

Teckla-Osage-Rapid City 230kV Transmission Line Project BHP, Inc., PAH680



USDA Forest Service Guidance for Reclamation & Facility Restoration

April 26, 2017

INTRODUCTION

Black Hills Power, Inc. (BHP) is nearing completion of an approximate 40 mile 230kv Transmission Line from the Wyoming/South Dakota State line to Rapid City and across portions of the Black Hills National Forest. The 100 foot right-of-way (ROW) has been cleared of timber, with the exception of hazard trees within and adjacent to the ROW corridor; power poles have been set with guy wires; and power line has been strung. Use of existing National Forest non-System Roads, construction of new spur roads, pad construction for power poles and anchor points, and staging areas have created ground disturbance on a variety of soils and terrain, including within the buffer zones of protected water features and near heritage buffer sites and botanical habitat.

A work schedule for reclamation of disturbed areas and restoration of impacted facilities needs to be developed. Some considerations in developing a work schedule include, identifying high priority areas and associated levels of reclamation, accounting for the natural variability of on-the-ground conditions, creating a flexible work schedule to perform reclamation where areas become dry during the wet season (April-August), working around wildlife timing restrictions, coordination with the continued removal of hazard trees along the ROW, and preparing fences/gates in anticipation of the annual turn-out of cattle (June).

TASK

Reclamation

Ground disturbance as a result of project implementation has been widespread along the 40 mile ROW and those disturbances have been varied in degree of disturbance. Reclamation work will involve some degree of work as identified in the following section on Reclamation Guidance. This will include reclamation work on non-system access roads, within and outside the ROW, pad construction for poles, staging areas, etc. As part of reclamation, soil stained/saturated with diesel fuel, hydraulic fluids, etc. that leaked from equipment during construction, especially at the pole sites, must be removed and taken to a State approved solid waste disposal site, with disposal site records copied to the Forest Service.

Restoration

National Forest System Roads (NFSR) will be restored to the condition they were in prior to the start of the project. Recreation trails will either be restored to the condition they were in prior to the start of the project or obliterated and reclaimed. While access is needed for completion of the project, range fences will be reconstructed with gates and upon project completion reconstructed as fence, if that was the condition prior to the start of the project.

PURPOSE

Reclamation

The goal of reclamation is to establish ground cover to stabilize soil and control erosion for the protection of water quality and sensitive plants and associated habitat. Soil stabilization and erosion control should be used in areas where soil is exposed and natural vegetation is inadequate.

Steeper slopes(>20%), especially with highly erosive soils, soils susceptible to mass failure, and/or soils subject to compaction will require more extensive reclamation measures than terrain with more gentle terrain.

Examples of more intensive measures include but are not limited to, biodegradable erosion control fabric, biodegradable weed-free wattles, water bars, cross-drains, rip-rap, slashing, and in some cases, terracing. Establishing ground cover by applying a Forest Service approved seed mix is critical to long-term stabilization of disturbed areas, and once established will help control runoff and promote infiltration.

Restoration

Restoring existing facilities makes the Agency, public users, and other permittees whole again, in terms of the condition of those facilities prior to the start of the project.

ENDPOINT

Reclamation

BHP has the responsibility to apply appropriate reclamation measures so that vegetation establishes quickly and surface runoff is minimized. To deem project implementation appropriate, complete reclamation practices given the natural variability of on-the-ground conditions and maintain and reapply erosion control measures until vegetation is successfully established.

Restoration

BHP has the responsibility to restore existing facilities to their prior condition or to support relocating them where the power line has created user conflict and/or safety issues.

RECLAMATION GUIDANCE FOR NON-SYSTEM ROADS, CONSTRUCTED SPUR ROADS, POLE & ANCHOR SITES, STAGING AREAS, ETC.

Any non-system road and spur road will be completely reclaimed and barricaded as to prevent any further use of the road. Barricading can take the form of large earthen berms, slash, boulders, etc.

Refer to the Teckla–Osage-Rapid City, 230 kV Transmission Line, Final Environmental Impact Statement (FEIS), Record of Decision (ROD), and Appendix B of the FEIS, for design criteria and mitigation measures and the required Best Management Practices (BMPs).


The guidance below is meant to highlight those areas of the project with a higher risk of impacting natural resources on National Forest System lands (NFSL), if not reclaimed in a timely manner. About 70% of the yearly moisture comes from April through August. The 2017 fire weather outlook predicts higher than normal precipitation during these months. Reclamation should be completed as soon as ground conditions are dry, even if that occurs during the wetter months. All reclamation must be completed by **November 30, 2017**.

