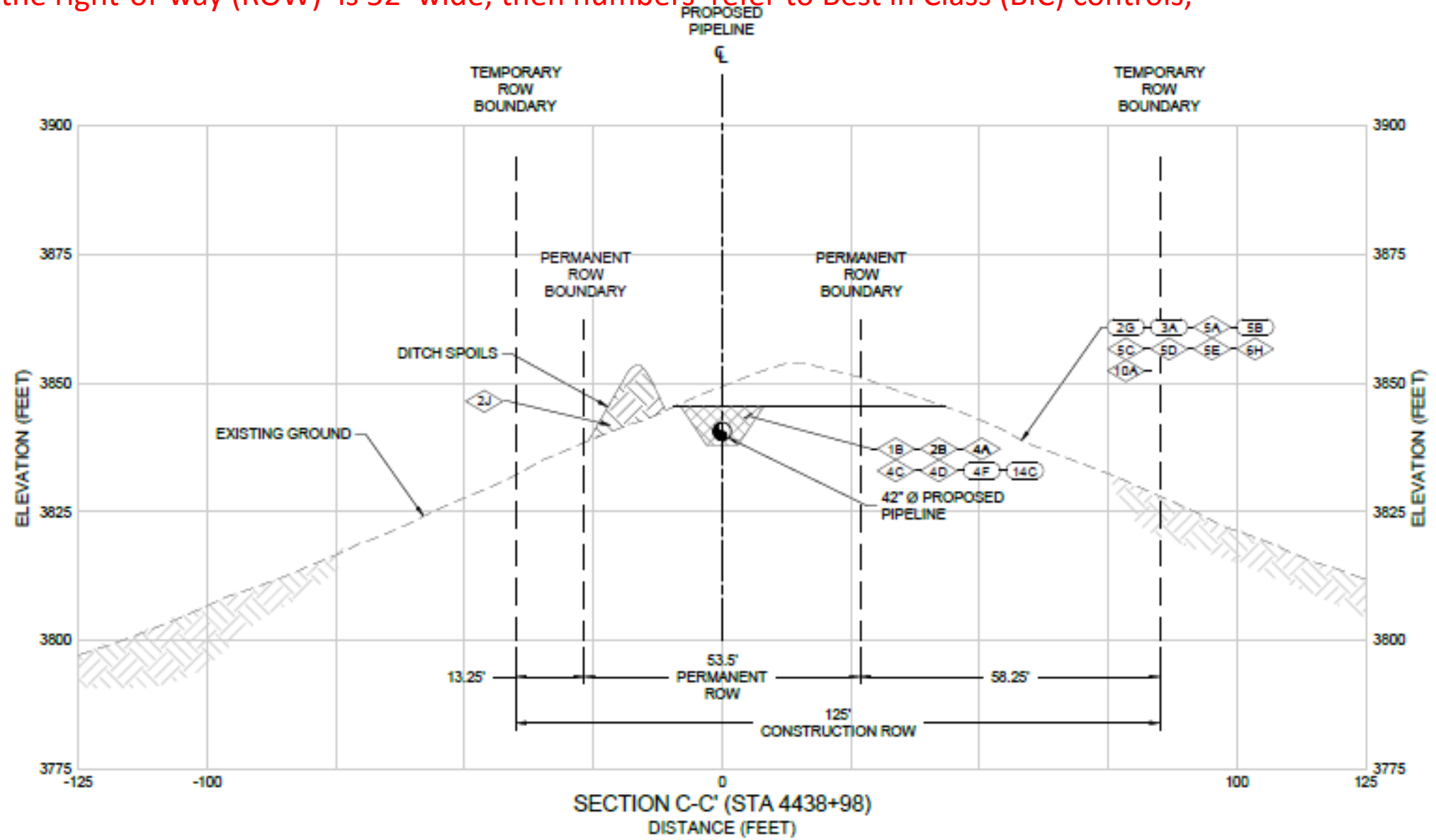
ATLANTIC COAST PIPELINE, REV 11a

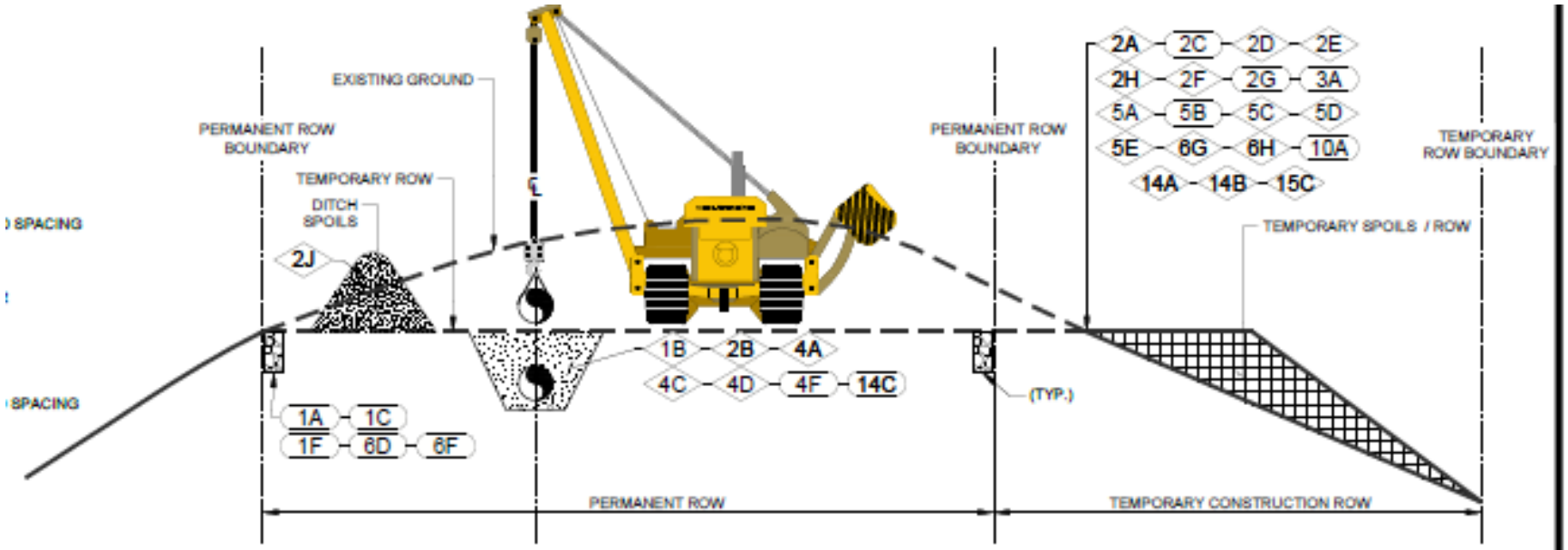
SITE SPECIFIC DESIGN
MP 73.20 TO 73.50 (AP-1)

DESIGNED BY:	LM/TR	DATE:	NOVEMBER 2018
DRAWN BY:	JJA/KH	PROJECT NO.:	TX0000713.03
CHECKED BY:	LM/TR	FILE:	TX0000713D01
REVIEWED BY:	RS	DRAWING NO.:	
APPROVED BY:	TR		1 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

Tom C. the right-of-way (ROW) is 52’ wide, then numbers refer to Best in Class (BIC) controls,





NOTES

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2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. SCENARIO SHOWN WHERE RIDGE TOP IS GENERALLY CENTERED, BUT MAY VARY WITH CUT/FILL TO ONE SIDE OR THE OTHER.

LEGEND

XX SCHEDULE A

XX SCHEDULE B

REV	DATE	REVISION DESCRIPTION	DSI	CADD	CHK	RVW
1	2016-11-10	WORKING - DRAFT	DBC	THR	AGM	AQK

NOTES

DRAFT

PROJECT

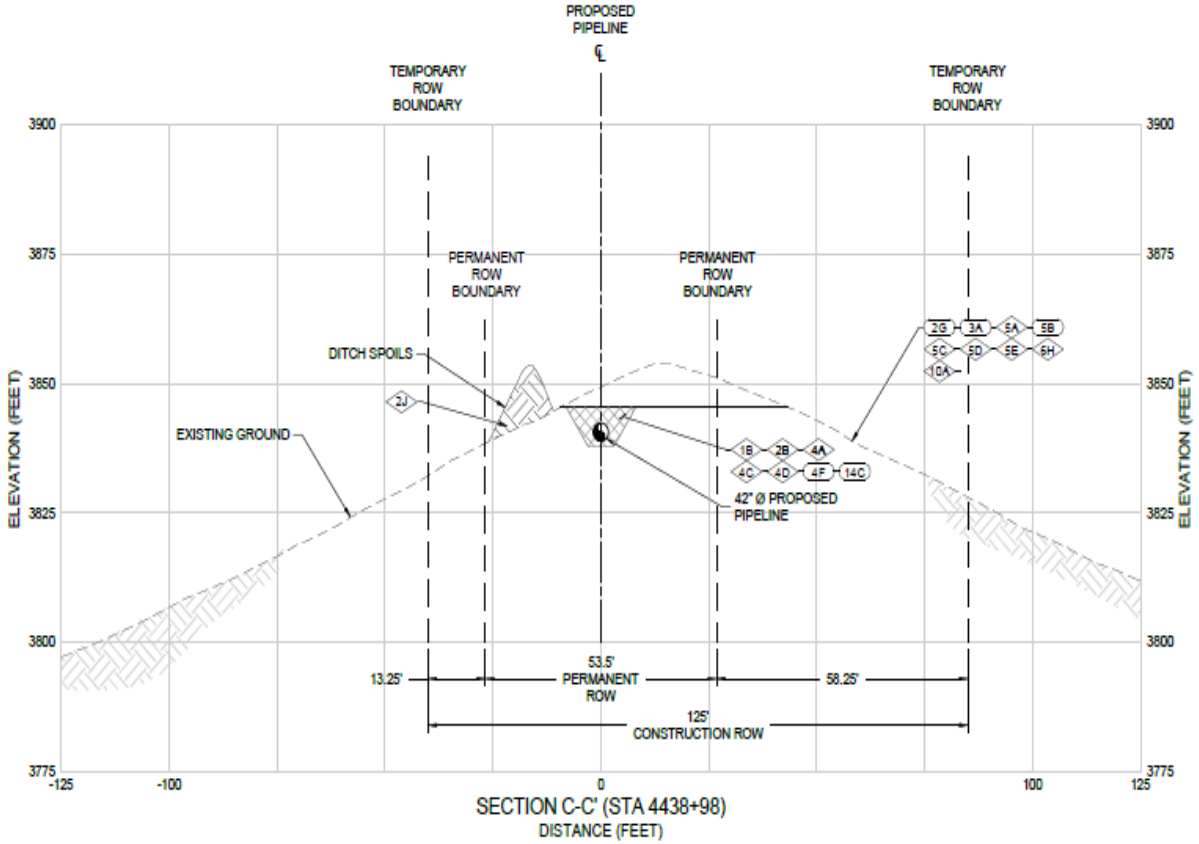
BIC STEEP SLOPE
HAZARD MITIGATION PROGRAM

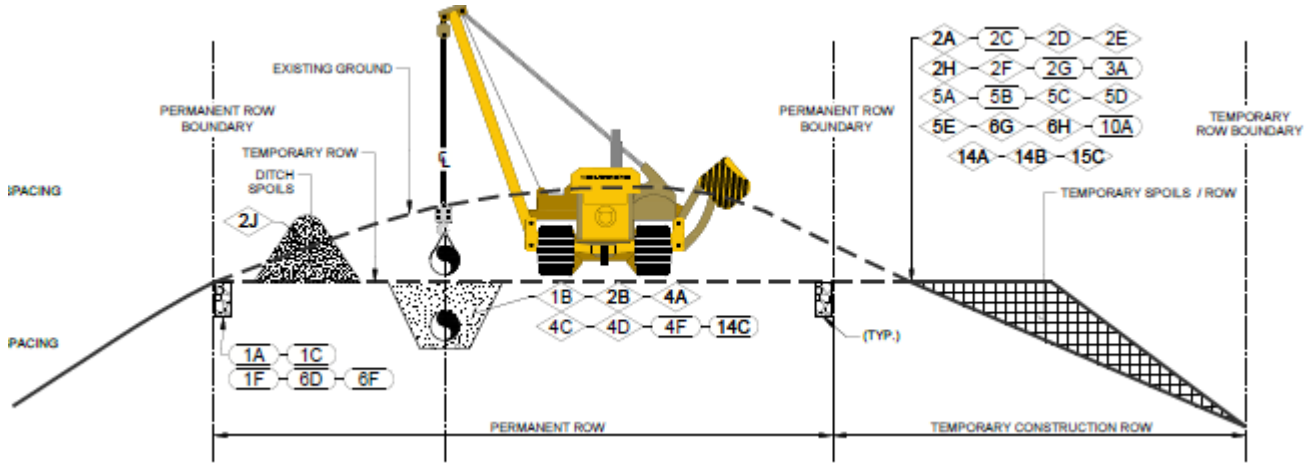
TITLE

D - STEEP SLOPES NEAR NARROW RIDGE TOPS

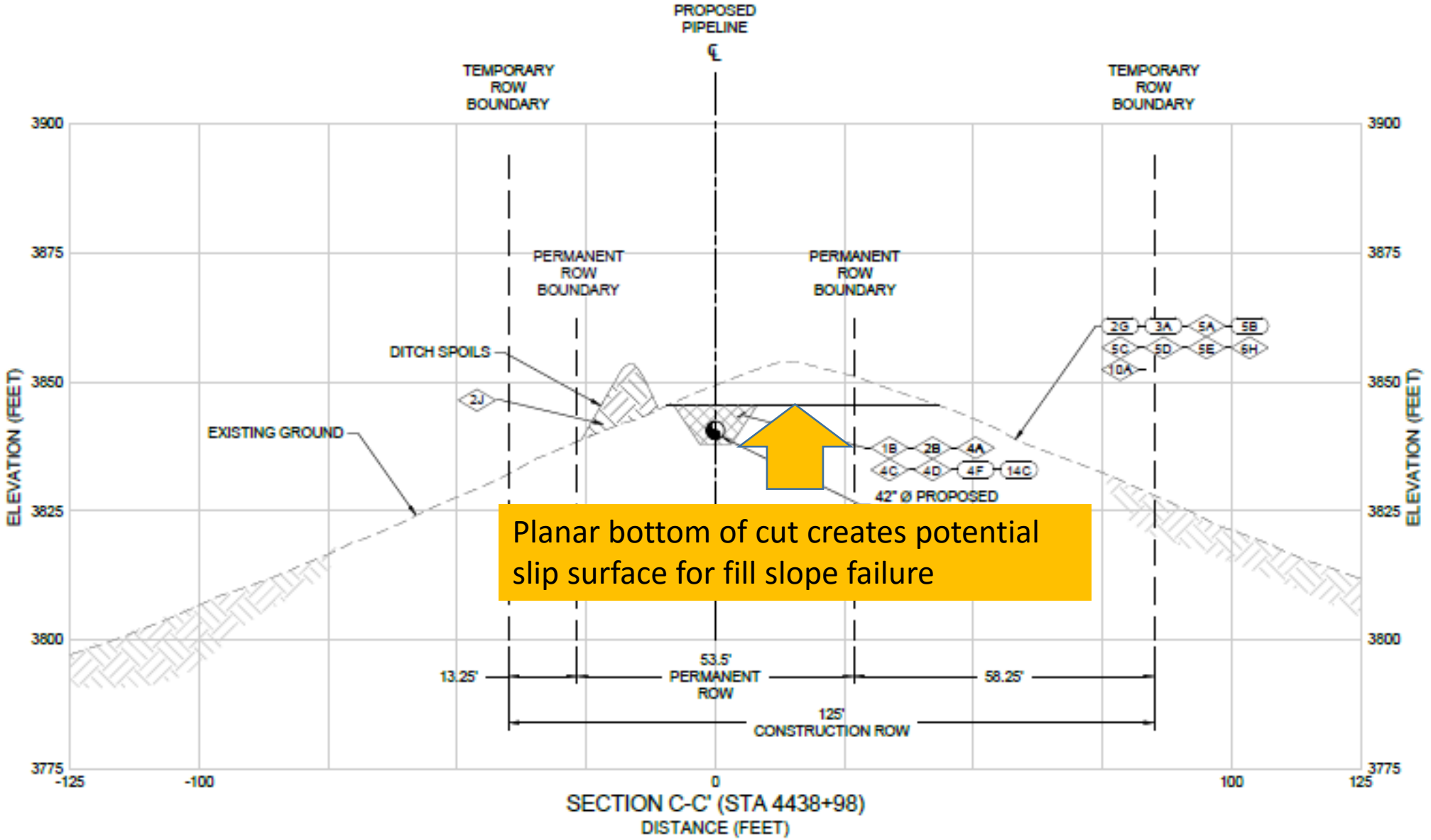
Atlantic Coast Pipeline

PROJECT No.		1535050	FILE No.	TypScenarios1
DESIGN	DBC	2016-11-10	SCALE	AS SHOWN
CADD	THR	2016-11-10	FIGURE	
CHECK	AQK	2016-11-10		1 OF 1
REVIEW	AQK	2016-11-10		

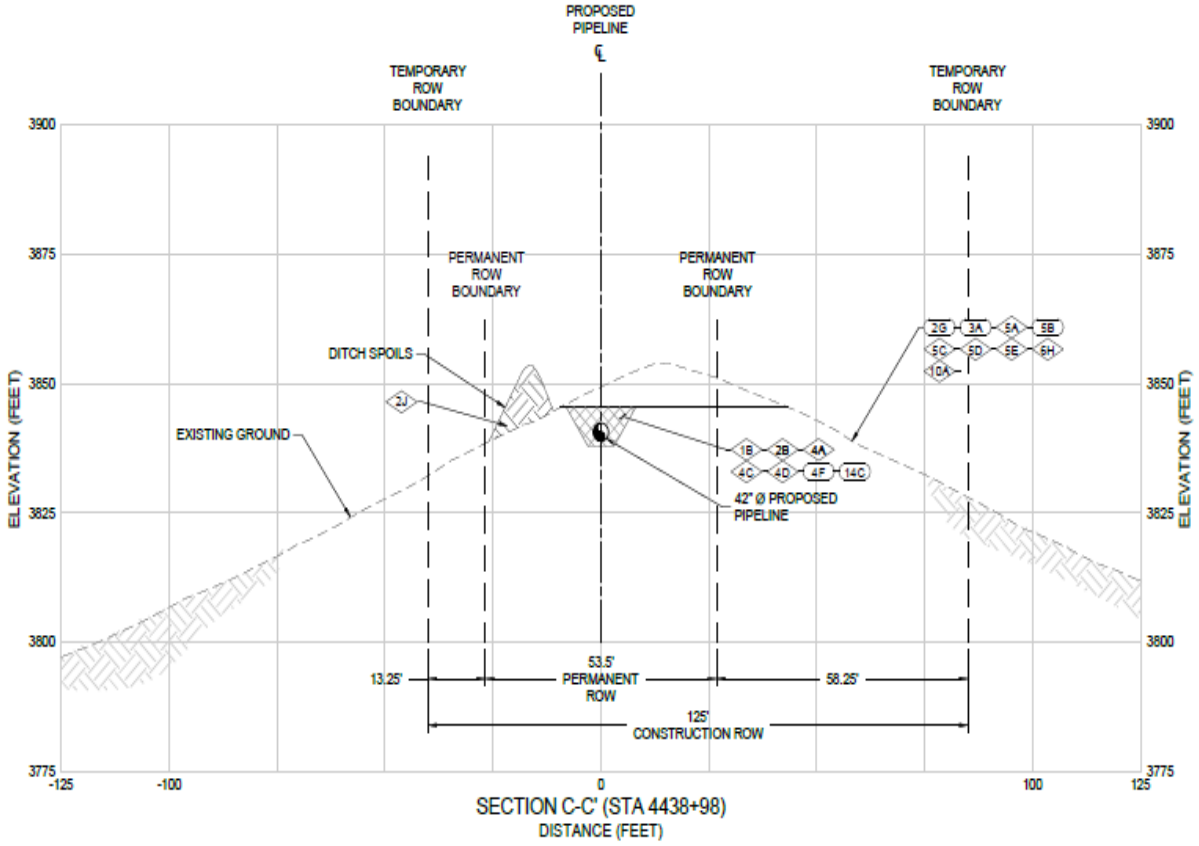


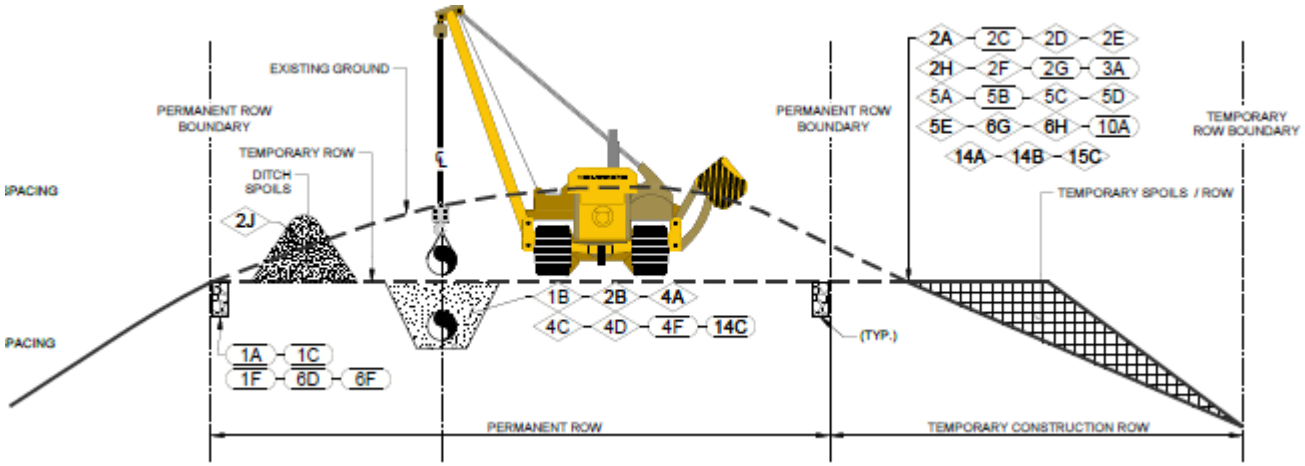


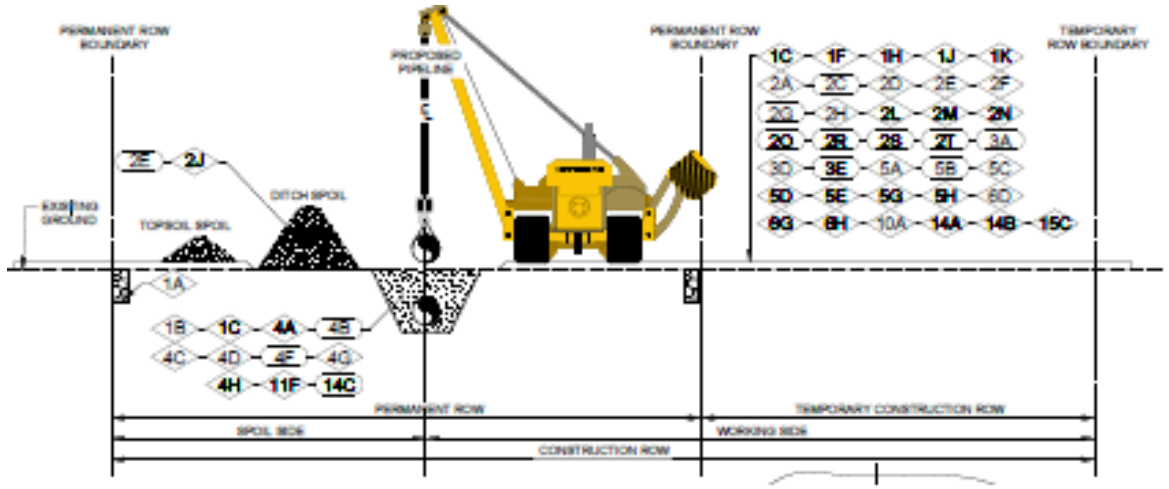
Tom C said the Forest Service (FS) want to see accounting for mass balance and how materials will be moved on the site. He added the FS wants to see designs similar to the one on the right, but to scale so it shows the amount of spoil.

