# MVP Southgate Amendment Project

# Docket No. CP25-60-000

# Resource Report 1

# Updated Appendix 1-G

# Landslide Mitigation Report

# MVP Southgate Amendment Project

# Landslide Mitigation Report

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# APPENDICES

# 1.0 EXECUTIVE SUMMARY

Mountain Valley Pipeline, LLC ("Mountain Valley") prepared this *Landslide Mitigation Report* to address potential post-construction landslide hazards for MVP Southgate Amendment Project ("Amendment Project"). The pipeline route was analyzed to determine if mitigation controls installed during construction are necessary to avoid potential landslide issues following construction. Potential landslide sites were identified by a desktop analysis that considered previous landslide activity, slope steepness, and sidehill construction. Mountain Valley Design Engineering ("Design Engineering") has determined that the areas that are listed in **Appendix A** require additional controls to maintain slope stability. A summary of the required mitigation controls can be found in **Section 4.0**. These controls may be added, edited, or removed based on changing construction practices through the design of the pipeline and/or field conditions at the time of construction. A plan depicting the extent of the controls for each site can be found in **Appendix A**, and details for the controls are provided in **Appendix B**.

**Name of System:** Mountain Valley Pipeline, LLC

**Name of Pipeline:** MVP Southgate - H-650 Pipelines

**Length of Pipeline:** 31.3 Miles

# 2.0 DESKTOP ANALYSIS

A desktop analysis was performed for the entire length of the pipeline route to identify areas most susceptible to landslide issues. The analysis considered three critical factors:

- Previous landslide activity: The United States Geological Survey ("USGS") Landslide Potential Maps (USGS 2024), as well as publicly available LIDAR data, was used to determine if there is evidence of movement and/or a high probability of landslide hazards on slopes crossed by the Amendment Project.
- Steepness of Slope: Portions of the pipeline that traverse slopes with an angle of inclination of 16 degrees or greater are considered to be in a steep slope area. A slope of 16 degrees is marginally stable with a typical low-strength in-situ soil and is therefore used as the threshold for this analysis. Slopes were measured using LIDAR flown for the original MVP Southgate Project, as approved June 18, 2020. The steepness of the slope is measured without regard for the orientation of the pipeline (i.e., perpendicular to the contour lines even if the pipeline is sidehill).
- Sidehill construction: If the orientation of a segment of the pipeline is parallel or near parallel to the contour lines of a slope, then the segment is considered an area of sidehill construction.

# 3.0 FIELD REVIEW

Prior to construction, Mountain Valley's geotechnical engineer will field review the areas where potential stability issues were identified, as detailed in Appendix A, to verify the mitigation measures required. If updates are required, a supplement to this report will be created.

# 4.0 PROPOSED MITIGATION CONTROLS

The following section provides a description of proposed mitigation controls. One or a combination of controls may be utilized and shall be based on the actual field conditions encountered. The comments column in Appendix A provides suggested controls based on the desktop analysis.

In addition to the mitigation controls specified in Appendix A, drains should be installed in any seep or spring identified during construction, and transverse trench drains will be installed throughout the length of every sidehill. All drains shall be installed to collect and control the release of water to a stable and well-vegetated location outside of existing streams or environmentally sensitive areas.

## 4.1 Surface and Subsurface Drainage Controls

- **Trench Breaker Daylight Drain (MVP-SG-35):** The trench breaker daylight drains will prevent saturation of the trench backfill by pulling groundwater moving along the trench to the surface. A 4" perforated pipe bedded in free-draining AASHTO #57 stone and wrapped in permeable geotextile filter fabric will be placed against the upslope face of a trench breaker (perpendicular to the pipeline) at the bottom of the trench underneath the pipeline. The perforated pipe will turn 90 degrees at the low point of the trench and daylight into a riprap apron to dissipate the flow of water.
- **Cutoff Drain (MVP-SG-36A/B and MVP-SG-37):** For sidehill construction, the cutoff drain works by catching or "cutting off" groundwater as it enters the right-of-way ("ROW"). The sidehill cutoff drain is a subsurface drain constructed of a 6" perforated pipe bedded in AASHTO #57 stone and wrapped in geotextile filter fabric. The drain is placed upslope of and parallel to the pipe for the specified length before turning downslope and daylighting near the edge of the ROW into riprap to dissipate the flow of water. For downhill construction, the cutoff drain is intended to cut off groundwater flowing along the ROW at a specified location. The downhill cutoff drain will be identical to the sidehill cutoff drain, except that it will be oriented perpendicular to the pipelines. In both cases, the drain pipe will be solid and surrounded by typical trench backfill for the portion crossing the pipeline trench in order to prevent the migration of water from the drain pipe into the trench.
- **Transverse Trench Drain (MVP-SG-38A/B):** These drains are to be installed within the trench at specified intervals and/or at low points of sidehill construction. They are constructed by digging a small ditch extending from the pipeline trench to the edge of the ROW. The ditch will be lined with geotextile filter fabric and a 4" perforated pipe will be laid in the ditch and surrounded with AASHTO #57 stone. The remainder of the ditch will be filled with the same type of stone to the top of the ditch and then covered with backfill as required for grading purposes. The drain should form a 10 ft tee within the trench against the back (uphill side) of the trench. Where this drain crosses the pipeline trench, stone backfill in the drain will only extend to just below the bottom of the pipe, after which typical trench backfill will be used.
- **Rock Lined Swale (MVP-SG-39):** A small surface drainage ditch will be constructed to efficiently convey water across the pipeline ROW and into a wooded area off the ROW and prevent surface water from seeping into the ground, causing saturation of the ROW. The drainage ditch will be lined with geotextile filter fabric overlain by 6" to 12" rock (which can be sourced from excavated spoils).

- **Riprap Natural Drains (MVP-SG-40):** Where natural drains intersect the pipeline ROW, the drain shall be restored to its original dimensions and drainage path. The drain shall be lined with geotextile filter fabric overlain by 6" to 12" rock (which can be sourced from excavated spoils).
- **Riprap Slope Breakers (MVP-SG-41):** Slope breakers (water bars) that may experience more constant or higher peak flows may be lined with riprap to ensure their long-term integrity. Slope breakers receiving riprap treatment will be lined with 3" to 6" rock (which can be sourced from excavated spoils).
- **Trench Breaker Pass-through Drain (MVP-SG-43A/B):** The pass-through trench breaker drain is intended to prevent the buildup of water behind trench breakers, which could saturate the slope and cause a slide. These pass-through drains will be installed on the same slopes as the trench breaker daylight drains and will provide a way for groundwater to reach the daylight drains and ultimately be pulled to the surface. The trench breaker pass-through drains will allow water to pass through the trench breaker using two 2" PVC pipes, which will be placed near the bottom of the trench breaker.
- **Brow Ditch (MVP-SG-46):** The brow ditch is a rock-lined ditch intended to catch surface water runoff and divert it around a protected area of the ROW. These are typically installed in sidehill sections oriented parallel to the pipeline at the uphill edge of the ROW to catch the water flowing from upslope of the ROW. The brow ditch will eventually turn and cross the ROW to safely carry the water to an exit point at the downhill edge of the ROW.

## 4.2 Stabilization Controls

- **Geogrid Reinforcement (MVP-SG-42A/B/C):** In areas where the existing grade of the slope is too steep to maintain long-term stability, layers of geogrid reinforcement may be placed during backfill operations to provide additional strength to the slope.
- **Highwall Revetment (MVP-SG-44A/B):** For near vertical slopes requiring additional trench stabilization measures, sakrete highwall revetment may be used. The revetment is essentially acting as a concrete retaining wall, and therefore a footing in the form of a toe key and rebar will be utilized to help stabilize the wall. The trench may be filled with sandbags or crushed rock. Design Engineering shall determine or approve all materials used. Weephole drains should be installed at specified intervals to relieve water pressure from behind the revetment.
- **Steep Slope Revetment (MVP-SG-45):** For steep slopes requiring additional trench stabilization measures, sakrete trench breakers with a sakrete or riprap revetment may be used. The trench may be filled with sandbags or crushed rock, or in some cases, native material. Design Engineering shall determine or approve all materials used and the spacing of the sakrete trench breakers. All sakrete breakers shall have drains installed.
- **Other (Site-Specific) Stabilization:** Depending on the site, this may involve regrading the slope to a more stable angle or installing some sort of engineered retaining structure (soil nails, soldier pile wall, gabions, etc.). Design Engineering will produce site-specific details for these items if required.

### 4.3 Additional Measures

In addition to these site-specific controls, the following practices should be applied to the entire length of the pipeline:

- **Compact Soil Backfill:** During construction, areas will be encountered that require placement on compacted soil backfill. Soil backfill shall be placed in successive horizontal layers of 12" in loose depth for the full width of the cross-sectional area and shall be compacted using equipment approved by the Engineer or Designee. Each lift shall be compacted to a minimum of no visual movement before the overlaying lift is placed. Moisture content of the backfill material shall be adjusted by wetting or aerating as necessary as determined by the Engineer or Designee. Depending on the site specifics additional compaction testing and specifications may be required.
- **Compact Slope Breakers:** All slope breakers (water bars) shall be compacted as specified in the Erosion and Sediment Control Plan drawings. Compaction can be achieved via bucket tamping with a hoe. This will help ensure that water bars maintain their intended drainage and are not deformed by freeze-thaw cycles.
- **Track-In Workspaces:** Tracking consists of using machinery to create a series of ridges and depressions that run perpendicular to the slope (on the contour). This can be accomplished with any appropriate implement that can be safely operated on the slope, and that will not cause undue compaction. All workspaces on a hillside that have had fill temporarily placed during construction and then removed for backfill operations shall be tracked in. For sidehill construction areas, special attention shall be paid to the area where the cut and fill portions of the slope meet, as this is the most likely area for cracks to form. If this area is not tracked in, water can seep into the crack and may eventually destabilize the hillside.

Note that the information contained in this report is based upon the results of the desktop analysis and field-reported areas of concern received to date. **If additional areas of concern are encountered during construction, the author of this report should be contacted for guidance**.

### 4.4 Construction Considerations

Design Engineering recommends that the contractor submit to Mountain Valley a description of the construction means and methods for the areas identified in this report. The purpose of this is to allow Mountain Valley to determine if temporary construction conditions could lead to a slide.

## 5.0 REFERENCES

United States Geological Survey. 2024. U.S. Landslide Inventory and Susceptibility Map. Available online at: https://www.usgs.gov/tools/us-landslide-inventory-and-susceptibility-map. Accessed September 2024.

