SAN DIEGO GAS & ELECTRIC COMPANY

CLEVELAND NATIONAL FOREST POWER LINE REPLACEMENT PROJECTS ACCESS ROAD CONDITION EVALUATION AND REPAIR DESIGN REPORT

AUGUST 2016

SDGE

A Sempra Energy utility℠

TABLE OF CONTENTS

LIST OF ATTACHMENTS

1 – INTRODUCTION

This Access Road Condition Evaluation and Repair Design Report (Report) describes the recent evaluation of access roads by San Diego Gas & Electric Company (SDG&E) and its contractors for the Cleveland National Forest Power Line Replacement Projects (Project). The Project includes a variety of activities in support of the following construction components:

- replacement of approximately 1,400 existing wood poles with fire-resistant, weathered steel poles;
- undergrounding of approximately 26 miles of existing 12 kilovolt (kV) distribution lines;
- removal of approximately 30 miles of existing 12 kV and 19 miles of existing 69 kV overhead facilities; and
- closure of approximately 24 miles of access roads.

This Report was prepared in accordance with Mitigation Measure (MM) HYD-4 as described in the Project's Final Environmental Impact Report/Environmental Impact Statement's Mitigation Monitoring, Compliance, and Reporting Program (MMCRP) for the Project. This Report provides the methodology that will be used as a general framework to evaluate the condition of access roads on the entire Project. This Report also provides engineering recommendations to reduce or minimize off-site sedimentation associated with any areas meeting the criteria established in MM HYD-4. Attachment A: Access Road Evaluation by Transmission Line provides the access road condition evaluation results for each transmission line segment. Site-specific recommendations to reduce the erosion potential or repair the access road are provided in Attachment B: Access Road Recommendations and Repair. Engineered solutions to be implemented in accordance with the United States Forest Service (USFS) Handbook 2509.22 are provided in Attachment C: USFS Handbook References. Maps of the access roads evaluated are provided in Attachment D: Detailed Route Map.

Access roads are being evaluated sequentially according to the construction schedule. As of June 2016, Transmission Line (TL) 625B and TL629E have been evaluated and the results are presented in Attachment A: Access Road Evaluation by Transmission Line, Attachment B: Access Road Recommendations and Repair, and Attachment D: Detailed Route Map. These attachments will be updated to include evaluation results and repair recommendations for the remainder of the construction segments and will be submitted to the California Public Utilities Commission (CPUC) and the USFS for review and approval prior to construction on subsequent segments.

2 – OBJECTIVES

The purpose of this Report is to provide a narrative description of how MM HYD-4 will be satisfied[1], including the specific solutions to be implemented if chronic erosion and drainage

[1] Please note that this Report and MM HYD-4 are not applicable to the Project component—Circuit (C) 78—scheduled for construction in 2016. C78 is a distribution line with approximately 0.1 mile of SDG&E-maintained access roads. The approximately 0.1-mile-long segment does not fall under MM HYD-4, as described on Page

issues are identified during access road evaluations. The evaluation and recommendations in this Report accomplish the following objectives:

- Identify existing SDG&E maintained access roads with planned grading and repair activities needed to be complete prior to start of construction of each project segment.

- Identify where sedimentation could adversely affect water quality as a result of soil erosion on existing SDG&E maintained access roads that exceed 15 percent grade for a length greater than 100 feet, that are located in Riparian Conservation Areas (RCAs), or that are located in sediment-sensitive watersheds (as defined by the State Water Resources Water Quality Control Board).

- Provide the evaluation results from a Professional Engineer (PE) for access roads maintained by SDG&E within the Project area and that meet the aforementioned criteria.

- Prescribe site-specific solutions in accordance with the USFS Handbook 2509.22 for areas identified by the PE as needing an engineered solution to reduce potential water quality impacts caused by chronic erosion and drainage issues.

3 – MITIGATION MEASURE

The full text of MM HYD-4 is provided as follows:

HYD-4: <u>Access Road Condition Evaluation and Repair Design Report</u>

"Planned grading and repair activities along SDG&E exclusive-use access roads that a) exceed grades of 15% (over a minimum distance of 100 feet), b) are within RCAs, or c) are anywhere within a sediment-sensitive watershed (as defined by the SWRCB) shall be evaluated by a qualified professional (e.g., PG, PE, or CEG contracted by SDG&E and reviewed and approved by the CPUC and the Forest Service) prior to initiating construction on the associated segment, who will identify areas experiencing chronic erosion and drainage issues. At a minimum, segments shall include, but are not limited to, the following:

- TL626 south of Eagle Creek Road and north of Boulder Creek Road
- TL625 in the Vicinity of Barber Mountain Road
- TL625 north of Lyons Valley Road and south of Carveacre Road
- C442 east of Oak Valley and south of I-8, on the western flanks of Long Peak
- Short segments of TL629 on either side of Cameron Valley and east of Pine Valley

The qualified professional shall design an engineered solution(s) to be implemented within the existing access roadway disturbance area in accordance with Forest Service standards, as described in Forest Service Handbook 2509.22 (Section 12.2), for each area determined to experience chronic erosion and/or drainage issues prior to beginning work on those facilities

B-18 in Section B.3 Project Components of the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

associated with the problematic access road. The designed solution(s) shall be included into the approved project to ensure the avoidance or minimization of substantial damage or soil loss along the identified road segments.

Examples of such solutions could include, but are not limited to the following:

- Crowning road sections with gentle slopes to prevent standing water on the road
- Outsloping roads at 3%-5% wherever possible
- Where required for proper maneuvering and safety, insloping roads at 3-5% into properly designed ditches
- Installing rolling dips, ditch relief culverts, and/or water bars at intervals appropriate for the road-grade and the soil erosivity
- Minimizing the number of water crossings, and maintaining crossings as close to a 90-degree angle as possible to the streambed.
- Constructing perennial and seasonal/ephemeral stream crossings so as not to change the cross-sectional area of the stream channel or impede fish migration.
- Constructing perennial and seasonal/ephemeral stream crossings with materials that will not degrade water quality (e.g., concrete, coarse rock, riprap and/or gabions)
- Surfacing roads with erosion-resistant materials such as rock or asphalt concrete.

The Access Road Condition Evaluation and Repair Design Report shall identify locations, if any, where no feasible and/or effective solutions can be implemented to adequately handle runoff or comply with Forest Service soil and water quality management standards as contained in Forest Service Handbook 2509.22 (Section 12.2). The report will be updated for each construction segment according to SDG&E's final construction schedule.

In these locations, the qualified professional shall recommend options for access road removal (i.e., requiring access by helicopter) or realignment (e.g., to achieve a lower slope) that would still achieve project objectives.

Construction of each segment shall not proceed until the report section pertaining to that segment has been reviewed and approved by CPUC and Forest Service. In the event there are disputes regarding specific problem locations, CPUC and Forest Service will allow construction to proceed on those portions of the construction segment not impacted by access roads requiring evaluation under this measure; however, SDG&E shall not work in areas under dispute until resolution is achieved."

4 – METHODOLOGY

For purposes of this Report, "access road" is defined as any existing access road that is maintained by SDG&E, that will be used during construction of the Project, and that is not subject to the decommissioning Plan requirements discussed in MM HYD-3. Roads that are not maintained by SDG&E (e.g., county roads, or access routes that are only used for overland travel) were not evaluated under MM HYD-4. The steps taken to evaluate chronic erosion and drainage issues on Project access roads are described in the following subsections.

4.0 PRELIMINARY FIELD REVIEW AND DESKTOP ANALYSIS

SDG&E's contracted PE reviewed and evaluated TL625B and TL629E in April and May 2016 to determine whether any of the access roads exhibited the three evaluation criteria described in Section 3 – Mitigation Measure. This included an evaluation of access roads where SDG&E had previously installed erosion control devices. SDG&E's contracted PE also consulted with SDG&E's Transmission Construction and Maintenance (TCM) team members to incorporate their observations and experience maintaining these access roads into this evaluation report. TCM provided feedback regarding whether there were any access road areas where chronic erosion and drainage issues existed, as described in the Project's Final EIR/EIS (CPUC 2015).

First, SDG&E identified all existing SDG&E maintained access roads within the Project area, as shown in Attachment D: Detailed Route Map. Next, SDG&E identified the access roads with planned grading or repair activities necessary for construction of portions of the Project. Then SDG&E determined which areas along the access roads were within a RCA or a sediment sensitive watershed as defined by the SWRCB.[2] SDG&E also engaged a survey contractor to perform a centerline survey on the access roads where slope was unknown to identify access roads that exceeded grades of 15 percent over a minimum distance of 100 feet. Finally, any areas known to have potential chronic erosion and drainage issues were identified. This information was included in a draft version of the evaluation spreadsheet, which is provided as Attachment A: Access Road Evaluation by Transmission Line.

4.1 FINAL FIELD REVIEW AND IDENTIFICATION OF SOLUTIONS

Subsequent to the desktop evaluation, SDG&E conducted a reconnaissance-level field survey to evaluate access roads along the transmission line segment with the contracted PE, a team of engineers, erosion control specialists, and personnel with historic records and experience maintaining the roads. As previously noted, SDG&E does not maintain access roads for distribution lines; therefore, no surveys were conducted on C78 as part of this effort. Following the reconnaissance-level field survey, the evaluation spreadsheet and detailed route maps were updated to depict the access roads that meet the criteria listed in Section 3 – Mitigation Measure. The maps are included in Attachment D: Detailed Route Map and Attachment E: AutoCAD Profile Drawings of Road Segments.

SDG&E's contracted PE then conducted site-specific evaluations for each mapped road segment potentially meeting the aforementioned criteria to prescribe site-specific remedies where it was deemed necessary. For the purposes of this Report and consistency with MM HYD-4 in the Project's MMCRP, chronic erosion is defined as recurrent, accelerated weathering of soil and rock particles that result in increased turbidity levels in downstream waterbodies. Access roads experiencing chronic erosion exhibit degraded roadway prisms that cannot be mitigated through existing Best Management Practice enhancements. This definition is consistent with the Final EIR/EIS, where chronic erosion areas "essentially means periodically importing soil material to

[2] A sediment sensitive watershed drains into a receiving water body that is listed on the Environmental Protection Agency's Clean Water Act Section 303 (d) list for sedimentation/siltation, turbidity, or has an approved sediment Total Maximum Daily Load, or has the following beneficial uses defined in the Water Quality Control Plan (Basin Plan) for the region: SPAWN, MIGRATORY, and COLD.

fill in and compact ruts, potholes, and other erosional features…. [with] the primary consideration in determining the severity of the issue is the degree to which erosional features are connected to intermittent/perennial creeks and/or high-order drainages." (CPUC 2015, p. D.9-43 and 44) Where erosion was noted, but the access roads did not experience chronic issues (e.g., where sedimentation was limited to the road prism or the waterbar energy dissipaters were functioning as designed), no site-specific recommendations are provided. In addition, if erosion control devices were already installed on the road segment and required only maintenance-related activities to resolve observed erosion, then site-specific design solutions are not provided in this Report. Please note that maintenance-related activities include activities such as, grading roads to smooth out rills and ruts, recontouring water bars, removal of sediment from energy dissipaters, adding riprap to energy dissipaters, and installing additional water bars, and increasing the size of energy dissipaters. Instead, the evaluation spreadsheet notes that additional maintenance is required in that area. These maintenance items will be addressed during construction and through SDG&E's Operations and Maintenance Plan to be reviewed and approved by the USFS, but are not covered by this report based on the evaluation criteria established in MM HYD-4.

For locations that exhibited chronic erosion and/or drainage issues that could adversely affect water quality, the contracted PE has determined whether there is a feasible and/or effective solution that can be implemented and has prepared site-specific engineering solutions consistent with the BMPs described in Section 12.2 of USFS Handbook 2509.22 where appropriate. Site-specific recommendations to reduce the erosion potential or repair the access road are provided in Attachment B: Access Road Recommendations and Repair. If necessary, engineered solutions to be implemented are provided in Attachment C: USFS Handbook References.

SDG&E's access roads are typically 14 feet wide, but may be as wide as 20 feet for sharp turns. A minimum of 12 feet is necessary for most vehicles and equipment, which precludes implementation of some BMPs that would reduce the access road width. The recommendations proposed in this Report consider the space requirements for safe passage, BMPs that do not require additional land authorizations, the necessary functional width of the road prism, and disturbance of sensitive or native habitat.

5 – REPORT RESULTS, RECOMMENDATIONS, AND IMPLEMENTATION

The recommendations contained within this Report will be implemented by SDG&E's construction contractors if needed to access construction sites, or if road repairs are performed during regular maintenance activities, as described in the following subsections.

5.0 RESULTS AND RECOMMENDATIONS

The results of the access road evaluation are found in Attachment A: Access Road Evaluation by Transmission Line, and site-specific solutions for those areas identified as having a chronic erosion and drainage issues are contained in Attachment B: Access Road Recommendations and Repair.

5.1 IMPLEMENTATION

SDG&E's contractors will use this Report to implement access road repairs during construction of the Project if needed to access construction sites or if road repairs are performed during regular maintenance activities prior to the start of construction in each area. SDG&E's Contract Administrators, Environmental Inspectors, and/or contracted PE will monitor the implementation of the repairs or designed solutions as prescribed in Attachment B: Access Road Recommendations and Repair.

6 – REFERENCES

CPUC. 2015. Final Environmental Impact Report/Environmental Impact Statement: Master Special Use Permit and Permit to Construction Power Line Replacement Projects. Online. http://www.cpuc.ca.gov/environment/info/dudek/CNF/MSUP-PTC_PowerLineReplacementProject_Vol1P1_Final_EIR-EIS.pdf. Site visited September 9, 2015.

USFS. 2011. Forest Service Hand Book Southwest Region (Region 5) Vallejo, CA. R5 FSH 2509.22 – Soil and Water Conservation Handbook, Amendment Number 2509.22-2011-1.

USFS. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide.

ATTACHMENT A: ACCESS ROAD EVALUATION BY TRANSMISSION LINE

TIE LINE 625B

FUSCOE ENGINEERING

TL625B Access Road Evaluation Summary

A geographic information system desktop evaluation of Transmission Line (TL) 625B access roads was conducted by Fuscoe Engineering in order to map riparian conservation areas (RCAs), sediment-sensitive watersheds (as defined by the State Water Resources Control Board), and other geographic properties in the area prior to prior to conducting field investigations. In addition, SDG&E's Transmission Construction and Maintenance (TCM) team members were consulted to incorporate their observations and experiences maintaining these access roads. TCM provided feedback regarding whether there were any access road areas that experienced chronic erosion as defined in the Final Environmental Impact Report/Environmental Impact Statement (FEIR/EIS). Subsequently, Fuscoe Engineering performed access road field investigations on two occasions (April 21, 2016 and on May 23, 2016).

On the first site investigation, the condition of San Diego Gas & Electric Company (SDG&E) maintenance roads associated with TL625B between the Loveland Substation and the Barrett Tap was reviewed to determine locations of chronic erosion and/or drainage issues. The condition of access roads was photo-documented, as well as the presence of best management practices, such as water bars and riprap. Areas that appeared to approach slopes greater than 15 percent for a distance of 100 feet or greater were noted, and focus was also paid to areas located within RCAs. After the initial site investigation, an additional field survey to determine roadway slope was performed. Survey data was then reviewed to determine precise locations where roadway slopes exceeded 15 percent over a distance of 100 feet. The results of the survey data review were overlaid with field notes and photographs to develop a list of roadway reaches where additional site investigation was warranted to verify if chronic erosion and drainage issues were present.

Table 1: TL625B Access Road Evaluation Table provides a summary of the access road evaluation for TL625B. A few areas exhibited minor rutting and rilling; however, none of the access road segments evaluated met the definition of chronic erosion and drainage issues as described in the Final Environmental Impact Report/Environmental Impact Statement and described in the Report. Moreover, site-specific solutions for TL625B were not warranted and Attachment B: Access Roads Recommendations and Repair did not need to be prepared for this portion of the Project. Included in Table 1 are references to site photographs taken during the site visits mentioned above. Representative site photographs are provided following Table 1.

As stated above, supplemental field surveys were performed on access road reaches that approached the threshold of greater than 15 percent for a distance of 100 feet. Profiles of surveys are provided in Attachment E: AutoCAD Profile Drawings of Road Segments. Note that profiles are provided for all road reaches surveyed, some of which did not meet the threshold of greater than 15 percent for a distance of 100 feet.

Table 1: TL625B Access Road Evaluation Table

SDG&E Exclusive Use Access Road Segment Start		SDG&E Exclusive Use Access Road Segment Stop		Within Sediment-Sensitive Watershed?	Within RCA?	Exceeds 15% for More Than 100 Feet?	Exhibits Chronic Erosion and Drainage Issues?	Photo #	Access Road Reach #	Notes
GPS Coordinates	Physical Reference	GPS Coordinates	Physical Reference							
32°47'48.44"N, 116°47'33.25"W	Paved road west of Loveland Substation	32°47'47.43"N, 116°47'33.38"W	Bottom of paved access road	No	No	Yes	No	TL625B-01	3	Access road is paved and erosion was not noted.
32°47'52.37"N, 116°47'22.72"W	Start of spur road to Z242841	32°47'51.56"N, 116°47'21.53"W	130 feet along spur road to Z242841	No	No	Yes	No	TL625B-02	4 (west portion)	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'50.59"N, 116°47'20.30"W	Fork in spur road to Pole Z272841	32°47'50.36"N, 116°47'19.12"W	70 feet northwest of Pole Z272841	No	No	Yes	No	TL625B-03	4 (east portion)	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'50.59"N, 116°47'20.30"W	230 feet north of Pole Z247842	32°47'50.20"N, 116°47'09.36"W	90 feet north of Pole Z272842	No	No	Yes	No	TL625B-04	7	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'52.42"N, 116°46'46.96"W	160 feet northwest of Pole Z272845	32°47'51.57"N, 116°46'45.94"W	60 feet northwest of Pole Z272845	No	Yes	No	No	TL625B-05	9	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'55.87"N, 116°46'01.19"W	140 feet west of Pole Z272853	32°47'55.33"N, 116°45'59.92"W	Pole Z272853	No	No	Yes	No	TL625B-06	12	Erosion was not noted. Waterbars have been installed and are functioning as designed. Riprap at outlet from pad is located properly and in good condition.
32°48'00.18"N, 116°45'48.39"W	370 feet north of Pole Z272854	32°47'58.77"N, 116°45'48.27"W	240 feet north of Pole Z272854	No	No	Yes	No	TL625B-07	13	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'58.77"N, 116°45'48.27"W	240 feet north of Pole Z272854	32°47'56.95"N, 116°45'47.90"W	50 feet north of Pole Z272854	No	Yes	Yes	No	TL625B-08	13	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'56.95"N, 116°45'47.90"W	50 feet north of Pole Z272854	32°47'56.61"N, 116°45'47.55"W	Pole Z272854	No	Yes	N/A	No	TL625B-09	13	Erosion was not noted. Riprap at outlet from pad is located properly and in good condition.
32°47'56.47"N, 116°45'43.03"W	220 feet north of Pole Z272855	32°47'54.65"N, 116°45'42.63"W	35 feet north of Pole Z272855	No	No	Yes	No	TL625B-10	14	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'49.71"N, 116°45'26.30"W	130 feet northwest of fork in spur road leading to Z272857	32°47'48.49"N, 116°45'25.35"W	At fork in spur road leading to Z272857	No	No	Yes	No	TL625B-11	16	Erosion was not noted. Waterbars have been installed and are functioning as designed.
32°47'41.69"N, 116°45'10.68"W	20 feet east of fork in spur road to Pole Z272860	32°47'42.14"N, 116°45'09.18"W	160 feet east of fork in spur road to Pole Z272860	No	No	Yes	No	TL625B-12	18	Minor rilling, approximately 4" wide by 2" deep noted. Water bars have been installed and are functioning as designed.
32°47'42.14"N, 116°45'09.18"W	80 feet southwest of Pole Z272860	32°47'40.59"N, 116°44'43.08"W	Pole Z272860	No	Yes	N/A	No	TL625B-13	18	No erosion noted. Riprap at outlet from pad is located properly and in good condition.

SDG&E Exclusive Use Access Road Segment Start		SDG&E Exclusive Use Access Road Segment Stop		Within Sediment-Sensitive Watershed?	Within RCA?	Exceeds 15% for More Than 100 Feet?	Exhibits Chronic Erosion and Drainage Issues?	Photo #	Access Road Reach #	Notes
GPS Coordinates	Physical Reference	GPS Coordinates	Physical Reference							
32°47'37.33"N, 116°44'32.49"W	Entrance of spur road to Poles Z272862 and Z272865	32°47'40.59"N, 116°44'43.08"W	Pole Z272862	No	Yes	N/A	No	TL625B-14	N/A	Erosion was not noted. Waterbars have been installed and are functioning as designed. Riprap at outlet from pad is located properly and in good condition.
32°47'37.33"N, 116°44'32.49"W	Entrance of spur road to Poles Z272866 through Z272869	32°47'36.82"N, 116°44'33.66"W	Midway between Poles Z272867 and 272868	No	Yes	N/A	No	TL625B-15	N/A	Road is in good condition and waterbars have been installed and are functioning as designed. Rilling noted between road and pad for existing structure located midway between Pole Z272866 and Z272867. Existing structure is slated for removal, and pad will be restored through implementation of the Habitat Restoration Plan.

FUSCOE ENGINEERING

TL625B-01 – Paved road west of substation

TL625B-02 – Looking northwest to start of spur road to 242841

TL625B-03a - 115 feet north of Pole 242841 looking south

TL625B-03b - 115 feet north of Pole 242841 looking north

FUSCOE
ENGINEERING

TL625B-04a - 140 feet north of Pole 272842 looking north

TL625B-04b - 140 feet north of Pole 272842 looking south

FUSCOE ENGINEERING

TL625B-05 - 70 feet northwest of Pole 272845 looking northwest

TL625B-06a - Near Pole Z272853 looking northwest

FUSCOE
ENGINEERING

TL625B-06b – Riprap at outlet from pad at Pole Z272853

TL625b-07a - 300 feet north of Pole Z272854 looking north

TL625B-07b - 300 feet north of Pole Z272854, typical waterbar in good condition

TL625B-07c - 300 feet north of Pole Z272854, looking south

FUSCOE
ENGINEERING

TL625B-08 - 50 feet north of Pole Z272854, looking north

TL625B-09a - 50 feet north of Pole Z272854, looking south

TL625B-09b – Riprap at outlet from pad at Pole Z272854

TL625B-10a - 115 feet north of Pole Z272855 looking north

FUSCOE
ENGINEERING

TL625B-10d - 115 feet north of Pole Z272855, waterbar outlet in good condition

TL625B-11 – at fork in road leading to spur toward Pole Z272857, looking northwest

TL625B-12 - 160 east of fork to Pole Z272860, looking west

TL625B-13a - 70 southwest of Pole Z272860, looking northeast

FUSCOE ENGINEERING

TL625B-13b – Riprap at outlet from west side of pad at Pole Z272860, in good condition

TL625B-14a - 180 feet southwest of road entrance leading to of Pole Z272865, looking northeast,

TL625B-14b – Midway between Pole Z272865 and Pole Z272864, looking northwest

TL625B-14c – Midway between Pole Z272865 and Pole Z272864, looking southeast

FUSCOE ENGINEERING

TL625B-14d - 90 feet northeast of Pole Z272862, looking southwest

TL625B-15a - 100 feet southwest of entrance to road leading to Poles Z272866 through Z272869, looking northeast

FUSCOE ENGINEERING

TL625B-15b - 100 feet southwest of entrance to road leading to Poles Z272866 through Z272869, looking southwest

TL625B-15c - Near Pole Z272866, looking northwest

FUSCOE
ENGINEERING

TL625B-15d – 75’ southeast of Pole Z272866, looking southeast

TL625B-15e – Midway between Poles Z272866 and Z272867, rilling noted near existing pole slated for removal. Pad area to be restored through Habitat Restoration Plan

TL625B-15f - Near Pole Z272867, looking southeast

TIE LINE 629E

FUSCOE
ENGINEERING

TL629E Access Road Evaluation Summary

A geographic information system desktop evaluation of Transmission Line (TL) 629E access roads was conducted by Fuscoe Engineering in order to map riparian conservation areas (RCAs), sediment-sensitive watersheds (as defined by the United States Forest Service), and other geographic properties in the area prior to conducting field investigations. In addition, SDG&E's Transmission Construction and Maintenance (TCM) team members were consulted to incorporate their observations and experiences maintaining these access roads. TCM provided feedback regarding whether there were any access road areas that experienced chronic erosion as defined in the Final Environmental Impact Report/Environmental Impact Statement (FEIR/EIS). Subsequently, Fuscoe Engineering performed access road field investigations on two occasions (April 22, 2016 and on May 23, 2016).

On the first site investigation, the condition of San Diego Gas & Electric Company (SDG&E) maintenance roads associated with TL629E between Cameron Truck Trail and Old Highway 80 was reviewed to determine locations of chronic erosion and/or drainage issues. The condition of the access roads was photo-documented, as well as the presence of best management practices, such as water bars and riprap. Areas that appeared to approach slopes greater than 15 perfect for a distance of 100 feet or greater were noted, and focus was also paid to areas located within RCAs. After the initial site investigation, an additional field survey to determine roadway slope was performed. Survey data was then reviewed to determine precise locations where roadway slopes exceeded 15 percent over a distance of 100 feet. The results of the survey data review were overlaid with field notes and photographs to develop a list of roadway reaches where additional site investigation was warranted to verify if chronic erosion and drainage issues were present.

Table 1: TL629E Access Road Evaluation Table provides a summary of the access road evaluation for TL629E. A few areas exhibited evidence of erosion at the time of the site investigation, primarily from waterbars eroding or breaching due to sediment deposition on the uphill side of the waterbar. Waterbar spacing appeared to be adequate on most of the slopes and effective outlets are available along most of the roadway segments; however, a number of waterbars were observed to have failed. Some waterbars were degraded due to the highly erodible soil type they were constructed from, while others showed signs of vehicle tire damage. It could not be determined whether the waterbars failed during one rain event or over time. Most waterbars displayed evidence that they were originally diverting water off the road as intended.Failed waterbars should be re-constructed and enhanced to increase their effectiveness of dissipating overland flow and diverting runoff. While erosion was observed, none of the access road segments evaluated met the definition of chronic erosion and drainage issues as described in the FEIR/EIS and described in the Report. Moreover, site-specific engineered solutions for TL629E were not warranted and Attachment B: Access Roads Recommendations and Repair did not need to be prepared for this portion of the Cleveland National Forest Power Line Replacement Projects. Nonetheless, erosion and sediment control structures need maintenance to function properly in the future. For this reason, recommendations for

maintenance or enhancement have been included where appropriate. These recommendations will be implemented during construction and ongoing operations and maintenance activities, as needed. Included in Table 1 are references to site photographs taken at during the site visits mentioned above. Representative site photographs are provided following Table 1.

As mentioned above, supplemental field surveys were performed on access road reaches that approached the threshold of greater than 15 percent for a distance of 100 feet. Profiles of surveys are provided in Attachment E: AutoCAD Profile Drawings of Road Segments.. Note that profiles are provided for all road reaches surveyed, some of which did not meet the threshold of greater than 15 percent for a distance of 100 feet.

Table 1: TL629E Access Road Evaluation Table

SDG&E Exclusive Use Access Road Segment Start		SDG&E Exclusive Use Access Road Segment Stop		Within Sediment-Sensitive Watershed?	Within RCA?	Exceeds 15% for More Than 100 Feet?	Exhibits Chronic Erosion and Drainage Issues?	Photo #	Profile Road Reach #	Notes
GPS Coordinates	Physical Reference	GPS Coordinates	Physical Reference							
32°43'4.68"N, 116°26'51.75"W	Entrance from Cameron Truck Trail	32°43'5.26"N, 116°26'46.67"W	430 feet east of entrance	No	Yes	N/A	No	TL629E-01	N/A	Erosion was not noted along road reach. Waterbars have been installed and are functioning as designed.
32° 43' 05.57"N, 116° 26' 39.57"W	135 feet west of Pole Z44164	32° 43' 05.45"N, 116° 26' 37.49"W	Pole Z44164	No	No	Yes	No	TL629E-02a, TL629E-02b	1	Minor rilling, approximately 4" wide and 2" deep, was noted along south side of the road. Waterbars have been installed and are functioning as designed. Sediment accumulation was noted in riprap at the downstream end of waterbars and shall be cleaned up during construction and maintained under SDG&E's operations and maintenance (O&M) program.
32° 43' 06.00"N, 116° 26' 30.33"W	270 feet east of Pole Z44165	32° 43' 06.39"N, 116° 26' 28.28"W	490 feet east of Pole Z44165	No	No	Yes	No	TL629E-03a-TL629E-03c	2	Rilling noted on/across road approximately 18" wide by 4" deep. Water bars have been installed, but have failed. The waterbar on the east end/upstream end of the road segment should be reconstructed and the rip rap at the end of the waterbar should be lowered to allow runoff to exit the roadway. An additional waterbar should be installed near the center of the reach to minimize rilling potential in the future. The waterbars should be repaired during construction and maintained under SDG&E's O&M program.
32° 43' 02.95"N, 116° 26' 03.23"W	40' west of Pole Z44170	32° 43' 02.45"N, 116° 26' 01.62"W	160 feet southeast of Pole Z44170	No	No	Yes	No	TL629E-04a, TL629E-04b	4	Erosion was not noted along road reach. Waterbars have been installed and in general are functioning properly. However, during construction, additional rip rap shall be added at the outlet of waterbars to minimize future erosion and sediment transport.
32°43'2.04"N, 116°25'54.03"W	150 feet east of spur road to Z44170 through Z44172	32°42'59.77"N, 116°25'46.95"W	La Posta Road crossing	No	Yes	N/A	No	TL629E-05a, TL629E-05b	N/A	Access road is generally flat and no erosion was noted.
32° 42' 54.44"N, 116° 25' 25.36"W	180 feet west of Pole Z44177	32° 42' 54.04"N, 116° 25' 24.00"W	60 feet west of Pole Z44177	No	No	Yes	No	TL629E-06	6	Minor rilling, approximately 6" wide and 2" deep, was noted along north side of the road. Waterbars have been installed and are functioning as designed.
32° 42' 53.10"N, 116° 25' 19.82"W	250 feet west of Pole Z44178-79	32° 42' 52.90"N, 116° 25' 18.76"W	100 feet west of Pole Z44178-79	No	No	Yes	No	TL629E-07a-TL629E-07c	7 (west portion)	Erosion was not noted along road reach. Waterbars have been installed and in general are functioning properly. Sediment accumulation was noted in riprap at the downstream end of waterbars and shall be cleaned up during construction and maintained under SDG&E's O&M program.

SDG&E Exclusive Use Access Road Segment Start		SDG&E Exclusive Use Access Road Segment Stop		Within Sediment-Sensitive Watershed?	Within RCA?	Exceeds 15% for More Than 100 Feet?	Exhibits Chronic Erosion and Drainage Issues?	Photo #	Profile Road Reach #	Notes
GPS Coordinates	Physical Reference	GPS Coordinates	Physical Reference							
32° 42' 52.63"N, 116° 25' 15.38"W	55 feet west of Pole Z44180-81	32° 42' 52.81"N, 116° 25' 14.39"W	Pole Z44180-81	No	No	Yes	No	TL629E-08a, TL629E-08b	7 (east portion)	Minor rilling, approximately 2" wide by 2" deep was noted in the center of the road, near the start of the reach at the approach to the waterbar. Waterbars have been installed and are functioning as designed.
32°42'52.90"N, 116°25'8.75"W	250 feet west of Pole Z44182-83	32°42'51.57"N, 116°24'50.70"W	420 feet southeast of Pole Z44186, intersection with non-SDG&E dirt road	No	Yes	N/A	No	TL629E-09a-TL629E-09h	N/A	Road is less steep along road reach and waterbars have been installed and are functioning as designed. Approximately 60' west of Pole Z44184, rilling was noted at outlet from waterbar riprap. Additional rock should be added to riprap during construction and maintained under SDG&E's operations and maintenance (O&M) program. Approximately 200' east of Pole Z44184, minor rilling, approximately 6" wide by 2" deep was noted along the north side of the road. Approximately 50' west of Pole Z44185, sediment accumulation was noted at outlet point from road. Riprap should be added at this location and sediment should be cleaned up during construction and maintained under SDG&E's O&M program. At the intersection with the non-SDG&E dirt road (end of the road reach), rilling/incision greater than 6" deep was noted on the west side of the road. Riprap should be added in this location to reduce potential for future erosion and maintained under SDG&E's O&M program.
32°42'50.90"N, 116°24'50.11"W	At intersection with non-SDG&E dirt road	32°42'42.18"N, 116°24'46.82"W	75 feet south of Pole Z44188	No	Yes	N/A	No	TL629E-10a-TL629E-10g	N/A	Rilling was noted along the west side of road, approximately 18 inches wide by 4 inches deep for approximately 200', and rilled area has accumulated with sediment. Sediment should be cleaned out during construction and velocity check dams should be installed within rilled area prior to heavy rain events during construction. 140 feet north of Pole Z44187, runoff crosses roadway, causing an approximate 8" wide by 4" deep rill. Surface runoff and associated rilling can be alleviated by reconstructing waterbar located near Pole Z44187. Waterbars should be maintained under SDG&E's O&M program.