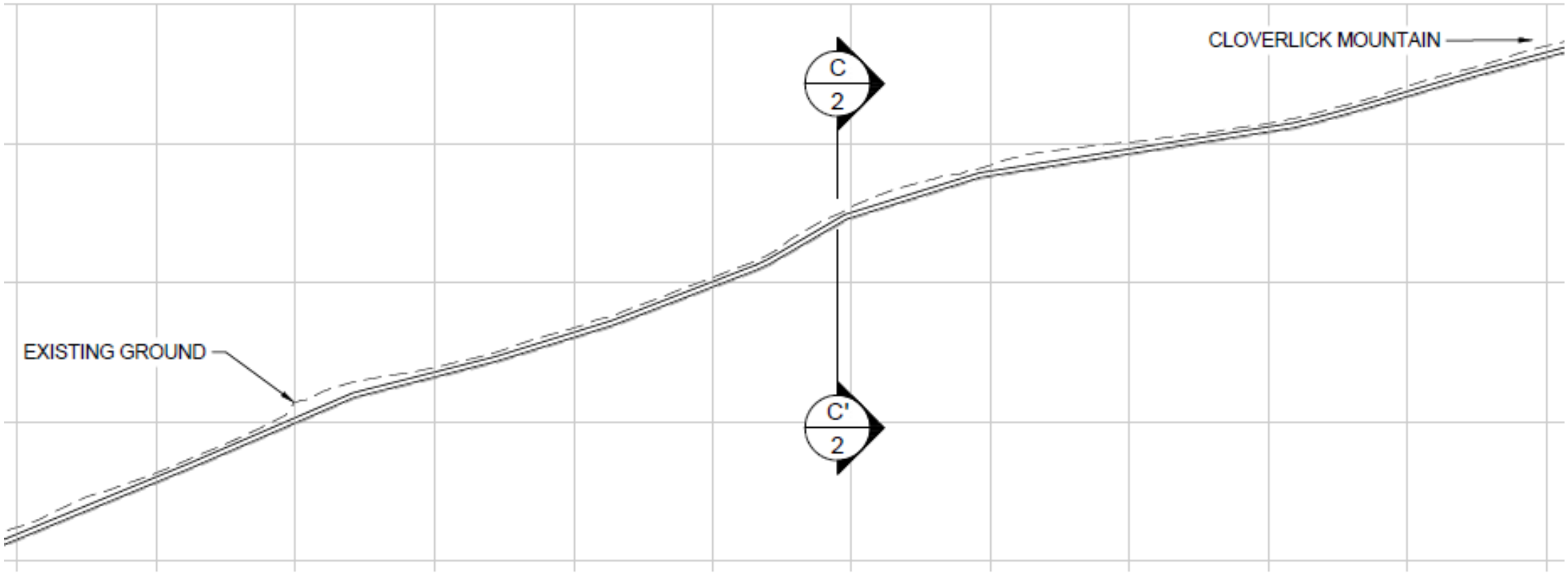


Tom C. said this 52’ wide cut creates a surface for slippage.

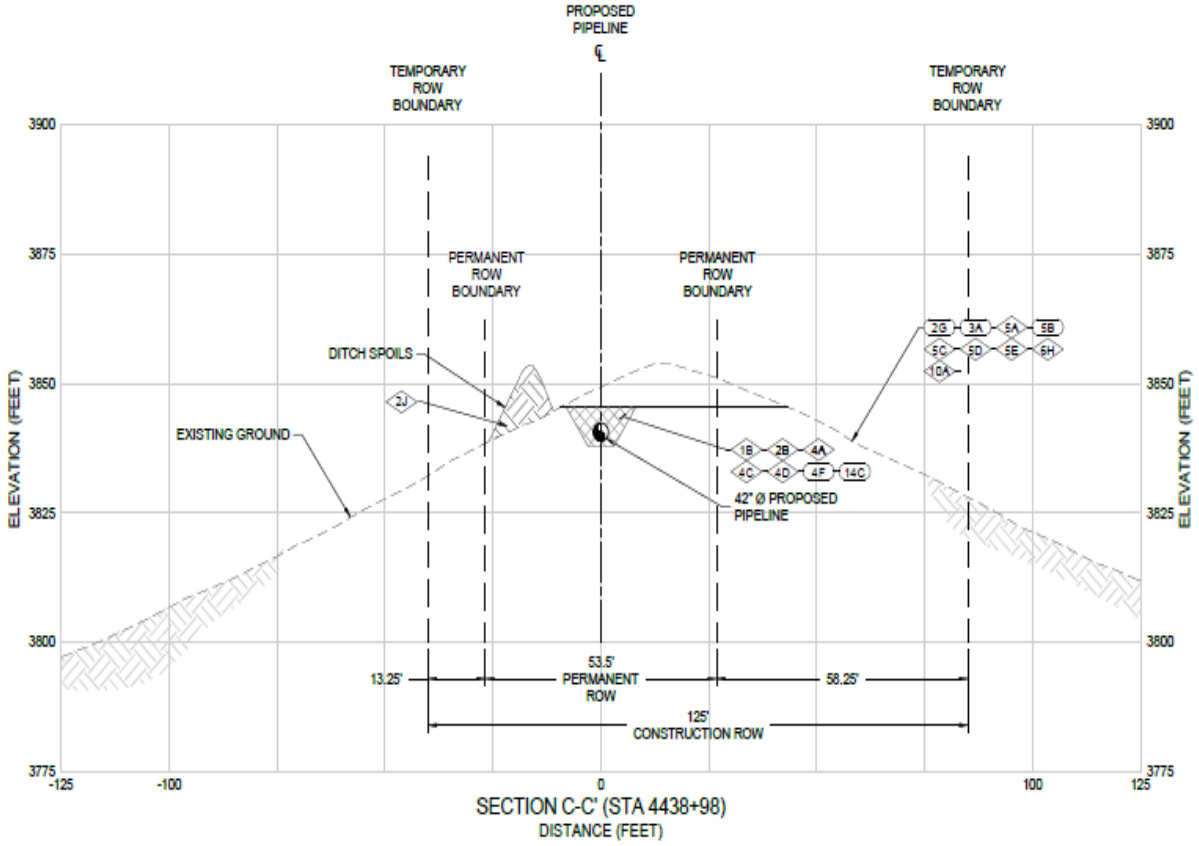

PROPOSED PIPELINE
TEMPORARY ROW BOUNDARY
TEMPORARY ROW BOUNDARY
PERMANENT ROW BOUNDARY
PERMANENT ROW BOUNDARY
DITCH SPOILS
EXISTING GROUND
42" Ø PROPOSED PIPELINE
2J
1B 2B 4A
4C 4D 4F 14C
2G 3A 5A 5B
5C 5D 5E 6H
10A
13.25'
53.5' PERMANENT ROW
58.25'
125' CONSTRUCTION ROW
ELEVATION (FEET)
3900
3875
3850
3825
3800
3775
-125
-100
0
100
125
SECTION C-C' (STA 4438+98)
DISTANCE (FEET)


EXISTING GROUND
PERMANENT ROW BOUNDARY
TEMPORARY ROW
DITCH SPOILS
2J
1A 1C
1F 6D 6F
1B 2B 4A
4C 4D 4F 14C
(TYP.)
PERMANENT ROW BOUNDARY
2A 2C 2D 2E
2H 2F 2G 3A
5A 5B 5C 5D
5E 6G 6H 10A
14A 14B 15C
TEMPORARY ROW BOUNDARY
TEMPORARY SPOILS / ROW
PERMANENT ROW
TEMPORARY CONSTRUCTION ROW


PERMANENT ROW BOUNDARY
PROPOSED PIPELINE
PERMANENT ROW BOUNDARY
TEMPORARY ROW BOUNDARY
2E 2J
DITCH SPOIL
TOPSOIL SPOIL
1A
1B 1C 4A 4B
4C 4D 4F 4G
4H 11F 14C
1C 1F 1H 1J 1K
2A 2C 2D 2E 2F
2G 2H 2L 2M 2N
2Q 2R 2S 2T 3A
3D 3E 5A 5B 5C
5D 5E 5G 5H 6D
6G 6H 10A 14A 14B 15C
PERMANENT ROW
TEMPORARY CONSTRUCTION ROW
SPOIL SIDE
WORKING SIDE
CONSTRUCTION ROW



Tom C. said this is the profile, planar surface roughly parallel to the existing slope, in order to look at that the FS will need a plan in detail.


PROPOSED PIPELINE
TEMPORARY ROW BOUNDARY
TEMPORARY ROW BOUNDARY
PERMANENT ROW BOUNDARY
PERMANENT ROW BOUNDARY
DITCH SPOILS
EXISTING GROUND
42" Ø PROPOSED PIPELINE
ELEVATION (FEET)
3900
3875
3850
3825
3800
3775
-125
-100
0
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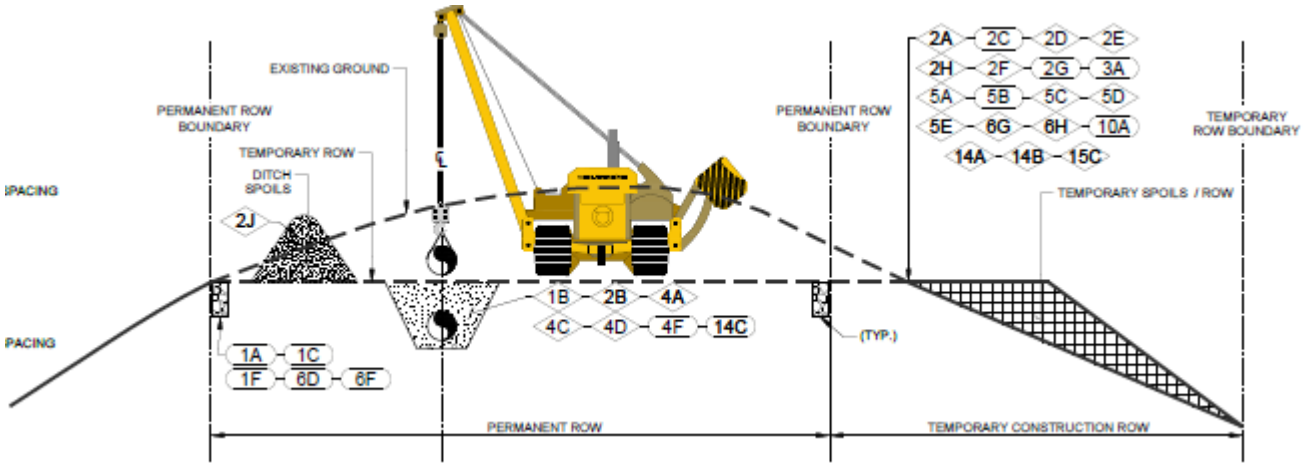
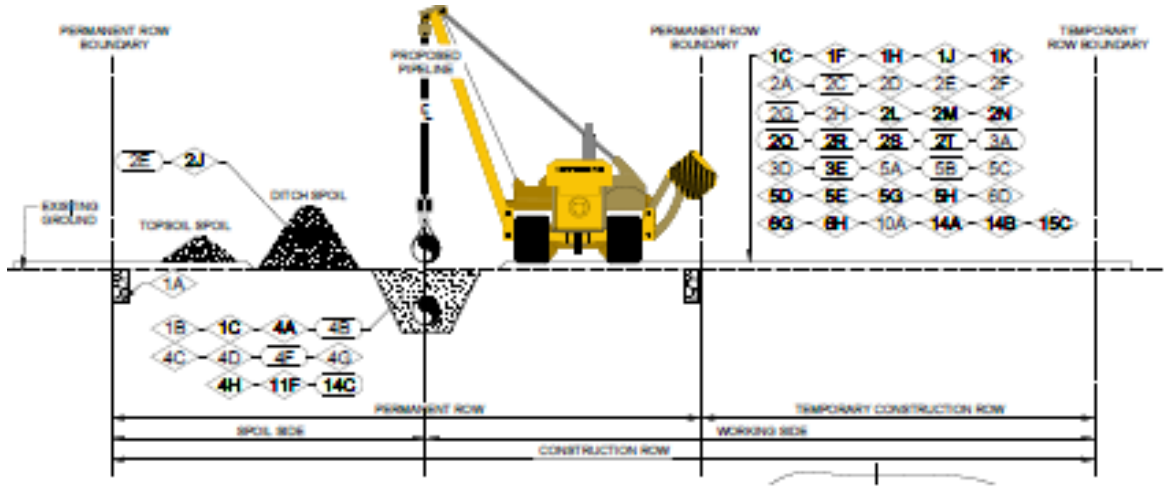
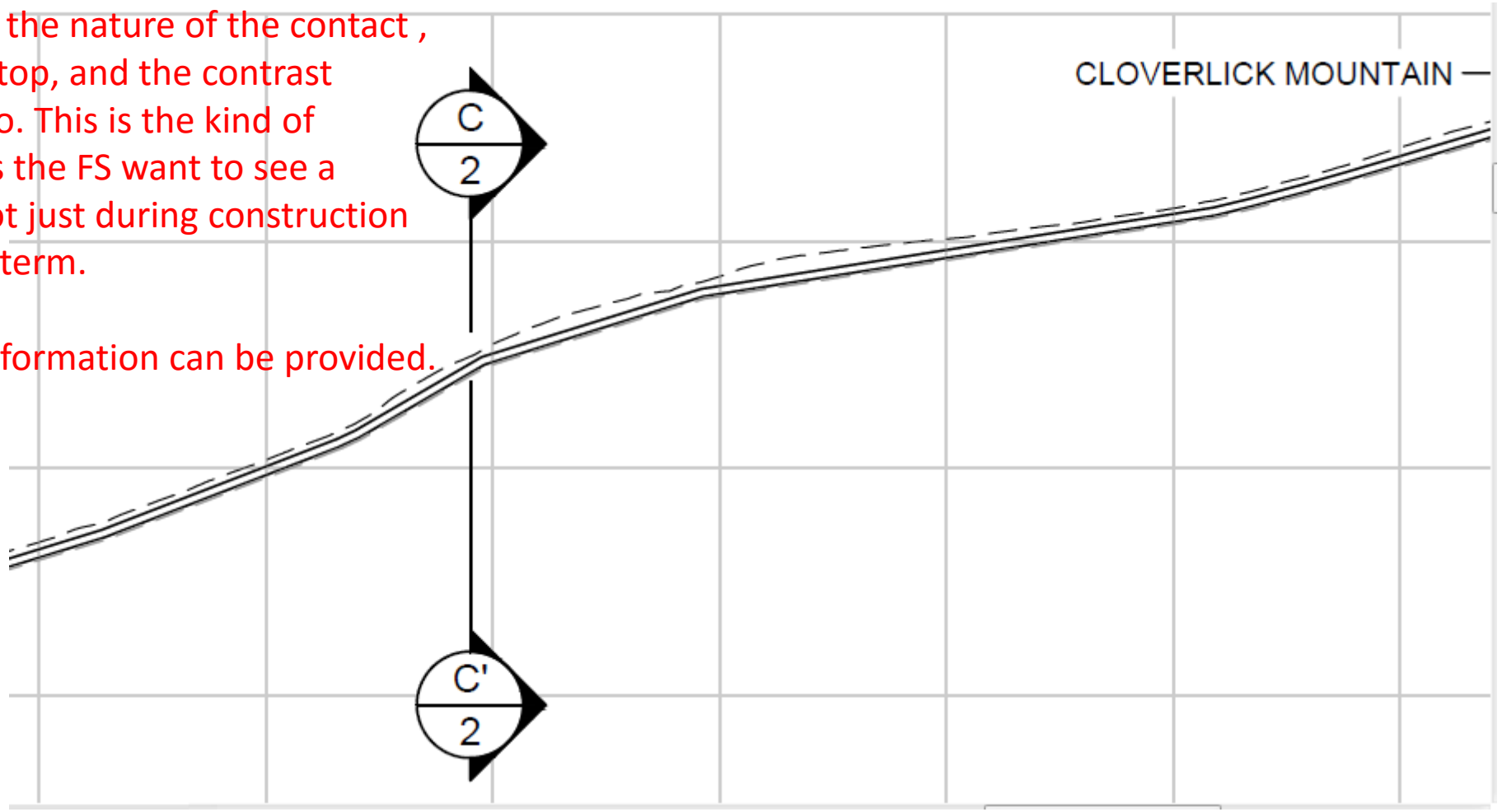
125
13.25'
53.5' PERMANENT ROW
58.25'
125' CONSTRUCTION ROW
SECTION C-C' (STA 4438+98)
DISTANCE (FEET)

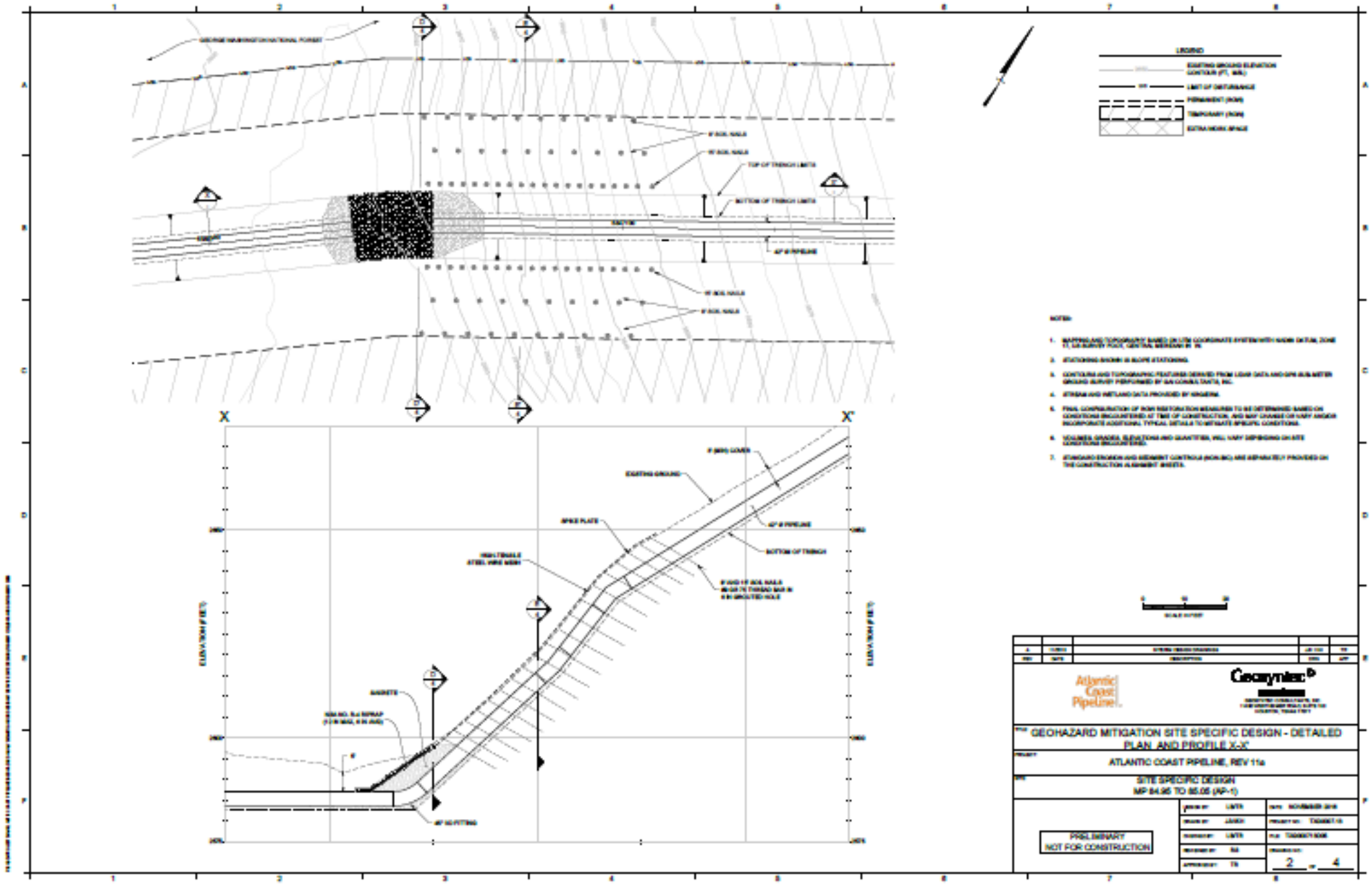

EXISTING GROUND
PERMANENT ROW BOUNDARY
TEMPORARY ROW
DITCH SPOILS
PERMANENT ROW BOUNDARY
TEMPORARY ROW BOUNDARY
TEMPORARY SPOILS / ROW
(TYP.)
PERMANENT ROW
TEMPORARY CONSTRUCTION ROW


PERMANENT ROW BOUNDARY
PROPOSED PIPELINE
PERMANENT ROW BOUNDARY
TEMPORARY ROW BOUNDARY
DITCH SPOIL
TOPSOIL SPOIL
PERMANENT ROW
TEMPORARY CONSTRUCTION ROW
SPOIL SIDE
WORKING SIDE
CONSTRUCTION ROW

Tom C. said the project is doing 2 things, creating a planar slip surface and then piling loose aggregate on top of that. FS needs to look at the nature of the contact , the material on top, and the contrast between the two. This is the kind of detailed analysis the FS want to see a narrative on; not just during construction but for the long term.