# Appendix A

# Site-Specific Mitigation Controls

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 1 | 6+25 | 6+60 | 36.82908 | -79.34453 | 36.82897 | -79.34456 | -- | Water bar installed at tops of stream bank (6+25 and 6+60). | Stream crossing with moderately steep slopes on stream bank. |
| 2 | 35+00 | 35+65 | 36.82298 | -79.34746 | 36.82286 | -79.34759 | -- | Water bar installed at tops of stream bank (35+00 and 35+65). | Stream Crossing with moderately steep slopes on stream bank. |
| 3 | 43+25 | 43+75 | 36.82121 | -79.34926 | 36.82111 | -79.34936 | -- | Water bar installed at tops of stream bank (43+25 and 43+75). | Stream Crossing with moderately steep slopes on stream bank. |
| 4 | 72+45 | 72+90 | 36.81502 | -79.35548 | 36.81494 | -79.35558 | -- | Water bar installed at tops of stream bank (72+45 and 72+90). | Stream Crossing with moderately steep slopes on stream bank. |
| 5 | 106+40 | 106+90 | 36.80848 | -79.36302 | 36.80835 | -79.36317 | -- | Water bar installed at tops of stream bank (106+40 and 106+90). | Stream Crossing with moderately steep slopes on stream bank. |
| 6 | 133+25 | -- | 36.80305 | -79.36921 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | Moderately steep slope section (16-26 deg). Less than 50 feet section or ROW with moderately steep slope. |
| 7 | 186+15 | 186+85 | 36.79216 | -79.38113 | 36.79202 | -79.38128 | -- | Water bar installed at tops of stream bank (186+15 and 186+85). | Stream Crossing with moderately steep slopes on stream bank. |
| 8 | 234+00 | 234+75 | 36.78284 | -79.39049 | 36.78277 | -79.39067 | MVP-SG-40 | Water bar installed at tops of stream bank (234+00 and 234+75) and rip rap armoring of stream channel and banks. | Stream crossing with steep slopes. |
| 9 | 249+80 | 251+60 | 36.78109 | -79.39542 | 36.78079 | -79.39558 | MVP-SG-36A/B and MVP-SG-37 | Cut off drain with outlet. | PI near partial side slope area with drainage downhill of ROW. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 10 | 271+25 | 273+00 | 36.77572 | -79.39842 | 36.77531 | -79.39865 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with outlet drains for each trench breaker. | Moderately steep slope section (16-26 degrees). |
| 11 | 277+15 | 277+90 | 36.77425 | -79.39920 | 36.77404 | -79.39931 | -- | Water bar installed at tops of stream bank (277+15 and 277+90). | Larger stream crossing with moderate to steep slopes on stream bank. |
| 12 | 285+80 | 287+00 | 36.77191 | -79.39999 | 36.77186 | -79.40022 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with outlet drains. | Steep slope section. Slopes ~26 degrees. |
| 13 | 312+82 | -- | 36.76853 | -79.40775 | -- | -- | MVP-SG-35 | Trench breakers with outlet drains. | Moderately steep slope section (16-26 degrees). Less than 50 feet section or ROW with moderately steep slope. |
| 14 | 314+50 | 315+50 | 36.76819 | -79.40812 | 36.76799 | -79.40834 | -- | Water bar installed at tops of stream bank (314+50 and 315+50). | Steep slopes around small creek drainage. |
| 15 | 334+00 | 337+00 | 36.76415 | -79.41249 | 36.76349 | -79.41315 | MVP-SG-36A/B | In order to avoid steep slopes and drainage features east of ROW, do not install pipeline east of current center line alignment. Install cutoff drain from station 334+00 to 337+00. | Steep slope on east side of ROW. East of proposed CL. |
| 16 | 367+45 | -- | 36.75695 | -79.41961 | -- | -- | MVP-SG-40 | Riprap armoring of stream channel and banks. | Steep slopes around small creek drainage. |
| 17 | 385+30 | 386+30 | 36.75309 | -79.42344 | 36.75292 | -79.42361 | MVP-SG-45 | Steep slope revetment. | Steep slope section, Slope ~25-30 degrees. |
| 18 | 416+50 | 417+50 | 36.74619 | -79.42983 | 36.74596 | -79.43005 | MVP-SG-45 | Steep slope revetment. During restoration, reestablish existing natural drainage swale at STA 416+50. | Steep slopes on north side of drainage area with pond off ROW to west. Slopes ~16-26 degrees with isolated, very steep areas. Possible old slide area based on Google Earth. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 19 | 417+50 | 419+30 | 36.74596 | -79.43005 | 36.74565 | -79.43033 | MVP-SG-35 | Trench breakers with outlet drains. | Steep slope section on south side of drainage. |
| 20 | 437+60 | 439+00 | 36.74153 | -79.43406 | 36.74127 | -79.43431 | MVP-SG-35 | Trench breakers with outlet drains. | Steep slope section. Slopes ~16 to 30 degrees. |
| 21 | 469+50 | 471+00 | 36.73456 | -79.44054 | 36.73423 | -79.44084 | MVP-SG-35 | Trench breakers with outlet drains. | Steep slope section. Slopes ~26 to 33 degrees. |
| 22 | 543+25 | 544+25 | 36.72027 | -79.45537 | 36.72027 | -79.45537 | MVP-SG-45, MVP-SG-35 | Steep slope revetment from station 543+25 to 543+75. Trench breakers with outlet drains from station 543+75 to 544+25. | Steep slope section. Slopes ~26 to 40 degrees. |
| 23 | 544+25 | 547+50 | 36.71999 | -79.45568 | 36.71942 | -79.45657 | MVP-SG-38A/B | Transverse drains with outlet drain every 100 feet along ROW. | Large side slope section. |
| 24 | 548+25 | 549+25 | 36.71932 | -79.45680 | 36.71917 | -79.45705 | MVP-SG-35 | Trench breakers with outlet drains. | Steep slope section. Large side slope section. |
| 25 | 550+25 | 551+00 | 36.71901 | -79.45720 | 36.71884 | -79.45735 | MVP-SG-35, MVP-SG-43A/B | Breakers with alternating outlet/daylight and pass through drains. | Moderately steep slope section. >16 degrees. |
| 26 | 597+00 | 600+75 | 36.70874 | -79.46673 | 36.70771 | -79.46699 | MVP-SG-35 | Trench breakers with outlet drains. | Semi-sidehill section with moderately steep slopes. |
| 27 | 600+75 | 601+75 | 36.70771 | -79.46699 | 36.70744 | -79.46703 | MVP-SG-45 | Steep slope revetment along south of stream. | Steep slope section, Slope ~25-30 degrees. |
| 28 | 632+50 | -- | 36.70140 | -79.47364 | -- | -- | MVP-SG-35 | Breaker with drain. | Moderately steep slope section (16-26 deg). Less than 50 feet section or ROW with moderately steep slope. |
| 29 | 643+00 | -- | 36.69923 | -79.47554 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | Topographic slope map shows possible drainage with steep slopes. |
| 30 | 648+20 | 650+25 | 36.69780 | -79.47723 | 36.69816 | -79.47687 | MVP-SG-35, MVP-SG-43A/B | Trench breaker with alternating outlet/daylight and pass through drains. | Moderately steep slope section. >16 degrees. In USGS Landslide low probability slide zone. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 31 | 692+70 | 693+75 | 36.68868 | -79.48632 | 36.68848 | -79.48652 | MVP-SG-35 | Trench breakers with outlet drains. | Steep slope section, Slope ~25-30 degrees. IN USGS low probability landslide area. |
| 32 | 728+80 | 730+80 | 36.68023 | -79.49036 | 36.67976 | -79.49075 | MVP-SG-35, MVP-SG-45 | Steep slope revetment from station 728+80 to 729+20. Trench breakers with outlet drains from station 729+20 to 730+80. | Steep slope section, Average Slope ~25-30 degrees with steep section ~40 degrees. IN USGS low probability landslide area. |
| 33 | 738+50 | 739+00 | 36.68055 | -79.49316 | 36.68048 | -79.49334 | MVP-SG-38A/B | Transverse drain for 50 feet south of the PI. | PI in area with moderate slopes ~16 degrees in drainages south of PI. |
| 34 | 742+30 | -- | 36.68006 | -79.49436 | -- | -- | MVP-SG-35 | Trench breakers with outlet drains. | Moderately steep slope section (16-26 deg) in drainage. Less than 50 feet section or ROW with moderately steep slope. |
| 35 | 755+00 | -- | 36.67766 | -79.49734 | -- | -- | MVP-SG-35 | Trench breakers with outlet drains. | Moderately steep slope section (16-26 deg) in drainage. Less than 50 feet section or ROW with moderately steep slope. |
| 36 | 774+80 | 775+80 | 36.67345 | -79.50161 | 36.67326 | -79.50180 | -- | Water bar installed at tops of stream bank (774+80 and 775+80). | Stream crossing with moderately steep slopes on stream bank. |
| 37 | 825+10 | 825+50 | 36.66212 | -79.51121 | 36.66206 | -79.51129 | -- | Water bar installed at tops of stream bank (825+10 and 825+50). | Stream Crossing with moderately steep slopes on stream bank. |
| 38 | 847+00 | 848+00 | 36.65820 | -79.51667 | 36.65797 | -79.51699 | Site-specific controls | Stream bank protection along ROW. | Stream bank on southeast side of TWS has bank erosion and steep slope (+40 degrees) cutting into the ROW. |
| 39 | 850+00 | 850+75 | 36.65753 | -79.51737 | 36.65737 | -79.51750 | Site-specific controls | Trench breaker with outlet drain and possible rock-lined stream banks. | Meandering stream crossing with steep banks. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 40 | 857+30 | 857+75 | 36.65590 | -79.51878 | 36.65573 | -79.51893 | MVP-SG-36A/B and MVP-SG-37 | Cutoff drains on top side of the LOD from station 857+30 to 857+75. | Moderate slopes of drainages crossing ROW. |
| 41 | 860+30 | -- | 36.65524 | -79.51939 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | Moderately steep slope section (16-26 degrees) in drainage. Less than 50 feet section or ROW with moderately steep slope. |
| 42 | 875+00 | 875+75 | 36.651976 | -79.522157 | 36.651642 | -79.522444 | MVP-SG-35 | Trench breakers with outlet drains. Install breakers at toe of slope in steeper section (station 875+70). | Stream Crossing with moderately steep slopes on stream bank. |
| 43 | 908+25 | 908+75 | 36.64397 | -79.527388 | 36.643802 | -79.527354 | -- | Water bar installed at tops of stream bank (908+25 and 908+75). | Stream Crossing with moderately steep slopes on stream bank. |
| 44 | 916+70 | 917+00 | 36.641988 | -79.528759 | 36.641916 | -79.528838 | -- | Water bar installed at tops of stream bank (916+70 and 917+00). | Stream Crossing with moderately steep slopes on stream bank. |
| 45 | 933+75 | 936+25 | 36.639913 | -79.533857 | 36.639577 | -79.534623 | MVP-SG-35, MVP-SG-45 | Trench breakers with outlet drains every breaker. Steep slope revetment on west bank of slope from station 935+00 to 935+50. | Steep slopes leading to drainage. Steep slopes on both sides. Slopes up to ~30 degrees. In USGS low probability landslide area. |
| 46 | 998+50 | -- | 36.627925 | -79.547958 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | Moderate slopes with multiple PIs. |
| 47 | 999+50 | -- | 36.627732 | -79.548318 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | Moderate slopes with multiple PIs. |
| 48 | 1053+00 | -- | 36.617154 | -79.560019 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. Install breaker uphill of PI at a safe distance from welds and fittings. | Moderate slopes near PIs. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 49 | 1058+00 | 1061+00 | 36.615908 | -79.560857 | 36.615518 | -79.561119 | MVP-SG-38A/B | Continuous transverse trench drain for entire length between station 1058+00 and 1061+00 with at least two outlets. | Slight side slope (~12 degrees). The ROW is downhill of recently cleared area that may lead to additional drainage across ROW. |
| 50 | 1101+70 | 1103+70 | 36.606006 | -79.568075 | 36.605426 | -79.56857 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Steep slopes leading to drainage. Steep slopes on both sides. Slopes up to ~25 degrees. In USGS low probability landslide area. Very steep slopes off ROW to southeast. |
| 51 | 1114+20 | 1116+00 | 36.603071 | -79.570585 | 36.602605 | -79.570989 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with alternating outlet/daylight and pass through drains. | Moderately steep slope section. >16 degrees. In USGS low probability landslide area. |
| 52 | 1132+80 | 1133+15 | 36.598933 | -79.574146 | 36.598848 | -79.574219 | -- | Water bar installed at tops of stream bank (1132+80 and 1133+15). | Stream Crossing with moderately steep slopes on stream bank. |
| 53 | 1211+75 | -- | 36.582538 | -79.592092 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. | PI in side slope area. |
| 54 | 1224+25 | 1226+50 | 36.580509 | -79.594363 | 36.579533 | -79.594988 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. Some semi-side slope areas. Pipeline is partial side slope. |
| 55 | 1230+00 | 1238+00 | 36.579145 | -79.59551 | 36.577544 | -79.59727 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. Some semi-side slope areas. Pipeline is partial side slope. |
| 56 | 1250+60 | 1251+40 | 36.574816 | -79.599904 | 36.574704 | -79.600099 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Steep slope (26 to 30 degrees) in area of USGS moderate landslide probability. |
| 57 | 1251+50 | 1254+00 | 36.574643 | -79.600207 | 36.574264 | -79.600867 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (~12-16 degrees) in area of USGS moderate landslide probability. |

