



January 30, 2018

Powder Cat Townhomes, LLC
c/o Mr. David Orr
11180 Sunrise Valley Drive, #300
Reston, VA 20191

IGES Project No. 02579-001

Subject: Supplemental Subsurface Assessment
Copper Crest West Townhomes
Summit Powder Mountain Resort
Weber County, Utah

Reference: IGES, Inc., 2017a, Geotechnical and Geologic Hazard Investigation, Copper Crest West, Summit Powder Mountain Resort, Weber County, Utah, Project No. 01628-022, dated January 16, 2017

Mr. Orr:

As requested, IGES has conducted a supplemental subsurface assessment to further evaluate subsurface conditions for the remaining units of the Copper Crest West Townhomes. The purpose of our work is to further quantify the elevation of various geologic units within the footprint of the townhomes, provide data with which the Client can more accurately estimate quantities with respect to over-excavation, and to provide supplemental recommendations for foundations, as warranted by the new data. The following letter provides a summary of our findings, conclusions, and recommendations.

Method of Study

On January 9, 2018, Mr. Peter Doumit, P.G. and Mr. David Glass, P.E., of IGES visited the site to assess further assess the subsurface conditions at the site. At the time of our visit IGES met with Mr. Tyler Orr, the Client's representative. Also on site was Mr. Greg Chambers, the excavator subcontracting for the Client. Several test pit locations had been surveyed and located with stakes by the project surveyor; elevation control was also provided.

At, or approximately near the pre-determined locations, test pits were excavated down to bedrock (Wasatch Formation). Utilizing a survey rod and known elevation points, the elevation of various earth strata was recorded, including:

- Contact between undocumented fill and underlying colluvium
- Contact between colluvium and bedrock

Since the presence of utilities precluded the ability to excavate the test pits at all of the exact pre-marked locations, for each test pit the location where the strata elevations were obtained was recorded with a hand-held GPS device.

Findings

The findings are summarized on the test pit logs/fence diagrams, attached. On the diagrams, the elevations of the various strata are recorded. Figure 1, attached, provides a *Geotechnical Map*, illustrating the locations of the test pits. These test pits have been located on the map based on GPS units and comparison with a Google Earth image – the project civil engineer should verify the accuracy of test pit location. It should be noted that the data obtained from Test Pit 4 was inconclusive, since this area appears to expose mostly fill from a utility trench.

To visualize the depth to various strata with respect to the proposed foundations, five cross-sections were prepared, designated A-A' through E-E', shown on Figure 1. Information regarding the elevation of the bottom of footings was evaluated based on Sheets S1.01, S1.02, S1.11, and S1.12 (Foundation Plans), prepared by Studio MA, dated June 1, 2017. The resultant cross-sections are illustrated on Sheet 1, attached. These sections illustrate the locations of footings with respect to the various strata contacts – the ground surface is not shown.

The building footprint is overlain by a few feet of undocumented fill. Underlying the fill, we observed coarse colluvium. This unit was of variable character, grading from clayey gravel to gravel and cobbles with minimal matrix material. For some colluvium, voids could be seen between the cobble-size rocks – this likely represents a buried talus deposit. This material appeared loose, and readily raveled from the test pit walls. Also, topsoil was observed underlying the undocumented fill; the thickness of the topsoil was variable, ranging from negligible to as much as 10 inches locally.

Conclusions and Recommendations

Based on our observations, placing the proposed townhomes on conventional spread footings is feasible. However, at some locations, the depth of undocumented fill underlying proposed foundations is as deep as 3½ feet. In many locations, the foundations are underlain by a sliver of undocumented fill, and only partially penetrate into the underlying colluvium. At the currently proposed footing elevations, IGES does not anticipate the footings will bear directly on bedrock, except perhaps at very localized areas.

In consideration of our findings, IGES recommends the following:

- a) All undocumented fill and topsoil shall be removed from beneath structural elements. Removals shall extend 1 foot horizontally for every foot of depth below the bottom footing elevation.
- b) All foundation elements shall be underlain by a minimum of 2 feet of structural fill. It should be noted that the depth of structural fill may be greater, depending on the required over-excavation to remove deleterious earth materials, upwards of 4 feet in limited areas should be anticipated.
- c) Structural fill (as defined in IGES, 2017) shall consist of a coarse, granular material – excavated site material is largely expected to meet this criterion. Material classifying as topsoil is not suitable for use as structural fill; this material, where encountered, should be segregated, and must be kept out of the soil stockpiles to be utilized as structural fill.
- d) In consideration that the entire structure will be supported by a relatively uniform bearing stratum (granular structural fill), the allowable bearing capacity may be

increased to 3,700 psf. This is for live plus dead loads; the allowable bearing capacity may be increased by 1/3 for transient loads such as wind or seismic.