Colin said this information can be provided.

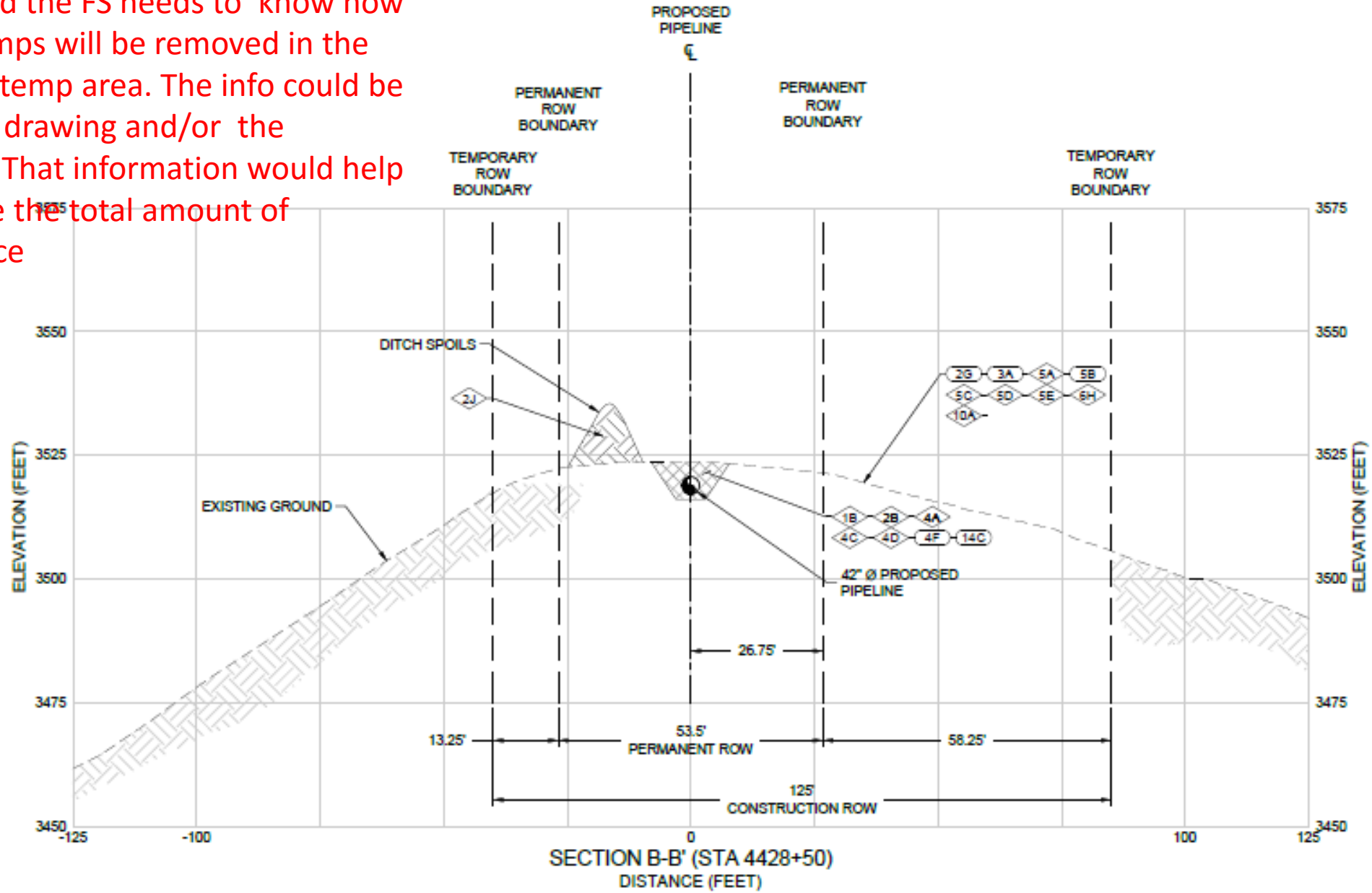




Tom C. said this is from the George Washington Jefferson National Forest, there is an overall plan and then a detailed plan. For the cross section the FS would need something that includes 100' up and down slope that shows the nature of the surface and amount of materials. This is a place where the BIC can be shown in plan and profile view.

Tom C. said it would be good to have some narrative on why the BIC were chosen.

Tom C. said the FS needs to know how many stumps will be removed in the ROW and temp area. The info could be put in the drawing and/or the narrative. That information would help determine the total amount of disturbance



NOTES:
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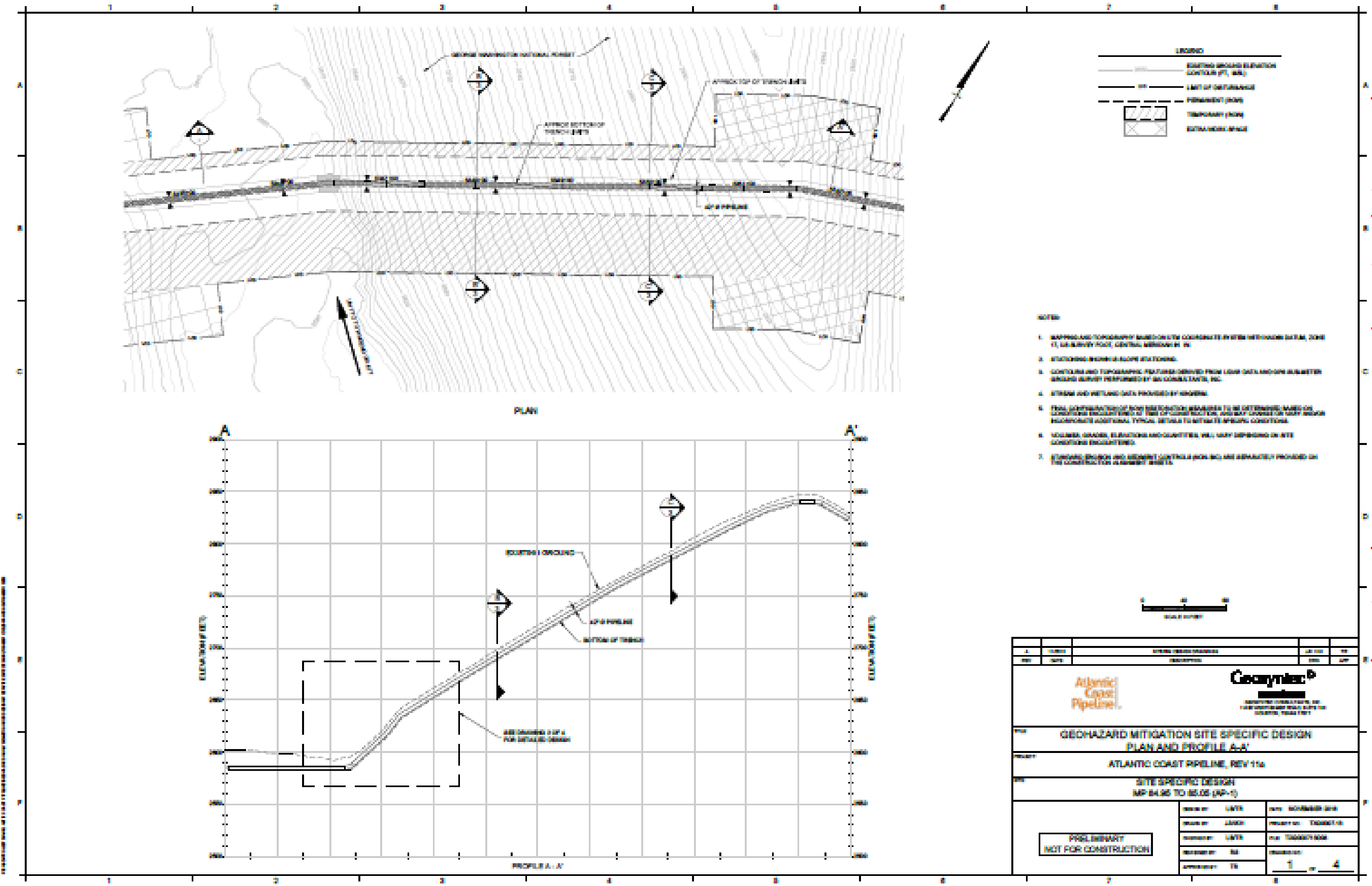
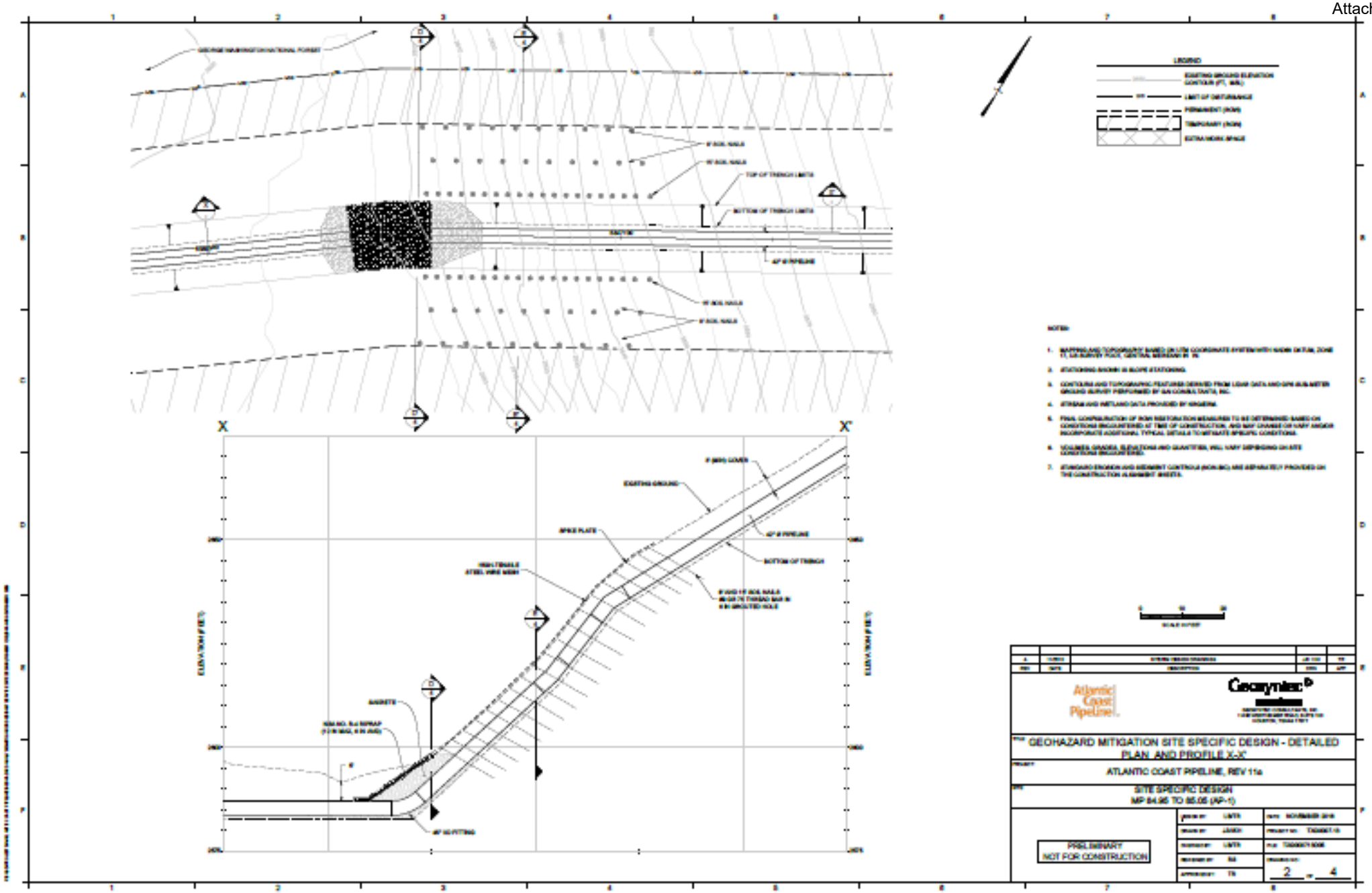
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.

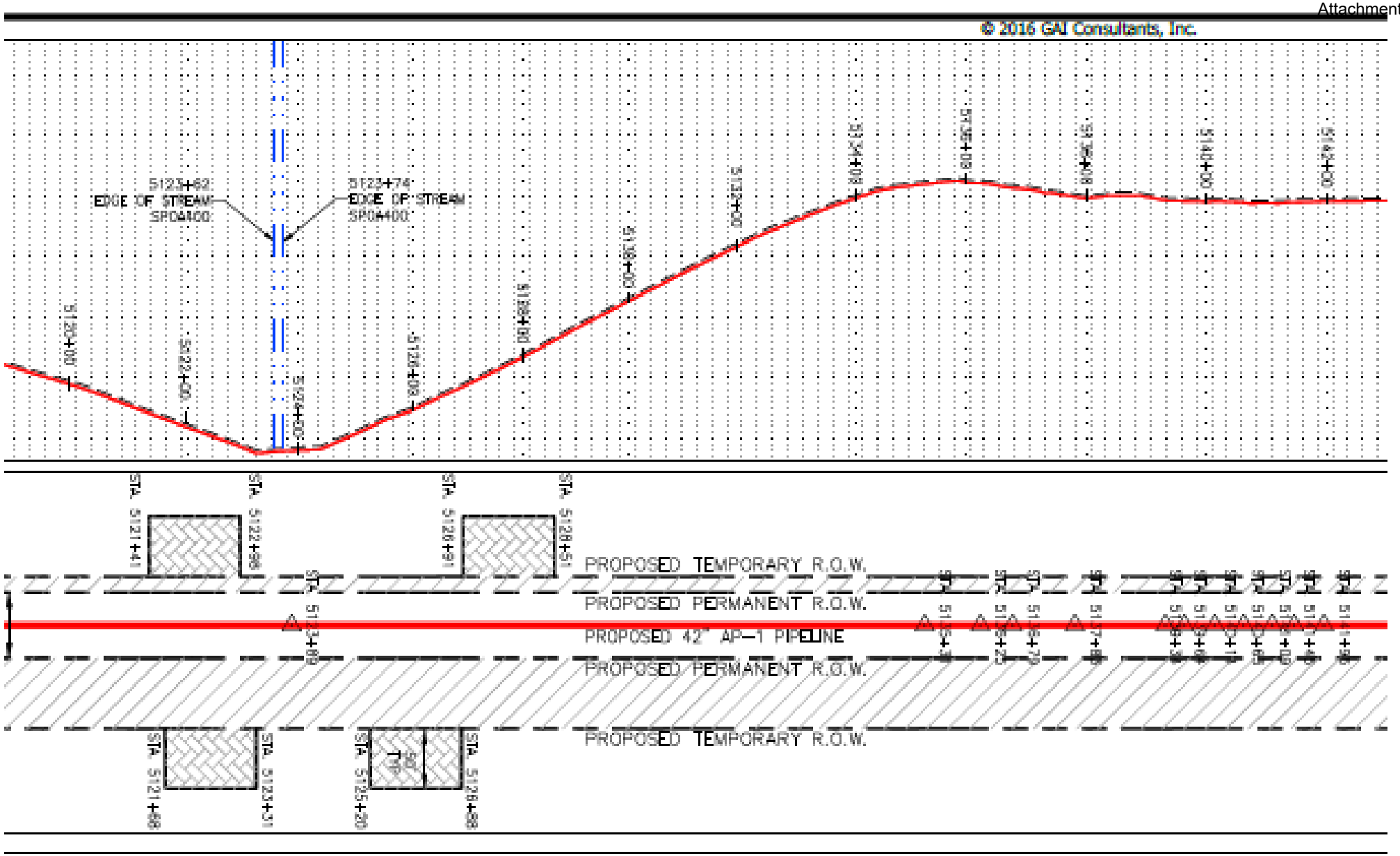
Colin- the restoration measures are not here but are on the alignment sheets. Atlantic Coast Pipeline didn't include on the site specific drawing but can show them.



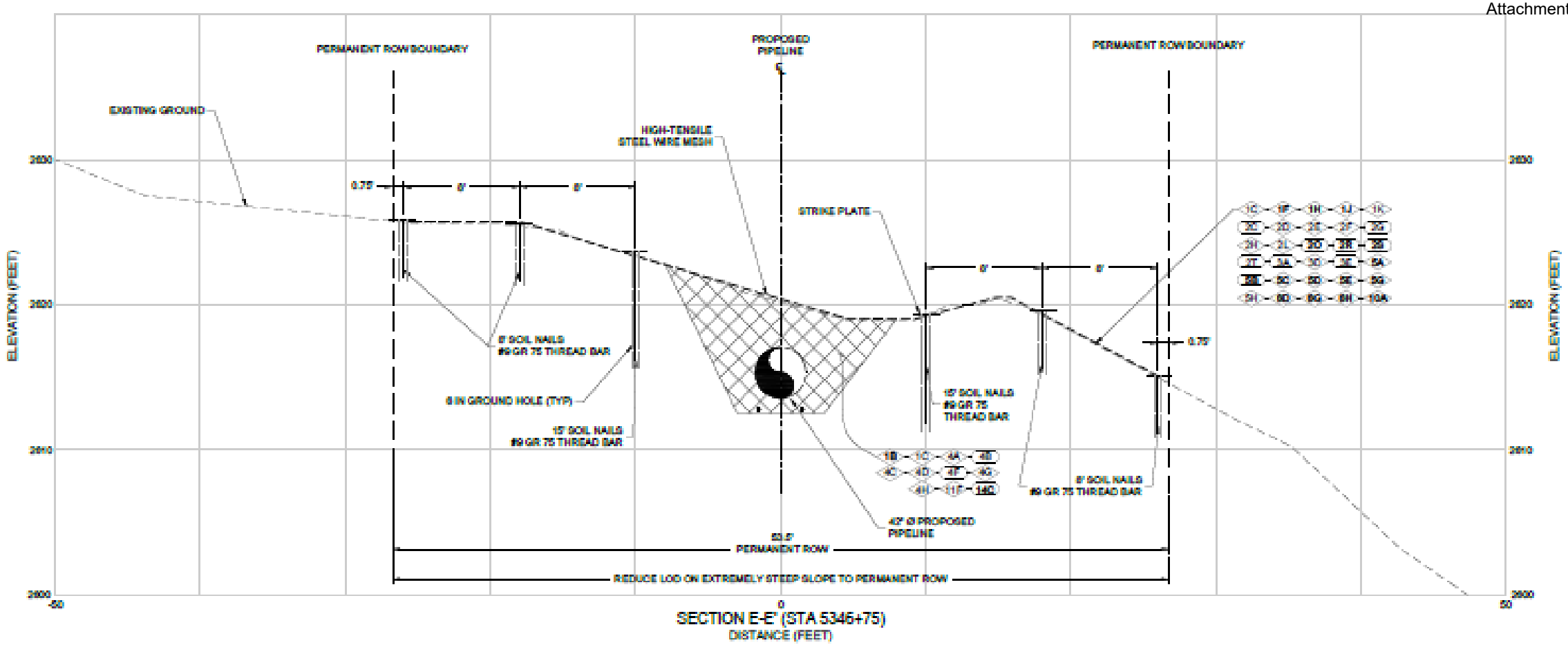
Tom C. said the alignment shows the square footage for temporary work space (TWS), but on plan view drawing, the TWS is on the top of the ridge. On the Monongahela National Forest and GWJ there was no cross section on the TWS. The FS wants to see a cross section and profile of the TWS.

TC-


X
X'
EXISTING GROUND
SPIKE PLATE
BOTTOM OF TRENCH
GABIONS
LEGEND
NOTES
GEOHAZARD MITIGATION SITE SPECIFIC DESIGN - DETAILED PLAN AND PROFILE X-X'
ATLANTIC COAST PIPELINE, REV 11a
SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)
PRELIMINARY
NOT FOR CONSTRUCTION
2
4



Tom C- from alignment shows the TWS is at the bottom not the top. Action- ACP provides most recent alignment.