To understand the magnitude of the reclamation associated with constructing a major overhead power line, the Forest Service relied on experience and observations during clearing of the ROW and construction of the line, as well as existing natural resource information stored electronically in our Geographic Information System as GIS data. This information allowed us to identify critical areas, such as water features, sensitive botany sites, and fragile soils, and to prioritize these areas for reclamation.

The prioritized areas warrant a certain level of reclamation and/or protocol based on the resources present and the terrain involved. The information below attempts to capture the minimum level of reclamation given a particular set of conditions. It can be used in developing a work schedule to reclaim disturbed areas, but BHP must take into consideration the natural variability that exists at any one site. Natural variability will dictate the final decision by BHP regarding the proper level and type of reclamation required to stabilize grades and drainages, control erosion, and establish ground cover. Ground cover on stable slopes is critical to successful reclamation.

The accompanying thumb-drive contains a GIS shapefile of where to apply the various Forest Service approved seed mixes. It also contains shapefiles, discussed below, of the prioritized areas and levels of anticipated reclamation.

The table and narrative, below, describe four levels of reclamation, with 1 having the highest priority and 4 having the lowest priority. **Level 4, Standard Reclamation Practices, is included as a base level of reclamation in Levels 1, 2, and 3.**

Table 1. Reclamation of Non-System Roads, Constructed Spur Roads, Pole & Anchor Sites, Staging Areas, Etc.			
Priority	Reclamation Level	Field Characteristics	Potential Reclamation Measures
 <p>HIGHEST</p> <p>LOWEST</p>	1	<p>Within the Water Influence Zone (WIZ) of protected streams, springs, & wetlands</p> <p>Potential for soil to move into sensitive plant habitat or Heritage sites. Or, potential for such sites to be impacted by erosion</p>	<ul style="list-style-type: none"> • 0-50 feet from the water feature: Consult the Forest Service Hydrologist • 50-100 feet from the water feature: apply standard reclamation practices and/or measures appropriate for the site. • Apply standard reclamation measures and/or measures appropriate for the site
	2	<p>Any of the following:</p> <ul style="list-style-type: none"> • Slopes greater than 40% • Slopes greater than 20% with highly erosive soils • Slopes greater than 30% with soils subject mass failure • Soils subject to compaction 	<p>Standard Reclamation Practices plus:</p> <ul style="list-style-type: none"> • Scarify/rip bare & compacted travel routes • Terraces (Coordinate with FS Engineering) • Water bars • Biodegradable erosion control fabric • Biodegradable weed-free wattles • Rip-rap
	3	<p>Access to ≥ 3 pole sites, with any of the following:</p> <ul style="list-style-type: none"> • soils subject to compaction • scattered areas of slopes greater than 30% with soils subject to mass failure 	<p>Standard Reclamation Practices plus:</p> <ul style="list-style-type: none"> • Scarify/rip bare & compacted travel routes • Biodegradable weed-free wattles • Rip-rap • Other measures, as needed, for steeper slopes
	4	Access to < 3 pole sites	Standard Reclamation Practices

Levels of Reclamation

1) **Protected Stream, Spring, and Wetland WIZ Reclamation:**

If the disturbance is within 50 feet of a water feature, consult with the Forest Service Hydrologist. If the disturbance is between 50 and 100 feet from the water feature, apply Standard Reclamation Practices and more, if needed.

Protected stream crossings with connected disturbed areas (CDAs) will likely require special attention to stabilize stream banks, reconfigure channel geometry, and to establish native vegetation as quickly as possible. Consult with the Forest Service Hydrologist and Engineer to develop appropriate design criteria and best management practices.

Sensitive Botany Habitat and Heritage Sites

Disturbances located upslope of sensitive botany habitat and heritage sites are priority areas to reclaim. The goal is to prevent sediment and debris from moving into these areas and/or excess runoff to form rills or gullies, thereby washing away habitat and/or cultural artifacts. Sensitive botany habitat and heritage sites occur on a variety of terrain, soils, and vegetation. Apply reclamation measures appropriate for each site.

This category applies to existing Forest Service non-system roads used for project implementation outside of the ROW (ROW) and similar roads within the ROW. In the shapefiles' attribute table, these areas are identified with a "1" in the "Recl_Lev" column.

2) **Standard Reclamation Practices, Scarify/Rip Bare & Compacted Travel Routes, Terraces, Water Bars, Biodegradable Erosion Control Fabric, Biodegradable Weed-Free Wattles, and/or Rip-Rap** (Prior to constructing terraces, coordinate with Forest Service Engineering):

This category applies to existing Forest Service non-system roads used for project implementation inside and outside the ROW, involving slopes >40%, slopes greater than 20% with highly erosive soils, slopes greater than 30% with soils susceptible to mass failure, and/or soils subject to compaction. In the shapefiles' attribute table, these areas are identified with a "2" in the "Recl_Lev" column.