SDG&E Exclusive Use Access Road Segment Start		SDG&E Exclusive Use Access Road Segment Stop		Within Sediment-Sensitive Watershed?	Within RCA?	Exceeds 15% for More Than 100 Feet?	Exhibits Chronic Erosion and Drainage Issues?	Photo #	Profile Road Reach #	Notes
GPS Coordinates	Physical Reference	GPS Coordinates	Physical Reference							
32°42'42.18"N, 116°24'46.82"W	75 feet south of Pole Z44188	32°42'34.69"N, 116°24'44.84"W	90 feet north of Pole Z44190	No	Yes	N/A	No	TL629E-11a-TL629E-11c	N/A	Minor rilling, approximately 8 inches wide by 2 inches deep noted along east side of the road between Poles Z44188 and Z44189. Approximately 75 feet south of Pole Z44189, incision of bank approximately 10" deep is occurring on the east side of the access road, at the intersection with a non-SDG&E dirt road. Riprap should be added at the location of incision during construction and maintained under SDG&E's O&M program. Approximately 120' south of Pole Z44189, minor sheet rilling, approximately 2" deep, is occurring across the road from east to west.
32°42'10.03"N, 116°23'55.65"W	Pole Z44209	32°42'9.97"N, 116°23'53.56"W	140 feet southeast of Pole Z44210-11	No	Yes	N/A	No	TL629E-12a-TL629E-12d	N/A	Erosion along the road was not noted within this road reach. However, at the waterbar located approximately 365' northeast of Pole Z44209, erosion was noted at the waterbar riprap in the form of minor rilling, approximately 2" deep, in the approach to the riprap and bank incision approximately 12" deep immediately downstream of the riprap. Additional riprap shall be added at the waterbar during construction and maintained under SDG&E's O&M program.
32° 42' 05.27"N, 116° 22' 21.95"W	Z44220	32° 42' 04.58"N, 116° 22' 21.15"W	Through gully toward Pole Z44221-22	No	No	Yes	No	TL629E-13a-TL629E-13c	17	Although the access road is quite steep in this road reach, road is comprised of rockier material which is preventing the occurrence of erosion.
32° 41' 55.90"N, 116° 21' 24.87"W	East limit of pad for Z44232	32° 41' 55.51"N, 116° 21' 23.08"W	West limit of pad for Z100145	No	No	Yes	No	TL629E-14a-TL629E-14d	21	Multiple rills noted along center of road, up to 18 inches wide by 8 inches deep. This section of roadway is slated to be removed from service and restored through implementation of the Habitat Restoration Plan.

FUSCOE
ENGINEERING

TL629E-01 - Entrance from Cameron Truck Trail looking east

TL629E-02a - Near Pole Z44164 looking west

TL629E-02b – Sediment accumulation south of Z44164, to be cleaned up during construction

TL629E-03a - 300 feet east of Pole Z44165 looking west

FUSCOE ENGINEERING

TL629E-03b - 300 feet east of Pole Z44165 looking east, rilling to be repaired and waterbar added during construction

TL629E-03c - 490 feet east of Pole Z44165 looking east, waterbar to be lowered to allow runoff to exit the roadway

TL629E-04a - 100 feet southeast of Pole Z44170 looking west

TL629E-04b – Along spur road to Pole Z44170 looking east, additional rock to be added to riprap

FUSCOE
ENGINEERING

TL629E-05a - 470 feet east of spur road to Z44170 through Z44172 looking west

TL629E-05b - 470 feet east of spur road to Z44170 through Z44172 looking east

TL629E-06 - 60 feet west of Pole Z44177 looking west, minor rilling along north side of road

TL629E-07a - 250 feet west of Pole Z44178-79 looking east

FUSCOE ENGINEERING

TL629E-07b - 135 feet west of Pole Z44178-79 looking west

TL629E-07c - 100 feet west of Pole Z44178-79, sediment accumulation in riprap to be cleaned out

TL629E-08a - 55 feet west of Pole Z44180-81 looking east, minor rilling across the road

TL629E-08b - Near Pole Z44180-81 looking east

FUSCOE
ENGINEERING

TL629E-09a - Near Pole Z44182-83 looking east

TL629E-09b – 60 feet west of Pole Z44184 looking west

TL629E-09c – 60 feet west of Pole Z44184, rilling at outlet from riprap

TL629E-09d – 100 feet east of Pole Z44184 looking east

FUSCOE
ENGINEERING

TL629E-09e - 200 feet east of Pole Z44184 looking west, minor rilling along north side of the road

TL629E-09f - 50 feet east of Pole Z44185 looking west, sediment accumulation at outlet point from road

TL629E-09g - 280 feet east of Pole Z44185 looking east

TL629E-09h - 420 feet southeast of Pole Z44186 looking west, incised area at intersection with dirt road, riprap to be added

FUSCOE ENGINEERING

TL629E-10a - 130 feet south of intersection with non-SDG&E dirt road looking north, sediment accumulation within rilled area at west side of road. Sediment to be cleaned out, velocity check dams to be added

TL629E-10b - 130 feet south of intersection with non-SDG&E dirt road looking south

TL629E-10c - 140 feet north of Pole Z44187 looking north

TL629E-10d - 140 feet north of Pole Z44187 looking south, runoff causing rilling across the road. Would be alleviated by improvement/repair to waterbar upstream

FUSCOE
ENGINEERING

TL629E-10e - 195 feet south of Pole Z44187 looking north

TL629E-10f - 55 feet north of Pole Z44188 looking north

TL629E-10g - 80 feet south of Pole Z44188 looking north

TL629E-11a - 80 feet south of Pole Z44188 looking south

FUSCOE
ENGINEERING

TL629E-11b - 220 feet north of Pole Z44189 looking south

TL629E-11c – Incised area near intersection with dirt road 75’ south of Pole Z442189, riprap to be added to incised area

TL629E-12a - Near Pole Z44209 looking northeast

TL629E-12b – 330 feet northeast of Pole Z44209 looking southwest

FUSCOE
ENGINEERING

TL629E-12c – 330 feet northeast of Pole Z44209 looking northeast

TL629E-12d – Waterbar 365 feet northeast of Pole Z44209, rilling and incision noted. Riprap to be added

TL629E-13a – 60 feet north of Pole Z44220 looking east at entrance toward gully

TL629E-13b – 130 feet east of Pole Z44220 looking southeast into gully

FUSCOE
ENGINEERING

TL629E-13c – 180 feet east of Pole Z44220 looking southeast up from gully

TL629E-14a – East limit of pad for Pole Z44232 looking east into gully

TL629E-14b – 115 feet east of Pole Z44232 looking west into gully

TL629E-14c – 115 feet east of Pole Z44232 looking east

TL629E-14d – 70 feet west of Pole Z100145 looking west

ATTACHMENT B: ACCESS ROAD RECOMMENDATIONS AND REPAIR

ATTACHMENT B: ACCESS ROAD RECOMMENDATIONS AND REPAIR

The following data sheets provide recommendations for access road repair, as identified in Attachment A: Access Road Evaluation by Transmission Line. For each data sheet, the following information is provided:

- the location along the access road's "reach" that is experiencing chronic erosion and drainage issues;
- a description of how this area met evaluation criteria identified in Mitigation Measure HYD-4;
- an evaluation of potential solutions; and
- a final recommendation.

TIE LINE 625B

Based on the evaluation provided in Attachment A: Access Road Evaluation by Transmission Line, the current drainage patterns observed on San Diego Gas & Electric Company (SDG&E) access roads used for Tie Line (TL) 625B include outlets that allow runoff to exit the road at regular frequencies. The current maintenance practices, which include waterbars with rock energy dissipaters, appear to be the appropriate best management practice (BMP). Therefore, no additional recommendations or engineered solution is proposed for the access roads on TL 625B.

TIE LINE 629E

Based on the evaluation provided in Attachment A: Access Road Evaluation by Transmission Line, the current drainage patterns observed on SDG&E access roads used for TL 629E include outlets that allow runoff to exit the road at regular frequencies. The current maintenance practices, which include waterbars with rock energy dissipaters, appear to be the appropriate BMP. Therefore, no additional recommendations or engineered solution is proposed for the access roads on TL 625E.

ATTACHMENT C: USFS HANDBOOK REFERENCES

ATTACHMENT C: USFS HANDBOOK REFERENCES

Best management practices (BMPs) from Chapter 10 (*Water Quality Management Handbook*) of the United States Forest Service (USFS) Handbook 2509.22 (*Soil and Water Conservation Handbook*) will be implemented in the performance of repair recommendations. The following BMPs will be implemented and include excerpts from Chapter 10.

BMP 2.3 – Road Construction and Reconstruction

A Storm Water Pollution Prevention Plan (SWPPP) will be developed for the Cleveland National Forest Power Line Replacement Projects (Project) in accordance with State Water Resources Control Board Order No. 2009-0009-DWQ, and a Notice of Intent to enroll under the Construction General Permit will be submitted.

BMP 2.4 – Road Maintenance and Operations

San Diego Gas and Electric Company (SDG&E) currently maintains the access roads under consideration in accordance with the document entitled *Best Management Practice for Drainage Control Guidance Manual for Maintenance Roads* (2010). Access roads are maintained to ensure safe and reliable access to SDG&E facilities. The maintenance program employed by SDG&E has the additional benefit of preventing erosion on the majority of the company's roads. This attachment includes details for structural BMPs that are typically employed by SDG&E during scheduled maintenance and that will be implemented during the repair of access roads under consideration. The following standard BMPs will be implemented:

- 2.2.1 – Waterbars (also per the United States Department of Agriculture drawing for Earthen Waterbar)
- 2.2.2 – Velocity Dissipation Measures
- 2.2.5 – Earth Dikes and Drainage Ditches

BMP 2.13 – Erosion Control Plan

Prior to the start of construction, a SWPPP will be prepared for the Project, which will include an Erosion Control Plan to ensure runoff management during construction.

BMP 7.1 – Watershed Restoration

In locations where portions of access roads, spur roads, or maintenance pads will be removed from service, roads and pads to be removed from service will be restored per the Project's Habitat Restoration Plan.

12.21 Exhibit 03
BMP 2.3 - Road Construction and Reconstruction

Objective: Minimize erosion and sediment delivery from roads during road construction or reconstruction, and their related activities.

Explanation: During road construction and reconstruction activities, vegetation and ground cover are removed, often exposing both the surface and subsurface soil to erosion. Temporary and long-term erosion-control measures are necessary to reduce erosion and maintain overall slope stability. These erosion-control measures may include vegetative and structural techniques to ensure the area's long-term stability. The risk from road construction and reconstruction activities can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation: Enforcement of the techniques is the responsibility of the inspector and contracting officer's representative for public works contracts, the inspector and engineering representative for timber sale roads, and the permit administrator for roads constructed or reconstructed under administrative operations (that is, Road Use Permit, Special Use Permit, and so forth). If roads are constructed or reconstructed by force account crews, the project manager and foreman are responsible for adherence to project drawings, specifications, and erosion control plan.

1. Implement the approved erosion control plan that covers all disturbed areas, including borrow areas and stockpiles used during road management activities (see BMP 2.13- Erosion Control Plan). Include the forest's wet weather operations standards (WWOS).

2. Maintain erosion-control measures to function effectively throughout the project area during road construction and reconstruction, and in accordance with the approved erosion control plan (see BMP 2.13- Erosion Control Plan).

3. Set the minimum construction limits needed for the project and confine disturbance to that area.

4. Locate and designate waste areas before operations begin.

   a. Deposit and stabilize excess and unsuitable materials only is designated sites.

   b. Do not place such materials on slopes with a high risk of mass failure, in areas subject to overland flow (for example, convergent areas subject to saturation overland flow), or within the SMZ.

   c. Provide adequate surface drainage and erosion protection at disposal sites.

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

d. Comply with BMP 2.5 - Water Source Development and Utilization.

5. Comply with BMP 2.11 - Equipment Refueling and Servicing.

6. Do not permit sidecasting within the SMZ. Prevent excavated materials from entering water ways or SMZs.

7. Develop and follow blasting plans to move materials when necessary.

a. To the extent possible, restrict blasting in sensitive areas and those sites with high landslide potential.

b. Restrict blasting after intense storms when soils are saturated.

c. Prevent damage from fly rock and overshot by not overloading shots, installing blasting mats, or avoiding setting charges through variable rock strata.

8. Schedule operations when rain, runoff, wet soils, snowmelt or frost melt are less likely. Follow seasonal restrictions of the forest's WWOS, and notification protocols, as outlined in an approved erosion control plan.

a. Optimally, schedule construction during dry periods, while still adhering to other seasonal restrictions (wildlife breeding, spawning, fire activity levels, and so forth), consistent with local ordinances.

b. Stabilize project area during normal operating season when the National Weather Service predicts a 30 percent or greater chance of precipitation, such as localized thunderstorm or approaching frontal system.

c. Keep erosion-control measures sufficiently effective during ground disturbance to allow rapid closure when weather conditions deteriorate.

d. Complete all necessary stabilization measures prior to predicted precipitation that could result in surface runoff.

9. To the extent possible, construct new stream crossings when streams are dry or when stream flow is at its lowest. Install sediment controls.

10. Comply with BMP 2.8- Stream Crossings.

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

11. Limit operation of equipment when ground conditions could result in excessive rutting, soil compaction (except on the road prism or other surface to be compacted), or runoff of sediments directly to streams.

12. On slopes greater than 40 percent, the organic layer of the soil shall be removed prior to fill placement, according to project specifications.

13. Waste organic material, such as uprooted stumps, cull logs, accumulations of limbs and branches, and unmerchantable trees, shall not be buried in logging road or landing fills. Dispose of waste organic material according to project specifications, in locations designated for waste disposal. Assure compliance with the project erosion control plan.

14. Construct fills and keyways according to design drawings and specifications, not exceeding specified lift thickness and moisture content. Ensure uncompacted materials are prevented from leaving disturbance limits.

15. Stabilize all disturbed areas with mulch, erosion fabric, vegetation, rock, large organic materials, engineered structures, or other stabilization measures according to the Erosion Control Plan, and project specifications and drawings for permanent controls (that is, crib walls, gabions, riprap placement, and so forth).

16. Scatter construction-generated slash on disturbed areas to help control erosion.

a. Ensure ground contact between slash and disturbed slopes.

b. Windrow slash at the base of fill slopes to reduce sedimentation.

c. Ensure that windrows are placed along the contour and that there is ground contact between slash and disturbed slope.

17. Remove large limbs and cull logs to designated sites outside the SMZ or relocate within the SMZ to meet aquatic resource management objectives.

18. Monitor contractor’s plans and operations to assure contractor does not open up more ground than can be substantially completed before expected winter shutdowns, unless erosion-control measures are implemented.

19. If snow/rainy season operations are proposed, specifications for snow/ice depth or soil operability conditions must be described. Include these specifications in the erosion control plan (see BMP 2.13- Erosion Control Plans).

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

20. Install erosion-control measures on incomplete roads prior to precipitation events or the start of the winter period (November 16 through March 31) and in accordance with the approved erosion control plan:

a. Remove ineffective temporary culverts, culvert plugs, diversion dams, or elevated stream crossings, leaving a channel at least as wide as before construction and as close to the original grade as possible.

b. Install temporary culverts, side drains, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, dikes, debris racks, pipe risers, or other facilities needed to control erosion.

c. Remove debris, obstructions, and spoil material from channels, floodplains, and riparian areas.

d. Do not leave project areas for the winter with remedial measures incomplete.

e. Plant vegetation, mulch, and amendments, or provide other protective cover for exposed soil surfaces.

21. When pioneer roads are necessary:

a. Confine construction of pioneer roads to the planned roadway limits unless otherwise specified or approved.

b. Locate and construct pioneering roads to prevent undercutting of the designated final cut slope.

c. Avoid deposition of materials outside the designated roadway limits.

d. Dewater live streams where crossed by pioneer roads with appropriate diversion devices.

e. Accommodate drainage with adequate temporary crossings.

12.21 Exhibit 04
BMP 2.4 - Road Maintenance and Operations

Objective: To ensure water-quality protection by providing adequate and appropriate maintenance and by controlling road use and operations.

Explanation: Appropriate maintenance and control of road use and operations can protect water quality, aquatic and riparian resources, and capital investments. Maintenance needs and operational controls are informed by periodic inventory and assessment that determine road condition and the potential impacts the road has on water quality.

Properly designed and maintained road surfaces and drainage systems can reduce adverse effects to water resources by facilitating natural hydrologic function. Roads and drainage systems normally deteriorate because of traffic, weather, and effects of maintenance. In addition, roads occasionally become saturated by new groundwater springs and seeps after a wildfire or unusually wet periods. Many such conditions can be corrected by timely maintenance. However, while routine maintenance may be needed to ensure the road performs as designed, it can also be a source of soil disturbance and therefore, sediment production. In particular, the grading of inside ditches and road surfaces can significantly increase sediment production rates. Less aggressive maintenance may be desired to minimize disturbance of stable sites.

Road management objectives include the level and type of maintenance that a road is expected to receive. Assigned road maintenance levels vary from 1 to 5, and are directly linked to the operational objectives for the road. Maintenance Level 1 is assigned to roads closed to all motorized vehicles for a year or more; they should be left in a stable condition, and by definition, require less maintenance. Maintenance Levels 4 and 5 are assigned to roads that are typically double-lane, aggregate-surfaced or paved, and passenger vehicle traffic is “encouraged.” They are well maintained to provide a moderate to high degree of user comfort and convenience.

Operational objectives and activities are also defined by the road management objectives, and depend upon the amount of maintenance a road is expected to receive. Road operations also include permit, contract, and agreement administration, control of seasonal use, sustaining roads in closed status and revising maintenance levels and seasonal closures, as needed. Road closures and restrictions are necessary because many forest roads are designed for dry-season use. Most local roads are not surfaced, while others have some surfacing or spot stabilization. Roads without stabilized surfaces or adequate base can be damaged by use during wet periods or by loads heavier than the road was designed to convey.

Road maintenance plans are implemented through contract, cooperators, force account, and active timber sale or other authorized activities. Contract, timber sale, and other authorized or permitted operations are bound by specifications and drawings. BMPs are incorporated as specifications, contract or sale clauses, operating plan requirements, permit clauses, and are often

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

shown in the drawings. The contracting officer's representative is responsible for assuring compliance by contractors; engineering representative, TSA, or FSR assures compliance by cooperator, purchaser or permitted operator. Project manager and crew supervisor assures compliance for force account work. Optimally, the forest hydrologist works with the forest quality assurance personnel to determine if approved maintenance tasks are completed with minimal resource impacts. Adjustments to future maintenance plans and methods are considered when previous methods do not provide the needed protection to water quality.

Risk from road maintenance activities can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation

Inspection:

1. Periodically inspect system travel routes to assess condition and linkage to water quality. This information assists in setting maintenance and improvement priorities.

   a. Provide training to the engineering personnel performing condition surveys to successfully identify and assess linkage to water quality.

   b. Conduct condition surveys jointly with engineering and hydrology personnel, to more accurately assess potential of road to impact water quality.

   c. Prioritize inspections to roads at high risk of failure, followed by road segments that are hydrologically connected to the stream network, to reduce risk of diversions and cascading failures.

   d. Identify diversion potential on roads, and prioritize for treatment.

2. Inspect drainage structures and runoff patterns after major storm events and snowmelt, and perform any necessary maintenance. Major storm events include all storm events for which the National Weather Service issues a local flood watch, advisory, or warning.

   a. Determine the extent of hydrologic connectivity during and/or just after major storm events, including the connectivity of disturbed areas directly adjacent to the road network. Use this information to prioritize and plan improvements to road drainage.

   b. Immediately clean out, repair or reconstruct waterbars, inside ditches, culverts, and other features that are not functioning in order to hydrologically disconnect roads

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

from surface waters and prevent discharges of sediment andother pollutants to water bodies.

3. Regularly inspect roads during all operations.

4. Keep roads closed to public use, but open for administrative use, in hydrologically functional condition. If waterbars are breached, forest personnel will promptly repair them.

5. Encourage field personnel of all disciplines to observe road deterioration or damage commensurate with travel to field activities, and report to engineering, for immediate action, if necessary.

a. Restrict operations if impact or imminent threat of impact to water quality is occurring.

b. Consider restricting operations if road damage such as surface displacement or active rutting is occurring.

Maintenance Planning:

1. Incorporate the forest's Wet Weather Operations Standards and notification protocols in maintenance and operations.

2. Develop and implement an erosion control plan commensurate with the complexity and scale, and duration of the activity. See BMP 2.13.

3. Develop and implement annual maintenance plans that prioritize road maintenance work for the forest or district.

a. Include roads identified as needing maintenance from field condition surveys, and roads identified through roads analysis and travel analysis that negatively impact water quality.

b. Determine method of accomplishment (contract, force account, permit, and cooperative) and define responsibilities and maintenance timing in the plan.

4. Planning for emergency interim/temporary erosion controls to protect water quality is considered for roads that may require immediate maintenance, but are beyond capability of annual maintenance plan.

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

5. Identify roads with potential to improve water quality by modifying road prism and drainage patterns through maintenance operations.

a. Analyze roads in an interdisciplinary manner to identify other impacts that may occur due to changes in road prism or drainage patterns. Consider local conditions and site characteristics.

b. Implement diversion potential method per Forest Service Publication 9777.1814P-SDTDC Diversion Potential at Road-Stream Crossings.

c. Consider user safety and protection of other forest resources.

d. Provide training and reference materials for forest road managers, road maintenance operators, and road maintenance contract preparation personnel to work with hydrologists in identifying appropriate roads for revised maintenance procedures.

6. Evaluate road management objectives when an inspection indicates road design is not meeting current transportation and/or resource needs. Road management objectives support forest LRMP prescriptions.

Maintenance Activities:

1. Maintain road surfaces to dissipate intercepted water in a uniform manner along the road by outsloping with rolling dips, insloping with drains, or crowning with drains. Where feasible and consistent with protecting public safety, utilize outsloping and rolling the grade (rolling dips) as the primary drainage technique.

2. Adjust surface drainage structures to minimize hydrologic connectivity by:

a. Discharging road runoff to areas of high infiltration and high surface roughness.

b. Armoring drainage facility outlet as energy dissipater and to prevent gully initiation.

c. Increasing the number drainage facilities with SMZs.

3. Clean ditches and drainage structure inlets only as often as needed to keep them functioning. Prevent unnecessary or excessive vegetation disturbance and removal on features such as swales, ditches, shoulders, and cut and fill slopes.

4. Minimize diversion potential by installing diversion prevention dips that can accommodate overtopping runoff.

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

a. Place diversion prevention dips downslope of crossing, rather than directly over the crossing fill, and in a location that minimizes fill loss in the event of overtopping.

b. Armor diversion prevention dips when the expected volume of fill loss is significant.

5. Address risk and consequence of future failure at the site when repairing road failures. Use vegetation, rock, and other native materials to help stabilize failure zones.

6. Maintain road surface drainage by removing berms, unless specifically designated otherwise.

7. Install and preserve markers to identify and protect drainage structures that can be damaged during maintenance activities (that is, culverts, subdrains, and so forth)

8. When grading roads or cleaning drainage structure inlets and ditches, avoid undercutting the toe of the cut slope.

9. Grade road surfaces in accordance with road management objectives and assigned maintenance level. Grade only as needed to maintain a stable running surface and adequate surface drainage.

10. Accompany grading of hydrologically connected road surfaces and inside ditches with erosion and sediment control installation.

11. Identify additional road maintenance measures to protect and maintain water; aquatic, and riparian resources including: surfacing and resurfacing, outsloping, dips and cross drains, armoring of ditches, spot rocking, replacing culverts, and installing new drainage features.

12. Effectively maintain roads in storage to eliminate all motorized vehicle use. Maintain physical closure devices, if present, to be safe and effective. For roads where physical closure methods are not feasible, install signing to inform of road closure.

13. Enforce pre-haul maintenance, maintenance during haul, and post haul maintenance (putting the road back in storage) specifications when maintenance level 1 roads are opened for use on commercial resource management projects. Require the commercial operator to leave roads in a satisfactory condition when project is completed.

14. Opened for use on commercial resource management projects. Require the commercial operator to leave roads in a satisfactory condition when project is completed.

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

Operations:

1. Restrict or prohibit road use during periods when such use would likely damage the roadway surface or road drainage features are identified through Travel Analysis and Travel Management, and implement through enforcement of motor vehicle use map. Changes in road management are supported by appropriate analysis. Follow the forest's WWOS. See BMP 2.13.

2. Require users to obtain permit(s) when proposed operations involve use of roads by vehicles larger than the design vehicle, or beyond typical operation period or season of use (that is, timber purchasers, mining operations, oversize vehicle movement, and so forth. Conditions of the permitted use may require:

   a. Strengthening the road surface by adding rock, dust palliatives, pavement, or armor, particularly in areas where surfaces are vulnerable to movement such as corners and steep sections.

   b. Considering short-term road surface stabilization by dust abatement methods, such as watering.

   c. Upgrading drainage structures.

   d. Restricting use to low-ground-pressure vehicles or frozen ground conditions.

   e. Strengthening the road base if roads are tending to rut.

   f. Using a base course of rock and/or geotextile fabric to provide subsurface stability.

   g. Intensifying maintenance to handle the traffic without creating excessive erosion and damage to the road surface.

   h. Repairing damage to road and forest resources associated with use by permittee.

   i. Restoring the road to original standard of features, such as restoring waterbars.

3. To the extent possible, ensure drainage features are fully capable of preventing pollutant discharges to surface waters before the start of the local winter season (such as November 16 to March 31) or before the start of runoff-inducing precipitation events.

4. Permits to oversize or overweight loads require that damage by such loads be repaired by the permit holder. Damage includes impacts to water quality.

5. Cooperative maintenance agreements follow Forest Service direction for use, maintenance, repairs, and responsibilities.

6. Roads under easement are subject to terms of conditions for operation and maintenance.

12.21 Exhibit 13
BMP 2.13 - Erosion Control Plan

Objective: Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.

1. Provide seamless transition between planning-level (NEPA) mitigation descriptions and on-the-ground implementation of erosion-control measures tailored to site conditions.

2. Ensure that all disturbance-related mitigation requirements and provisions for field revisions or modifications are accurately captured in one comprehensive document for each project or activity.

3. Activities include, but are not limited to: timber sale harvest; facility site, road, bridge, trail and appurtenance construction, reconstruction, and maintenance; watershed improvement; road and trail decommissioning; legacy site restoration, administratively permitted activities; and vegetation and fuels management activities.

4. Comply with overarching area plans, such as Northwest Forest Plan and Sierra Nevada Framework Plan Amendment.

Explanation: Ground-disturbing activities can result in erosion and sedimentation. By effectively planning for erosion control, sedimentation can be controlled or prevented. Engineering and hydrology personnel jointly develop mitigation recommendations and preliminary BMPs using an interdisciplinary team during the project planning process and environmental analysis phase. Erosion control plans are not be confused with design features whose primary objective is to provide or improve water quality, such as a bridge; reinforced earth retaining wall; or landscaping. The long-term mitigation objectives are typically described in the NEPA document for the project, and then refined in project drawings and specifications as design features. Short-term mitigation measures to prevent erosion and sedimentation are described in detail in the project's erosion control plan.

Project mitigations are conceptually described in NEPA analyses but are typically generic. Detailed mitigation measures are based on site-specific surveys, conditions, and characteristics, and are developed in the project design phase. They are ultimately displayed in the project document's design documents (specifications and drawings) based on site-specific surveys, conditions, and characteristics. Furthermore, field personnel have the responsibility to make refinements or additional recommendations to adjust to actual current and predicted future conditions.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

This flexibility is a necessary and desirable component of project implementation, but must ultimately result in implementation of requirements to protect soil and water quality. To ensure

that all required and relevant mitigation measures are documented and implemented, an environmental control plan will be prepared to complement design (design addresses required mitigations specified in NEPA documents), site-specific prescriptions, and amended to include changes made in the field. Detailed and accurate environmental control plan will allow Forest Service and Water Board staff to conduct efficient, meaningful inspections of ground-disturbing projects, and will provide a needed check to ensure that mitigation measures for addressing impacts from the activities are accurately communicated to field staff.

Implementation: Ground-disturbing activities will be exempt from the requirement to prepare an erosion control plan under any of the four exemption categories below:

1. Area-based - less than 50 square feet in riparian area; less than 10,000 square feet in a non-riparian area;

2. Activity-based - activities conducted under a categorical exclusion with no wheeled or tracked equipment, or included under North Coast Regional or State waiver Category A;

3. Site-condition criteria - project locations that are: outside of riparian areas and on soils with high infiltration rates (more than 2 inches per hour) and on slopes less than 15 percent.

4. Flexibility criteria - any activity approved by the forest hydrologist with documentation explaining the rationale for the exemption.

BMP checklists will be prepared for all projects (see section 16) even if an erosion control plan is not necessary.

Erosion control plans for any ground-disturbing activity not meeting the exemption categories above will be reviewed and recommended by the forest hydrologist, and approved and signed by the District Ranger. The hydrologist's recommendation and signature indicates that all mitigation measures prescribed in environmental documents and project plans, or resource specialist's recommendations are included on the environmental control plan. The Forest Supervisor will approve and sign the environmental control plan for forestwide ground-disturbing activities, such as annual road maintenance.

All forests shall develop wet weather operations standards (WWOS). The purpose of the WWOS is to provide guidance with the end result of preventing significant adverse impacts to water quality from wet weather operations on NFTS roads and trails. Such operations may include

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

winter hauling, fuelwood gathering, public access for hunting or Christmas tree cutting, administrative access on closed roads for springtime burning of slash piles, reforestation activities, snow plowing, or other ground disturbance outside normal operating season. WWOS must include notification protocols for informing resource specialists (hydrologists, biologists,

soil scientists) as well as line officers prior to initiation or continuation of a project or activity into wet weather season.

Project field operations cannot begin until the District Ranger approves and signs the plan. The erosion control plan will be kept on site during project activity and made available for review upon request of a representative of the Water Board or any local storm water management agency which receives the storm water discharge. The erosion control plan shall be amended if there is a change in control practices, site conditions, or BMPs that may result in less water-quality protection than specified in the project's environmental document, project plan, accepted erosion control plan, or permit/waiver. The amendment must include: name of person requesting the change; a description of the change, including revised BMPs or control practices to mitigate the effects of the change; and why the change is needed.

Even the best erosion and sediment control plan cannot cover the specifics of each situation that will arise on a site during the life of a project. All parties involved in the project have a role and responsibility to ensure the activity complies with the goals or intent of the erosion control plan at all times. All temporary erosion and sediment control practices must be maintained and repaired as needed to assure continued performance of their intended function.

