

HOWARD NEEDLES TAMMEN & BERGENDOFF

GEOTECHNICAL INVESTIGATION REPORT

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**SQUAW PEAK PARKWAY
PHOENIX, ARIZONA**

SEGMENT NO. 5B
Bethany Home Rd. to Myrtle Ave.
P-856344

FOR:

CITY OF PHOENIX
ENGINEERING DEPARTMENT

APRIL 1988

HNTB

GEOTECHNICAL INVESTIGATION REPORT

SQUAW PEAK PARKWAY
PHOENIX, ARIZONA

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11184-21-01

HNTB

Geotechnical Investigation Report

Squaw Peak Parkway

Phoenix, Arizona

1.0 Introduction - Scope

Segment No. 5B of the Squaw Peak Parkway runs from just south of Bethany Home Road to just north of Myrtle Avenue, as shown on Figure 1. The proposed limited access divided highway is planned to be constructed on embankment or retained fill from south of Bethany Home Road to Rose Lane and from Maryland Avenue to just north of the Arizona Canal. The roadway will be depressed from just south of Glendale Avenue to near the crossing of Myrtle Wash. Major structures include bridges over Bethany Home Road and Arizona Canal, a bridge over the depressed roadway at Glendale Avenue, several associated box culvert structures, extensive lengths of retaining walls, and a major storm drainage line.

Proposals for subsurface explorations were taken in April 1986 and a revised proposal was signed in September 1986 with Western Technologies, Inc. Field work was started in January 1987.

This report presents the results of the drilling-sampling, field and laboratory testing program, analysis of roadway soil profile, retaining wall and bridge foundation conditions, specific and general recommendations for use in design and construction.

2.0 Area Geology

The alignment studied for Squaw Peak Parkway, Phoenix, Arizona runs generally along 18th Street from Solano Drive at the south to Gardenia Avenue at the north. This area lies entirely within the Basin and Range Physiographic Province. The area is characterized by faulted and folded mountains surrounded by nearly flat alluvial plains. The project lies in these plains and encroaches the mountainous areas on its north end. The surface is typical urban residential and associated construction can expect to be encountered in the near surface.

The surface in the area from the southern limit to the Arizona Canal can be described as alluvial valley deposits. The material consists of mixtures of clays, silts, sands, gravel, with some cobbles. The coarser gravel and cobbles were found near a depth of approximately 50 feet with a predominance of sand and clay with some gravel above this level. A material such as the S-G-C or River Run deposits was not encountered in the exploration borings. The area north of the canal has a thin surface alluvial layer that varies from zero to fifteen feet. Below the surface layer an indurated Petromict Conglomerate (Pettijohn) of light to heavy cementation was encountered. The conglomerate consists of predominantly gravel size particles although boulders up to 1 foot in diameter were observed. The constituents of the conglomerate were bound in fines with a carbonate cement. The conglomerate outcrops and can be observed in the Myrtle Wash near the crossing of the alignment. This formation is wedge shaped accumulations of gravel that were shed from sharply elevated adjacent highlands and may be basal or may be intercalated at several horizons.

The metamorphic schists of the Phoenix Mountains were encountered in Borings AC-5 and AC-6 taken at the Arizona Canal. This bedrock underlies the conglomerates in the area at variable depths.

3.0 Subsurface Explorations - Drilling, Sampling, and Testing

A total of 57 borings were drilled along the proposed alignment by Western Technologies, Inc., (WTI), Phoenix, Arizona. Figure 1 shows the project location. All boring locations and depths, sampling procedures and frequencies, and laboratory testing were determined by HNTB. Drilling and sampling commenced on January 12, 1987, and was completed on February 11, 1987. Supplemental borings were taken during March-April 1988 by WTI and Muncy Drilling, Inc. An HNTB geologist witnessed the field work on a full-time basis.

Various boring prefixes were selected to identify the main purpose of the borings. Bridge structure borings include "G", "AC", and "BH" borings, roadway structures include "RS" series, roadways - "R" series, and storm drainage borings include "SD" borings. The as drilled boring locations are shown on Figures 2.1 - 2.9. The logs of borings for the structures and roadways are contained in Appendix 1 of this report. Appendix 2 contains the boring logs for the storm drainage investigation.

The borings were drilled with truck-mounted CME-45 and 75 drill rigs. Advancement of the borings included one or more of the following methods: 6-inch solid stem auger, 7-inch hollow stem auger, 4-inch rotary wash, and NX size rock coring. Standard Penetration Tests (SPT) were generally performed at five-foot intervals of depth or at stratum changes in the structure borings.

The SPT test involves driving a 2 inch O.D., 1 3/8 inch I.D. split barrel

sampler 18 inches into the in situ soil in six inch increments by a 140-pound hammer falling freely 30 inches. The sum of the number of blows for the last two six-inch increments is recorded as "N" or the penetration resistance in blows per foot. The consistency of cohesive soils may also be roughly estimated from the penetration resistance. A small sample of disturbed soil suitable for classification type testing was recovered from each SPT.

In selected locations, relatively undisturbed samples of overburden soils were taken with a driven 3" O.D. sampler lined with 2.42" brass ring segments. The sampler is driven 12" with with SPT hammer and the blows recorded as blows per foot.

Where refusal was met with auger methods, the borings were advanced further with 4-inch rotary wash and/or NX size rock coring. Both recovery and RQD were determined for all rock core runs.

Laboratory tests were performed on selected samples assigned by HNTB. Classification testing included natural moisture content, Atterberg Limits (LL & PL), and sieve analysis. Direct shear and compression tests were performed on selected ring liner samples. Appendix 1 contains the laboratory test data for the structure and roadway borings.

Field resistivity readings were taken at each "SD" boring location along with the boring. Soil samples obtained were tested for classification purposes. Results of the field and laboratory testing are contained in Appendix 2.

4.0 Subsurface Conditions

In the vicinity of Bethany Home Road subsurface conditions indicate primarily sandy clays with gravel and sandy and clayey gravels to a depth of 60+ feet. North from Bethany Home Road to the Arizona Canal crossing were encountered primarily sandy gravel soils to depths of up to 20+ feet. From the Arizona Canal northward to Myrtle Wash the upper sandy gravels encountered were typically less than 10 feet thick.

Beneath these thin overburden soils from Arizona Canal to Myrtle Wash were encountered a rock-like conglomerate material. This material was generally moderate to highly cemented gravel, cobble, and boulders with occasional clay and sand lenses. The depth to this conglomerate varied from 15-20 feet at the Arizona Canal to approximately 5 feet at Glendale Avenue and Myrtle Wash.

The thickness of the conglomerate is anticipated to generally decrease to the north as the roadway approaches the Phoenix Mountains. Two borings taken at the Arizona Canal encountered the underlying schist bedrock at very different elevations, 1149+ and 1207+. This variation, while surprising, is not unusual as the mountainous terrain as observed above ground extends beneath the overlying conglomerate and gravel soils.

The subsurface information profile showing the plotted boring information is shown on Figures 3.1 to 3.4. A separate profile showing the storm drainage boring information is included in Appendix 2.

5.0 Analysis and Conclusions

The interpreted subsurface conditions were examined with respect to proposed construction of the roadway cut, roadway embankment, retaining walls, bridge structures, and box culvert structures, and are discussed below.

Retaining Walls

Proposed locations of the retaining walls are shown on Figures 3.1 and 3.4 along with the subsurface profile information. Walls will be constructed either above or below existing grade along much of the length of the planned roadway. The subsurface conditions indicate materials below the proposed footing levels are anticipated to vary considerably along the alignment. Some footings will likely be supported on the clayey and gravelly overburden while others will be supported on the conglomerate materials.

Maximum safe allowable bearing pressures for spread footings for walls can vary from 1500 to 4000 psf for overburden soils and from 4000 - 10,000 psf for the dense gravels and conglomerate. Wall footings can be supported on a minimum of 3 feet of compacted fill or recompacted soil at an allowable bearing value of 3,000 psf. Where walls are high and the corresponding bearing pressures are too low to design spread footings economically, deep foundations extending into the underlying dense materials may be required.

The use of reinforced earth walls along certain wall sections may be feasible. However, these walls would require the import of special granular backfill from offsite, as much of the proposed excavated materials would not be suitable for the reinforced earth wall backfill. Should this type of wall be considered, the wall manufacturer's plans should include verification of internal stability using the available soils information. All calculations should be provided with the plans submittal. External stability confirmation is generally the responsibility of the engineer..

Roadways

The preliminary roadway grades show the proposed Squaw Peak Parkway constructed on embankment heights up to 30 feet \pm for the approaches to Bethany Home Road and 15 feet \pm for the approaches to the Arizona Canal crossing. Cuts on the order of 20 feet \pm are shown for the depressed roadway approaches for the Glendale Avenue underpass.

The high fill areas will be contained by walls and maximum embankment heights anticipated are 15 feet \pm . Embankment slopes of 3:1 (H:V) should be satisfactory if constructed properly with suitable materials, while 4:1 slopes if permissible should allow for easy slope maintenance.

Embankment settlement should be minor and occur rapidly as construction is performed. Embankment construction should be according to appropriate City or State standards.

The major cut area associated with the depressed roadway approaches to the Glendale Avenue underpass may utilize walls and cut slopes in combination. The anticipated cut section will be primarily in rock-like conglomerate materials. Excavation of these materials with normal earth moving equipment may not be possible and may require special ripping equipment and/or controlled blasting. If blasting is permitted, monitoring of the surrounding residences should be required as well as a preconstruction survey of each structure.

Cut slopes in the conglomerate could be made vertical, however, long-term exposure of such slopes would likely result in localized erosion and sloughing and ultimately overall slope instability. Slopes could be benched or flattened to 3:1 or flatter and paved or covered with a soil layer to establish vegetative cover.

Along the roadway in areas where conglomerate materials are encountered at subgrade level, the excavation beneath the proposed pavement should be over excavated to at least 12 inches below the final subgrade level and back-filled with suitable fill material.

Bridge Structures

Three main bridge structures are proposed at the locations shown on Figures 3.1 to 3.4.

For the bridge over Bethany Home Road, subsurface conditions show an upper stiff sandy clay with gravelly sand layers to a depth of 20 feet \pm , underlain by a dense sandy gravel to gravelly sand with some clay. Spread footings supported in the upper soils would be limited to allowable bearing pressures of from 1500 to 3000 psf. Driven pile foundations would have to be supported in the lower dense granular materials but there may be some difficulty in driving piling to the required depths. Drilled shaft foundations could extend into the lower dense granular materials and provide support in combined end bearing and side resistance. An allowable end bearing value on the order of 12 KSF and a side resistance value of 1.2 KSF below Elevation 1165 \pm can be used. Should shafts extend below Elevation 1119 \pm , an allowable end bearing of 20 KSF and side resistance of 2 KSF can be used.

For the bridge over the Arizona Canal, shallow soil bearing spread footings would be limited to allowable bearing pressures of from 1500-3000 psf. Drilled shaft foundations would extend into the lower conglomerate materials below approximate Elevation 1226 \pm at an allowable side resistance value of 1.0 KSF and an allowable end bearing value of 10 KSF. Below Elevation 1205 \pm , drilled shaft capacities can increase. Deep spread footings could also be used at an allowable bearing value of 10 KSF, however, spread footings are not recommended for the bridge structure due to the potential effects on the soils from water in the canal.

At Glendale Avenue, the bridge will be built over the depressed roadway, some 20 feet \pm deep. For spread footings supported below Elevation 1240 \pm ,

an allowable bearing value of 10 KSF is appropriate. Drilled shafts with an embedment of 10 feet or more below Elevation 1240_± can be designed for an allowable end bearing value of 15 KSF and an allowable side resistance value of 1.5 KSF. Shallower spread footings in the poorer quality conglomerate materials can be designed for an allowable bearing value of 4000-6000 psf, depending on the location of the footing.

Box Culverts

Box culvert structures are proposed in the area of the Arizona Canal crossing and at Myrtle Wash. Near the Arizona Canal, box culvert structures could be supported on spread or mat foundations at an allowable bearing pressure of from 1500 to 3000 psf above Elevation 1226_±, depending on the actual footing location. Construction of a box at Myrtle Wash would likely be in the conglomerate materials below Elevation 1290_±. An allowable bearing pressure for the dense granular materials at this location is 6000 psf.

Pedestrian Overpass/Underpass

A proposed pedestrian crossing near Maryland Avenue is being considered as either an overpass or underpass structure. Recent borings indicate a primarily sandy gravel material increasing in density and strength with depth. For spread footings, allowable bearing pressures of 1500 - 5000 psf could be used depending on the design depth of the footings.

6.0 Recommendations

1. Retaining wall foundation recommendations are shown on Figures 3.1 to 3.4, including shallow and deep foundations where practical. In the area of Bethany Home Road, deep foundations should be required to support the high wall sections to reduce the potential for unfavorable wall movements.
2. For walls placed on at least 3 feet of compacted fill either in embankments or in overexcavation and backfill situations, an allowable bearing value of 3000 psf is recommended.
3. For normal backfill conditions using a granular backfill layer adjacent to the wall with a positive drainage system, an equivalent lateral fluid pressure (EFP) of 35 pcf is appropriate. The coefficient of friction against sliding along the base of the walls for spread footings may be taken as 0.35 in overburden areas and 0.50 for footings on the dense gravels and conglomerate. Where conditions justify, a passive soil resistance in front of these walls may be taken as 1000 psf and 3000 psf for soil and conglomerate materials respectively.
4. Where the use of reinforced earth type retaining walls are considered, the wall manufacturer's plans should include verification of internal stability using the available soils information. Design assumptions should be stated and stability calculations provided. Walls of this

type would require the import of special granular backfill from offsite, as much of the proposed excavated materials would not be suitable for the special wall backfill.

5. Embankment slopes for compacted fills should be stable at 3:1 (H:V) slopes, while 4:1 slopes if permissible should allow for easier slope maintenance. Embankment construction should be according to appropriate City or State standards.
6. Excavation of the depressed roadway approaches to the Glendale Avenue underpass will be primarily in rocklike conglomerate materials. Excavation of these materials with normal earth moving equipment may not be possible and may require special ripping equipment and/or controlled blasting. If blasting is permitted, monitoring of the surrounding residences should be required as well as a preconstruction survey of each structure. Blasting should not be performed within 200 feet \pm of new construction.
7. Vertical cut slopes in the conglomerate material may not be stable for the long term. Slopes could be benched or flattened to 3:1 or flatter and paved or covered with a soil layer to establish vegetative cover.
8. Along the roadway in areas where conglomerate materials are encountered at subgrade level, the excavation beneath the proposed pavement should be over excavated to at least 12 inches below the final subgrade level and backfilled with suitable fill material.

9. Excavated conglomerate materials may be suitable for use in general embankment fills if broken down sufficiently such that there are adequate finer particles to allow even distribution and filling of all voids to form a dense and compact fill. These materials should be placed in the lower part of embankments and kept below three feet of the finished subgrade.

10. Bridge foundation recommendations are shown on Figures 3.1 to 3.4, including shallow and deep foundations where practical. Where deep foundations are used, drilled shafts are recommended. At the Arizona Canal crossing, spread footings are not recommended for the bridge structure due to potential effects on the soils from adjacent water in the canal. Lengths of drilled shafts within 5 feet of the finished ground surface should be disallowed for side resistance support.

11. Drilled shafts should be straight sided and designed with a minimum diameter of 24 inches. Shafts should be spaced a minimum of $2.5D$ center to center in the dense granular soils for independent action. Shafts expected to be in primarily the conglomerate materials can be safely spaced as close as $2D$. Shafts should be visually inspected by qualified personnel. Machine cleaning should be adequate if proper equipment is used. Rock augers and/or rock coring methods will be necessary to excavate shafts in the conglomerate materials and perhaps the dense gravels. Temporary casing may be necessary in some areas and slurry or dewatering methods may be necessary also.

12. Recommended design parameters for lateral loads on drilled shafts are as follows:

For COM 624 Program

Layer 1: Sandy clay and clayey sand overburden and fill

KS0IL = 3
k = 150 pci
 γ = 0.064 pci
 ϕ = 0°
C = 5.2 psi
E₅₀ = 0.015

Layer 2: Clayey sand and gravels

KS0IL = 4
k = 90 pci
 γ = 0.069 pci
 ϕ = 33°
C = 0
E₅₀ = 0

Layer 3: Dense gravels and conglomerate

KS0IL = 4
k = 225 pci
 γ = 0.075 pci
 ϕ = 40°
C = 0
E₅₀ = 0

Location of these layers are shown on Figures 3.1 to 3.4.

13. At the Arizona Canal bridge, deep penetration of the conglomerate may be required by drilled shaft foundations. The variable cemented conglomerate appears rock-like in some areas but in others is uncemented with numerous clay layers. Several foundations could encounter bedrock above planned bottom of shaft elevation. The schist bedrock is highly fractured and jointed with clay infilling while the upper portion is indicated to be weathered and broken. Side resistance and end bearing capacity of the upper bedrock is expected to be similar to the overlying conglomerate. Penetration of 10-15 feet into the bedrock may be required before rock quality improves significantly to allow an increase in side resistance and end bearing capacity. Foundations should be inspected by qualified foundation personnel to confirm the design capacity and make adjustments in shaft lengths if required.
14. At the proposed Pedestrian Bridge, the following elevations and allowable bearing pressures apply:

<u>Location</u>	<u>Foundation Elevation</u>	<u>Allowable Bearing Pressure</u>
West Side	1222 - 1219	1500 psf
	1219 - 1212	3000 psf
	1212 & below	5000 psf
Center Line	1222 - 1219	1500 psf
	1219 - 1212	3000 psf
	1212 & below	5000 psf
East Side	1223 - 1220	1500 psf
	1220 - 1215	3000 psf
	1215 & below	5000 psf

7.0 Limitations

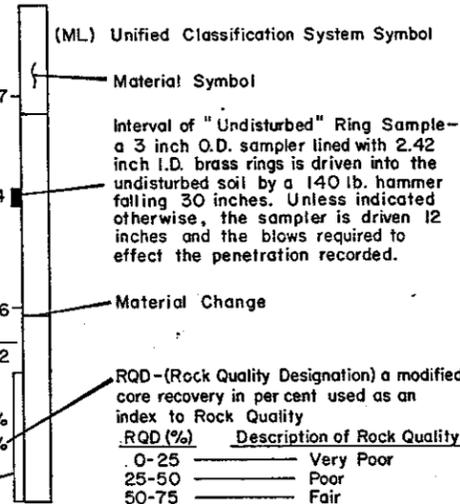
These analyses, interpretations and recommendations are of necessity based on site conditions - surface and subsurface - as they existed at the time of the exploratory borings. Further, it has been assumed that the limited exploratory borings, in relation to both area of the site and depth, are representative of conditions throughout the site. If during construction conditions are encountered which differ significantly from those reported herein, the analyses, interpretations, and recommendations should be reviewed and/or revised as necessary.