3) **Standard Reclamation Practices, Scarify/Rip Bare & Compacted Travel Routes, Biodegradable Weed-Free Wattles, and/or Rip-Rap:**

This category applies to existing Forest Service non-system roads used for project implementation outside the ROW and similar roads within the ROW that accessed ≥ 3 pole sites. These roads involve soils subject to compaction and scattered areas of soils susceptible to mass failure on slopes greater than 30%. In the shapefiles' attribute table, these areas are identified with a "3" in the "Recl_Lev" column.

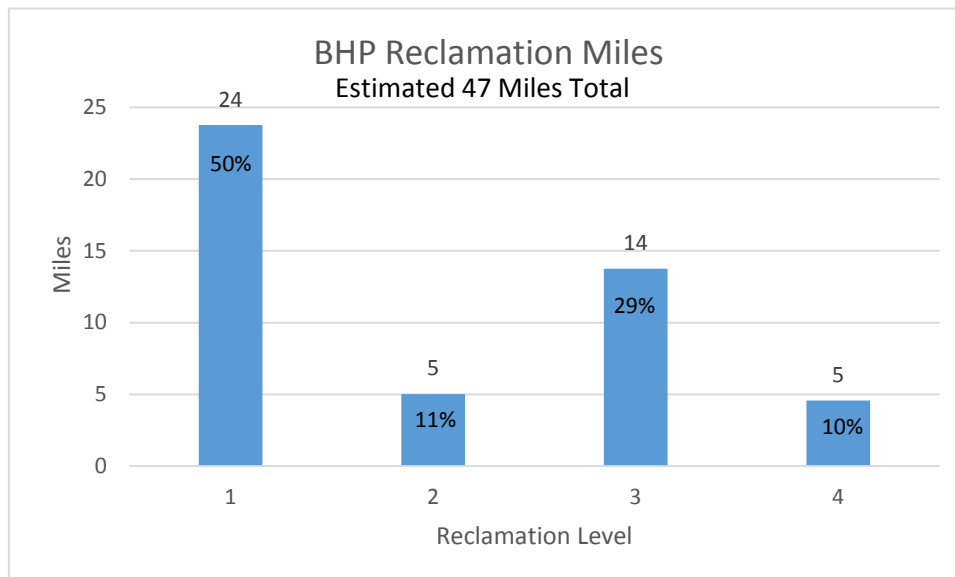
4) **Standard Reclamation Practices:**

Disturbed areas could have water bars and/or slash placed across the travel routes to reduce erosion potential, with the method used dependent on the site characteristics. Tree and slash piles created during road construction need to be lop and scattered, with tree stumps cut off and scattered. A Forest Service approved seed mix must be applied.

- a) This category applies to non-system roads used for project implementation outside of the ROW (ROW) and similar roads within the ROW that accessed < 3 pole sites. In the shapefiles' attribute table, these areas are identified with a "4" in the "Recl_Lev" column.