Erosion Control Plan Contents

1. Erosion and Sediment Control shall include:

   a. List of anticipated ground-disturbing actions associated with the project (for example, stream diversion; exposed cut slopes; stripped and stockpiled topsoil; water source development or use)

   b. Checklist which includes mitigation measures required by project NEPA, and in some cases CEQA documents, requirements to meet BMPs, project plans, specifications, and permits, if any. The selection of erosion and sedimentation control measures shall be based on assessments of site conditions and how storm events may contribute to erosion. Control measures will be selected from the references provided in the On-Line Library at the end of section 12, or will be of equivalent effectiveness as the measures described in those references.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

c. Illustrations of control practices designed to prevent erosion and sedimentation. Illustrations must show construction and installation details for control practices, and must be included in the erosion control plan. (for example, California Stormwater Quality Association BMP standard specifications CASQA at http://www.cabmphandbooks.com, or Caltrans Stormwater and Water Pollution Control guides at http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm)

d. Map/drawing(s) showing soil or water buffer zones, RCAs, RCHAs, SMZs or other soil or water protection areas to be protected from project activities. Project boundary extends beyond disturbance limits.

e. A description of the color and/or pattern of flagging or marking for soil or water buffer zones, RCAs, RCHAs, SMZs or other soil or water protection areas for each unit.

f. Relevant sections from the forest's WWOS that apply to activity/activities. The WWOS will provide guidance to prevent significant adverse impacts to water quality from wet weather operations on NFTS roads and trails.

i. Forest motor vehicle use map will be used to determine seasonal closures for all NFTS routes that are not under permit or for administrative use only.

(1) A storm preparedness plan that describes additional control practices to be implemented when the National Weather Service predicts a 50 percent or greater chance of precipitation.

(2) A winterization plan that describes additional control practices to be implemented to stabilize the site during periods of seasonal inactivity. The dates vary by locality, and may be determined by the individual RWQCB (for example, October 15 through May 1). "Winterized" means that the site is stabilized to prevent soil movement permanently if project activities are complete, or temporarily in a manner which will remain effective until end of the stabilization period.

(3) If winter activity, including over-snow operation is proposed, specifications for snow/ice depth or soil operability conditions must be described.

g. Control practices to reduce the tracking of sediment onto paved roads. These roads will be inspected and cleaned as necessary.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

h. Control practices to reduce wind erosion and control dust.

i. A proposed sequential schedule to implement erosion and sediment control measures, in addition to the general construction schedule.

j. Location information, including directions to access the project area. Include a scaled map, with road names/numbers.

k. Contact information of project personnel, including name and cell phone number (that is, sale administrator, contracting officer's representative, project manager, project supervisor, contractor, site superintendent, hydrologist, permit administrator and so forth)

2. Maps requirements: Maps must be clear, legible, and of a scale such that depicted features are readily discernable. For example, sale area maps may be used to satisfy the mapping requirements outlined in b.ii, below, if they meet this intent.

a. As a means of determining BMPs and erosion control measures, a topographic map should be in the project file. The map should extend beyond the boundaries of the project site, showing the project site boundaries, and surface and subsurface water bodies (ephemeral and intermittent waters, springs, wells, and wetlands) that could be at risk of water-quality impacts from project activities.

b. For timber harvest activities, unit-specific map(s) shall be scaled no smaller than 1 inch equals 1,000 feet (1:12,000). For all other activities, maps shall be scaled to provide legible interpretation of requirements shown above. All maps shall include:

(1) Specific locations of storm water structures and controls used during project activities.

(2) Erosion hazard ratings for each unit, specified down to 20 acres if different EHRs exist within each unit.

(3) Locations of existing and proposed haul roads, watercourse crossings, skid trails, and landings.

(4) Locations of post-project storm water structures and controls.

(5) Equipment access, storage, and service areas.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

3. Diversion of Live Streams: If the project involves stream diversions for crossing construction, the erosion control plan must include detailed plans for these activities, including storm contingencies. See BMP 2.8 - Stream Crossings.

4. Non-Storm Water Management:The erosion control plan shall include provisions which eliminate or reduce the discharge of materials other than storm water to the storm sewer system and/or receiving waters. Such provisions shall ensure that discharged materials shall not have an adverse effect on receiving waters. Materials other than storm water that are discharged shall be listed, along with the estimated quantity of the discharged material.

5. Waste Management and Disposal: The erosion control plan shall describe waste management and disposal practices to be used at the project site. All wastes (including equipment and maintenance waste) removed from the site for disposal shall be disposed of in a manner that is in compliance with Federal, State, and local laws, regulations, and ordinances. Include plan for project-specific activities that produce waste products, such as concrete truck/chute/pump washout, equipment servicing, equipment washing, and so forth.

6. Maintenance, Inspection, and Repair: The erosion control plan shall include inspection, maintenance and repair procedures to ensure that all pollution-control devices identified in the erosion control plan are maintained in good and effective condition and are promptly repaired or restored. A qualified person shall be assigned the responsibility to conduct inspections. The name and telephone number of that person shall be listed in the erosion control plan. A tracking and follow-up procedure shall be described to ensure that all inspections are done by trained personnel and that adequate response and corrective actions have been taken in response to the inspection. This procedure may be in the form of a written checklist, with inspections signed and dated. Photo documentation is encouraged.

7. Other Plans: This erosion control plan may incorporate, by reference, the appropriate elements of other plans required by local, State, or Federal agencies. A copy of any requirements incorporated by reference shall be kept in the project file.

8. Post-Project Storm Water Management: The erosion control plan shall describe the storm water control structures and management practices that will be implemented to minimize pollutants in storm water discharges after project activity phases have been completed at the site. It shall also specify controls to be removed from the activity site(s) and methods for their removal. The discharger must consider site-specific factors and

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

seasonal conditions when designing the control practices that will function after the project is complete.

9. Preparer: The erosion control plan shall include the title and signature of the person responsible for preparation of the erosion control plan, the date of initial preparation, and the person and date responsible for any amendments to the erosion control plan.

10. Template: The Forest Service will develop sample templates for erosion control plans based on activity type. Complexity of the template will be commensurate with the degree of risk to impact water quality by the activity.

12.71 Exhibit 01
BMP 7.1 - Watershed Restoration

Objective: To repair degraded watershed conditions, and improve water quality and soil stability.

Explanation: Watershed restoration is a corrective measure to:

1. Improve ground cover density;
2. Improve infiltration;
3. Prevent excessive overland runoff and conserve the soil resource;
4. Stabilize stream banks and stream channels;
5. Improve soil productivity;
6. Reduce flood occurrence and flood damage;
7. Enhance economic, social and/or aesthetic values of the watershed; and
8. Improve overall watershed function.

The following factors will be considered during development of restoration projects: predicted changes in water quality and any direct or indirect impacts on the beneficial uses of water, downstream values, site productivity, and threats to life and property.

Watershed restoration measures will reflect the state-of-the-art and must be chosen to custom fit the unique hydrological, physical, biological, and climatic characteristics of each watershed. Examples of watershed-restoration measures are check dam installation, streambank and channel stabilization structures, soil scarification, and seeding and planting.

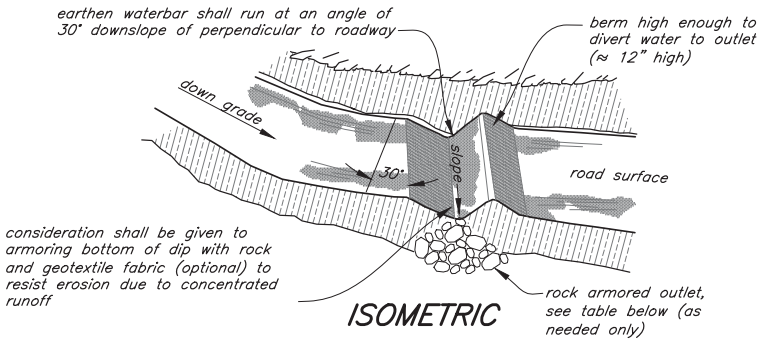
Implementation: This management practice is implemented through the development of a Watershed Improvement Needs (WIN) inventory, identification of projects, preparation and approval of restoration plans and related environmental documentation, and the funding and implementation of the restoration actions.

The Forest Supervisor ensures that a WIN inventory is completed and identified restoration projects prioritized (the current USFS data base for documenting watershed improvement projects is the USFS NRM WIT data base)..

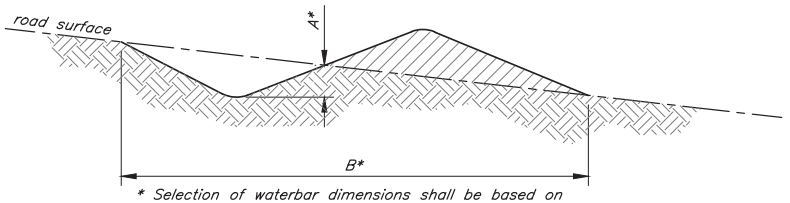
12.71 Exhibit 01--Continued
BMP 7.1 - Watershed Restoration

Planning will be through an interdisciplinary team effort. Multifunctional funding of projects will be pursued where improvement of watershed conditions will benefit multiple resource areas and/or where causal actions of deteriorated conditions can be identified.

The actual work will be done by force account or through contract. Effectiveness of the restoration measures used will be monitored by project proponents. Physical, hydrological, biological, or aquatic indicators of deteriorated conditions will be the focus of the monitoring effort.



ISOMETRIC



* Selection of waterbar dimensions shall be based on minimum vehicle clearance requirements for road users. See Recommended Waterbar Dimension Table below.

PROFILE

DESIGN CRITERIA

Minimum Spacing _____(ft)

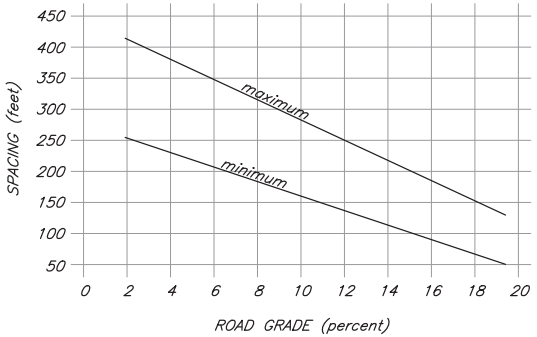
Water Bar A _____(ft) Water Bar B _____(ft)

Rock Armoring _____(Y/N) if yes, see Table 1 below

Volume of Rock Armoring _____(yd^3)

1. MINIMUM SPACING OF EARTHEN WATERBARS

*Additional earthen waterbars may be needed based on site-specific considerations as determined by a qualified NRCS Representative



$$EQ\ \#1 = \frac{400}{slope\ \%} + 100\ ft$$

TABLE 2. ROCK ARMORING GRADATION FOR EARTHEN WATERBAR OUTLETS

Size of stone (inches)	Range D_{50} (inches)	Percent of total weight smaller than the given size
1.5 to 2.0 x D_{50}	8 to 12	100
1.3 to 1.8 x D_{50}	7 to 10	85
1.0 to 1.5 x D_{50}	4 to 6	50
0.3 to 1.5 x D_{50}	2 to 3	15

NOTES:

1. Earthen waterbars are for light use roads only.
2. The landowner is responsible for procuring and complying with all permits and easements, including all Federal, State and local requirements. The landowner is also responsible for insuring that all work done on access roads that join state or county roads shall be in compliance with the requirements for these roads.
3. All construction operations shall be carried out in such a manner that potential erosion, air and water pollution are minimized. Work shall be performed in accordance with CS-OR-001, Clearing, CS-OR-002, Clearing and Grubbing and CS-OR-005, Pollution Control.
4. Minimum spacing of waterbars shall be determined using EQ #1 or graph. Additional spacing may be needed based on site-specific considerations. When a road is within 25 feet of a stream and runs parallel to a stream for more than 300 feet, decrease spacing (as specified by EQ #1 or graph) by a minimum of 25 percent.
5. Where a road is grading down towards a stream, locate the last waterbar at about 10 to 30 feet from stream (depending upon filtering capability at the outlet). Place the next waterbar upgrade at 75 percent of the spacing guide value.
6. If road has drainage ditch, extend waterbar to intercept the runoff.
7. Protect outlet area of waterbar with riprap, stone, or appropriate vegetative cover.
8. Inspect waterbars after each major runoff event and provide maintenance as needed to maintain proper drainage. See Practice Standard 560 Operation & Maintenance for additional guidance.
9. All waterbars shall begin at the intersection of the roadbed and cut slope and shall extend the entire width of the roadbed. They shall be installed at an angle of 30° downslope of perpendicular to direction of road.
10. Vegetated outlets shall be maintained with adequate cover. Reseed and mow as needed per Practice Standard 342, Critical Area Planting.
11. All waterbars shall have free flowing outlets and shall be armored at outlet. See Rock Armoring Table. For additional information see Minnesota Technical Note #3: "Loose Riprap Protection".
12. For additional information guidance see Oregon's Forest Protection Laws, 2nd Edition and USDA – Forest Service "Environmentally Sensitive Maintenance for Dirt and Gravel Roads", April 2012.

TABLE 3. RECOMMENDED WATERBAR DIMENSIONS

DEEP WATERBAR	SHALLOW WATERBAR
A = 24 to 30 inches	A = 8 to 12 inches
B = 6 to 10 feet	B = 6 to 12 feet

This drawing requires supporting technical documentation prior to use and must be adapted to the specific site.

Drawing not to scale

Drawings were developed by the Oregon NRCS State Design Engineer and State Forester. For additional guidance please contact either one regarding these drawings or any general questions on access roads

EARTHEN WATERBAR (LIGHT USE ONLY)

PRACTICE STANDARD 560 – ACCESS ROADS

NRCS Natural Resources Conservation Service

United States Department of Agriculture

Date

Designed

Drawn KLY 1/2013

Checked

Approved

Title State Conservation Engineer

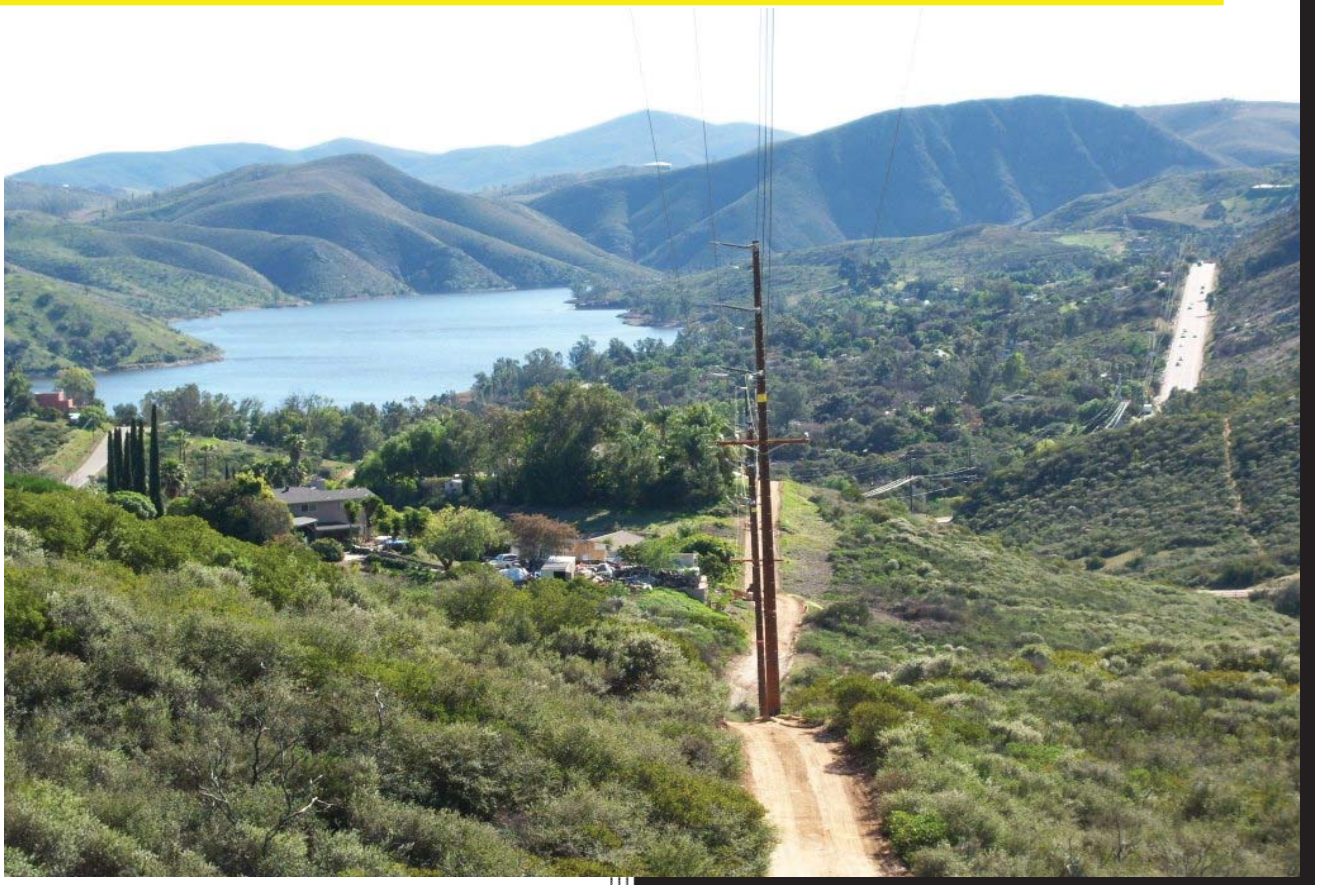
File Name access_roads.dwg

Drawing No.

Sheet of

2010

Best Management Practice and Drainage Control Guidance Manual for Maintenance Roads



Prepared For:
San Diego Gas & Electric Company

SDGE
A Sempra Energy utility®

Whitson Contracting & Management, Inc.

11021 Via Frontera, Suite E
San Diego, CA 92127
Phone 858.673.0966 Fax 858.487.8355
License No. 823289A
www.whitsoncm.com

8/1/2010

2.2 Index of Drainage Control Best Management Practices

2.2.1 Waterbars

Description and Purpose

Waterbars are an inexpensive way to control and divert water from a road surface at selected intervals. These narrow bermed natural structures are constructed by forming a ridge or a ridge and channel diagonally across the sloping roadway, and may be shallow or deep depending on the need and anticipated runoff volumes. They can be used to divert water and prevent erosion on long, sloping roads.

Suitable Applications

Waterbars can be used on all sloped maintenance roads within San Diego County. Locations of waterbars include sloped roads, switch backs and areas of run-on drainage flows from offsite.

Limitations

There are two key limitations when constructing waterbars; rock surface roads and roads composed of silty sands. Road surfaces composed primarily of rock and gravel can be very difficult for construction of a waterbar due to the lack of available soil used to for construction, see photo right. If soil is imported and a waterbar is constructed on this type of road surface, experience has shown that runoff during rain events can travel between the waterbar and road surface contributing to failure of the waterbar.

Example of maintenance road primarily composed of rock and gravel.

Roads composed primarily of silty sands can be difficult to use for waterbars. This is due to two factors: improper compaction and low yielding long-term effectiveness. During the dry season silty sands are very difficult to compact, even using large quantities of water, due to the low plasticity of the soil. The waterbars fail to achieve proper compaction and easily wear down or crumble during periods of high traffic volume.

Implementations

- Construct low enough for traffic to pass over but high enough to direct runoff flow off the road.
- The height of the waterbar is constructed higher than the downstream outflow rock dissipation.
- Install at about a 30-degree angle down slope.
- Ensure adequate drainage at the outflow and protected with 6”-8” minus rip rap rock.
- Compaction to occur using water mixed with the soil. Wheel roll the waterbar with skid steer, track steer or other equipment to ensure long-term compaction.

Spacing Needed Between Waterbars	
Slope	Diversion Spacing (feet)
< 5%	Not required
5%	125
10%	80
15%	60
> 25%	50

Inspection and Maintenance

- Inspect after rain events greater than 0.5 inches.
- Inspect prior to the rainy season (October 1st) and at the end of the rainy season (May 1st).
- Maintain and rebuild periodically or as needed.

Resources

Fifield, J.S., 2004, Designing for Effective Sediment and Erosion Control on Construction Sites: p. 5-1 – 5-23.

U.S. Department of Transportation, 2000, Gravel Roads Maintenance and Design Manual, South Dakota: Section 1.

U.S. Environmental Protection Agency Region 1, 2001, Unpaved Roads BMP Manual: A Guidebook on How to Improve Water Quality While Addressing Common Problems, Massachusetts: p. 11.

2.2.2 Velocity Dissipation Measures

Description and Purpose

Velocity controls and energy dissipaters, also called check dams, are used to slow the water flowing through ditches and swales. The reduced water speed reduces erosion and gullying in the channel and allows sediments to settle out behind the check dam. They may be built from 6”-8” minus rip rap, burlap gravel bags, or other durable products such as *snakebags*. In extreme cases the implementation of rice hay bales can be used, see photo right. Straw hay bales are not recommended. They are effective at keeping sediment and other debris from reaching and plugging culverts. Where temporary channels or permanent channels are not yet stabilized, velocity controls must be used. Use only for watershed areas less than 2 acres.

Example of rice hay bales effectively reducing runoff velocity and settling out debris and sediment.

Suitable Applications

Velocity controls and energy dissipaters can be used in drainage ditches and swales and at locations with a watershed area less than 2 acres.

Limitations

Velocity controls and energy dissipaters should generally not be used in existing rills or gullies. This is somewhat counter intuitive however think of this, runoff drainage during rain events will always use the path of least resistance. If the runoff comes in contact with a strong gravel bag berm and native soil, the water will create eddies at the corners of the berm and begin to erode away the native soil. Over time the berm will remain in place and the native soil will be eroded around the berm, see photo right.

Example of eddies causing erosion around the rock berm.

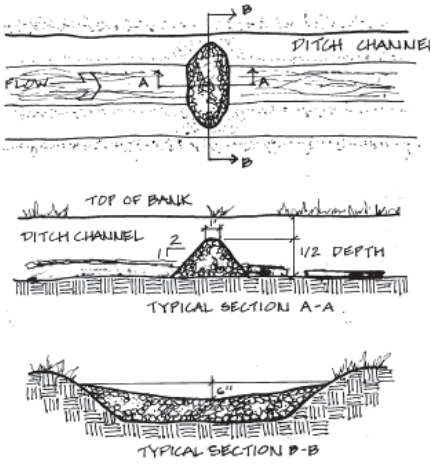
Implementations

- Locate in ditch channel or near culvert outlet.
- Construct dams and dikes no higher than 2 feet.
- Clear sediment out from behind dams when half full.
- Monitor all check dams for performance and clean sediments and debris regularly, especially after rainstorms.

Rock Check Dams

Rock check dams provide a more permanent structure and may consist of several options including 6”-8” minus rock, burlap gravel bags and synthetic gravel bags such as *snakebags*. They are good at preventing rill and gully erosion in ditches and create volume for settling out sediments.

- Construct with stone large enough to handle the expected velocity of water, generally 4” to 8” in size. The smaller the stone size the more sediment removed. The rock must be large enough to stay in place given the expected design flow through the channel.
- Place the rock by hand or with mechanical placement to achieve complete coverage of the ditch or swale. To *ensure that the center of the dam is lower than the edges*, do not dump rock to form dam.
- The dams should be spaced so that the toe of the upstream dam is at the same elevation as the top of the downstream dam.



Typical schematic of rock check dam.

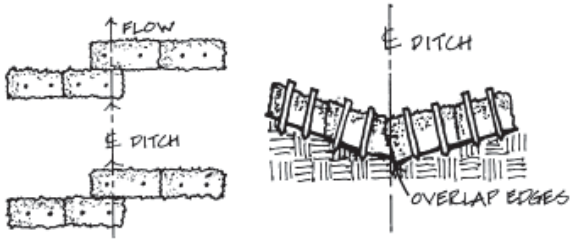
Inspection and Maintenance

- Inspect after rain events greater than 0.5 inches.
- Inspect prior to the rainy season (October 1st) and at the end of the rainy season (May 1st).
- Remove sediment from behind dams when half full.

Rice Hay Bale Check Dams

Rice hay bale check dams are temporary sediment barriers constructed of a row of rice bales tightly butted together, embedded no less than 6 inches into the ground and anchored with t-posts or other means. Properly sited, they decrease the velocity of sheet flows and low-to-moderate level channel flows. The ends of hay bales should be higher than centers such that water will spill over the top of the bales, not around the sides. For maximum sediment removal the rice hay bales should be staggered within the drainage channel. This will allow for the water to meander through the bales, settling the sediment/debris and greatly reducing the effects of eddies and other physical characteristics with high sediment-laden flows.

- Use in smaller ditches to slow water flow and at the toe of a slope.
- Installation technique is critical to proper functioning of a dike: bales must be entrenched and backfilled, first stake in each bale driven toward previous bale to force them together, and gaps between bales should be wound with wire, see photo right.



Typical schematic of rice hay bale check dams.

Inspection and Maintenance

- Inspect after rain events greater than 0.5 inches.
- Inspect prior to the rainy season (October 1st) and at the end of the rainy season (May 1st).
- Maintain and rebuild periodically or as needed.

Resources

Fifield, J.S., 2004, Designing for Effective Sediment and Erosion Control on Construction Sites: p. 6-1 – 6-13.

U.S. Environmental Protection Agency Region 1, 2001, Unpaved Roads BMP Manual: A Guidebook on How to Improve Water Quality While Addressing Common Problems, Massachusetts: p. 21-25.

2.2.5 Earth Dikes and Drainage Ditches

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel runoff to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales can be used to divert off site runoff through a maintenance road without causing erosion on the road surface and direct runoff into sediment traps, see photo right.

Example of a rip rap (or stabilized) drainage swale.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

Earth dikes and drainage swales may be used:

- To convey surface runoff down sloping road surfaces.
- To intercept and divert runoff to avoid sheet flow erosion over sloped surfaces, including at the bottom and mid slope of maintenance roads.
- To divert and direct runoff towards a stabilized water course, culvert pipe or channel.
- Below steep grades where runoff begins to concentrate.
- Drainage swales or earth dikes can be used to divert runoff into a sediment trap.

Limitations

Dikes should not be used for drainage areas greater than 2 acres or along toe of slopes greater than 10 percent, unless stabilized with rip rap rock. For larger watershed areas more permanent drainage structures are recommended such as culvert pipes.

- Earth dikes should be stabilized to reduce the runoff velocity and allow sediment to settle. However, earth dikes/drainage swales may not be suitable as the primary sediment trapping device for watershed areas greater than 0.5 acres.
- If drainage swales are constructed of soils that may be easily eroded, such as sandy soils, it is recommended the filter fabric be used between the soil surface and rip rap rock.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

Implementations

Road gradient changes that are formed during maintenance road grading activities should be protected to prevent or reduce the effect of erosion. A combination of a temporary drainage swale and an earth dike at the top of a maintenance road can divert runoff to a stabilized location where it can be brought to the bottom of the maintenance road without causing or contributing to erosion on the road surface. Diversion structures should be installed when the maintenance road is initially graded and remain in place until post construction.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur or the soils are easily erodible, a swale should be stabilized using filter fabric and rip rap rock. In some circumstances vegetation may be used, however, this method should be designed and reviewed by an environmental specialist from SDG&E. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

Inspection and Maintenance

- Inspect after rain events greater than 0.5 inches.
- Inspect prior to the rainy season (October 1st) and at the end of the rainy season (May 1st).
- Maintain and rebuild periodically or as needed.
- Inspect ditches and berms for washouts. Replace lost rip rap, damaged linings or soil stabilizers as needed.
- Inspect beds of ditches for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

Resources

Fifield, J.S., 2004, Designing for Effective Sediment and Erosion Control on Construction Sites: p. 7-3 – 7-4.

California Storm Water Quality Association, 2009, Construction BMP Handbook: EC-9 p. 1 and 7.

County of San Diego Department of Public Works Flood Control Section, July 2005, San Diego County Drainage Design Manual: 5-15 – 5-23.

ATTACHMENT D: DETAILED ROUTE MAP

TIE LINE 625B

Attachment D:
Detailed Route Map
TL625B Map 1 of 5

Cleveland National Forest
Power Line Replacement Projects

- Road Slope Greater Than 15%
- New Steel Pole
- Wood-to-Steel Replacement Pole
- Removal Pole
- Undergrounding
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area

1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL625B Map 2 of 5

Cleveland National Forest
Power Line Replacement Projects

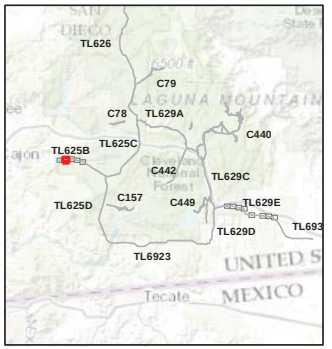
- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Removal Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area



1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\Plans\Access_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL625B Map 3 of 5

Cleveland National Forest
Power Line Replacement Projects

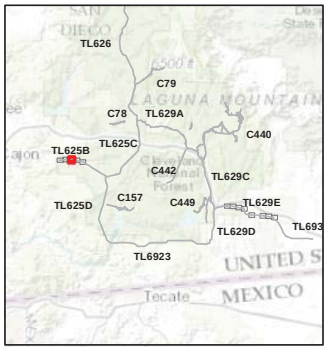
- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Removal Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area



1:3,400
0 200 400 Feet

8/11/2016
Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd

Attachment D:
Detailed Route Map
TL625B Map 4 of 5

Cleveland National Forest
Power Line Replacement Projects

- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Staging Area

Access Roads

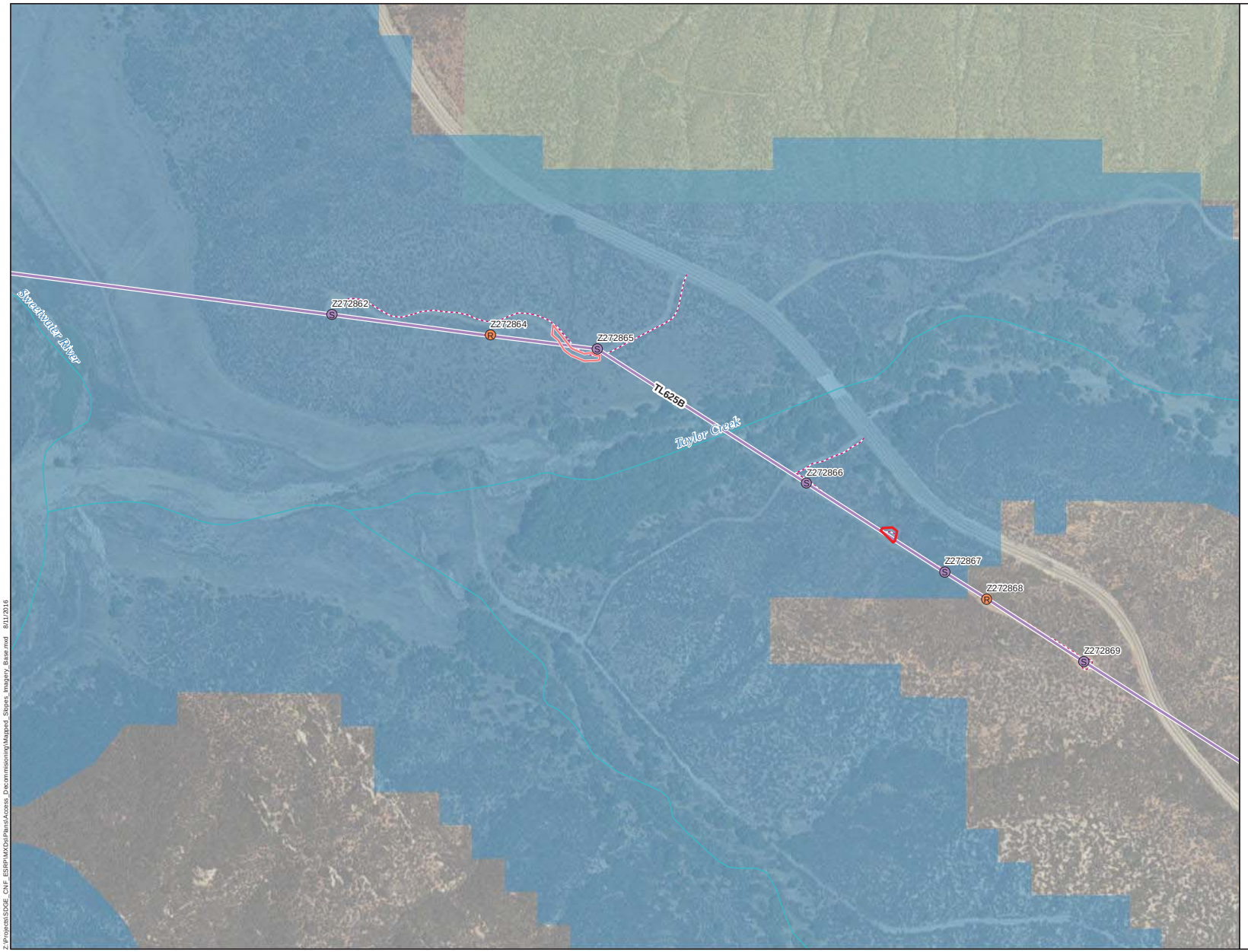
- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area