* * * * *

FIGURES

TYPICAL BORING

Standard Penetration Test "N"
Value - the number of blows of
a 140 lb. hammer falling 30
inches required to drive a 2 inch
O.D., 1 3/8 inch I.D. split
barrel sampler 12 inches.
(Penetration of less than 12
inches is recorded as blows/
penetration - 100 / 7.5")

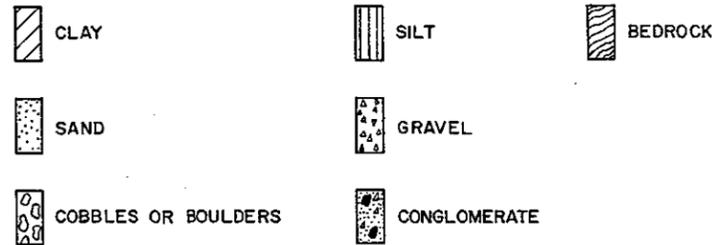


Interval of "Undisturbed" Ring Sample -
a 3 inch O.D. sampler lined with 2.42
inch I.D. brass rings is driven into the
undisturbed soil by a 140 lb. hammer
falling 30 inches. Unless indicated
otherwise, the sampler is driven 12
inches and the blows required to
effect the penetration recorded.

RQD - (Rock Quality Designation) a modified
core recovery in per cent used as an
index to Rock Quality

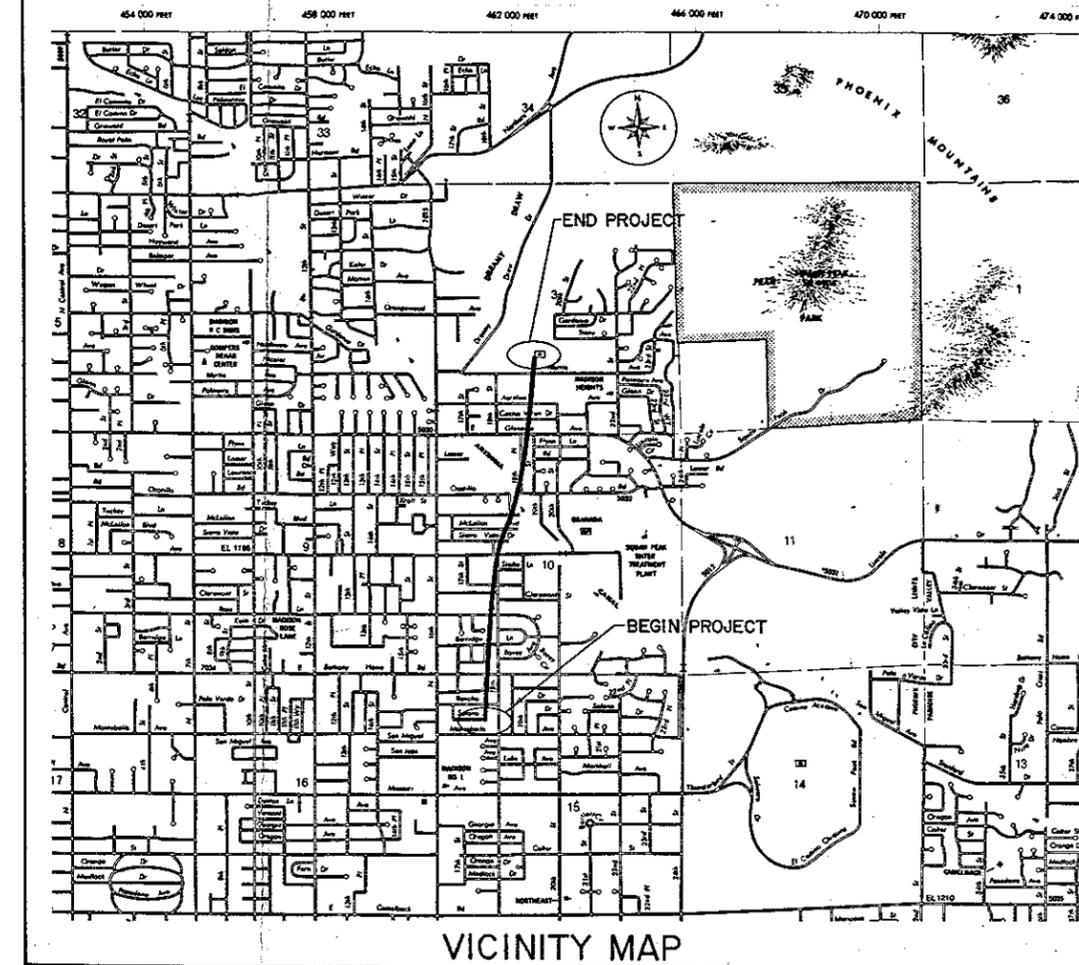
RQD (%)	Description of Rock Quality
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

MATERIALS LEGEND



SOIL FRACTIONS

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 INCHES
COBBLES	3 INCHES TO 12 INCHES
GRAVEL	NO. 4 SIEVE TO 3 INCHES
COARSE GRAVEL	3/4 INCH TO 3 INCHES
FINE GRAVEL	NO. 4 SIEVE TO 3/4 INCH
SAND	NO. 200 SIEVE TO NO. 4 SIEVE
COARSE SAND	NO. 10 SIEVE TO NO. 4 SIEVE
MEDIUM SAND	NO. 40 SIEVE TO NO. 10 SIEVE
FINE SAND	NO. 200 SIEVE TO NO. 40 SIEVE
FINES (SILT OR CLAY)	BELOW NO. 200 SIEVE



UNIFIED SOIL CLASSIFICATION SYSTEM

FINE GRAINED SOIL

SYMBOL	DESCRIPTION	MAJOR DIVISIONS
ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	SILTS AND CLAYS
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	SILTS AND CLAYS
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	SILTS AND CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

COARSE GRAINED SOIL

SYMBOL	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% - 200 FINES	GRAVELS
GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% - 200 FINES	
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% - 200 FINES	GRAVELS
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% - 200 FINES	
SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% - 200 FINES	SANDS
SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% - 200 FINES	
SM	SILTY SANDS, SAND-SILT MIXTURES MORE THAN 12% - 200 FINES	SANDS
SC	CLAYEY SANDS, SAND-CLAY MIXTURES MORE THAN 12% - 200 FINES	

NOTE: SOILS WITH 5 TO 12% MINUS 200 FINE SHOULD BE CLASSIFIED WITH DUAL SYMBOLS.

SOIL TESTING LEGEND

- WC - Water Content
- LL - Liquid Limit
- PI - Plasticity Index
- %-200 - Percent Passing a 200 Sieve
- Dry - Dry Unit Weight
- MD - Moisture / Density - Maximum Dry Unit Weight in Pounds Per Cubic Foot at Optimum Moisture Content in Percent
- Res. - Resistivity in ohm-cm

NOTES

- The borings shown on these drawings were drilled by Western Technologies Inc., Phoenix, Arizona, between January 12 and February 11, 1987.
- Elevation datum is U.S.G.S.
- The ground water levels shown were recorded during times of drilling. Porosity of soil strata, weather conditions, seasonal changes, site topography, etc., may cause changes in the water levels recorded.

SQUAW PEAK PARKWAY SEGMENT NO 5B	
PHOENIX, ARIZONA	
GENERAL INFORMATION	
<small>HOWARD NEEDLES TAMMEN & BERGENDOFF ARCHITECTS ENGINEERS PLANNERS</small> HNTB	
PREPARED: WAD	DATE: 4-7-87
DRAWN: SEG	DATE: 4-13-87
CHECKED: WAD	DATE: 4-16-87
HNTB JOB NO. 11184 -21-01	
FIGURE 1	

SQUAW PEAK PARKWAY SEGMENT NO. 5B
 PHOENIX STREETS-MARICOPA CO.
 BETHANY HOME RD. TO MYRTLE AVE.

FHWA REGION	STATE	PROJ. NO.	SHEET TOTAL	AS BUILT
9	ARIZ.	P-856344	NO. SHEETS	
HNTB			CONSULTING ENGINEER	
DES	DR	CK	DATE	

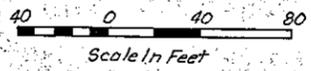


LEGEND

● As Drilled Boring Location

AS DRILLED BORING LOCATION PLAN

SQUAW PEAK FREEWAY
 CITY OF PHOENIX, ARIZONA
 ENGINEERING DEPARTMENT
SQUAW PEAK PARKWAY
 SEGMENT NO. 5 B
 BETHANY HOME RD. TO MYRTLE AVE.
P-856344



NOTE:
 Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

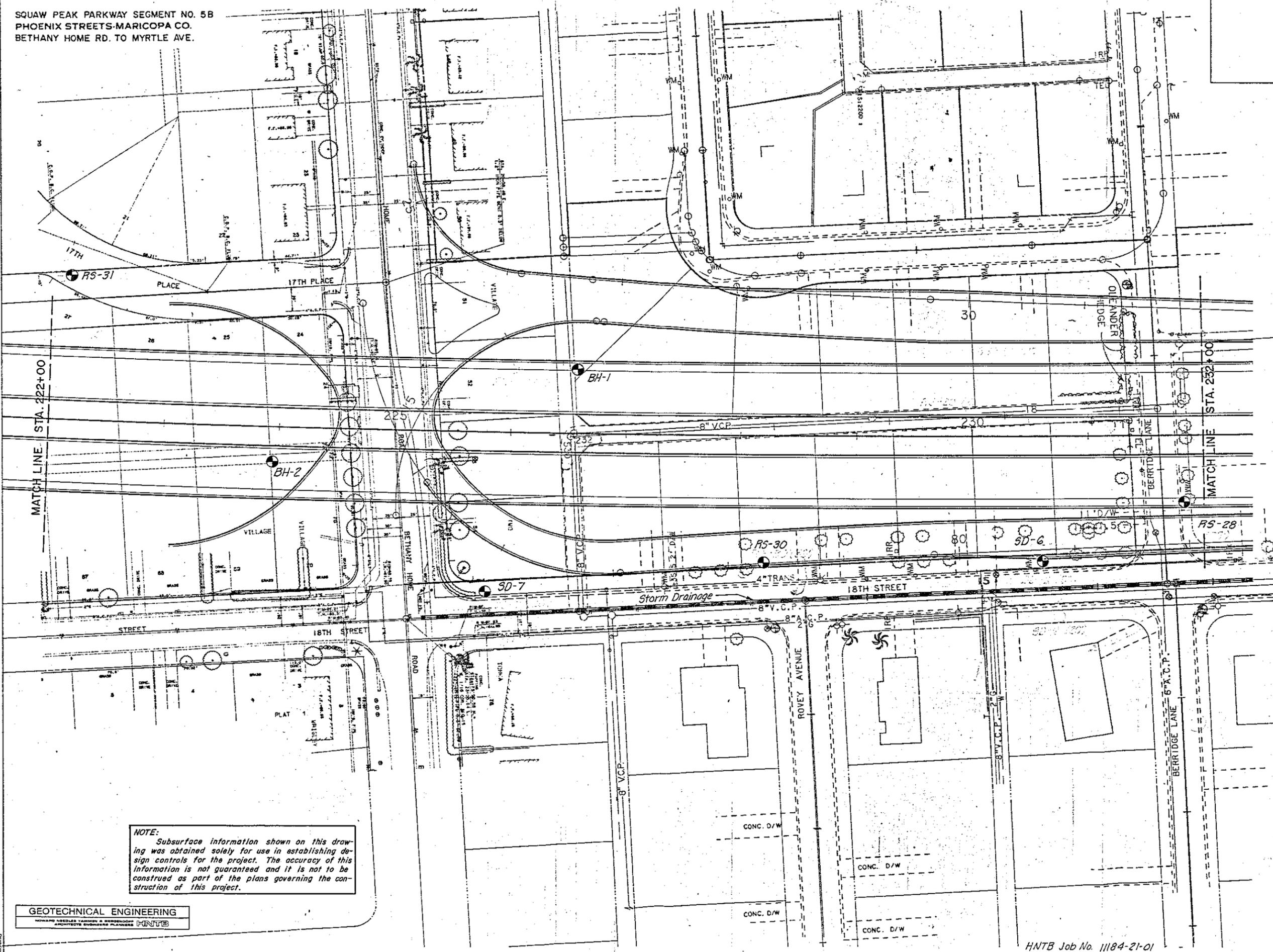
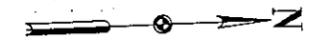
HNTB Job No. 11184-21-01

GEOTECHNICAL ENGINEERING
 HOWARD MENDEL TAYLOR & ASSOCIATES
 ARCHITECTS ENGINEERS PLANNERS HNTB

DR	DES	CK	WAD	SHEET	TOTAL	AS
DATE	DATE	DATE	DATE	NO.	SHEETS	BUILT
SCALE 1" =	HORIZONTAL		VERTICAL		Fig. 2.1	

SQUAW PEAK PARKWAY SEGMENT NO. 5B
 PHOENIX STREETS-MARICOPA CO.
 BETHANY HOME RD. TO MYRTLE AVE.

FEDERAL REGION	STATE	PROJ. NO.	SHEET NO.
9	ARIZ	P-856344	
DESIGNER		CONSULTING ENGINEER	DATE
DR		CK	



NOTE: Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

GEOTECHNICAL ENGINEERING
 HOWARD NEEDLES TAMMEN & BERENSON
 ARCHITECTS ENGINEERS PLANNERS HNTB

LEGEND

- As Drilled Boring Location
 - Proposed Standard Penetration Test Boring
 - Proposed Boring Depth
- 40 0 40 80
 Scale in Feet

AS DRILLED BORING LOCATION PLAN

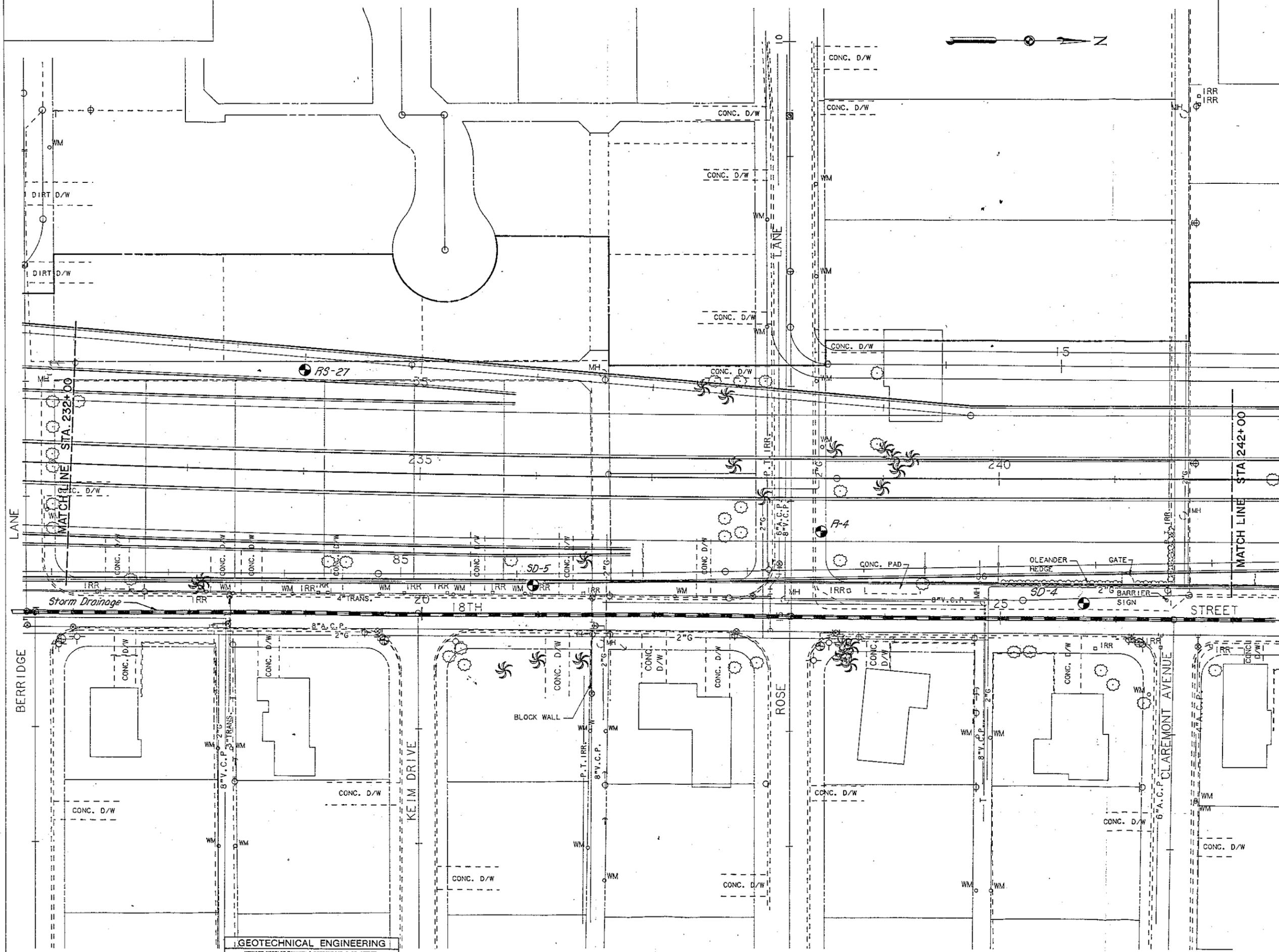
CITY OF PHOENIX, ARIZONA
 ENGINEERING DEPARTMENT
SQUAW PEAK PARKWAY
 SEGMENT NO. 5 B
 BETHANY HOME RD. TO MYRTLE AVE.
 P-856344

DR. REG. NO.	DESIGNER	CK. WAD. NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE 1-23-87	DATE 1-23-87	DATE 1-23-87			