Estimated Miles and Acres of Reclamation

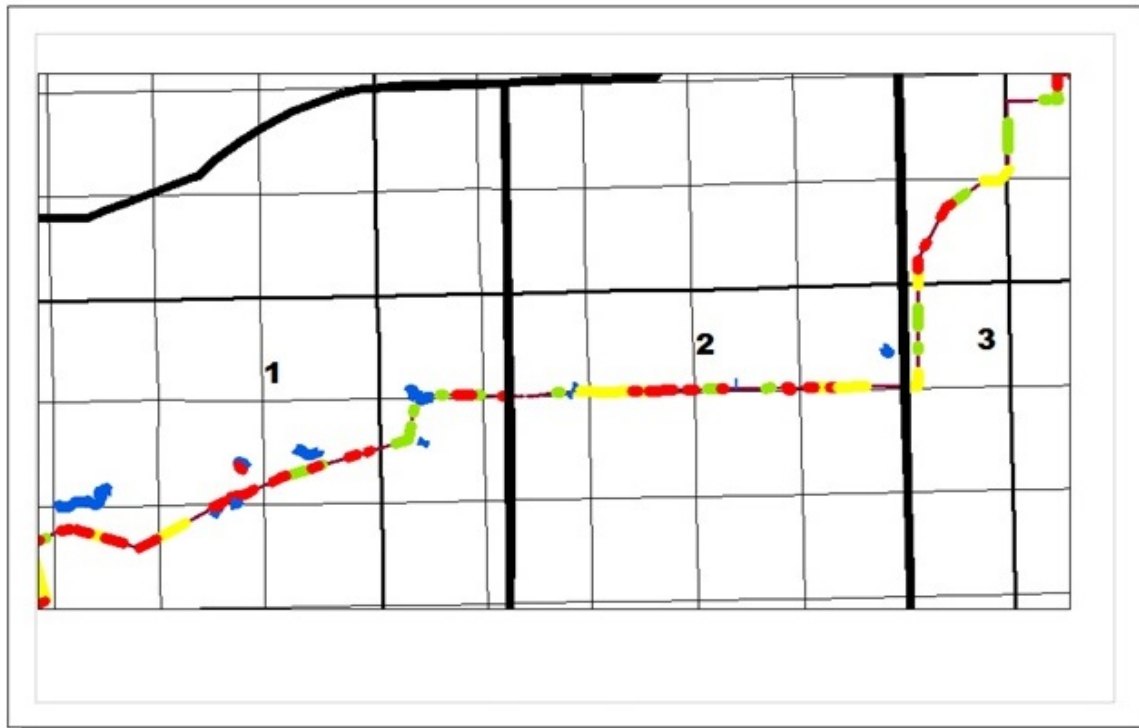
There are more than 47 miles of potential disturbance along the power line corridor and along certain non-system roads outside the corridor. This data was calculated from the ***BHP_ReclamationLine shapefile*** and is only an estimate. The actual length is likely greater due to ongoing activities associated with hazard tree removal. If it is assumed access width averages 15 feet, there are about 85 acres of ground disturbance to be reclaimed.



Two Geographic Information System (GIS) shapefiles, ***BHP_Priority ReclamationAreas and BHP_ReclamationLine shapefiles*** (Refer to the attached thumb drive), were created to help understand where reclamation is likely needed and the level of reclamation anticipated. The following factors were considered as a basis for the two shapefiles:

- Field observations during construction
- Project activities located within the Water Influence Zone (WIZ) of protected streams, springs, and wetlands
- Potential for soil to move into sensitive plant habitat
- Slopes greater than 40%
- Slopes greater than 20% with highly erosive soils
- Slopes greater than 30% with soils subject mass failure
- Soils subject to compaction

The *BHP_ReclamationLine shapefile* indicates the variability of reclamation levels, described above, along certain Forest Service non-system roads, constructed spur roads, and access within the ROW. The *BHP_ReclamationAreas shapefile* attempts to group areas along the ROW that have a predominant level of reclamation. The purpose is to indicate the general intensity of reclamation needed so as to compliment on-site planning and development of a work schedule for reclamation by BHP. The map below is an example of how these shapefiles depict this information.



BHP_ReclamationLine shapefile & BHP_ReclamationAreas shapefile Depiction.

Reclamation Levels: Level 1 = Blue, Level 2 = Red, Level 3 = Yellow, and Level 4 = Green

USDA Forest Service Approved Seed Mixes (Reference the FEIS Appendix B, Design Standards)

The FEIS, Appendix B (page B-5) and the Special Use Permit (PAH680), Exhibit G-Operating Plan specifies the seed mixes to be applied where, as well as the proper application rates for drill-seed and broadcast applications.

Field experience indicates successful seed germination occurs when seeding takes place from September 1 through June 15. Seeding outside this timeframe generally results in poor success and the need for re-application of seed. Higher than normal precipitation could be a justification for extending these dates.

The table below generally describes the geographic areas within the project where each seed mix is to be applied.

Table 2. USDAFS Approved Seed Mixes	
Project Area (Reference attached thumb drive, BHP_SeedMixes_Areas Shapefile)	Seed Mixes (Reference Appendix A)
West of Boles Canyon Road & East of Pactola Lake	Low Elevation Upland Mix
Between Boles Canyon Road and Pactola Lake	High Elevation Upland Mix
Areas Where No Woody Vegetation Is Wanted (i.e. ROW & roads needed for access)	Mystic Mix
Water Influence Zones	High Elevation Upland Mix

RESTORATION GUIDANCE FOR NATIONAL FOREST SYSTEM ROADS (NFSR), NATIONAL FOREST SYSTEM TRAILS RECREATION TRAILS, & RANGE ALLOTMENT FENCES

National Forest System Roads

All NFS roads used for this project need to be restored to the condition they were in prior to the start of the project and per Forest Service road maintenance specifications (See Appendix B).