1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016



Attachment D:
Detailed Route Map
TL625B Map 5 of 5

Cleveland National Forest
Power Line Replacement Projects

- Road That Needs Repair
- Wood-to-Steel Replacement Pole
- Removal Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area

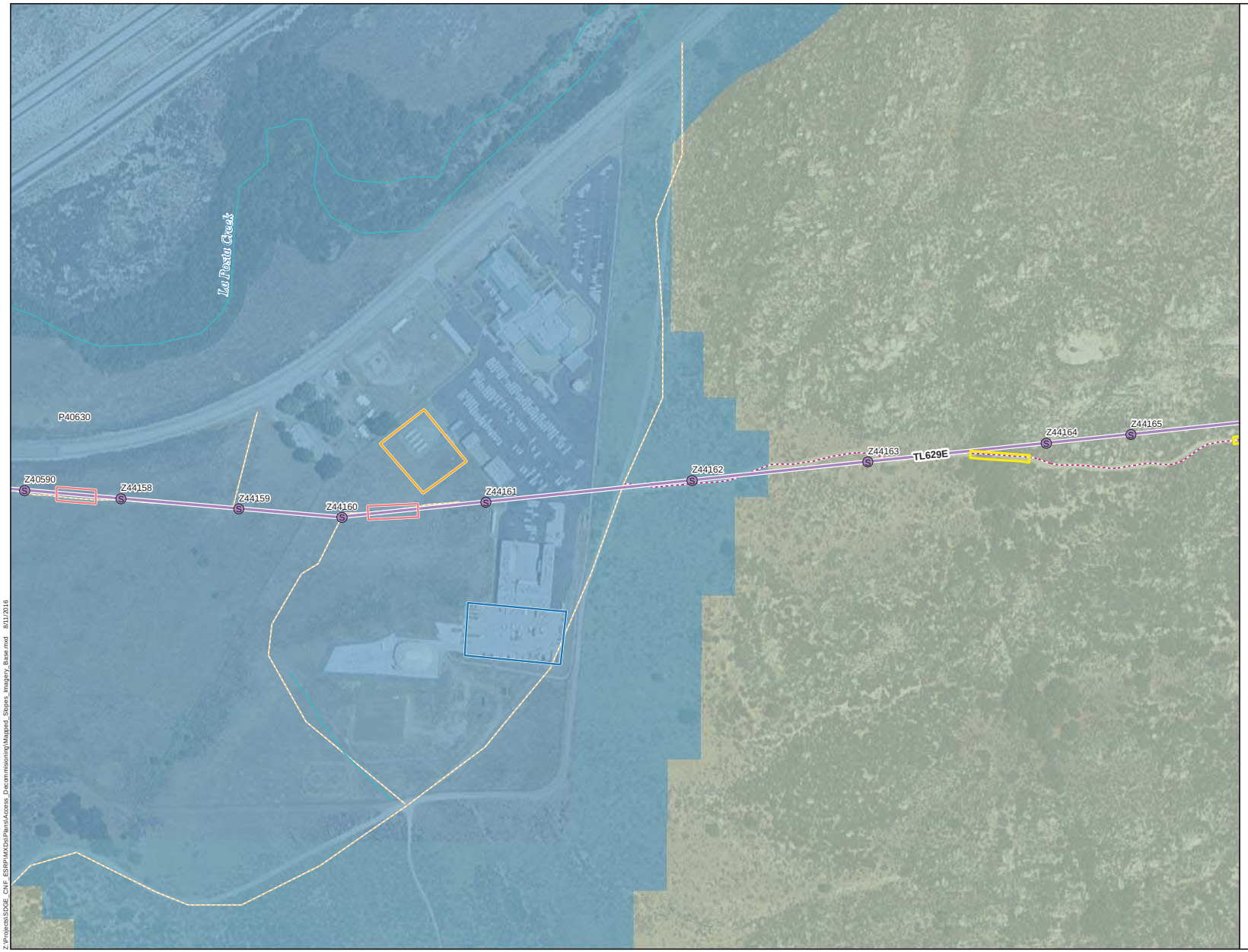
Land Administration

- United States Forest Service

1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

TIE LINE 629E



Attachment D:
Detailed Route Map
TL629E Map 1 of 8

Cleveland National Forest
Power Line Replacement Projects

- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Fly Yard
- Staging Area
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area

Land Administration

- United States Forest Service

SDGE Sempra Energy utility

INSIGNIA ENVIRONMENTAL

1:3,400

0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL629E Map 2 of 8

Cleveland National Forest
Power Line Replacement Projects

- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

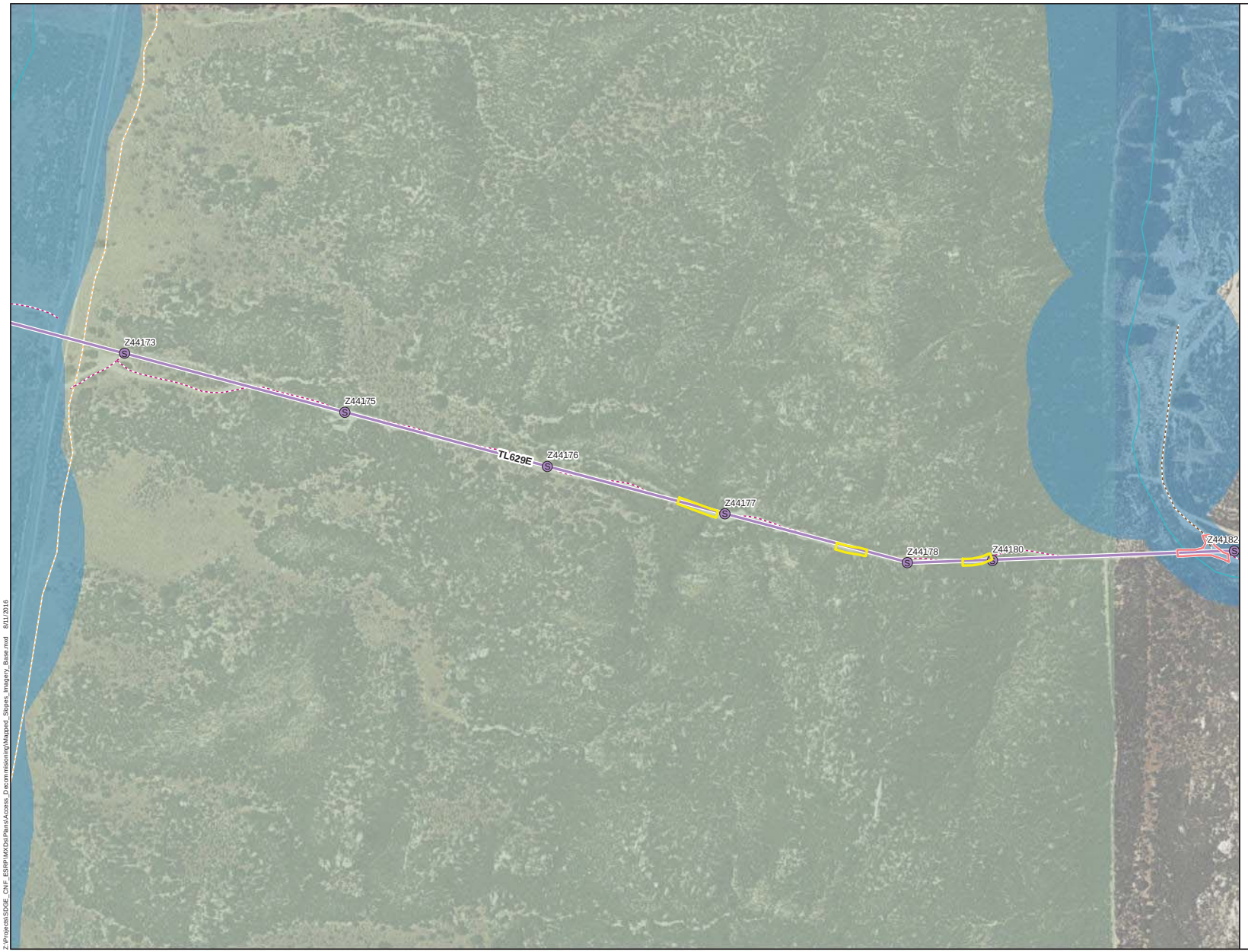
- Stream
- Riparian Conservation Area

Land Administration

- United States Forest Service

1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016



Attachment D:
Detailed Route Map
TL629E Map 3 of 8

Cleveland National Forest
Power Line Replacement Projects

- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

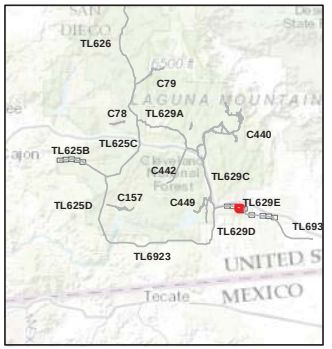
- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area

Land Administration

- United States Forest Service



1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL629E Map 4 of 8

Cleveland National Forest
Power Line Replacement Projects

- Road Erosion RCA
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

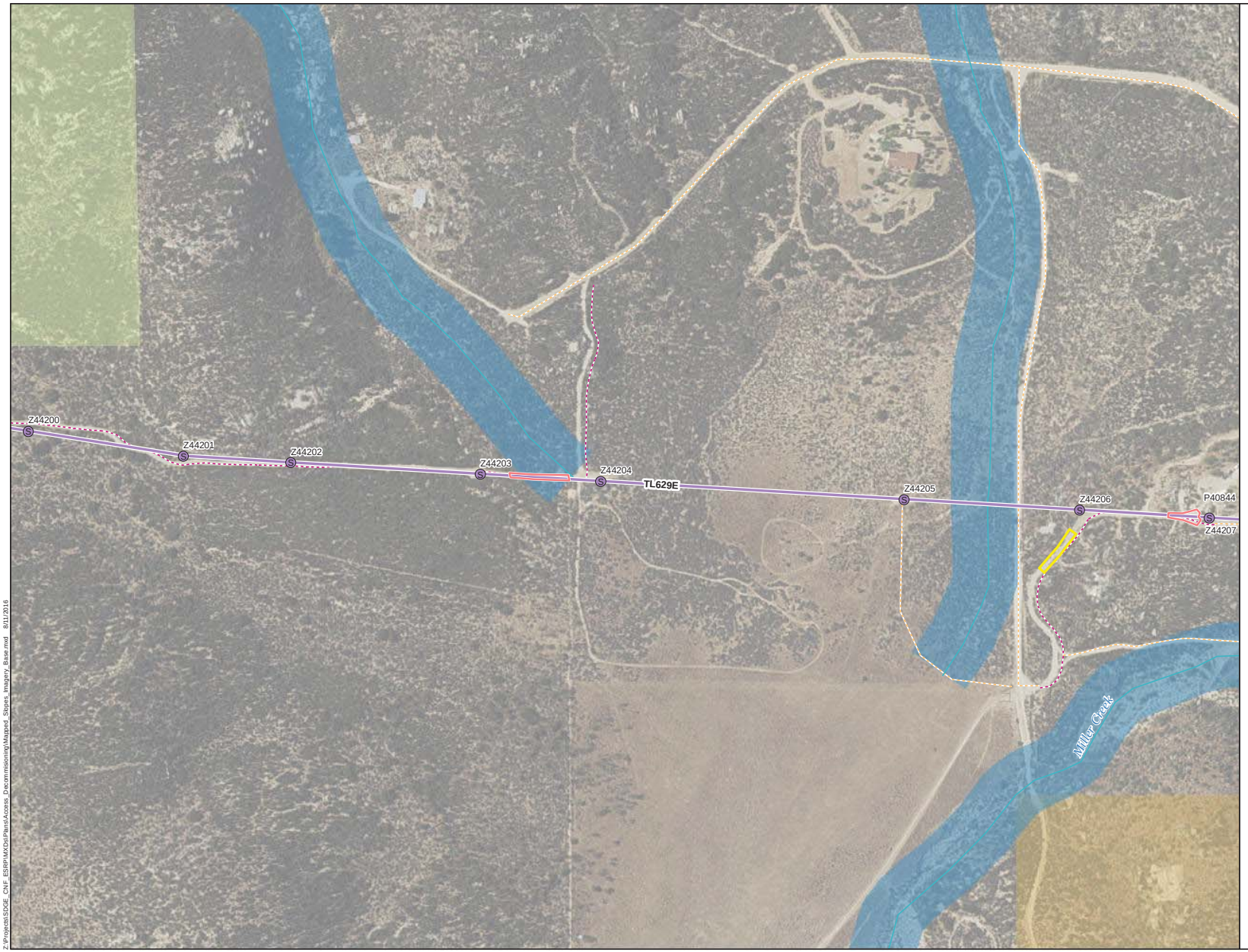
- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area
- U.S. Bureau of Land Management

1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016



Attachment D:
Detailed Route Map
TL629E Map 5 of 8

Cleveland National Forest
Power Line Replacement Projects

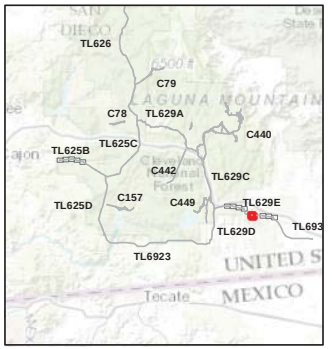
- Road Slope Greater Than 15%
- Wood-to-Steel Replacement Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area
- U.S. Bureau of Land Management
- Bureau of Indian Affairs Land



1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXD\s\Plans\Access_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL629E Map 6 of 8

Cleveland National Forest
Power Line Replacement Projects

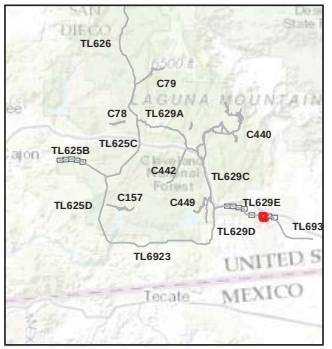
- Road Slope Greater Than 15%
- New Steel Pole
- Wood-to-Steel Replacement Pole
- Removal Pole
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Riparian Conservation Area



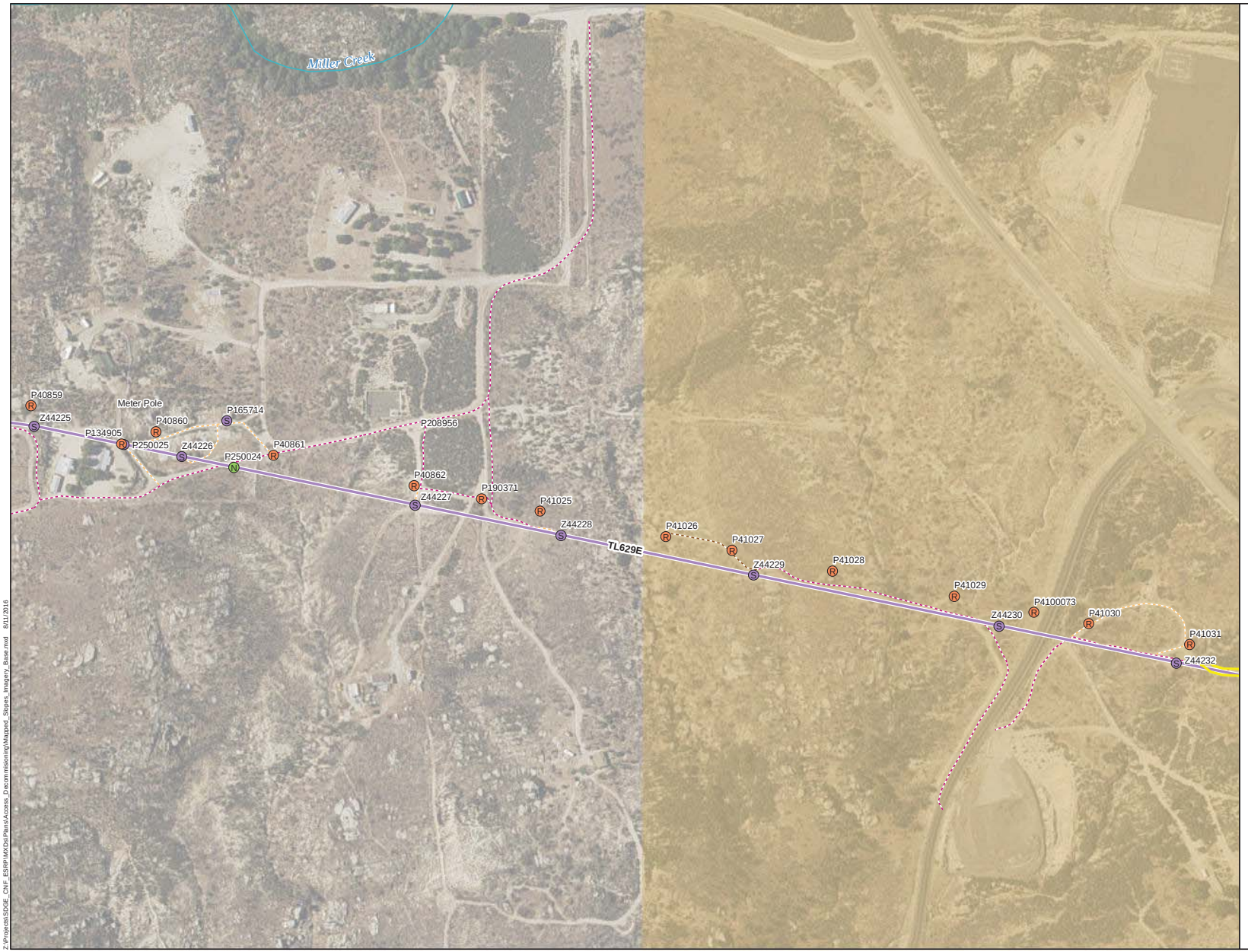
SDGE Sempra Energy utility

INSIGNIA ENVIRONMENTAL

1:3,400

0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016



Attachment D:
Detailed Route Map
TL629E Map 7 of 8

Cleveland National Forest
Power Line Replacement Projects

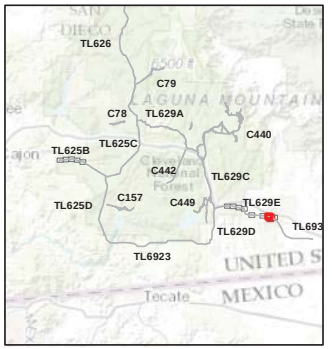
- Road Slope Greater Than 15%
- New Steel Pole
- Wood-to-Steel Replacement Pole
- Removal Pole
- Wood-to-Steel Replacement

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation

Hydrology Features

- Stream
- Bureau of Indian Affairs Land



SDGE Sempra Energy utility

INSIGNIA ENVIRONMENTAL

1:3,400

0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

Attachment D:
Detailed Route Map
TL629E Map 8 of 8

Cleveland National Forest
Power Line Replacement Projects

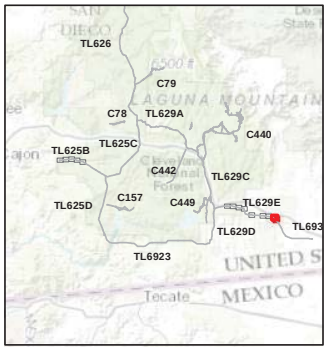
- Road Slope Greater Than 15%
- New Steel Pole
- Wood-to-Steel Replacement Pole
- Removal Pole
- TL6931 Pole
- Undergrounding
- Wood-to-Steel Replacement
- Stringing Site

Access Roads

- SDG&E Construction Only
- SDG&E Construction Only - Removing Road
- SDG&E Maintained
- SDG&E Navigation
- Existing Access Roads

Hydrology Features

- Stream
- Bureau of Indian Affairs Land

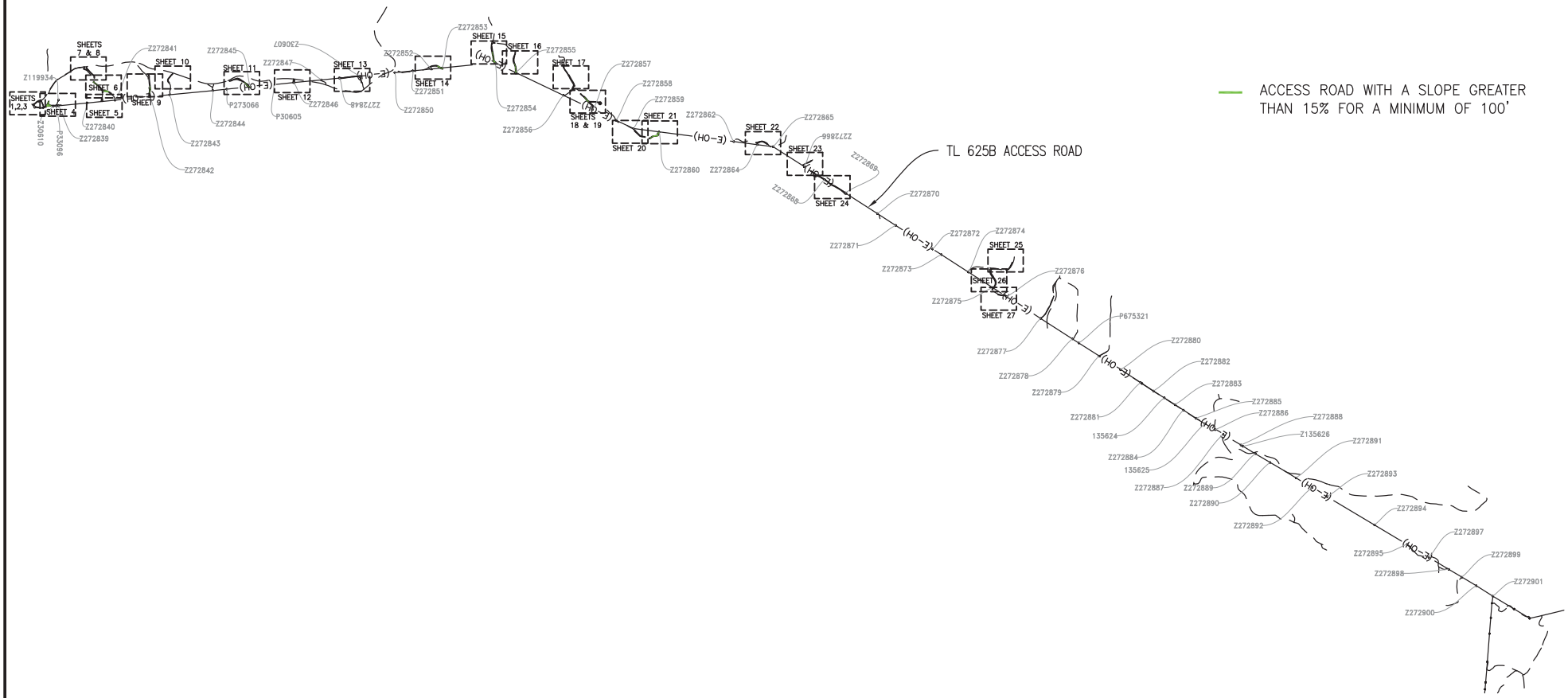


1:3,400
0 200 400 Feet

Z:\Projects\SDGE_CNF_ESRP\MXDs\PlansAccess_Decommissioning\Mapped_Slopes_Imagery_Base.mxd 8/11/2016

ATTACHMENT E: AUTOCAD PROFILE DRAWINGS OF ROAD SEGMENTS

TIE LINE 625B



SCALE : 1"=2000'

2000 1000 0 2000 4000 6000

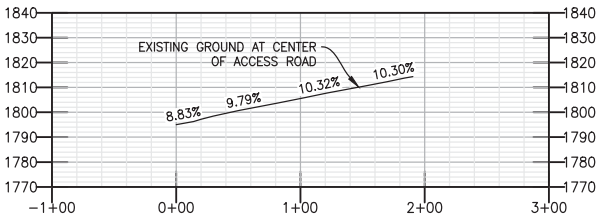
GRAPHIC SCALE IN FEET

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

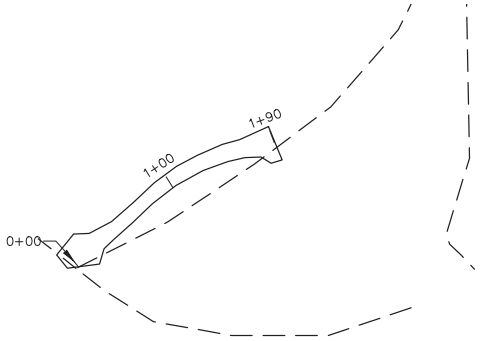
DATE: AUGUST 2016

TITLE SHEET

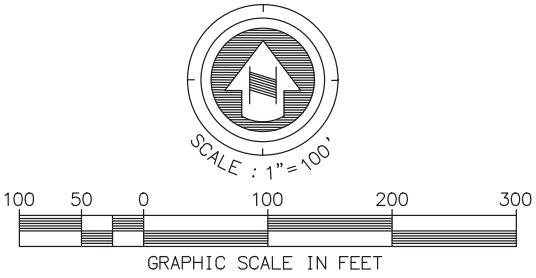
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 • fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #1-A
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #1-A
SCALE: 1"=100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

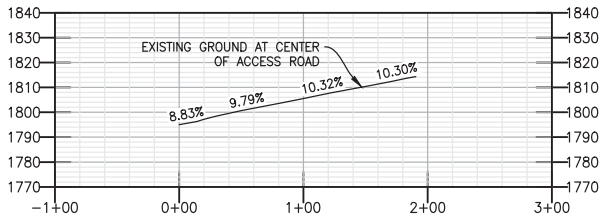
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

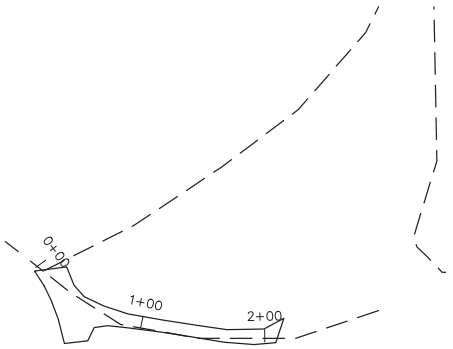
SHEET 1

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



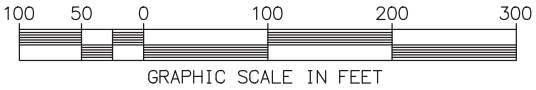
PROFILE-ROAD REACH #1-B

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #1-B

SCALE: 1"=100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

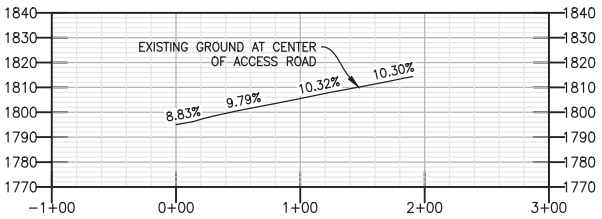
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

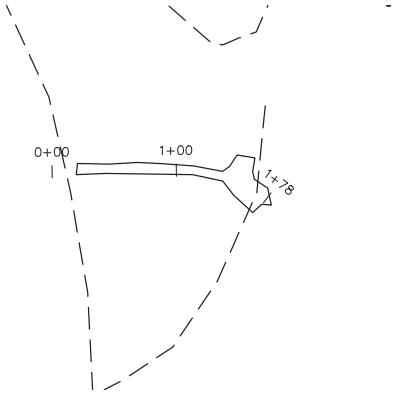
DATE: AUGUST 2016

SHEET 2

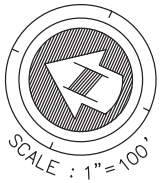
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com

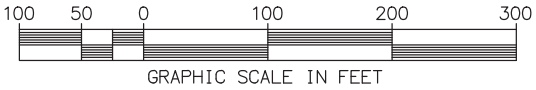


PROFILE-ROAD REACH #1-C
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #1-C
SCALE: 1"=100'





GRAPHIC SCALE IN FEET

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

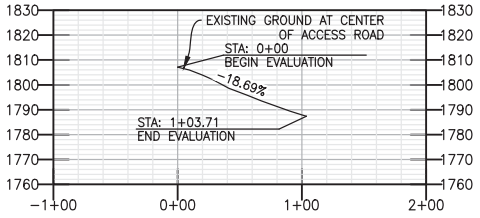
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

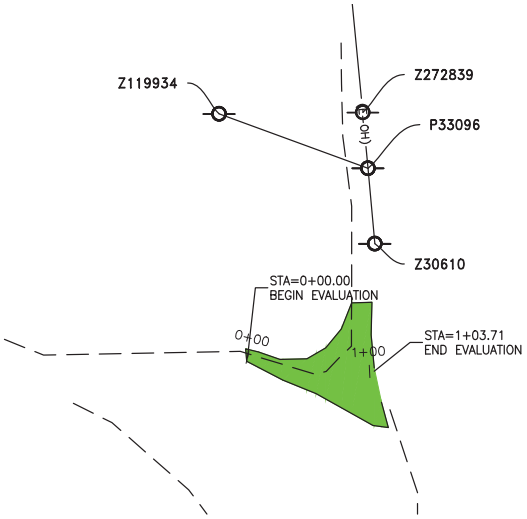
SHEET 3

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



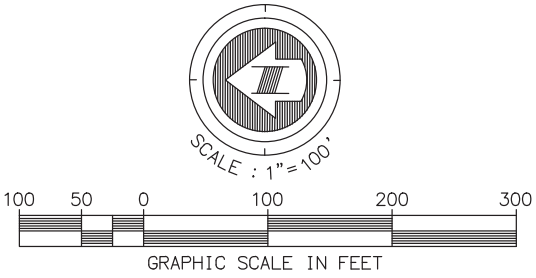
PROFILE-ROAD REACH #2

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #2

SCALE: 1" = 100'



LEGEND

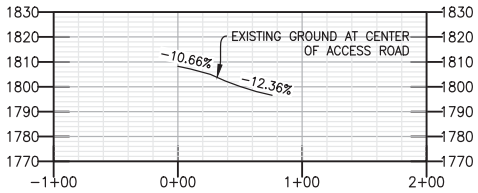
- CNF ACCESS ROADS
- OVERHEAD POWER LINES (E-OH)
- POWER POLES Z30610
- ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

SHEET 4

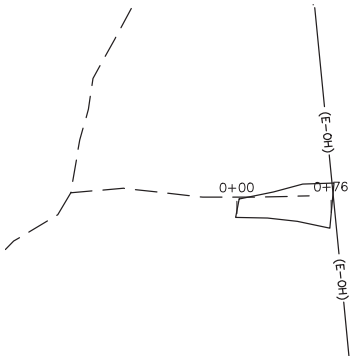
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #3

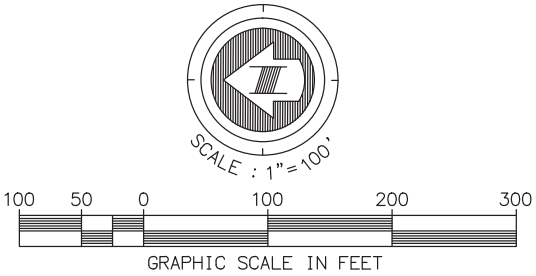
SCALE HORIZONTAL: 1"=100'

VERTICAL: 1"= 50'



PLAN-ROAD REACH #3

SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

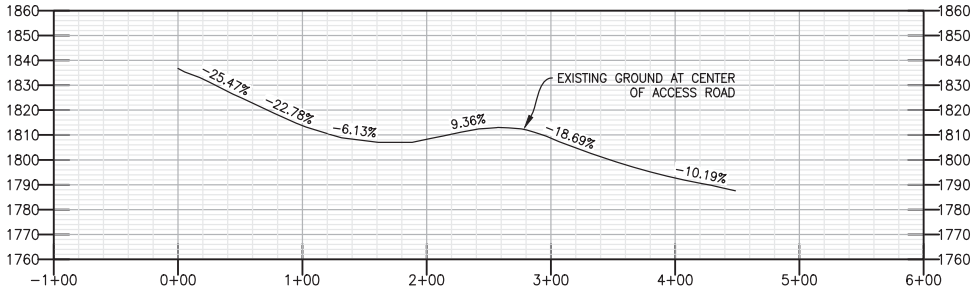
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