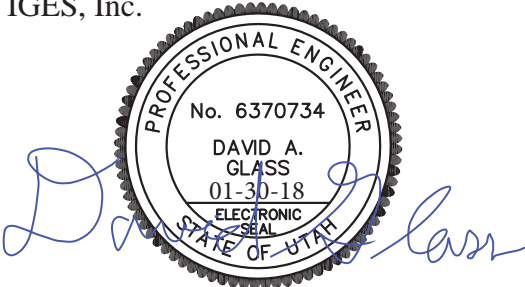
- e) Prior to placement of structural fill, the exposed subgrade shall be compacted in-place to approximately 92% of the Modified Proctor (ASTM D1557).
- f) An IGES representative should observe the foundation subgrade prior to placement of structural fill to assess removal of deleterious earth materials (undocumented fill, topsoil).

All other recommendations presented in our referenced geotechnical report remain valid and should be implemented into the design and construction of the project, except as superseded herein.

Closure

We appreciate the opportunity to provide you with our services. If you have any questions please contact the undersigned at your convenience (801) 748-4044.

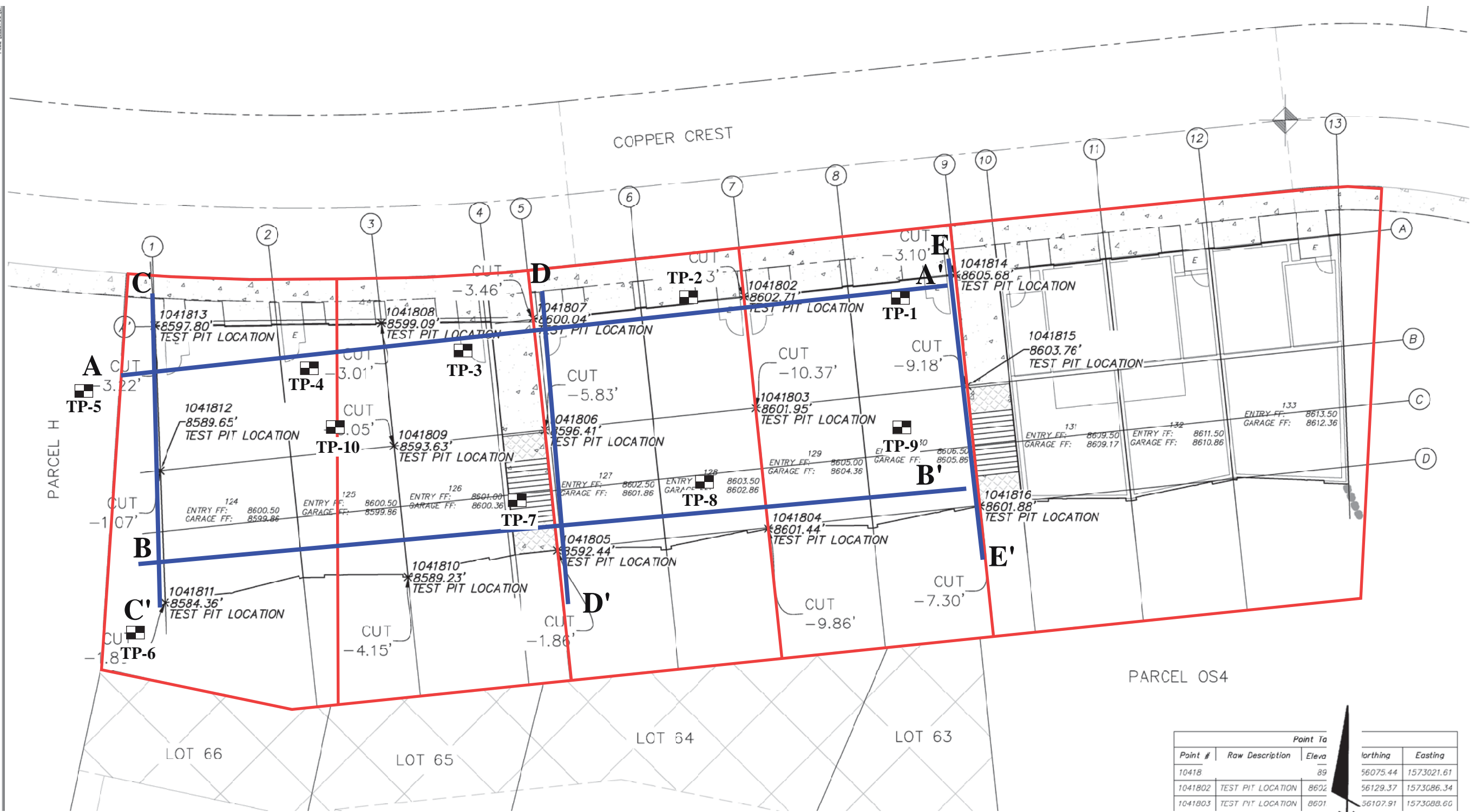
Respectfully Submitted,
IGES, Inc.