SCALE 1" = _____ HORIZONTAL
 VERTICAL

Fig. 2.2

HNTB Job No. 11184-21-01



LEGEND

● As Drilled Boring Location



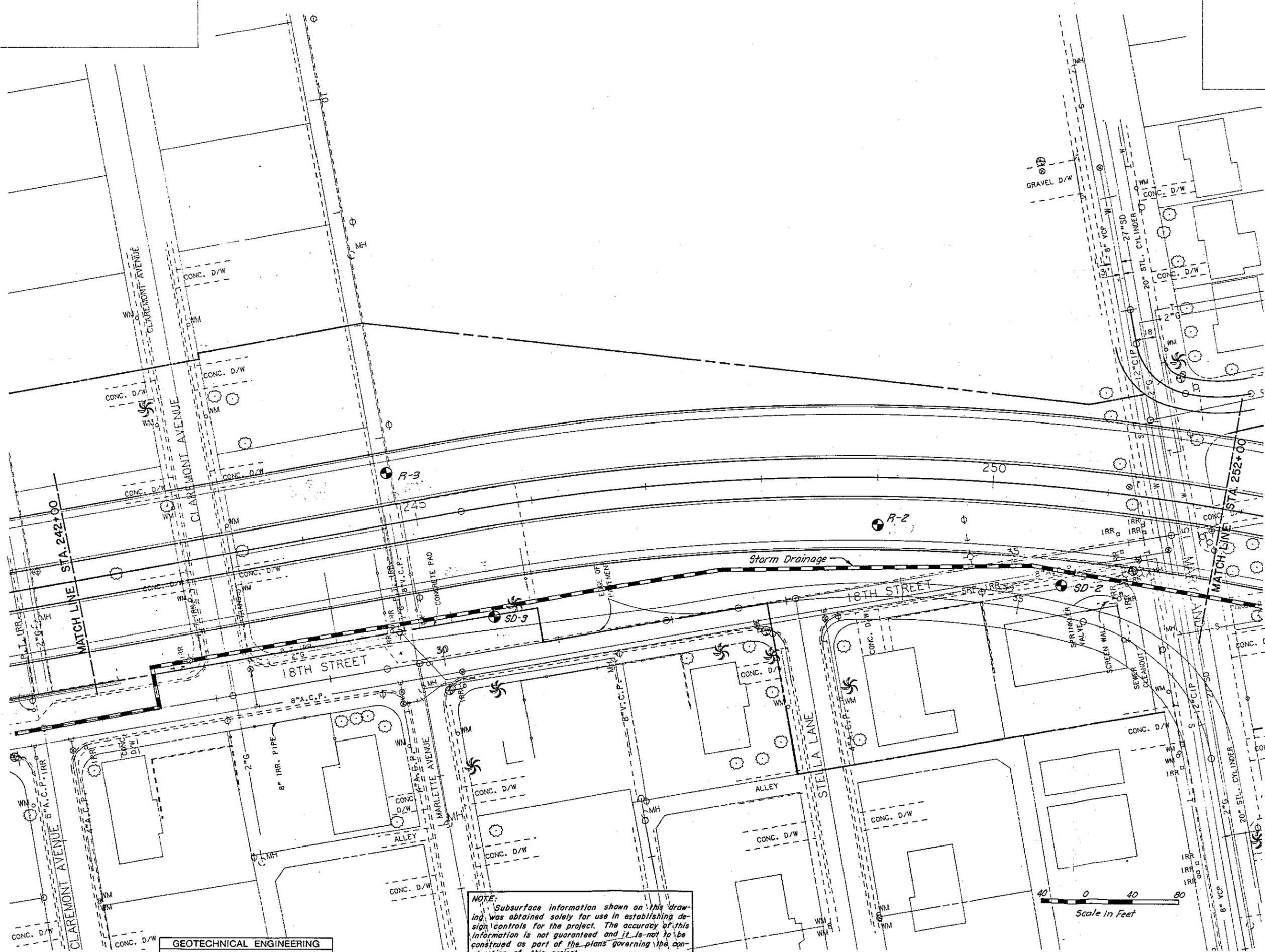
NOTE:
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AS DRILLED BORING LOCATION PLAN

CITY OF PHOENIX, ARIZONA				
ENGINEERING DEPARTMENT				
SQUAW PEAK PARKWAY				
SEGMENT NO. 5 B				
BETHANY HOME RD. TO MYRTLE AVE.				
P-856344				
DR. SEG.	DATE	CHK. WAD	SHEET	TOTAL
1-23-87	1-23-87	1-23-87	NO.	SHEETS
SCALE 1" =				AS
HORIZONTAL				Fig. 2.3
VERTICAL				

GEOTECHNICAL ENGINEERING
 HOWARD NEEDLES TAMM & BERENSON
 ARCHITECTS ENGINEERS PLANNERS

HNTB Job No. 11184-21-01



LEGEND

- ⊕ As Drilled Boring Location
- ⊕ Prepared Standard Penetration Test Boring
- () Estimated Boring Depth

AS 'DRILLED' BORING LOCATION (PLAN)

CITY OF PHOENIX, ARIZONA
 ENGINEERING DEPARTMENT
SQUAW PEAK PARKWAY
 SEGMENT NO. 5 B
 BETHANY HOME RD. TO MYRTLE AVE.
P-856344

DATE	DES	CHK	DATE	SHEET	TOTAL	AS
7-23-87		WAD	7-23-87	NO.	SHEETS	BUILT
SCALE 1" =				HORIZONTAL		Fig. 2.4
				VERTICAL		

NOTE: Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

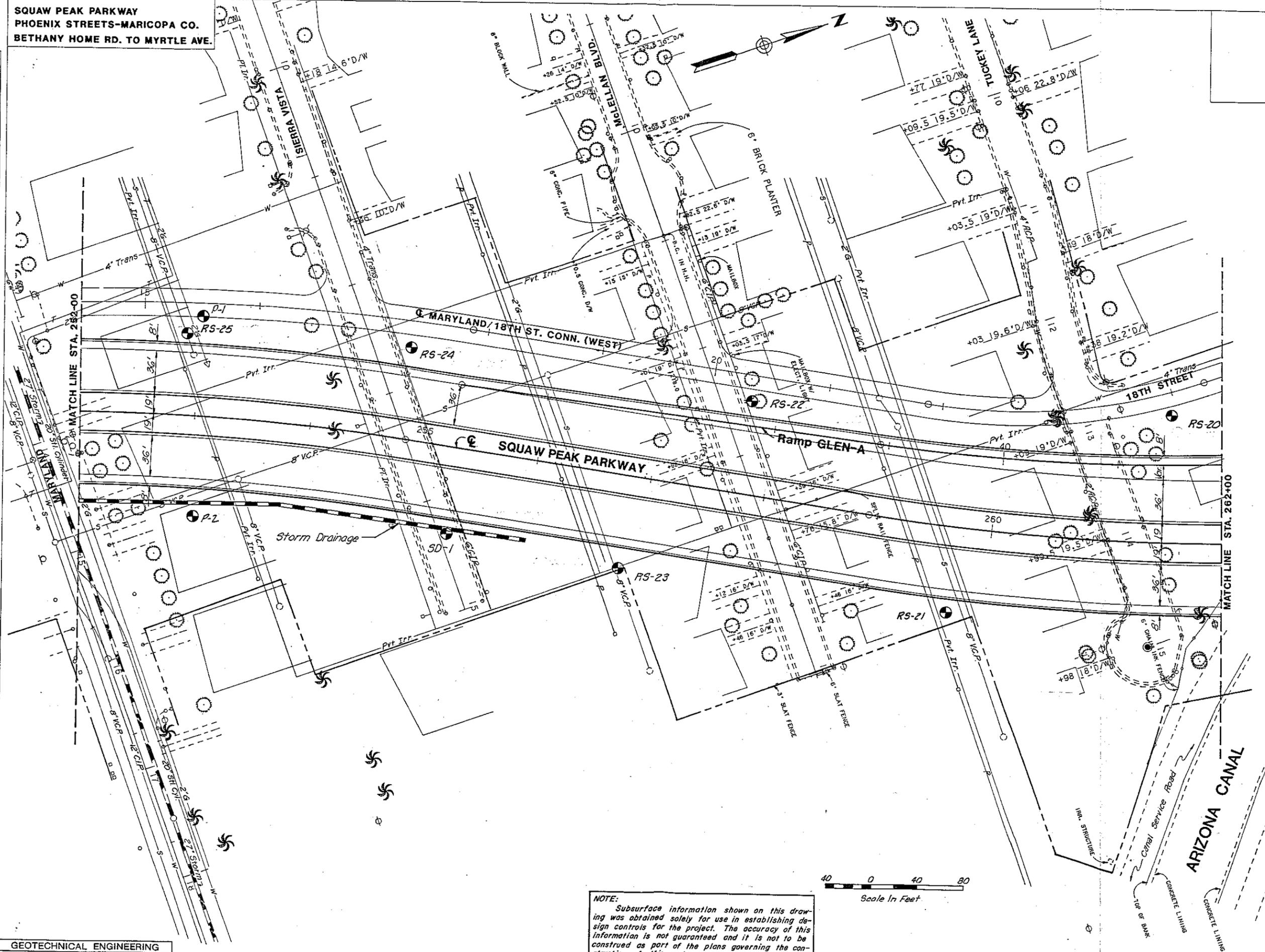
GEOTECHNICAL ENGINEERING
 HOWARD NEUBER TAYLOR & BERENSON
 ARCHITECTS ENGINEERS PLANNERS
HNTB



HNTB Job No. 11184-21-01

SQUAW PEAK PARKWAY
 PHOENIX STREETS-MARICOPA CO.
 BETHANY HOME RD. TO MYRTLE AVE.

FHWA REGION	STATE	PROJ. NO.	SHEET TOTAL	AS BUILT
9	ARIZ.		NO. SHEETS	
CONSULTING ENGINEER				
DES.	IDR.	CK.	DATE	
HNTB HOWARD NEEDLES TAMMEN & BERGENDORFF				



LEGEND

⊕ As Drilled Boring Location

AS DRILLED BORING LOCATION PLAN

**SQUAW PEAK PARKWAY
 STA. 252+00 to STA. 262+00**

**CITY OF PHOENIX, ARIZONA
 ENGINEERING DEPARTMENT**

**SQUAW PEAK PARKWAY
 SEGMENT No. 5 B
 BETHANY HOME RD. TO MYRTLE AVE.
 P-856344**

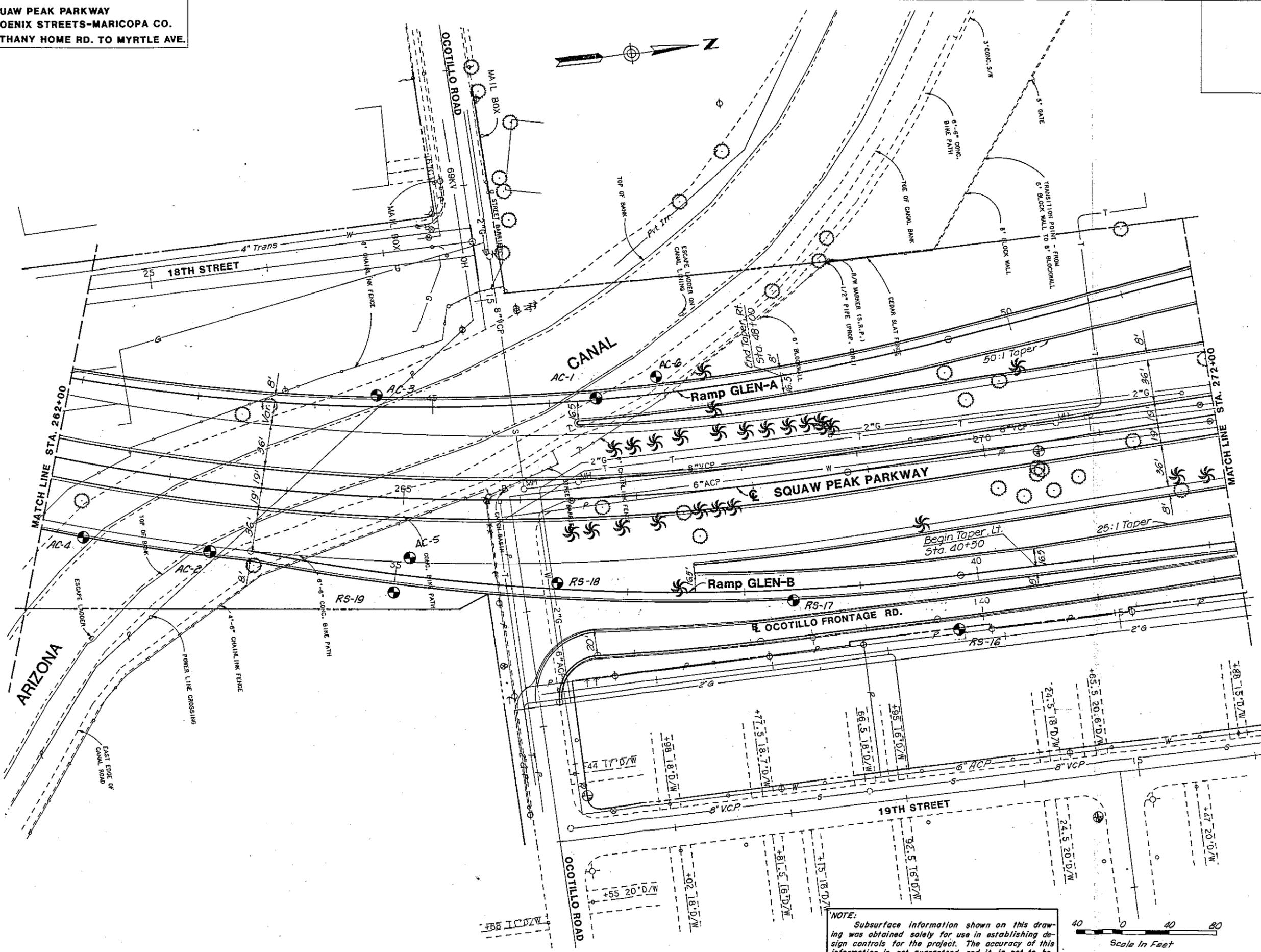
DR. CAC	IDES	CK WAD	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE 12-8-84	DATE	DATE 1-23-85			

SCALE: 1" = 40' Fig. 2.5

NOTE:
 Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

GEOTECHNICAL ENGINEERING
 HOWARD NEEDLES TAMMEN & BERGENDORFF
 ARCHITECTS ENGINEERS PLANNERS
HNTB

HNTB Job No. 11184-21-01



LEGEND

● As Drilled Boring Location

AS DRILLED BORING LOCATION PLAN

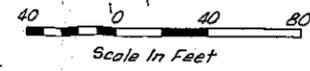
SQUAW PEAK PARKWAY
STA. 262+00 to STA. 272+00
CITY OF PHOENIX, ARIZONA
ENGINEERING DEPARTMENT

SQUAW PEAK PARKWAY
SEGMENT No. 5 B
BETHANY HOME RD. TO MYRTLE AVE
P-856344

DR. ZGL	DES.	CK.	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 2-6-86	DATE	DATE			

SCALE: 1" = 40'

NOTE:
Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

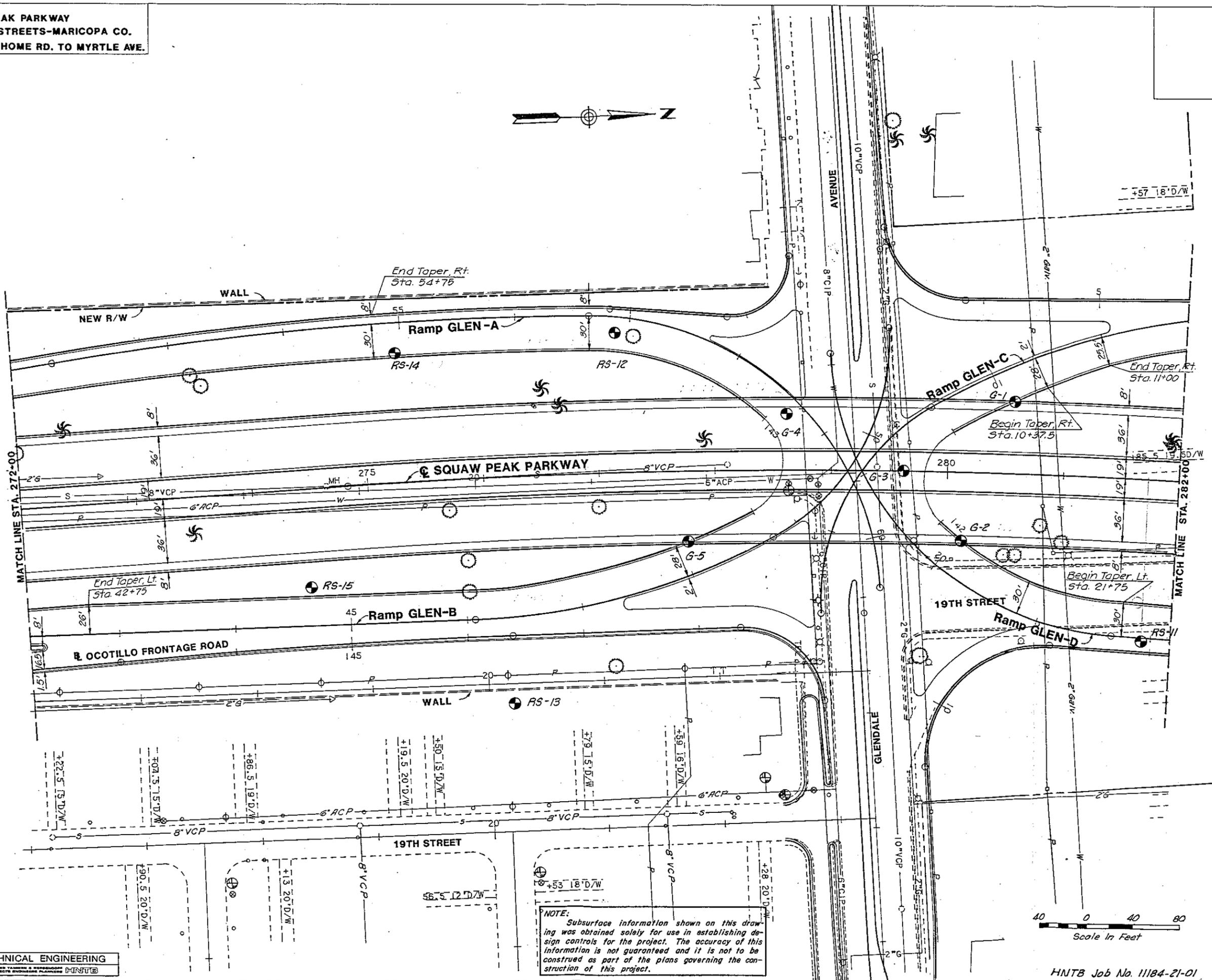


HNTB Job No. 11184-21-01

SQUAW PEAK PARKWAY
PHOENIX STREETS-MARICOPA CO.
BETHANY HOME RD. TO MYRTLE AVE.

