

**ADDENDUM FAULT INVESTIGATION
508 ± ACRES
ARANTINE HILLS
CORONA, CALIFORNIA**

**PROJECT NO. 31558.32
NOVEMBER 7, 2003
(REVISED NOVEMBER 16, 2004)**

Prepared for:

Bluestone Communities
4100 Newport Place, Suite 730
Newport Beach, California 92660

Attention: Mr. Ralph Emerson

November 7, 2003
(Revised November 16, 2004)

Bluestone Communities
4100 Newport Place, Suite 730
Newport Beach, California 92660

Project No. 31558.32

Attention: Mr. Ralph Emerson

Subject: Addendum Fault Investigation, 508 ± Acres, Arantine Hills, Corona, California.

LOR Geotechnical Group, Inc. is pleased to present this report summarizing our Addendum Fault Investigation conducted by this firm for the 508 ± acre project located in the Arantine Hills area of the City of Corona, California. This report was based upon a scope of services generally outlines in our Work Authorization Agreement, dated February 6, 2003 and other written and verbal communications.

This study was conducted as an addendum to our original preliminary geotechnical feasibility investigation, dated March 25, 2002, to address the concerns raised in that study regarding the potential for seismic hazards at the site.

The scope of our study included a review of published and unpublished literature, maps and records concerning geologic units faults groundwater barriers and other factors, interpretation of aerial photographs, surface mapping of the site, and a sub-surface investigation which included the excavation, cleaning, geologic logging, and backfilling of five separate fault trenches, representing nearly 1,800 linear feet.

Based on the above scope of work, no evidence was noted of any active fault splays crossing the site. Therefore no set-back criteria are being recommended at the site. However any development at the site should anticipate very strong ground motions from an earthquake on the Elsinore fault which lies just southwest of the site.

LOR Geotechnical Group, Inc.

Table of Contents

Page No.

INTRODUCTION 1

PROJECT CONSIDERATIONS 1

SUBSURFACE FIELD INVESTIGATION 3

 Trench Backfill 4

FINDINGS 4

PEER FIELD OBSERVATIONS 8

CONCLUSIONS 9

CLOSURE 10

REFERENCES 11

APPENDICES

- Appendix A** - Index Map, Fault Trench Location Maps, and Field Data
- Appendix B** - Trench Logs

INTRODUCTION

During August and September of 2003 an Addendum Fault Investigation was conducted by this firm for the proposed residential and commercial development of 508 ± acres within Arantine Hills wash in the Corona area of Riverside County, California. This study was conducted as an addendum to our original preliminary geotechnical feasibility investigation, dated March 25, 2002, to address the concerns raised in that study regarding the potential for seismic hazards at the site.

The scope of work for this addendum study included:

- A review of recently published and un-published literature, maps and records concerning geologic conditions of the site;
- Stereoscopic interpretation of aerial photographs of the site and immediate surrounding region;
- The excavation of a series of subsurface trenches across the entire portion of the site located within the Alquist-Priolo Earthquake Fault Zone, and within other areas of concern;
- Logging of the subsurface soils and geologic units exposed in the trench by an engineering geologist from this firm;
- Meetings at the site with special consultants, this firm, and representatives from the State of California Geological Survey and Seismic Hazards Mapping Program;
- Backfilling of the trench; and
- Preparation of this report summarizing our findings, and providing conclusions.

The approximate location of the site is shown on the attached Index Map, A-1, within Appendix A.

PROJECT CONSIDERATIONS

As noted in our original report from March of 2002, it is our understanding that the subject site is being considered for a master-planned residential development. The proposed development will consist predominantly of the construction residential

housing with a school and associated parks, open space. In addition the far eastern portion of the site is proposed to contain commercial/industrial development.

In our previous geotechnical feasibility report for the site we noted the potential presence of nine various features which exhibited some evidence that they could be representative of earthquake faults at or crossing the site. In addition, some documents noted where these features had been mapped as earthquake faults by past authors, although no mention was made as to the activity rating. These were arbitrarily labeled as features "A" thorough "I" in our report. It was originally considered that some of these features may occur in pairs, that is if one is active the other should also be considered to be. Therefore, three trenches were excavated across these areas in the main Arantine Hills area where these features were noted to exit from the older alluvium of the bluffs to the south.

Also noted in our original report was that the main break of the Elsinore fault zone lies adjacent to the southwestern portion of the site. This fault is considered to be an active earthquake fault and thus is within an Alquist-Priolo Earthquake Fault Zone as set up by the State of California Geological Survey. The Alquist-Priolo Earthquake Fault Zoning Act prohibits the location of structures for human occupancy across the traces of active faults and requires the State Geologist to delineate wide zones around known, well defined, active earthquake faults. The act defines a fault as sufficiently active if there is evidence of activity within the last 11,000 years. A fault is considered to be well defined if it is clearly detectable at or near the surface by a trained geologist.

At the time of our previous study, no part of the subject site was located within the zone for the Elsinore fault. However the far southwestern corner of the site was located approximately 200 feet north of this zone, which extends approximately 500 feet on either side of the suspected main trace of the fault. However in November of 2002, eight months after our original report, the State Geological Survey updated their map for the Corona South quadrangle. This map included a new secondary trace running sub-parallel to and approximately 1000 feet northeast of the main trace. This feature was shown as cutting across the site approximately 300 feet into the southwest corner of the site approximately coincident with our feature "I".

In the new study, the State placed the region lying approximately 500 feet to the north of the new fault trace within the Earthquake Fault zone, which now lies about

800 feet into the subject site. We contacted Mr. Jerome Treiman the project geologist with the State Geological Survey who conducted this study. Mr. Treiman informed us that he noted a "lineament" on aerial photographs at this location which led him to include this feature into the zone, which he informed us is meant to mandate additional studies and not preclude development.

Therefore, in order to satisfy the requirements of the State of California guidelines for a geologic investigation within an Alquist-Priolo Earthquake Fault Zone, as well as evaluate the other concerns raised in our original geotechnical feasibility study, we have conducted this addendum fault study which included the excavation of two subsurface fault trenches which cross the entire area of the new Earthquake Fault Zone on the site, as well as three trenches within the main canyon.

SUBSURFACE FIELD INVESTIGATION

The subsurface investigation consisted of the excavation of a total of five trenches, three within Arantine Hills along the southeastern base of the bluff and two placed up on the bluff at the far southwestern corner of the site so as to cross the entire portion of the Earthquake Fault zone. These trenches ranged in length from 200 to over 800 feet in length and were up to 22 feet in depth.

Due to the thick deposits of younger alluvial within the main canyon, the three trenches within this area were excavated to depths up to 22 feet and were placed so as to extend on the order of 100 feet beyond the suspected lineaments in both directions. These larger trenches were excavated using a CAT 235 excavator using a four-foot bucket. The trenches were properly benched for safe entry. The location of the trenches, based on a Bruton compass and tape measurements from reference points in the field, are given on the Fault Trench Location Maps, Enclosure A-2 and A-3, within Appendix A.

The location of the Earthquake Fault Zone at the site was established on the site based on the locations given on the Official Maps of Alquist-Priolo Earthquake Fault Zone of California, Corona South prepared by the State of California, Department of Conservation, Division of Mines and Geology. Using the coordinates from digital maps, the zone in the field was staked using a hand-held GPS. As this method is generally considered to be accurate to within 15 feet, the trenches were extended distanced greater than this past the zone determined by this method.