Requirements for restoration of NFS roads will be developed in coordination with Forest Service Engineering and will be consistent with those outlined in Appendix B. Measures that may need to be taken include the following, but are not limited to:

- Repair, replace, and/or clean out all drainage structures
- Re-establish cross-drains and rolling dips
- Blade and shape native surfaced roads
- Spot surface and re-establish the crown of gravel surfaced roads, as needed
- Limb, lop and scatter trees cut along roads
- Remove berms along travel ways
- Re-install signs, posts, and carsonite road and trail markers

Recreation Trails

The project intersects recreation trails at more than 20 locations. Some intersects involve roads and others involve the ROW. The types of trails include Pack and Saddle, Motorcycle, ATV, and 4-Wheel Drive trails. Some trails, such as ATV and 4-Wheel Drive trails, have a range of width acceptable to the Forest Service. Pack and Saddle and Motorcycle trails have narrower widths. Except for the Lightning Strike Trail #3550, where its location coincides with the ROW, all intersected trails will require coordination with Forest Service Engineering and Recreation Specialists to identify appropriate site-specific restoration design criteria.

Lightning Strike Trail #3550: The power line ROW overlaps Trail #3550 for about 5.5 miles. Reclaim this area, as the Trail will be relocated outside the ROW.

Range Allotment Fences

Range fences crossed by access routes or damaged during construction need to be restored, per the Forest Service specification given below. While access is needed to complete the project, gates can be constructed, but must be kept closed to contain cattle. Once the project is complete, these gates will be removed and fence line constructed, if there was no gate originally. **Cattle can be present from June through the end of October.**

The following fencing specifications will be used at all times:

Posts

All wooden posts, cross members, and stays shall be treated with 40% Ac2 Treatment or CCA. Wood can be either Pine, Douglas Fir or Lodge Pole. Untreated wooden posts of any type are not acceptable fence material

End and Corner Posts – shall be wood and have a diameter greater than 6 inches and less than 9 inches in diameter. Length of the post shall be at least 6 feet in length. End and corner posts shall be positioned with the large end (butt) in the ground. End posts shall be notched to provide a flat bearing surface to receive the cross brace. Notch shall be less than 1/4 of the diameter of the post.

Brace Posts – shall be of wood and have a diameter greater than 6 inches, and less than 9 inches. Length of post shall be at least 6 feet in length. Brace posts shall be positioned with the large end (butt) in the ground. Brace posts shall be notched to provide a flat bearing surface to receive the cross brace.

Cross Brace – shall have a minimum diameter of 4 inches and be of the length required for the type of end or brace panel. Braces shall be attached with a minimum of three 40d spikes securely fastening brace to each post.

Metal Line Posts – shall be a standard T – post 6 feet in length. Anchor plates shall be securely fastened to all steel posts and have notches or studs placed as to hold the line wires in proper position. Notches should be placed so they will not impair the strength of the post. All steel posts shall be green in color, and shall be a minimum of 1.33 pounds per foot regardless of length. The permittee shall set all steel posts to ensure the anchor plate is below ground.

Wooden Line Posts – shall have a diameter greater than 4 inches and less than 5 inches and at least 6 feet in length. Tamped posts shall be positioned with the large end (butt) in the ground. Mechanically driven posts shall have the tapered end of the post driven into the ground.

All wooden posts shall be buried in the ground at least 24 inches.

Structures

All H-braces shall be constructed as illustrated in **Exhibits A and B**. The top of cross members shall be 6 inches below the top of the posts to which they are attached. Cross members shall be installed parallel with the fence wire.

Tensioning wires shall be held in place with dip or rise nails and then secured to the posts with 2 staples as illustrated in **Exhibit D**. A twitch stick shall be inserted in the wire loop and twisted until the wires are taut, and be positioned so one end binds against the cross member on the down-slope side of the cross member. One tensioning wire shall be used on each H-brace if all the fence pull is in one direction.

Double H-braces shall be constructed as illustrated in **Exhibit C**. If a double H-brace is placed in a straight run, the side of the three posts in the double H-brace to which the fence wires are attached shall be aligned in a straight line. Double H-braces shall be constructed if angles in the fence exceed 5 degrees or greater than 10 degrees in topography breaks.

Corner Braces and Brace Panels – shall be constructed at all corners, fence ends, both ends of gates, abrupt changes in slope or other stress points, or constructed in the fence line at a maximum length of 1,300 feet apart.

Spacing of Posts

Spacing of posts shall not exceed 16 feet.

Wire

Barbed Wire – shall be a minimum of 12.5 gauge 2 point barbed wire.

Smooth Wire – shall be a 9 gauge smooth wire used for tensioning wire on braces.

The permittee may splice into existing fences as needed and terrain allows. A splice shall be used for all barbed and barb less wire splicing.