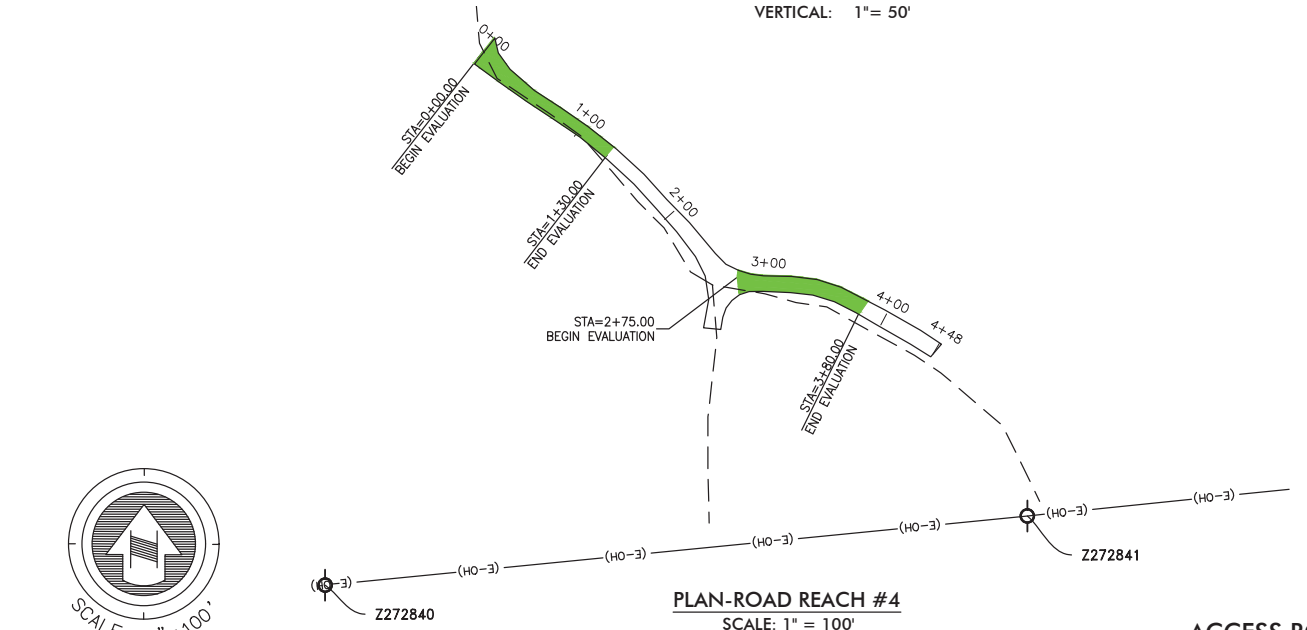
SHEET 5

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #4

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'

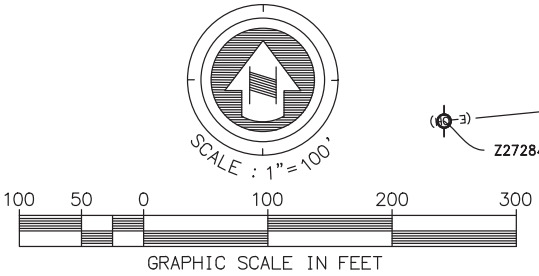


PLAN-ROAD REACH #4

SCALE: 1" = 100'

LEGEND

- CNF ACCESS ROADS
- OVERHEAD POWER LINES (E-OH)
- POWER POLES Z30610
- ROAD SEGMENT EVALUATED

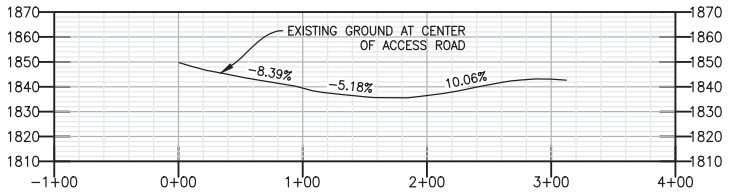


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

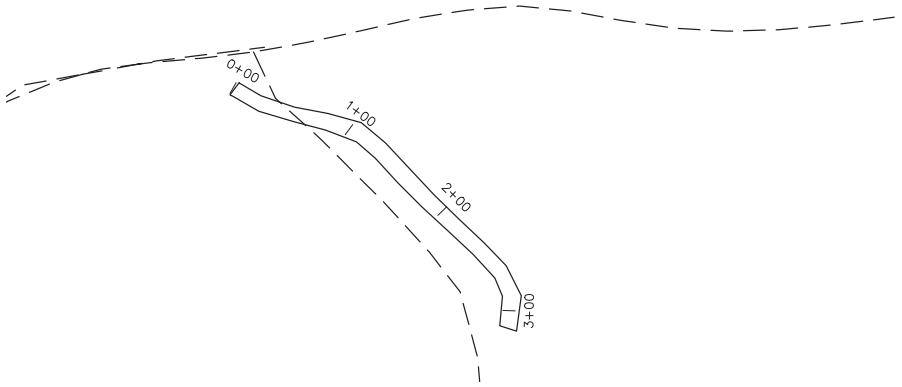
SHEET 6

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #5

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #5

SCALE: 1" = 100'

SCALE : 1"=100'

100 50 0 100 200 300

GRAPHIC SCALE IN FEET

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

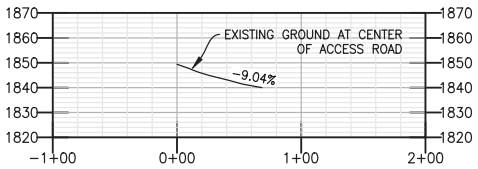
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

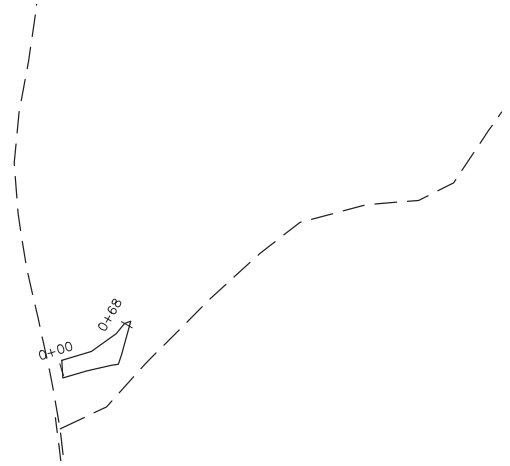
DATE: AUGUST 2016

SHEET 7

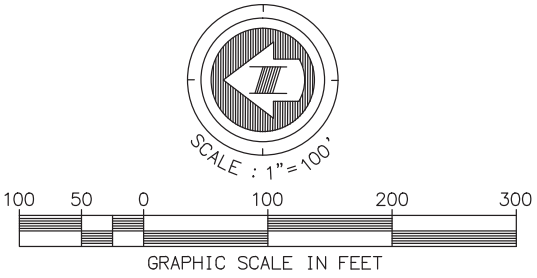
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #6
SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #6
SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

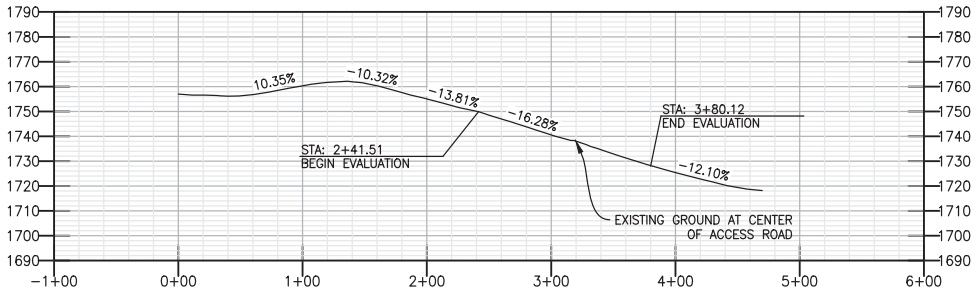
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

SHEET 8

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com

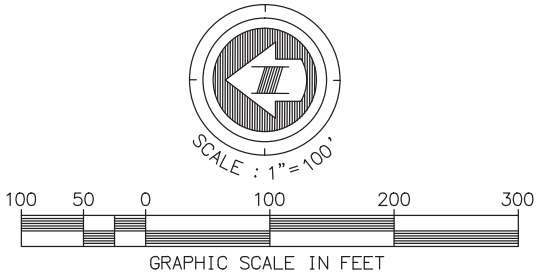


PROFILE-ROAD REACH #7

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'

PLAN-ROAD REACH #7

SCALE: 1" = 100'



LEGEND

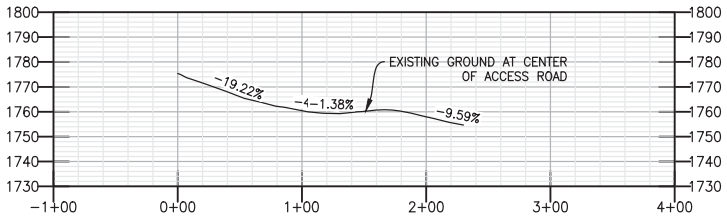
- CNF ACCESS ROADS
- OVERHEAD POWER LINES (E-OH)
- POWER POLES Z30610
- ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

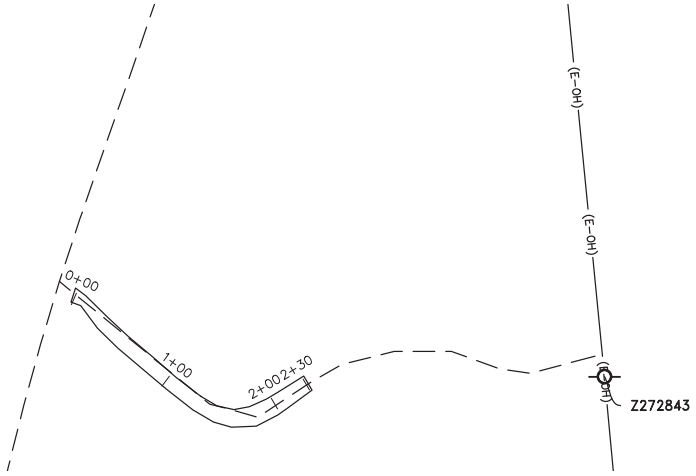
SHEET 9

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #8

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #8

SCALE: 1" = 100'

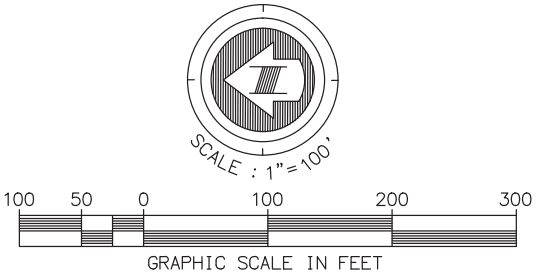
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E−OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

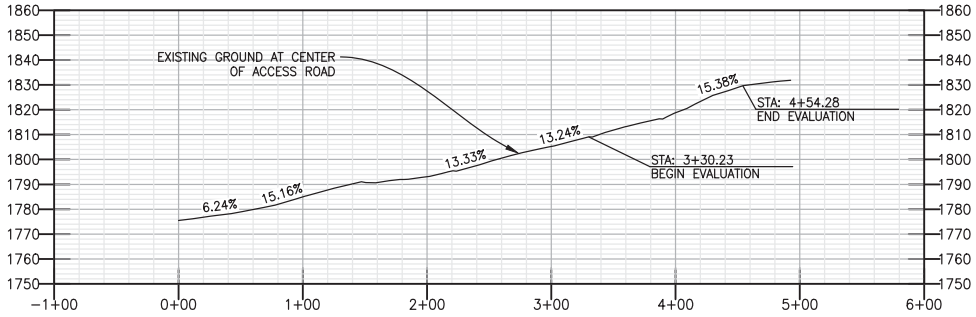


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

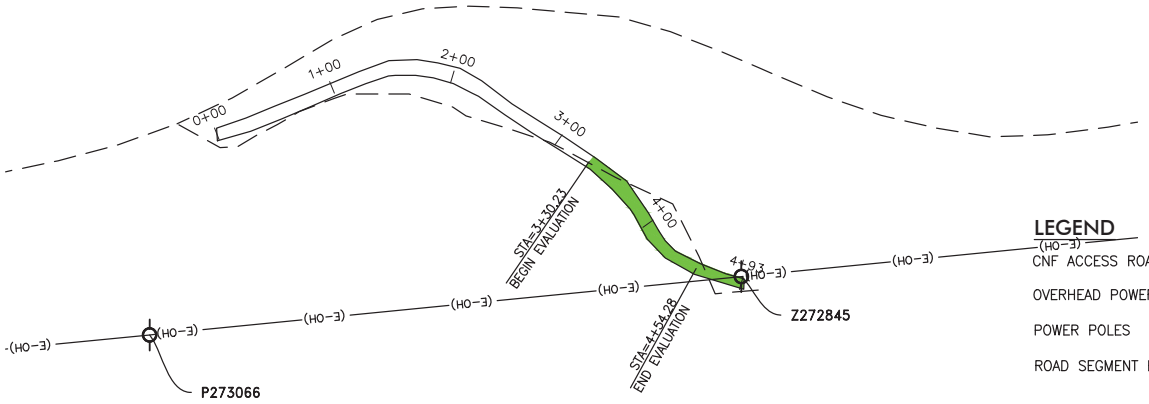
SHEET 10

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #9

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



LEGEND

- CNF ACCESS ROADS — (HO−3)
- OVERHEAD POWER LINES — (E−OH)
- POWER POLES — Z30610
- ROAD SEGMENT EVALUATED

PLAN-ROAD REACH #9

SCALE: 1" = 100'

SCALE : 1"=100'

100 50 0 100 200 300

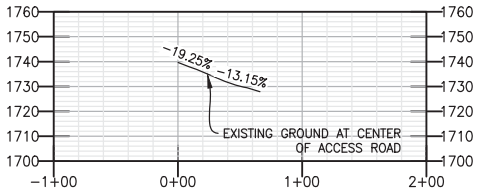
GRAPHIC SCALE IN FEET

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

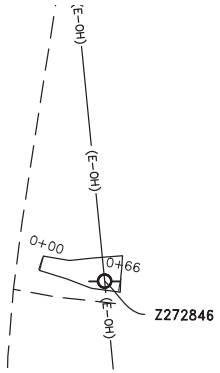
SHEET 11

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



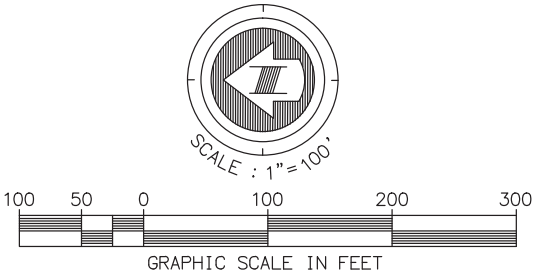
PROFILE-ROAD REACH #10

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #10

SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

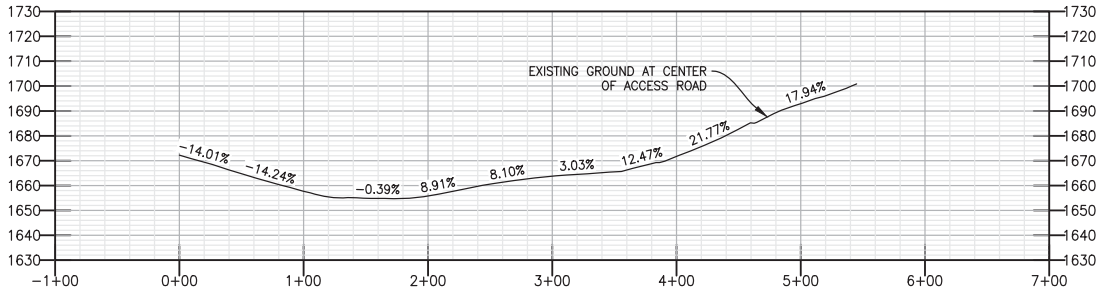
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

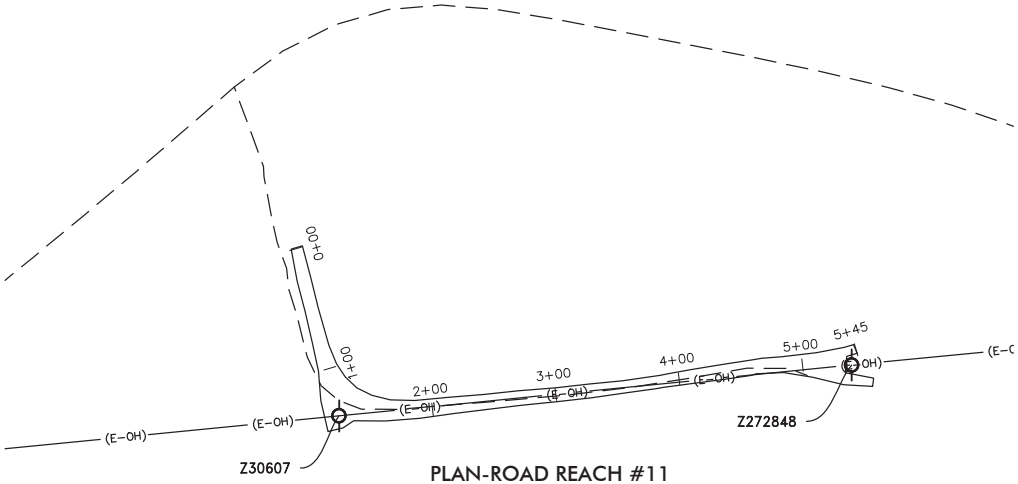
SHEET 12

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #11

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #11

SCALE: 1" = 100'

SCALE : 1"=100'

100 50 0 100 200 300

GRAPHIC SCALE IN FEET

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

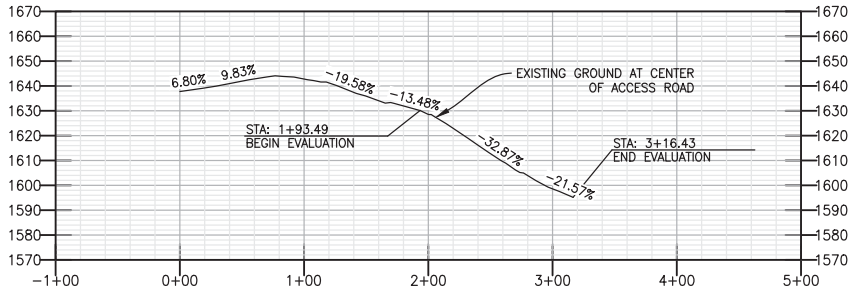
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

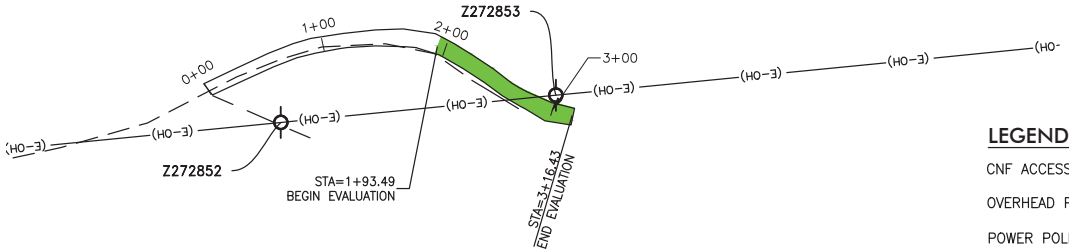
SHEET 13

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #12

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



LEGEND

CNF ACCESS ROADS
OVERHEAD POWER LINES (E-OH)
POWER POLES Z30610
ROAD SEGMENT EVALUATED

PLAN-ROAD REACH #12

SCALE: 1" = 100'

SCALE : 1"=100'

100 50 0 100 200 300

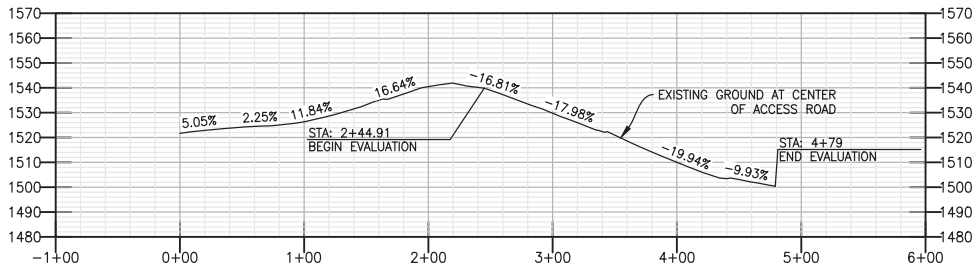
GRAPHIC SCALE IN FEET

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

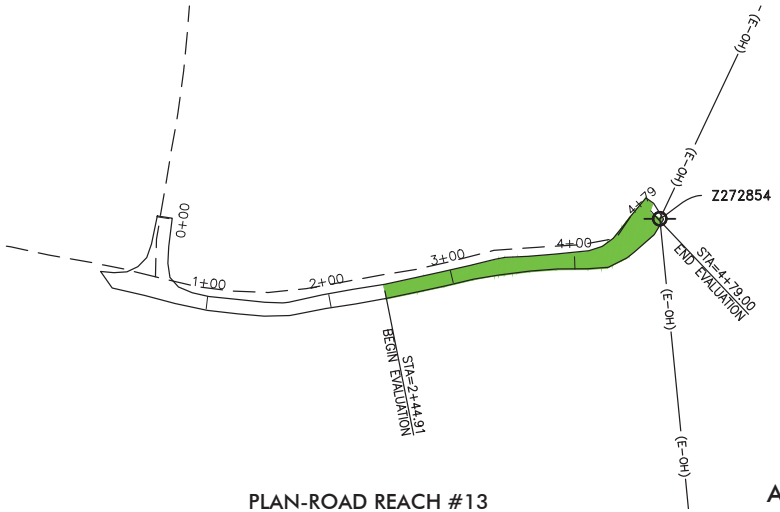
SHEET 14

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



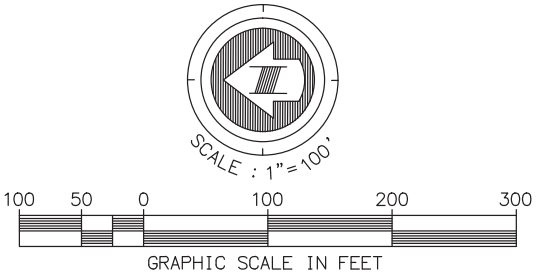
PROFILE-ROAD REACH #13

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #13

SCALE: 1" = 100'



LEGEND

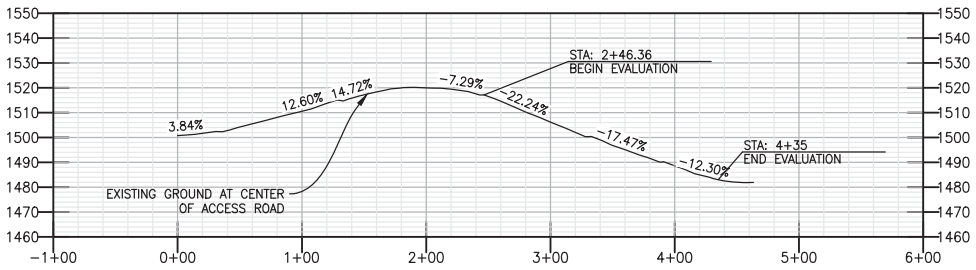
- CNF ACCESS ROADS
- OVERHEAD POWER LINES (E-OH)
- POWER POLES Z30610
- ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

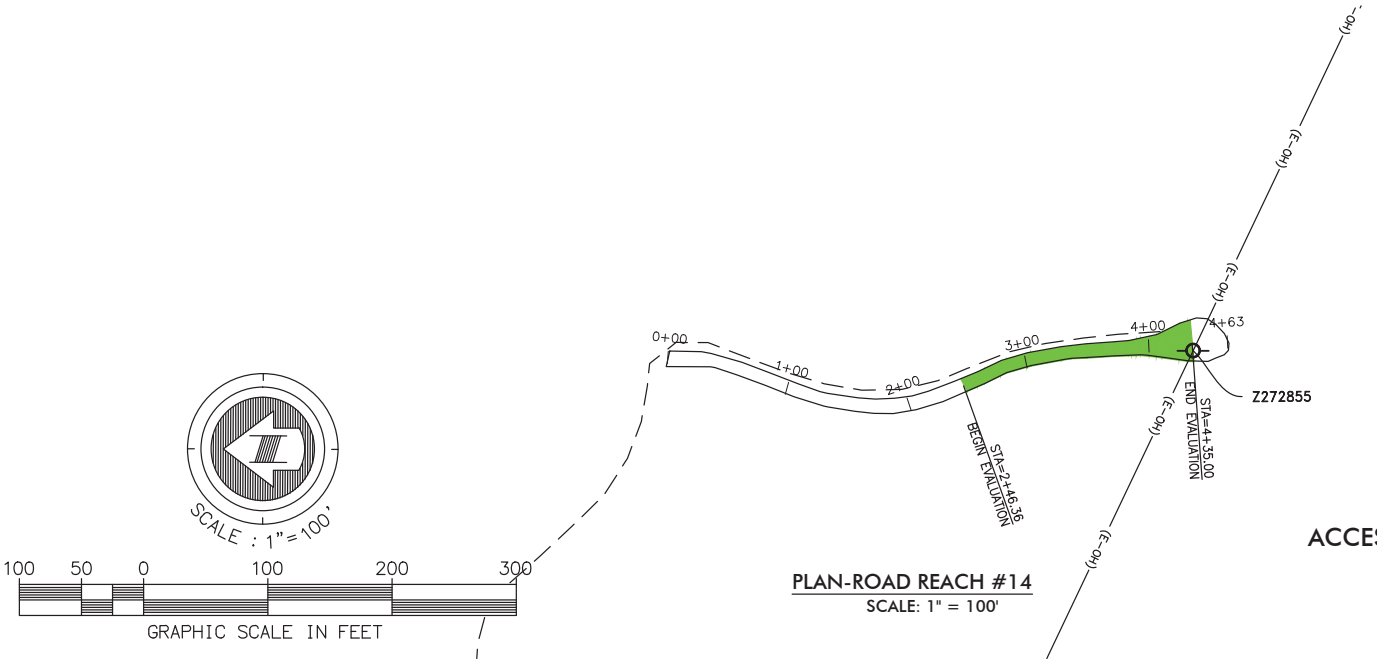
SHEET 15

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #14

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #14

SCALE: 1" = 100'

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E−OH)

POWER POLES Z30610

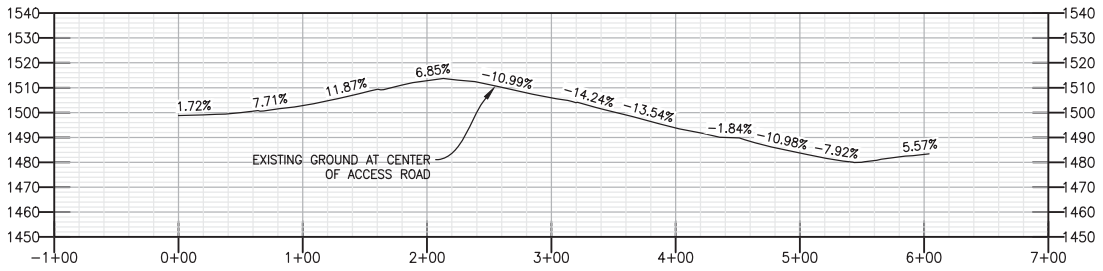
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

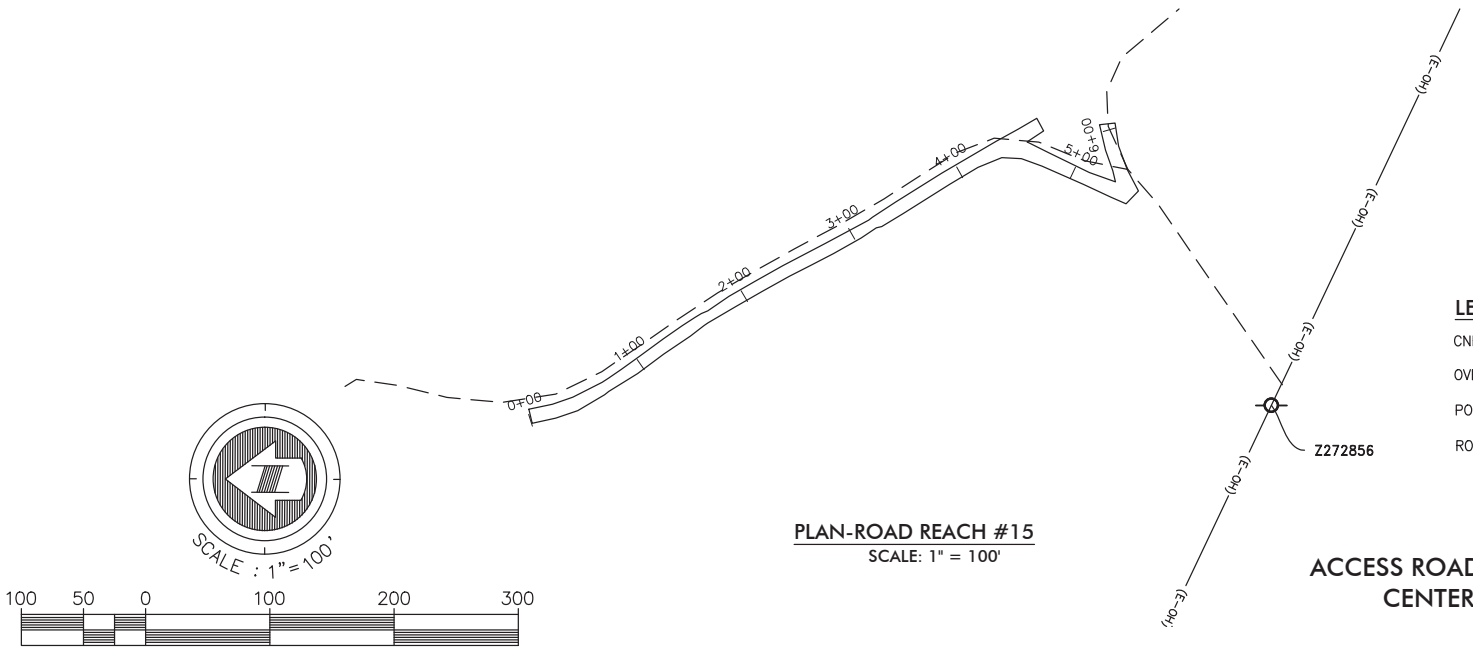
SHEET 16

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #15

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #15

SCALE: 1" = 100'

SCALE : 1"=100'

100 50 0 100 200 300

GRAPHIC SCALE IN FEET

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

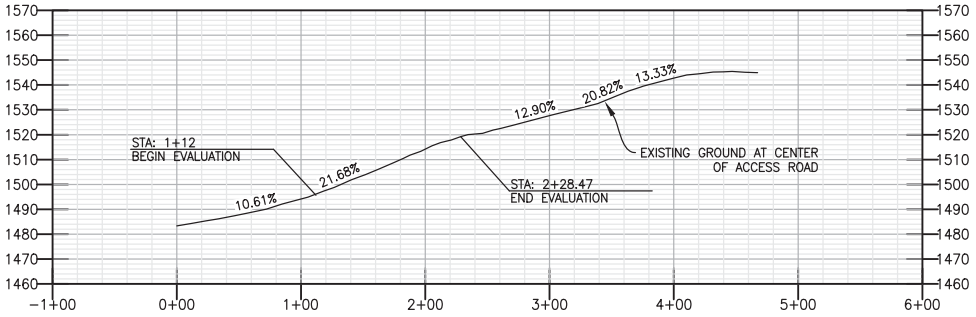
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