After excavation, the trenches were logged by a staff geologist and an engineering geologist from this firm. The stratigraphic units noted within the trenches were described according to standard geologic field methods. This involved assigning a local or geologic-interpretive designation such as recent stream alluvium, young alluvial fan, older alluvium, or bedrock, followed by a physical descriptive characterization. For unconsolidated sediments, the interpretive designation is followed by a soils classification group name, given in general accordance with the Unified Soil Classification, textural-plasticity classification scheme outlined in ASTM 2488-00 (ASTM, 2000). The matrix color of the unconsolidated sediments are classified according to the Munsell soil-color charts (Munsell, 1992) at a damp moisture content, along with an estimate of the in-place moisture. Other descriptive characteristics, such as bedding thickness, textures, shape and angularity, are given in general accordance with the standards set forth in ASTM 2488-00, (ASTM, 2000).

Graphical representation of the conditions as encountered within the exploratory trenches are presented on Enclosures B-1 through B-18, within Appendix B.

Trench Backfill

After the trenches were logged in the manner described above, the trenches were backfill and returned to as close as possible to the pre-trench, un-compacted state. This was accomplished by placing the excavated materials back into the trench in lifts of approximately 5 feet each. A minimal amount of compaction was achieved with the use of "wheel-rolling" with the rubber tire loader.

While the procedure describe above is not considered adequate to place the materials within a compacted engineer soils state, so as to support structures, it is considered adequate to return the materials to conditions similar to the pre-trenched conditions and minimize settlement.

FINDINGS

The materials noted within our trenches generally fell within one of four basic categories. The three trenches excavated in the main canyon noted the presence of very young alluvial sediments, overlying either older alluvial materials, or sandstone bedrock, while the two trenches excavated up on the bluff exposed almost entirely units of an older alluvial fan. Precise age data of the various units was not

established, predominately due to the lack of any materials within the older units which would be subject to radiometric dating such as Carbon (^{14}C). However the relative ages of the materials were bracketed using the techniques of soil profile development, clast and matrix weathering of the soil layers, and past studies. The general age of these sediments is generally considered as follows:

The younger alluvial materials are "Holocene" age sediments which means they were deposited less than 11,000 years ago and for the most part are much more recent than this with the units at the surface currently undergoing transport down the canyon. The age of these sediments increases with depth. The older alluvial sediments within the main canyon are transitional in nature but the lowermost units observed in these trenches appears to be older than Holocene, which closed 11,000 years ago, going back into the upper portion of the Pleistocene age. The older alluvial fan materials noted up on the bluff areas of the site (in trenches T-4 and T-5) are thought to have been stripped off the local mountains to the south and deposited as part of a large alluvial fan during the period from about 50,000 to 100,000 years ago. This is based on the coloration of the materials from leaching (Shlemon, 2003). The bedrock units exposed at the site were mapped in the past by geologist with the USGS who indicated these units were part of the Sespe and Vaqueros formations which were deposited during the transition from the Eocene to Oligocene time period around 35 to 40 million years ago.

A general description of the findings in each trench is given below:

T-1: The first trench was excavated along the far northeastern end of the project in the main drainage area of Arantine Hills along the bluff. The trench was placed at this location to cross the suspected area of Fault "A" from our original report which was a moderately strong lineament noted on aerial photographs. The trench was excavated for a total length of 244 feet, with the depths starting at 0 at each end then ramping downward to a maximum depth of 22 feet. The trench was placed so as to have the deeper portions of the trench extend approximately 75 feet on either side of the lineament, with the ramps leading out on each end.

The materials exposed in this trench were composed entirely of unconsolidated alluvial materials which appear to have been derived from the Arantine Hills formation in the upper regions of Arantine Hills to the southeast. These sediments were composed of various units of moderately metamorphosed argillites, graywakes, and

impure quartzites, although, some small-sized angular clasts were noted to be slightly metamorphosed volcanic rocks of andesite or dacite.

The alluvial units were divided into either younger or older units based on the relative ages. While all the units appeared to be transitional, getting older deeper, there was a relatively sharp change within the alluvium at depths on the order of 15 to 17 feet or more. The alluvial units above this depth tended to be looser, gray to grayish brown in color, stratified in thin layers with channel cutting. The alluvial units below this depth tended to be slightly denser, yellowish brown to reddish brown with coatings on the grains. These units also contained many thin layers with some channel cutting. Some of these units tended to be more massive.

T-2: The second trench was excavated along the northeastern end of the project in the main drainage area of Arantine Hills along the bluff. The trench was placed at this location to cross the suspected area of Fault "C" from our original report, which was previously mapped by Weber (1977) and by this firm (LOR, 2002). The trench was excavated for a total length of 155 feet with the depths starting at 0 at each end then ramping downward to a maximum depth of 14 feet. The trench was placed so as to have the deeper portions of the trench extend approximately 50 feet on either side of the feature, with the ramps leading out on each end. This trench was shorter in length for two reasons, the thickness of the overlying younger alluvial materials was relatively thin, and the feature noted associated with Fault "C" is visible on the wall of the canyon at this point.

Two drastically differing types of materials were exposed in this trench. These included very young alluvial sediments overlying sedimentary bedrock units. The younger alluvial materials were very similar to those noted in T-1. They were composed of unconsolidated sediments ranging from silt to boulders with the average unit on the order of a silty sand with gravel. There was one small channel of alluvial units which appeared to be an older deposit. These were composed of silty sand with gravel deposits that have weathered to a yellowish brown to reddish brown with coatings on the grains. The bedrock units in this trench were composed predominately of sandstone units, ranging from a well sorted medium grained clean sand unit to a massive silty sandstone.

T-3: The third trench was excavated along the middle portion of the site in the main drainage area of Arantine Hills along the southern bluff. The trench was placed at this

location to cross the suspected area of Fault "D" from our original report which was a slight lineament noted on aerial photographs that coincide with a fault mapped by the CDMG (Gray, 1961) . The trench was excavated for a total length of 250 feet with the depths ramping downward at each end to a maximum depth of 21 feet. The trench was placed so as to have the deeper portions of the trench extend approximately 75 feet on either side of the lineament, with the ramps leading out on each end.

This trench exposed units entirely composed of alluvial sediments which were very similar to those noted in our first trench. These consisted of coarse grained sediments of sand and silt with gravel through boulder sized clasts of predominately metamorphosed argillites, graywakes, and impure quartzites.

The alluvial units were divided into either younger or older units based on the relative ages. As in trench number 1, the units in this trench also appeared to be transitional, getting older with depth. This trench also contained a relatively sharp change within the alluvium at depths on the order of 15 feet or more. Here again the units above this depth tended to be looser, gray to grayish brown in color, stratified in thin layers with channel cutting. The alluvial units below this depth tended to be slightly denser, yellowish brown to reddish brown with coatings on the grains. These units also contained many thin layers with some channel cutting, some of the units tended to be more massive.

T-4 and T-5: The last two trenches were excavated on the southern and upper portions of the site, outside of the main canyon. Trench number 4 was excavated to a depth of approximately 8 feet for a length of over 800 feet in order to cross the entire Earthquake fault zone placed by the State. Trench number 5 was excavated to a depth of approximately 9 feet for a length of approximately 340 feet.

The materials exposed in these trenches were composed entirely of a slightly indurated, older alluvial deposit, with the exception of a thin overlying layer of topsoil. The older alluvial materials were composed of a silty sand matrix, with a relatively high percentage of fines, and coarse grained clasts ranging from gravel to small boulder in size. These units tended to be dense, yellowish brown to reddish brown with coatings on the grains.

A detailed description of the units encountered is given on the attached trench logs within Appendix B.