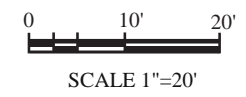
David A. Glass, P.E.
Senior Geotechnical Engineer

Attachment:

Figure 1 – Geotechnical Map
Test Pit Logs/Fence Diagram
Sheet 1 – Geotechnical Cross-Sections



Point To				
Point #	Raw Description	Eleva	Northing	Easting
10418		89	56075.44	1573021.61
1041802	TEST PIT LOCATION	8602	56129.37	1573086.34
1041803	TEST PIT LOCATION	8601	56107.91	1573088.60



Basemap: Sheet 1, "Powdercat Test Pit Locations", prepared by Talisman, dated 01-09-18



Project No. 02579-001

Supplemental Subsurface Data
 Copper Crest West Townhomes
 Summit Powder Mountain Resort
 Weber County, Utah

GEOTECHNICAL MAP

Figure
1



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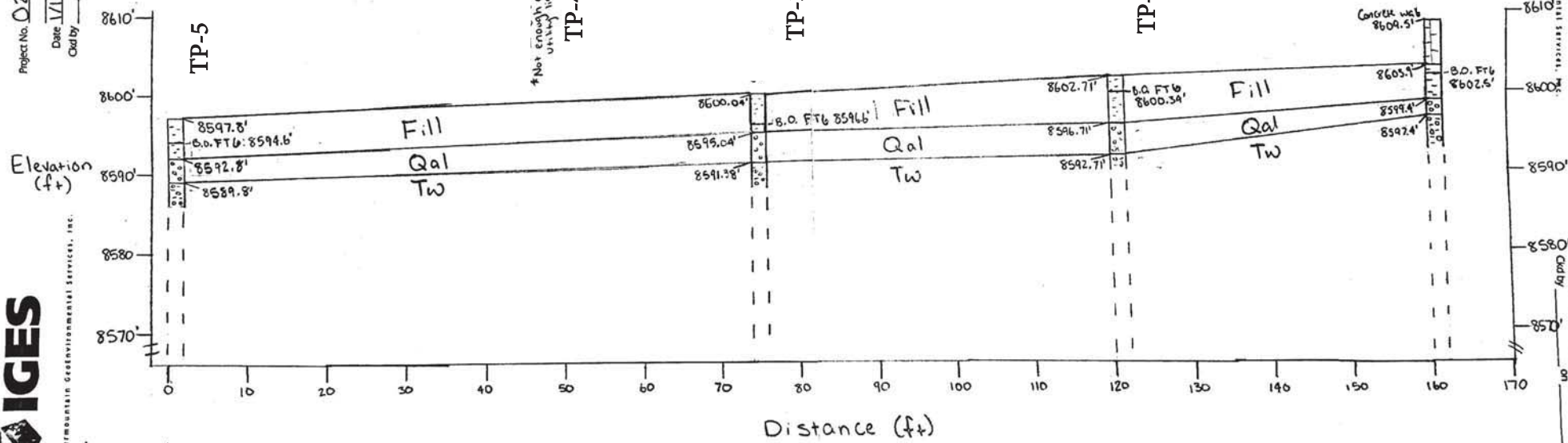
Project No. 02579-001

Date 1/10/18 by KLA
Cvd by on

Cross Section A-A'

A
West

A'
East



Intermountain Geoenvironmental Services, Inc.

Elevation (ft)

Project No. _____
Date _____
Cvd by _____
on _____



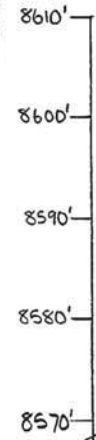
Intermountain Geo-Environmental Services, Inc.

Project No. Q2579-001

Date 1/10/18 by KLA on

Elevation (ft)

B West



Cross Section B-B'

TP-6

8584.36' B.O. FTG 8582.5'
8581.11'
8578.36'

Fill
Qal
Tw

TP-7

8592.44'
8587.76'
8582.53'

B.O. FTG 8588.5'

Fill
Qal
Tw

TP-8

8601.44'
8591.847'
8587.51'

B.O. FTG 8591.5'

Fill
Qal
Tw

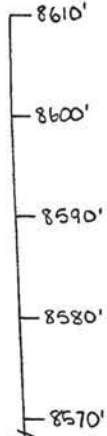
TP-9

Concrete
8609.5'
8602.4'
8595.71'
8591.7'

B.O. FTG 8594.5'

B' East

Elevation (ft)



Distance (ft)

1" = 10ft

Project No. _____
Date _____ by _____
On _____

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Cross Section C-C'