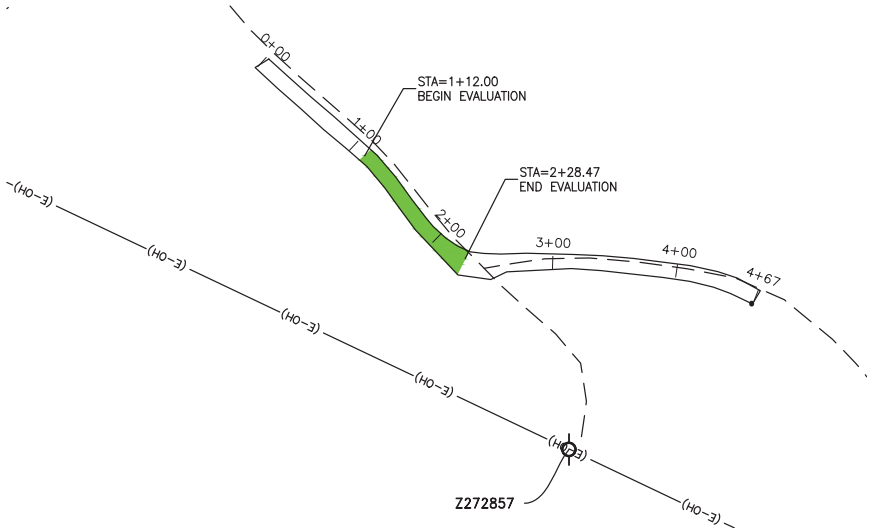
SHEET 17

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #16-A

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #16-A

SCALE: 1" = 100'

LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

SCALE : 1"=100'

100 50 0 100 200 300

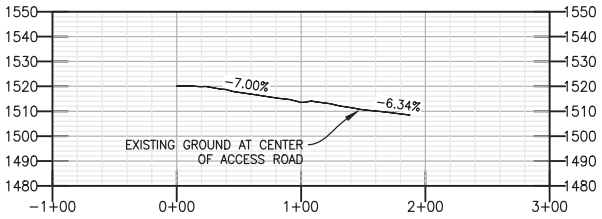
GRAPHIC SCALE IN FEET

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

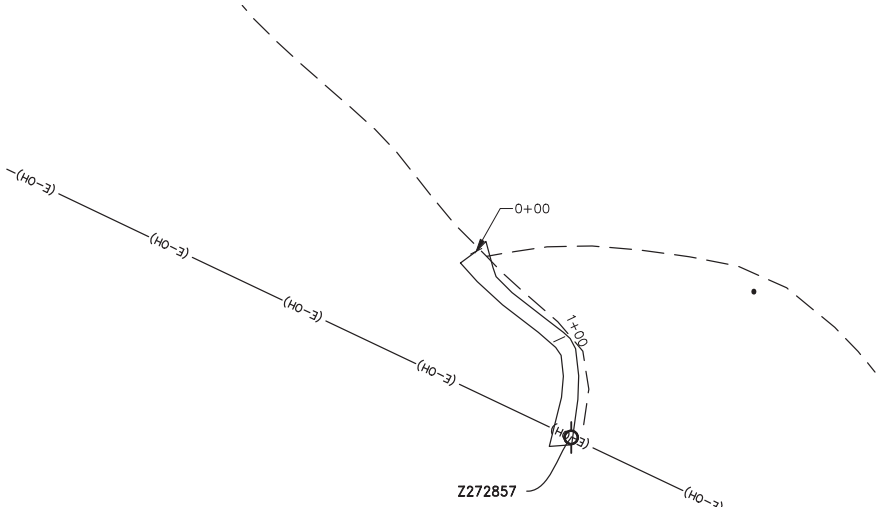
DATE: AUGUST 2016

SHEET 18

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #16-B
SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #16-B
SCALE: 1" = 100'

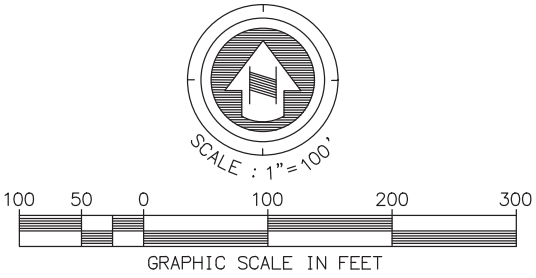
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

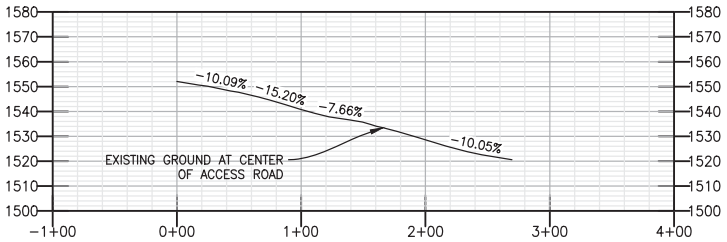


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

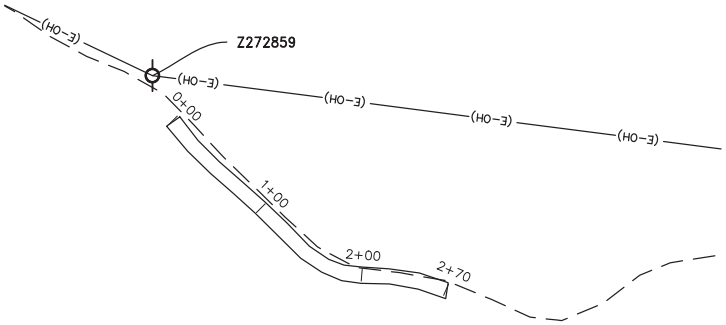
SHEET 19

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #17

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #17

SCALE: 1" = 100'

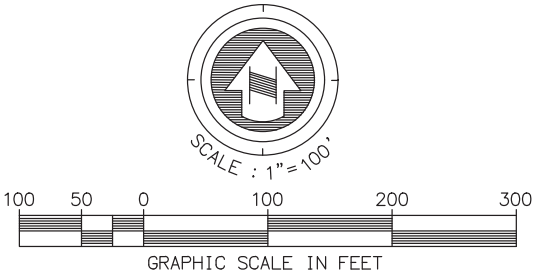
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

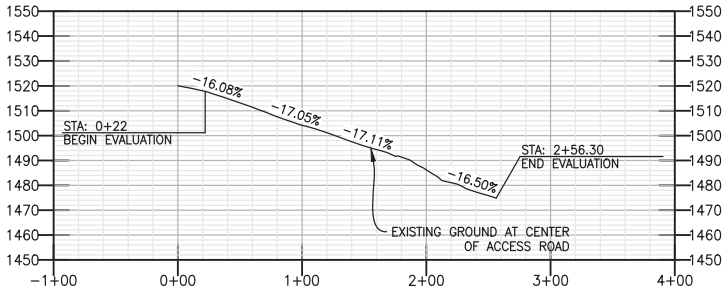


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

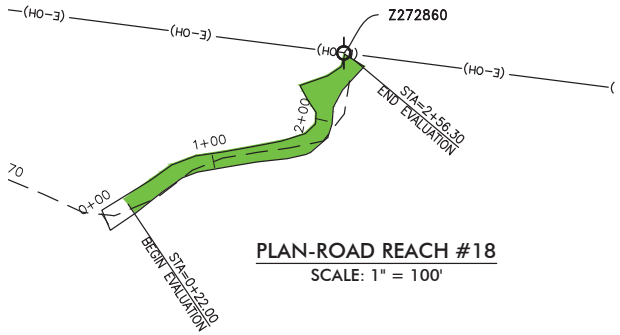
SHEET 20

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #18

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #18

SCALE: 1" = 100'

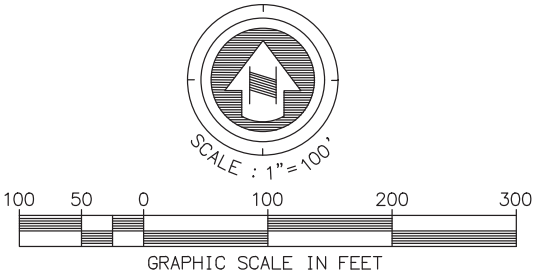
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

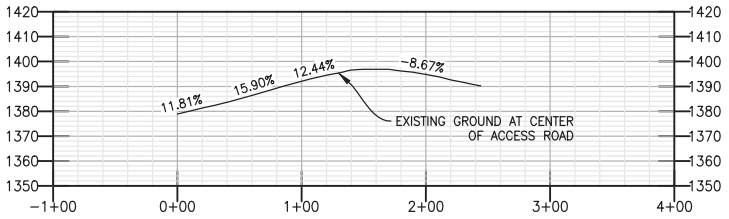


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

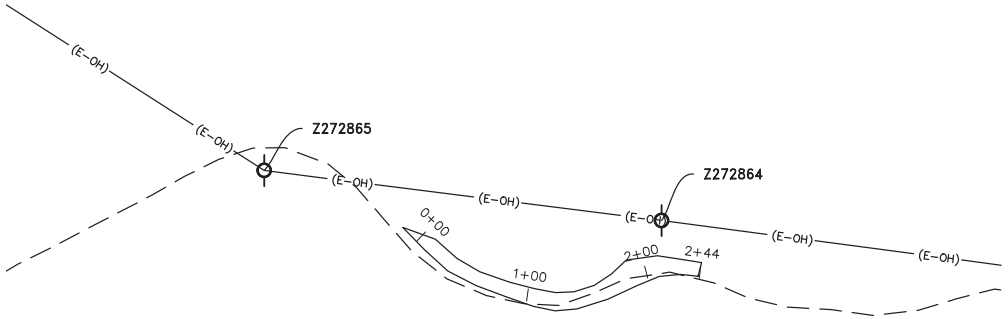
SHEET 21

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #19

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #19

SCALE: 1" = 100'

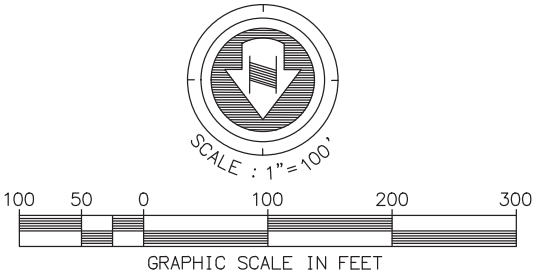
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

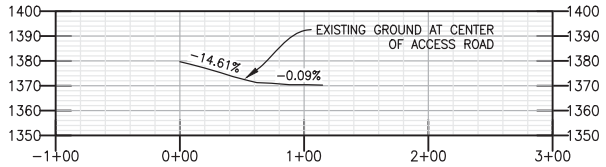


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

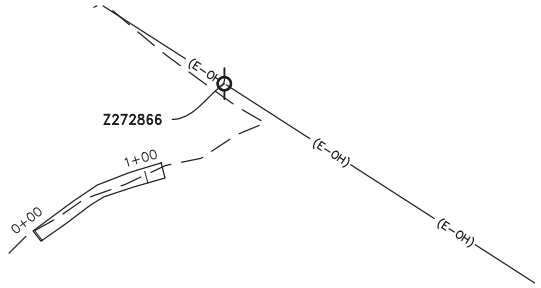
SHEET 22

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #20

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #20

SCALE: 1" = 100'

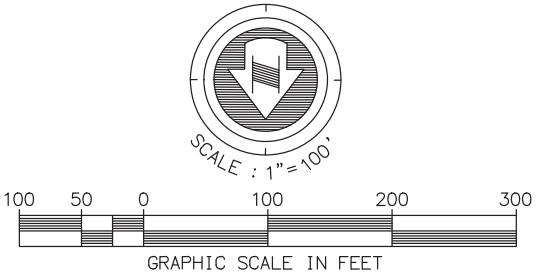
LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

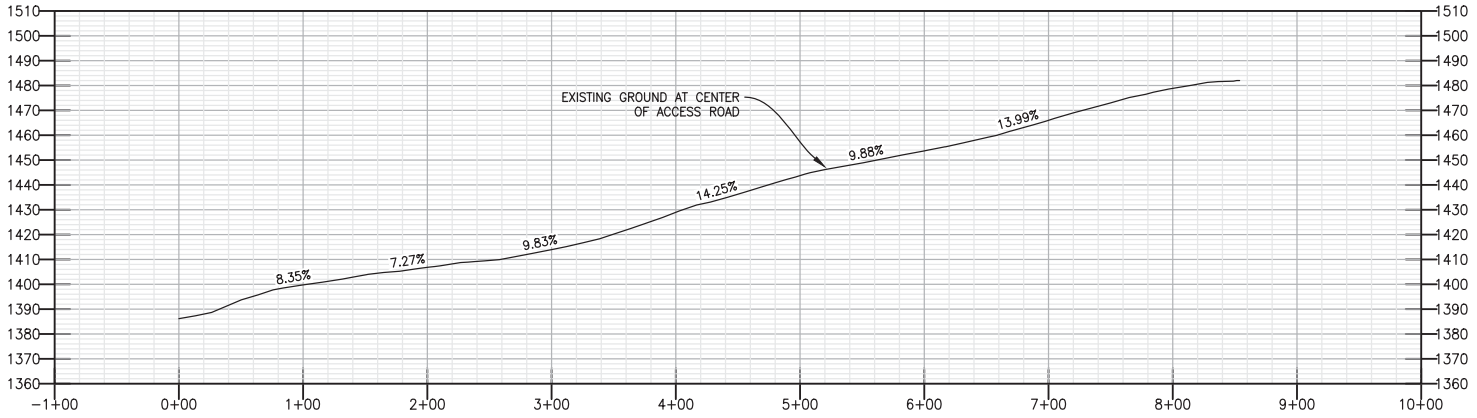


TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

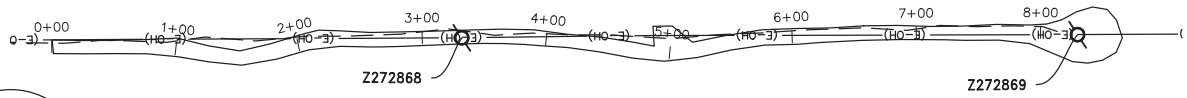
SHEET 23

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #21

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



LEGEND

- CNF ACCESS ROADS
- OVERHEAD POWER LINES (E-OH)
- POWER POLES Z30610
- ROAD SEGMENT EVALUATED

SCALE : 1"=100'

100 50 0 100 200 300

GRAPHIC SCALE IN FEET

PLAN-ROAD REACH #21

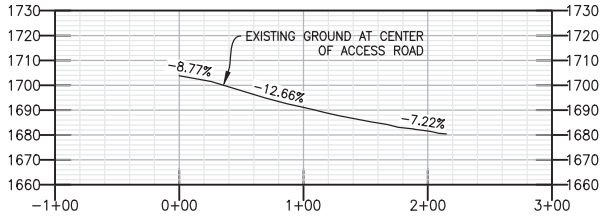
SCALE: 1" = 100'

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

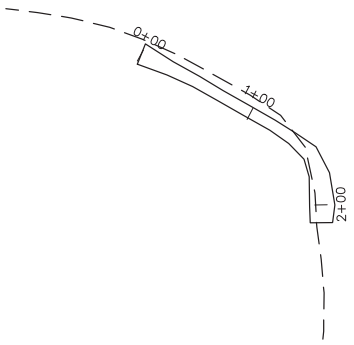
SHEET 24

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



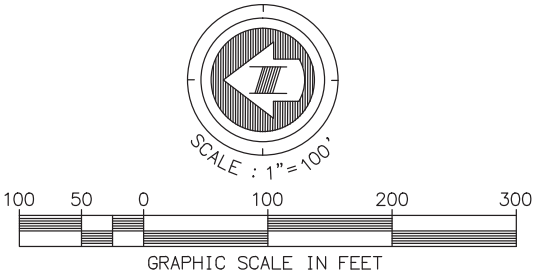
PROFILE-ROAD REACH #22

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #22

SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

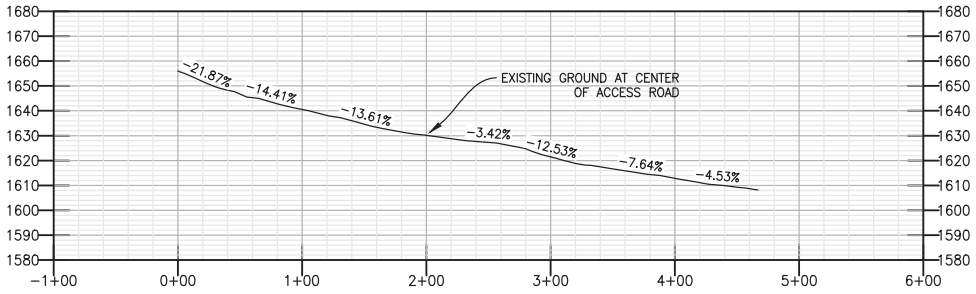
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

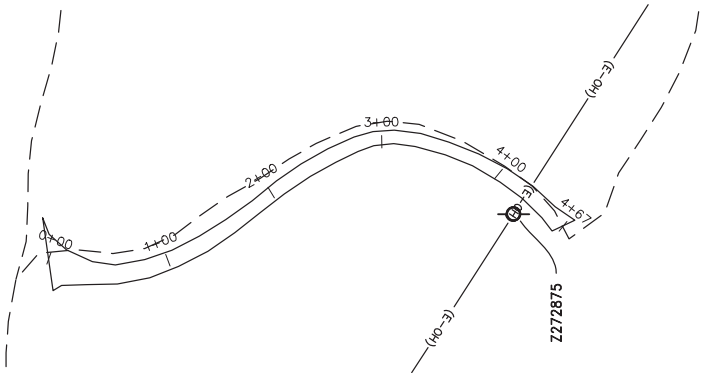
DATE: AUGUST 2016

SHEET 25

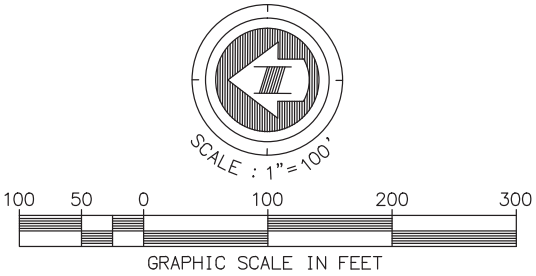
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #23
SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #23
SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

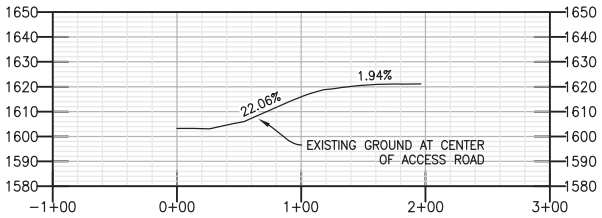
ROAD SEGMENT EVALUATED

TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

DATE: AUGUST 2016

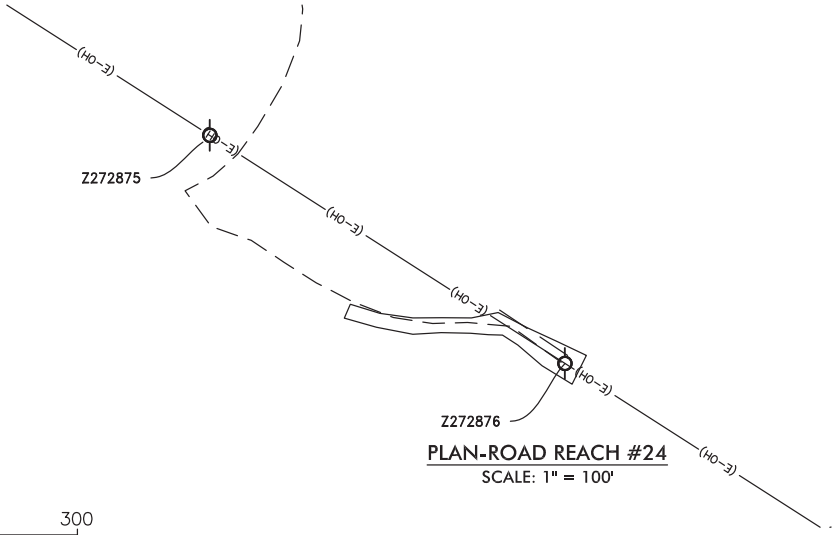
SHEET 26

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



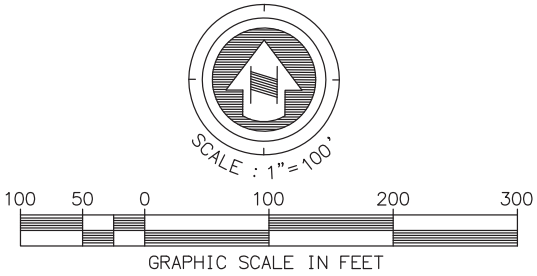
PROFILE-ROAD REACH #24

SCALE HORIZONTAL: 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #24

SCALE: 1" = 100'



LEGEND

CNF ACCESS ROADS

OVERHEAD POWER LINES (E-OH)

POWER POLES Z30610

ROAD SEGMENT EVALUATED

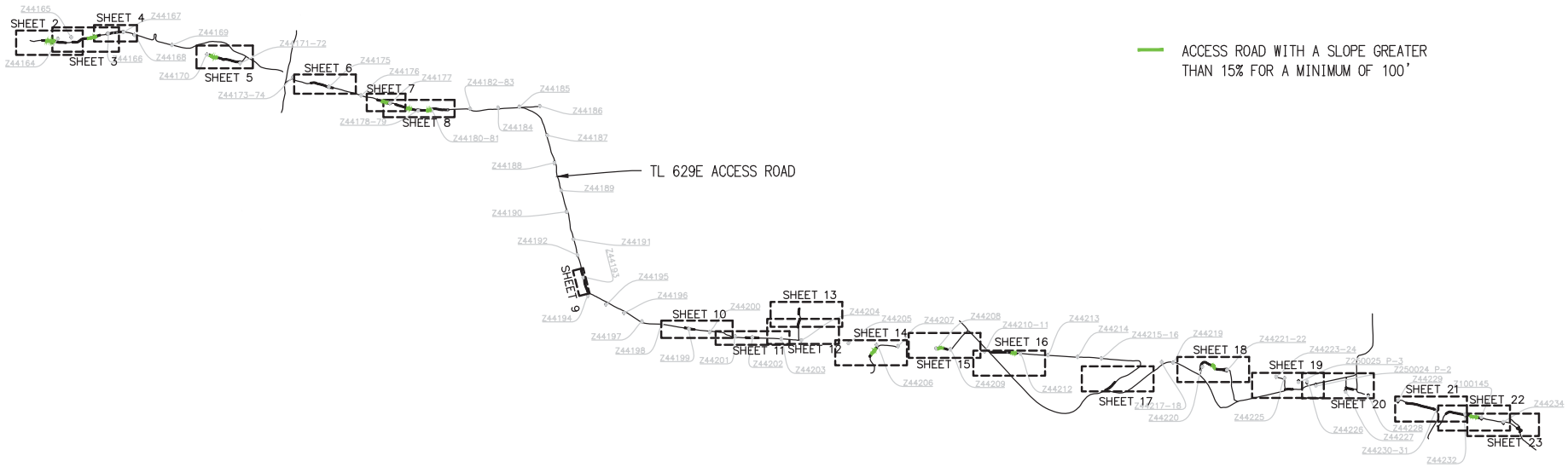
TL 625B
ACCESS ROAD EVALUATION
CENTERLINE PROFILES

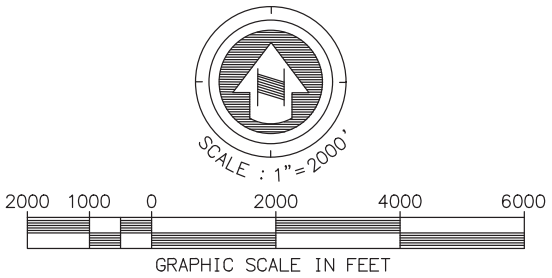
DATE: AUGUST 2016

SHEET 27

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 • fax 858.597.0335
www.fuscoe.com

TIE LINE 629E



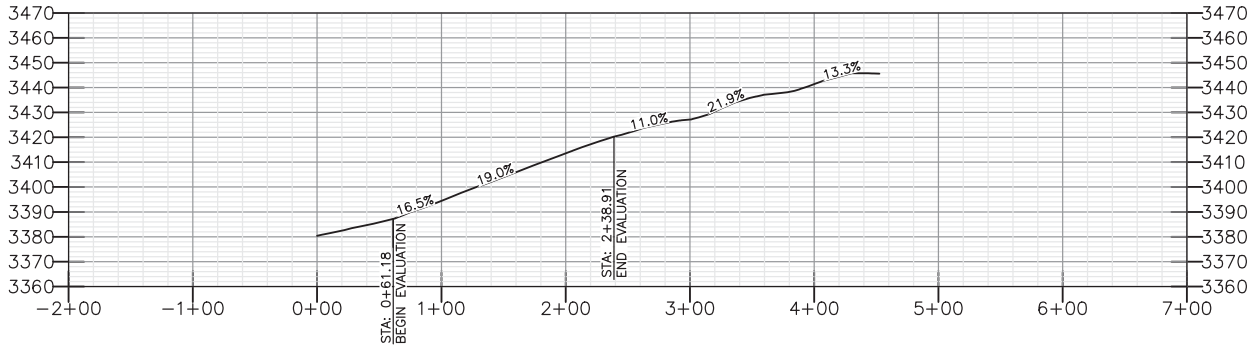


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

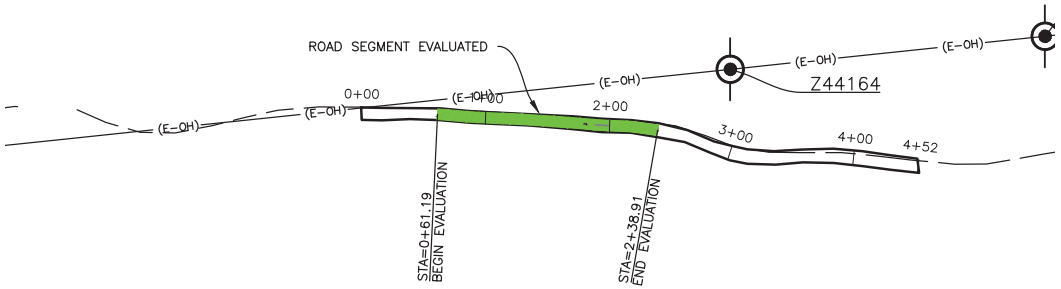
SHEET 1

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



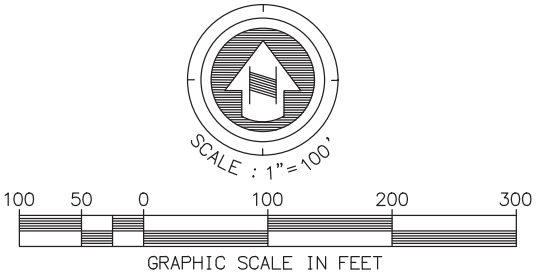
PROFILE-ROAD REACH #1

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #1

SCALE: 1"=100'

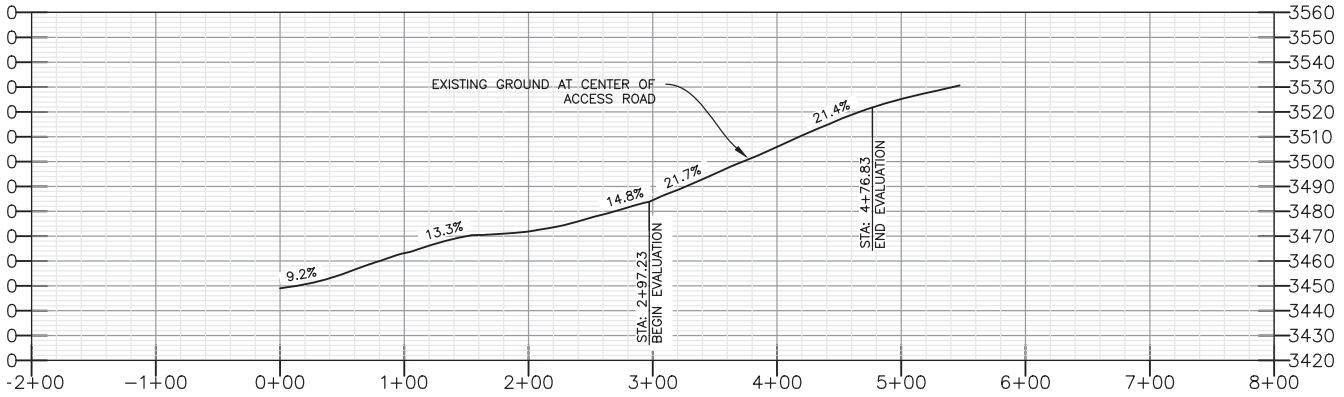


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

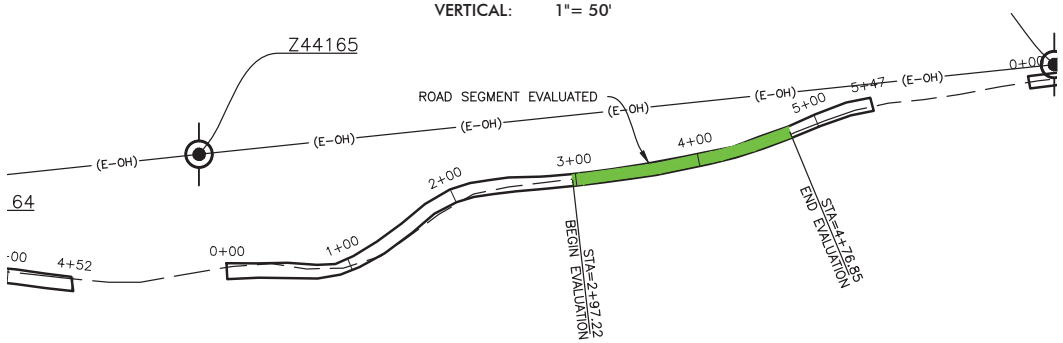
SHEET 2

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



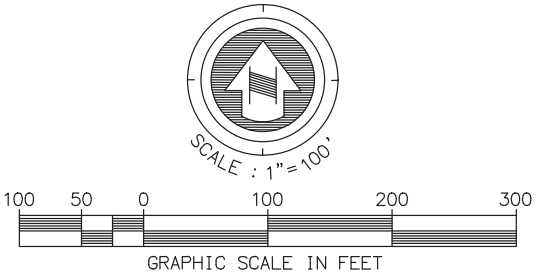
PROFILE-ROAD REACH #2

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #2

SCALE: 1"=100'

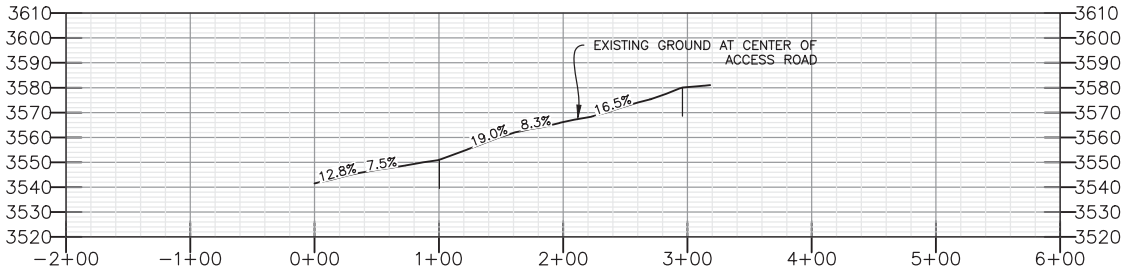


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

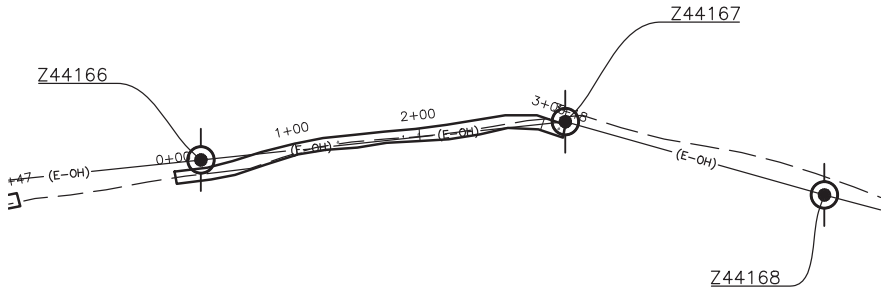
DATE: AUGUST 2016

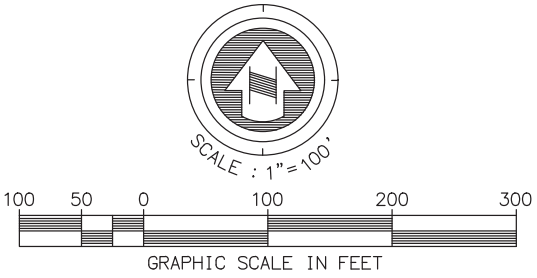
SHEET 3

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #3
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'