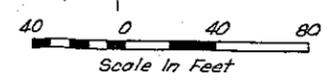
F.H.W.A. REGION	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ				

CONSULTING ENGINEER		
DES.	DR.	DATE
HNTB HOWARD NEEDLES TAMMEN & BERENSON		



LEGEND
 ● As Drilled Boring Location

AS DRILLED BORING LOCATION PLAN
 SQUAW PEAK PARKWAY
 STA. 272+00 to STA. 282+00
 CITY OF PHOENIX, ARIZONA
 ENGINEERING DEPARTMENT
 SQUAW PEAK PARKWAY
 SEGMENT No. 5 B
 BETHANY HOME RD. TO MYRTLE AVE.
 P-856344



HNTB Job No. 11184-21-01

GEOTECHNICAL ENGINEERING
 HNTB

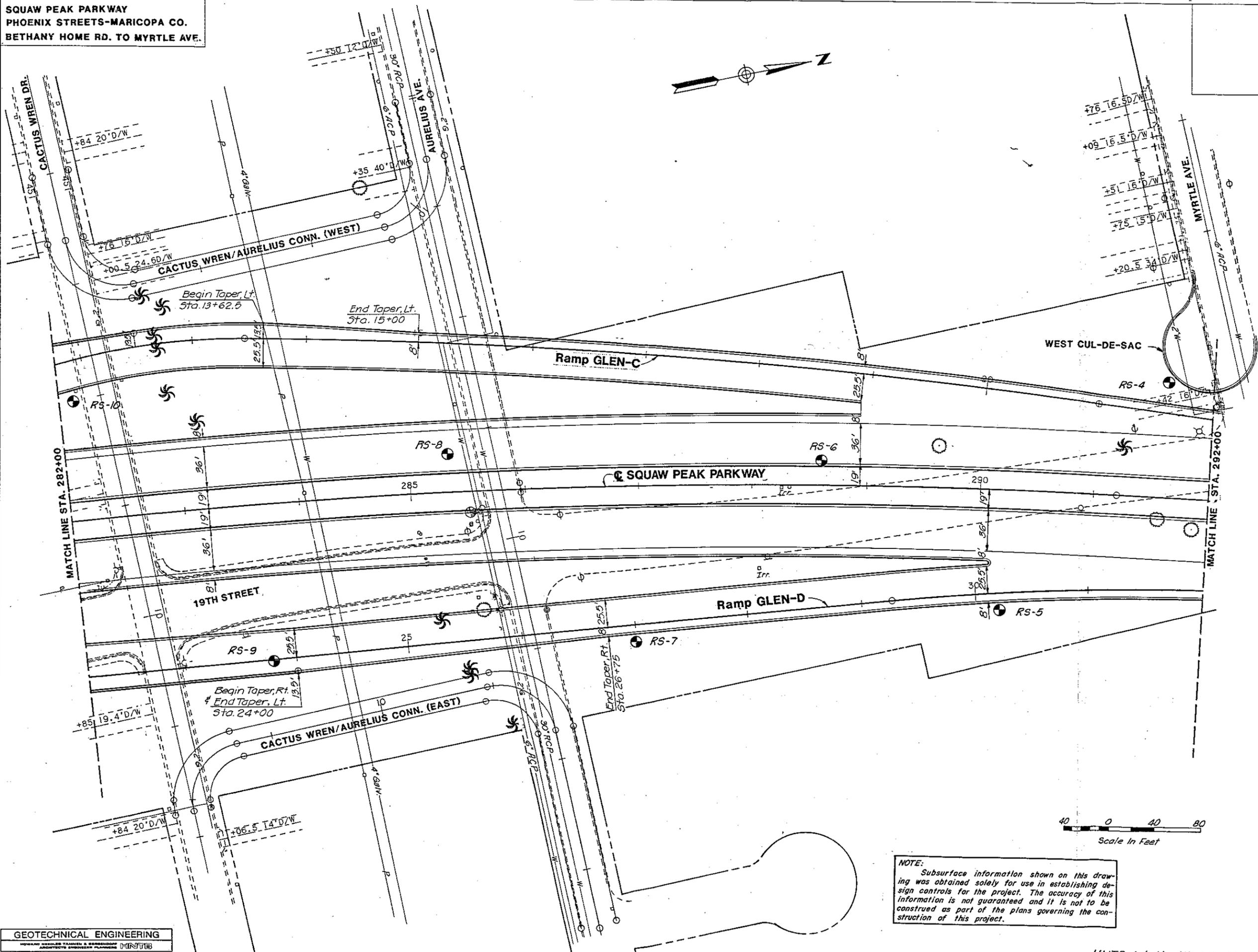
NOTE:
 Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

DR.	DES.	ICK	SHEET NO.	TOTAL SHEETS	AS BUILT

SCALE: 1" = 40'

SQUAW PEAK PARKWAY
PHOENIX STREETS-MARICOPA CO.
BETHANY HOME RD. TO MYRTLE AVE.

F.H.W.A. REGION	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				
CONSULTING ENGINEER					DATE
DES.					DR.
HNTB					HOWARD NEEDLES TAMMEN & BERENDSON



LEGEND

● As Drilled Boring Location

AS DRILLED BORING LOCATION PLAN

SQUAW PEAK PARKWAY
STA. 282+00 to STA. 292+00
CITY OF PHOENIX, ARIZONA
ENGINEERING DEPARTMENT
SQUAW PEAK PARKWAY
SEGMENT No. 5 B
BETHANY HOME RD. TO MYRTLE AVE.
P-856344

NOTE:
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GEOTECHNICAL ENGINEERING
HOWARD NEEDLES TAMMEN & BERENDSON
ARCHITECTS ENGINEERS PLANNERS
HNTB

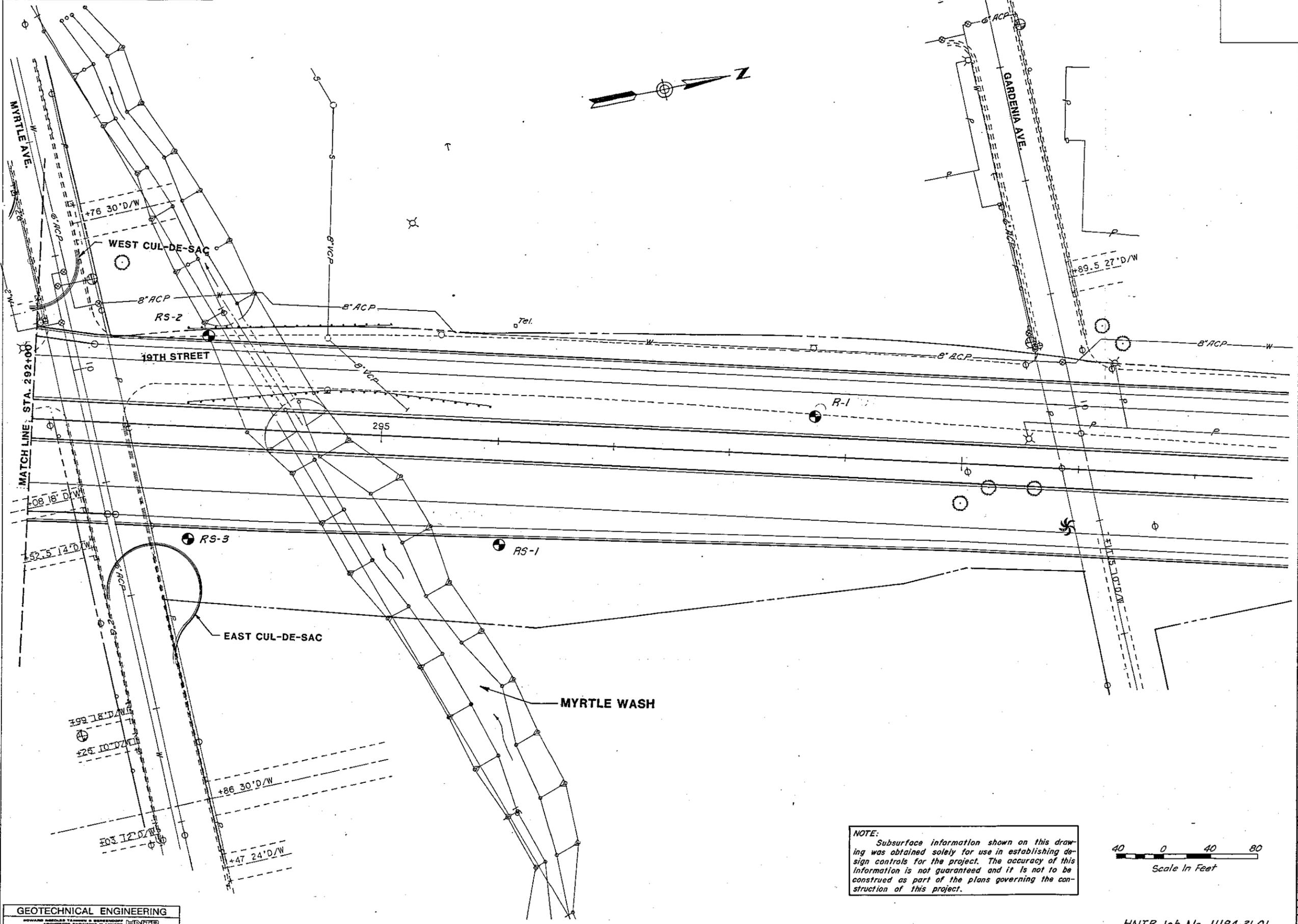
DR. DATE	DES. DATE	CK. DATE	SHEET NO.	TOTAL SHEETS	AS BUILT

SCALE: 1" = 40'

HNTB Job No. 11184-21-01

SQUAW PEAK PARKWAY
PHOENIX STREETS-MARICOPA CO.
BETHANY HOME RD. TO MYRTLE AVE.

F.H.W.A REGION	STATE	PROJ NO	SHEET NO	TOTAL SHEETS	AS BUILT
9	ARIZ				
CONSULTING ENGINEER					
DES	DR	ICK	DATE		
HNTB HOWARD NEEDLES TAMMEN & BERENSON					



LEGEND

⊙ As Drilled Boring Location

NOTE:
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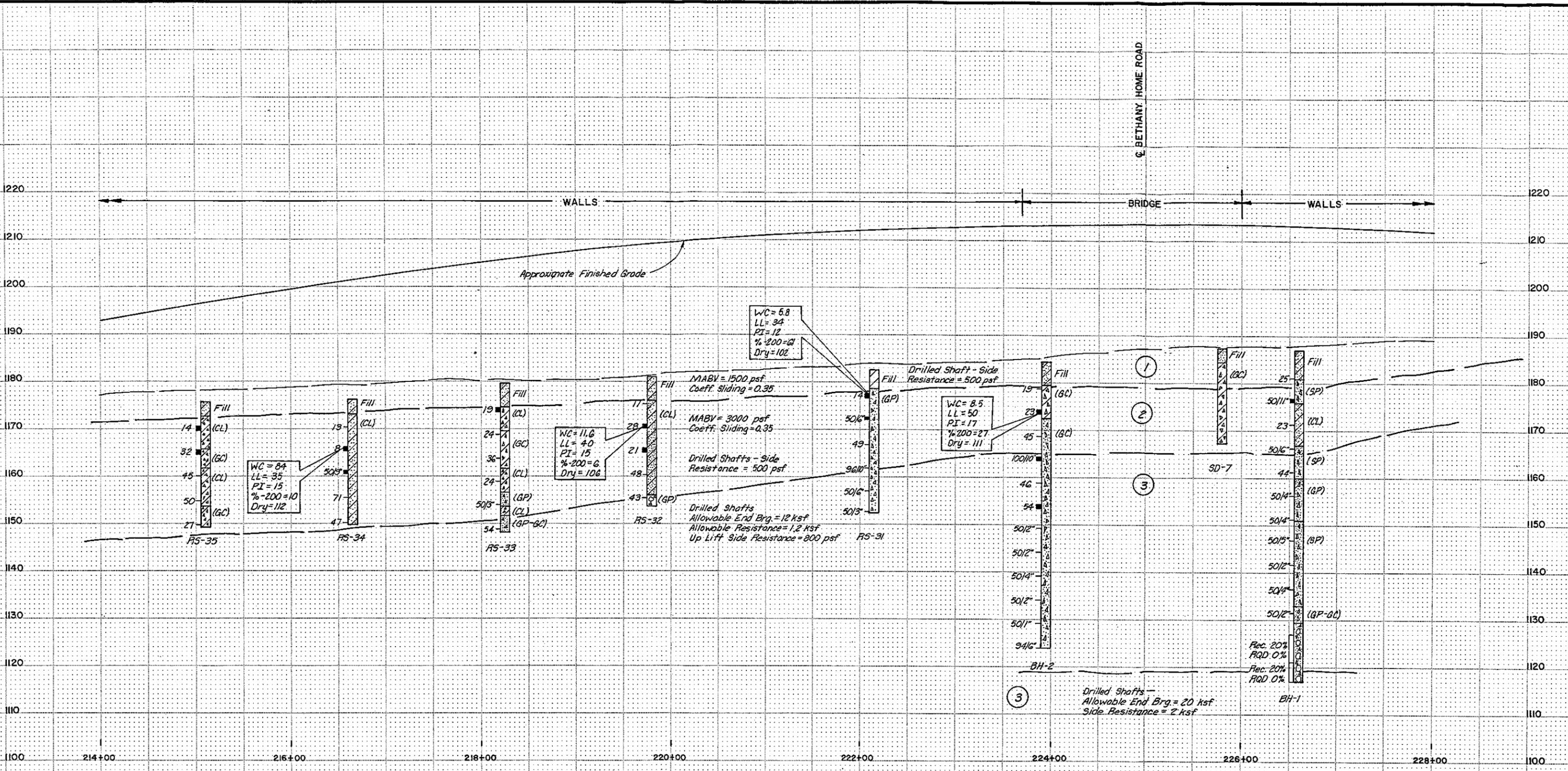
AS DRILLED BORING LOCATION PLAN

SQUAW PEAK PARKWAY
STA. 292+00 to STA. 302+80
CITY OF PHOENIX, ARIZONA
ENGINEERING DEPARTMENT
SQUAW PEAK PARKWAY
SEGMENT No. 5 B
BETHANY HOME RD. TO MYRTLE AVE.
P-856344

GEOTECHNICAL ENGINEERING
HOWARD NEEDLES TAMMEN & BERENSON
ARCHITECTS ENGINEERS PLANNERS
HNTB

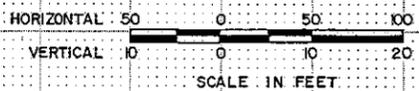
DR	DES	ICK	SHEET	TOTAL	AS
DATE	DATE	DATE	NO	SHEETS	BUILT
SCALE: 1" = 40'					Fig. 2.9

HNTB Job No. 11184-21-01



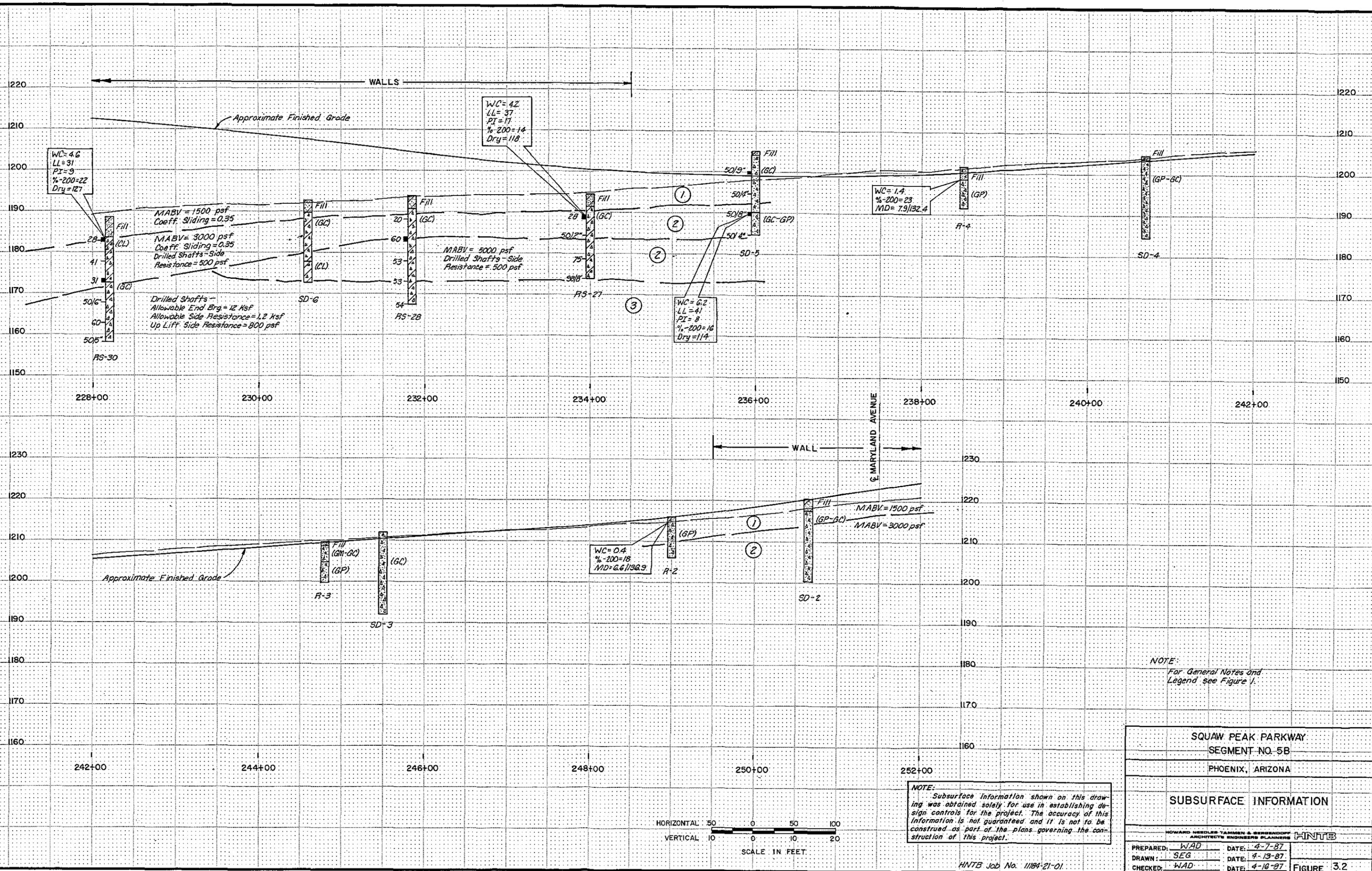
NOTE:
For General Notes and
Legend, see Figure 1.