PEER FIELD OBSERVATIONS

After the excavation and logging of the trenches we notified the City of Corona Planning department of our progress for any required field review observations. In addition, we initiated a series of peer field observations by various agencies and personnel connected with or familiar with the project area. We contacted Mr. Wayne Harrison of the County of Riverside as the County was the review agency for the golf course/residential development and the Retreat Project, currently under construction and located adjacent to the site to the south. The City at that time had also contracted with the County of Riverside to conduct the geologic review for all of the Eagle Canyon projects located adjacent the site to the north. However, Mr. Harrison informed us that the County will not be conducting the geologic review of this project for the City of Corona, and suggested that we contact Mr. Steve Kupferman. Mr. Kupferman was the County Geologist responsible for the review and County approval of all the Eagle Canyon projects as well as the preliminary studies for the Retreat Project. Therefore we contracted with Mr. Kupferman to observe all of the conditions exposed, as well as our logs and interpretation of the conditions. We also contacted Mr. Jerome Treiman of the California Geological Survey, who in turn contacted Ms. Janis Hernandez of the State of California Seismic Hazards Reduction Program. Mr. Treiman was the State geologist responsible for the mapping of the new Corona quadrangle fault map for the State of California. Mr. Treiman and Ms. Hernandez visited the site and observed the conditions exposed in all of our trenches.

Mr. Kupferman, Mr. Treiman, and Ms. Hernandez all provided valuable input on the aspects of the alluvial and bedrock materials noted in our subsurface excavations in terms of types and relative ages of the materials as well as inter-relation of the deposits, which have been incorporated into our analysis and graphic trench logs. For example Mr. Kupferman noted that the lineaments noted along the southern canyon could be explained by slope instabilities, which would explain why the older alluvial units under these materials have not been sheared. We also agreed that this is a possibility, and in fact our preliminary report did note the presence of and potential for slope instabilities along this slope.

It was the overall opinion that no evidence was noted of active faulting in any of our trenches. Mr. Treiman did express some concern that our trenches T-4 and T-5 may have missed the photo lineament that he used to move the Earthquake Fault Zone line. Therefore he later provided us with his field data used to locate the lineament. Using this data and a GPS location device we located the two end-points of this feature in the field, and noted that his feature was crossed by our trench T-4 and overlapped by approximately 130 feet. A copy of Mr. Treiman's field map is attached as Enclosure A-4, our Fault Trench (T-4) is also shown on this map.

CONCLUSIONS

As previously noted, our preliminary geotechnical feasibility report conducted for the site in March of 2002 noted the potential presence of nine various features which exhibited some evidence that they could be representative of past tectonic activity crossing the site. It is still possible that at least some of these features may have been the product of past tectonic activity. However as these features, arbitrarily labeled as features "A" thorough "I", appear to be covered with various units of unbroken, relatively unfractured, alluvial sediments which are thought to be older than 11,000 years, and perhaps much older, no evidence was noted that any of these features are active. One possibility is these features are the results of past tectonic settings, where the upper portion of the Elsinore Valley was being stretched by interactions along the Elsinore fault zone, creating old cross faults which have long ceased activity.

In summary it appears that none of the features noted at the site would classify as an "active" earthquake hazard as defined by the State of California Alquist-Priolo Earthquake Fault Zone act. Therefore no setback zones from any of these features are within the actual State Earthquake fault zone on the site are recommended.

However, we would like once again to note that the site could experience moderate to very strong ground motions due to the presence of the main trace of the Elsinore fault located just southwest of the site. At a minimum the effects of ground shaking anticipated at the subject site should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the Uniform Building Code. However, current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of

the structure. It has been estimated that single family residences in the 300 to 600 thousand dollar range can be properly designed to withstand earthquakes without major structural damage for about a 2% increase in cost (Larson and Slosson, 1992).

CLOSURE

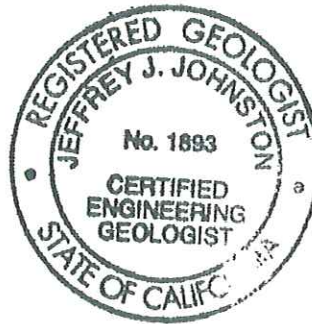
This report contains geotechnical conclusions and recommendations developed solely for use by Bluestone Communities for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The report was prepared using generally accepted geologic engineering practices under the direction of a state licensed engineering geologist. As such, the client is aware that no warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Should you have any questions regarding this report, please contact us.

Respectfully submitted,
LOR Geotechnical Group, Inc.



Jeffrey J. Johnston, CEG 1893
Engineering Geologist



JJJ:JPL:mmm

Distribution: Addressee (3)
AEI-CASC Engineering, Inc. (3)

REFERENCES

California Division of Mines & Geology (CDMG), 1997, Guidelines for Evaluation and Mitigation Seismic Hazards in California, Special Publication 117.

California Division of Mines & Geology (CDMG), 1986, Guidelines to geologic/seismic reports, Note No. 42.

Gray Jr., C.H., 1961, Geology of the Corona South Quadrangle and the Santa Ana Narrows Area, Riverside, Orange, and San Bernardino Counties, California and Mines and Mineral Deposits of the Corona South Quadrangle, Riverside and Orange Counties, California, California Division of Mines, Bulletin 178

Gray, Jr., C.H., D. Morton, and E.H. Weber, 2002, Geologic Map of the Corona South 7.5' Quadrangle, Riverside and Orange Counties, California, v. 1.0, United States Geological Survey, Open File Report 02-21.

Hart, E.W., 1994, Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zones Act of 1972 with Index to Earthquake Fault Maps, CDMG Special Publication 42.

Larson, R. And Slossen, J., 1992, The Role of Seismic Hazard Evaluation in Engineering Reports, and in Engineering Geology Practice in Southern California, AEG Special Publication, November 4, pp 191-194.

LOR 2002, Preliminary Geotechnical Feasibility Investigation, 508 Acres Arantine Hills Corona Area, Riverside County, unpublished geotechnical consultants report dated March 25 2002, Project Number 31558.1.

Munsell Color, 1992, Munsell soil color charts, 1992 edition: Baltimore Maryland, Macbeth Division of Kollmorgen Corporation.

Petersen, M.D., W.A. Bryant, C.H. Cramer, T. Cao, M.S., Reichle, A.D. Frankel, J.J. Lienkaemper, P.A. McCrory, and D.P. Schwartz, 1996, Probabilistic seismic hazard assessment for the State of California, California Department of Conservation, Division of Mines and Geology, Open-File Report 96-08 and U.S. Geological Survey Open-File Report 96-706.