Tom C asked if the equipment will be able to navigate this terrain, or if it would need to be leveled out. Also, the illustrations for the trenches use about a 6’ bottom width and 18-16’ top, but in the Construction, Operations and Monitoring (COM) Plan it says on steep slopes the top width might be 30’. On these steep slopes, will the COM Plan dimensions apply? Colin said that winches are being used to assist equipment in this portion. What is shown is the typical width for trench, on some steep slopes the extra width used so the pipe can be laid in and welded in place. Tom C. said if that applies that is what the drawing should show. Greg- said ACP needs to look at this particular slope again to inform site specific plans. How the soil responds when digging begins will also inform the depth and width of digging. The FS said there may be an adjustment to the route in this area.

Geosyntec consultants

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www.geosyntec.com

Memorandum

Date:	6 December 2016
To:	Colin Olness, Dominion
Copies to:	Tony Rice, Geosyntec Seattle
From:	Logan Brant, Geosyntec Houston
Subject:	Revision B Updates to Site Specific Geohazard Mitigation Design Drawings Atlantic Coast Pipeline Geosyntec Project: TXG0007 / 013 / 1210

Following the 21 November, 2016 meeting in Harrisonburg VA, Geosyntec Consultants, Inc. (Geosyntec) has revised the site specific geohazard mitigation design drawings developed for the two steep slope sites requested by the Forest Service, located along the Atlantic Coast Pipeline (ACP) Segment AP-1 between Mileposts (MP) 73.20 to 73.50 and MP 84.95 to 85.05. The revised drawings are identified as Revision B and are dated December 2016. The changes are largely intended to improve the clarity and consistency of the drawings and address some of the comments made during the meeting by the Forest Service.

The following lists summarize the changes on each drawing incorporated into Revision B.

ACP AP-1 MP 73.20 to 73.50 – Drawing No.: 1 of 2:

- Pipeline centerline and stationing added to legend.
- Note 2 expanded to identify stationing referenced to “Route Rev 11a (3D)”.
- Pipeline centerline, right of way (ROW) and limits of disturbance (LOD) extended to the edge of the plan.
- Title revised to removed hyphen between site and specific.
- Date changed to “December 2016”.
- Revision B line added to the revision block.

ACP AP-1 MP 73.20 to 73.50 – Drawing No.: 2 of 2:

- "Proposed pipeline" changed to "pipeline" on centerline label and pipeline label.
- Dimensions of ditch spoils piles reduced.
- Additional labels added to Section C-C' to identify the "temporary cut" surface and the "existing / final ground" surface.
- Additional axes labels added to the horizontal offset distances on the sections.
- Title revised to removed hyphen between site and specific.
- Date changed to "December 2016".
- Revision B line added to the revision block.

ACP AP-1 MP 84.95 to 85.05 – Drawing No.: 1 of 4:

- Pipeline centerline and stationing added to legend.
- Note 2 expanded to identify stationing referenced to "Route Rev 11a (3D)".
- Arrow indicating direction of stream flow reversed.
- Hatching in extra work space made consistent throughout drawings.
- Additional axes tick marks removed from Profile A-A'.
- Pipe bends near crest of slope removed from Profile A-A'.
- Date changed to "December 2016".
- Revision B line added to the revision block.

ACP AP-1 MP 84.95 to 85.05 – Drawing No.: 2 of 4:

- Pipeline centerline and stationing added to legend.
- Note 2 expanded to identify stationing referenced to "Route Rev 11a (3D)".
- Hatching in extra work space made consistent throughout drawings.
- Additional axes tick marks removed from Detailed Profile X-X'.
- Missing grid lines added to Detailed Profile X-X'.
- Title formatting revised.
- Date changed to "December 2016".
- Revision B line added to the revision block.

ACP AP-1 MP 84.95 to 85.05 – Drawing No.: 3 of 4:

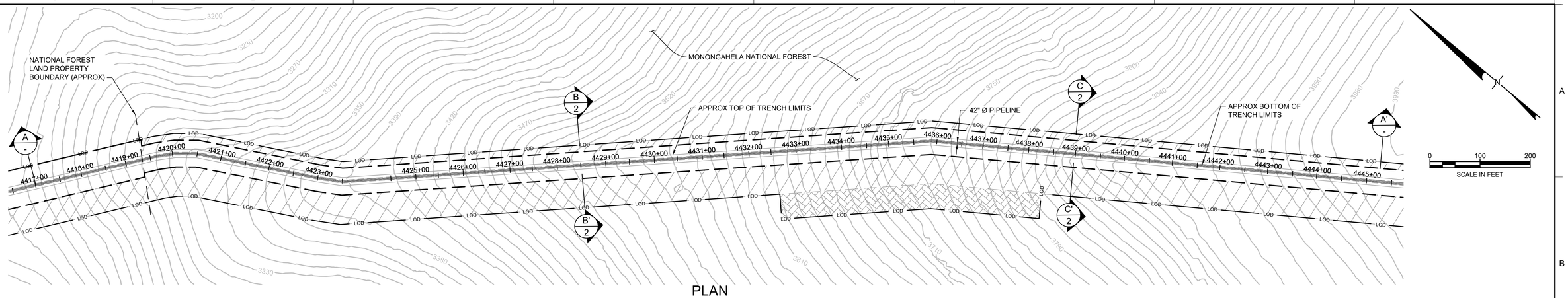
- "Proposed pipeline" changed to "pipeline" on centerline label and pipeline label.
- Dimensions of ditch spoils piles reduced.
- Additional axes labels added to the horizontal offset distances on the sections.

- Limits of Section C-C' expanded for consistency with Section B-B'.
- Title revised to "Geohazard mitigation site specific design section B-B' and C-C' ".
- Date changed to "December 2016".
- Revision B line added to the revision block.

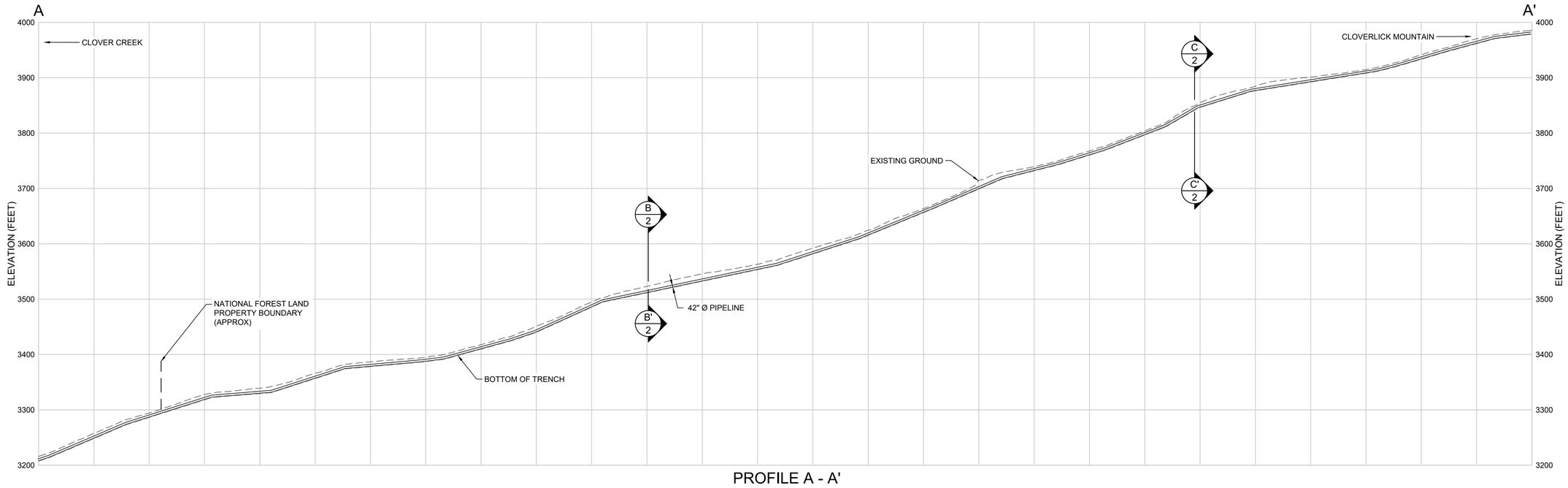
ACP AP-1 MP 84.95 to 85.05 – Drawing No.: 4 of 4:

- "Proposed pipeline" changed to "pipeline" on centerline label and pipeline label.
- Additional axes labels added to the sections.
- Label of "NSA No. R-1 Riprap" replaced with "Sakrete" on Section D-D'.
- Label of "strike plate" replaced with "spike plate" on Section E-E'.
- Label of "6 in ground hole (typ)" replaced with "6 in grouted hole (typ)" on Section E-E'.
- Title revised to remove hyphen between design and sections.
- Date changed to "December 2016".
- Revision B line added to the revision block.

* * * * *



PLAN



PROFILE A - A'

LEGEND

- 2650 — EXISTING GROUND ELEVATION CONTOUR (FT, MSL)
- LOD — LIMIT OF DISTURBANCE
- PERMANENT (ROW)
- 4426+00 — PIPELINE CENTERLINE AND STATIONING
- TEMPORARY (ROW)
- EXTRA WORK SPACE

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 17, US SURVEY FOOT, CENTRAL MERIDIAN 81 W.
2. STATIONING SHOWN IS SLOPE STATIONING FOR ROUTE REV 11A (3D).
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY GAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
5. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
7. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

REV	DATE	DESCRIPTION	DRN	APP
B	12/2016	PRELIMINARY - NOT FOR CONSTRUCTION	JJV	LCB
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN PLAN AND PROFILE A-A'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP 73.20 TO 73.50 (AP-1)

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D01
REVIEWED BY:	RS	DRAWING NO.:	1 OF 2
APPROVED BY:	TR		

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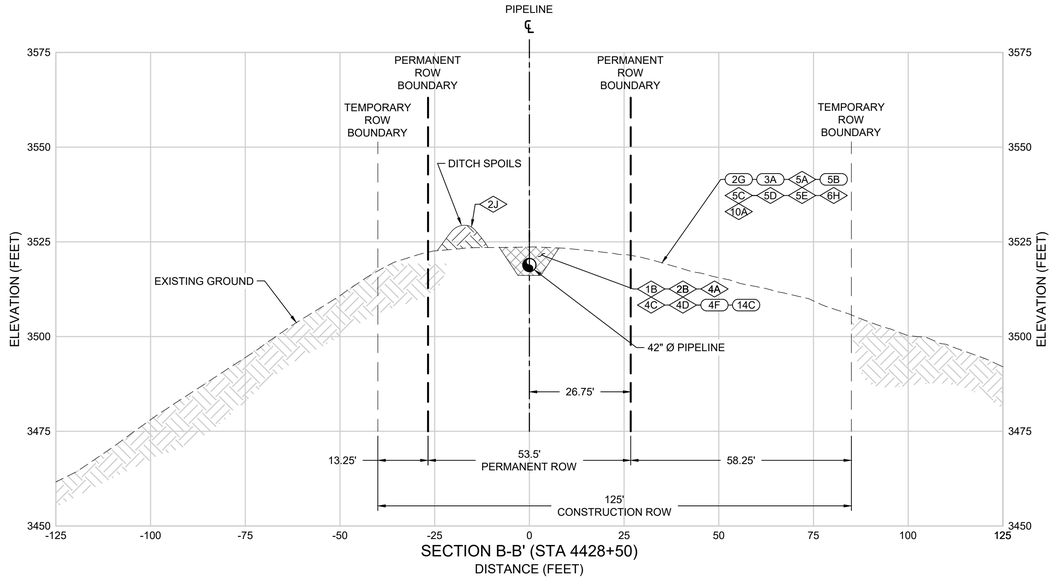
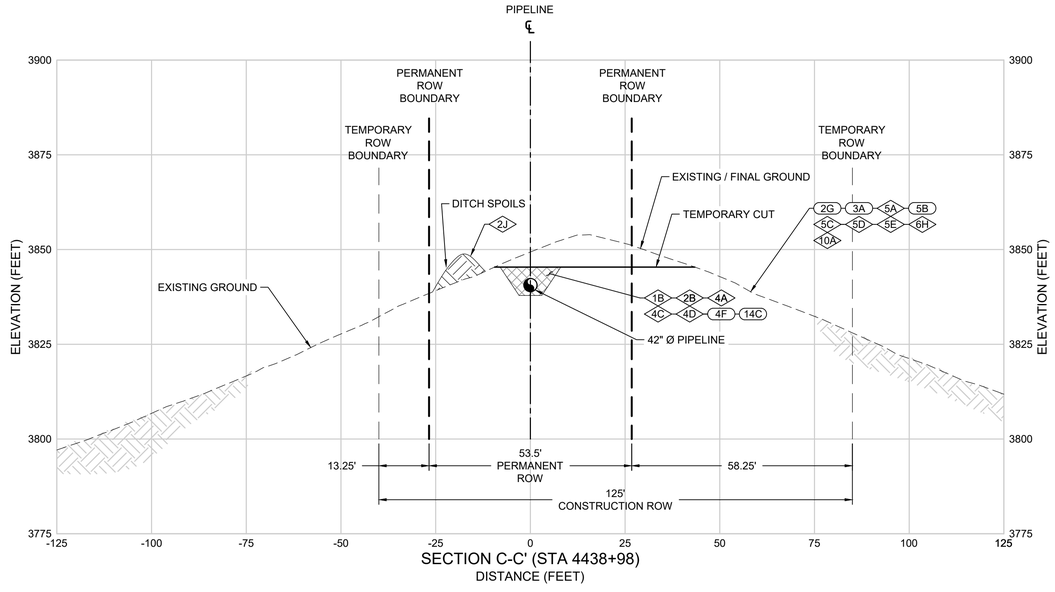


BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1B ENHANCED DRAIN (GERMAN DRAIN)
- 2A GRADING TEMPORARY ROW SURFACE
- 2B GRADING TRENCH WITH OUTBOARD WEDGE
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2J SPOILS MANAGEMENT
- 3A TRACK DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 14C BLASTING PLAN(S)



NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 20 40
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
B	12/2016	PRELIMINARY - NOT FOR CONSTRUCTION	JJV	LCB
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
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TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN SECTIONS B-B' AND C-C'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP 73.20 TO 73.50 (AP-1)

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D02
REVIEWED BY:	RS	DRAWING NO.:	
APPROVED BY:	TR		2 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

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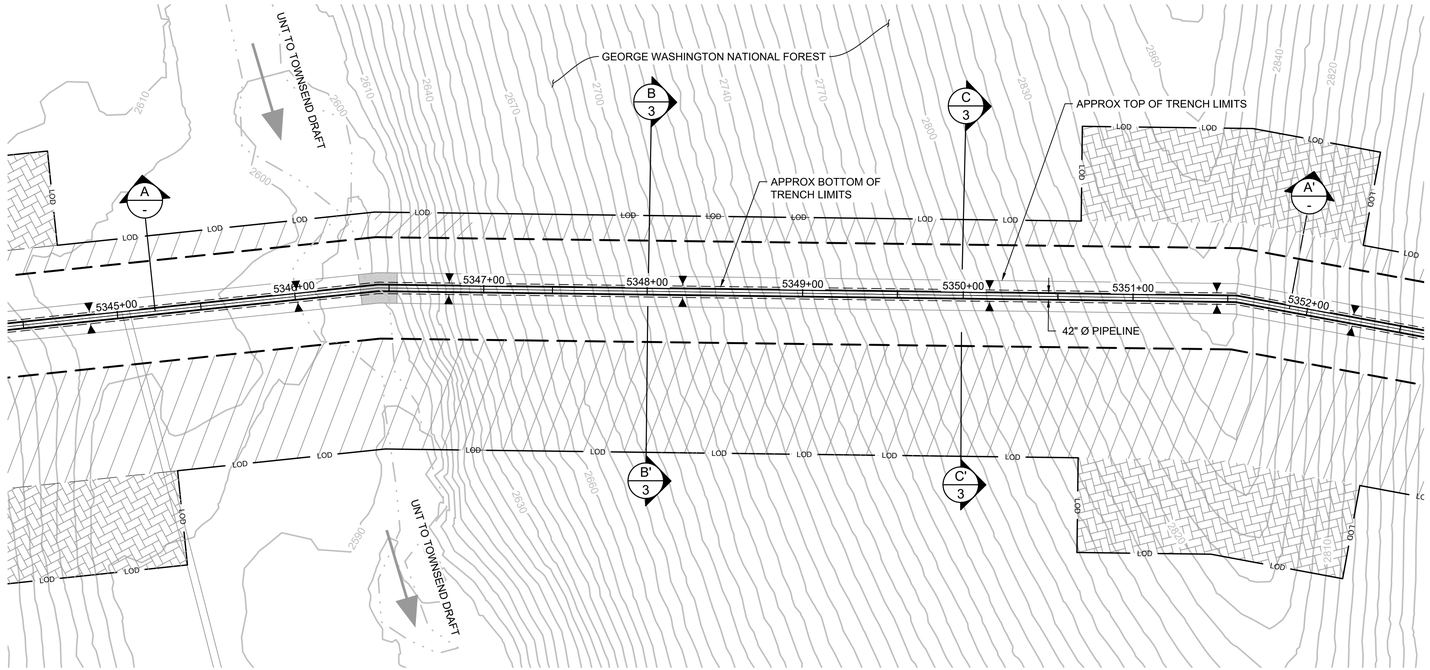
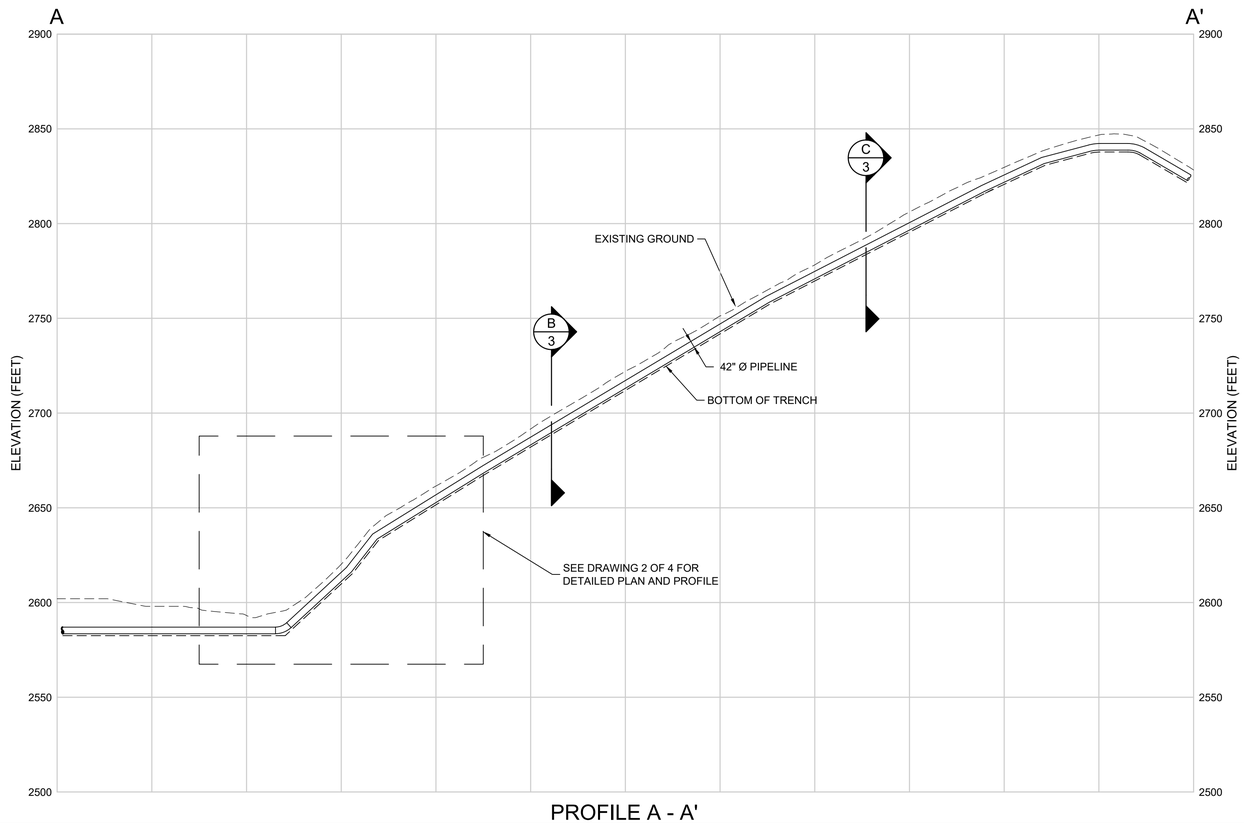
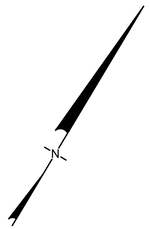


PLAN



PROFILE A - A'



LEGEND

- 2650 — EXISTING GROUND ELEVATION CONTOUR (FT, MSL)
- EXISTING STREAM LINE
- ACCESS ROAD
- LOD — LIMIT OF DISTURBANCE
- PERMANENT (ROW)
- 4426+00 — PIPELINE CENTERLINE AND STATIONING
- TEMPORARY (ROW)
- EXTRA WORK SPACE

NOTES:

1. MAPPING AND TOPOGRAPHY BASED ON UTM COORDINATE SYSTEM WITH NAD83 DATUM, ZONE 17, US SURVEY FOOT, CENTRAL MERIDIAN 81° W.
2. STATIONING SHOWN IS SLOPE STATIONING FOR ROUTE 11A (3D).
3. CONTOURS AND TOPOGRAPHIC FEATURES DERIVED FROM LIDAR DATA AND GPS SUB-METER GROUND SURVEY PERFORMED BY GAI CONSULTANTS, INC.
4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
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0 40 80
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
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A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN PLAN AND PROFILE A-A'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP 84.95 TO 85.05 (AP-1)