Wires shall be secured on all braces, posts, gate ties, wire wraps, etc, with 1.5 inch or 2 inch galvanized staples. Staples shall be driven on a slant to prevent material splitting. Barbed wire shall be dead-ended at all corner, brace, or gate posts by at least two wraps around the post and then secured back to the tight wire with at least three complete wraps. Staples shall be driven snug to the wire and not into the wire or loose from the wire allowing it to run through the staple. All wire ends shall be bent down along the wood structure, wire ends shall not protrude from any fence structure.

Standard fence clips shall be used to attach wire to steel posts.

4 – Wire Fence

Bottom Wire – 16 inches above ground level

Lower Wire – 8 inches above bottom wire

Upper Wire – 8 inches above lower mid wire

Top Wire– 10 inches above upper mid wire

3- Wire Fence

Bottom Wire – 16 inches above ground level

Middle Wire – 13 inches above bottom wire

Top Wire – 13 inches above middle wire

Gate Installment

All gates shall be constructed as illustrated in **Exhibit E**, and installed on all roadways, and at pre-identified locations. A standard H – brace shall be constructed on each side of all gates. All gate openings shall be 16 feet in length unless otherwise identified.

Gates shall be attached to brace panels as illustrated in **Exhibit E**. Wooden gate stays shall be greater than 1 inch in diameter and less than 3 inches in diameter.

Gate End Pieces – shall range from 2.5 to 3.5 inches in diameter. Barbed wire with two wraps around the end piece and tied back by three complete wraps on self. Wire shall be stapled to wood.

Wire Loops – On hinge end of gate, double wrap No. 9 wire around stay and post or other structure, and staple loop on each side of holding structure. Place one wire loop above bottom wire and one loop below top wire. The bottom loop shall be stapled to the post or other structure but not to gate end piece.