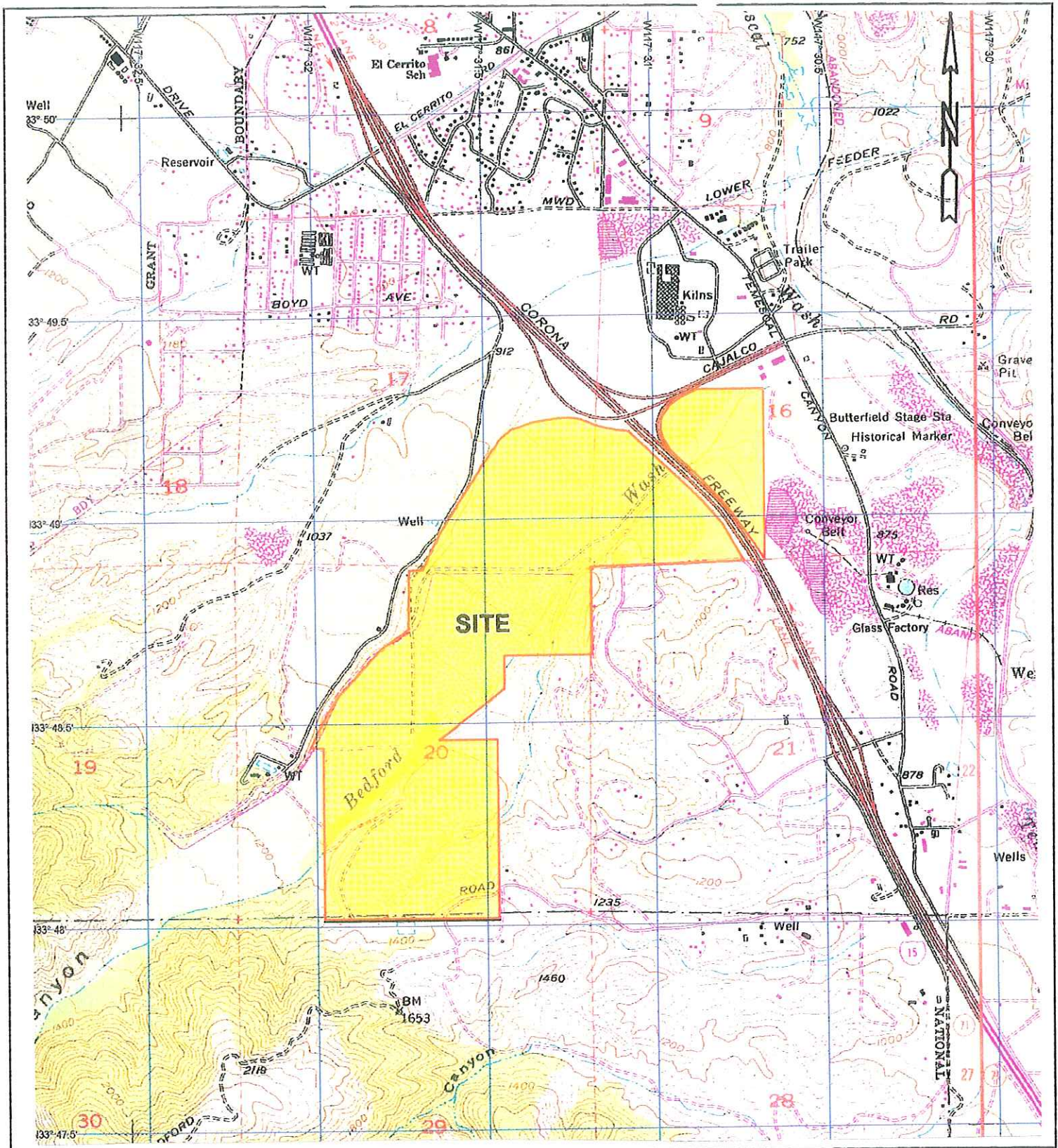
Shlemon, R.J., 1993, Applications of Soil Stratigraphy to Engineering & Environmental Geology: Publications of the Association of Engineering Geologists, Southern California Section Short Course Notes, June 5, 1993.

Tinsley, J.C., Matti, J.C, and McFadden, L.D., 1982, Late Quaternary pedogenesis and alluvial chronologies of the Los Angeles and San Gabriel Mountains areas, southern

Weber Jr., F.H., 1977, Seismic Hazards Related to Geologic Factors, Elsinore and Chino Faults, Northwestern Riverside County, California, California Department of Conservation, Division of Mines and Geology, Open-File Report 77-4.

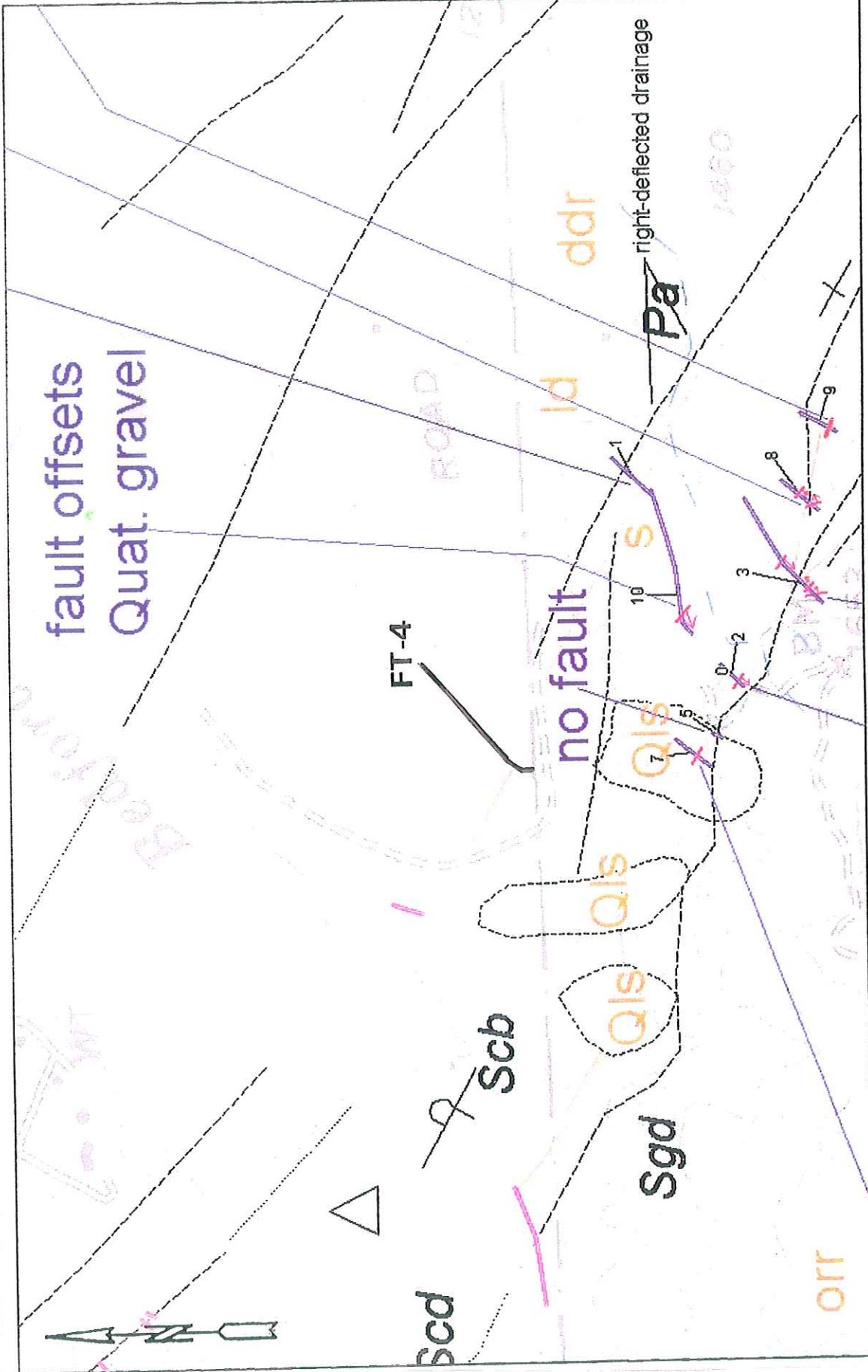
APPENDIX A

**Index Map, Fault Trench Location Maps,
and Field Data**



INDEX MAP

PROJECT:	508 ± ACRES, ARANTINE HILLS, CORONA, CALIFORNIA	PROJECT NO.:	31558.32
CLIENT:	BLUESTONE COMMUNITIES	ENCLOSURE:	A-1
LOR Geotechnical Group, Inc.		DATE:	NOVEMBER 2003
		SCALE:	1" = 2,000'



FIELD DATA FROM MR. TREIMAN

PROJECT:	508 ± ACRES, ARANTINE HILLS, CORONA, CALIFORNIA	PROJECT NO.:	31558.32
CLIENT:	BLUESTONE COMMUNITIES	ENCLOSURE:	A-3
LOR Geotechnical Group, Inc.		DATE:	NOVEMBER 2003
		SCALE:	REDUCED COPY