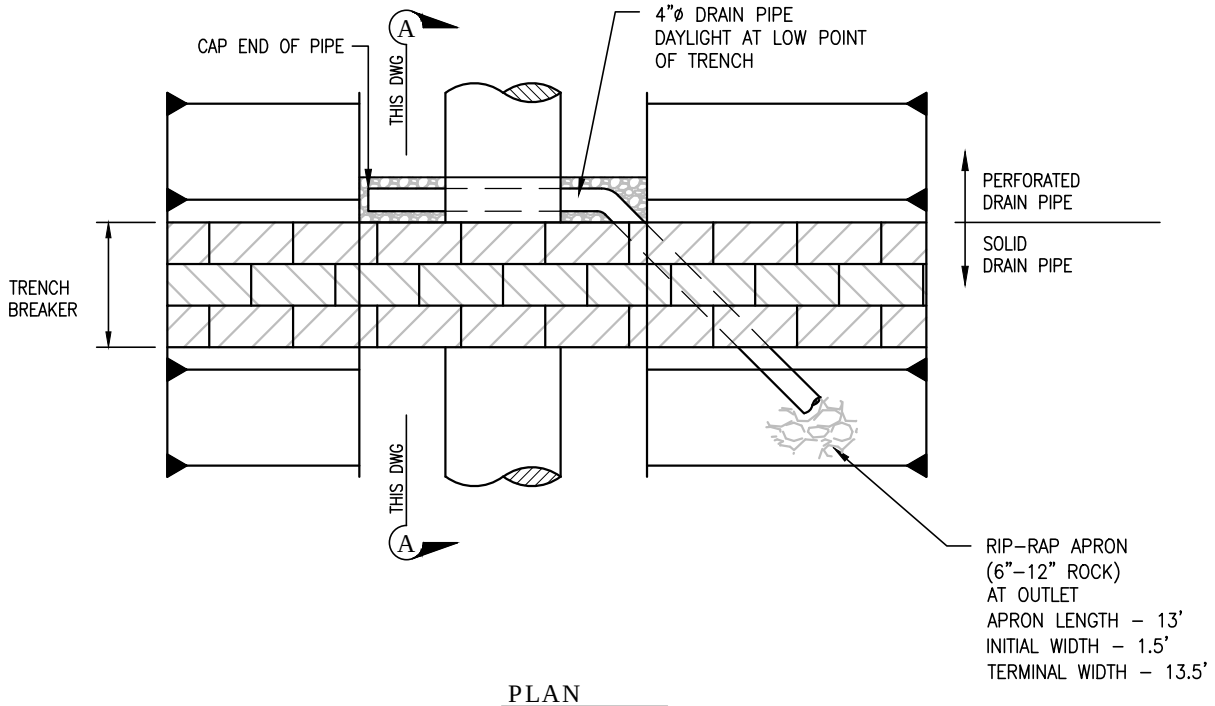
| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 58 | 1255+00 | 1256+00 | 36.574125 | -79.60111 | -79.60134 | 36.57399 | MVP-SG-36A/B | Transverse drain from station 1255+00 to 1256+00. | Moderate slope (>16 degrees) side slope area on north side or ROW. |
| 59 | 1313+40 | 1314+00 | 36.563758 | -79.613674 | 36.563504 | -79.613571 | -- | Water bar or maybe riprap lined water bar if high flow velocity is a concern. | Stream/drainage Crossing with moderately steep slopes on stream bank. |
| 60 | 1347+00 | 1348+00 | 36.556419 | -79.617843 | 36.556162 | -79.618118 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. A very steep area (>33 degrees near drainage). |
| 61 | 1358+00 | 1359+00 | 36.554094 | -79.62022 | 36.553964 | -79.620349 | MVP-SG-35 | Trench breakers with outlet drains every breaker. | Moderate slopes (>16 degrees) above proposed bore pit under railroad tracks. |
| 62 | 1395+85 | 1396+30 | 36.546013 | -79.628291 | 36.545917 | -79.628386 | -- | Water bar installed at tops of stream bank (1395+85 and 1396+30). | Stream Crossing with moderately steep slopes on stream bank. |
| 63 | 1481+75 | 1482+75 | 36.528178 | -79.646037 | 36.527867 | -79.646336 | -- | Water bar installed at tops of stream bank (1481+75 and 1482+75). | Stream Crossing with moderately steep slopes on stream bank. |
| 64 | 1537+50 | 1538+00 | 36.516262 | -79.656848 | 36.516091 | -79.657028 | -- | Water bar installed at tops of stream bank (537+50 and 1538+00). | Stream Crossing with moderately steep slopes on stream bank. |
| 65 | 1553+50 | -- | 36.512926 | -79.660336 | -- | -- | MVP-SG-35 | Trench breaker with outlet drain. Install breaker uphill of PI at a safe distance from welds and fittings. | PI in side slope area. Locate trench breaker 50 feet from PI to avoid welds and fittings. |
| 66 | 1561+00 | 1564+00 | 36.51138 | -79.662117 | 36.510679 | -79.662848 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. Pipeline is partial side slope. |

| Geohazard Point | Approx. Station[1] | | Approx. Coordinates[2] | | | | Mitigation Controls (Appendix B) | Mitigation Controls[3, 4] | Geohazard Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | Start | | End | | | | |
| | Start | End | Lat. | Long. | Lat. | Long. | | | |
| 67 | 1567+50 | 1568+75 | 36.510017 | -79.66354 | 36.509737 | -79.663833 | MVP-SG-35, MVP-SG-43A/B | Trench breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. |
| 68 | 1583+50 | 1585+75 | 36.506652 | -79.667062 | 36.506135 | -79.667427 | MVP-SG-35, MVP-SG-43A/B | Breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (>16 degrees) in area of USGS moderate landslide probability. |
| 69 | 1588+00 | 1590+50 | 36.505374 | -79.667489 | 36.504822 | -79.667534 | MVP-SG-35, MVP-SG-43A/B | Breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (~20 degrees) in area of USGS moderate landslide probability. |
| 70 | 1593+50 | 1592+00 | 36.504523 | -79.667715 | 36.504201 | -79.668094 | MVP-SG-35, MVP-SG-43A/B | Breakers with alternating outlet/daylight and pass through drains. | Moderate slopes (~20 degrees) in area of USGS moderate landslide probability. |
| 71 | 1598+00 | 1598+40 | 36.50371 | -79.66958 | 36.50369 | -79.66963 | MVP-SG-45 | Steep slope revetment. | Moderately steep slope (26 to 30 degrees). |

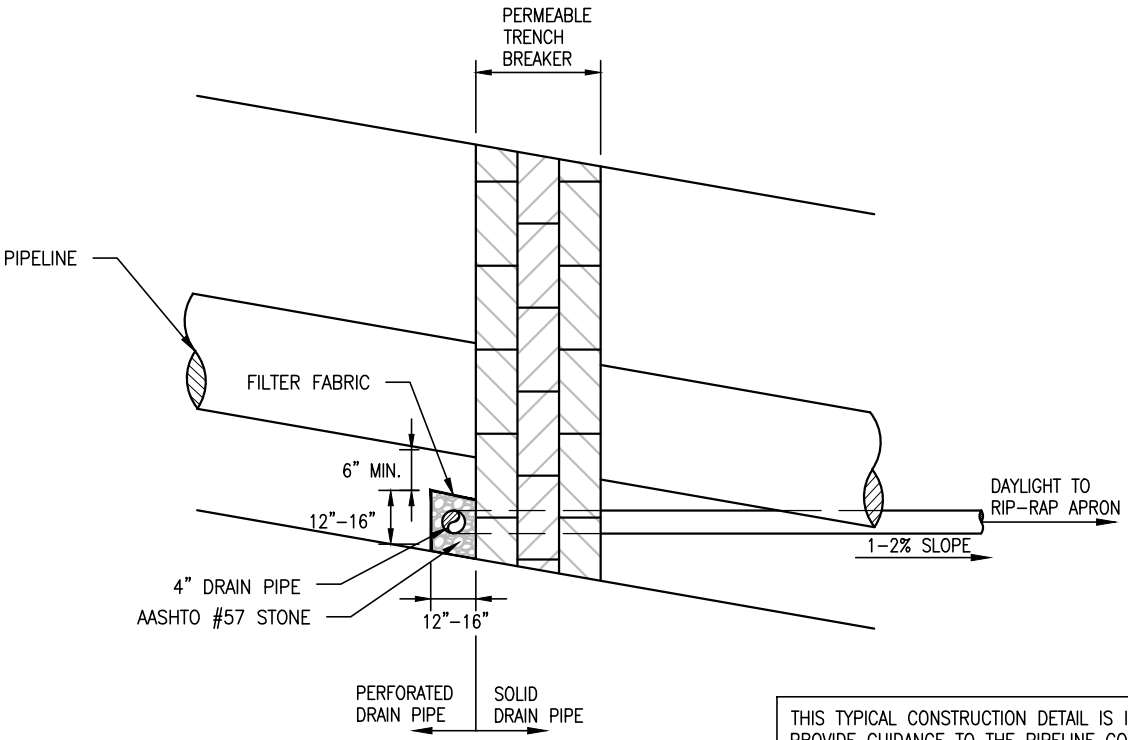
[1] Stationing is approximate based on the alignment stationing provided at the time this report was prepared (November 2024). Please refer to the coordinates provided to verify the geohazard and mitigation control location. The location of the mitigation controls should be field fit based on conditions observed during construction.
[2] The coordinates provided are approximate locations of mitigation controls. The actual locations should be field fit based on conditions observed during construction.
[3] All surface and subsurface drains should be graded for positive drainage with outlets at the wooded or well-vegetated area at the edge of the LOD. Surface and subsurface drains should outlet away from and on the opposite side of the ROW from existing facilities (i.e. the Transco pipelines). Drain outlets should be in stable areas outside of existing streams or environmentally sensitive areas.
[4] The mitigation controls are recommended as general guidance; additional controls may be necessary based on field conditions observed during construction.

# Appendix B

# Slide Mitigation Details




PLAN
SCALE: NOT TO SCALE




SECTION A-A
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

| | | | |
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

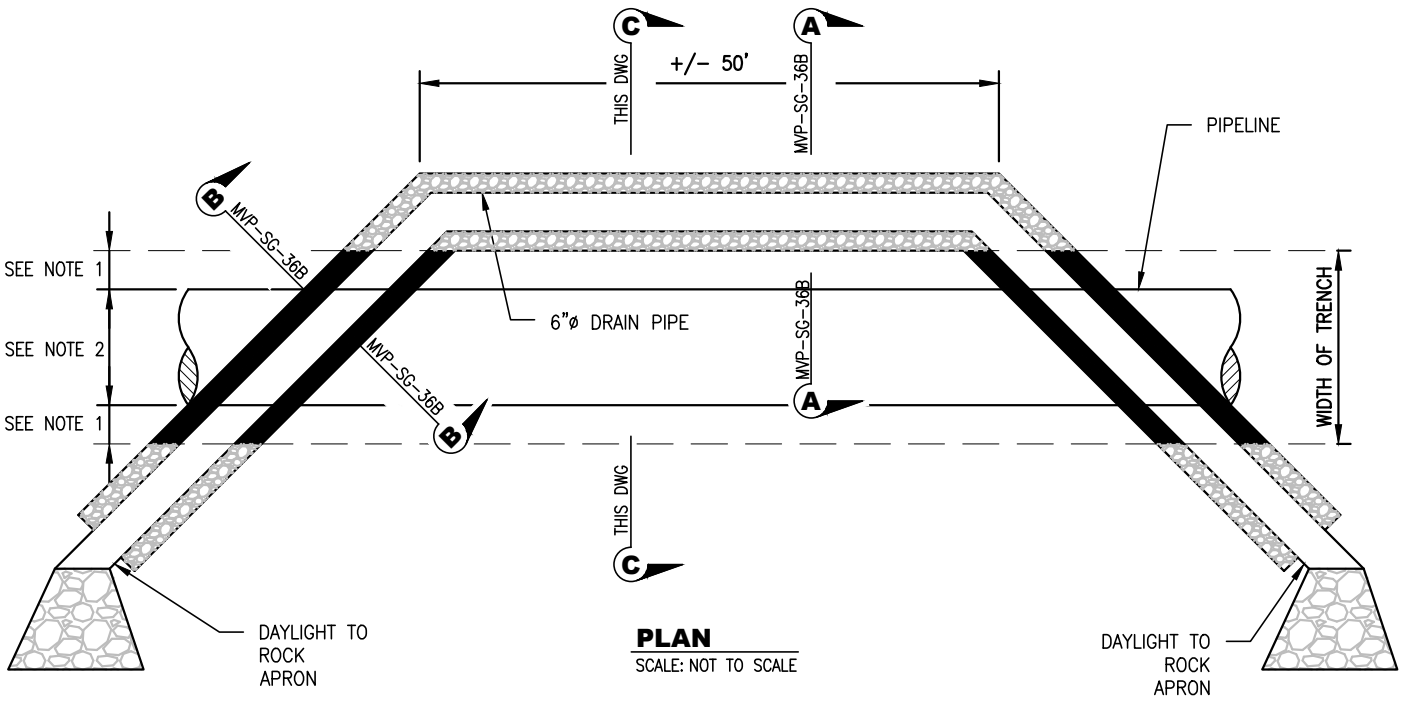
# TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER DAYLIGHT DRAIN