Exhibit A
Fence Construction
Single H-Brace

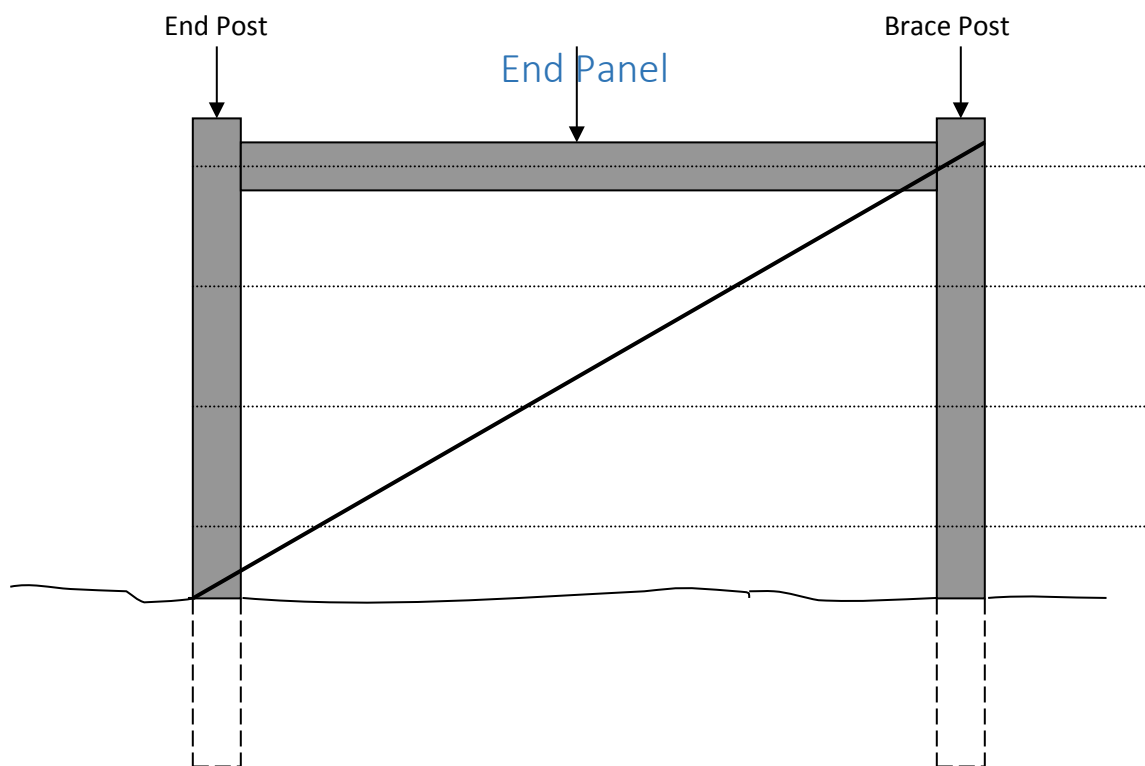


Exhibit B
Fence Construction
Inline H-Brace

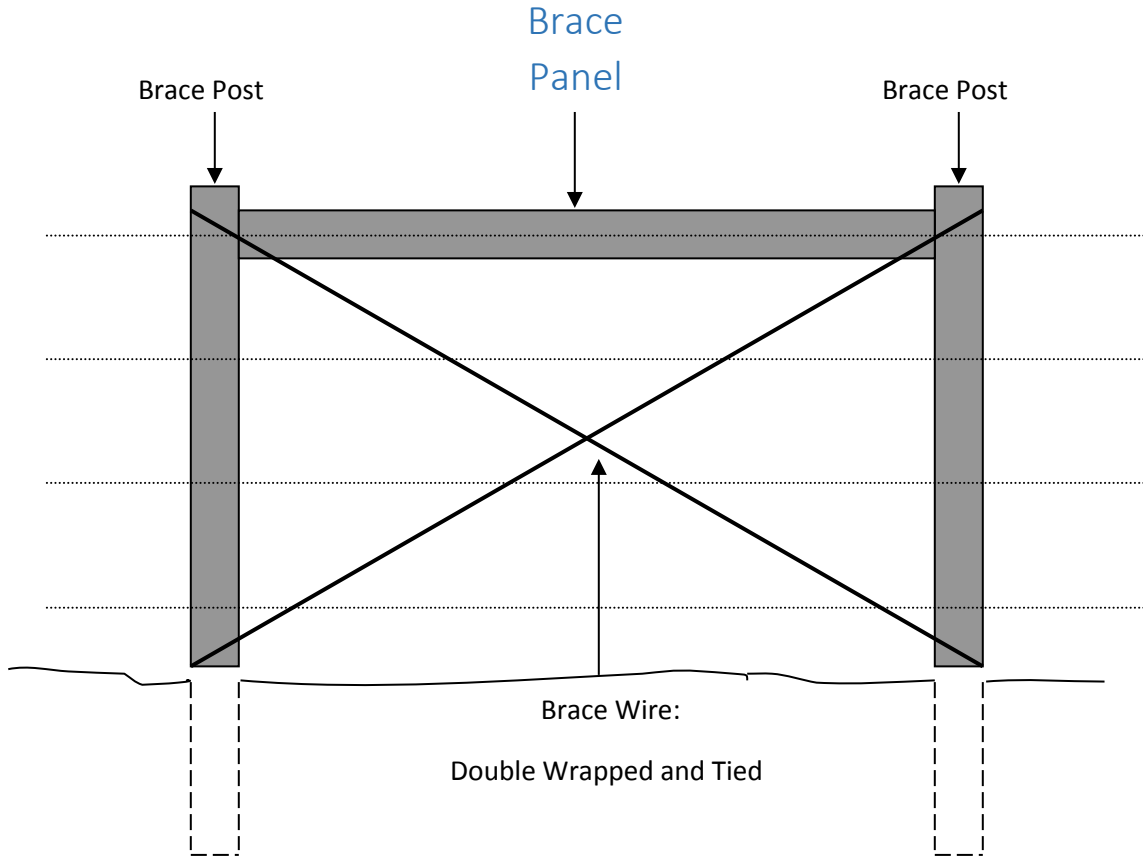


Exhibit C
Fence Construction