APPENDIX B

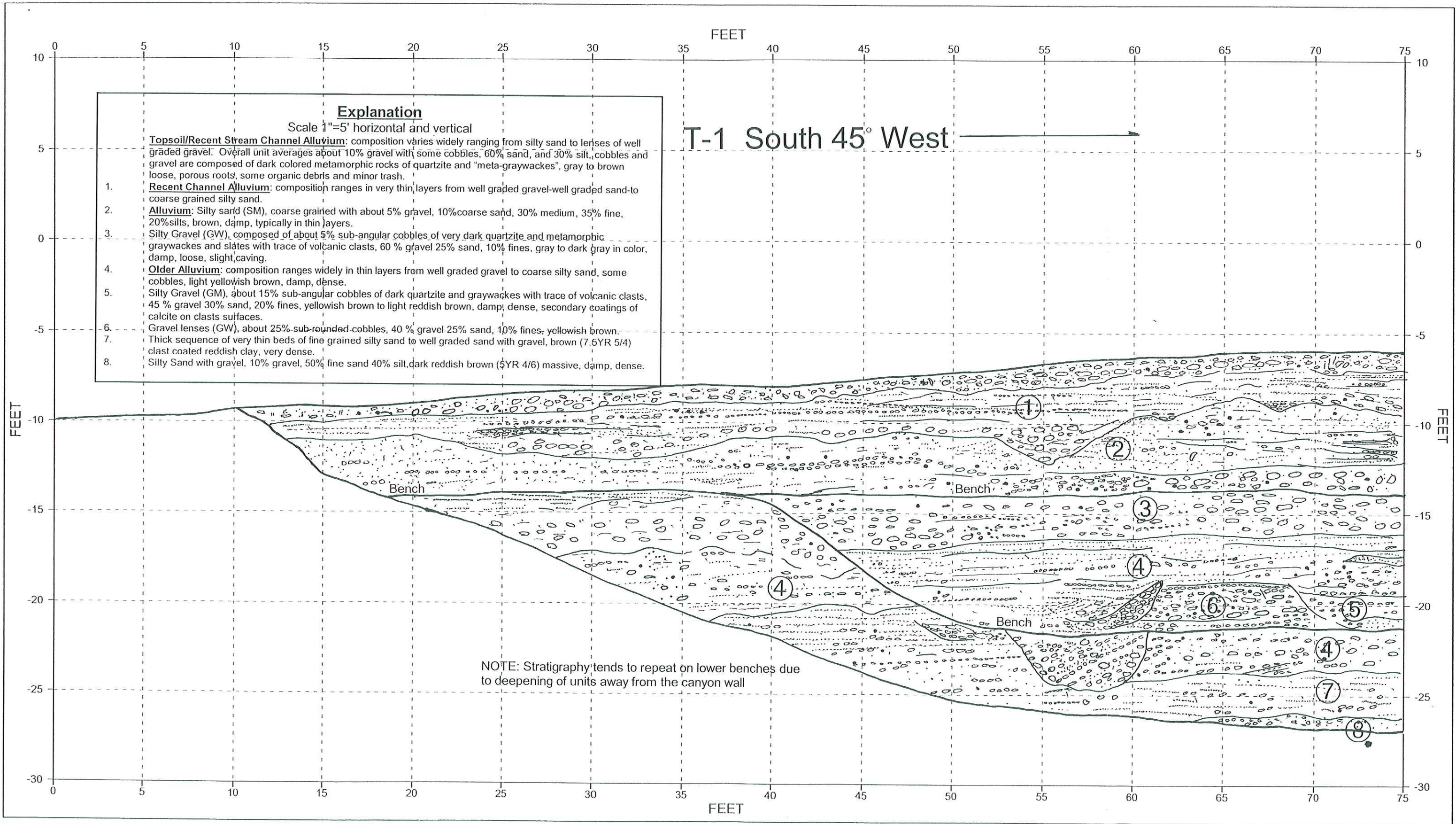
Trench Logs

T-1 South 45° West

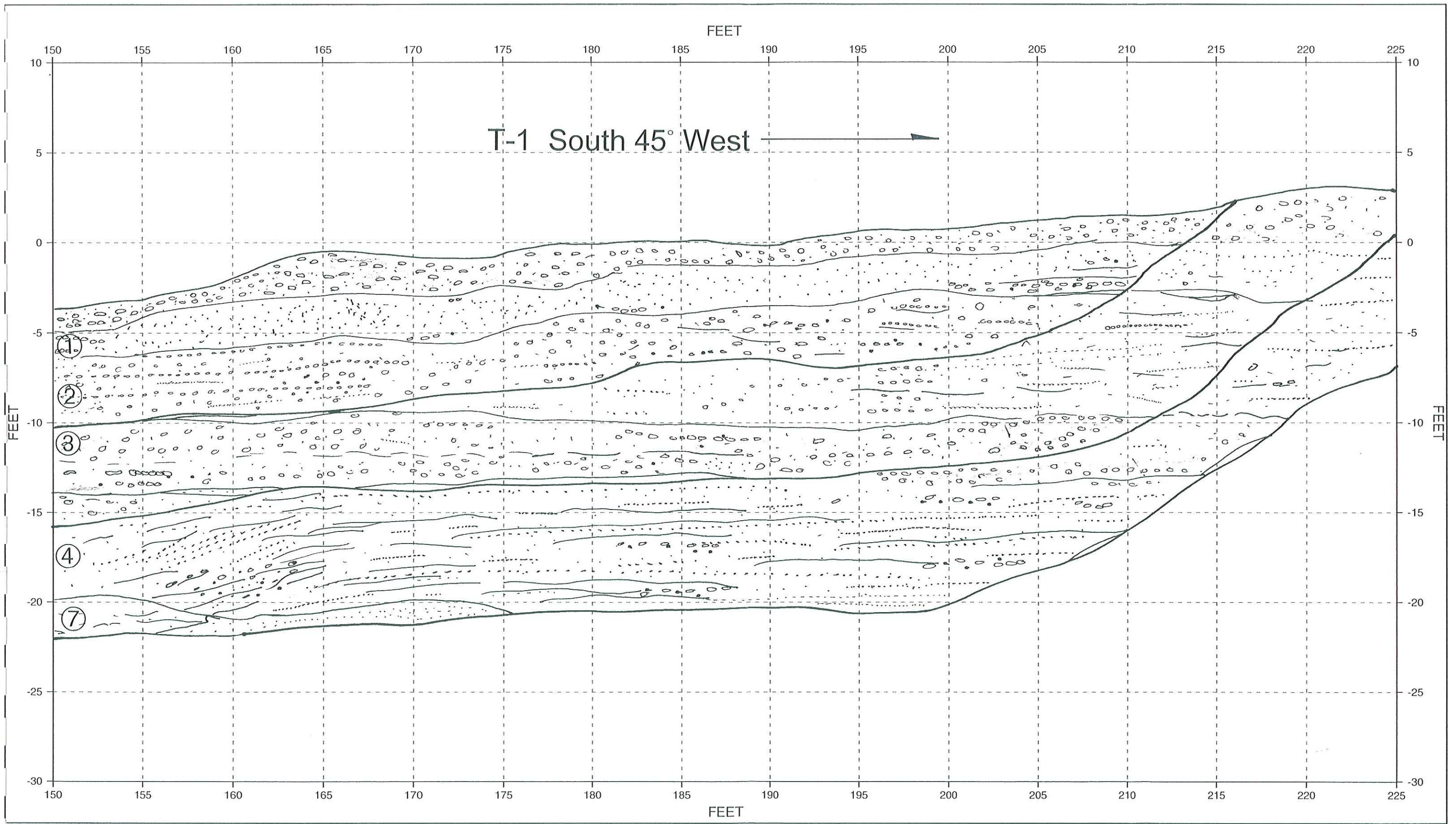
Explanation

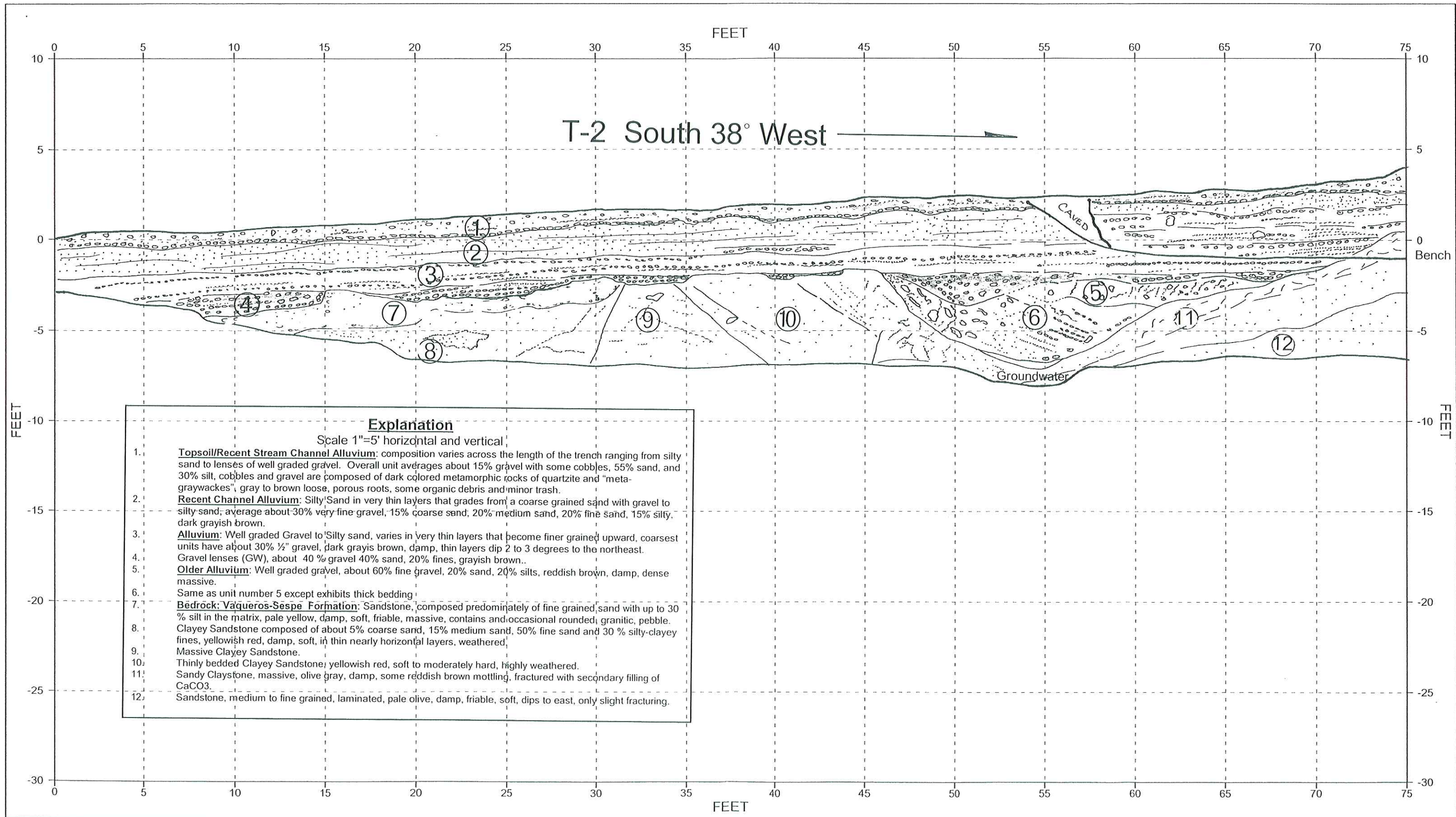
Scale 1"=5' horizontal and vertical

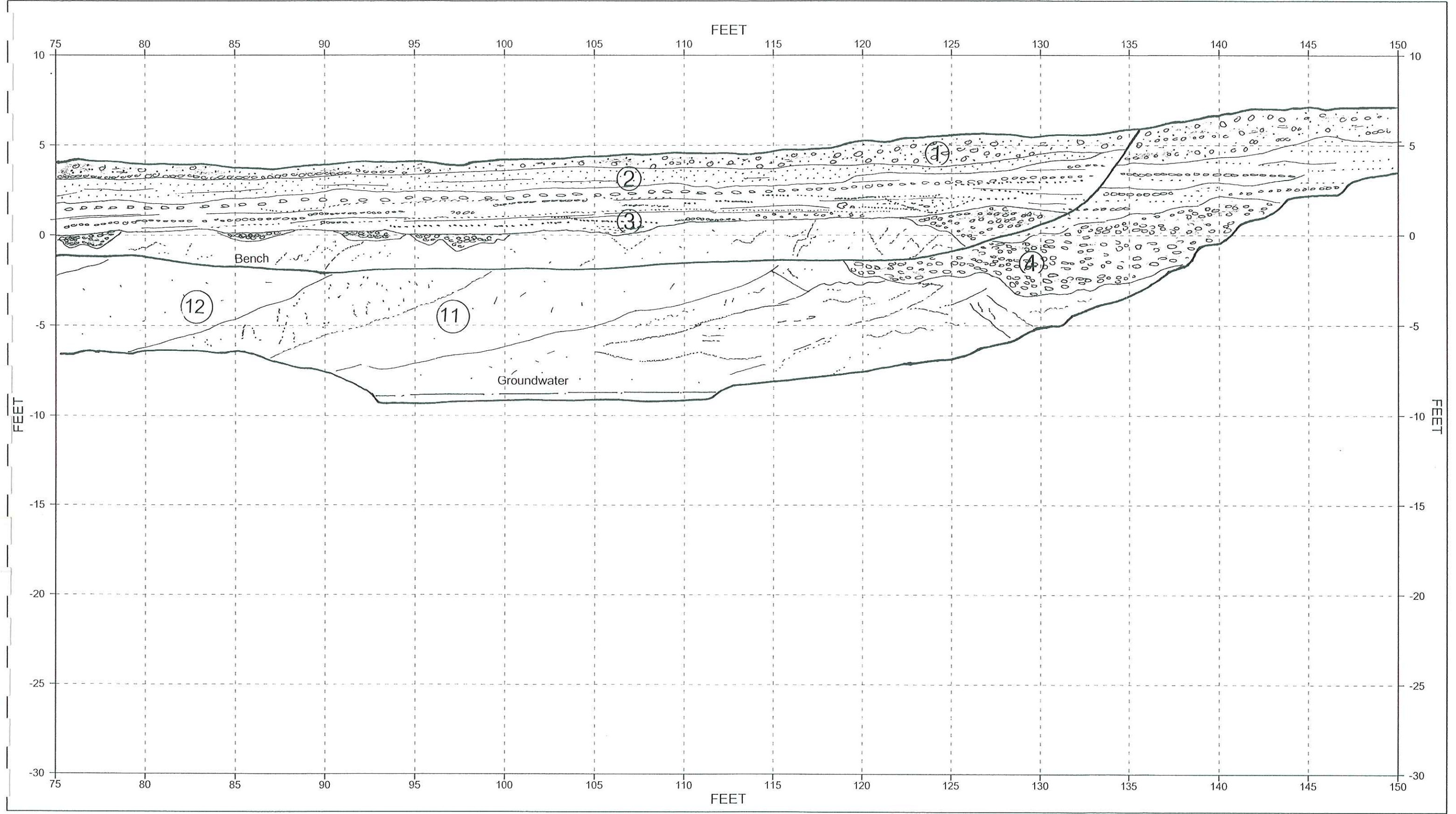
- 1. **Topsoil/Recent Stream Channel Alluvium:** composition varies widely ranging from silty sand to lenses of well graded gravel. Overall unit averages about 10% gravel with some cobbles, 60% sand, and 30% silt. cobbles and gravel are composed of dark colored metamorphic rocks of quartzite and "meta-graywackes", gray to brown loose, porous roots, some organic debris and minor trash.
- 2. **Recent Channel Alluvium:** composition ranges in very thin layers from well graded gravel-well graded sand to coarse grained silty sand.
- 3. **Alluvium:** Silty sand (SM), coarse grained with about 5% gravel, 10% coarse sand, 30% medium, 35% fine, 20% silts, brown, damp, typically in thin layers.
- 4. **Silty Gravel (GW),** composed of about 5% sub-angular cobbles of very dark quartzite and metamorphic graywackes and slates with trace of volcanic clasts, 60% gravel 25% sand, 10% fines, gray to dark gray in color, damp, loose, slight caving.
- 5. **Older Alluvium:** composition ranges widely in thin layers from well graded gravel to coarse silty sand, some cobbles, light yellowish brown, damp, dense.
- 6. **Silty Gravel (GM),** about 15% sub-angular cobbles of dark quartzite and graywackes with trace of volcanic clasts, 45% gravel 30% sand, 20% fines, yellowish brown to light reddish brown, damp, dense, secondary coatings of calcite on clast surfaces.
- 7. **Gravel lenses (GW),** about 25% sub-rounded cobbles, 40% gravel 25% sand, 10% fines, yellowish brown.
- 8. **Thick sequence of very thin beds of fine grained silty sand to well graded sand with gravel, brown (7.5YR 5/4) clast coated reddish clay, very dense.**
- 9. **Silty Sand with gravel, 10% gravel, 50% fine sand 40% silt, dark reddish brown (5YR 4/6) massive, damp, dense.**