Project No. 02579-001

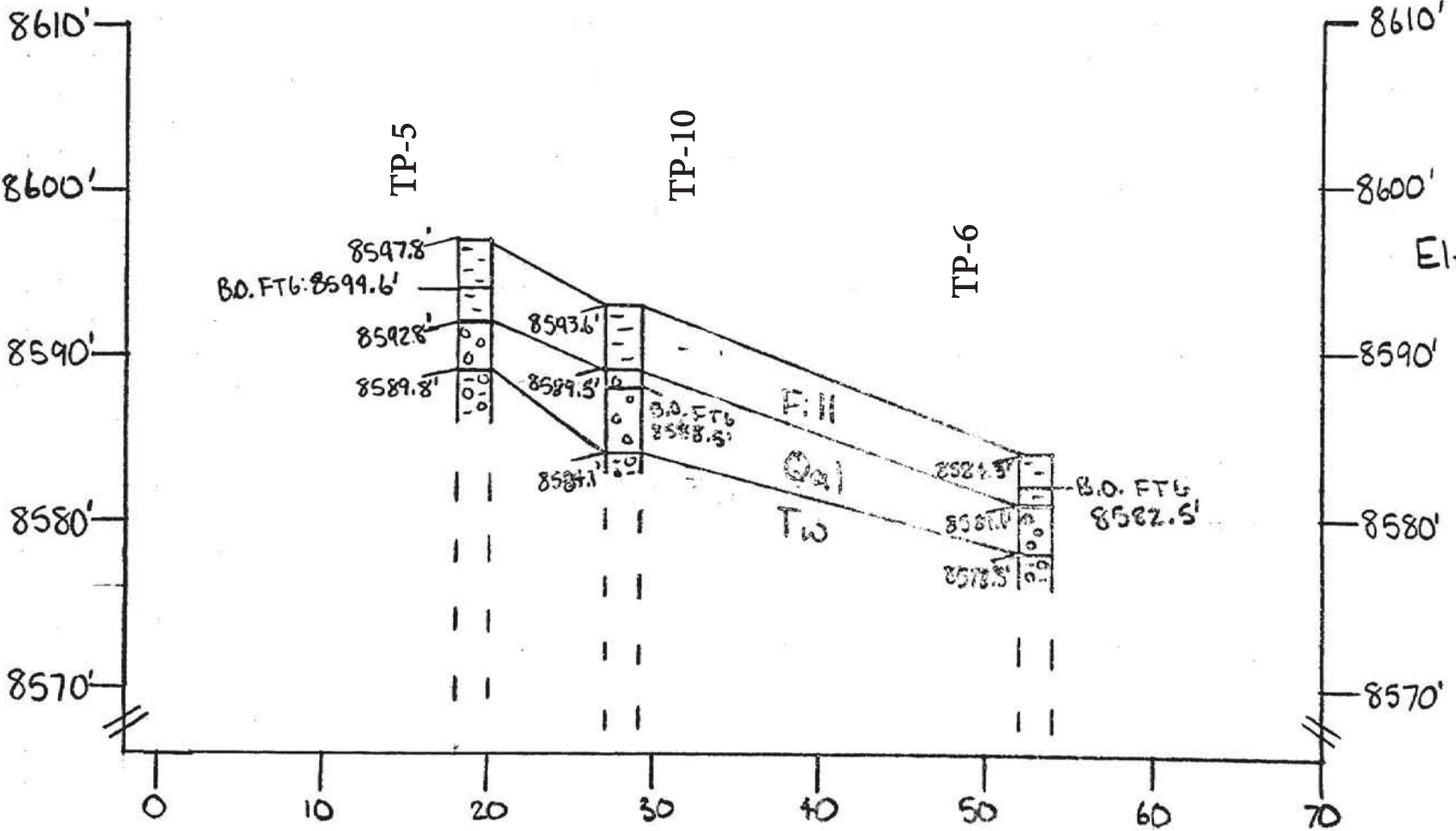
Date 1/11/18 by KLA
 Ckd by _____ on _____

C
 North

C'
 South

Elevation (ft)

Elevation (ft)



1" = 10ft

Distance (ft)



Intermountain GeoEnvironmental Services, Inc.

Cross Section D-D'