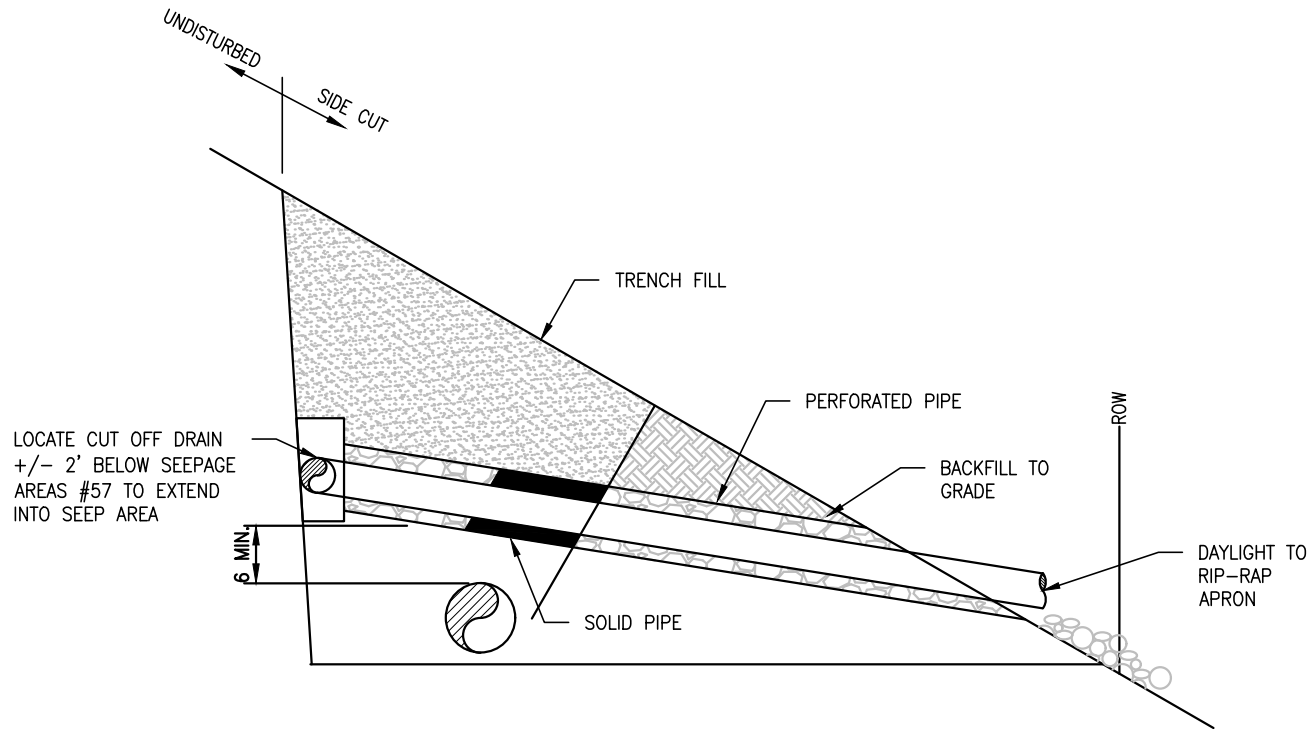
| DRAWING NO. | REV. |
|---|---|
| MVP-SG-35 | P1 |

Plotted by: Sample, Stanley on: August 16, 2018 - 12:39 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-35.dwg




**PLAN**
SCALE: NOT TO SCALE




**SECTION C-C**
SCALE: NOT TO SCALE

NOTES:
1. PERFORATED PIPE SURROUNDED BY #57 STONE.
2. SOLID PIPE (IN TRENCH) SURROUNDED BY TRENCH BACKFILL.

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

| | | | |
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

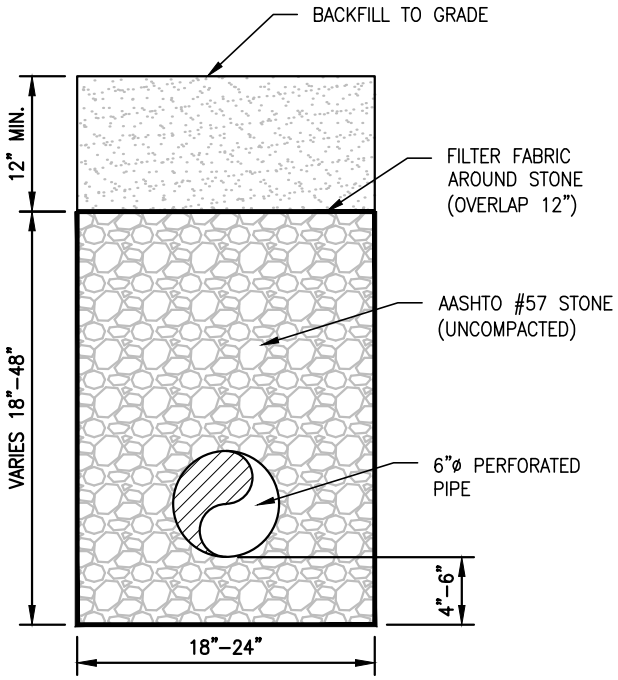
# TYPICAL CONSTRUCTION DETAIL

CUTOFF DRAIN-SIDEHILL

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-36A | P1 |

Plotted by: Doersom, Sharon on: January 28, 2025 - 10:58 AM

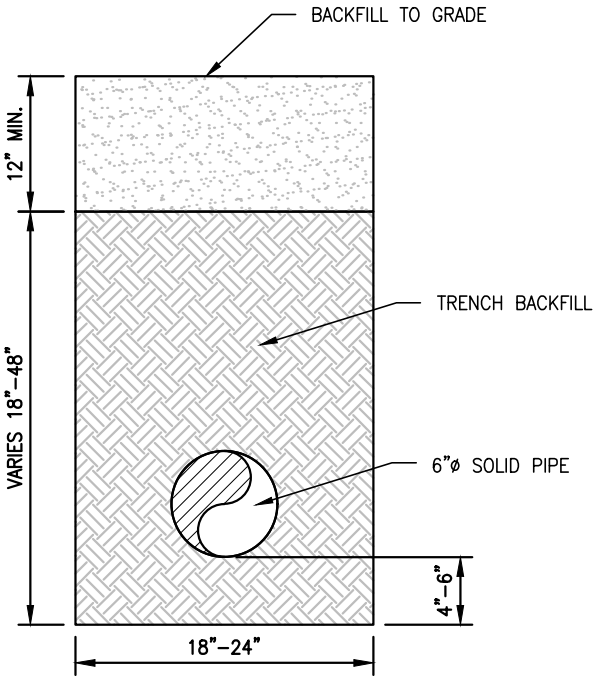
File Path: C:\users\sdoersom\projectwise\fsl\dms27383\MVP-SG-36A.dwg




**SECTION A-A**

SCALE: NOT TO SCALE

FROM MVP–SG–36A




**SECTION B-B**

SCALE: NOT TO SCALE

FROM MVP–SG–36A

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

| | | | |
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 2 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H–650–TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

CUTOFF DRAIN–SIDEHILL

| DRAWING NO. | REV. |
|---|---|
| MVP–SG–36B | P1 |

Plotted by: Doersom, Sharon on: January 28, 2025 - 10:53 AM

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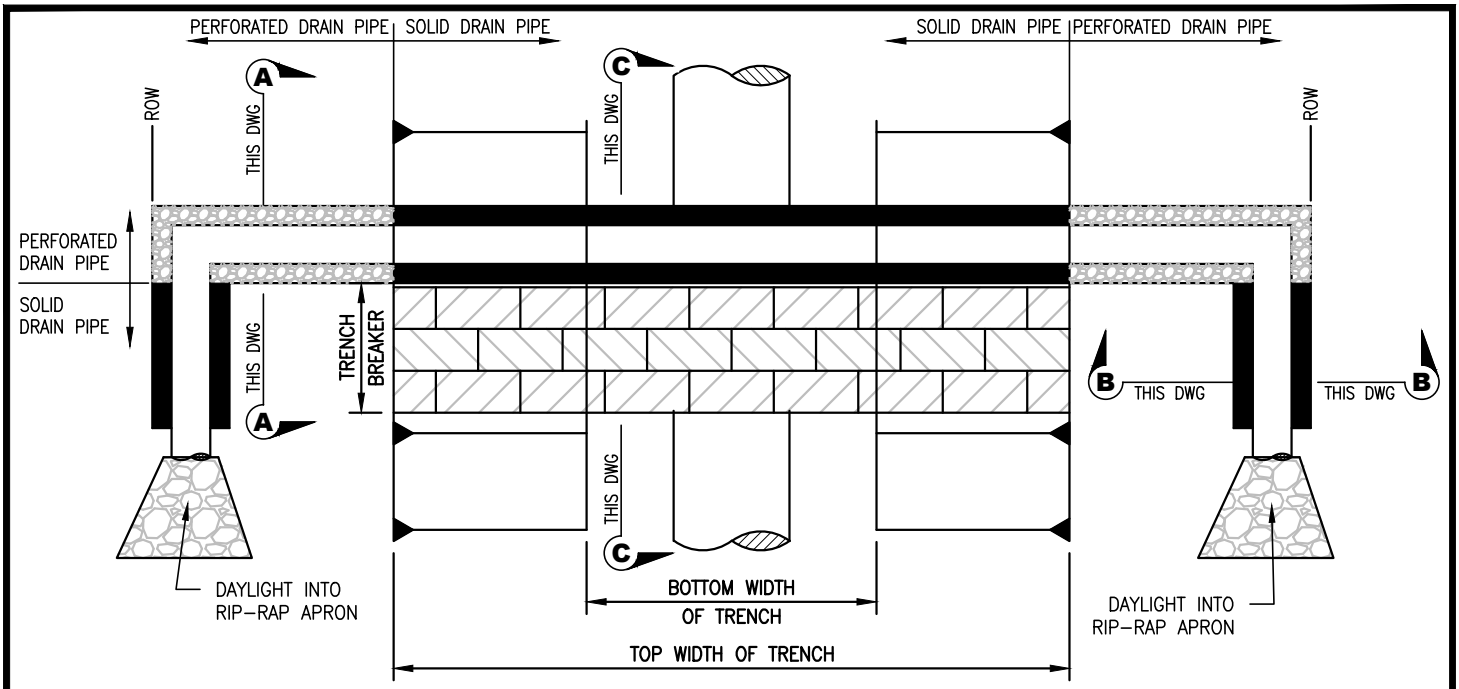
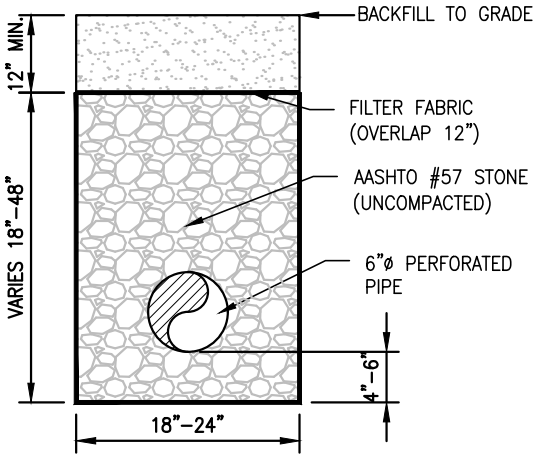



**PLAN**
SCALE: NOT TO SCALE




**SECTION A-A**
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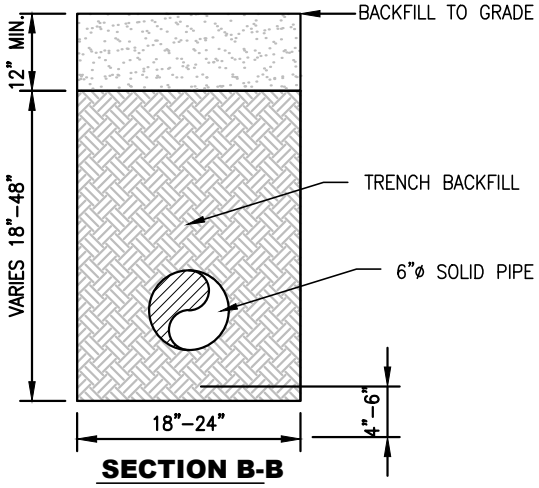
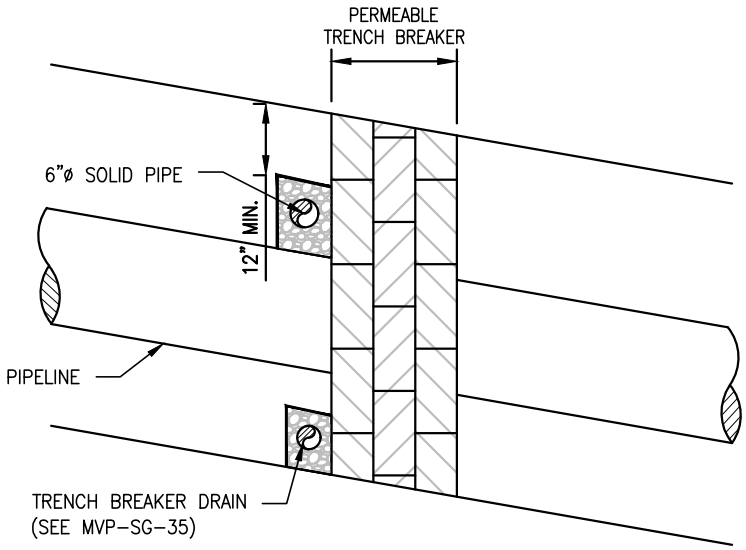



**SECTION B-B**
SCALE: NOT TO SCALE

NOTES:
1. EACH CUTOFF DRAIN SHALL UTILIZE A TRENCH BREAKER DRAIN (SEE DETAIL 1) TO DRAIN THE TRENCH.