NOTE:
Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.



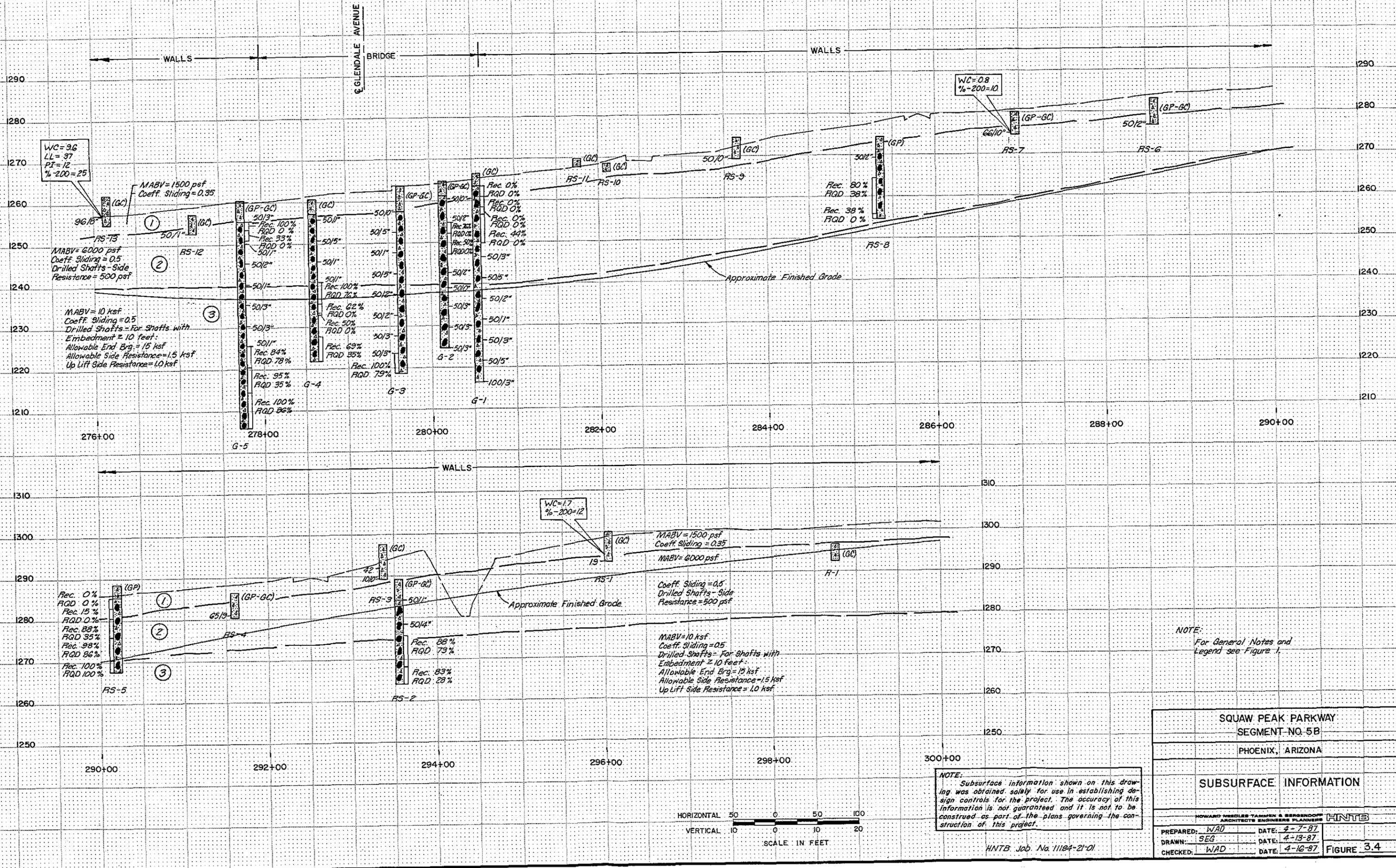
HNTB Job No. 1184-21-01

SQUAW PEAK PARKWAY SEGMENT NO. 5B	
PHOENIX, ARIZONA	
SUBSURFACE INFORMATION	
HNTB	
PREPARED: WAD	DATE: 4-7-87
DRAWN: SEG	DATE: 4-13-87
CHECKED: WAD	DATE: 4-16-87
FIGURE 3.1	



NOTE:
For General Notes and
Legend see Figure 1.

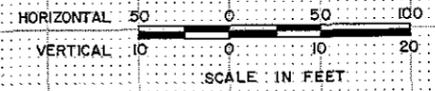
SQUAW PEAK PARKWAY SEGMENT NO. 5B	
PHOENIX, ARIZONA	
SUBSURFACE INFORMATION	
<small>HOWARD NEEDLES TAMMEN & BERENSON ARCHITECTS ENGINEERS PLANNERS</small>	
PREPARED: WAD	DATE: 4-7-87
DRAWN: SEG	DATE: 4-13-87
CHECKED: WAD	DATE: 4-16-87
HNTB	
HNTB Job No. 11184-21-01	
FIGURE 3.2	



NOTE:
For General Notes and Legend see Figure 1.

SQUAW PEAK PARKWAY SEGMENT NO. 5B	
PHOENIX, ARIZONA	
SUBSURFACE INFORMATION	
HOWARD NEEDLES TAMMEN & BERGENDOFF ARCHITECTS ENGINEERS PLANNERS	
PREPARED: WAD	DATE: 2-7-87
DRAWN: SEG	DATE: 4-13-87
CHECKED: WAD	DATE: 4-16-87

NOTE:
Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.



HNTB Job No. 11184-21-01

HNTB

APPENDIX 1

Boring Logs and Test Data

LOG OF BORING NO. AC-1 CONTINUED

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet			Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
	39	98					moderately cemented (schist cobbles are highly decomposed)
	95	95					Possible contact with underlying schist unit.
35							Boring stopped @ 35 feet Hole backfilled 2/3/87
40							
45							
50							

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1242.6 Datum 263+42 59' Right of Centerline
 Type/Size Boring 7" HSA/4" RW/4" CNX Rig Type CME 45/CME 75 Date 1/12 & 2/2/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		91	N			GP	SANDY GRAVEL; some clay, some cobbles, dark brown, very dense, moist brown
10		63	N				
15		50/5"	N				
20	RQD %	% REC					Auger refusal @ 15 feet Lightly to moderately cemented sandy cobble gravel conglomerate (cobbles and gravels of schist and quartzite in a sandy clay matrix.) uncemented clay matrix boulders
25	40	92					
30	19	75					

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
19	75						
35							moderately to heavily cemented
40	74	95					
45							Boring stopped @ 41 feet Hole backfilled 2/2/87
50							
55							
60							

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1242.2 Datum 264+74 87' Left of Centerline

Type/Size Boring 7" HSA/4" RA/4" CNX Rig Type CME 75 Date 1/12 & 1/29/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		11	N			CL/ SC	GRAVELLY CLAY AND SAND FILL; dark brown, dense, moist
10		50/5"	N			GP/ GC	SANDY GRAVEL; some clay, brown, very dense, moist
15							
20	RQD % 0	% REC 20					Auger refusal @ 17 feet
20		50/2"	N				uncemented clay matrix
25							heavily cemented
25	78	100					uncemented clay matrix, varies in thickness not exceeding 6"
30	12	61					moderately cemented

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet			Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
12	12	61					Moderately cemented sandy cobble gravel conglomerate (cobbles and gravels of schist in a sand-clay matrix)
20	20	73					
35							
40							Boring stopped @ 37.1 feet Hole backfilled 1/29/87
45							
50							
55							
60							

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1243.5 Datum 262+35 64' Right of Centerline

Type/Size Boring 7" HSA/CNX Rig Type CME 75 Date 1/13/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		28	N			GP/ GC	SANDY GRAVEL; some clay, brown, very dense
10		27	N				
15		73/11"	N				
20		50/2"	N				
25	RQD %	% REC					Auger refusal @ 23 feet
	0	83					Heavily cemented boulder and cobble conglomerate (boulders and cobbles of schist and quartzite in a non-calcareous clay and sand matrix)
30	0	36					

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
	0	20					Heavily cemented; boulder and cobble conglomerate (boulders and cobbles of schist and quartzite in a sand and clay matrix)
	0	4					
35							Boring stopped @ 34.9 feet Hole backfilled 1/13/87
40							
45							
50							
55							
60							

HNTB

HOWARD NEEDLES TAMMEN & BERGENDOFF

GEOLOGIC LOG

BORING NO.

AC-5

SHEET

OF

3

4

PROJECT Squaw Peak Parkway
Phoenix, ArizonaSTATION 265+08OFFSET 51' Rt.EXPLORATION CONTRACTOR Muncy Drilling Inc.STARTED 3-30-88ENGINEERS REP. J. SzturoLOGGED BY J. SzturoCOMPLETED 3-31-88

CASING INFORMATION		GROUNDWATER LEVEL DATA					
SIZE	DEPTH	DATE	TIME	DEPTH	DATE	TIME	DEPTH
NX	19.0						

DRILLING METHOD _____

DEPTH BELOW SURFACE	RUN NUMBER	RECOVERY (IN.)	% RECOVERED	% RQD.	CORE SIZE	CORE BOX NO.	PROFILE	DESCRIPTION	REMARKS	ELEV. DATUM
										USGS
										ELEV. 1241.8
	61.6				NX 2"	5		High core loss - absence of cobbles and cementation.		
-62.5	9	18	35	0						
-65.0	65.9							Probable - gravel in sandy clay.		
-67.5	10	12	55	0						
-70.0	67.7							Well cemented 77'-78'		
-72.5	11	12	25	0						
-75.0	71.7							More cobbles - no apparent cementation.		
-77.5	12	32	37	12						
-80.0	78.9							Sandy clay matrix no cementation		
-82.5	13	26	31	0						
-85.0	85.9									
-87.5	14	36	52	0						
-90.0	91.7				8					

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1187.0 Datum 226+58 6' Left of Centerline

Type/Size Boring 7" HSA/4" CNX Rig Type CME 75 Date 2/5/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		25	N			CL	SANDY CLAY FILL; some gravels, brown, firm to stiff, moist
10		50/11"	R			SP	GRAVELLY SAND; with fines, light brown, moderately dense, damp, light cementation
15		23	N			CL	SANDY CLAY; some gravels, brown, hard, moist
20		50/6"	N			SP	GRAVELLY SAND; some fines, light brown, very dense, moist, moderate cementation
25		44	N				
30						GP	SANDY GRAVELS; some fines, light brown, moderately dense, moist, light cementation

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
35		50/4"	N			GP	SANDY GRAVELS; some fines, brown, very dense, moist, light cementation
		50/4"	N				
40		50/5"	N			SP	GRAVELLY SAND; some fines, brown, very dense, moist, light cementation
45		50/2"	N				
50		50/4"	N				gravels are decomposing
55		50/2"	N			GP/ GC	Sandy gravel; with fines, light brown, very dense, moist, light cementation
60							Auger refusal @ 57.3 feet Sandy Gravels and cobbles; with fines, light brown, very dense, damp, light cementation

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
65	0	20					Sandy gravels and cobbles, with fines, light brown, very dense, damp, light cementation
70	0	20					
75							Boring stopped @ 70 feet Hole backfilled 2/5/87
80							
85							
90							

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1184.3 Datum 223+94 31.4' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/6/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5						CL	SANDY CLAY FILL; trace gravels, dark brown, firm, moist
10		19	N			GC	CLAYEY GRAVELS; with sand, brown, loose, moist moderately dense
		23	R				
15		45	N			GC	SANDY GRAVELS; with fines, brown, moderately dense, damp very dense, some fines
20		100/10"	R				
25		46	N				
30							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
		54	R			GC	SANDY GRAVELS; with fines, brown, very dense, moist
35		50/2"	N				
40		50/2"	N				
45		50/4"	N				
50		50/2"	N				some fines, trace cobbles
55		50/1"	N				(True samples from 30 to 60 feet are unattainable using a split spoon and catcher; cobbles and possibly boulders seemed to be prevalent @ 55 feet. Changed bit @ 55 feet)
60							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
65		94/6"	N			GC	SANDY GRAVELS AND COBBLES; some fines, brown, very dense, damp
70							Boring stopped @ 60.5 feet Hole backfilled 2/6/87
75							

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1266.3 Datum 280+56 63' Left of centerline

Type/Size Boring 7" HSA/4" RW/4" CNX Rig Type CME 75 Date 1/12/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; some clay, brown, dense, damp
5	RQD %	% REC					Auger refusal @ 3 feet
	0	0					Highly cemented cobbles and gravel conglomerate (cobbles and gravels of schist and quartzite in a calcareous cement)
	0	0					
10	0	0					
	0	44					
15							
20			50/3"	N			Highly cemented cobbles and gravel conglomerate (cobbles and gravels of schist in a non-calcareous sand and clay matrix)
25			50/5"	N			
30							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
35		50/2"	N				Highly cemented cobble and gravel conglomerate (cobbles and gravels of schist in a non-calcareous sand and clay matrix)
		50/1"	N				
40		50/3"	N				
45		50/5"	N				
50		100/3"	N				
							Boring stopped @ 50.2' Hole backfilled 1/15/87

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1264.7 Datum 280+14 60' Right of Centerline

Type/Size Boring 4" RW/4" CNX Rig Type CME 75 Date 1/19/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GP/GC	SANDY GRAVEL; trace clay, brown, dense, damp
5		50/0"	N				Auger refusal @ 3.5 feet
	RQD %	% REC					
	0	76					
15	0	50					moderate cementation
20		50/2"	N				
25		50/0"	N				clay lenses prominent
30							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
35		50/3"	N				Cobble and gravel conglomerate (cobbles and gravels of schist and quartzite in a non-calcareous sand and clay matrix) clay lenses prominent
		50/3"	N				
40		50/3"	N				
45							Boring stopped @ 40.2 feet Hole backfilled 1/20/87
50							

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1263.8 Datum 279+63 on centerline
 Type/Size Boring 7" HSA/4" RW/4" CNX Rig Type CME 75 Date 1/12/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		50/0"	N			GP/GC	SANDY GRAVEL; trace clay, light brown, very dense, slightly damp (moistly 1/2" gravel)
10		50/5"	N				Auger refusal @ 6 feet heavy cementation Highly cemented boulder and cobble conglomerate (boulders and cobbles of schist in a cemented sand clay matrix)
15		50/1"	N				
20		50/5"	N				
25		50/2"	N				
30							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
35		50/2"	N				Highly cemented gravel and cobble conglomerate (boulders and cobbles of schist in a cemented sand and clay matrix)
		50/3"	N				
40		50/3"	N				
45	RQD %	% REC					
	79	100					
50							Boring stopped 45 feet Hole backfilled 1/19/87

Project Squaw Peak Parkway Job No. 2126J313

Depth, feet			Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	RQD %	% REC					
35	35	69					Boulder, cobble and gravel conglomerate (boulders, cobbles and gravels of schist and quartzite in a calcareous sand and clay matrix)
40							Boring stopped @ 39 feet Hole backfilled 1/23/87
45							
50							

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1260.5 Datum 277+76 61' Right of Centerline

Type/Size Boring 7" HSA/4" CNX/4" RW Rig Type CME 75 Date 1/12 & 1/21/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		50/3"	N			GP/ GC	SANDY GRAVEL; some cobbles, some clay, dark brown, dense, moist
	RQD %	% REC					Auger refusal @ 5 feet Moderately cemented gravel, cobble and boulder conglomerate (gravels, cobbles and boulders of schist and quartzite in a calcareous sand and clay matrix) Boring hole moved 12 feet west for coring access highly cemented clay lenses prominent
	0	100					
	0	33					
10		50/1"	N				
15		50/2"	N				
20		50/1"	N				
25		50/3"	N				
30							

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
35		50/3"	N				Highly cemented gravel and cobble conglomerate (gravels and cobbles of schist and quartzite in a calcareous sand and clay matrix) moderate to heavy cementation
	RQD % 78	% REC 84	N				
40	35	95					
45	86	100					
50							Boring stopped @ 50.5 feet Hole backfilled 1/22/87
55							

LOG OF BORING NO. P-1

Project Pedestrian Overpass (HNTB Job No. 11184-21-01) Job No. 2128J054

Elevation 1222.1 Datum 253+03 88' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 3/30/88

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		32	N			GP-GC	SANDY GRAVEL; some clay, gray, dense, slightly damp
		46	N				with clay
10		28	N			SC	CLAYEY SAND; with gravel, brown, dense, light cementation, damp
		25/0"	R	NR		GP	SANDY GRAVEL; some clay, trace cobbles, gray, very dense, damp
15		25/½"	N	NR			
		50/5"	N	NR			
20							Auger refusal at 17 feet
25							
30							



LOG OF BORING NO. P-2

Project Pedestrian Overpass (HNTB Job No. 11184-21-01) Job No. 2128J054
 Elevation 1223.0 Datum 253+03 88' Rt of Centerline
 Type/Size Boring 7" HSA Rig Type CME 75
 Groundwater Conditions None Encountered Date 3/30/88

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		42	N			GC	SANDY GRAVEL; with clay, gray, dense, slightly damp trace cobbles, very dense
		51	N				
		50/3½"	N				
10		50/3"	N				
		50/5½"	N				
15							Auger refusal at 14½ feet
20							
25							
30							



LOG OF BORING NO. R-1

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1296.6 Datum 298+73 34' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
			B			GC	SANDY GRAVEL; some clay, dark brown, medium dense, moist light brown
5							Auger refusal @ 4 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. R-2

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1216.14 Datum 249+01 41' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
0			G			GP	SANDY GRAVEL; some fines, dark brown, moderately dense, moist trace cobbles
1			B				
5			G				
10			G				
10							Boring stopped @ 10 feet Hole backfilled 2/4/87
15							
20							
25							
30							

LOG OF BORING NO. R-3

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1209.7 Datum 244+82 45' Left of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
			G			SP	GRAVELLY SAND FILL; with fines, brown, loose, moist
			B			GM/ GC	SANDY GRAVEL; with fines, brown, loose, moist
5							
			G			GP	SANDY GRAVEL; trace fines, brown, dense, moist
10			G				some fines
							Boring stopped @ 10 feet Hole backfilled 2/4/87
15							
20							
25							
30							

LOG OF BORING NO. R-4

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1201.8 Datum 238+47 44' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
			G			SP	GRAVELLY SAND FILL; with fines, dark brown, loose, moist
5			B			GP	SANDY GRAVEL; some fines, brown, dense, moist
			G				
10			G				
							Boring stopped @ 10 feet Hole backfilled 2/4/87
15							
20							
25							
30							