Project No. 02579-001

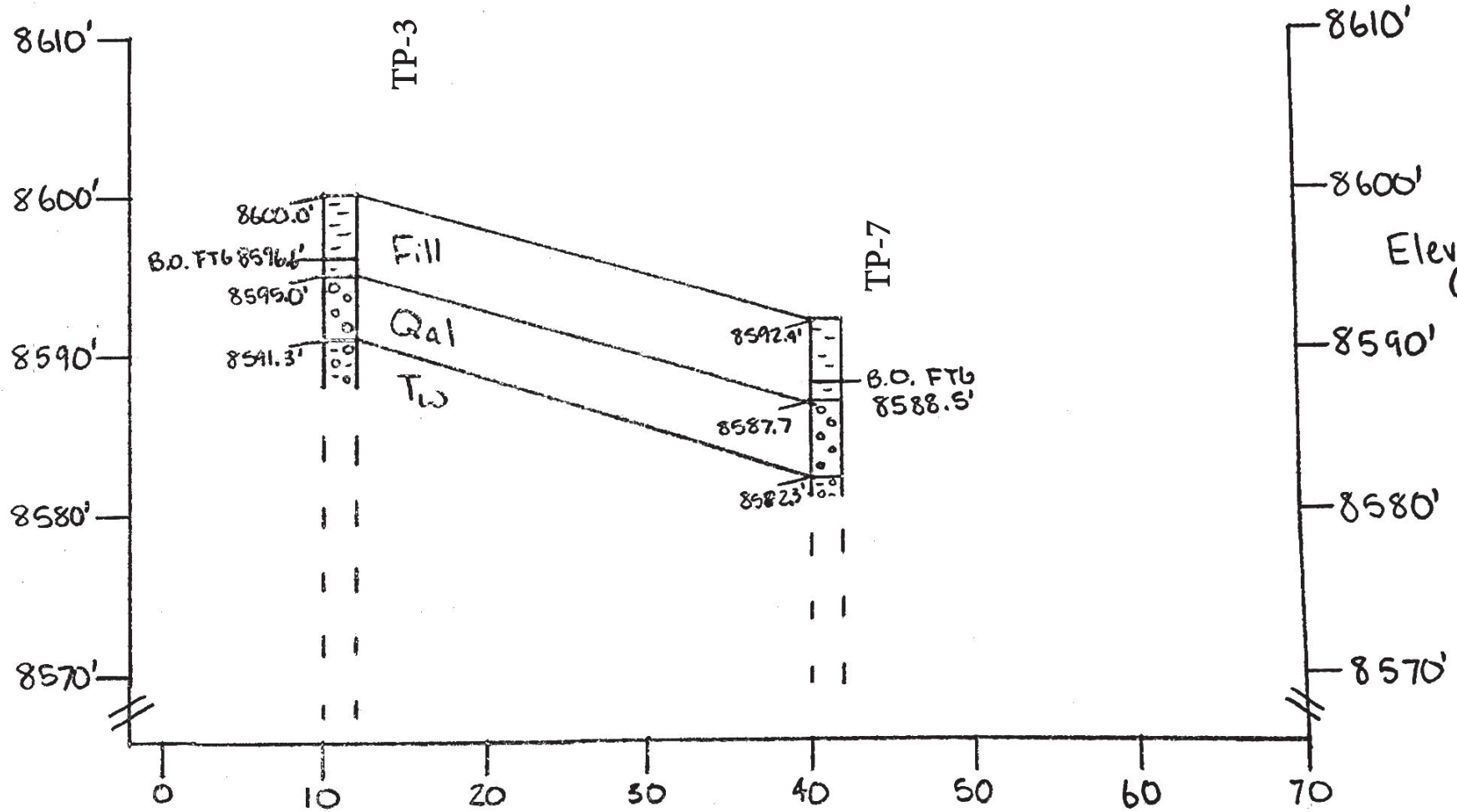
Date 1/11/18 by KLA
 Ckd by _____ on _____

North D

D' South

Elevation (ft)

Elevation (ft)



1" = 10ft



Intermountain GeoEnvironmental Services, Inc.

Cross Section E-E'