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D03
REVIEWED BY:	RS	DRAWING NO.:	1 OF 4
APPROVED BY:	TR		

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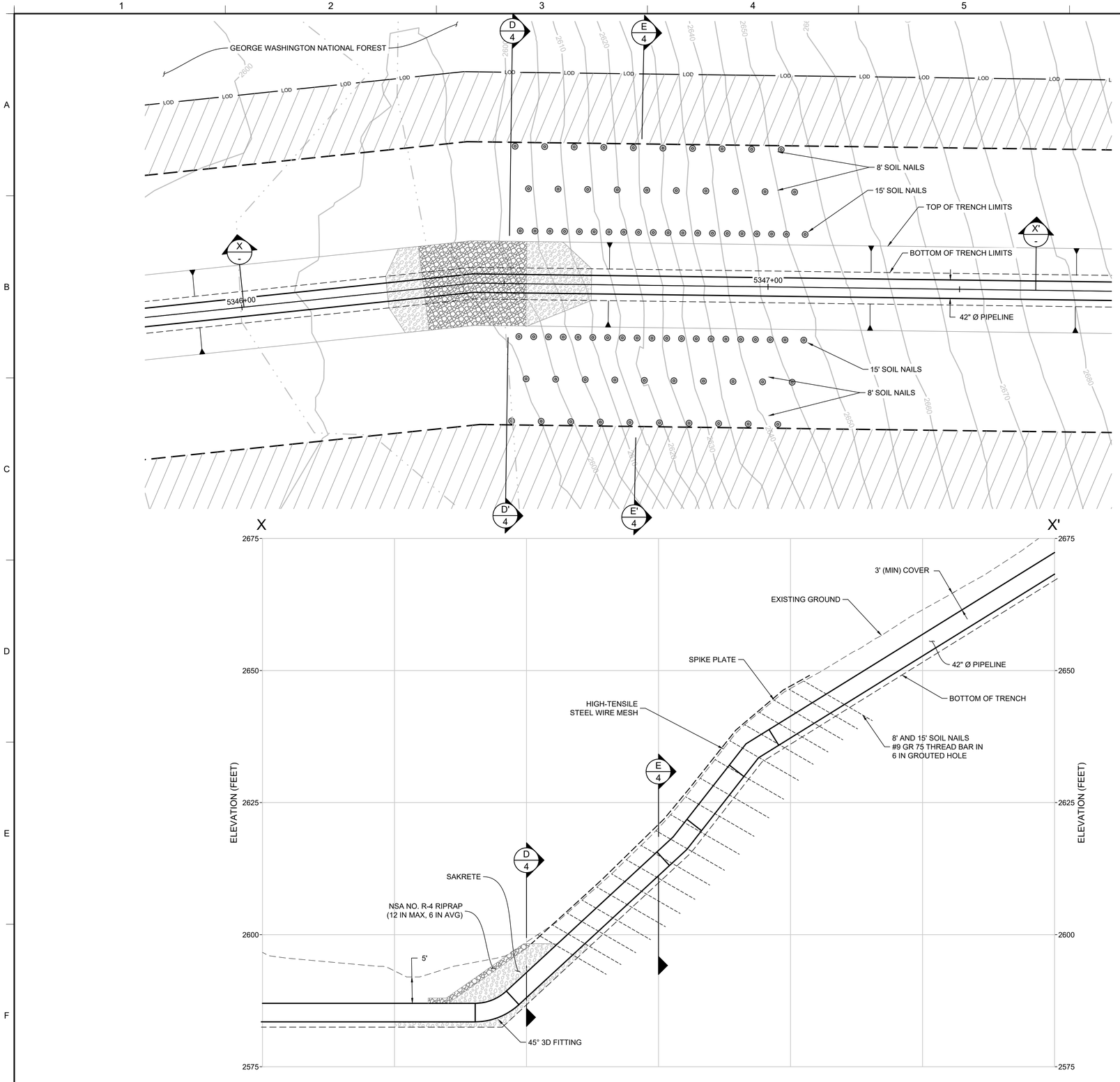

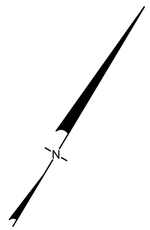

LEGEND

- 2650 — EXISTING GROUND ELEVATION CONTOUR (FT, MSL)
- EXISTING STREAM LINE
- LOD — LIMIT OF DISTURBANCE
- PERMANENT (ROW)
- 4426+00 — PIPELINE CENTERLINE AND STATIONING
- TEMPORARY (ROW)

NOTES:

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2. STATIONING SHOWN IS SLOPE STATIONING FOR ROUTE 11A (3D).
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4. STREAM AND WETLAND DATA PROVIDED BY NRG/ERM.
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6. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
7. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

REV	DATE	DESCRIPTION	DRN	APP
B	12/2016	PRELIMINARY - NOT FOR CONSTRUCTION	JJV	LCB
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN
DETAILED PLAN AND PROFILE X-X'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D05
REVIEWED BY:	RS	DRAWING NO.:	2 OF 4
APPROVED BY:	TR		

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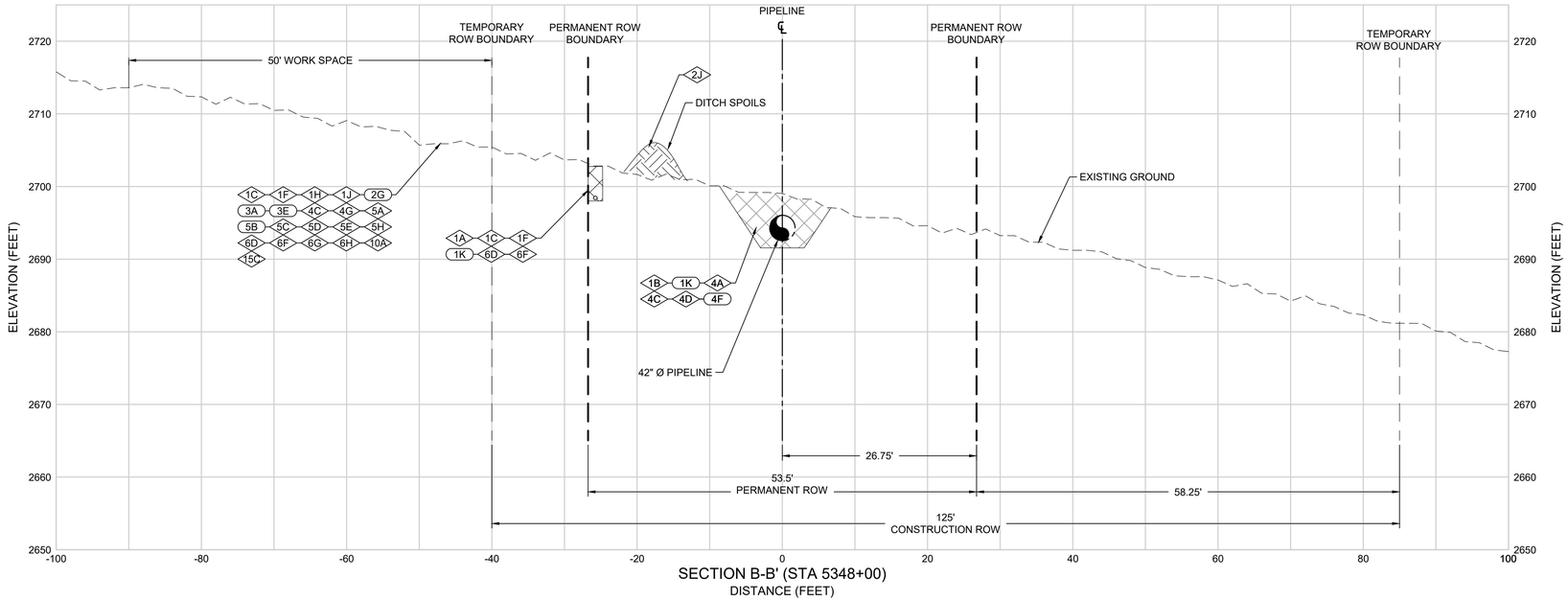
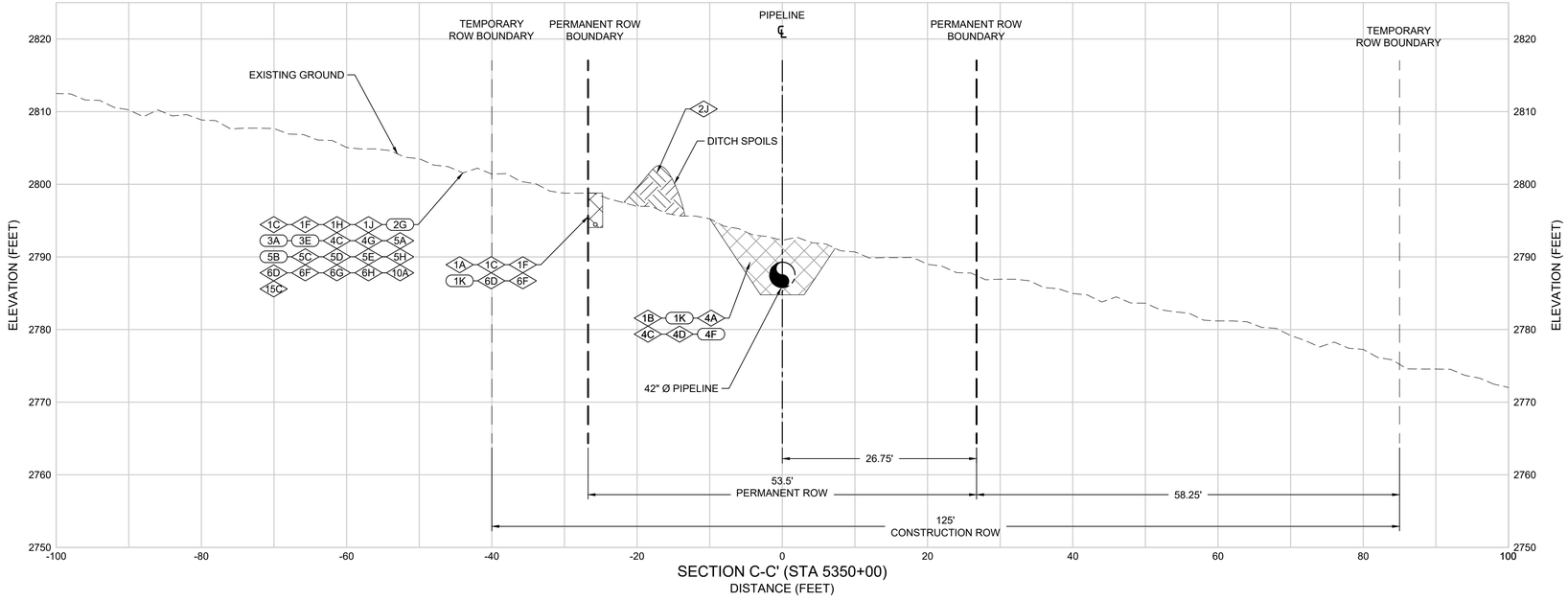


SECTION B-B' (STA 5348+00)
DISTANCE (FEET)



SECTION C-C' (STA 5350+00)
DISTANCE (FEET)

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

1B	ENHANCED DRAIN (GERMAN DRAIN)
1C	TARGETED SEEP DRAINS, AT INTERSEPTED SEEPS
1F	ARMORED CHANNEL WITH DRAIN PIPE
1H	STEEP CONVEYANCE CHANNEL
1I	CHANGED SEEP CHARACTERISTICS
1J	SINGLE TARGETED SEEP COLLECTOR
1K	ENERGY DISSIPATION BASIN
2G	GRADING TO MATCH EXISTING CONTOURS
2J	SPOILS MANAGEMENT
3A	TRACK DISTURBED SLOPES
3E	COIR LOGS ON DISTURBED SLOPES
4A	TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
4C	SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
4D	SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
4F	TRENCH BREAKER WITH DRAINAGE
4G	SACK-CRETE ARMOR WITH BREAKERS
5A	SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
5B	SLOPE BREAKER ARMORED OUTLET
5C	SLOPE BREAKERS WITH DIVERSION CHANNELS
5D	ACCESS ROADS
5E	TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
5H	SURFACE WATER DIVERSIONS
6D	ARMORED CHANNEL
6F	RIPRAP GRADATIONS
6G	ARMORED V-SHAPED AND U-SHAPED CHANNELS
6H	TYP SURFACE WATER CONTROL LAYOUT
10A	BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
15C	ACCESS TO REMOTE ROW LOCATIONS

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 10 20
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
B	12/2016	PRELIMINARY - NOT FOR CONSTRUCTION	JJV	LCB
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN SECTIONS B-B' AND C-C'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN MP 84.95 TO 85.05 (AP-1)

PRELIMINARY NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D04
REVIEWED BY:	RS	DRAWING NO.:	
APPROVED BY:	TR		3 OF 4

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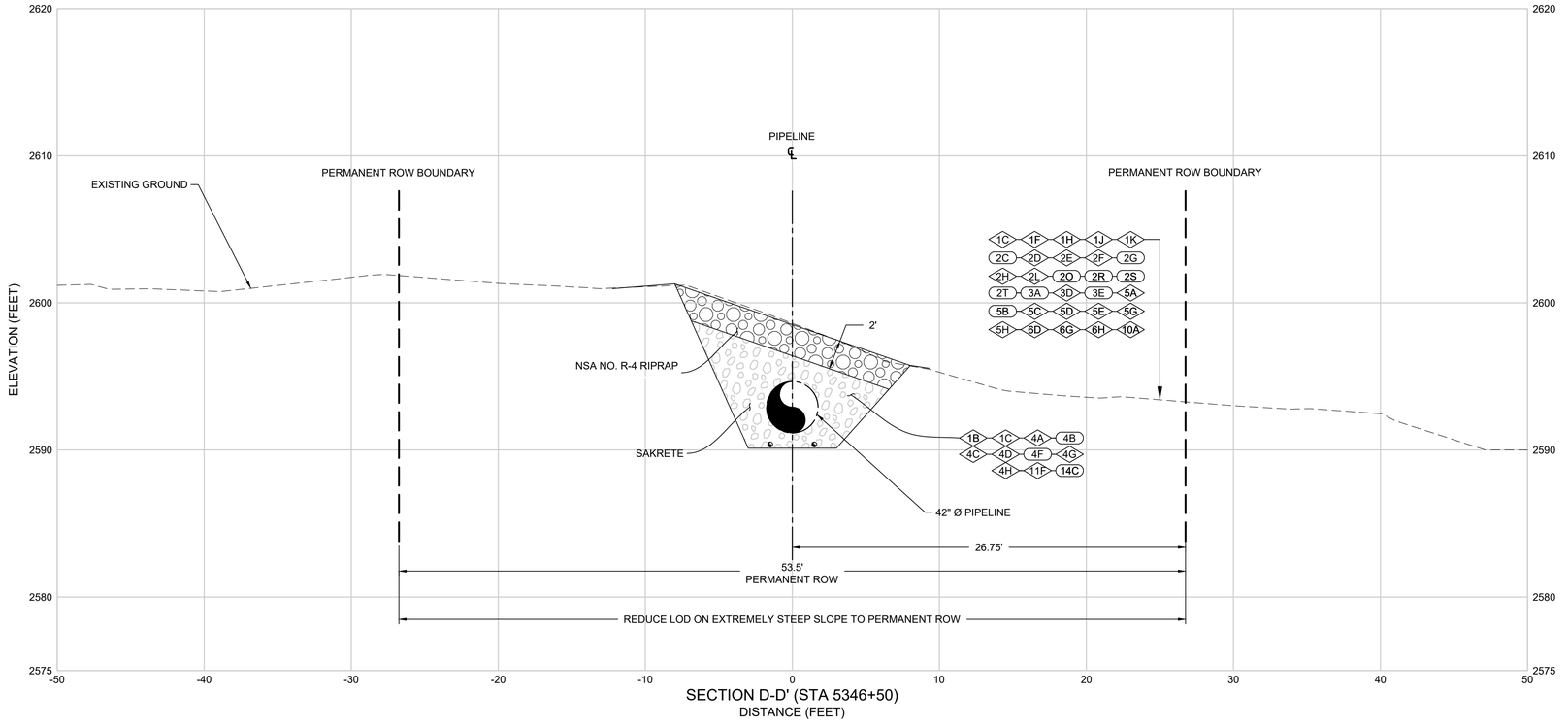
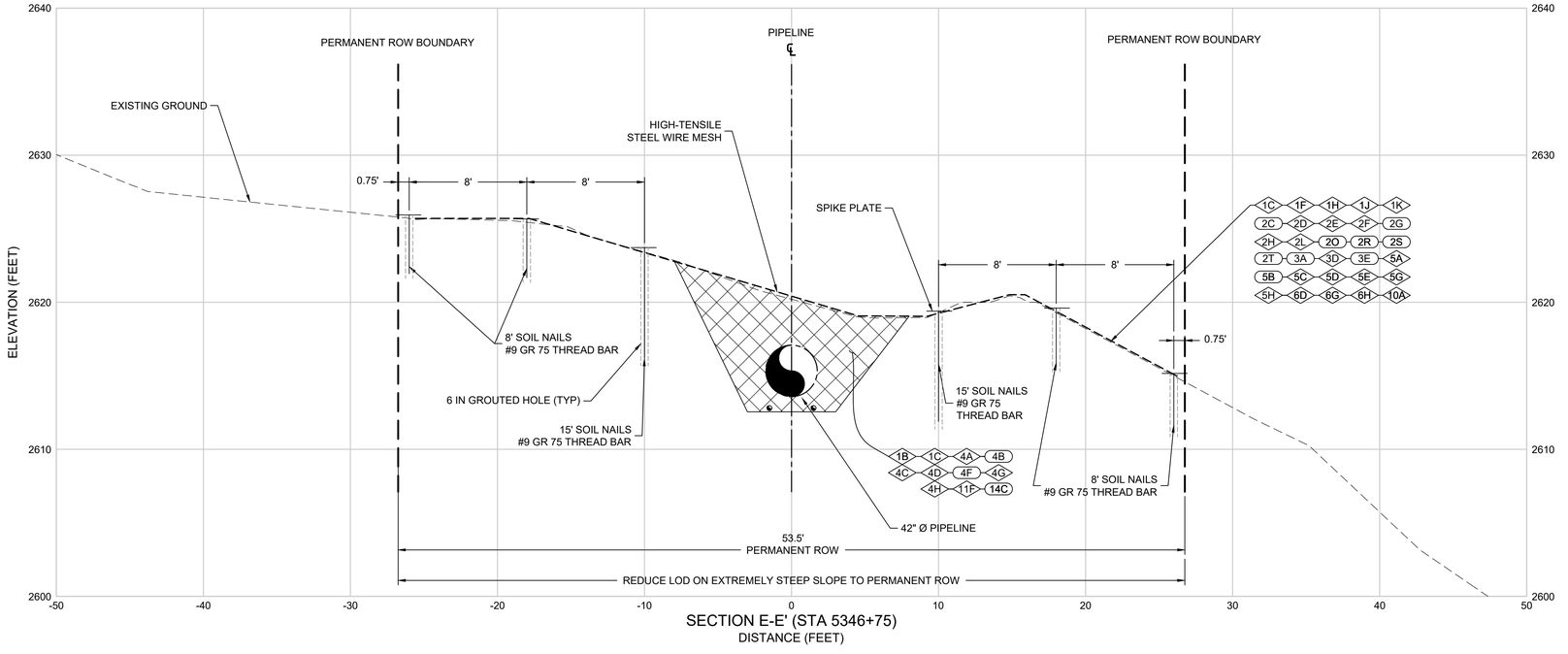


SECTION D-D' (STA 5346+50)



SECTION E-E' (STA 5346+75)

BEST IN CLASS (BIC) INCREMENTAL CONTROLS

- 1B ENHANCED DRAIN (GERMAN DRAIN)
- 1C TARGETED SEEP DRAINS, AT INTERSEPTED SEEPS
- 1F ARMORED CHANNEL WITH DRAIN PIPE
- 1H STEEP CONVEYANCE CHANNEL
- 1I CHANGED SEEP CHARACTERISTICS
- 1J SINGLE TARGETED SEEP COLLECTOR
- 1K ENERGY DISSIPATION BASIN
- 2B GRADING TRENCH WITH OUTBOARD WEDGE
- 2C COMPACT BACKFILL
- 2D DRY SOILS AND BACKFILL
- 2E REMOVE UNSUITABLE EXISTING SOILS AS BACKFILL
- 2F ROCK BACKFILL (WITH DRAIN)
- 2G GRADING TO MATCH EXISTING CONTOURS
- 2H GRADING TO MINIMIZE BACKFILL
- 2L SOIL-NAIL WITH TECCO MESH
- 2O BENCH AND REGRADE WITH BACKFILL
- 2R TYP SECTION VIEW FILL WITH ROCK UNDER DRAIN
- 2S TYP PLAN VIEW FILL WITH ROCK UNDER DRAIN
- 2T TYP FILL WITH MULTIPLE ROCK CHANNELS
- 3A TRACK DISTURBED SLOPES
- 3D ROCK ARMORING ON DISTURBED SLOPES
- 3E COIR LOGS ON DISTURBED SLOPES
- 4A TRENCH BREAKERS (FOAM AND SANDBAGS), MODIFIED SPACING
- 4B TRENCH DAMS (FOAM BAGS OR FINE GRAINED SOILS)
- 4C SACK-CRETE BREAKERS (STRUCTURAL BREAKER)
- 4D SLEEVE INTERFACE BETWEEN PIPELINE AND BREAKER
- 4F TRENCH BREAKER WITH DRAINAGE
- 4G SACK-CRETE ARMOR WITH BREAKERS
- 5G NO WOOD CHIPS IN ROW
- 4H FLOWABLE FILL FOR TRENCH BACKFILL
- 5A SLOPE BREAKERS (TEMP AND PERMANENT), MODIFIED SPACING
- 5B SLOPE BREAKER ARMORED OUTLET
- 5C SLOPE BREAKERS WITH DIVERSION CHANNELS
- 5D ACCESS ROADS
- 5E TEMPORARY SLOPE BREAKER WITH DRAIN PIPE
- 5G NO WOOD CHIPS IN ROW
- 5H SURFACE WATER DIVERSIONS
- 6D ARMORED CHANNEL
- 6G ARMORED V-SHAPED AND U-SHAPED CHANNELS
- 6H TYP SURFACE WATER CONTROL LAYOUT
- 10A BENCH RE-CONSTRUCTION THROUGH NATURAL STEPS
- 11F AS-BUILT SURVEY TRENCH AND SLOPE BREAKERS
- 14C BLASTING PLAN(S)

NOTES:

1. FINAL CONFIGURATION OF ROW RESTORATION MEASURES TO BE DETERMINED BASED ON CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION, AND MAY CHANGE OR VARY AND/OR INCORPORATE ADDITIONAL TYPICAL DETAILS TO MITIGATE SPECIFIC CONDITIONS.
2. VOLUMES, GRADES, ELEVATIONS AND QUANTITIES, WILL VARY DEPENDING ON SITE CONDITIONS ENCOUNTERED.
3. ACTUAL CUT/FILL CONFIGURATIONS MAY VARY DEPENDING ON ACTUAL SITE CONDITIONS.
4. STANDARD EROSION AND SEDIMENT CONTROLS (NON-BIC) ARE SEPARATELY PROVIDED ON THE CONSTRUCTION ALIGNMENT SHEETS.