LOG OF BORING NO. RS-1

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1300.0 Datum 296+05 90' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		19	N			GC	SANDY GRAVEL; some clay, brown, dense, moist light brown
10							Auger refusal @ 7 feet
15							
20							
25							
30							

LOG OF BORING NO. RS-2

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1289.2 Datum 293+48 78' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19 & 1/28/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		50/1"	N				Asphaltic Concrete 1-3/4"; Aggregate Base Course 8" GP/ GC SANDY GRAVEL: trace clay, light brown, dense, damp to moist
10		50/4"	N				Auger refusal @ 5 feet Moderately to lightly cemented sandy gravel and and cobble conglomerate (gravels and cobbles of schist and quartzite in a noncalcareous sand and clay matrix) Clay lenses prominent
15	RQD %	% REC					highly cemented clay lenses less prominent
	73	88					
20							
	28	83					
25							NOTE: Core hole moved 6 feet east (auger refusal @ 4.5 feet. 5 feet of auger was redrilled)
30							Boring stopped @ 25 feet Hole backfilled 1/29/87

LOG OF BORING NO. RS-3

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1297.6 Datum 293+38 97' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		42	N			GC	SANDY GRAVEL; some cobbles, some clay, reddish brown, dense, moist
							light brown
10		10/0"	N				Auger refusal @ 8.5 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-4

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1286.3 Datum 291+61 102' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		65/9"	N			GP/ GC	SANDY GRAVEL; with cobble, trace clay, dark brown, very dense, moist light brown
10							Auger refusal @ 6 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-5

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1288.6 Datum 290+21 102' Left of Centerline

Type/Size Boring 7" HSA/4" RW/4" CNX Rig Type CME 75 Date 1/26/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
	RQD %	% REC				GP	SANDY GRAVELS; some cobbles, trace clay, brown, dense, slightly damp
5	0	0					Auger refusal @ 3 feet With cobbles, moderate cementation
	0	15					
10	35	88					Boulder and cobble conglomerate; (boulders and cobbles of schist and quartzite in a calcareous sand and clay matrix (moderate cementation))
15	86	98					
20	100	100					
25							Boring stopped @ 21 feet Hole backfilled 1/26/87
30							

LOG OF BORING NO. RS-6

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1283.0 Datum 288+61 22' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		50/2"	N			GP/ GC	SANDY GRAVEL; with cobbles, some clay, brown, very dense, moist light brown
10							Auger refusal @ 6.5 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-7

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1280.1 Datum 286+95 138' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		66/10"	N			GP/ GC	SANDY GRAVEL; with cobble, trace clay, dark brown, dense, moist light brown
10							Auger refusal @ 5.5 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-8

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1274.2 Datum 285+34 146' Left on Centerline

Type/Size Boring 7" HSA/4" CNX Rig Type CME 75 Date 1/26/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GP	SANDY GRAVELS; with cobbles, with clay, brown, dense, slightly damp
5		50/2"	N				Auger refusal @ 3 feet Moderately cemented sandy gravel and cobble conglomerate (gravels and cobbles of schist and quartzite in a calcareous sand and clay matrix)
	RQD %	% REC					
10	38	80					
15							
20	0	38					Boring stopped @ 20 feet Hole backfilled 1/27/87
25							
30							

LOG OF BORING NO. RS-9

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1274.4 Datum 283+67 139' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		50/0"	N			GC	SANDY GRAVEL; some cobbles, some clay, reddish brown, very dense, moist, light brown/white
10							Auger refusal @ 5 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-10

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1268.6 Datum 282+12 106' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
0						GC	SANDY GRAVEY; with clay, some cobbles, brown, dense, moist
5							Auger refusal @ 2 feet Hole backfilled 1/13/87
10							
15							
20							
25							
30							

LOG OF BORING NO. RS-11

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1269.9 Datum 281+74 141' Right of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; with clay, brown, dense, damp to moist
5							Auger refusal @ 2 feet Hole backfilled 1/13/87
10							
15							
20							
25							
30							

LOG OF BORING NO. RS-12

Project Squaw Peal Parkway Job No. 2126J313

Elevation 1257.1 Datum 277+18 123' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; some clay, dark brown, dense, moist very dense light brown/white
5		50/1"	N				Auger refusal @ 4.5 feet Hole backfilled 1/13/87
10							
15							
20							
25							
30							

LOG OF BORING NO. RS-13

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1262.1 Datum 276+15 197' Right of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		96/8"	N			GC	SANDY CLAYEY GRAVEL; dark brown, dense, moist some clay, light brown
10							Auger refusal @ 7 feet Hole backfilled 1/13/87
15							
20							
25							
30							

LOG OF BORING NO. RS-14

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1253.3 Datum 275+30 113' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; some clay, dark brown, dense, moist light brown
5							Auger refusal @ 4 feet Hole backfilled 1/13/87
10							
15							
20							
25							
30							

LOG OF BORING NO. RS-15

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1256.0 Datum 274+46 86' Right of Centerline

Type/Size Boring 7" HSA/4" CNX/4" RW Rig Type CME 75 Date 1/27/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
0						GP	SANDY GRAVELS AND COBBLES; trace clay, brown, dense, slightly damp
5	RQD %	% REC					Auger refusal @ 3 feet Moderately cemented sandy boulder and gravel conglomerate (boulders of quartzite and gravels of schist in a calcareous sand and clay matrix)
10	27	98					clay less prominent
15							Boring stopped @ 15 feet Hole backfilled 1/27/87
20							
25							
30							

LOG OF BORING NO. RS-16

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1249.6 Datum 269+55 149' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GP	SANDY GRAVEL: trace clay, dark brown, dense, moist
5		50/1"	N			GP/ SC	SANDY GRAVEL; some clay, dark brown, moist light brown
10							Auger refusal @ 6 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-17

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1246.2 Datum 268+22 103' Right of Centerline

Type/Size Boring 7" HSA/4" RW/4" CNX Rig Type CME 75 Date 1/27/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; with clay, dark brown, dense, moist
5		50/4"	N				Auger refusal @ 4 feet
10	RQD %	% REC					Sandy Boulder and Gravel conglomerate (boulders and gravels of schist and quartzite in a sand and clay matrix. Clay lenses very prominent.
	44	78					heavily cemented, calcareous (10'-11')
							lightly cemented, non-calcareous clay (11'-13'5)
15	44	93					clay lenses less prominent
20							Stopped boring @ 19.2 feet
							Hole backfilled 1/28/87
25							
30							

LOG OF BORING NO. RS-18

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1243.3 Datum 266+30 72' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/14/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		98/10"	N			GC	SANDY GRAVEL; with clay, brown, dense, moist light brown/white (small pea gravel)
10		50/1"	N				Auger refusal @ 9.1 feet Hole backfilled 1/14/87
15							
20							
25							
30							

LOG OF BORING NO. RS-19

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1248.7 Datum 264+94 30' Right of Centerline (Approximated-
 Stake was removed)
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						GC	SANDY GRAVEL; some cobbles, some clay, brown, dense, moist
5		47	N			GP/ GC	SANDY GRAVEL, trace clay, light brown/gray, dense, moist light brown moderate cementation
10		76	N				
		66	N				
15							Bottom of boring at 14.5 feet
20							
25							
30							

LOG OF BORING NO. RS-20

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1237.0 Datum 261+55 110' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		36	N			GP	SANDY GRAVEL; dark brown, moderately dense, moist, light brown
10		83	N				damp
15		66	N				dense
20		50/2"	N				
25							Boring stopped @ 20.2 feet Hole backfilled 1/29/87
30							

LOG OF BORING NO. RS-21

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1233.9 Datum 259+70 75' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		21	N			GC	SANDY GRAVEL; some cobbles, some clay, dark brown, medium dense, moist Light brown, dense
10							Auger refusal @ 7 feet
15							
20							
25							
30							

LOG OF BORING NO. RS-22

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1228.9 Datum 257+75 82' left of centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		88	N			GP	SANDY GRAVEL; with clay, dark brown, dense, moist light brown
10		49	N			GP	SANDY GRAVEL; trace clay, dark brown, light brown, dense, moist
15		50/4"	N				light brown, moist
20							Boring stopped @ 15 feet Hole backfilled 1/13/87
25							
30							

LOG OF BORING NO. RS-23

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1228.9 Datum 256+84 82' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 1/19/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		29	N			GC	SANDY GRAVEL; some clay, brown, dense, moist reddish brown, moderate cementation
10							Bottom of boring @ 5.5 feet
15							
20							
25							
30							

LOG OF BORING NO. RS-24

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1224.8 Datum 254+78 80' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45 Date 1/13/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		34	N			GP	SANDY GRAVEL; with clay, dark brown, dense, moist light brown
10		76/8"	N				
15		36/9"	N				
20							Boring stopped @ 15.2 feet Hole backfilled 1/13/87
25							
30							

LOG OF BORING NO. RS-25

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1221.8 Datum 252+90 72' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 45/CME 75 Date 1/13 & 1/29/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5		34	N			GP	SANDY GRAVEL; trace clay, dark brown, dense, moist
10		59	N				light brown slightly damp
15		50/2"	N				Boring stopped @ 15.2 feet Hole backfilled 1/29/87 Note: Hole was moved 8 feet east for CME 75 access. Redrilled 6 feet of auger.
20							
25							
30							

LOG OF BORING NO. RS-27

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1194.5 Datum 233+98 88' Left of Centerline
 Type/Size Boring 7" HSA Rig Type CME 75 Date 1/9/87
 Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						CL	SANDY CLAY FILL; trace gravles and cobbles, brown, soft to firm, moist
5		28	R			GC	CLAYEY GRAVEL; with sand, brown, moderately dense to dense, moist
10		50/2"	N				
15		75	N				
20		98/8"	N				
25							Boring stopped at 20.7 feet Hole backfilled 2/9/87
30							

LOG OF BORING NO. RS-28

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1193.9 Datum 231+84 59.2'

Type/Size Boring 7" HSA Rig Type CME 45 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						CL	SANDY CLAY FILL; some gravel, brown, soft, moist
5		20	N			GC	CLAYEY GRAVELS; with sand, light brown, loose to moderately dense, moist, light cementation along gravel boundaries
10		60	R				
15		23	N				
20		53	N				
25		54	N				
30							Boring stopped @ 26.5 feet Hole backfilled 2/9/87

LOG OF BORING NO. RS-30

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1188.6 Datum 228+20 112' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5						CL	SANDY CLAY FILL; some gravel, dark brown, firm, moist
10		28	R			CL	GRAVELLY CLAYS; with sand, brown, very stiff, moist
15		41	N				
		31	R				
20		50/6"	N			GC	CLAYEY GRAVELS; some sand, brown, dense, moist
25		60	N				
30		50/5"	N				

Boring stopped @ 30.4 feet
Hole backfilled 2/9/87

LOG OF BORING NO. RS-31

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1182.5 Datum 222+15 126.1 Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 45 Date 2/11/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						CL	SANDY CLAY FILL; trace gravel, brown, soft, damp
5		14	R			GP	SANDY GRAVELS; with fines, brown, moderately dense, damp
10		50/6"	R				trace fines, very dense
15		39	N				with fines, moderately dense
20		96/10"	N				some fines, very dense
25		50/6"	N				
30		50/3"	N				

Boring stopped @ 30.2 feet

Hole backfilled 2/11/87

LOG OF BORING NO. RS-32

Project Squaw Peak Parkway Job No. 2126J313
 Elevation 1181.0 Datum 219+80 90.0' Right of Centerline
 Type/Size Boring 7" HSA Rig Type CME 75 Date 2/10/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5						CL	SANDY CLAY FILL; trace gravels, brown, soft, moist
10		17	N			CL	SANDY CLAY; some gravels, brown, firm to stiff, moist
		28	R				very stiff
15		21	R				with gravels
20		48	N				
25		43	N			GP	GRAVELS AND BOULDERS; with sand, with clay (fines), brown, very dense, moist
30							Auger refusal @ 27.4 feet Hole backfilled 2/10/87

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1179.9 Datum 218+24 62.6' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/10/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5						CL	SANDY CLAY FILL; brown, soft, moist
10		19	R			CL	GRAVELLY CLAY; with sand, brown, very stiff, damp
15		24	N			GC	CLAYEY GRAVELS; with sand, brown, moderately dense, damp
		36	N				
20		24	N			CL	GRAVELLY CLAY; with sand, brown, stiff, damp
25		50/3"	N			GP	SANDY GRAVELS; some clay, light brown, very dense, damp
						CL	GRAVELLY CLAY; with sand, brown, hard, damp
30						GP/ GC	SANDY GRAVELS; with clay, light brown, moderately dense, damp

Project Squaw Peak Parkway

Job No. 2126J313

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
		54	N			GP/ GC	SANDY GRAVELS; (cont'd)
35							Boring stopped @ 31.5 feet Hole backfilled 2/10/87

LOG OF BORING NO. RS-34

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1176.2 Datum 216+66 54' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/10/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						CL	SANDY CLAY FILL; trace gravels, dark brown, soft, moist
5		13	N			CL	SANDY CLAY; some gravel, brown, firm, moist
10		8	R				with gravels
15		50/9"	R				hard
20		71	N				some gravels, very stiff to hard
25		47	N				
30							Boring stopped @ 26.5 feet Hole backfilled 2/10/87

LOG OF BORING NO. RS-35

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1175.8 Datum 215+10 45.0' Left of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/10/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						CL	SANDY CLAY FILL; trace gravel, brown, soft, moist
5		14	R			CL	GRAVELLY CLAYS; with sand, brown, stiff, moist
10		32	R			GC	CLAYEY GRAVELS; with sand, brown, dense, moist
15		45	N			CL	GRAVELLY CLAYS; with sand, brown, stiff to very stiff
20		50	N				
25		27	N			GC	CLAYEY GRAVELS; with sand, brown, dense, moist
30							Boring stopped @ 26.5 feet Hole backfilled 2/10/87

PHYSICAL PROPERTIES

Job No. 2126J313

Boring No.	Depth, ft	Soil Class.	Particle Size Distribution, % Passing By Weight					Atterberg Limits		Moisture - Density Rel.			Specific Gravity	In Situ		'R' Value	Remarks
			3"	#4	#10	#40	#200	LL	PI	Dry Density pcf	Optimum Moisture %	Meth.		Dry Density pcf	Water Content %	Corrected 'R'	
RS-1	4-5.5	SC	100	57	41	22	12								1.7		2, 6
RS-7	4-5.5	GP/GC	100	45	32	18	10								0.8		2
RS-13	4-5	SC	100	80	66	44	25	37	12						9.6		2, 6
RS-19	9-10.5	SP/SC	100	55	38	18	9								1.7		2, 6
RS-20	5-6.5	GP/GC	100	51	35	17	9								0.9		2, 6
RS-24	4-5.5	GC	100	52	40	25	16								4.3		2, 6
RS-27	5-6	GC	100	48	36	23	14	37	17				118		4.2		2
RS-30	5-6	SC	100	65	50	34	22	31	9				127		4.6		2, 6
RS-31	5-6	CL	100	95	89	78	61	34	12				102		5.8		2, 6
RS-32	10-11	SP/SC	100	75	57	35	6	40	15				106		11.6		2, 6
RS-34	10-11	GP/GC	100	53	32	14	10	35	15				112		8.4		2, 6
BH-2	10-11	SM	100	77	62	45	27	50	17				111		8.5		2, 6
SD-1	2-3	GP/GM	100	20	16	12	8		NP						0.9		2, 6
SD-2	10-12	GP/GC	100	25	19	14	10	28	8						0.9		2
SD-3	4-6	GP/GC	100	24	17	14	11	33	11						1.0		2, 6
SD-4	12-13	SC	100	66	47	30	19	37	16						3.4		2, 6
Boring No.	Depth, ft	Comments															

REMARKS

Classification/Particle Size

- 1 Visual
- 2 Laboratory Tested
- 3 Minus #200 Only

Moisture Density Relationship

- 4 Tested ASTM D698/AASHTO T99
- 5 Tested ASTM D1557/AASHTO T180

Specific Gravity

- 7 Minus #4
- 8 Plus #4

Permeability

- 9 Constant Head
- 10 Falling Head

'R' Value

11 Expansion Pressure _____ psf

12 Exudation Pressure _____ psi

Note: NP = nonplastic

6 Other Laboratory classification does not correspond with field classification

SOIL PROPERTIES

Job No. 2126J313

Boring No.	Depth, ft.	Soil Class.	Expansion/Compression					Water Soluble Matter, %		Shear Strength					Consolidation		
			Initial Dry Density pcf	Initial Moisture Content, %	Surcharge KSF	+ Expan. - Comp. %	Max. Swell Pressure KSF	Salts	Sulfates	Test Method	Initial Moisture Content, %	Dry Density pcf	C KSF	φ Deg.	Initial Void Ratio	Surcharge KSF	Consol. %
RS-27	5-6	GC								DS	4.2	111	0	44			
RS-30	5-6	SC								DS	4.6	119	0	42			
RS-31	5-6	CL	99 ⁽¹⁾	5.8 ⁽⁴⁾											.7086	8.0	14.0 ⁽⁶⁾
RS-32	10-11	SP/SC								DS	11.6	103	0.69	26			
RS-34	10-11	GP/GC	109 ⁽¹⁾	8.4 ⁽⁴⁾											.5522	8.0	9.2 ⁽⁶⁾
BH-2	10-11	SM								DS	8.5	109	0.54	40			
Boring No.	Depth, ft.	Remarks															

LEGEND

- Shear Strength Test Method
- DS Direct Shear
 - DS Direct Shear (saturated)
 - UC Unconfined Compression
 - UU Unconsolidated Undrained
 - CU Consolidated Undrained w/pore press
 - CU Consolidated Undrained
 - CD Consolidated Drained
 - CR Cyclic Consolidated Undrained w/pore press

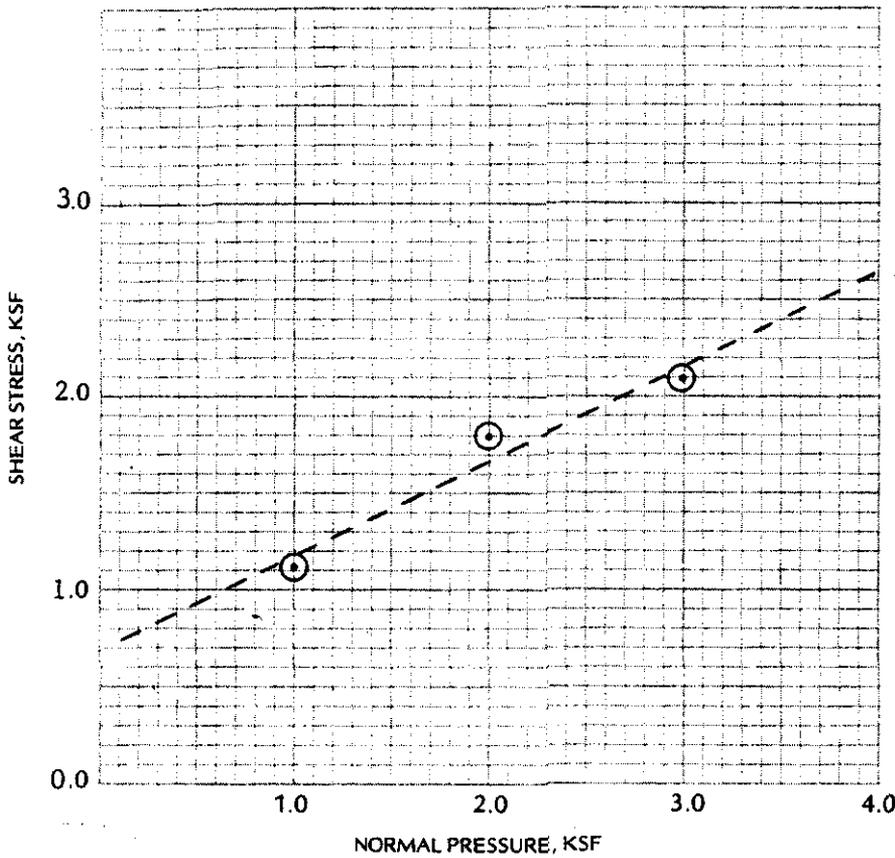
REMARKS

1. In-situ density. determined from one ring of a multiring sample.
2. Compacted density (Approx. 95% of ASTM:D698 max. density at moisture content slightly below optimum).
3. Compacted density (Approx. 95% of ASTM:D1557 max. density at moisture content slightly below optimum).
4. In-situ moisture.
5. Submerged to approximate saturation.
6. Consolidation % upon saturation.
- 7.