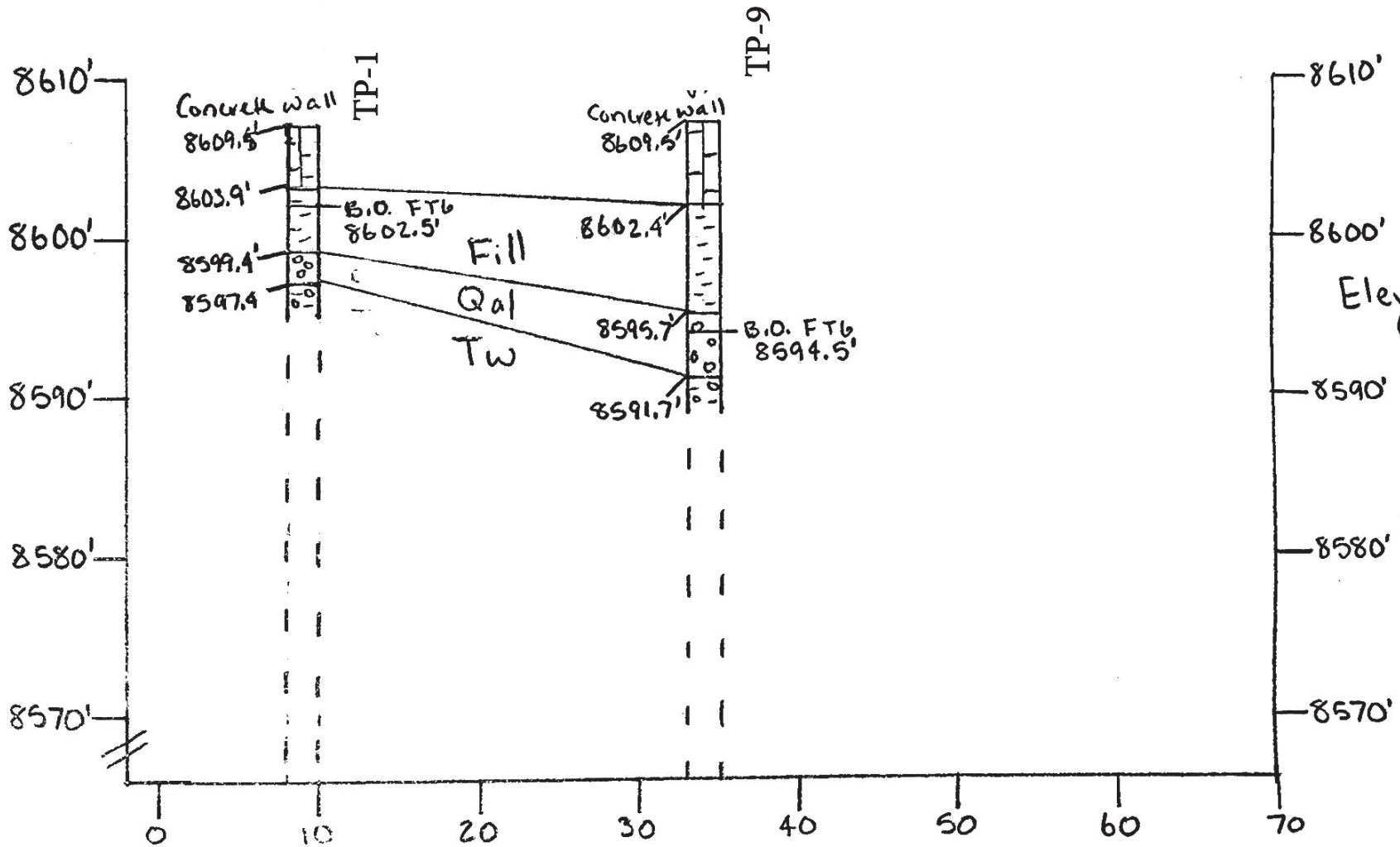
Project No. 02579-001

Date 1/11/18 by KLA

Ckd by _____ on _____

North E

E'
South



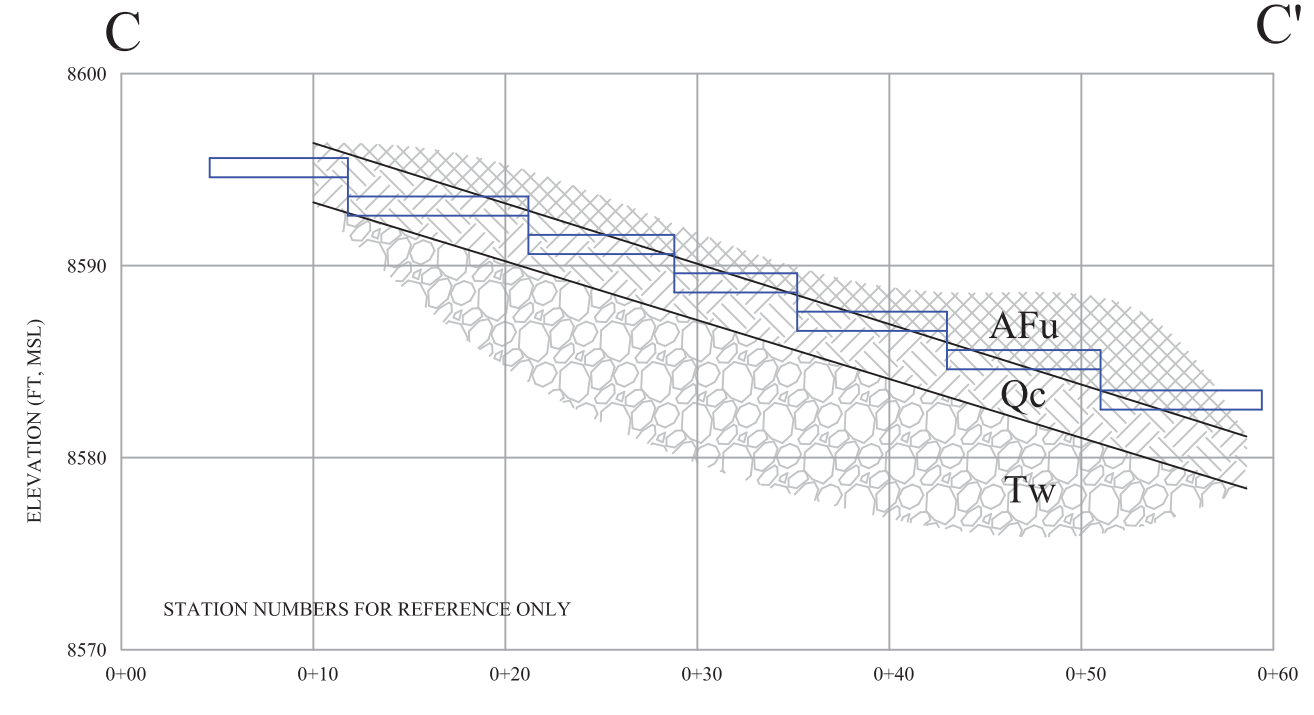