0 5 10
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
B	12/2016	PRELIMINARY - NOT FOR CONSTRUCTION	JJV	LCB
A	11/2016	INTERIM DESIGN DRAWINGS	JJV / KH	TR

Atlantic Coast Pipeline

Geosyntec consultants
GEOSYNTEC CONSULTANTS, INC.
11490 WESTHEIMER ROAD, SUITE 150
HOUSTON, TEXAS 77077

TITLE: GEOHAZARD MITIGATION SITE SPECIFIC DESIGN
SECTIONS D-D' AND E-E'

PROJECT: ATLANTIC COAST PIPELINE, REV 11a

SITE: SITE SPECIFIC DESIGN
MP 84.95 TO 85.05 (AP-1)

PRELIMINARY
NOT FOR CONSTRUCTION

DESIGN BY:	LB/TR	DATE:	DECEMBER 2016
DRAWN BY:	JJV/KH	PROJECT NO.:	TXG0007.13
CHECKED BY:	LB/TR	FILE:	TXG000713D07
REVIEWED BY:	RS	DRAWING NO.:	
APPROVED BY:	TR		4 OF 4

P:\CADD\PROJECTS\AATLANTIC COAST PIPELINE\GEOHAZARD ANALYSIS\MITIGATION DESIGN\F SERVICE SITE DESIGN\TXG0007.13\10\DRAWINGS\TXG000713D07

Pat Robblee

From: John Cassady
Sent: Tuesday, January 31, 2017 1:30 PM
To: cnthompson@fs.fed.us; jtimm@fs.fed.us; kkarriker@fs.fed.us; tahess@fs.fed.us; afaught@fs.fed.us; jenniferpadams@fs.fed.us
Cc: Richard B Gangle (Services - 6); Pat Robblee
Subject: Atlantic Coast Pipeline - COM Plan
Attachments: COM Plan Status Master for USFS 160126 (2).xlsx

Follow Up Flag: Follow up
Flag Status: Flagged

All: We inadvertently failed to attach the annotated USFS comment matrix referenced in Dominion's January 20, 2017 transmittal of the second draft of the COM Plan. It is attached herewith.

John Cassady
Senior Regulatory Specialist

Environmental Resources Management (ERM)
1500 SW 1st Ave., Suite 885 l Portland l Oregon l 97201
T 503.525.5146 l M 503.819 7579
E john.cassady@erm.com www.erm.com

The world's leading sustainability consultancy

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 10, 2017

Clyde Thompson
Forest Supervisor
U.S. Forest Service
Monongahela National Forest
200 Sycamore Street
Elkins, WV 26241

Mr. Joby Timm
Forest Supervisor
U.S. Forest Service
George Washington and Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Construction, Operation, and Maintenance Plan – Attachment F

Dear Mr. Thompson and Mr. Timm,

Enclosed please find Attachment F (Access Road Improvement Maps) to the Construction, Operation, and Maintenance Plan, which was sent to you on January 27, 2017. We have enclosed both hard copies of the maps and digital versions on a DVD. Please contact Mr. Richard Gangle at (804) 273-2814 or richard.b.gangle@dom.com if you have questions regarding this submittal. Please direct written responses to:

Richard Gangle
Energy Infrastructure Environmental Services
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc (w/enclosures):

Kent Karriker, Ecosystems Group Leader, Monongahela National Forest
Todd Hess, Realty Specialist/Special Use Manager, Monongahela National Forest
Alex Faught, Lands Program Manager, George Washington National Forest
Jennifer Adams, Special Projects Coordinator, U.S. Forest Service
Richard Gangle, Dominion

Attachments

Exhibit F; Hard Copy and DVD

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 24, 2017

BY OVERNIGHT (OR EXPRESS) MAIL

Clyde Thompson
Forest Supervisor
U.S. Forest Service
Monongahela National Forest
200 Sycamore Street
Elkins, WV 26241

Mr. Joby Timm
Forest Supervisor
U.S. Forest Service
George Washington and Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, Virginia 24019

Re: Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Revised Karst Assessment and Survey Report

Dear Mr. Thompson and Mr. Timm,

Enclosed please find an update to Atlantic Coast Pipeline, LLC's *Karst Assessment and Survey Report* for the Atlantic Coast Pipeline (ACP). The revised report includes data from an additional 9.2 miles of field survey along the proposed pipeline route, as well as appendices identifying karst features found in the ACP Project area in the George Washington National Forest (Appendix D) and Monongahela National Forest (Appendix). Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com if you have questions regarding this report. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

FOR RICHARD GANGLE

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Jennifer Adams, U.S. Forest Service

Attachment: Revised Karst Assessment and Survey Report

State/Commonwealth Agencies

West Virginia Agencies

West Virginia Division of Culture and History

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 3, 2017

Ms. Susan M. Pierce
Deputy State Historic Preservation Officer
West Virginia Division of Culture and History
1900 Kanawha Boulevard, East
Charleston, West Virginia 25305-0300

Subject: Section 106 Review – Revised Phase I Historic Architectural Survey Report Addendum 4 and HPI Forms, Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project FR#: 14-928-Multi

Dear Ms. Pierce:

Atlantic Coast Pipeline, LLC (Atlantic) is requesting review and comment on the enclosed revised addendum architectural survey report on investigations conducted for the proposed Atlantic Coast Pipeline (ACP) in November 2016. The revisions are based on a request from Mitchell Schaefer (email to Richard Gangle on February 2, 2017) to provide higher quality photographs in the report and make minor corrections to HPI forms. The revised HPI forms are included in this submittal. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency for this Project. Atlantic's consultant, ERM, conducted the survey and prepared the enclosed report pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

Atlantic would appreciate your comments on the attached revised addendum architectural survey report and HPI forms, and we look forward to continuing to work with you on this Project. If you have any questions regarding the enclosed report, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosures: Phase I Historic Architectural Survey Report Revised Addendum 4; HPI Forms; CD with pdf version of the report, HPI Forms, and shapefiles

DeAnn Thyse

From: TrackingUpdates@fedex.com
Sent: Wednesday, February 08, 2017 7:49 AM
To: DeAnn Thyse
Subject: FedEx Shipment 778370909047 Delivered

This tracking update has been requested by:

Company Name: ERM
Name: DeAnn Thyse
E-mail: deann.thyse@erm.com

Our records indicate that the following shipment has been delivered:

Reference: 0345197 Task 350
Ship date: Feb 7, 2017
Delivery date: Feb 8, 2017 8:46 am
Signed for by: F.HESS
Delivery location: CHARLESTON, WV
Delivered to: Guard/Security Station
Delivery date: Wed, 2/8/2017 8:46 am
Service type: FedEx Standard Overnight
Packaging type: FedEx Envelope
Number of pieces: 1
Weight: 2.00 lb.
Special handling/Services Deliver Weekday
Standard transit: 2/8/2017 by 3:00 pm

Tracking number: 778370909047

Shipper Information	Recipient Information
DeAnn Thyse	Susan Pierce
ERM	WV Division of Culture & History
1000 IDS CENTER 80 SOUTH 8 th ST	1900 KANAWHA BLVD E
MINNEAPOLIS	CHARLESTON
MN	WV
US	US
55402	25305

Please do not respond to this message. This email was sent from an unattended mailbox. This report was generated at approximately 7:48 AM CST on 02/08/2017.

All weights are estimated.

The shipment is scheduled for delivery on or before the scheduled delivery displayed above. FedEx does not determine money-back guarantee or delay claim requests based on the scheduled delivery. Please see the FedEx Service Guide for terms and
conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx customer support representative.

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https://www.fedex.com/apps/fedextrack/?action=track&tracknumbers=778370909047&language=en&opco=FX&clientype=ivother

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.

West Virginia Department of Environmental Protection

ATLANTIC COAST PIPELINE
PROJECT CALL LOG

CALL TO/FROM WHOM:	PHONE NO.:
Nancy Dickson	304-926-0499

COMPANY:
West Virginia Department of Environmental Protection – Water Quality

PROJECT CONTACT:	PHONE NO.:
Mike Buckless	401-278-4303

DATE:	TIME OF CONVERSATION:
February 6, 2017	2:34 PM

RE:
West Virginia Natural Stream Preservation Act – Greenbrier River

LOG OF CONVERSATION:

Nancy Dickson, with the West Virginia Department of Environmental Protection, returned my call from the prior week where I inquired about the need for a Natural Stream Preservation Act (WVNSPA) permit based on the proposed crossing location of the Atlantic Coast Pipeline Project (ACP or Project) on the Greenbrier River.

In the voice message left with Ms. Dickson, I inquired about West Virginia Code, Chapter 22, Article 13, which states that the Greenbrier River was regulated under the WVNSPA beginning near Marlinton, West Virginia (the confluence with Knapp Creek), approximately 10 miles southwest and downstream from the Project crossing of the Greenbrier River. Based on the description in the West Virginia Code, it appeared that a permit application would not be required for the ACP crossing of the Greenbrier River. Ms. Dickson called to confirm that after her review of similar information, the ACP would only need a WVNSPA permit for activities that would occur on the Greenbrier River downstream of Marlinton, West Virginia. Since the crossing of the Greenbrier River is approximately 10 miles upstream from Marlinton, there would be no need for a WVNSPA permit for the ACP.

Virginia Agencies

Virginia Department of Conservation and Recreation

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 15, 2017

S. René Hypes
Commonwealth of Virginia
Department of Conservation and Recreation
600 East Main Street, 24th Floor
Richmond, VA 23219

RE: Response to DCR January 30, 2017 letter on the Dominion Transmission, Inc., Atlantic Coast Pipeline 2016 Handsom-Gum Powerline and Emporia Powerline Bog Hydrologic Study Plan

Dear Ms. Hypes:

Atlantic Coast Pipeline, LLC (Atlantic) has reviewed the Virginia Department of Conservation and Recreation's (DCR) comment letter, dated January 30, 2017, regarding the *Atlantic Coast Pipeline 2016 Handsom-Gum Powerline and Emporia Powerline Bog Hydrologic Study Plan* (Study Plan) dated December 1, 2016. On January 19, 2017, Atlantic and DCR staff participated in a conference call to discuss the Study Plan. On January 30, 2017, the DCR provided the Federal Energy Regulatory Commission (FERC) with comments and associated questions on the Study Plan. This letter provides Atlantic's response to the DCR's FERC filing. Below are italicized excerpts from DCR's filing followed by Atlantic's responses.

1. *DCR recommends avoidance of impacts to documented natural heritage resources associated with the Handsom-Gum Powerline Conservation Site and the Emporia Powerline Bog Conservation Site during field investigations. As necessary, test pits should be filled with an appropriately thick layer of benseal, as well as the excavated soil, in order to avoid hydrological alteration.*

   Dominion will use Benseal® in combination with native material as an avoidance measure in the event a clay lens is discovered in the soil horizon during the auguring of the initial test pits.

2. *DCR supports the delineation of the full extent of the wetlands and watersheds at both sites within and adjacent to the proposed pipeline right-of-way to accurately estimate a water budget through desktop analysis and field investigations.*

   As discussed during the January 19, 2017 conference call, Atlantic does not have permission to access properties within the whole watershed therefore, Atlantic will use

available desktop sources, including topography, aerial photos, and National Wetlands Inventory data, to understand the extent of wetlands in the area surrounding the bogs to inform the water budget. Watersheds shape and extent will also be defined using a desktop analysis. Any available field data collected during wetland delineations will be incorporated.

3. *DCR recommends using the same type of monitoring well/piezometer at all the monitoring points to reduce equipment variability in water level readings which can vary as much as 6-12 inches.*
    a. *Do the water level monitors require an aboveground data logger be used in addition to the belowground monitoring equipment to calibrate the data?*

Atlantic will use the same type of well/piezometer at all monitoring points for consistency. Atlantic will use an aboveground data logger and a below ground sensor. Calibration will be conducted by measuring water levels manually using a handheld probe and comparing probe readings to the well/piezometer readings.

4. *DCR recommends the monitoring be conducted year around for a better understanding of the hydrology of the wetlands at the sites instead of just monitoring in November and December. It is stated in the proposed hydrologic study plan on page 4 "any monitoring wells or piezometers installed for this study will be left onsite for future monitoring events to occur".*

Atlantic will monitor groundwater for up to a year or as long as possible without adjusting the construction schedule. This is anticipated to extend the duration of monitoring several months. At the point that construction will inhibit future monitoring, Atlantic will meet with the DCR to discuss the collected data and determine next steps as necessary.

5. *DCR recommends monitoring wells should be placed at different depths to accurately quantify the hydrological characteristics of the wetlands at the two sites.*
    a. *What is the rationale for the proposed depth of the monitoring wells?*
    b. *If a perched water table exists, piezometers may need to be placed above and below the impermeable clay layer.*
    c. *Are three monitoring wells adequate?*

Atlantic will place monitoring wells at different depths if a clay lens is encountered during test pit auguring. This approach would include a well below the lens and a well above the lens. The planned depth of the monitoring wells matches the depth of the trench, thereby providing the most clarity as to the behavior of groundwater in relation to the project. Atlantic believes three monitoring wells per site are sufficient for this study; however paired wells may be used depending on field and soil conditions.

6. *If the soils are identified as clay, the readings may be skewed by shrink/swell characteristics impacting the accuracy of the monitoring well readings especially in the summer months.*

Atlantic understands the concern and agrees that shrink/swell dynamics may affect water levels; however, the accuracy of the water level readings will not be affected. The wells/piezometers will capture these phenomena as they occur.

Atlantic appreciates the discussion on January 19, 2017, and looks forward to continuing to coordinate with the DCR on this project. Please contact Mr. Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this information. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

FOR RICHARD GANGLE

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Virginia Department of Environmental Quality

Dominion Resources Services, Inc.
5000 Dominion Boulevard.
Glen Allen, VA 23060

February 10, 2017

BY E-FILE

Ms. Bettina Sullivan
Virginia Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street
Richmond, VA 23219

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
Virginia Coastal Zone Management Program
Federal Consistency Information Package – Updated Filing

Dear Ms. Sullivan:

Atlantic Coast Pipeline, LLC (Atlantic) is a company formed by four major U.S. energy companies – Dominion, Duke Energy, Piedmont Natural Gas, and Southern Company Gas. The company was created to develop, own, and operate the proposed Atlantic Coast Pipeline (ACP), an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic has contracted with Dominion Transmission, Inc. (DTI), a subsidiary of Dominion, to seek authorization from the Federal Energy Regulatory Commission under Section 7(c) of the Natural Gas Act to construct, own, operate, and maintain the ACP on behalf of Atlantic. Approximately 307.2 miles of the project will be located within the Commonwealth of Virginia, of which 44.7 miles of 20-inch-diameter natural gas transmission pipeline in Virginia's Coastal Management Zone; within the Cities of Suffolk and Chesapeake.

Atlantic is submitting the enclosed Consistency Certification as an update to the original filing made on September 15, 2015. Through a series of stay agreements, Atlantic and the Virginia Department of Environmental Quality have coordinated the review of the ACP since first submitting project materials in September 2015. This filing includes revisions to the original filing and necessary data and information under the Coastal Zone Management Act, Section 307(c)(3)(A) and 15 CFR Part 930, subpart D, for the Atlantic Coast Pipeline. The materials included conform to the Commonwealth of Virginia outline for a non-federal applicant Coastal Zone Management Act Consistency Determination submittal.

Dominion appreciates the coordination to date and looks forward to continuing to work with you on this project. Please contact Richard Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal.

Please direct written responses to:

Richard Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle, Dominion

enclosure

Virginia Department of Game and Inland Fisheries

Sara Throndson

From: Sara Throndson
Sent: Wednesday, February 15, 2017 9:21 AM
To: Sara Throndson
Subject: FW: Crayfish in VA

From: Watson, Brian (DGIF) [mailto:Brian.Watson@dgif.virginia.gov]
Sent: Monday, February 13, 2017 10:21 AM
To: Casey Swecker <CSwecker@envsi.com>
Subject: RE: Crayfish in VA

Casey,

Nothing has changed in that regard. Thanks.

Brian

From: Casey Swecker [mailto:CSwecker@envsi.com]
Sent: Friday, February 10, 2017 5:57 PM
To: Watson, Brian (DGIF)
Subject: Crayfish in VA

Hey Brian,

Per our last conversation regarding Chowanoke Crayfish and Atlantic Coast Pipeline Project the consensus was that surveys are not necessary.

I don't believe anything has changed, but wanted to follow up to make sure.

Thanks, Casey

Casey Swecker
Senior Project Manager / Malacologist
Environmental Solutions & Innovations, Inc.
4525 Este Avenue | Cincinnati, Ohio 45232 | USA
office: 513.451.1777 **direct:** 513.591.4324
fax: 513.451.3321 **cell:** 304.633.5808
cswecker@envsi.com | www.envsi.com

Virginia Department of Historic Resources

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

January 26, 2017

Mr. Roger Kirchen, Director
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Subject: Addendum 2 Additional Deliverables for the Architectural Reconnaissance Survey of the Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project DHR File No. 2014-0710.

Dear Mr. Kirchen:

Atlantic Coast Pipeline, LLC (Atlantic) is pleased to submit the requested deliverables for the project referenced above. Enclosed are hard copies of the Virginia Cultural Resource Information System (V-CRIS) forms, site plans, and photos for all resources identified during this survey, as well as one CD with digital copies of all photos. The referenced addendum report was submitted to VDHR on October 11, 2016. The material enclosed was prepared by Atlantic's consultant, Dovetail Cultural Resources Group, and includes resources that were subsequently determined to be outside of the Project APE. These resources were not included in the submitted report, which was prepared by consultant ERM subsequent to changes to the proposed project route. For nine of the resources surveyed by Dovetail, seven of which remain in the project APE, only V-CRIS forms are being submitted because the properties were not visible from the public right-of-way, and thus photographs and sketch maps could not be produced. The NRHP eligibility recommendation for these resources is noted as Indeterminate on the attached table from the Addendum 2 report, with the exception of #026-0007, which was previously determined to be NRHP eligible.

The submitted documents should complete the required documentation for the Project. Atlantic would appreciate receipt of a letter acknowledging acceptance of the report by your office. If you have any questions regarding the enclosed documents, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: Table: Architectural Resources Surveyed as Part of the Modified Project APE, Atlantic Coast Pipeline Project, Addendum 2, Organized by County (North to South).

Table: Architectural Resources Surveyed as Part of the Modified Project APE, Atlantic Coast Pipeline Project, Addendum 2, Organized by County (North to South). *Note:* Resources that Dovetail recommends potentially eligible for, or should remain eligible for or listed in, the NRHP are highlighted in blue.