DIRECT SHEAR TEST

Job No. 2126J313

Lab/Invoice No. 2126W313



Type of Material Gravelly Sand

Source of Material RS-32 (10-11)

Sampled By J. Carrow Date 2/10/87

Submitted By F. Costello Date 2/25/87

Reviewed By M. Jahn Date 3/31/87

Test Procedure ASTM D3080- Single Shear

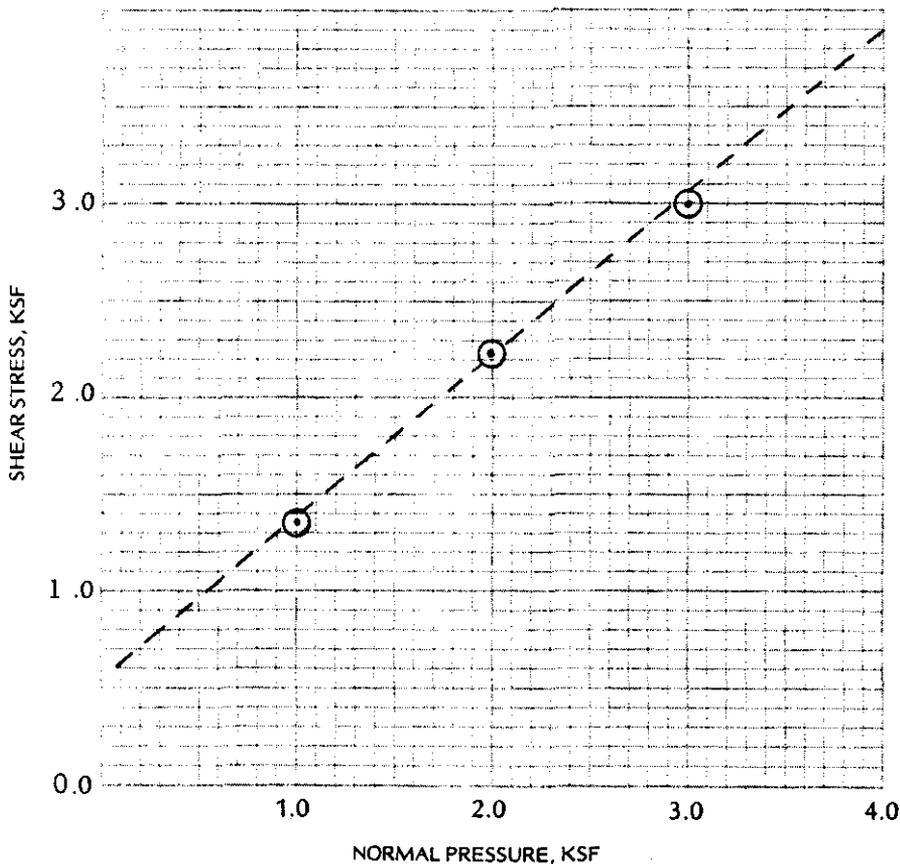
Test Condition: — InSitu - - - - Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 103

Initial Moisture Content, % 11.6

$\phi =$ 26 $^{\circ}$ $C =$ 0.69 Kips/Sq. Ft.



Type of Material Silty Sand

Source of Material BH-2 (10-11)

Sampled By J. Carrow Date 2/6/87

Submitted By F. Costello Date 2/25/87

Reviewed By M. Jahn Date 3/31/87

Test Procedure ASTM D3080- Single Shear

Test Condition: — InSitu - - - - Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 109

Initial Moisture Content, % 8.5

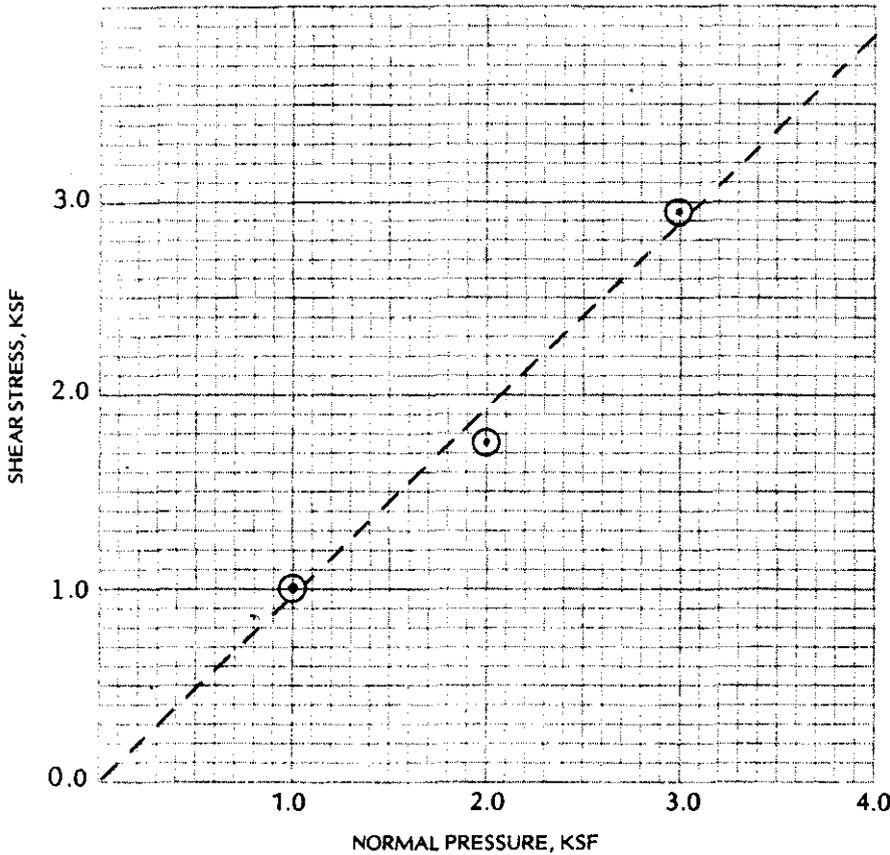
$\phi =$ 40 $^{\circ}$ $C =$ 0.54 Kips/Sq. Ft.



DIRECT SHEAR TEST

Job No. 2126J313

Lab/Invoice No. 2126W313



Type of Material Sandy Gravel

Source of Material RS-27 (5-6)

Sampled By J. Carrow Date 1/9/87

Submitted By F. Costello Date 2/25/87

Reviewed By M. Jahn Date 3/31/87

Test Procedure ASTM D3080- Single Shear

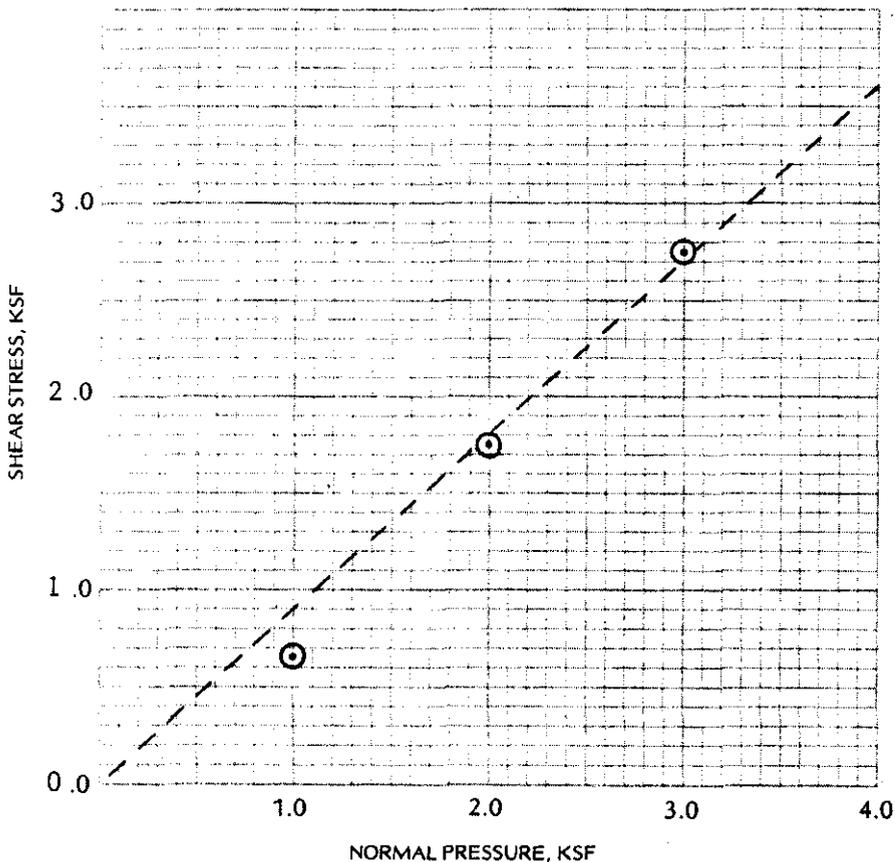
Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 111

Initial Moisture Content, % 4.2

$\phi =$ 44 $^{\circ}$ $C =$ 0 Kips/Sq. Ft.



Type of Material Gravelly Sand

Source of Material RS-30 (5-6)

Sampled By J. Carrow Date 2/9/87

Submitted By F. Costello Date 2/25/87

Reviewed By M. Jahn Date 3/31/87

Test Procedure ASTM D3080- Single Shear

Test Condition: — InSitu ---- Saturated

Sample Condition: Undisturbed Remolded

Initial Dry Density, pcf 119

Initial Moisture Content, % 4.6

$\phi =$ 42 $^{\circ}$ $C =$ 0 Kips/Sq. Ft.