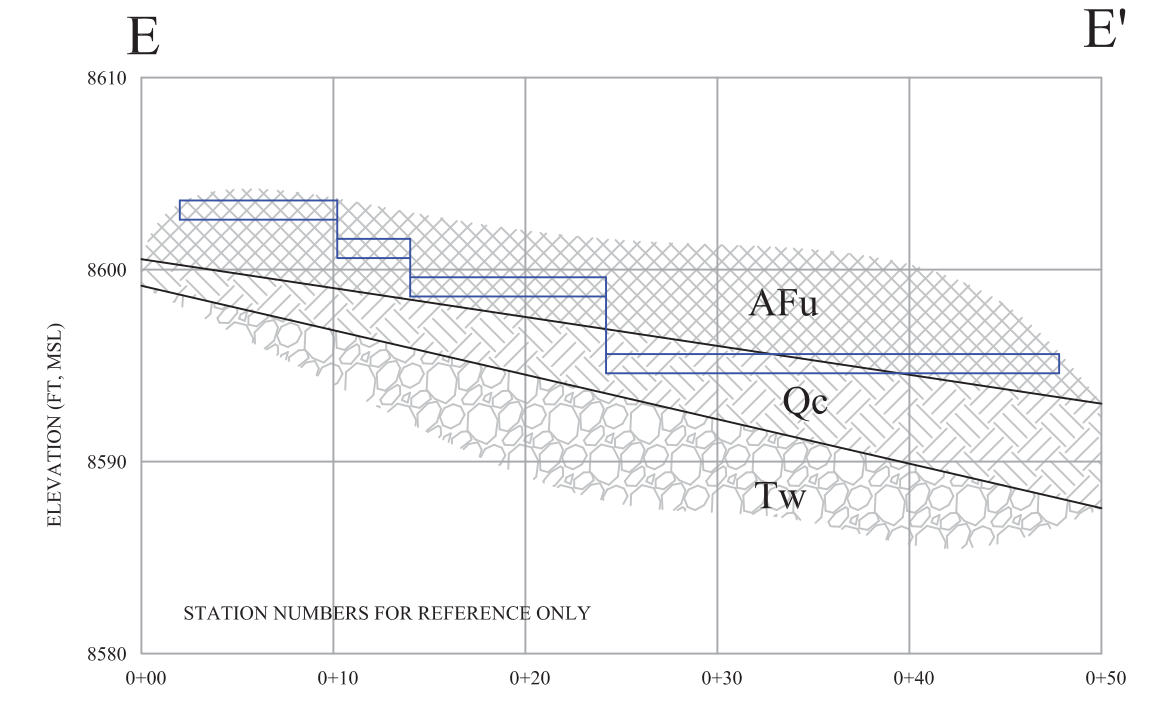
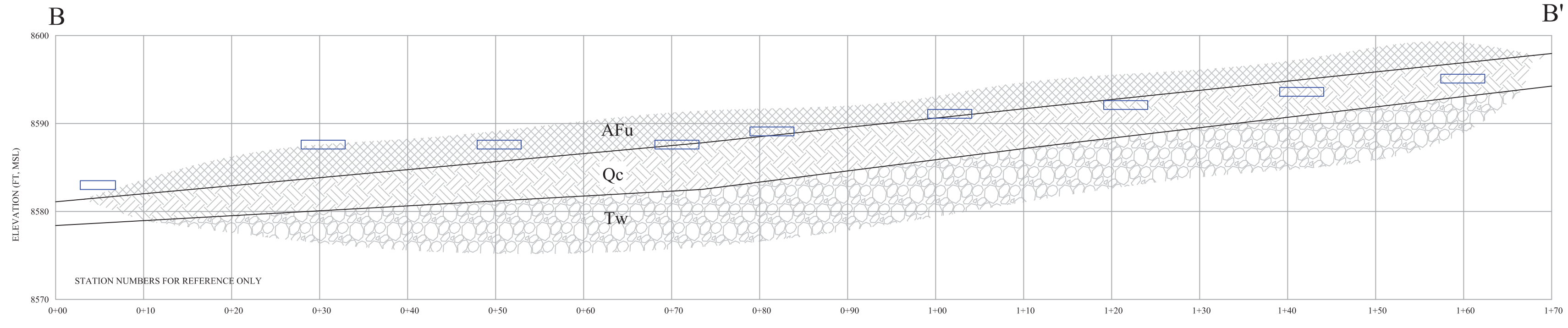
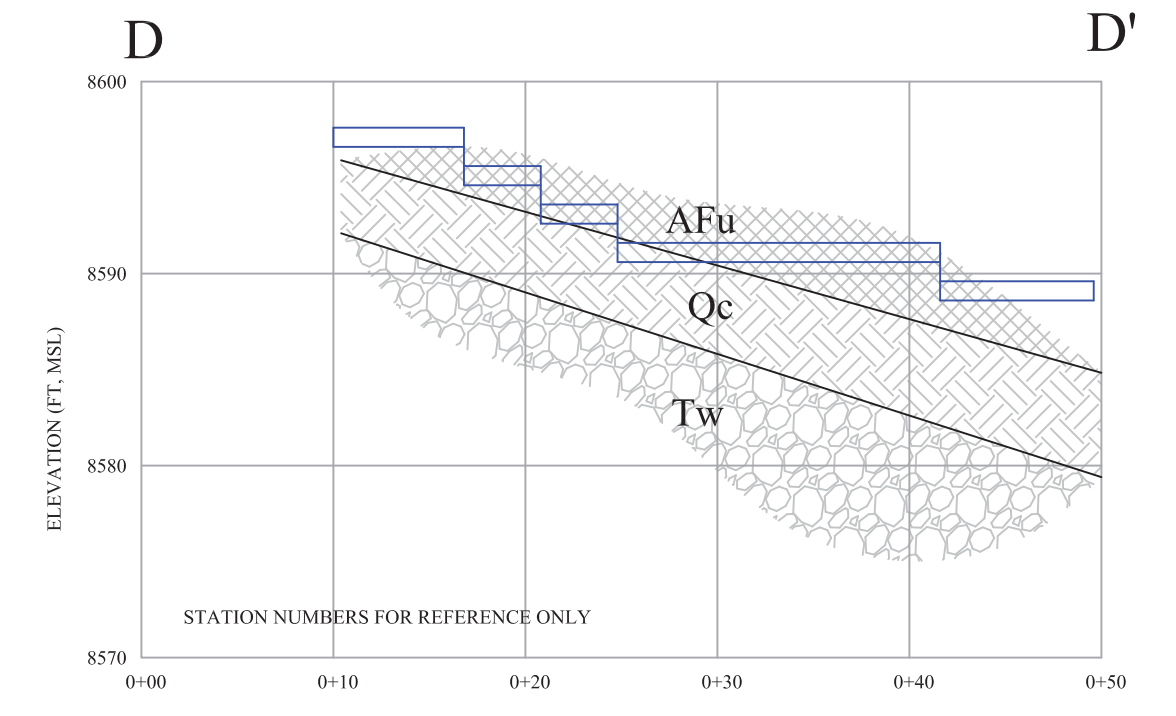
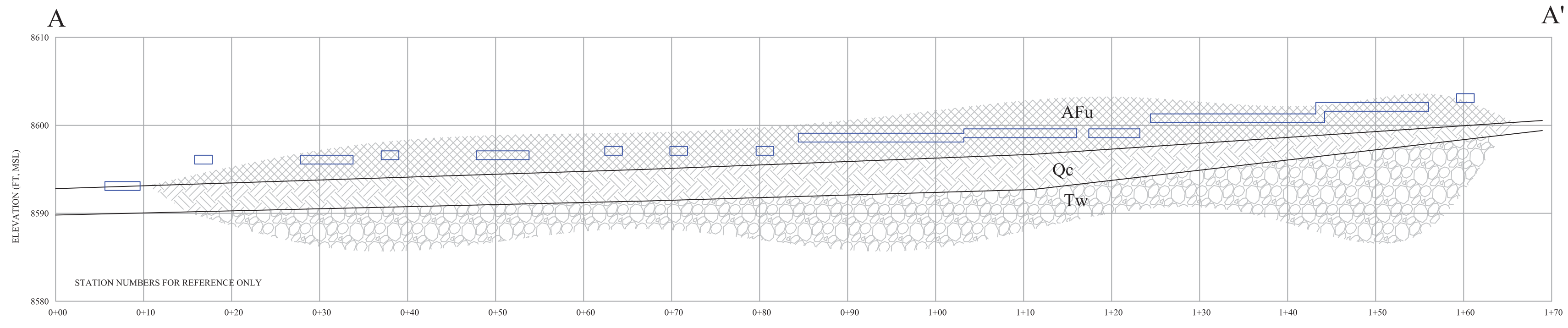
Elevation (ft)