DHR No.	Mile Post	Name/Address	City/County	Date of Construction	Eligibility Recommendation
007-0015	139.1–140.3	Folly Farm, 1319 Lee Jackson Highway	Augusta County	1818	Remains Listed
007-5147	153.3–153.4	Augusta Structure No. 6628	Augusta County	1940	Not Eligible
007-5586	124.1–124.4	House, 1095 Jennings Gap Road	Augusta County	ca. 1910	Not Eligible
007-5587	127.0-127.2	House, 100 Bobwhite Lane	Augusta County	pre-1966	Indeterminate
007-5588	129.2–129.3	House, 3387 Churchville Road (US 250)	Augusta County	ca. 1940	Not Eligible
007-5589	131.6–131.7	House, 3862 Morris Mill Road	Augusta County	ca. 1940	Not Eligible
007-5590	131.6–131.7	House, 3892 Morris Mill Road	Augusta County	ca. 1945	Not Eligible
007-5591	131.5–131.7	House, 3895 Morris Mill Road	Augusta County	1964	Not Eligible
007-5592	135.7–135.9	House, 692 Cedar Green Road	Augusta County	ca. 1940	Not Eligible
007-5593	135.7–135.9	House, 680 Cedar Green Road	Augusta County	ca. 1960	Not Eligible
007-5594	147.7–147.9	Abandoned House and Barn, Cisco Lane	Augusta County	ca. 1900	Not Eligible
007-5595	148.2–148.6	Farm Complex, Cisco Lane	Augusta County	ca. 1900	Not Eligible
007-5597	151.1–151.3	House, 680 China Clay Road	Augusta County	ca. 1910	Not Eligible
062-5121	179.7–180.5	Red Apple Orchards	Nelson County	ca. 1890	Potentially Eligible, Criterion C
014-5072	200.4–200.8	Andersonville Ostrich Ranch, 1203 Dixie Hill Road	Buckingham County	ca. 1950	Not Eligible
014-5073	202.2–202.4	House, 2622 Andersonville Road	Cumberland County	ca. 1960	Not Eligible
014-5074	208.8–209.2	House, 708 Old Curdsville Road	Cumberland County	Pre-1964	Indeterminate
024-5109	220.3–220.5	Farm, 710 River Road	Cumberland County	ca. 1940	Not Eligible
073-5092	224.5–224.7	Abandoned House, Gully Tavern Road	Prince Edward County	ca. 1910	Not Eligible
067-0186	230.2–230.4	Bright Shadows, 2624 Jennings Ordinary Road	Nottoway County	ca. 1850	Not Eligible
067-5050	237.1–237.3	House, 3025 Winningham Road	Nottoway County	ca. 1920	Not Eligible
067-5051	246.6–246.9	House, 725 Green Gable Road	Nottoway County	ca. 1960	Not Eligible

DHR No.	Mile Post	Name/Address	City/County	Date of Construction	Eligibility Recommendation
026-0007	259.6–260.2	Col. Joseph W. Harper House, 4105 Harper's Road	Dinwiddie County	ca. 1775	Remains Eligible
026-5222	256.0–256.4	Houses, 4723–4725 Darvills Road	Dinwiddie County	pre-1968	Indeterminate
012-5136	269.5–270.0	Farmstead, 981 Ebenezer Road	Brunswick County	ca. 1920	Not Eligible
012-5191	262.8–231.2	House, Rawlings Road (Route 629)	Brunswick County	ca. 1930	Indeterminate
040-5068	291.2–291.6	House, 422 Collins Road	Greensville County	ca. 1965	Not Eligible
040-5069	291.4–291.7	House, 425 Collins Road	Greensville County	ca. 1935	Not Eligible
040-5070	292.1–292.2	Abandoned House, Rock Bridge Road	Greensville County	ca. 1910	Not Eligible
040-5071	292.2–292.3	House, 1490 Rock Bridge Road	Greensville County	ca. 1960	Not Eligible
087-5615	18.5–19	Birdsong Peanuts, 31282 Powells Hill Road	Southampton County	ca. 1960	Not Eligible
087-5616	23.5–23.7	House, 28229 Grays Shop Road (Route 673)	Southampton County	ca. 1950	Not Eligible
087-5617	23.5–23.7	House, 28247 Grays Shop Road (Route 673)	Southampton County	ca. 1900	Not Eligible
087-5618	30.7–31.7	House. 28459 Nottoway Farms Drive	Southampton County	pre-1920	Indeterminate
087-5619	33.1–33.3	Ruins, 28035 Delaware Road	Southampton County	pre-1920	Not Eligible
131-0542	77.5–77.7	House, 3328 Galberry Road	City of Chesapeake	ca. 1900	Not Eligible
131-5842	77.5–77.6	House, 3345 Galberry Road	City of Chesapeake	1945	Not Eligible
131-5843	77.5–77.6	House, 3343 Galberry Road	City of Chesapeake	1947	Not Eligible
131-5844	78.3–78.4	House, 2860 Flag Road	City of Chesapeake	1965	Not Eligible
131-5845	78.6–78.7	House, 2808 Flag Road	City of Chesapeake	1955	Not Eligible
131-5846	78.6–78.7	Veterinary Hospital, 618 Happy Acres Road	City of Chesapeake	1960	Not Eligible
131-5848	79.3–79.5	House, 2400 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5849	79.3–79.4	House, 2404 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5850	79.3–79.4	House, 2408 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5851	79.3–79.4	House, 2412 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5847	79.3–79.4	House, 701 Hopewell Drive	City of Chesapeake	1964	Not Eligible
131-5858	79.1–79.2	House, 2528 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5857	79.1–79.2	House, 2524 Meiggs Road	City of Chesapeake	1964	Not Eligible

DHR No.	Mile Post	Name/Address	City/County	Date of Construction	Eligibility Recommendation
131-5856	79.1–79.3	House, 2520 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5855	79.2–79.3	House, 2516 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5854	79.2–79.3	House, 2512 Meiggs Road	City of Chesapeake	1964	Not Eligible
131-5853	79.2–79.3	House, 2508 Meiggs Road	City of Chesapeake	1965	Not Eligible
131-5852	79.2–79.3	House 2504 Meiggs Road	City of Chesapeake	1963	Not Eligible
131-5859	79.8–79.9	House, 109 Lake Street	City of Chesapeake	1953	Not Eligible
131-5860	79.8–79.9	House, 106 Lake Street	City of Chesapeake	1950	Not Eligible
131-5861	79.7–79.9	House, 110 Lake Street	City of Chesapeake	1960	Not Eligible
131-5862	79.7–79.8	House, 112 Lake Street	City of Chesapeake	1954	Not Eligible
131-5863	79.7-79.8	House, 114 Lake Street	City of Chesapeake	1954	Not Eligible
131-5864	80.9–81.1	Faith Tab Apostolic Holiness Church, 1216 New Street	City of Chesapeake	ca. 1950	Not Eligible
131-5865	80.9–81.0	House, 1709 Currie Ave	City of Chesapeake	1945	Not Eligible
133-0025	65.3–65.6	House, 203 Upton Lane	City of Suffolk	ca. 1780	Potentially Eligible, Criterion C
133-0105	59.0–59.2	E.P. Bradshaw Log Corn Crib, Pruden Boulevard	City of Suffolk	ca. 1840	Indeterminate
133-0233	60.1–60.3	Eley Farm, Lake Prince Road	City of Suffolk	ca. 1890	Not Eligible
133-5547	47.4–47.6	House, 414 Dutch Road	City of Suffolk	1954	Not Eligible
133-5548	50.6–50.7	House, 5229 Holland Road (Route 58)	City of Suffolk	ca. 1960	Not Eligible
133-5549	50.6–50.7	House, 5233 Holland Road (Route 58)	City of Suffolk	ca. 1950	Not Eligible
133-5550	50.6–50.7	House, 5237 Holland Road (Route 58)	City of Suffolk	ca. 1950	Not Eligible
133-5551	50.6–50.7	House, 5241 Holland Road (Route 58)	City of Suffolk	ca. 1960	Not Eligible
133-5552	50.6–50.7	House, 5245 Holland Road (Route 58)	City of Suffolk	ca. 1960	Not Eligible
133-5553	50.6–50.7	House, 5301 Holland Road (Route 58)	City of Suffolk	ca. 1940	Not Eligible
133-5554	50.6–50.7	House, 5325 Holland Road (Route 58)	City of Suffolk	ca. 1965	Not Eligible
133-5555	51.5–51.7	House, 533 Chappell Drive	City of Suffolk	ca. 1900	Not Eligible
133-5556	51.7–51.9	House, 564 Chappell Drive	City of Suffolk	1925	Not Eligible

DHR No.	Mile Post	Name/Address	City/County	Date of Construction	Eligibility Recommendation
133-5557	55.7–55.8	House, 3557 Kings Fork Road	City of Suffolk	1951	Not Eligible
133-5558	56.9–57.1	House, 3112 Archers Mill Road	City of Suffolk	1945	Not Eligible
133-5564	59.8–60.0	House, 3944 Lake Point Road	City of Suffolk	1961	Not Eligible
133-5561	60.1–60.3	House, 3477 Lake Prince Drive	City of Suffolk	1950	Not Eligible
133-5562	60.1-60.3	House, 3481 Lake Prince Drive	City of Suffolk	1950	Not Eligible
133-5565	60.4–60.6	House, 3600 Labrador Lane	City of Suffolk	1949	Not Eligible
133-5567	61.3–61.4	House, 3901 Matoaka Road	City of Suffolk	1960	Not Eligible

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January 31, 2017

Mr. Robert M. Bisha
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

Re: *Phase I Archaeological Survey for the Atlantic Coast Pipeline Project, Virginia Addendum Report 1*
Highland, Augusta, Nelson, Buckingham, Cumberland, Prince Edward, Nottoway, Dinwiddie, Brunswick, Greensville, and Southampton Counties and Cities of Suffolk and Chesapeake, VA
DHR File No. 2014-0710

Dear Mr. Bisha:

The Department of Historic Resources (DHR) has received the report referenced above prepared by Natural Resource Group, LLC (NRG). It is our opinion that this report meets DHR's *Survey Guidelines* and other applicable standards. Our comments are provided as assistance to Atlantic Coast Pipeline, LLC and the Federal Energy Regulatory Commission in meeting their collective responsibility under Section 106 of the National Historic Preservation Act.

This study represents the archaeological survey of 51.4 miles of pipeline corridor (~5,964 acres), 12.5 miles of access road right-of-way (n=24), and nine (9) tracts for proposed construction yards and M&R stations totalling 2,234 acres of surveyed land. Archaeological survey of the remaining 77 miles of pipeline corridor, systematic metal detection within the eight (8) Civil War battlefields, geomorphological assessment of the pipeline corridor, and deep testing at five (5) areas will be completed and presented as addenda to this report.

This archaeological survey identified 13 isolated finds and 39 sites within the study area, including two (2) previously recorded resources and 37 newly recorded resources. Three (3) additional previously recorded resources mapped within the study area (44BR0318, 44BR0319, and 44BR0320) were not relocated and are presumed destroyed. Two (2) historic cemeteries are among the newly recorded resources. An additional four (4) sites and two (2) isolated finds were recorded during the survey, but are located in areas no longer within the study area and are not discussed in the report.

The isolated finds are, by definition, not eligible for listing in the National Register of Historic Places (NRHP) and no further consideration of these resources is warranted. NRG recommends that 29 archaeological sites, including the two (2) cemeteries, are not eligible for NRHP listing or do not contain significant deposits within the study and warrant no further work. NRG also recommends that 10

archaeological sites warrant avoidance or further assessment. We concur with these recommendations and provide further detail in the attached table. It is DHR's preference that those sites recommended by NRG as unevaluated, but warranting avoidance or assessment, be managed as potentially NRHP-eligible until the sites can be fully evaluated. Furthermore, those sites recommended by NRG as having no contributing components should be managed as unevaluated for NRHP listing, but warranting no further work within the APE. Finally, we understand that the two (2) identified historic cemeteries will be avoided and look forward to reviewing the cemetery avoidance plans.

Thank you for the opportunity to review this work. If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Mr. William Stanyard, NRG

ATTACHMENT
DHR File No. 2014-0710
January 31, 2017

Site #	Period	NRG Recommendation	DHR Recommendation
44AU0024	Prehistoric/Historic Site	Unevaluated (avoid or assess)	Potentially Eligible
44AU0863	Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0864	Historic Site	Ineligible	Not Eligible
44AU0865	Prehistoric Site	Ineligible	Not Eligible
44AU0866	Prehistoric Site	Ineligible	Not Eligible
44AU0867	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0870	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44AU0871	Prehistoric Site	Ineligible	Not Eligible
44AU0872	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0873	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44AU0874	Prehistoric Site	Ineligible	Not Eligible
44BK0375	Historic Cemetery	Ineligible (avoid)	Not Eligible; Avoid
44BK0376	Prehistoric Site	Ineligible	Not Eligible
44BK0377	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BR0344	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44CM0131	Historic Site	Ineligible	Not Eligible
44CM0132	Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44CS0053	Prehistoric Site	Ineligible	Not Eligible
44CS0321	Prehistoric Site	Ineligible	Not Eligible
44GV0393/ 31NP0386	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44HD0148	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44HD0149	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44HD0150	Prehistoric Site	Ineligible	Not Eligible
44NE0194	Prehistoric Site	Ineligible	Not Eligible
44NE0195	Prehistoric Site	No Contributing Components (incorrect in Table 3.3-1)	Unevaluated; No Further Work in APE
44SK0013	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SK0583	Prehistoric Site	Ineligible	Not Eligible
44SK0584	Historic Site	Ineligible	Not Eligible
44SK0585	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0311	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible

Site #	Period	NRG Recommendation	DHR Recommendation
44SN0332	Prehistoric/Historic Site	Ineligible	Not Eligible
44SN0333	Prehistoric Site	Ineligible	Not Eligible
44SN0334	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44SN0335	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0336	Historic Cemetery	Ineligible (avoid)	Not Eligible; Avoid
44SN0337	Prehistoric/Historic Site	Ineligible	Not Eligible
44SN0338	Prehistoric/Historic Site	Ineligible	Not Eligible
44SN0339	Prehistoric Site	Ineligible	Not Eligible
44SN0340	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE

COMMONWEALTH of VIRGINIA

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February 1, 2017

Mr. Robert M. Bisha
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

Re: *Phase I Archaeological Survey for the Atlantic Coast Pipeline Project, Virginia Components*
Highland, Augusta, Nelson, Buckingham, Cumberland, Prince Edward, Nottoway, Dinwiddie, Brunswick, and Southampton Counties and Cities of Suffolk and Chesapeake, VA
DHR File No. 2014-0710

Dear Mr. Bisha:

The Department of Historic Resources (DHR) has received a revised version of the report referenced above prepared by Natural Resource Group, LLC (NRG) in response to comments by the Federal Energy Regulatory Commission. It is our opinion that this report meets DHR's *Survey Guidelines* and other applicable standards. The comments below and attached replace DHR's December 29, 2015 comments on an earlier version of this report. Our comments are provided as assistance to Atlantic Coast Pipeline, LLC and the FERC in meeting their collective responsibility under Section 106 of the National Historic Preservation Act.

This study represents the archaeological survey of 157.8 miles of 300' pipeline corridor, 47.5 miles of 50' access road right-of-way (n=112), and three (3) potential compressor station locations. Archaeological survey of the remaining pipeline corridor, systematic metal detection within the eight (8) Civil War battlefields, geomorphological assessment of the pipeline corridor, and deep testing at five (5) areas will be completed and presented as addenda to this report.

This archaeological survey identified within the study area 75 sites, six (6) historic cemeteries, and 31 isolated finds. An additional 23 sites, four (4) cemeteries, and five (5) isolated finds were recorded during the survey, but are located in areas no longer within the study area and are not discussed in the report. The isolated finds are, by definition, not eligible for listing in the National Register of Historic Places (NRHP) and no further consideration of these resources is warranted.

To summarize Table 5.2-1, NRG recommends the following: 55 archaeological sites and the six (6) historic cemeteries as not eligible for NRHP listing or do not have NRHP-eligible components within the Area of Potential Effects (APE), 18 sites warrant avoidance or further Phase II testing (although the report repeatedly

states that 17 sites are recommended for further evaluation), and two (2) sites need additional Phase I survey. DHR generally agrees with these recommendations, except for sites 44BK0366, 44NT0307, and 44SN0315. It is our opinion that the cemetery recorded as site 444BK0366 is potentially eligible for NRHP listing and sites 44NT0307 and 44SN0315 should be managed as unevaluated, but warrant no further work in the APE. Details of DHR's recommendations are provided in the attached table.

It is DHR's preference that those sites recommended by NRG as unevaluated, but warranting avoidance or assessment, be managed as potentially NRHP-eligible until the sites are fully evaluated or avoided. Furthermore, those sites recommended by NRG as having no contributing components should be managed as unevaluated for NRHP listing, but warranting no further work within the APE. Finally, we understand that the six (6) identified historic cemeteries will be avoided and look forward to reviewing the cemetery avoidance plans.

Thank you for the opportunity to review this work. If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Mr. Bill Stanyard, NRG

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ATTACHMENT
DHR File No. 2014-0710
February 1, 2017

Site #	Type	NRG Recommendation	DHR Recommendation
44AU0850	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0852	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0853	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0860	Historic Site	Unevaluated (avoid or assess)	Potentially Eligible
44BK0358	Historic Site	Ineligible	Not Eligible
44BK0359	Prehistoric Site	Ineligible	Not Eligible
44BK0360	Prehistoric Site	Ineligible	Not Eligible
44BK0362	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BK0363	Historic Site	Ineligible	Not Eligible
44BK0365	Historic Cemetery	Ineligible (avoid)	Not Eligible
44BK0366	Historic Cemetery	Ineligible	Potentially Eligible
44BK0367	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BK0368	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44BK0369	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44BK0370	Prehistoric Site	Ineligible	Not Eligible
44BK0371	Prehistoric/Historic Site	Unevaluated (avoid or assess)	Potentially Eligible
44BK0372	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44BK0373	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BR0327	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BR0328	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44CM0128	Historic Site	Ineligible	Not Eligible
44CM0129	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44CM0130	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44DW0450	Prehistoric Site	Ineligible	Not Eligible
44DW0451	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44DW0455	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44DW0456	Prehistoric Site	Pending	Additional Phase I Survey
44DW0457	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE

Site #	Type	NRG Recommendation	DHR Recommendation
44DW0458	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0366	Prehistoric Site	Ineligible	Not Eligible
44GV0367	Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0368	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0369	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0370	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0371	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0373	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44GV0374	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0375	Prehistoric Site	Pending	Additional Phase I Survey
44GV0376	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44GV0377	PS	Ineligible	Not Eligible
44GV0378	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0386	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44GV0387	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0388	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44GV0389	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44GV0390	Prehistoric Site	Ineligible	Not Eligible
44GV0391	Prehistoric Site	Ineligible	Not Eligible
44GV0392	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44HD0142	Historic Site	Ineligible	Not Eligible
44HD0143	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44HD0144	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44HD0145	Prehistoric Site	Ineligible	Not Eligible
44NE0178	Prehistoric Site	Ineligible	Not Eligible
44NE0179	Prehistoric Site	Ineligible	Not Eligible
44NE0180	Prehistoric Site	Ineligible	Not Eligible
44NE0182	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE

Site #	Type	NRG Recommendation	DHR Recommendation
44NE0193	Prehistoric Site	Ineligible	Not Eligible
44NT0302	Prehistoric/Historic Site	Unevaluated (avoid or assess)	Potentially Eligible
44NT0305	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44NT0306	Historic Site	Ineligible	Not Eligible
44NT0307	Historic Site	Ineligible	Unevaluated; No Further Work in APE
44NT0308	Historic Site	Ineligible	Not Eligible
44NT0309	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44NT0310	Historic Site	Ineligible	Not Eligible
44NT0311	Historic Site	Ineligible	Not Eligible
44NT0312	Historic Cemetery	Ineligible (avoid)	Not Eligible
44NT0313	Historic Cemetery	Ineligible (avoid)	Not Eligible
44PE0091	Prehistoric Site	Ineligible	Not Eligible
44PE0092	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44PE0093	Prehistoric Site	Ineligible	Not Eligible
44SK0553	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44SK0555	Historic Cemetery	Ineligible (avoid)	Not Eligible
44SK0556	Historic Cemetery	Ineligible (avoid)	Not Eligible
44SN0304	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0305	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0308	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0310	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44SN0312	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SN0315	Prehistoric/Historic Site	Ineligible	Unevaluated; No Further Work in APE
44SN0318	Historic Site	Ineligible	Not Eligible
44SN0319	Prehistoric/Historic Site	Unevaluated (avoid or assess)	Potentially Eligible

COMMONWEALTH of VIRGINIA

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February 2, 2017

Mr. Robert M. Bisha
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

Re: *Phase I Archaeological Survey for the Atlantic Coast Pipeline Project, Virginia Addendum Report 2*
Highland, Augusta, Nelson, Buckingham, Cumberland, Prince Edward, Nottoway, Dinwiddie, Brunswick, and Southampton Counties and Cities of Suffolk and Chesapeake, VA
DHR File No. 2014-0710

Dear Mr. Bisha:

The Department of Historic Resources (DHR) has received the report referenced above prepared by Natural Resource Group, LLC (NRG). It is our opinion that this report meets DHR's *Survey Guidelines* and other applicable standards. Our comments are provided as assistance to Atlantic Coast Pipeline, LLC and the Federal Energy Regulatory Commission in meeting their collective responsibility under Section 106 of the National Historic Preservation Act.

This study represents the archaeological survey of 94.4 miles of 300' pipeline corridor, 20.47 miles of 50' access road right-of-way (n=55), six (6) core drill locations, and three (3) potential contractor yards. Archaeological survey of the remaining pipeline corridor, systematic metal detection within the eight (8) Civil War battlefields, geomorphological assessment of the pipeline corridor, and deep testing will be completed and presented as addenda to this report.

This archaeological survey identified within the study area 51 sites, which includes five (5) historic cemeteries, and 21 isolated finds. An additional 16 sites and seven (7) isolated finds were recorded during the survey, but are located in areas no longer within the study area and are not discussed in the report. The isolated finds are, by definition, not eligible for listing in the National Register of Historic Places (NRHP) and no further consideration of these resources is warranted.

To summarize Table 3.3-1, NRG recommends the following: 40 archaeological sites and the five (5) historic cemeteries as not eligible for NRHP listing or do not have NRHP-eligible components within the Area of Potential Effects (APE) and six (6) sites warrant avoidance or further Phase II testing. DHR concurs with these recommendations. Details of DHR's recommendations are provided in the attached table.

It is DHR's preference that those sites recommended by NRG as unevaluated, but warranting avoidance or assessment, be managed as potentially NRHP-eligible until the sites are fully evaluated or avoided. Furthermore, those sites recommended by NRG as having no contributing components should be managed as unevaluated for NRHP listing, but warranting no further work within the APE. Finally, we understand that the five (5) identified historic cemeteries will be avoided and look forward to reviewing the cemetery avoidance plans.