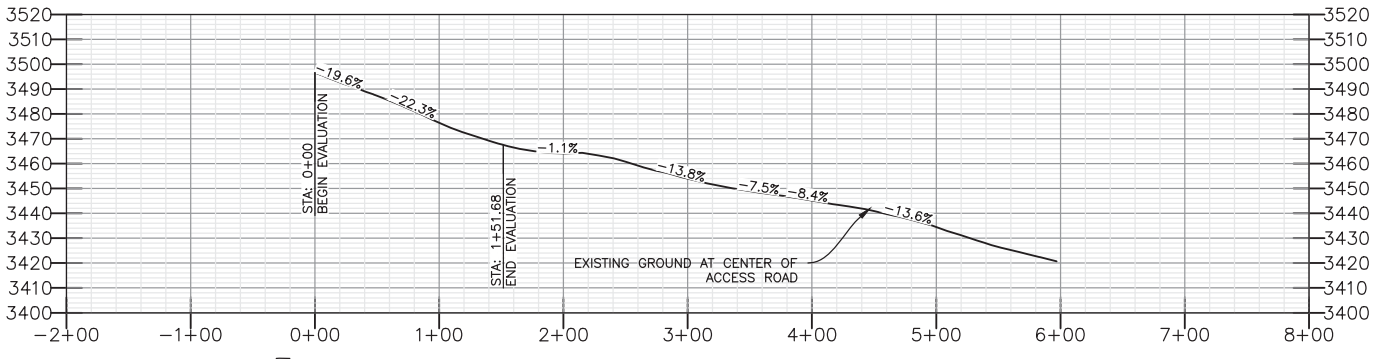
PLAN-ROAD REACH #3
SCALE: 1"=100'

TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

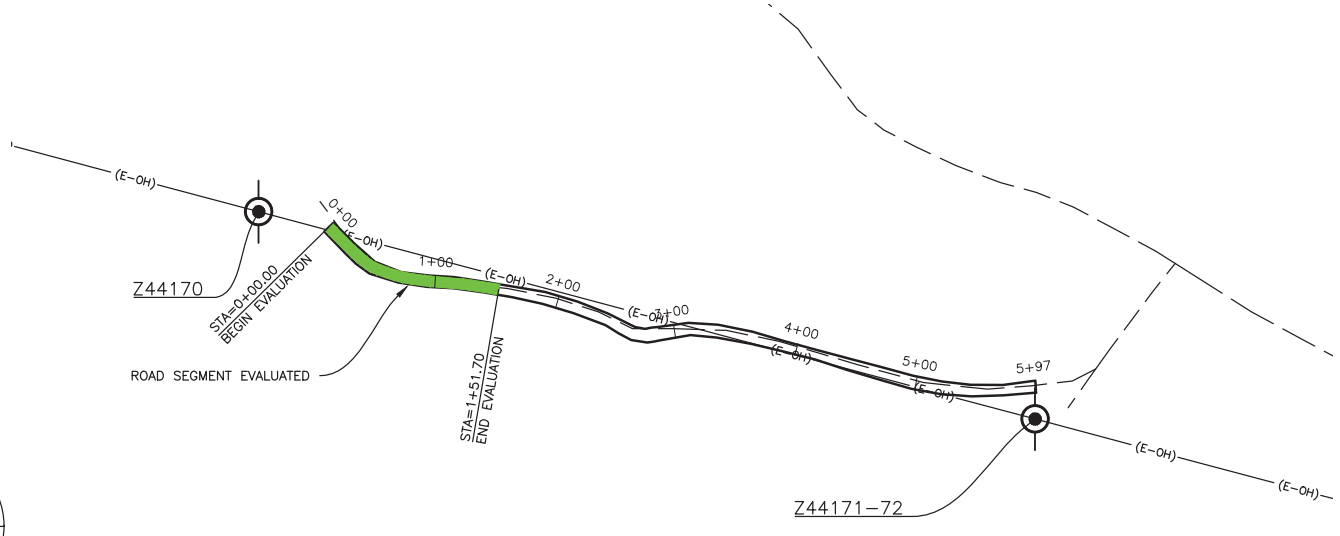
DATE: AUGUST 2016

SHEET 4

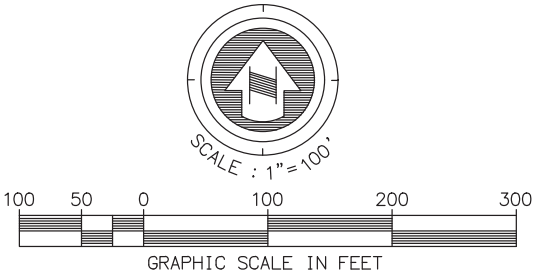
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #4
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #4
SCALE: 1"=100'

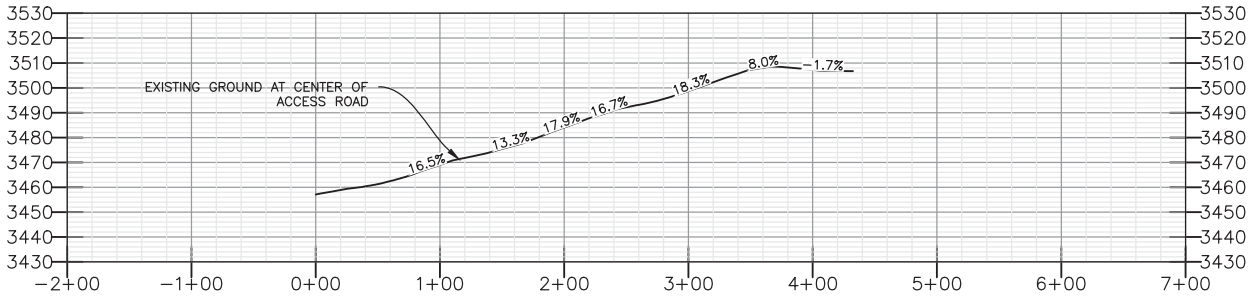


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

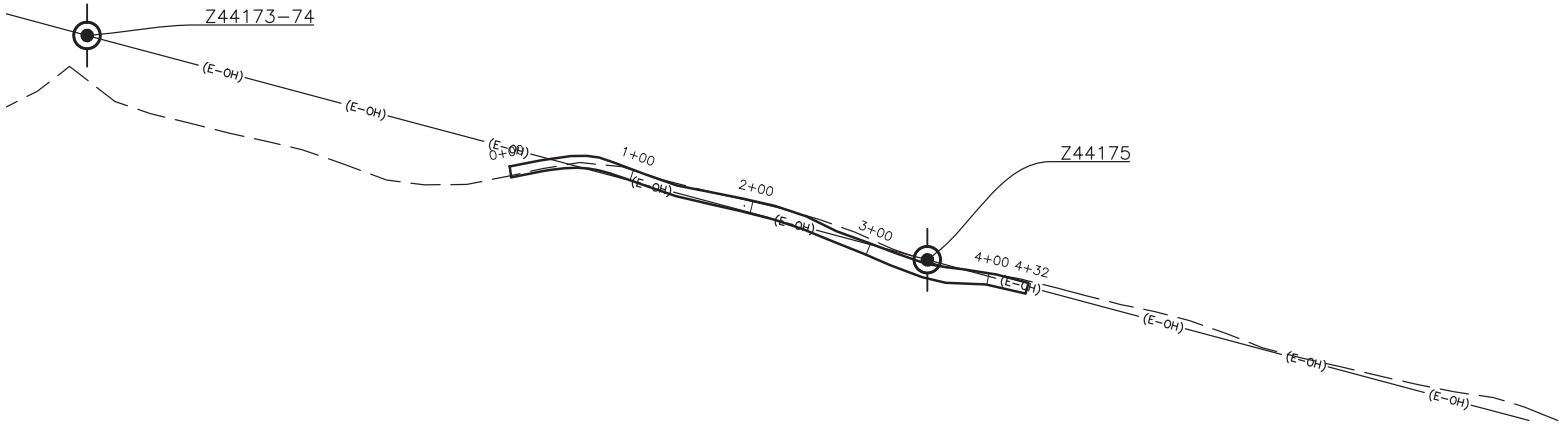
DATE: AUGUST 2016

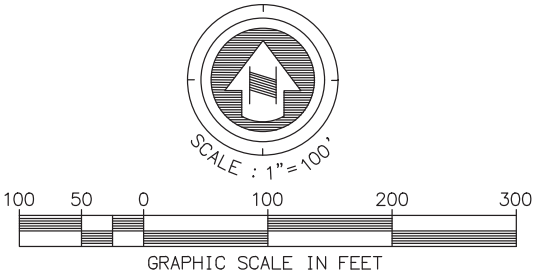
SHEET 5

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #5
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'





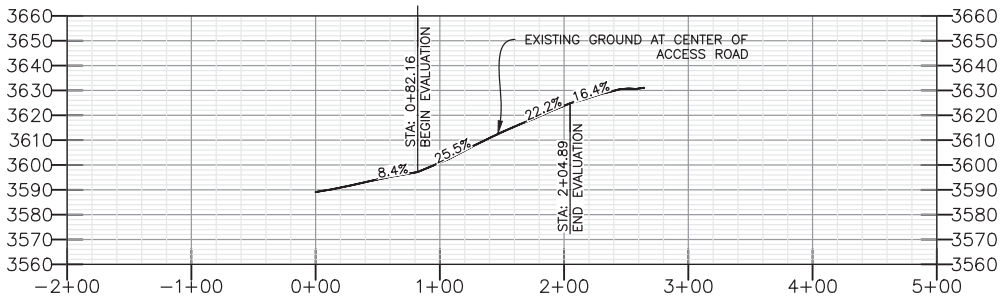
PLAN-ROAD REACH #5
SCALE: 1"=100'

TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

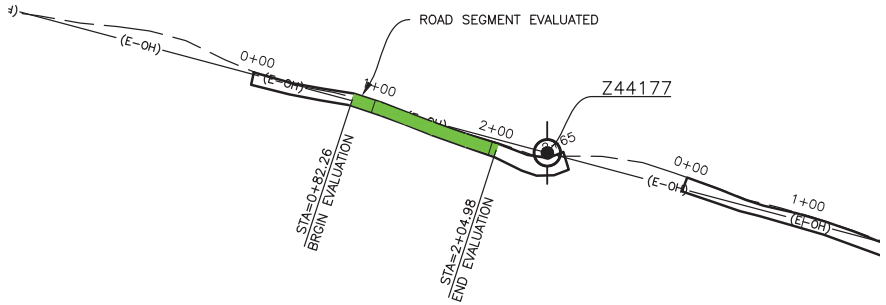
SHEET 6

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



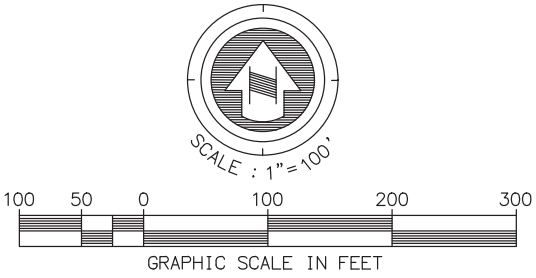
PROFILE-ROAD REACH #6

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #6

SCALE: 1"=100'

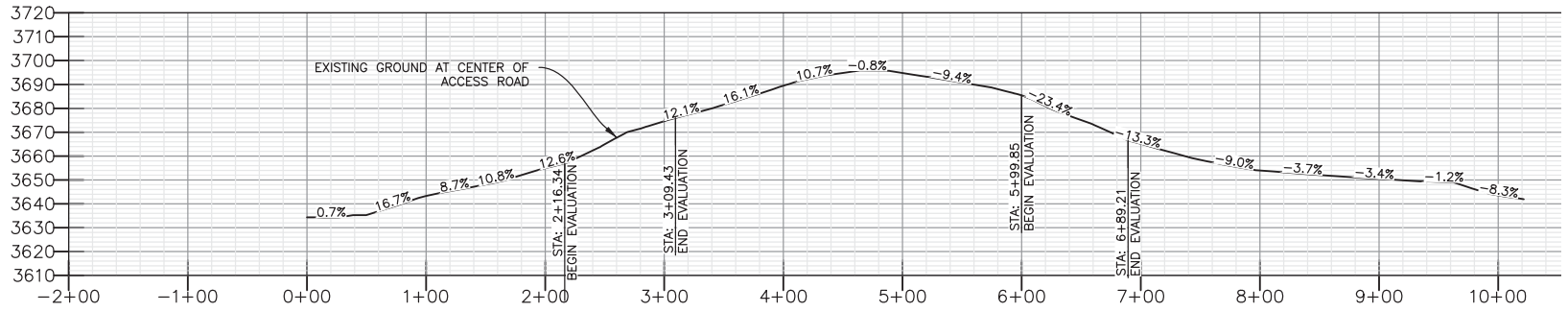


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

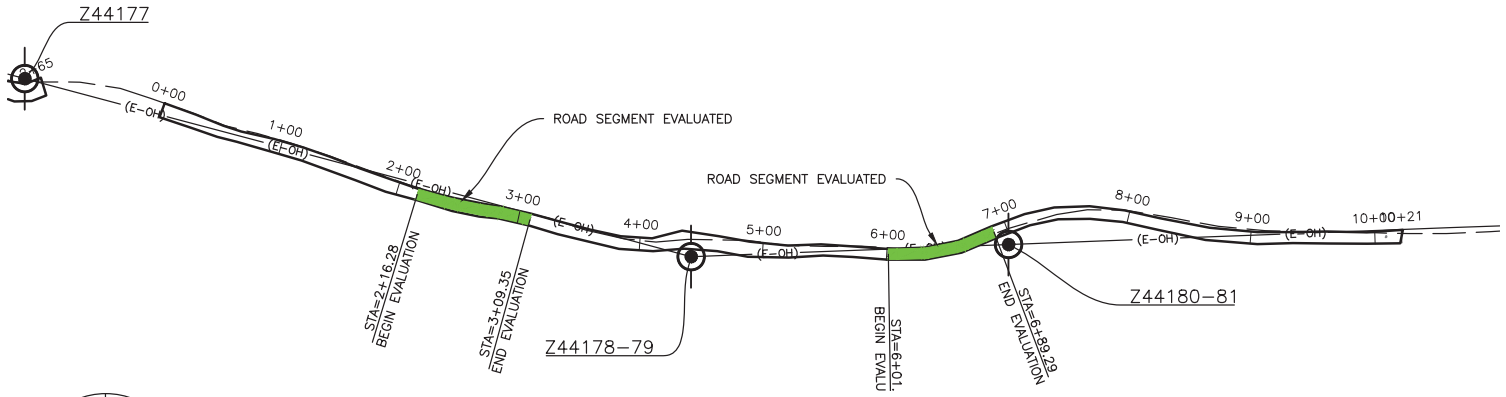
SHEET 7

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



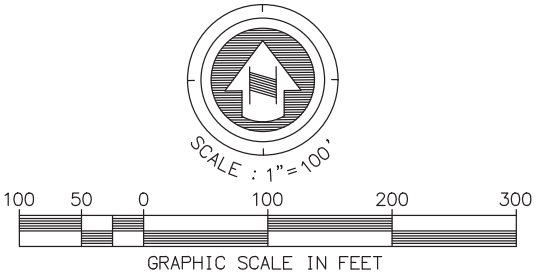
PROFILE-ROAD REACH #7

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #7

SCALE: 1"=100'

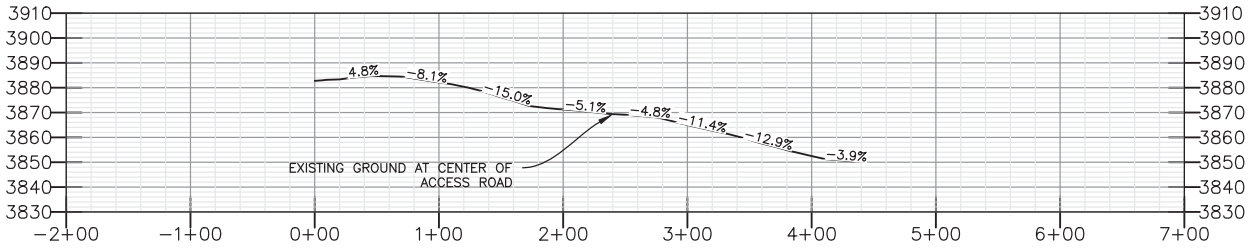


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

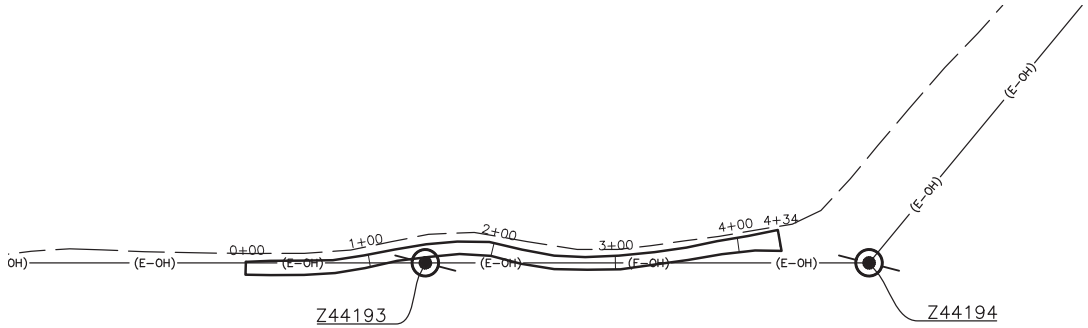
DATE: AUGUST 2016

SHEET 8

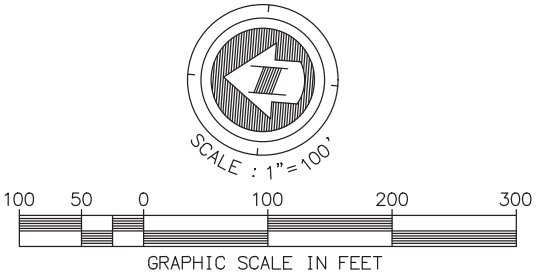
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #8
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #8
SCALE: 1"=100'

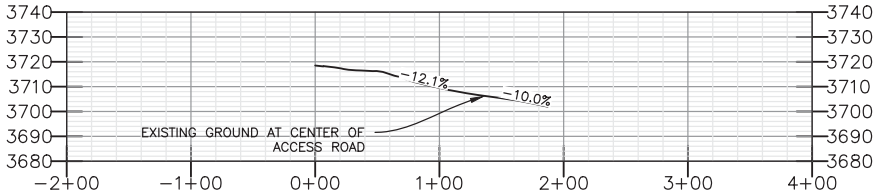


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

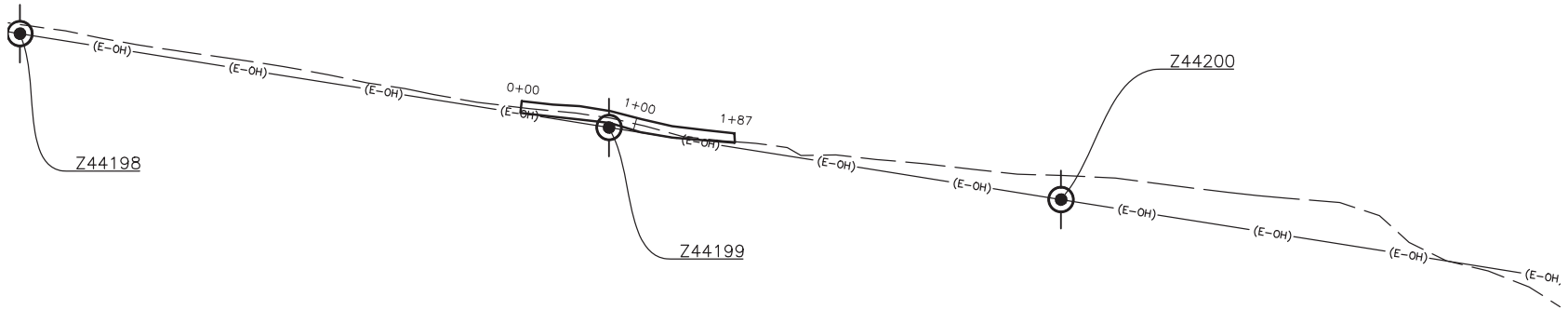
DATE: AUGUST 2016

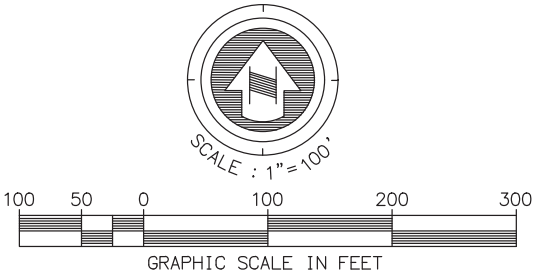
SHEET 9

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #9
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'





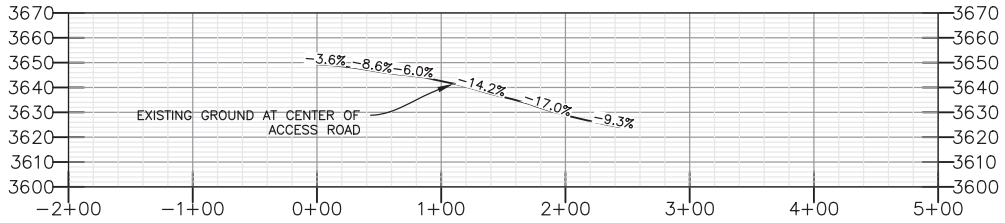
PLAN-ROAD REACH #9
SCALE: 1"=100'

TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

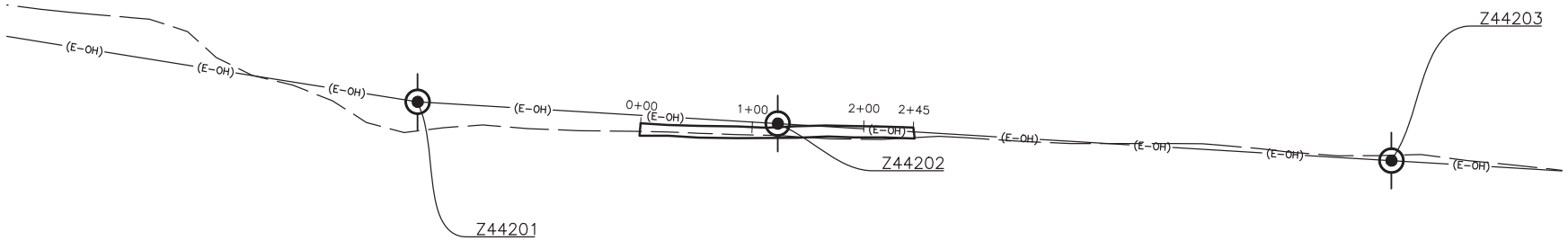
DATE: AUGUST 2016

SHEET 10

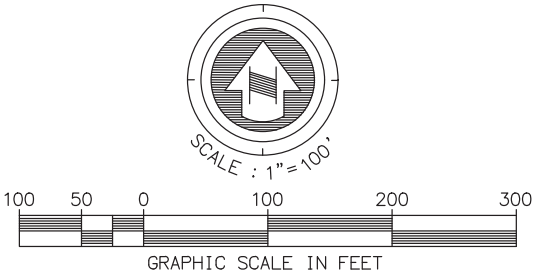
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #10
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #10
SCALE: 1"=100'

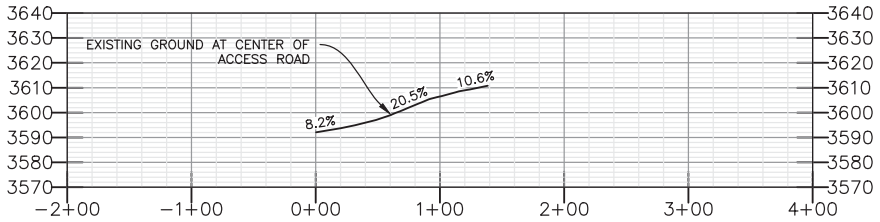


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

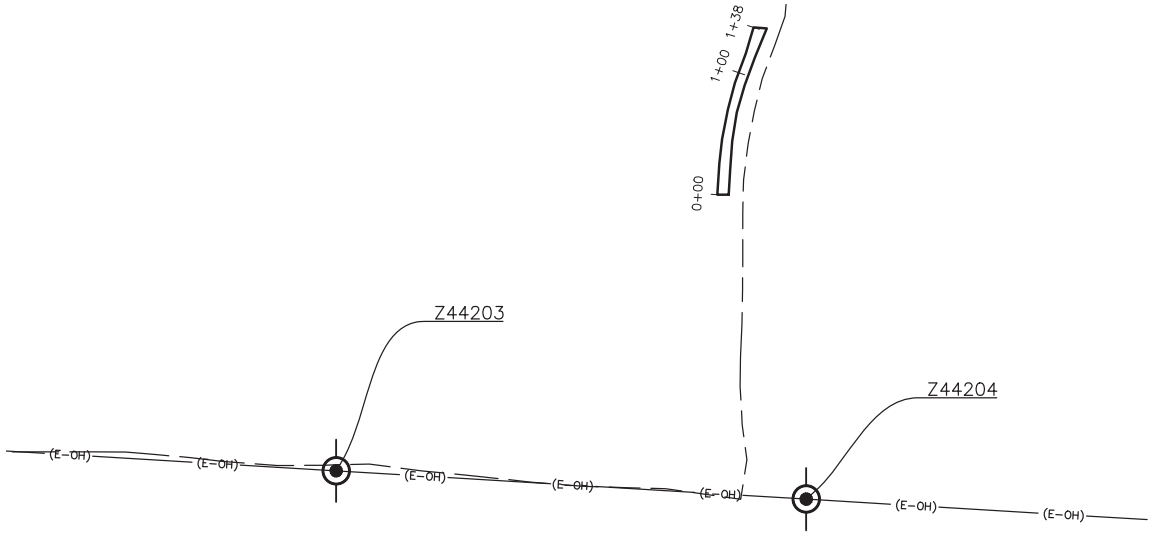
SHEET 11

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



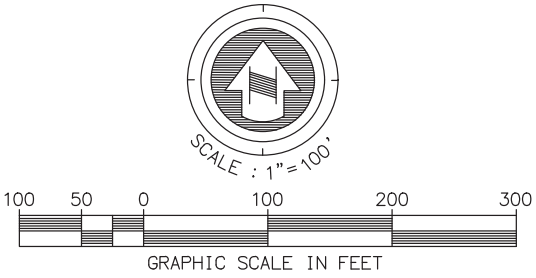
PROFILE-ROAD REACH #12

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #12

SCALE: 1"=100'

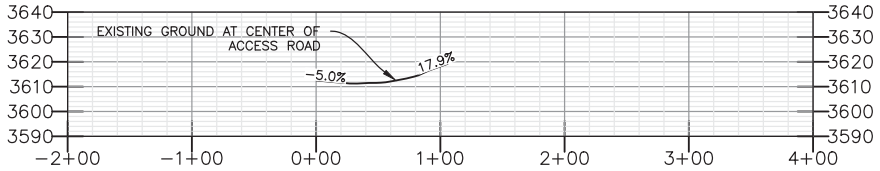


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

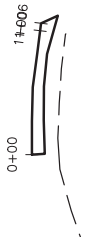
DATE: AUGUST 2016

SHEET 12

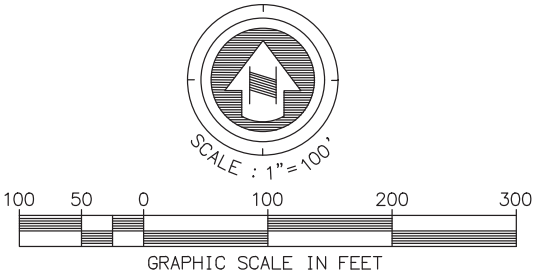
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #11
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #11
SCALE: 1"=100'

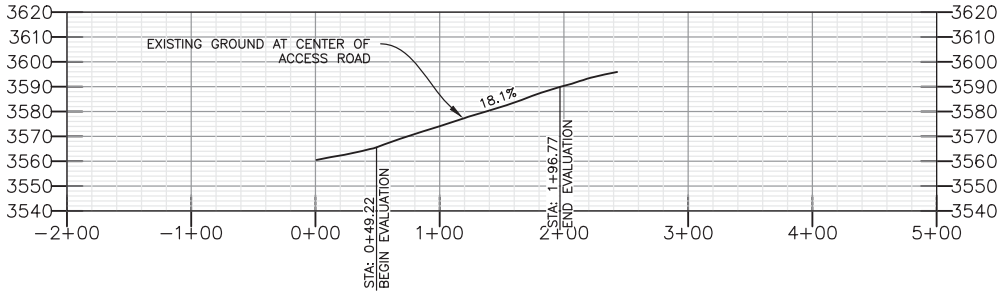


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

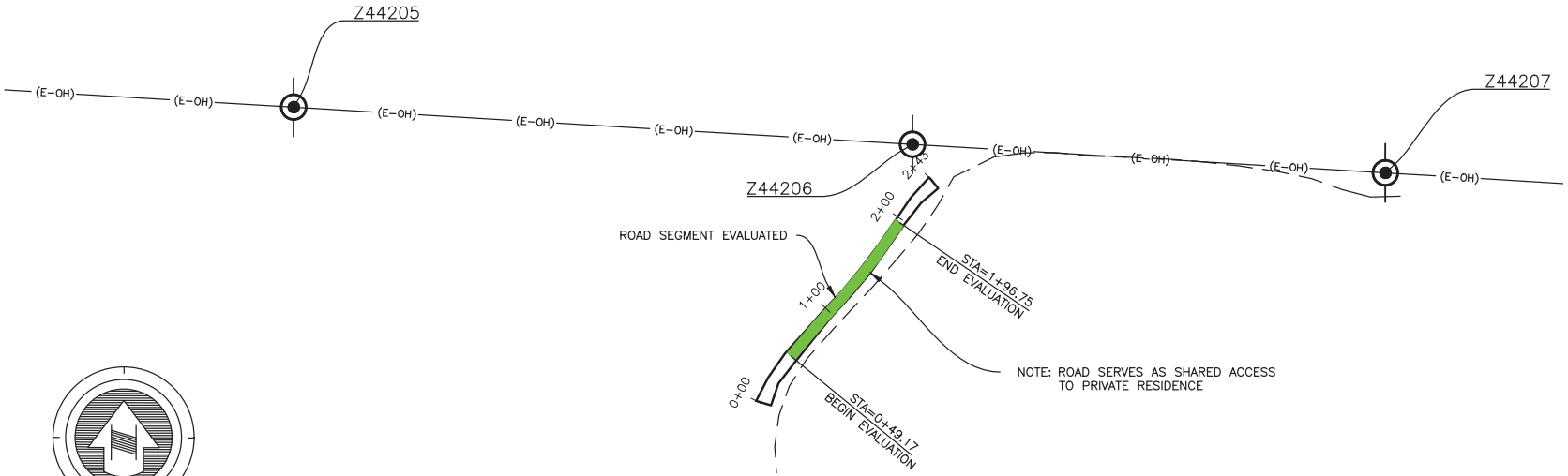
DATE: AUGUST 2016

SHEET 13

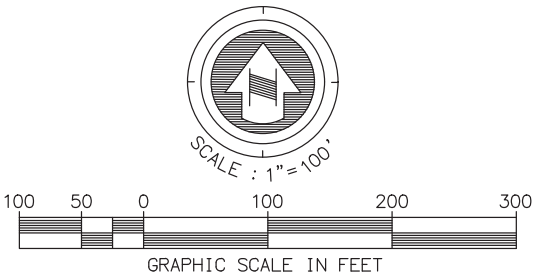
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #13
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #13
SCALE: 1"=100'