**SECTION C-C**
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

| | | | |
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

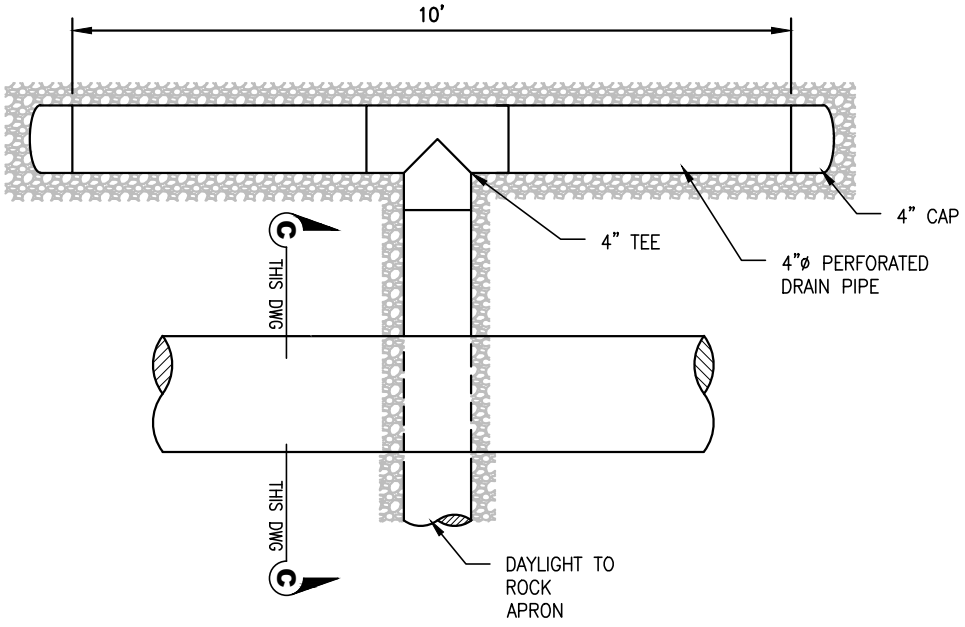
# TYPICAL CONSTRUCTION DETAIL

CUTOFF DRAIN-PLANAR

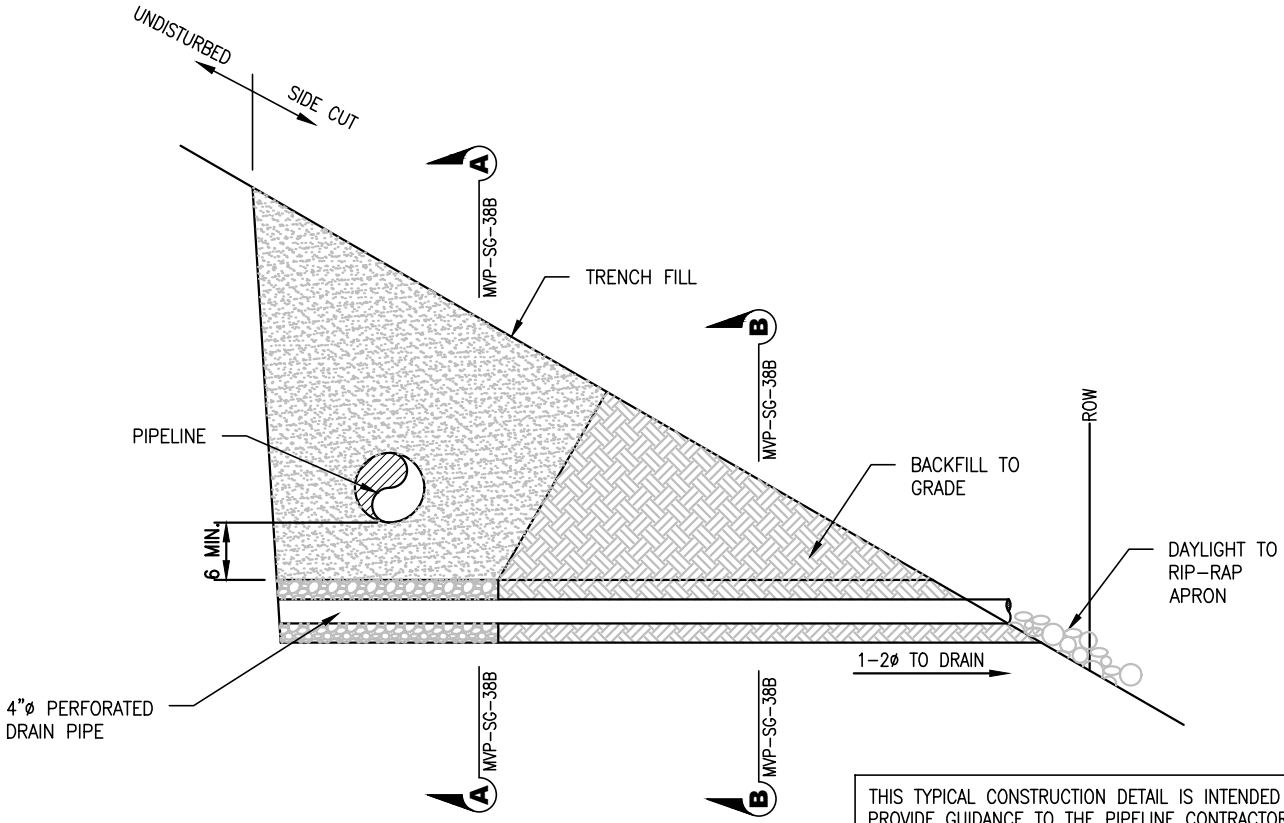
| DRAWING NO. | REV. |
|---|---|
| MVP-SG-37 | P1 |

Plotted by: Doersom, Sharon on: January 28, 2025 - 10:50 AM

File Path: C:\users\sdoersom\projectwise\fsl\dms27383\MVP-SG-37.dwg




**PLAN**
SCALE: NOT TO SCALE




**C-C**
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

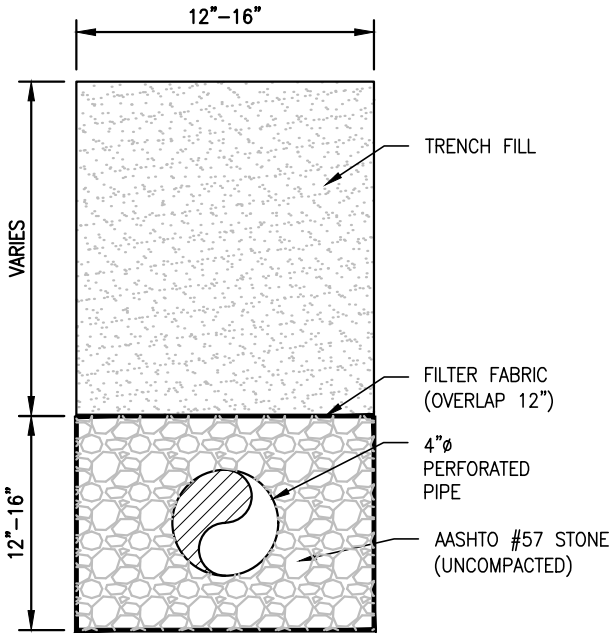
# TYPICAL CONSTRUCTION DETAIL

TRANSVERSE TRENCH DRAIN

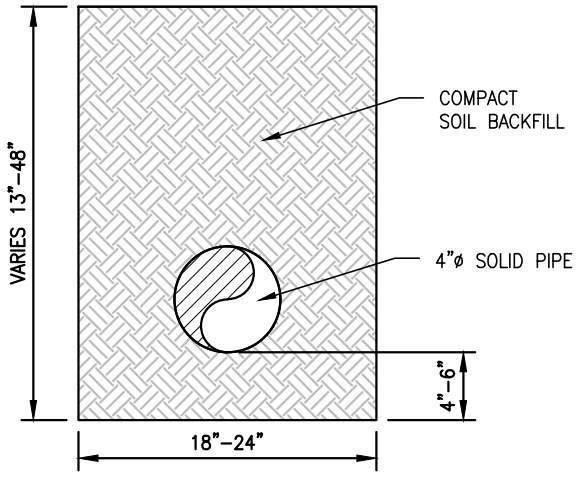
| DRAWING NO. | REV. |
|---|---|
| MVP-SG-38A | P1 |

Plotted by: Doersom, Sharon on: January 29, 2025 - 10:27 AM

File Path: C:\users\sdoersom\projectwise\fsl\dms27383\MVP-SG-38A.dwg




**SECTION A-A**
SCALE: NOT TO SCALE
FROM MVP–SG–38A




**SECTION B-B**
SCALE: NOT TO SCALE
FROM MVP–SG–38A

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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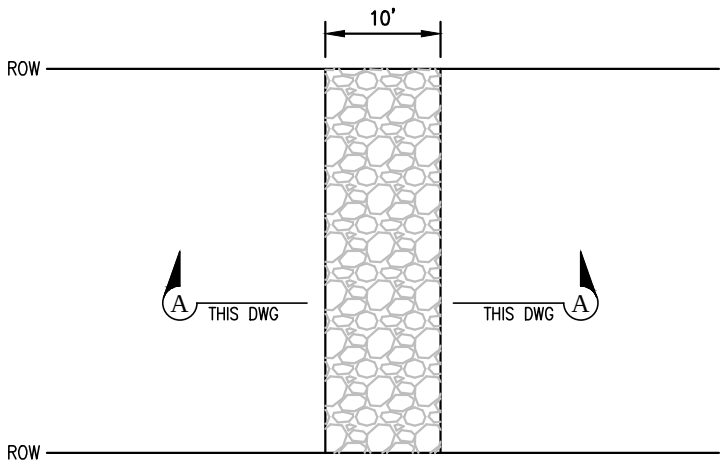
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 2 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H–650–TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

TRANSVERSE TRENCH DRAIN

| DRAWING NO. | REV. |
|---|---|
| MVP–38B | P1 |




PLAN
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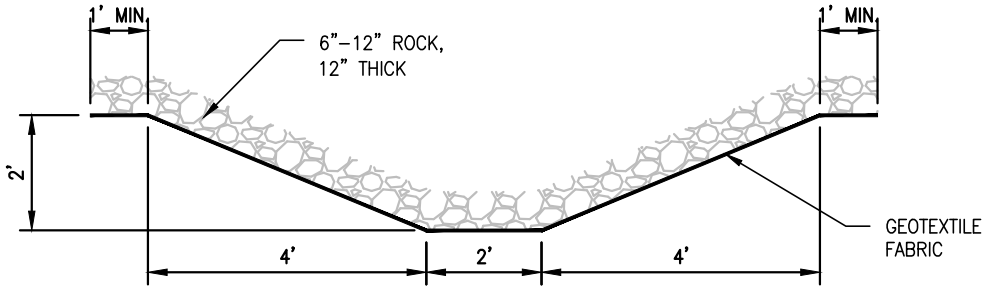


SECTION A-A
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H–650–TYP | | | |

Mountain Valley PIPELINE LLC

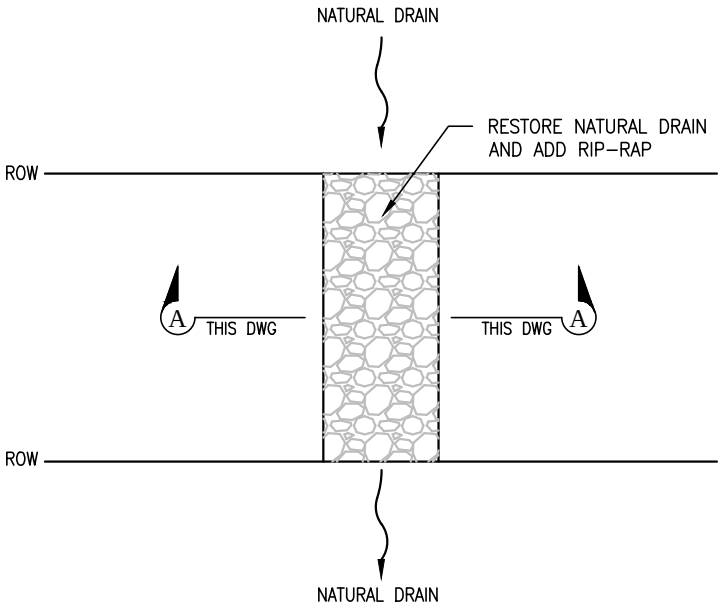
# TYPICAL CONSTRUCTION DETAIL

ROCK LINED SWALE

| DRAWING NO. | REV. |
|---|---|
| MVP–SG–39 | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:39 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-39.dwg