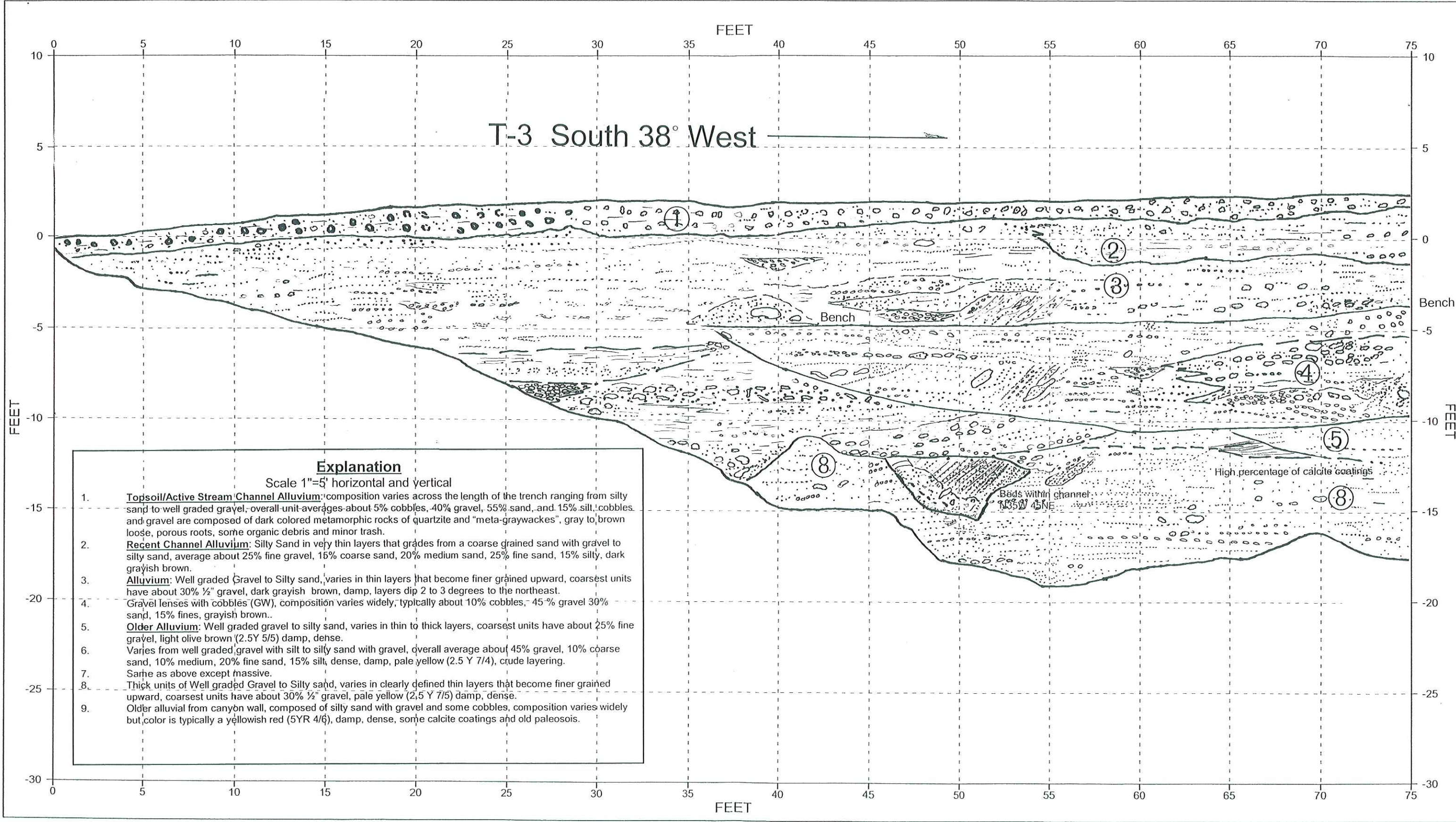
NOTE: Stratigraphy tends to repeat on lower benches due to deepening of units away from the canyon wall