Distance (ft)



Intermountain GeoEnvironmental Services, Inc.

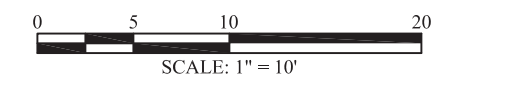
Elevation (ft)



LEGEND

- Afu - undocumented fill
- Qc - Colluvium
- Tw - Wasatch Formation (conglomerate)
- Proposed foundation element

Ground surface not shown



APPROXIMATE GRAPHICAL SCALE: 1 INCH = 10 FEET (24X36 ONLY)

MARK	REVISIONS	DATE	BY	CHK



12429 SOUTH 300 EAST, STE. 100
 DRAPER, UTAH 84020
 (801) 748-4044 FAX: (801) 748-4045

COPPER CREST WEST TOWNHOMES
 SUMMIT POWDER MOUNTAIN RESORT
 WEBER COUNTY, UTAH
 CONCEPTUAL CROSS-SECTIONS

DESIGNED BY: DAG	JAN 28, 2018	PLOT SCALE: 1"=1'
DRAWN BY: DAG	JAN 28, 2018	DWG SCALE: 1"=10'
IGES PROJECT NO. 02130-005	SHEET NO. 1	REV: N/A

PLOT DATE: JAN 28, 2018