PLAN
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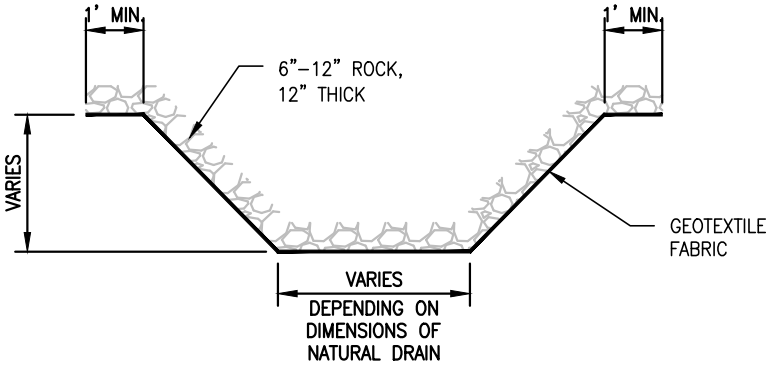


SECTION A-A
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

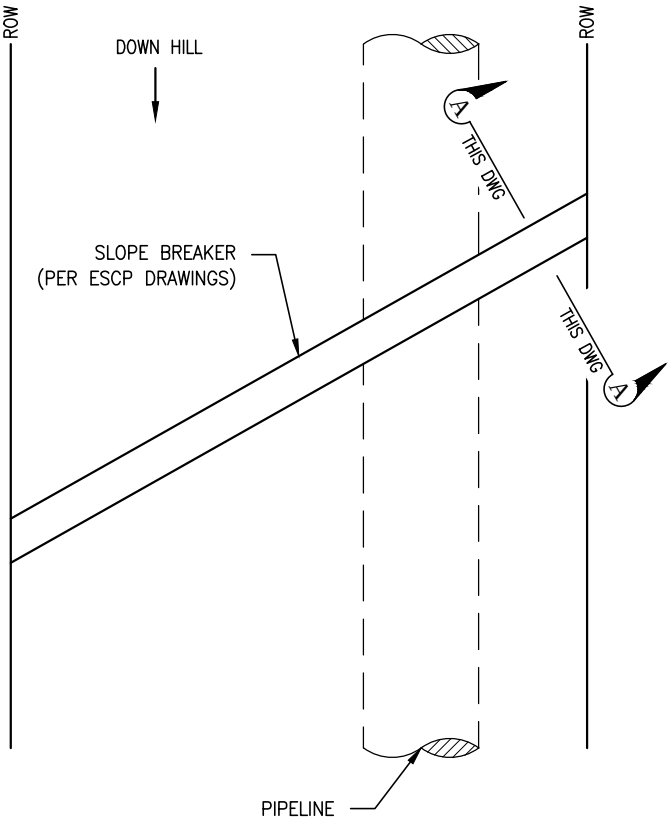
# TYPICAL CONSTRUCTION DETAIL

RIP-RAP NATURAL DRAIN

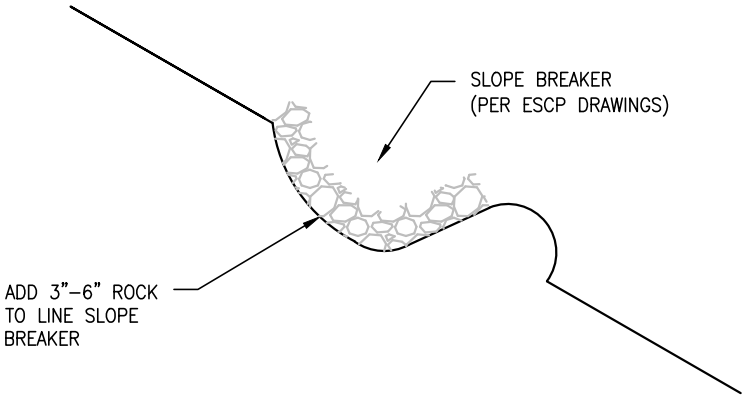
| DRAWING NO. | REV. |
|---|---|
| MVP-SG-40 | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:39 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-40.dwg




PLAN
SCALE: NOT TO SCALE




SECTION A-A
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H–650–TYP | | | |

Mountain Valley PIPELINE LLC

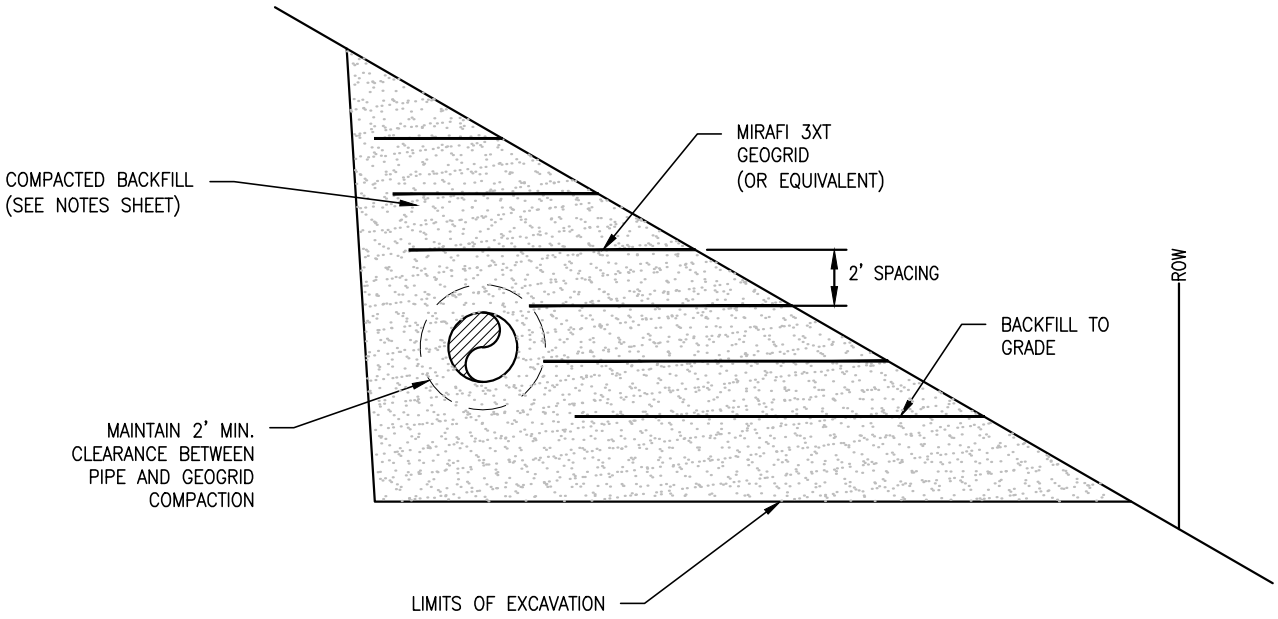
# TYPICAL CONSTRUCTION DETAIL

RIP–RAP SLOPE BREAKERS

| DRAWING NO. | REV. |
|---|---|
| MVP–SG–41 | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:39 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-41.dwg




THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 3 |
| JOB NO. | | | |
| PROJECT ID: H-650-TYP | | | |

Mountain Valley PIPELINE LLC

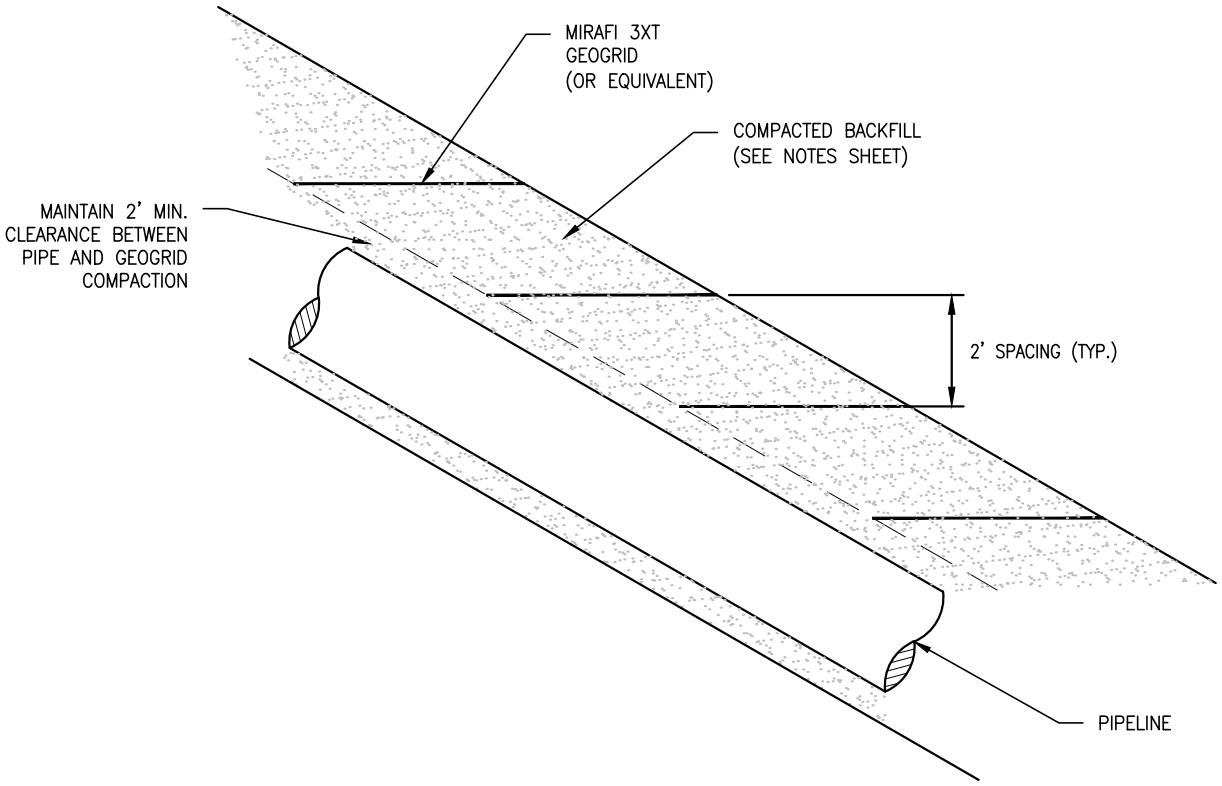
# TYPICAL CONSTRUCTION DETAIL

GEOGRID-SIDEHILL

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-42A | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:40 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-42A.dwg




SECTION VIEW
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

| | | | |
|---|---|---|---|
| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 2 OF 3 |
| JOB NO. | | | |
| PROJECT ID: H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# SLIDE MITIGATION DETAIL

GEOGRID-PLANAR

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-42B | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:58 PM

File Path: O:\Projects\300423 - NextEra MVP Southgate\CA - CADD\Pipeline\Drawings\Typicals\MVP-SG-42B.dwg

COMPACTION NOTES

1) ALL ROCKS LARGER THAN 6 INCHES IN SIZE, AND MORE THAN 10 PERCENT BY VOLUME SHOULD BE REMOVED AND PROPERLY DISPOSED FROM THE BACKFILL MATERIAL.
2) THE SUBGRADE AT THE BASE OF THE EXCAVATION SHOULD BE PROOFROLLED WITH A PNEUMATIC TIRED ROLLER OR VEHICLE.
3) THE EXCAVATED AREA SHALL BE BACKFILLED WITH THE CLEANED EXCAVATED SOIL MATERIAL AND COMPACTED IN PLACE.
4) BACKFILL OPERATIONS SHALL BE PERFORMED WHEN SOIL IS SUITABLE FOR COMPACTION (I.E., NOT IMMEDIATELY FOLLOWING A LARGE RAIN, SNOW, OR ICE EVENT). FROZEN FILL SHALL NOT BE USED.
5) THE BACKFILL SHALL BE PLACED IN COMPACTED LIFTS NO GREATER THAN 12 INCHES.
6) MAINTAIN A MINIMUM 2FT CLEARANCE BETWEEN COMPACTION ACTIVITY AND THE GAS PIPELINE.

GRAVEL DRAIN NOTES

1) GEOTEXTILE FABRIC SHALL BE TENCATE MIRAFI 140N OR APPROVED EQUIVALENT.
2) THE GEOTEXTILE FABRIC SHALL BE STORED UNDAMAGED PURSUANT TO MANUFACTURERS RECOMMENDATIONS.
3) DO NOT OPERATE CONSTRUCTION EQUIPMENT DIRECTLY ON THE GEOTEXTILE FABRIC.
4) DRAINAGE AGGREGATE SHALL MEET THE REQUIREMENTS OF AASHTO NO. 57 STONE.
5) DRAINAGE AGGREGATE SHALL NOT BE COMPACTED.