T-3 South 38° West



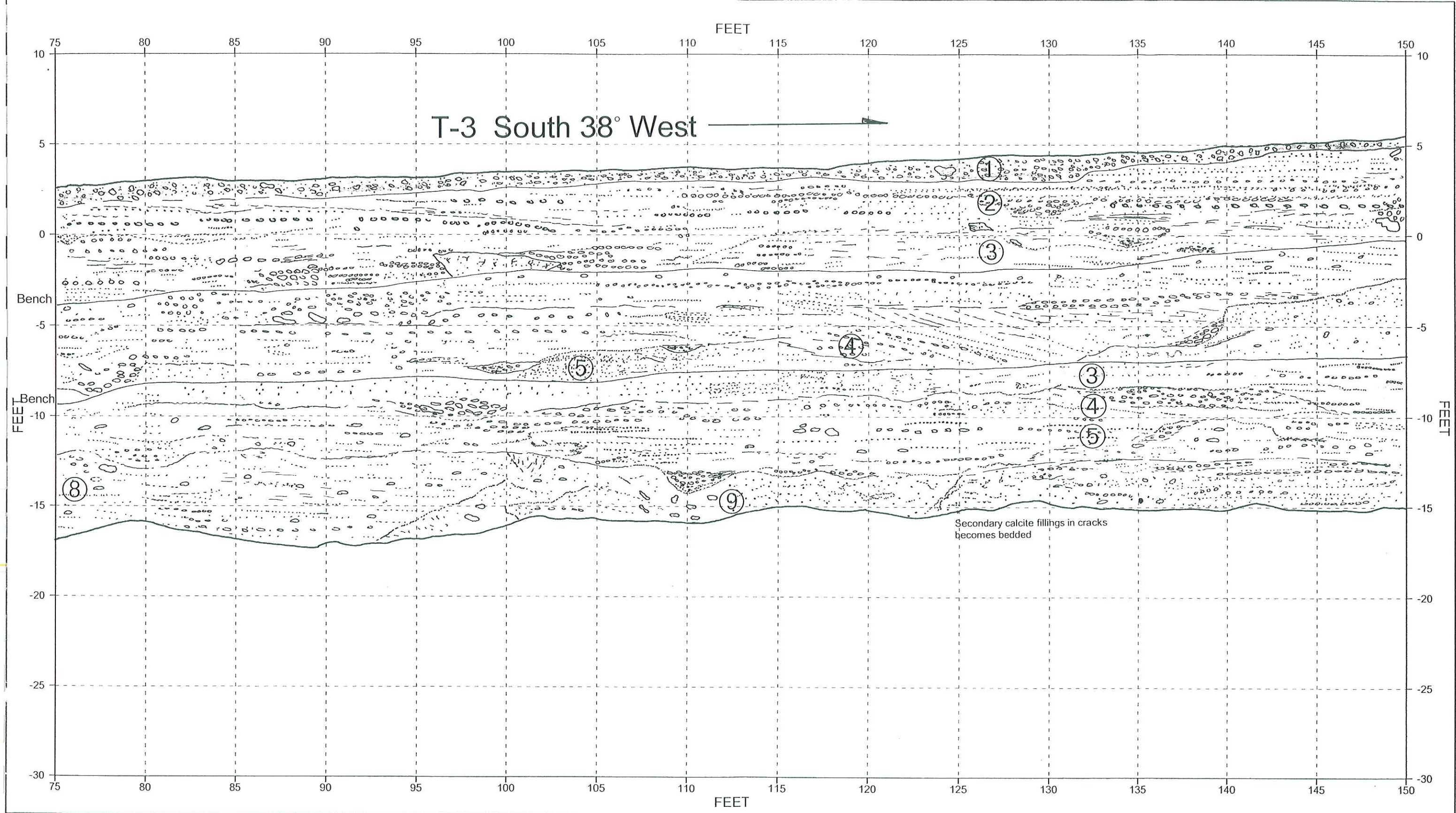
Explanation

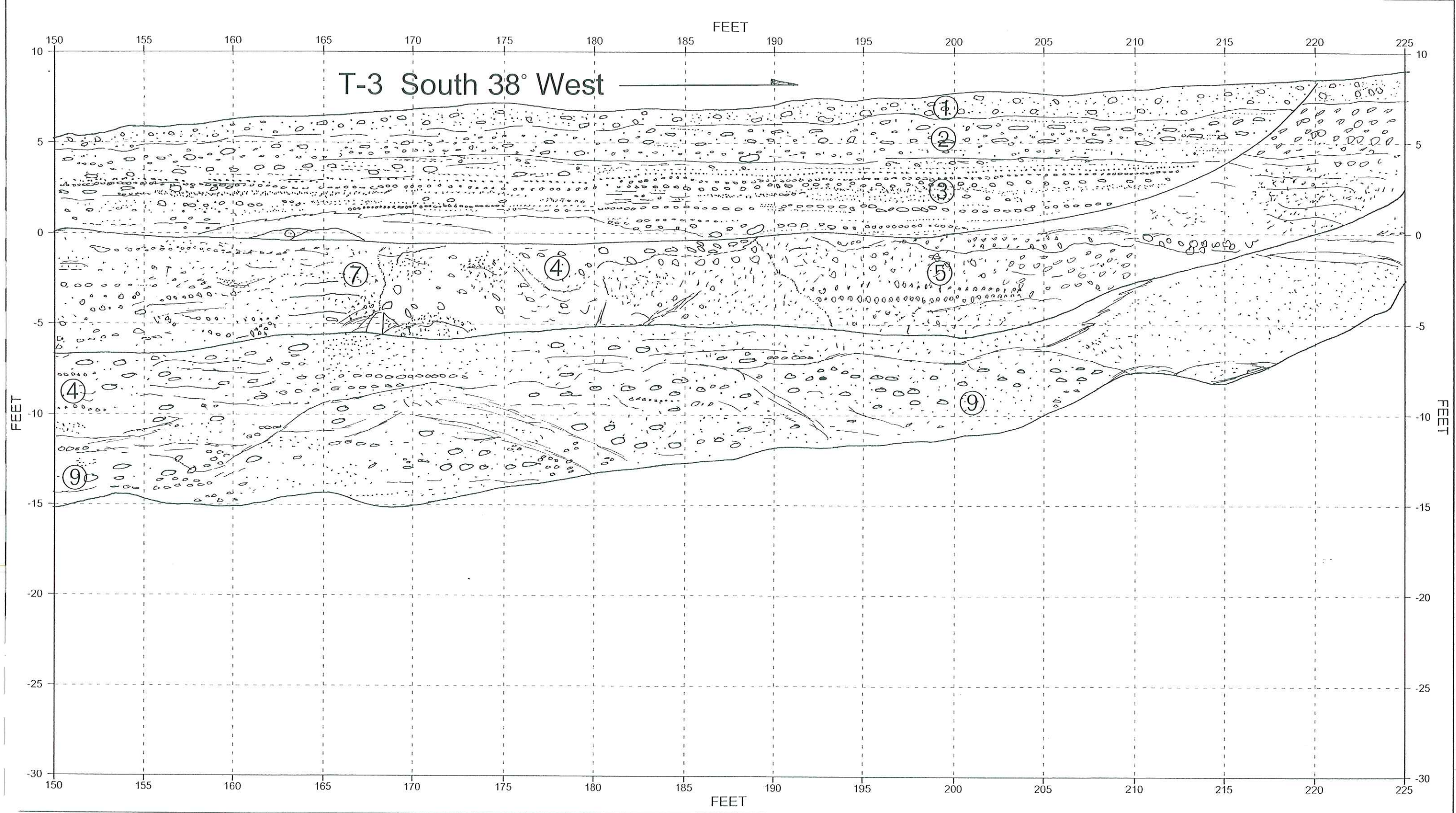
Scale 1"=5' horizontal and vertical

1. **Topsoil/Active Stream Channel Alluvium:** composition varies across the length of the trench ranging from silty sand to well graded gravel, overall unit averages about 5% cobbles, 40% gravel, 55% sand, and 15% silt. cobbles and gravel are composed of dark colored metamorphic rocks of quartzite and "meta-graywackes", gray to brown loose, porous roots, some organic debris and minor trash.
2. **Recent Channel Alluvium:** Silty Sand in very thin layers that grades from a coarse grained sand with gravel to silty sand, average about 25% fine gravel, 15% coarse sand, 20% medium sand, 25% fine sand, 15% silty, dark grayish brown.
3. **Alluvium:** Well graded Gravel to Silty sand, varies in thin layers that become finer grained upward, coarsest units have about 30% 1/2" gravel, dark grayish brown, damp, layers dip 2 to 3 degrees to the northeast.
4. **Gravel lenses with cobbles (GW),** composition varies widely, typically about 10% cobbles, 45% gravel 30% sand, 15% fines, grayish brown.
5. **Older Alluvium:** Well graded gravel to silty sand, varies in thin to thick layers, coarsest units have about 25% fine gravel, light olive brown (2.5Y 5/5) damp, dense.
6. **Varies from well graded gravel with silt to silty sand with gravel,** overall average about 45% gravel, 10% coarse sand, 10% medium, 20% fine sand, 15% silt, dense, damp, pale yellow (2.5 Y 7/4), crude layering.
7. **Same as above except massive.**
8. **Thick units of Well graded Gravel to Silty sand,** varies in clearly defined thin layers that become finer grained upward, coarsest units have about 30% 1/2" gravel, pale yellow (2.5 Y 7/5) damp, dense.
9. **Older alluvial from canyon wall,** composed of silty sand with gravel and some cobbles, composition varies widely but color is typically a yellowish red (5YR 4/6), damp, dense, some calcite coatings and old paleosols.

High percentage of calcite coatings

Beds within channel
105° 45' NE





T-3 South 33° West



FEET