Thank you for the opportunity to review this work. If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Mr. Bill Stanyard, NRG

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ATTACHMENT
DHR File No. 2014-0710
February 2, 2017

Site #	Type	NRG Recommendation	DHR Recommendation
44AU0037	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0076	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0872	Prehistoric/Historic Site	Ineligible	Not Eligible
44AU0873	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44AU0877	Historic Site	Ineligible	Not Eligible
44AU0878	Historic Site	Ineligible	Not Eligible
44AU0903	Prehistoric Site	Ineligible	Not Eligible
44AU0904	Prehistoric Site	Ineligible	Not Eligible
44AU0905	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44AU0907	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44AU0910	Prehistoric Site	Ineligible	Not Eligible
44AU0912	Prehistoric Site	Ineligible	Not Eligible
44AU0913	Prehistoric Site	Ineligible	Not Eligible
44BA0921	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BA0922	Prehistoric Site	Ineligible	Not Eligible
44BK0378	Prehistoric Site	Ineligible	Not Eligible
44BK0382	Historic Site	Ineligible	Not Eligible
44BK0383	Prehistoric Site	No Contributing Components	Unevaluated; No Further Work in APE
44BK0384	Prehistoric Site	Ineligible	Not Eligible
44BK0385	Prehistoric Site	Ineligible	Not Eligible
44BK0386	Historic Cemetery	Ineligible (avoid)	Not Eligible
44BK0387	Prehistoric Site	Ineligible	Not Eligible
44CS0329	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44GV0394	Historic Cemetery	Ineligible (avoid)	Not Eligible
44GV0395	Prehistoric Site	Ineligible	Not Eligible
44GV0398	Historic Site	Ineligible	Not Eligible
44GV0399	Historic Site	Ineligible	Not Eligible
44GV0400	Historic Cemetery	Ineligible (avoid)	Not Eligible
44NE0197	Historic Cemetery	Ineligible (avoid)	Not Eligible
44NE0198	Prehistoric Site	Ineligible	Not Eligible
44NE0199	Prehistoric Site	Ineligible	Not Eligible

Site #	Type	NRG Recommendation	DHR Recommendation
44NE0201	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44NE0202	Historic Site	Ineligible	Not Eligible
44NE0203	Historic Site	Ineligible	Not Eligible
44NT0315	Prehistoric Site	Ineligible	Not Eligible
44PE0094	Prehistoric/Historic Site	Ineligible	Not Eligible
44PE0095	Prehistoric Site	Ineligible	Not Eligible
44SK0080	Prehistoric/Historic Site	Unevaluated (avoid or assess)	Potentially Eligible
44SK0586	Historic Cemetery	Ineligible (avoid)	Not Eligible
44SK0587	Historic Site	Ineligible	Not Eligible
44SK0588	Historic Site	Ineligible	Not Eligible
44SK0589	Prehistoric/Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44SK0590	Prehistoric Site	Ineligible	Not Eligible
44SK0591	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible
44SK0592	Prehistoric Site	Ineligible	Not Eligible
44SK0593	Prehistoric Site	Ineligible	Not Eligible
44SK0594	Prehistoric Site	Ineligible	Not Eligible
44SK0595	Prehistoric Site	Ineligible	Not Eligible
44SK0599	Historic Site	Ineligible	Not Eligible
44SK0600	Historic Site	No Contributing Components	Unevaluated; No Further Work in APE
44SN0342	Prehistoric Site	Unevaluated (avoid or assess)	Potentially Eligible

COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

February 3, 2017

Mr. Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

Re: *Phase I Archaeological Survey for the Atlantic Coast Pipeline Project, Virginia Addendum Report 3*
Highland, Augusta, Nelson, Buckingham, Cumberland, Prince Edward, Nottoway, Dinwiddie, Brunswick, and Southampton Counties and Cities of Suffolk and Chesapeake, VA
DHR File No. 2014-0710

Dear Mr. Gangle:

The Department of Historic Resources (DHR) has received the report referenced above prepared by Natural Resource Group, LLC (NRG). It is our opinion that this report meets DHR's *Survey Guidelines* and other applicable standards. Our comments are provided as assistance to Atlantic Coast Pipeline, LLC and the Federal Energy Regulatory Commission in meeting their collective responsibility under Section 106 of the National Historic Preservation Act.

This study represents the archaeological survey of 5.9 miles of 300' pipeline corridor, 17.94 miles of 50' access road right-of-way (n=43), two (2) contractor yards, seven (7) ground bed locations, and one (1) water impoundment. Archaeological survey of the remaining pipeline corridor, systematic metal detection within the eight (8) Civil War battlefields, geomorphological assessment of the pipeline corridor, and deep testing will be completed and presented as addenda to this report.

This archaeological survey identified within the study area 10 sites, which includes one (1) historic cemetery, and five (5) isolated finds. The isolated finds are, by definition, not eligible for listing in the National Register of Historic Places (NRHP) and no further consideration of these resources is warranted.

To summarize Table 3.3-1, NRG recommends the nine (9) archaeological sites and the one (1) historic cemetery as not eligible for NRHP listing or do not have NRHP-eligible components within the Area of Potential Effects (APE). DHR generally concurs with these recommendations; however, several sites noted in the table as ineligible for NRHP listing are recommended in the text as having no contributing components in the APE. We agree with the recommendations in the text. Details of DHR's recommendations are provided in the attached table.

It is DHR's preference that those sites recommended by NRG as having no contributing components should be managed as unevaluated for NRHP listing, but warranting no further work within the APE. Finally, we understand that the one (1) identified historic cemetery will be avoided and look forward to reviewing the cemetery avoidance plans.

Thank you for the opportunity to review this work. If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Mr. Bill Stanyard, NRG

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

ATTACHMENT
DHR File No. 2014-0710
February 3, 2017

Site #	Type	NRG Recommendation	DHR Recommendation
44AU0919	Prehistoric Site	Ineligible	Not Eligible
44AU0920	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44AU0921	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44AU0922	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44BA0925	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44GV0401	Prehistoric Site	Ineligible	Not Eligible
44NE0204	Prehistoric Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE
44NT0316	Prehistoric Site	Ineligible	Not Eligible
44SK0605	Historic Cemetery	Ineligible (avoid)	Not Eligible
44SN0348	Historic Site	No Contributing Components (Table 3.3-1 incorrectly reflects "Ineligible" recommendation)	Unevaluated; No Further Work in APE

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 14, 2017

Mr. Roger Kirchen, Director
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Subject: Addendum 3 Additional Deliverables for the Architectural Reconnaissance Survey of the Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project DHR File No. 2014-0710.

Dear Mr. Kirchen:

Atlantic Coast Pipeline, LLC (Atlantic) is pleased to submit the requested deliverables for the project referenced above. Enclosed are hard copies of the Virginia Cultural Resource Information System (V-CRIS) forms, site plans, and photos for all resources identified during this survey, as well as one CD with digital copies of all photos. The referenced addendum report was submitted to VDHR on October 11, 2016. The material enclosed was prepared by Atlantic's consultant, Environmental Resources Management. A table of the resources is included for your reference.

The submitted documents should complete the required documentation for the Project. Atlantic would appreciate receipt of a letter acknowledging acceptance of the report by your office. If you have any questions regarding the enclosed documents, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

FOR RICHARD GANGLE
Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: **Table: Architectural Resources Surveyed as Part of the Modified Project APE, Atlantic Coast Pipeline Project, Addendum 3, Organized by County (North to South).**

Table: Architectural Resources Surveyed as Part of the Modified Project APE, Atlantic Coast Pipeline Project, Addendum 3, Organized by County (North to South).

Resource	Description	NRHP Recommendation
Augusta County		
045-0120	McDowell battlefield	Eligible
007-0103	Revercomb House, ca. 1850	Eligible
007-0445	West Augusta Cemetery	Ineligible
007-0455	Side gable dwelling, ca. 1875	Ineligible
007-0457	Georgina dwelling, ca. 1840	Ineligible
007-0480	John Montgomery House, ca. 1900	Eligible
007-5569	Side gable dwelling, ca. 1955	Ineligible
007-5681	I-house dwelling, ca. 1900	Ineligible
007-5682	Farm complex, ca. 1910-1960	Ineligible
007-5683	American Small House, ca. 1955	Ineligible
007-5684	Vernacular cottage dwelling, ca. 1930	Ineligible
007-5685	Side gable dwelling, ca. 1945	Ineligible
007-5686	Side gable dwelling, ca. 1955	Ineligible
007-5687	Ranch house, ca. 1965	Ineligible
007-5688	Side gable dwelling, ca. 1955	Ineligible
007-5689	Saltbox dwelling, ca. 1905	Eligible
007-5690	Vernacular, unknown, ca. 1960	Ineligible
007-5691	Bungalow dwelling, ca. 1910	Ineligible
007-5692	I-House variation, ca. 1900	Ineligible
007-5693	Side gable dwelling, ca. 1920	Ineligible
007-5694	Side gable dwelling, ca. 1950	Ineligible
007-5695	I-House, ca. 1900	Ineligible
007-5696	Side gable dwelling, ca. 1940-1960	Ineligible
007-5697	Ranch house, ca. 1960-1970	Ineligible
007-5698	Barn, ca. 1960	Ineligible
007-5699	I-House, ca. 1880	Ineligible
Bath County		
008-5053	Craftsman Bungalow, ca. 1930	Eligible
008-5054	Shed, ca. 1930-1950	Ineligible
008-5055	Side gable dwelling, ca. 1965	Ineligible
008-5056	Central hall dwelling, ca. 1920s	Ineligible
008-5058	Side gable dwelling, ca. 1960-1970	Ineligible
008-5059	Side gable dwelling, ca. 1920-1930	Ineligible
008-5060	Ranch house, ca. 1960-1970	Ineligible
008-5061	Gabled T dwelling, ca. 1900	Ineligible
008-5062	Side gable dwelling, ca. 1960-1970	Ineligible
008-5063	Side gable dwelling, ca. 1940	Ineligible

Resource	Description	NRHP Recommendation
Dinwiddie County		
026-5226	I-House, ca. 1900	Ineligible
Highland County		
045-0007	Sidney Wade House, 1826	Eligible
045-0055	Georgie Anson Bird House, ca. 1890	Ineligible
045-5013	Beam bridge1003, 1930	Ineligible
045-5014	Beam bridge 1005, 1930	Ineligible
045-5015	Beam bridge 1007, 1929	Ineligible
045-5016	Beam bridge, 1008, 1929	Ineligible
045-5017	Beam bridge 1006, 1929	Ineligible
045-5079	Farm buildings, early to mid 20th cent.	Ineligible
045-5080	Side gable dwelling, ca. 1950	Ineligible
045-5081	Side gable dwelling, 1842	Ineligible
045-5082	Side gable dwelling, ca. 1950	Ineligible
045-5083	Side gable commercial, ca. 1940	Ineligible
045-5084	Barns, ca. 1965-1970	Ineligible
045-5086	Side gable dwelling, early 20th cent.	Ineligible
Nelson County		
062-5119	South Rockfish Valley Rural Historic District	Listed, 2016
062-5160	Warminster Rural Historic District	Eligible
062-5180	Chesapeake and Ohio Railroad	Eligible
062-5221	Log Cabin, ca. 1880-1910	Ineligible
062-5222	I-House, ca, 1960-1970	Ineligible
City of Suffolk		
133-0209	I-house, ca. 1890	Ineligible
133-0215	Wright House, ca. 1840	Ineligible
133-5039	Siege of Suffolk	Eligible
091-5098	Norfolk and Petersburg Railroad, 1851	Eligible
133-5192	Hampton Roads Beagle Club, ca. 1950	Ineligible
133-5444	Bungalow dwelling, ca, 1930	Ineligible
133-5481	Cemetery, 1867	Ineligible
133-5558	Side gable vernacular, ca. 1950	Ineligible
133-5560	Ranch house, ca. 1950-1960	Ineligible
133-5563	American Small house, ca. 1960	Ineligible
133-5566	Cape Cod Revival dwelling, ca. 1960	Ineligible
133-5571	Side gable dwelling, ca. 1940-1950	Ineligible
133-5572	Outbuilding, ca. 1960-1970	Ineligible
133-5573	Minimal Traditional dwelling, ca. 1950	Ineligible
133-5574	Tudor Revival dwelling, ca. 1947	Ineligible
133-5575	Classical Revival dwelling, ca. 1913	Ineligible
133-5578	I-House, ca. 1890	Ineligible

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 21, 2017

Mr. Roger Kirchen, Director
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Subject: Section 106 Review –Archaeological Survey Report Addendum 4
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
DHR File No. 2014-0710

Dear Mr. Kirchen:

Atlantic Coast Pipeline, LLC (Atlantic) is requesting review and comment on the enclosed addendum archaeological survey report, which reports on surveys conducted for the proposed Atlantic Coast Pipeline (ACP) from September 2016 through January 2017. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency for this Project. Atlantic's consultant, ERM, conducted the survey and prepared the enclosed report pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

Atlantic would appreciate your comments on the attached addendum archaeological survey report, and we look forward to continuing to work with you on this Project. If you have any questions regarding the enclosed report, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

FOR RICHARD GANGLE

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: Archaeological Survey Report Addendum 4

North Carolina Agencies

North Carolina Department of Natural and Cultural Resources

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 24, 2017

Renee Gledhill-Earley
State Historic Preservation Office
109 East Jones Street, Room 258
Raleigh, NC 27601

Subject: Section 106 Review –Phase I Archaeological Survey Report Addendum 4
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
File No. Multi-County ER 14-1475

Dear Ms. Gledhill-Earley:

Atlantic Coast Pipeline, LLC (Atlantic) is requesting review and comment on the enclosed addendum archaeological survey report, which reports on surveys conducted for the proposed Atlantic Coast Pipeline (ACP) from September 2016 through January 2017. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency for this Project. Atlantic's consultant, ERM, conducted the survey and prepared the enclosed report pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

Atlantic would appreciate your comments on the attached addendum archaeological survey report, and we look forward to continuing to work with you on this Project. If you have any questions regarding the enclosed document, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

for Richard Gangle

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: Archaeological Survey Report Addendum 4

FEDERALLY RECOGNIZED INDIAN TRIBES

Delaware Tribe

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 9, 2017

BY OVERNIGHT (OR EXPRESS) MAIL

Brice Obermeyer
Tribal Historic Preservation Office
Delaware Tribe
Roosevelt Hall, Rm 212
1 Kellogg Drive
Emporia, KS 66801

RE: Section 106 Review
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Dominion Transmission, Inc., Supply Header Project
West Virginia and Pennsylvania

Dear Mr. Obermeyer:

Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) are pleased to provide you with the enclosed cultural resource reports for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) (collectively Projects) per your request to Peggy Boden on behalf of the Federal Energy Regulatory Commission (FERC) in June 2016. In August 2016, you received copies of Phase I archaeological survey reports which included the results of surveys conducted through June 2016 for the Projects. The enclosed reports document Phase II investigations, cemetery delineations, and additional Phase I survey results in West Virginia and Pennsylvania.

Atlantic - a company comprised of subsidiaries of Dominion Resources, Duke Energy, Piedmont Natural Gas, and Southern Company Gas – and DTI will seek authorization from FERC under Section 7(c) of the Natural Gas Act to construct and operate the Projects.

As you know, FERC is the lead Federal agency for these Projects. The Projects will be subject to review by FERC under Section 106 of the National Historic Preservation Act. To assist FERC in complying with Section 106, Atlantic and DTI are collecting information on archaeological sites and other cultural resources which may be affected by the Projects. As part of this process, Atlantic and DTI are interested in learning of any interests or concerns you may have regarding archaeological sites, burials, and traditional cultural properties so that these may be considered prior to construction of the Projects.

The regulations for implementing Section 106 (at 36 CFR 800) allow companies like Atlantic and DTI to gather information; however, FERC will be responsible for determinations regarding impacts on archaeological and cultural resources. While Atlantic and DTI are seeking your input

regarding potential interests and concerns, FERC is responsible for government-to-government consultations with Indian tribes.

If you would like to communicate directly with FERC staff to discuss its cultural resource review and consultation processes, please feel free to contact Kevin Bowman, FERC Project Manager for ACP and SHP, at (202) 502-6287or via email at Kevin.Bowman@ferc.gov.

If you have any questions regarding the enclosed survey reports, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline and Supply Header Projects

cc: Richard Gangle (Dominion)

Enclosures: Phase II Investigation Report (ACP – West Virginia)
Cemetery Delineation Report (ACP – West Virginia)
Phase I Archaeological Addendum Survey Report Pennsylvania (SHP)

DeAnn Thyse

From: TrackingUpdates@fedex.com
Sent: Monday, February 13, 2017 10:11 AM
To: DeAnn Thyse
Subject: FedEx Shipment 778402188560 Delivered

This tracking update has been requested by:

Company Name: ERM
Name: DeAnn Thyse
E-mail: deann.thyse@erm.com

Our records indicate that the following shipment has been delivered:

Reference: 0345197 Task 350
Ship date: Feb 10, 2017
Delivery date: Feb 13, 2017 10:07 am
Signed for by: M.THOMPSON
Delivery location: EMPORIA, KS
Delivered to: Receptionist/Front Desk
Delivery date: Mon, 2/13/2017 10:07 am
Service type: FedEx Standard Overnight
Packaging type: FedEx Box
Number of pieces: 1
Weight: 3.00 lb.
Special handling/Services Deliver Weekday
Standard transit: 2/13/2017 by 4:30 pm

Tracking number: 778402188560

Shipper Information	Recipient Information
DeAnn Thyse	Brice Obermeyer
ERM	Delaware Tribe
1000 IDS CENTER 80 SOUTH 8 th ST	1 Kellogg Drive
MINNEAPOLIS	Roosevelt Hall, Room 212
MN	EMPORIA
US	KS
55402	US
	66801

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conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx customer support representative.

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Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.

Eastern Band of Cherokee Indians

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

February 9, 2017

Eastern Band of Cherokee Indians
Russell Townsend, THPO
88 Council Loop Road
Cherokee, NC 28719

Subject: Section 106 Review
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Dominion Transmission, Inc., Supply Header Project
Pennsylvania, West Virginia, Virginia, and North Carolina

Dear Mr. Townsend:

Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) are pleased to provide you with the enclosed cultural resource reports for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) (collectively Projects) per your September 7, 2016, letter to the Federal Energy Regulatory Commission (FERC). In October 2016 you received copies of Phase I archaeological survey reports which included the results of surveys conducted through September 2016 for the Projects. The enclosed reports document Phase II investigations, cemetery delineations, geoarchaeological investigations, and additional Phase I survey results in Pennsylvania, West Virginia, Virginia, and North Carolina.

Atlantic - a company comprised of subsidiaries of Dominion Resources, Duke Energy, Piedmont Natural Gas, and Southern Company Gas – and DTI will seek authorization from FERC under Section 7(c) of the Natural Gas Act to construct and operate the Projects.

As you know, FERC is the lead Federal agency for these Projects. The Projects will be subject to review by FERC under Section 106 of the National Historic Preservation Act. To assist FERC in complying with Section 106, Atlantic and DTI are collecting information on archaeological sites and other cultural resources which may be affected by the Projects. As part of this process, Atlantic and DTI are interested in learning of any interests or concerns you may have regarding archaeological sites, burials, and traditional cultural properties so that these may be considered prior to construction of the Projects.

The regulations for implementing Section 106 (at 36 CFR 800) allow companies like Atlantic and DTI to gather information; however, FERC will be responsible for determinations regarding impacts on archaeological and cultural resources. While Atlantic and DTI are seeking your input regarding potential interests and concerns, FERC is responsible for government-to-government consultations with Indian tribes.

If you would like to communicate directly with FERC staff to discuss its cultural resource review and consultation processes, please feel free to contact Kevin Bowman, FERC Project Manager for ACP and SHP, at (202) 502-6287or via email at Kevin.Bowman@ferc.gov.

If you have any questions regarding the enclosed survey reports please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline and Supply Header Projects

cc: Richard Gangle (Dominion)

Enclosures: Phase II Investigation Reports (ACP)
Cemetery Delineation Reports (ACP)
Geoarchaeological Investigation Report (ACP)
Phase I Archaeological Addendum Survey Report Pennsylvania (SHP)

DeAnn Thyse

From: TrackingUpdates@fedex.com
Sent: Monday, February 13, 2017 1:55 PM
To: DeAnn Thyse
Subject: FedEx Shipment 778402271546 Delivered

This tracking update has been requested by:

Company Name: ERM
Name: DeAnn Thyse
E-mail: deann.thyse@erm.com

Our records indicate that the following shipment has been delivered:

Reference: 0345197 Task 350
Ship date: Feb 10, 2017
Delivery date: Feb 13, 2017 2:49 pm
Signed for by: J.YOUNGBIRD
Delivery location: CHEROKEE, NC
Delivered to: Receptionist/Front Desk
Delivery date: Mon, 2/13/2017 2:49 pm
Service type: FedEx 2Day
Packaging type: FedEx Box
Number of pieces: 1
Weight: 6.00 lb.
Special handling/Services Deliver Weekday
Standard transit: 2/14/2017 by 4:30 pm

Tracking number: 778402271546

Shipper Information	Recipient Information
DeAnn Thyse	Russell Townsend
ERM	Eastern Band of Cherokee Indians
1000 IDS CENTER 80 SOUTH 8 th ST	88 Council Loop Road
MINNEAPOLIS	CHEROKEE
MN	NC
US	US
55402	28719

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https://www.fedex.com/apps/fedextrack/?action=track&tracknumbers=778402271546&language=en&opco=FX&clientype=ivother

Standard transit is the date and time the package is scheduled to be delivered by, based on the selected service, destination and ship date. Limitations and exceptions may apply. Please see the FedEx Service Guide for terms and conditions of service, including the FedEx Money-Back Guarantee, or contact your FedEx Customer Support representative.

Thank you for your business.