GEOGRID NOTES

1) GEOGRID REINFORCEMENT SHALL BE TENCATE MIRAFI 3XT OR APPROVED EQUIVALENT.
2) THE GEOGRID MATERIAL SHALL BE STORED UNDAMAGED PURSUANT TO MANUFACTURERS RECOMMENDATIONS.
3) GEOGRID SHALL BE PLACED HORIZONTALLY ON THE BACKFILL WITH THE PRINCIPAL STRENGTH DIRECTION PERPENDICULAR TO THE FACE OF THE SLOPE. ADJACENT PIECES OF PRIMARY GEOGRID SHALL NOT OVERLAP BUT ARE TO BE BUTTED SIDE TO SIDE.
4) REMOVE ALL SLACK IN THE GEOGRID MATERIAL AND ANCHOR AS NECESSARY WITH PINS, OR BAGS TO PREVENT SLACK FROM DEVELOPMENT DURING FILL PLACEMENT AND COMPACTION.
5) FILL IS TO BE PLACED AND SPREAD DIRECTLY ON THE GEOGRID MATERIAL WITH RUBBER TIRED EQUIPMENT ONLY. SPEEDS ARE TO BE KEPT SLOW WITH AS FEW STOPS AND TURNS AS PRACTICAL.
6) DO NOT OPERATE TRACKED EQUIPMENT DIRECTLY ON THE GEOGRID MATERIAL.
7) MAINTAIN A MINIMUM 2FT CLEARANCE BETWEEN GEOGRID MATERIAL AND THE GAS PIPELINE.

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
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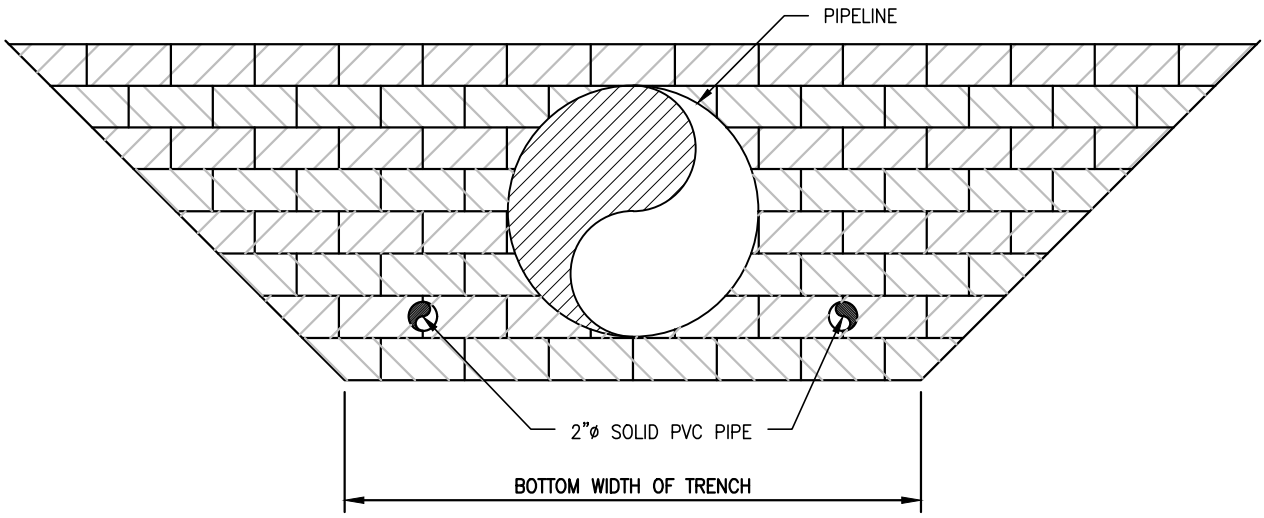
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

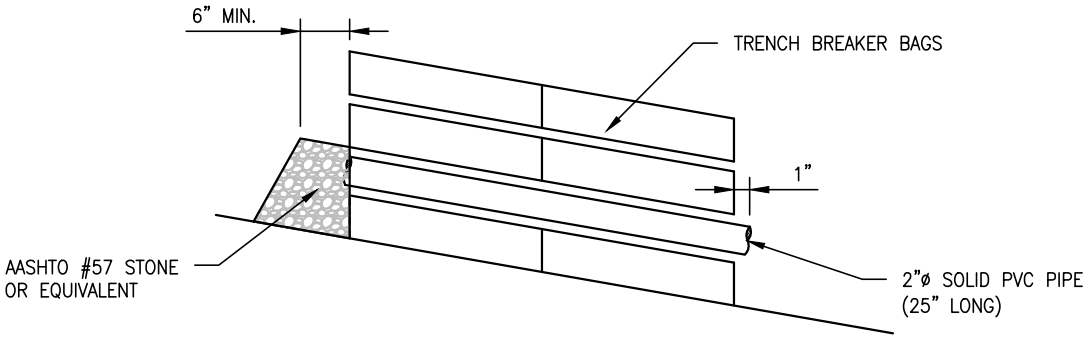
# TYPICAL CONSTRUCTION DETAIL

GEOGRID NOTES

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-42C | P1 |




FRONT VIEW
SCALE: NOT TO SCALE




SECTION VIEW
SCALE: NOT TO SCALE

NOTES:
1. PLACE PVC DRAIN PIPE ON FIRST LAYER OF TRENCH BREAKER BAGS.
2. PLACE PVC DRAIN PIPE EQUADISTANT FROM THE OUTSIDE EDGE OF THE 30" GAS PIPE AND THE BOTTOM LIMITS OF THE TRENCH.
3. EXTEND PVC PIPE THROUGH ENTIRE TRENCH BREAKER AND EXTEND APPROX. 1" PAST END OF BREAKER.
4. AASHTO#57 STONE SHALL BE PLACED TO A MINIMUM 6" THICKNESS UPSLOPE OF THE DRAIN PIPE.

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| DRAWN | TRC | DATE | 8/7/2018 |
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| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER
PASS-THROUGH DRAIN

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-43A | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:40 PM

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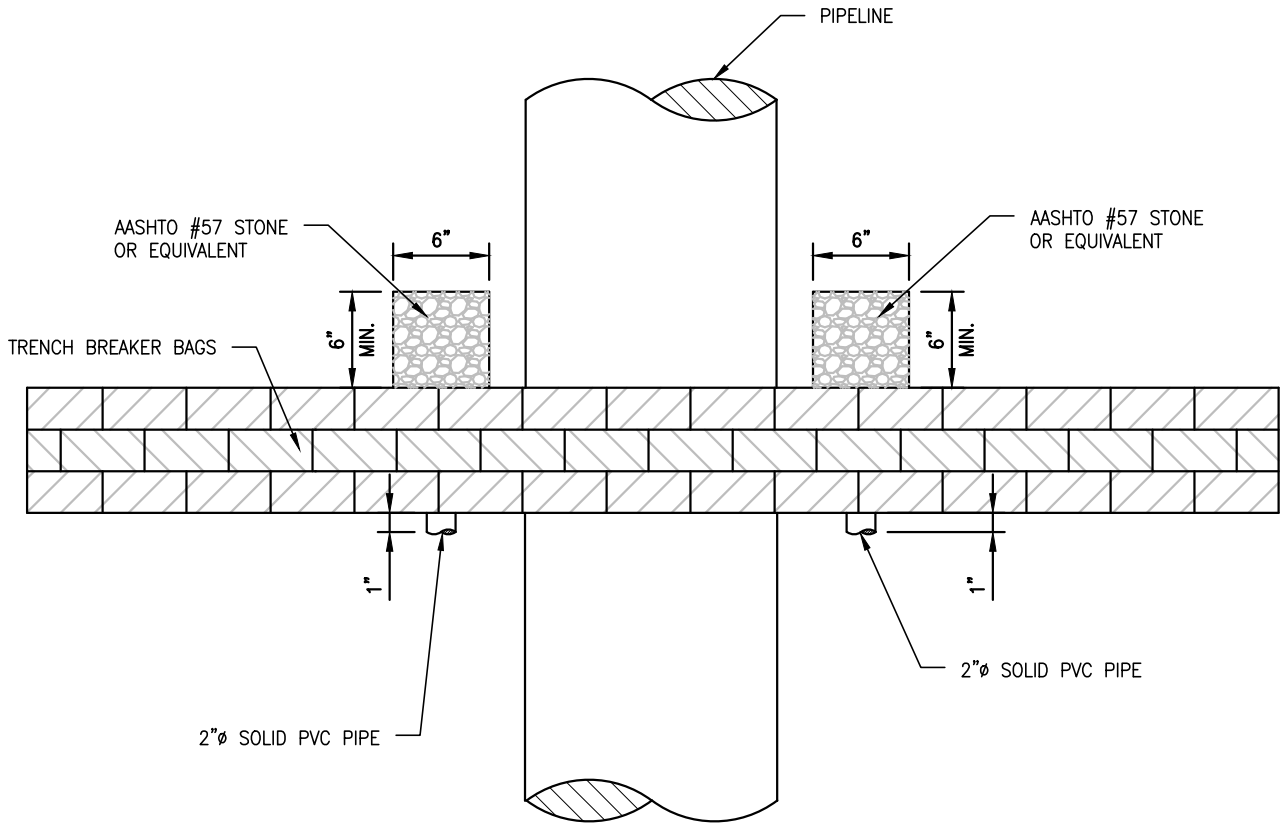


PLAN VIEW
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 2 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

TRENCH BREAKER
PASS-THROUGH DRAIN

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-43B | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:40 PM

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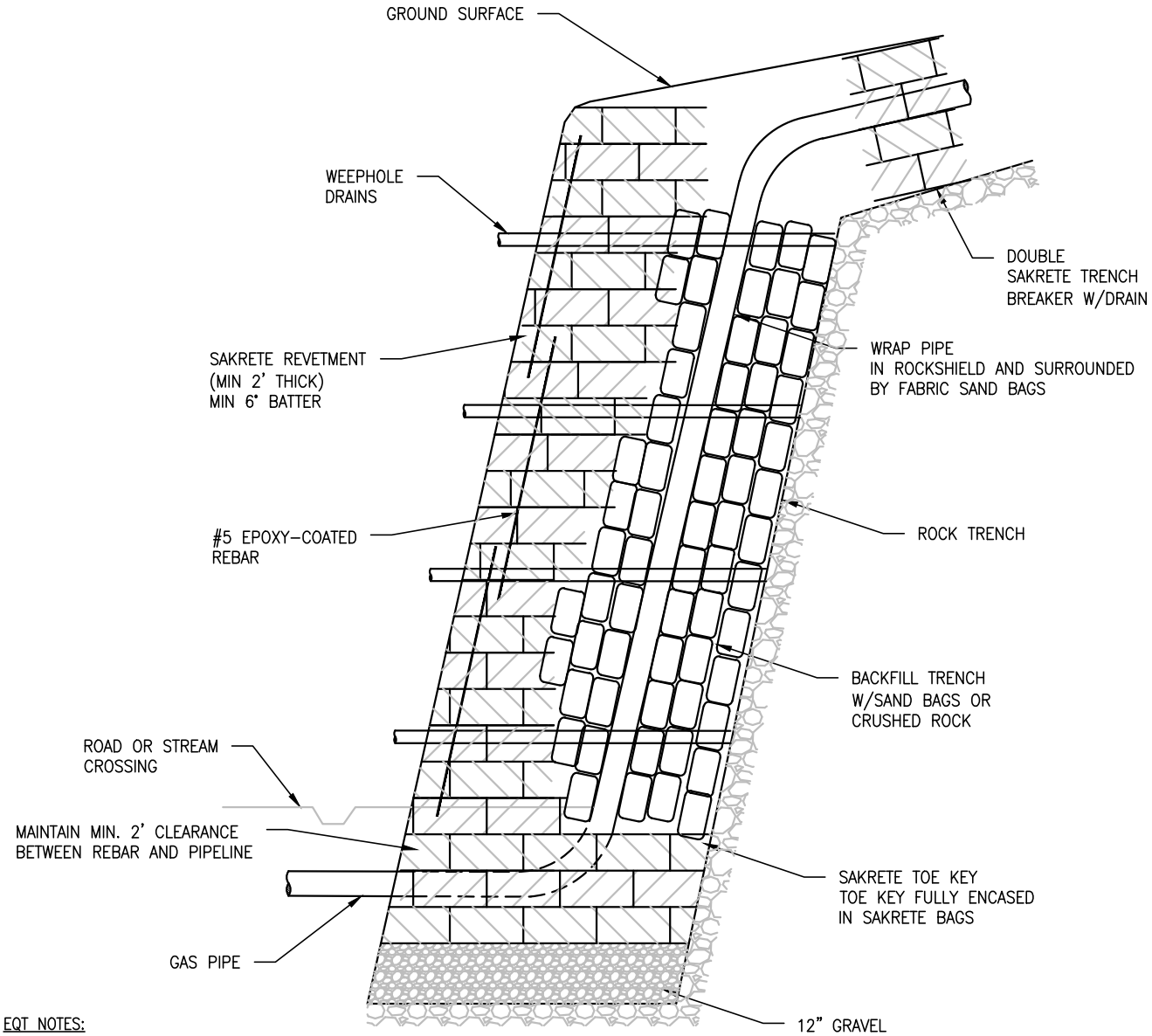


SIDE VIEW
SCALE: NOT TO SCALE

EQT NOTES:

1. SAKRETE BAGS SHOULD EXTEND 4 BAGS DEEP PIPE SHOULD BE COMPLETELY SURROUNDED BY SAND BAGS, OR CRUSHED ROCK (MAX 6").
2. SAKRETE BAGS SHOULD BE STAGGERED IN A MASONRY FASHION. THE FACE OF THE WELL SHALL BE INCLINED 6°-10° FROM VERTICAL.
3. #5 REBAR SHOULD BE DRIVEN THROUGH THE SAKRETE BAGS (SEE DETAIL 1).
4. 2"ø PVC WEEPHOLE DRAINS SHALL BE INSTALLED EVERY 15 FT.

