Tri-State Montrose-Nucla-Cahone Transmission Line Improvement Project

Draft Plan of Development

Montrose, Ouray, San Miguel, and Dolores Counties, Colorado

Appendix M

Draft Geotechnical Plan

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Objective

The objective of this Draft Geotechnical Plan is to detail practices designed to address potential impacts from field geotechnical testing on the Tri-State Montrose-Nucla-Cahone Transmission Improvement Project (Project). Tri-State Generation and Transmission Association (Tri-State) has developed this plan as part of the Plan of Development (POD) that accompanies their application to the Bureau of Land Management (BLM) for a Right of Way (ROW) grant. If the ROW grant is approved, the final POD and all appendices will be attached to the Decision Record. This plan provides guidance to field personnel on measures identified by Tri-State, BLM and US Forest Service (FS) to minimize effects during field geotechnical testing activities associated with the Project. It will be the responsibility of Tri-State and its project contractors, working with designated environmental inspectors, to comply with measures identified in this plan.

Final geotechnical testing plans, including a map of proposed boring locations and sensitive environmental resources will be provided to BLM in the Final POD. As a result of the testing, a geotechnical report will be prepared by a Geotechnical Engineer registered in the State of Colorado. The geotechnical report will provide recommendations for design of transmission line foundations.

Field Testing

Geotechnical testing will occur in late fall 2015.after structure locations and staking are completed. Field testing would involve transporting a truck or track mounted drill rig to various structure locations along the ROW and drilling test holes. Refer to Figures M-1 to M-5 for photos of typical drill rigs that could be used on a project of this scope.

Test holes will be required at each turning or “angle” structure on the project and at intervals of approximately 1 mile on the straight, “tangent” sections of the line. The soil borings at the highly loaded angle structures are critical to the safe design of the line and need to be made as close as possible to the angle structure locations, they cannot be moved more than a few feet. The boring locations on the tangent sections of the line are not as critical and can be moved significant distances to avoid environmentally sensitive areas. The borings on the tangent sections of the line will not be made in any cultural sites or areas of other significant environmental concern.

The test holes will most likely be 4inches in diameter although 6 inch borings may be required in unique geologic situations. Borings will range from 30 feet to 50 feet deep depending on the conditions encountered. Spoils from the test holes will be deposited back into holes and tamped flat before the drill rig leaves the site.

Existing roads will be used for all geotechnical testing access and activities. Borings will only be made within the existing ROW with the exception of the Dry Creek Basin re-route, the proposed re-route at the Dolores River Crossing, and in the immediate vicinity of the Montrose, Maverick and Cahone Substations as well as Nucla Station. Tri-State will obtain any necessary temporary use permits from the agencies.

The existing, energized 115-kV transmission line creates a potential hazard to field personnel as the extended drill rig must maintain a safe distance from the energized line at all times. On a new transmission line, borings at angle structures would typically be made at the exact center of the proposed structure location. In this case, that is impossible as there is an existing structure in that location. Also, on a new line the borings on the tangent sections would be made on the centerline of the ROW. In this case the existing, energized overhead conductors are in the way. For both angle and tangent borings the drill

rig will need to be offset from the existing line a safe distance. This offset will vary depending on topography but will not be outside the existing 100 foot ROW.

Figure M-1 Typical truck-mounted drill rig.

Figure M-2 Typical track-mounted drill rig.

Figure M-3: Drill sections being flown in by helicopter.

Figure M-4: Drill sections being flown in by helicopter.

Figure M-5: Drill sections being flown in by helicopter.

Geotechnical Report

The primary purpose of this report is to evaluate subsurface soil conditions and provide foundation recommendations and geotechnical design criteria for the project. The report will also identify potential geologic hazards, and recommend general and specific forms of geologic hazard mitigation. The hazards assessed will include avalanche, landslide, potentially unstable slopes, rock fall, slopes 30% to 50%, slopes over 50%, alluvial fans, talus slopes, Mancos shale, faults, weak soil, expansive soil and rock, and ground subsidence. Maps will be created to show the superposition of project components over the areas of identified potential geologic hazards. The project components shown on the maps may include some or all of the following: transmission structures, substations, marshalling yards, pulling sites, helicopter pads, and access roads. Identified hazards relevant to project components will be assessed and tabulated. Some geologic hazards only affect the design of project components rather than requiring mitigation during construction.

The geologic hazard assessment will allow the majority of project components to be designed or in some cases re-positioned to avoid or minimize potential geologic hazards. Where hazards cannot be avoided, the Environmental Protection Measures are adequate for most low rated hazards: see Tri-State's "Standard and Committed Mitigation Measures" (Table 4, POD). These measures include minimizing disturbances, avoiding sensitive terrain and vegetation, controlling erosion, limiting cuts and fills, and restoration and revegetation of disturbed areas.

Some hazards may not be avoided or easily mitigated. These will be described and discussed in the "Specific Mitigation Recommendations" section of the geotechnical report and this Appendix in the Final POD (See Table M-1). The recommended specific mitigation generally can be easily incorporated into construction procedures. Construction monitoring, if needed, will provide a means for assuring that the recommended site-specific mitigation is undertaken.

The following Environmental Protection Measure (EPM) applies:

Table M-1: Geotechnical Environmental Protection Measures

Measure	***Description***
S-5	As part of pre-construction activities, Tri-State and/or Tri-State contractors will perform detailed geologic evaluation and investigations in certain locations to evaluate potential geological and geotechnical hazards and design the project to avoid and minimize potential geotechnical risks such as slope failure, unstable soils, and landslide risks. In addition, soil will be sampled if potentially contaminated soils were observed during the pre-construction geotechnical investigation.