Double H-Brace

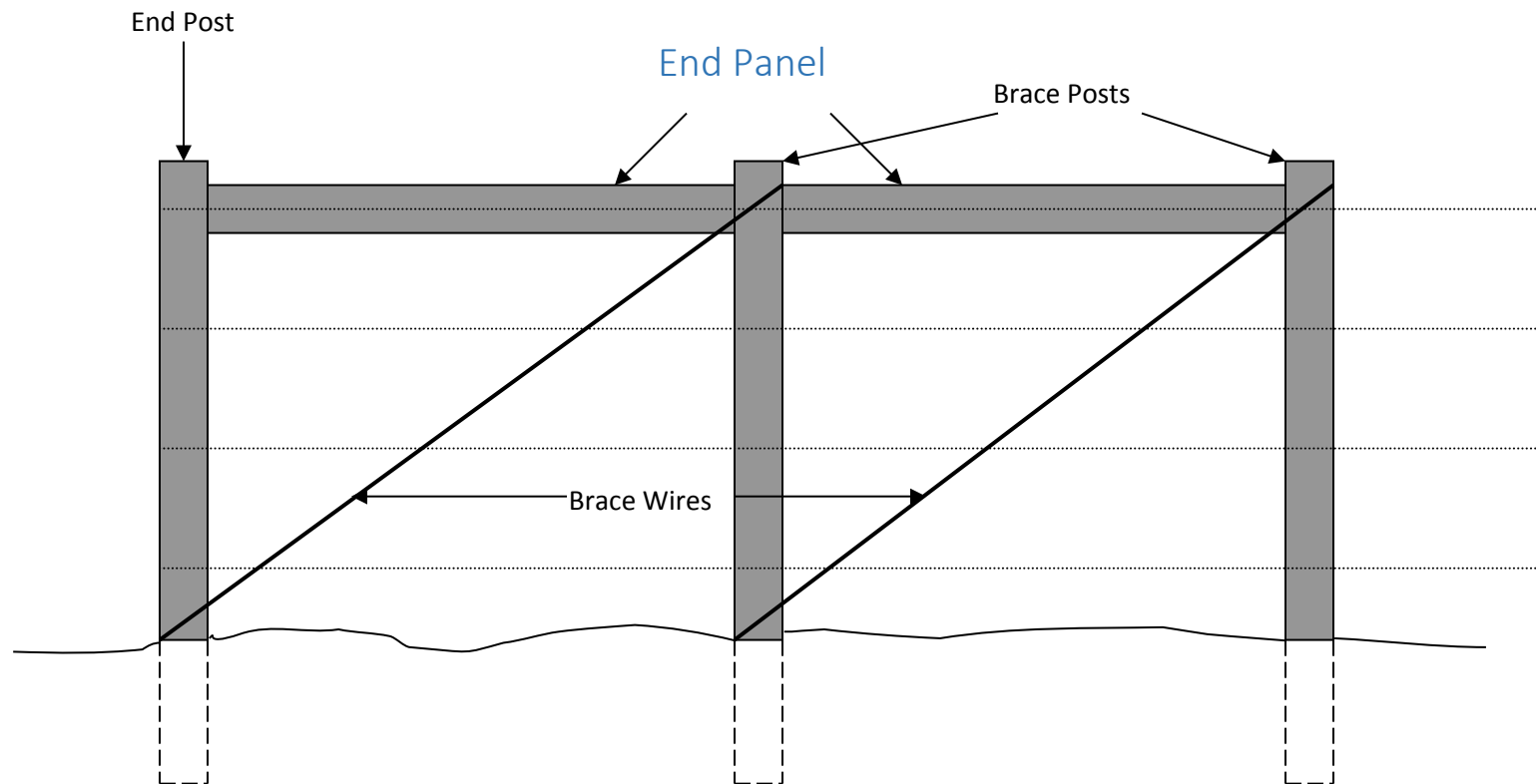


Exhibit D
Fence Construction
Wire Tension Installation

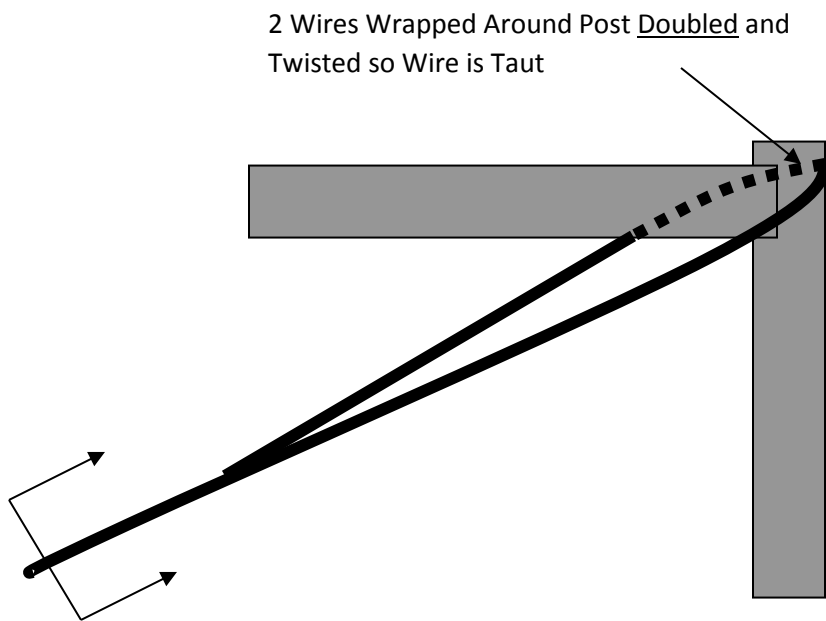


Exhibit E
Fence Construction
Wire Gate