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| DRAWN | TRC | DATE | 8/7/2018 |
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| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 2 |
| JOB NO. | | | |
| PROJECT ID: | | | |
| H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

SLIDE MITIGATION
HIGHWALL REVETMENT
SIDE VIEW

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-44A | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:40 PM

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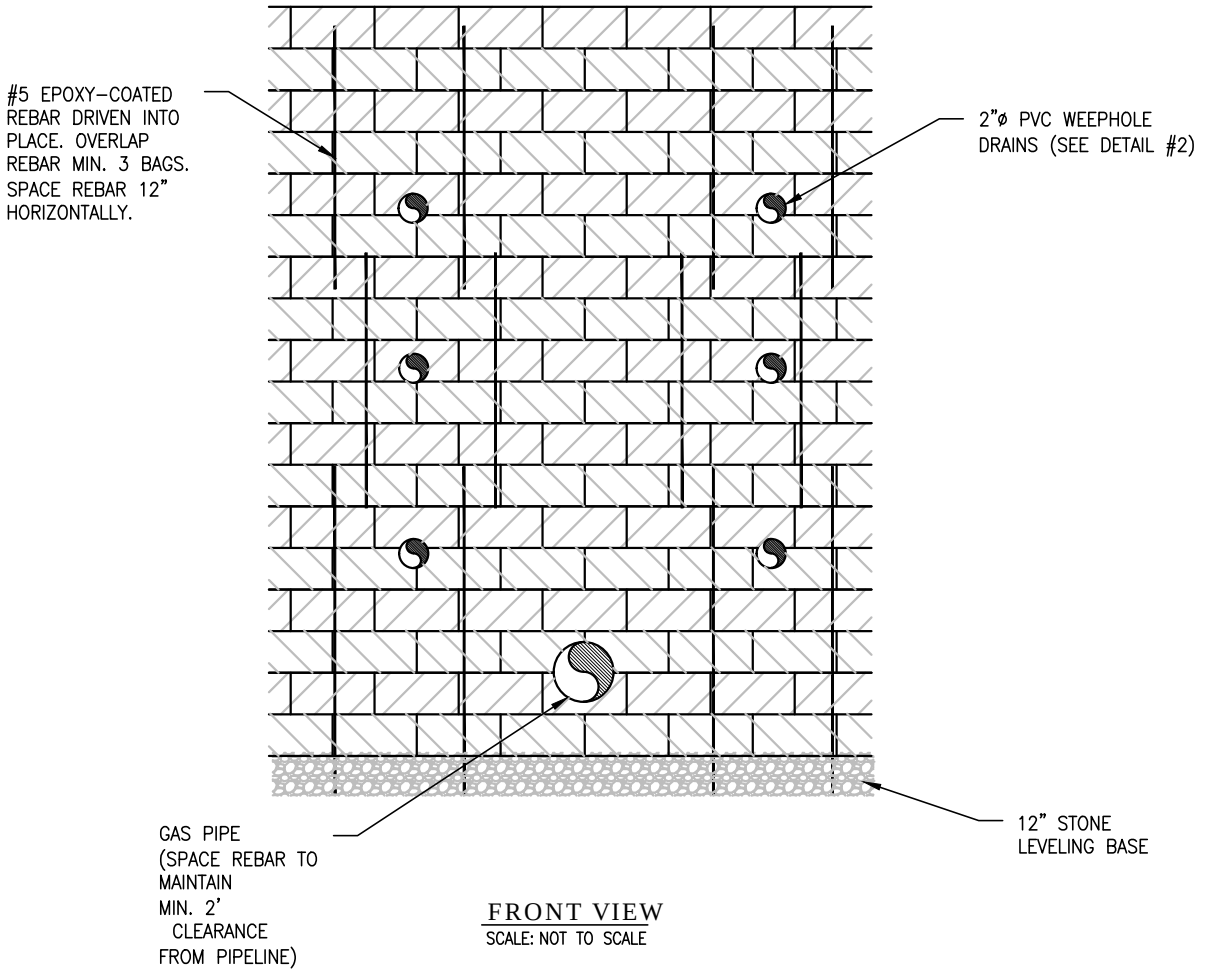
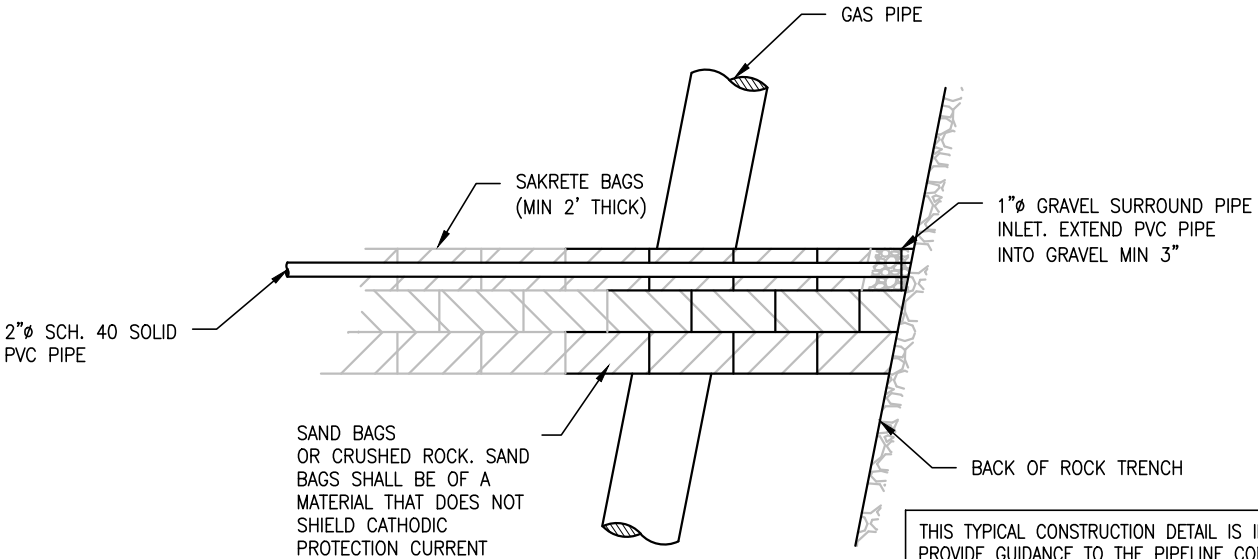



FRONT VIEW
SCALE: NOT TO SCALE




DRAIN DETAIL
SCALE: NOT TO SCALE

THIS TYPICAL CONSTRUCTION DETAIL IS INTENDED TO PROVIDE GUIDANCE TO THE PIPELINE CONTRACTOR. THE ACTUAL CONSTRUCTION TECHNIQUES MAY DIFFER DEPENDING UPON FIELD CONDITIONS AND OR REGULATORY REQUIREMENTS.

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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 2 OF 2 |
| JOB NO. | | | |
| PROJECT ID: H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

SLIDE MITIGATION
HIGHWALL REVETMENT
FRONT VIEW AND DRAIN DETAIL

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-44B | P1 |

Plotted by: Sample, Stanley on: August 14, 2018 - 12:40 PM

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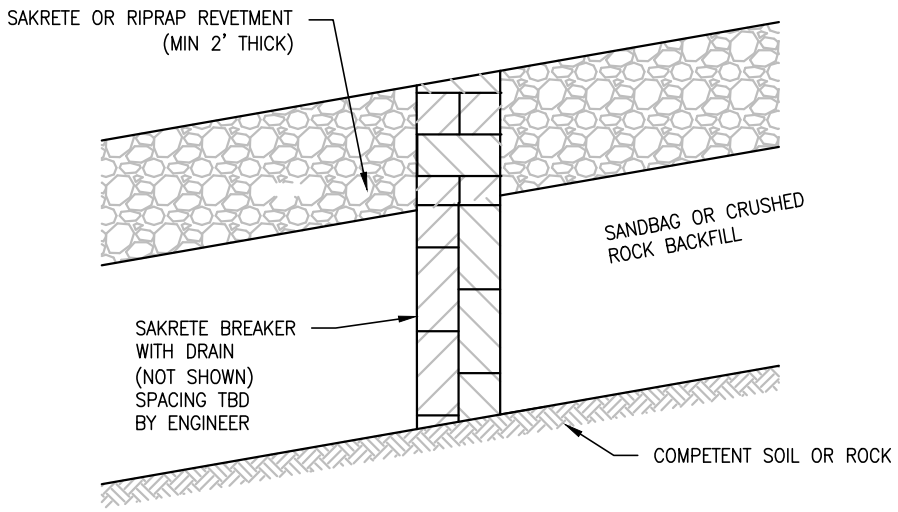


SIDE VIEW
SCALE: NOT TO SCALE

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| DRAWN | TRC | DATE | 8/7/2018 |
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| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: H-650-TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

STEEP SLOPE REVETMENT

| DRAWING NO. | REV. |
|---|---|
| MVP-SG-45 | P1 |

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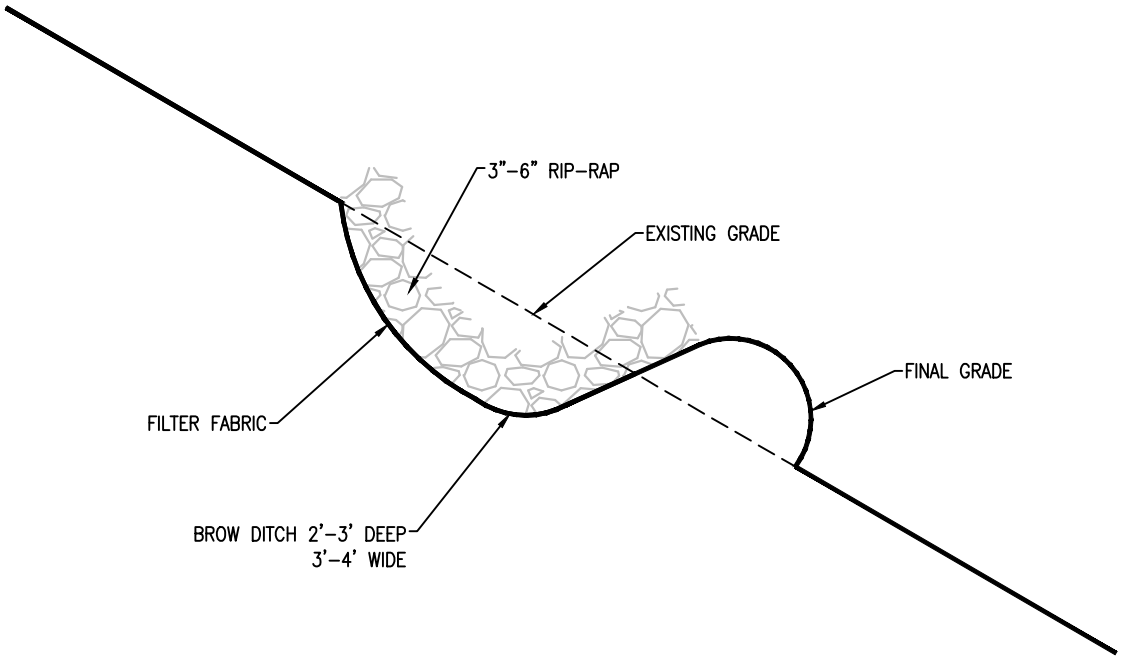


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| DRAWN | TRC | DATE | 8/7/2018 |
| CHECKED | XXX | DATE | X/X/2018 |
| APP'D | XXX | DATE | X/X/2018 |
| SCALE | N.T.S. | SHEET | 1 OF 1 |
| JOB NO. | | | |
| PROJECT ID: H–650–TYP | | | |

Mountain Valley PIPELINE LLC

# TYPICAL CONSTRUCTION DETAIL

BROW DITCH DETAIL

| DRAWING NO. | REV. |
|---|---|
| MVP–SG–46 | P1 |

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