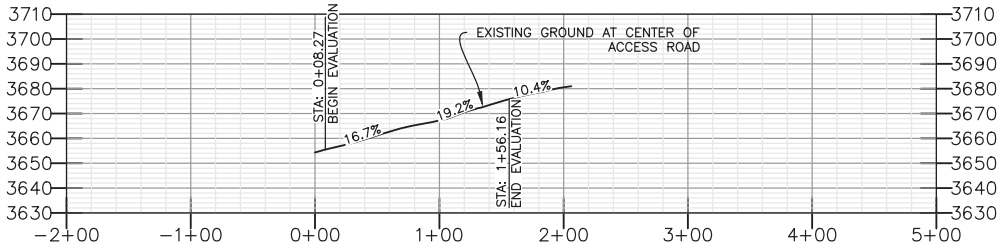


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

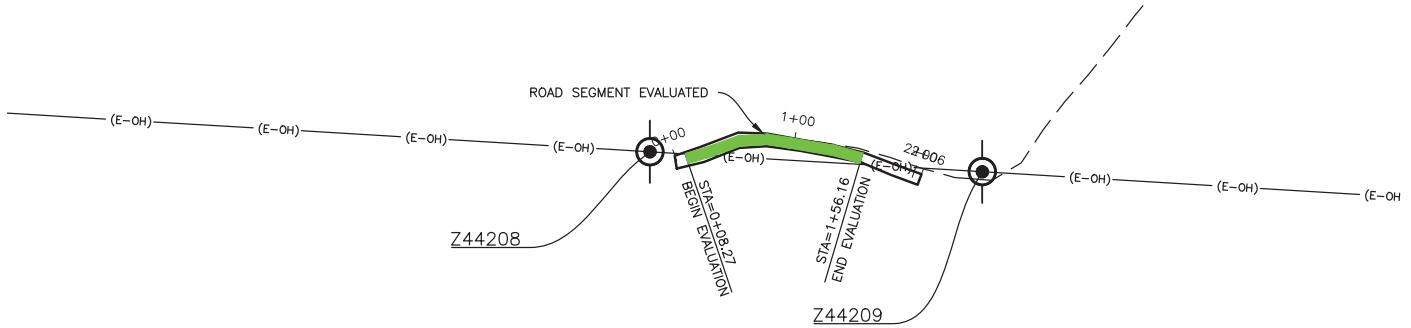
DATE: AUGUST 2016

SHEET 14

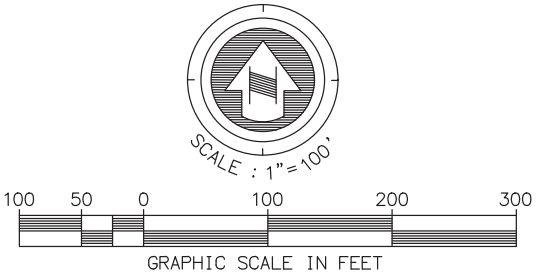
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #14
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #14
SCALE: 1"=100'

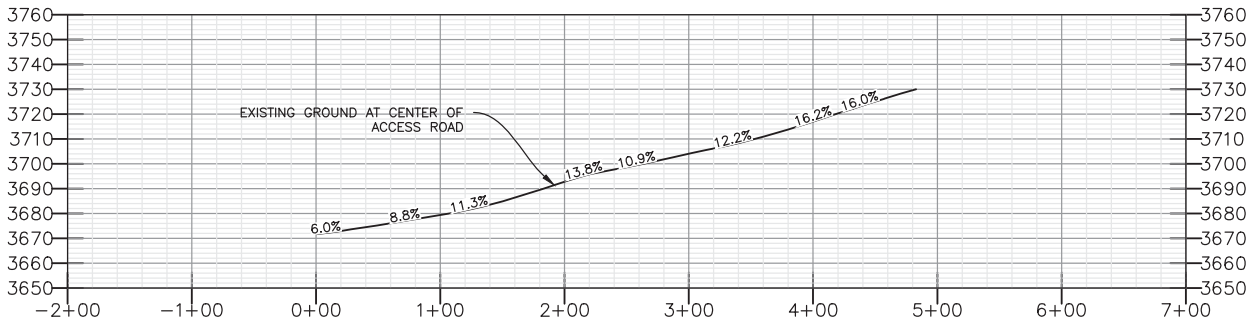


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

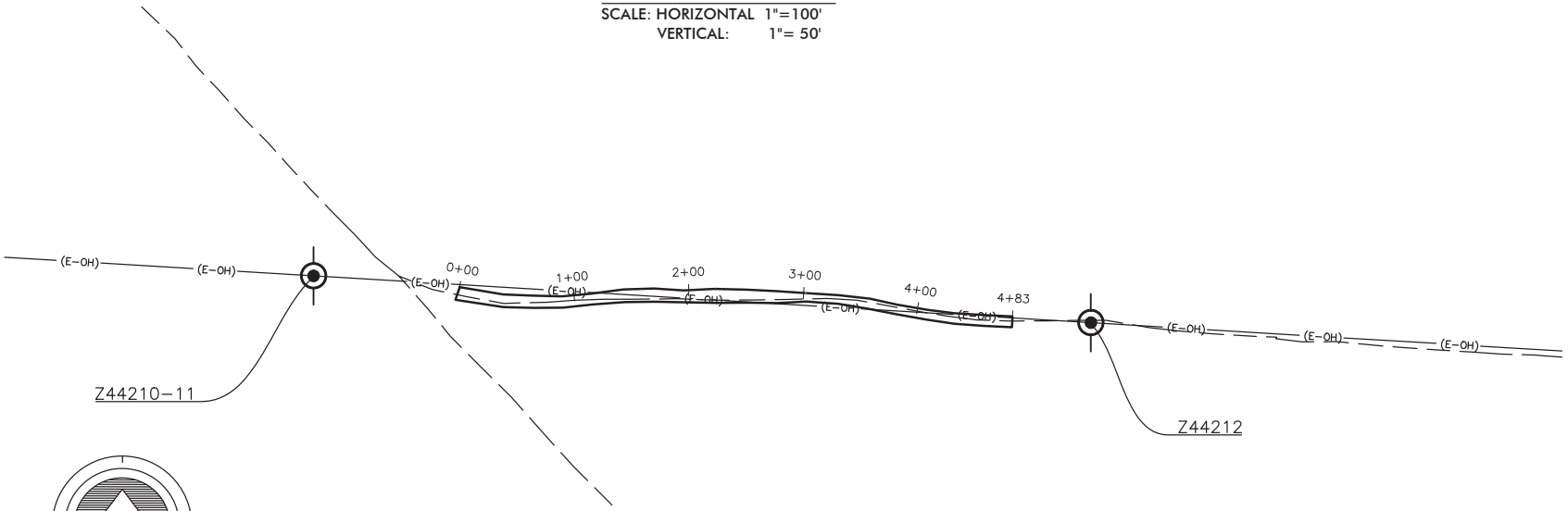
DATE: AUGUST 2016

SHEET 15

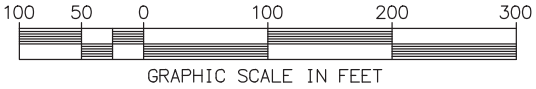
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #15
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #15
SCALE: 1"=100'

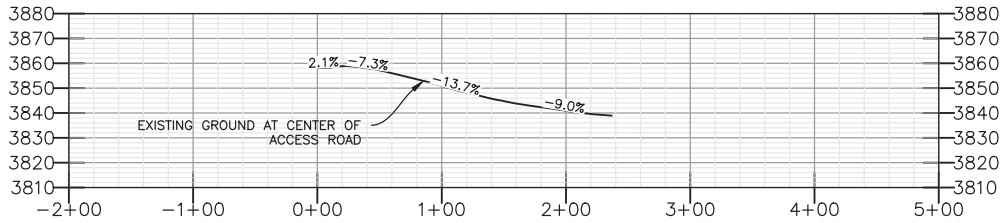


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

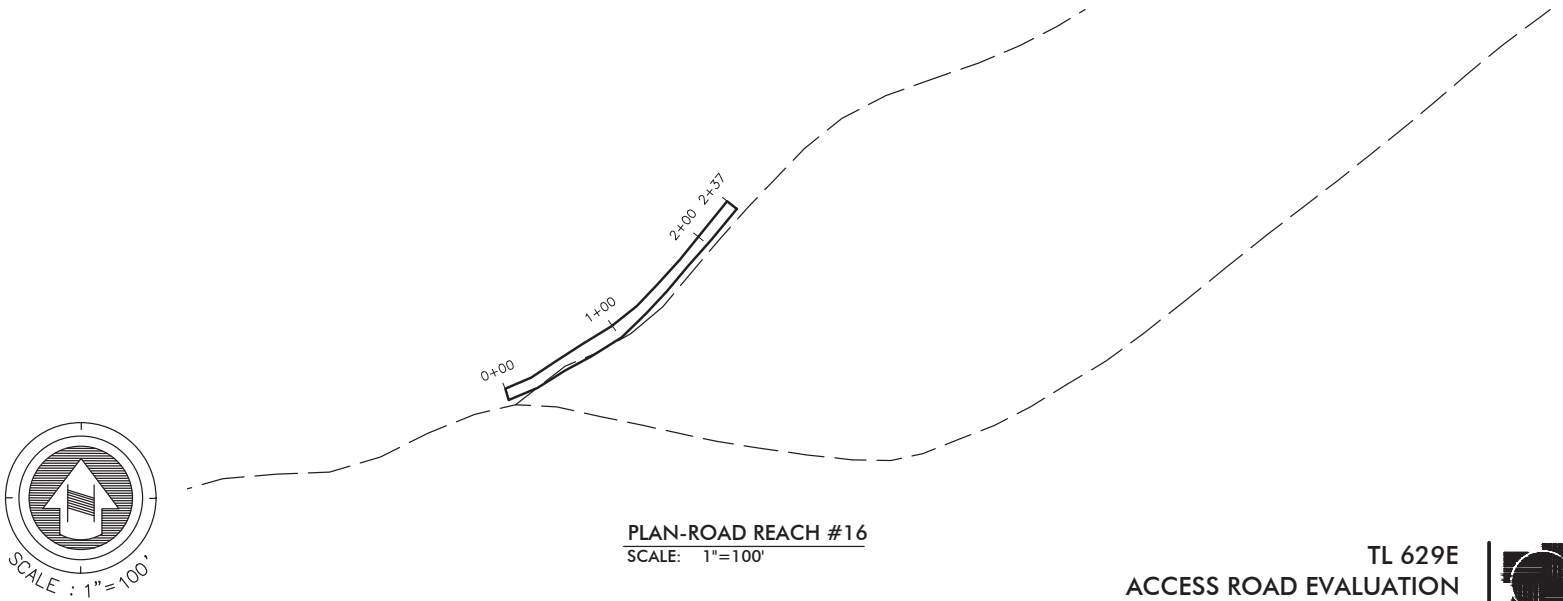
DATE: AUGUST 2016

SHEET 16

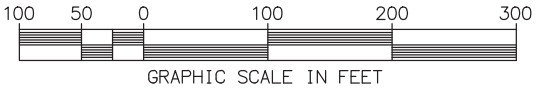
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #16
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #16
SCALE: 1"=100'

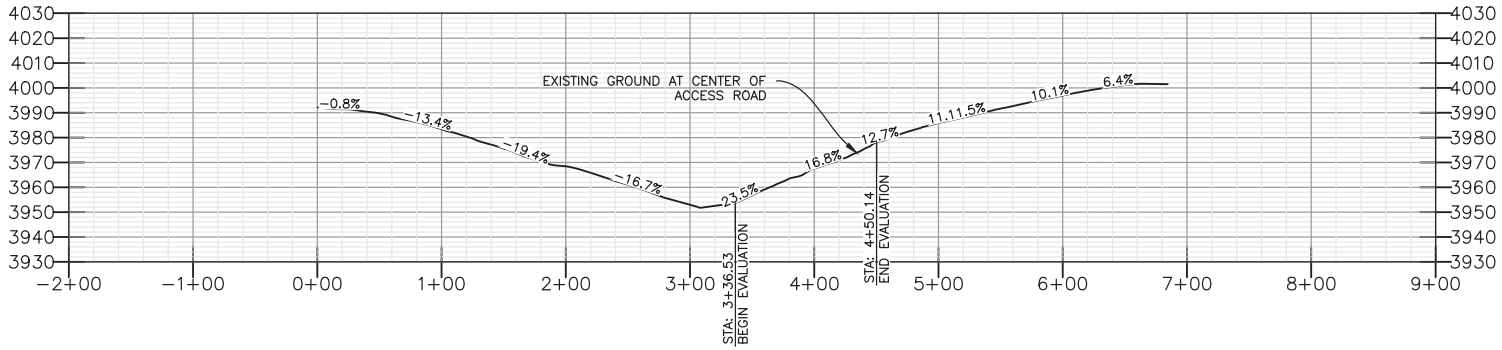


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

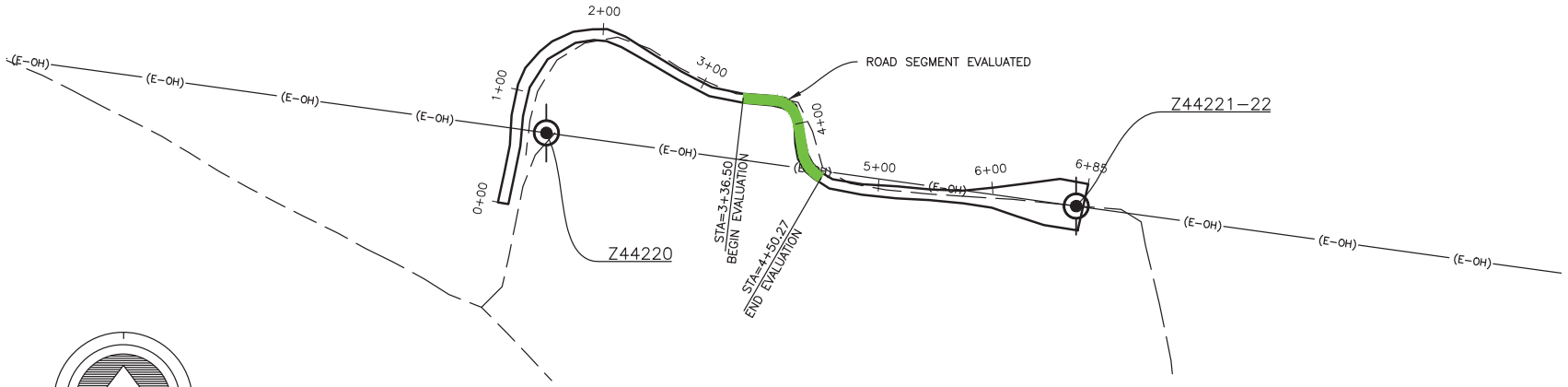
DATE: AUGUST 2016

SHEET 17

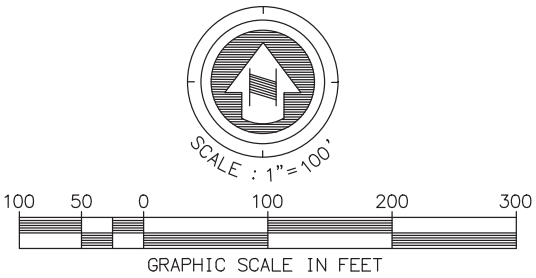
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #17
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #17
SCALE: 1"=100'

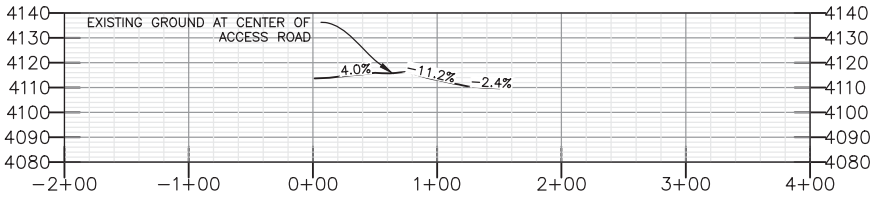


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

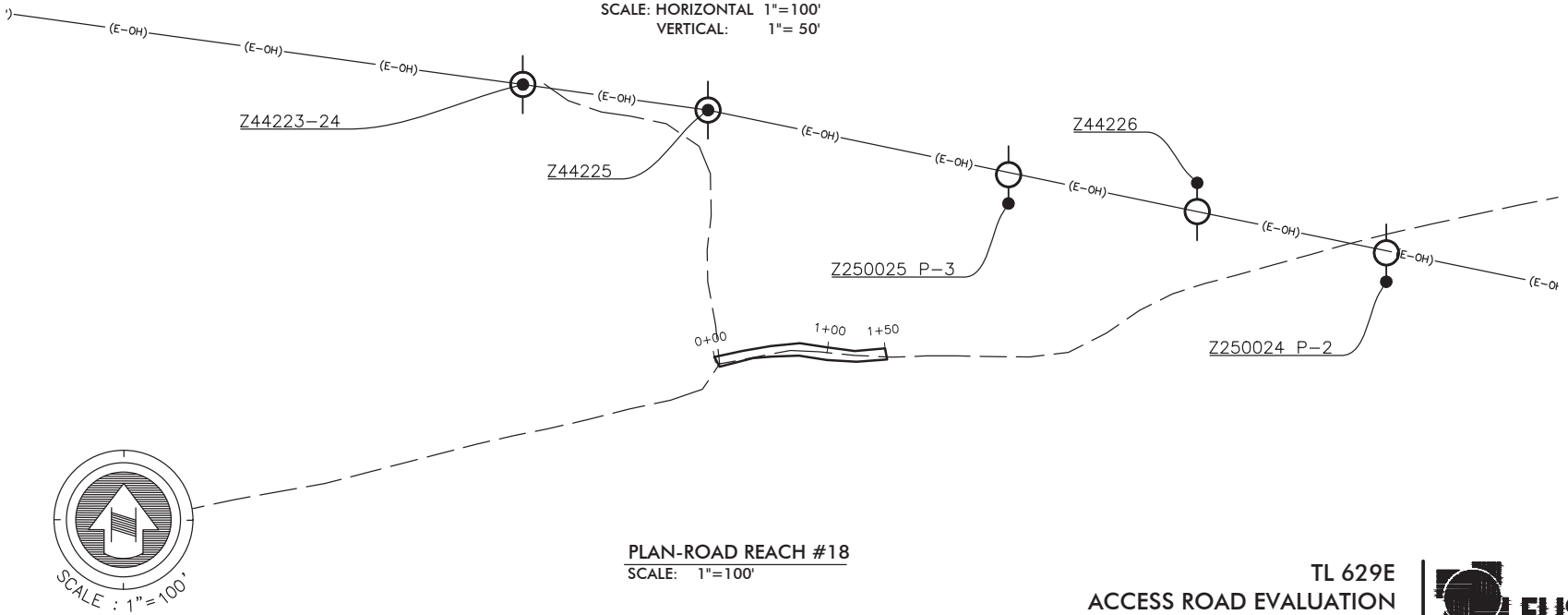
DATE: AUGUST 2016

SHEET 18

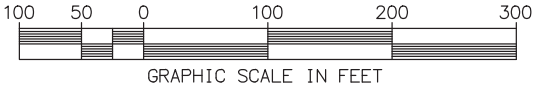
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ❖ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #18
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #18
SCALE: 1"=100'

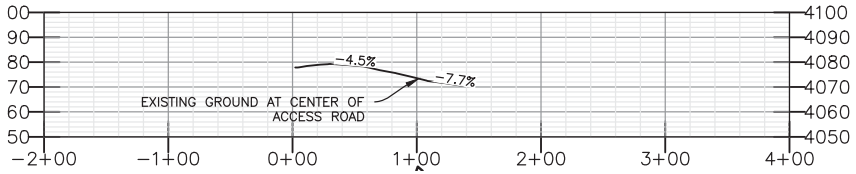


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

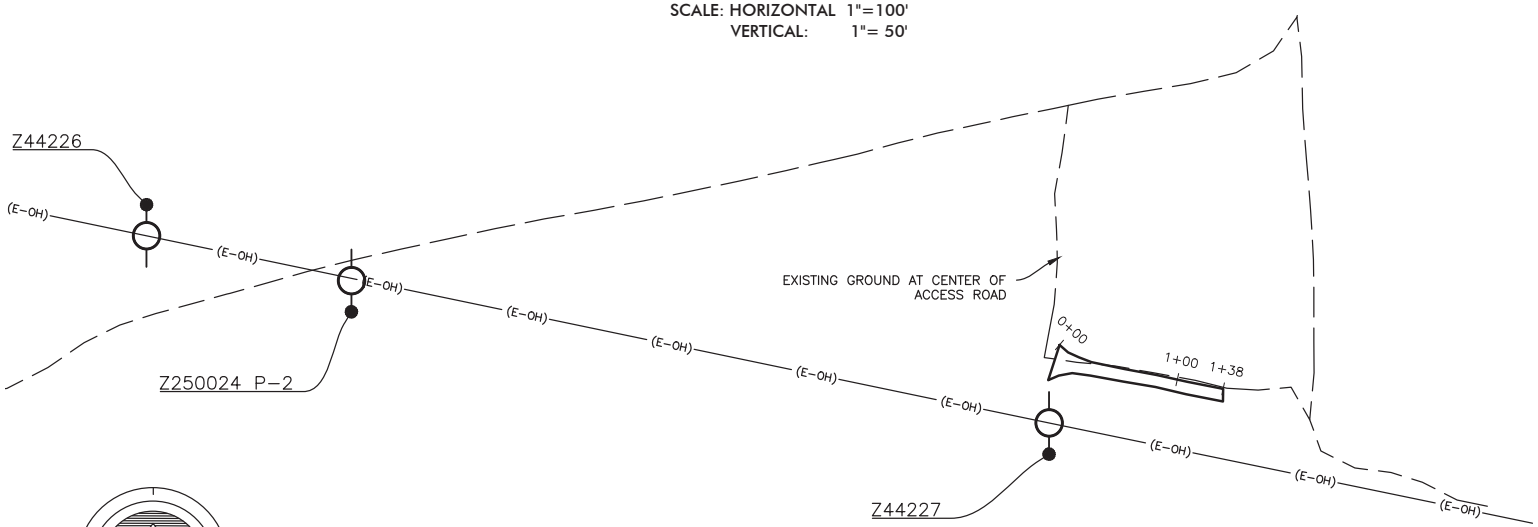
SHEET 19

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



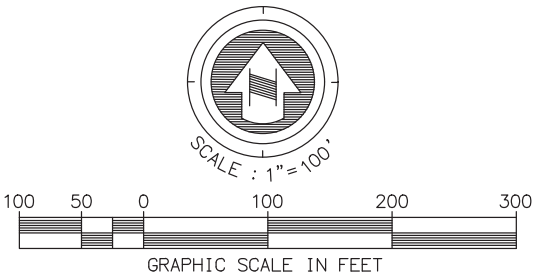
PROFILE-ROAD REACH #19

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #19

SCALE: 1"=100'

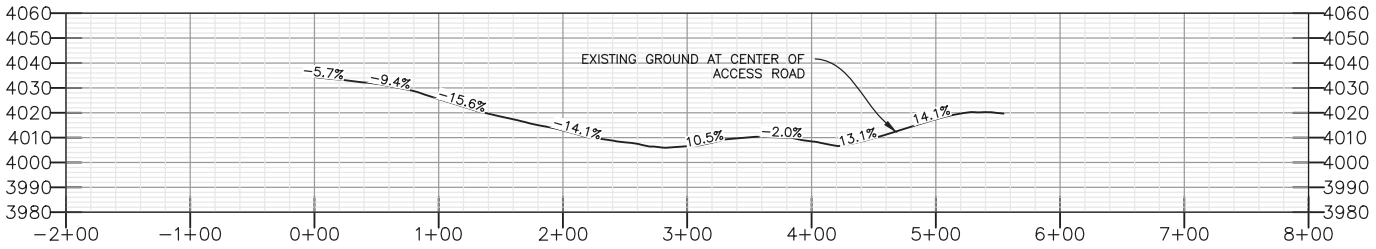


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

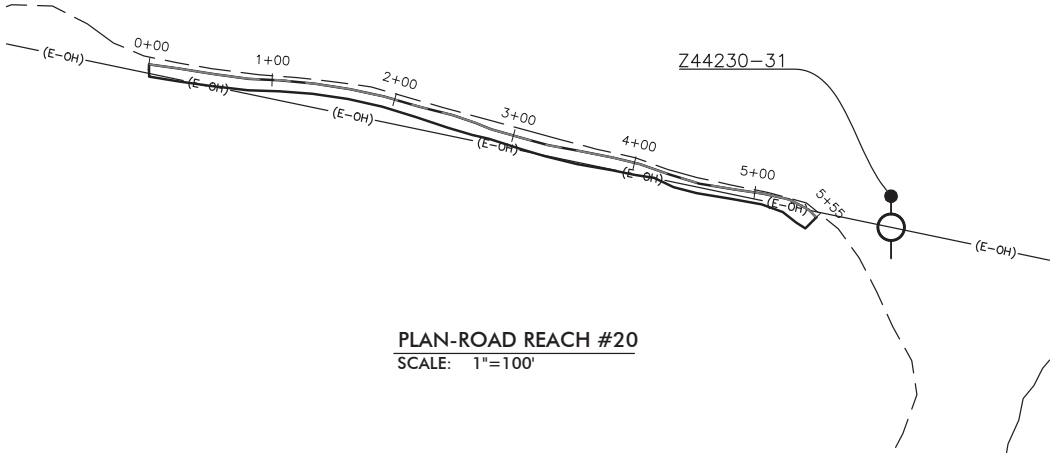
DATE: AUGUST 2016

SHEET 20

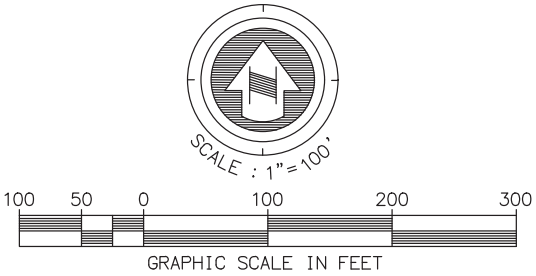
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #20
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #20
SCALE: 1"=100'

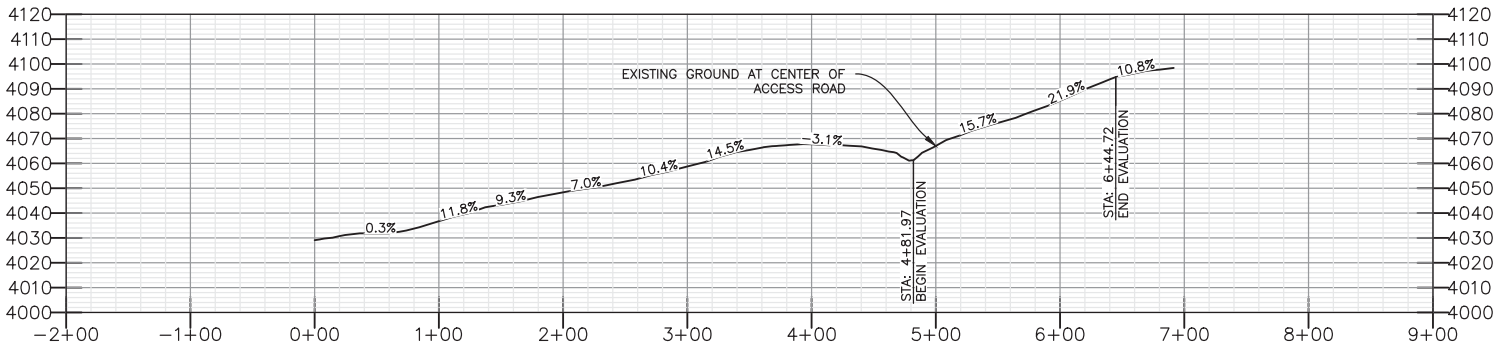


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

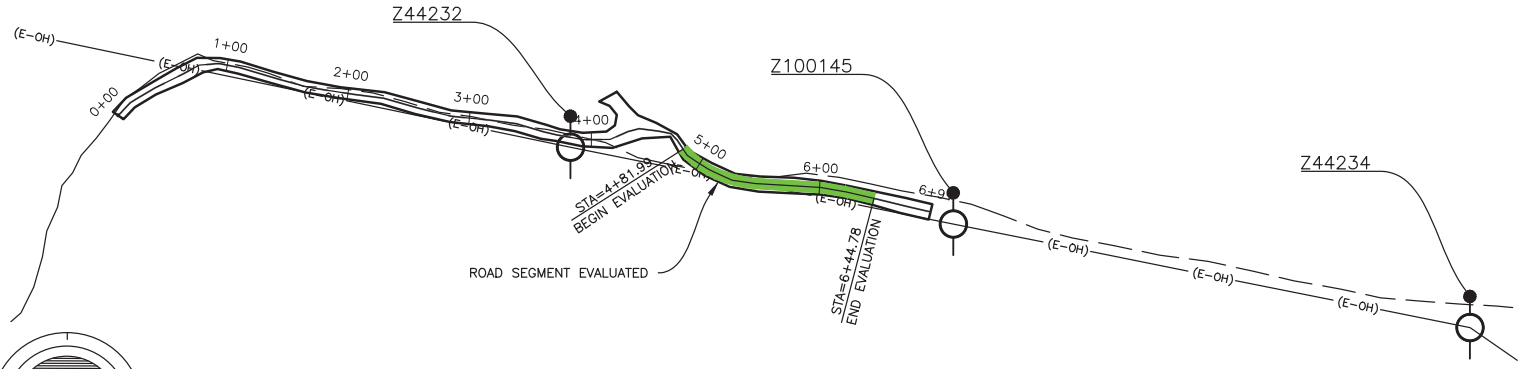
DATE: AUGUST 2016

SHEET 21

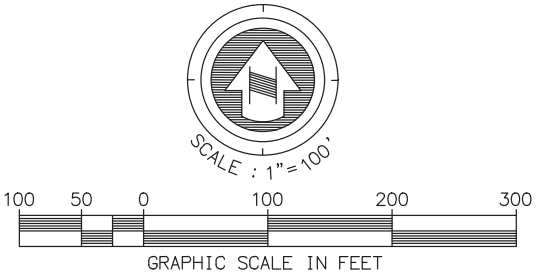
FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



PROFILE-ROAD REACH #21
SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #21
SCALE: 1"=100'

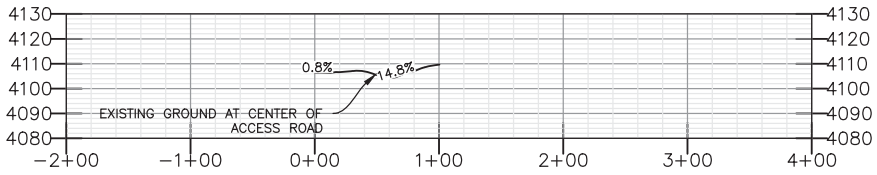


TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

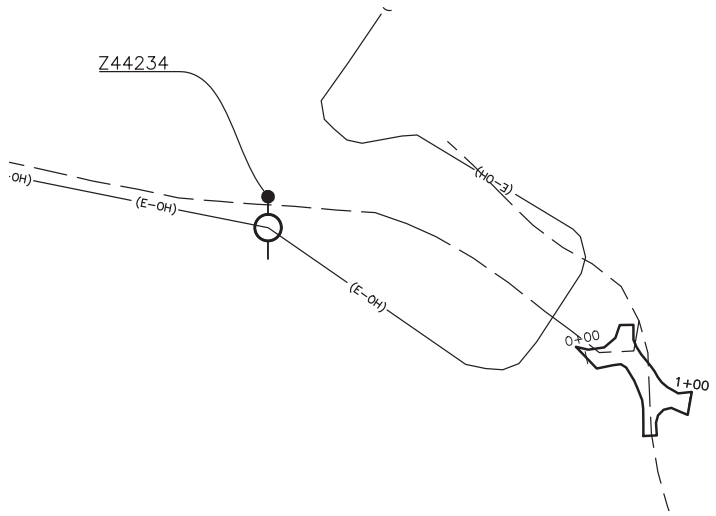
SHEET 22

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ◆ fax 858.597.0335
www.fuscoe.com



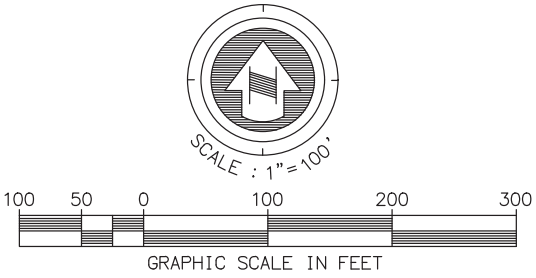
PROFILE-ROAD REACH #22

SCALE: HORIZONTAL 1"=100'
VERTICAL: 1"= 50'



PLAN-ROAD REACH #22

SCALE: 1"=100'



TL 629E
ACCESS ROAD EVALUATION
CENTERLINE PROFILE

DATE: AUGUST 2016

SHEET 23

FUSCOE ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 ⋄ fax 858.597.0335
www.fuscoe.com