CONSOLIDATION PROPERTIES OF SOIL

Client _____

Job No. 2126J313

Lab/Invoice No. 2126W313

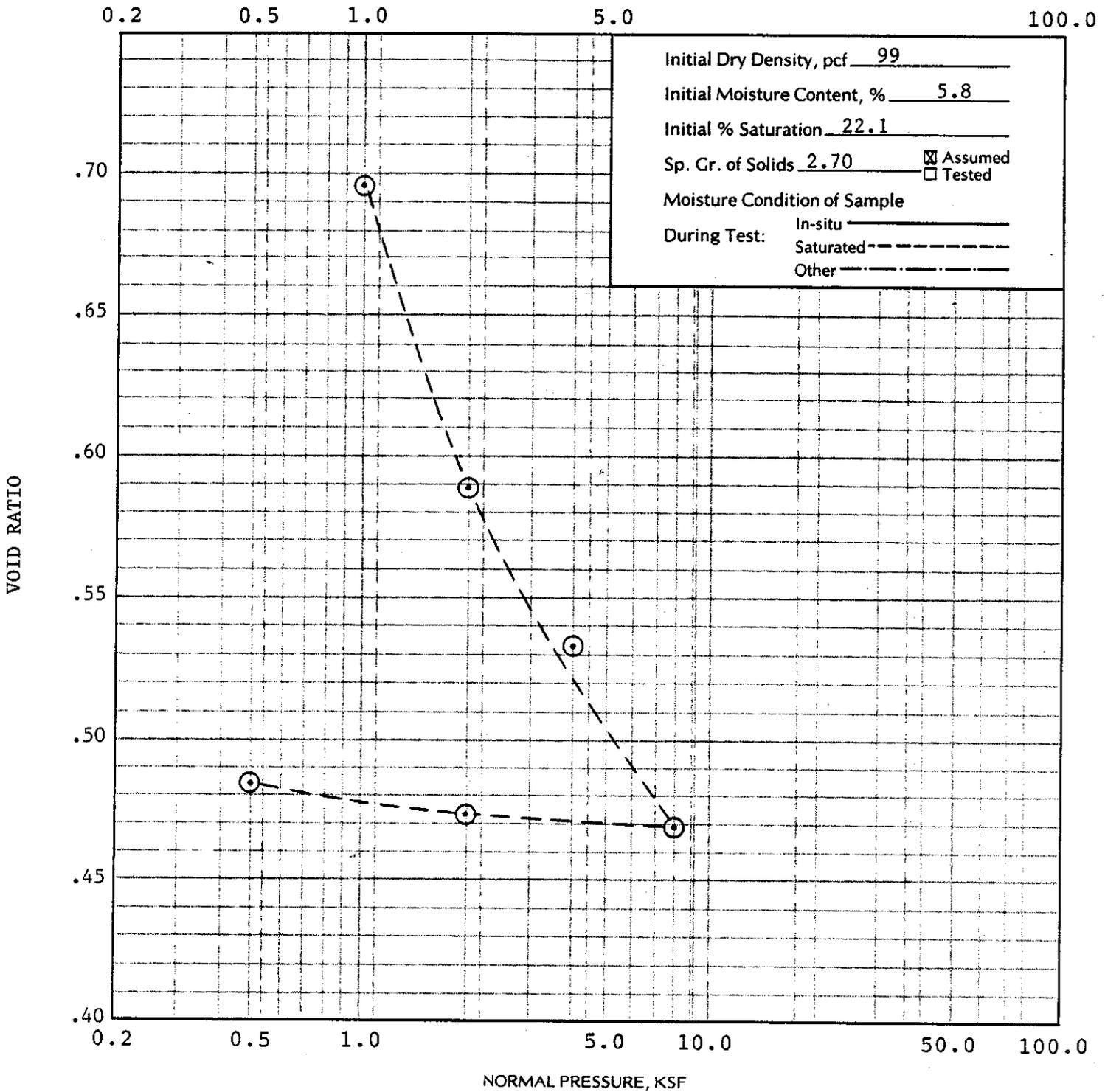
Date of Report 4/1/87

Reviewed By Mike Jahn

Type of Material Silty clay with sand

Source of Material Squaw Peak Undisturbed Remolded Compacted

Boring RS-31 Depth 5-6 Test Procedure ASTM D2435-



CONSOLIDATION PROPERTIES OF SOIL

Client _____

Job No. 2126J313

Lab/Invoice No. 2126W313

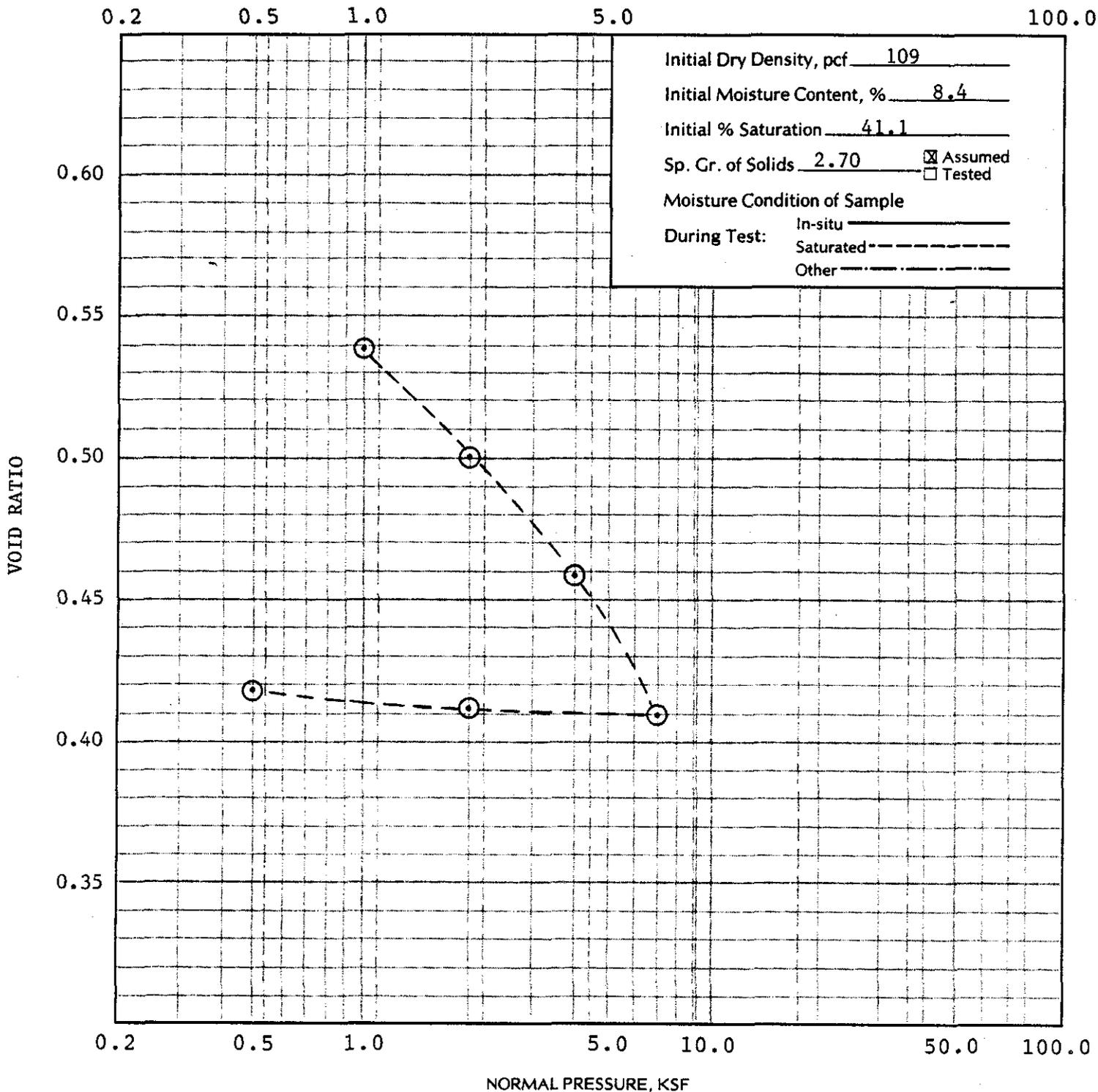
Date of Report 4/1/87

Reviewed By Mike Jahn

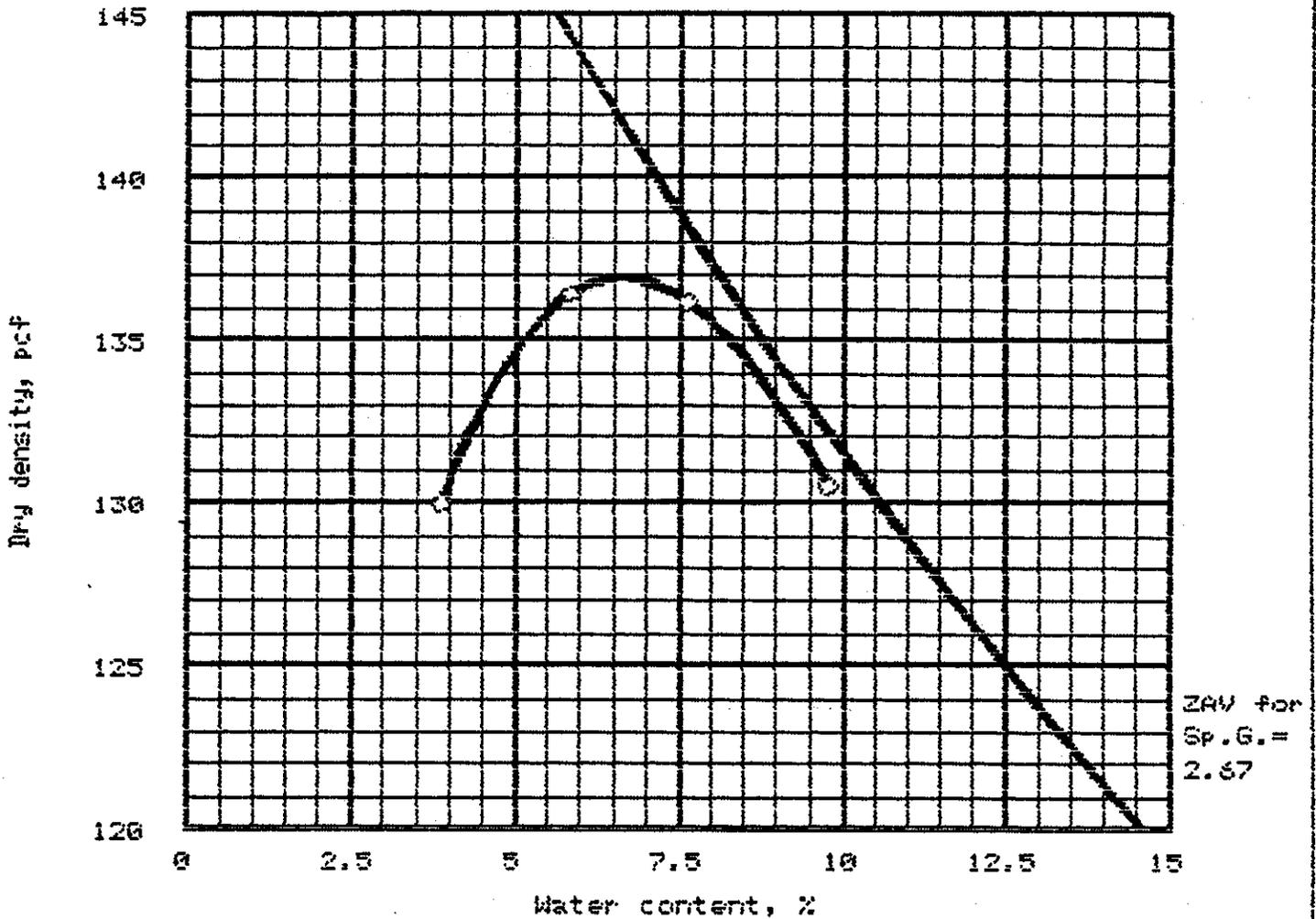
Type of Material Sandy gravel with clay

Source of Material Squaw Peak Undisturbed Remolded Compacted

Boring RS-34 Depth 10-11 Test Procedure ASTM D2435-



PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698-78, Method D

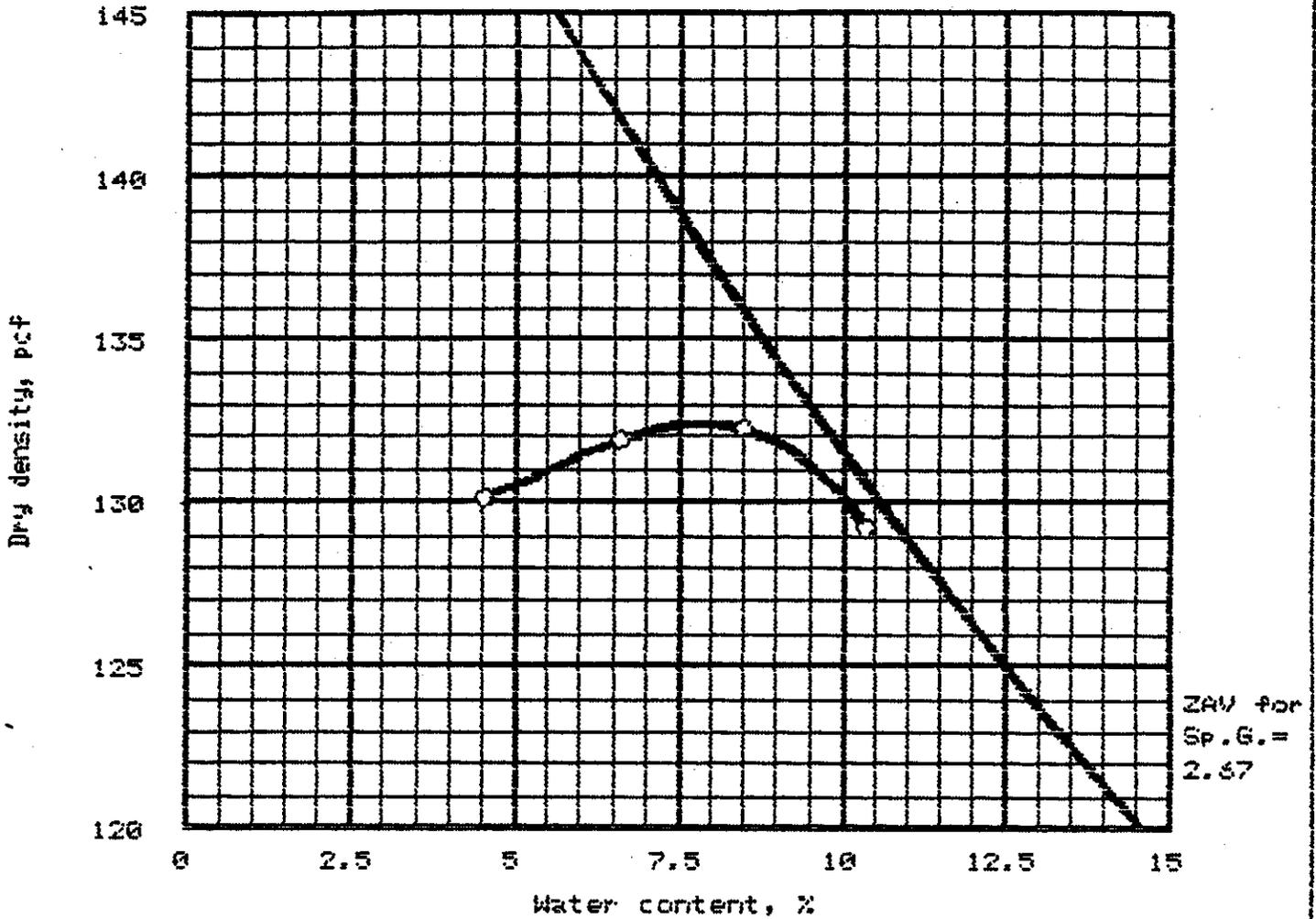
Elev/Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No. 4	% < No. 200
	USCS	AASHTO						
			%				42.8 %	17.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 6.6 % Maximum dry density = 136.9 pcf	Silty-Sand and Gravel R-2 (0'-2')
Project No.: 2126J313 Project: Squaw Peak Parkway Location: Date: 03-10-67	Remarks: 2126W313-1R-2

PROCTOR TEST REPORT
 WESTERN TECHNOLOGIES INC.

Fig. No. _____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698-78, Method C

Elev/ Depth	Classification		Nat. Moist. %	Sp.G.	LL	PI	% > No. 4	% < No. 200
	USCS	AASHTD						
							41.6 %	23.3 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 7.9 % Maximum dry density = 132.4 pcf	Silty-Sand and Gravel R-4 (2'-5')

Project No.: 2126W313 Project: Squaw Peak Parkway Location: Date: 03-10-87	Remarks: 2126W313-1(R-4)
---	-----------------------------



APPENDIX 2

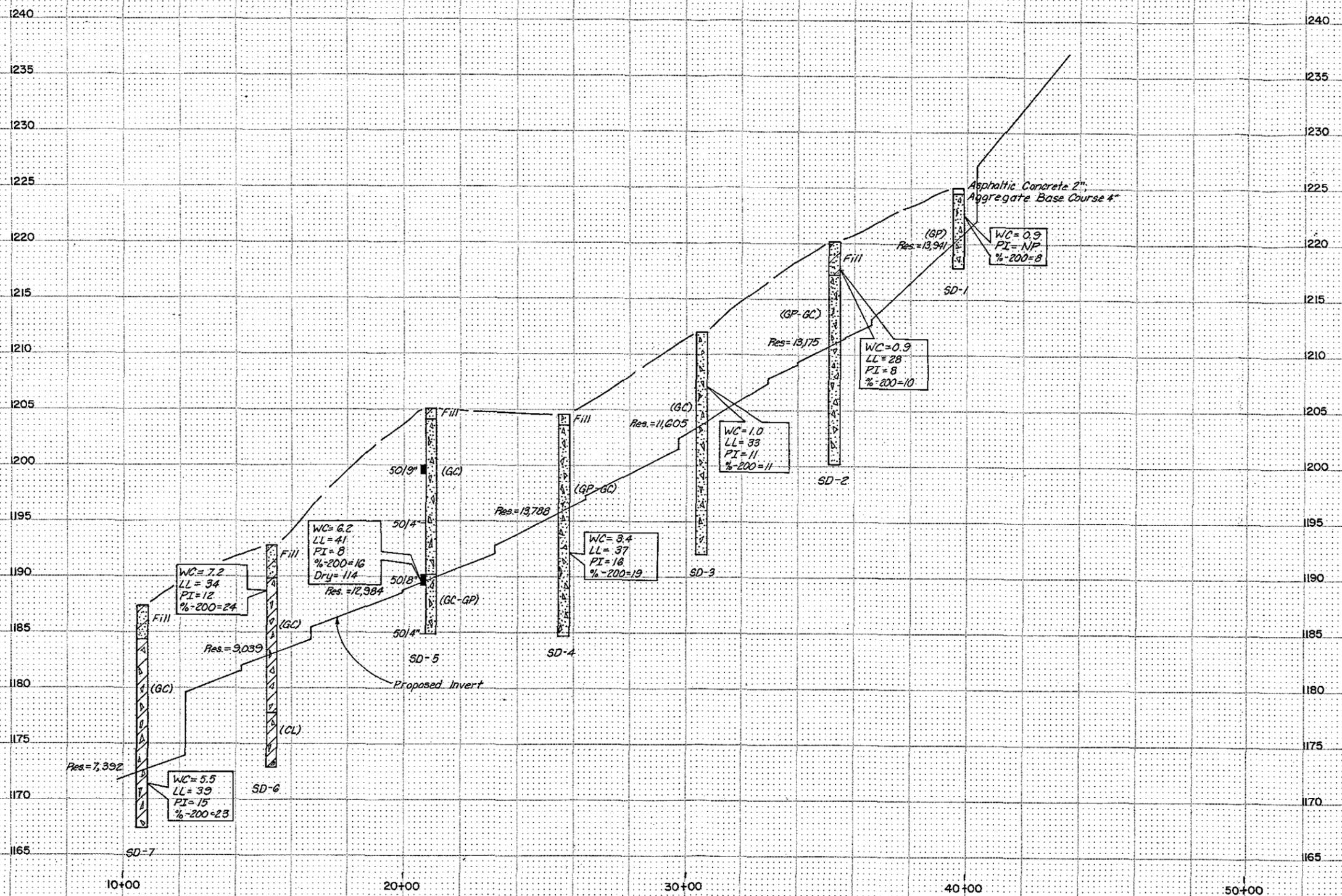
Storm Drainage - Subsurface Information

Storm Drainage - Subsurface Information

A total of seven borings, designated SD-1 through SD-7, were drilled along the proposed alignment for the storm drain addition as shown on Figures 2.1 through 2.9. A plot of the subsurface information along with the proposed invert is shown on Figure 4.

In addition to laboratory classification testing performed on selected samples from the borings, soil resistivity tests were taken at each boring location by the "in-place 4-terminal" method. Both laboratory and field test data are shown on Figure 4. Boring logs and test data are included in this appendix also.

The borings were advanced by auger methods to a depth below the proposed drain pipe invert level. The borings encountered primarily dense sandy and clayey gravels. Resistivity values recorded range from 7,392 to 13,941 ohm-cm, indicating no special pipe coating protection is needed.



NOTE:
 For General Notes and Legend see Figure 1.
 For As-Drilled Locations, see Figures 2.1-2.9.

NOTE:
 Subsurface information shown on this drawing was obtained solely for use in establishing design controls for the project. The accuracy of this information is not guaranteed and it is not to be construed as part of the plans governing the construction of this project.

SQUAW PEAK PARKWAY SEGMENT NO. 5B	
PHOENIX, ARIZONA	
SUBSURFACE INFORMATION STORM DRAIN PROFILE	
<small>HOWARD NEEDLES TAMMEN & BERGENCOFF ARCHITECTS ENGINEERS PLANNERS</small>	
PREPARED: WAD	DATE: 4-7-87
DRAWN: SEG	DATE: 4-8-87
CHECKED: WAD	DATE: 4-16-87

HNTB Job No. 1184-21-01

BORING LOGS AND TEST DATA

LOG OF BORING NO. SD-1

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1225.0 Datum 255+08 80' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
5			G			GP	Asphaltic Concrete 2"; Aggregate Base Course 4" SANDY GRAVEL; some clay, brown, dense, moist
10							Auger refusal @ 7.2 feet Hole backfilled 2/9/87
15							
20							
25							
30							

LOG OF BORING NO. SD-2

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1220.21 Datum 250+68 86' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pct	Moisture Content, %	Unified Classification	Description
	C	N/R					
0			G			SC	CLAYEY SAND FILL; with gravel, dark brown, loose, moist
5			G			GP/ GC	SANDY GRAVEL: some clay, trace cobbles, dark brown, loose, moist
10			G				light brown, dense
15			G				
20							Boring stopped @ 20 feet Hole backfilled 2/4/87
25							
30							

LOG OF BORING NO. SD-3

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1212.0 Datum 245+42 88' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
0						GC	SANDY GRAVEL; with clay, brown, moderately dense, damp
1			G				
5			G				
10							
15							
20			G				
25							Boring stopped @ 20 feet Hole backfilled 2/4/87
30							

LOG OF BORING NO. SD-4

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1204.6 Datum 240+72 109' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/4/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
			G			GC	SANDY GRAVEL FILL; with clay, dark brown, loose, moist
			G			GP/ GC	SANDY GRAVEL; some clay, brown, moderately dense, moist
5			G				dense
			G				
10							
			G				
15							
20							Boring stopped @ 20 feet Hole backfilled 2/4/87
25							
30							

LOG OF BORING NO. SD-5

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1205.1 Datum 235+98 95.6' Right of Centerline

Type/Size Boring 7" HSA Rig Type CME 75 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						SC	CLAYEY SAND FILL; trace gravels, brown, loose, moist
						GC	SANDY GRAVEL; with clay, brown, very dense, moist
5		50/9"	R				
10		50/4"	N				
15		50/8"	R			GC/ GP	SANDY GRAVEL; some clay, brown, very dense, moist
20		50/4"	N				
25							Boring stopped @ 20.3 feet Hole backfilled 2/9/87
30							

LOG OF BORING NO. SD-6

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1192.8 Datum 230+54 112' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						SC	CLAYEY SAND FILL; trace gravel, brown, loose, moist
5			G			GC	CLAYEY GRAVELS; with sand, brown, moderately dense, moist
10							
15							
			G			CL	GRAVELLY CLAY; with sand, brown, firm to stiff, moist
20							
							Boring stopped @ 20 feet Hole backfilled 2/9/87
25							
30							

LOG OF BORING NO. SD-7

Project Squaw Peak Parkway Job No. 2126J313

Elevation 1187.4 Datum 225+60 140' Right of Centerline

Type/Size Boring 6" SSA Rig Type CME 75 Date 2/9/87

Groundwater Conditions None Encountered

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
	C	N/R					
						SC	CLAYEY SAND FILL; trace gravel, brown, loose, moist
5			G			GC	CLAYEY GRAVEL; with sand, brown, moderately dense, moist
10							
15			G				
20							
							Boring stopped @ 20 feet Hole backfilled 2/9/87
25							
30							

PHYSICAL PROPERTIES

Job No. 2126J313

Boring No.	Depth, ft	Soil Class.	Particle Size Distribution, % Passing By Weight					Atterberg Limits		Moisture - Density Rel.			Specific Gravity	In Situ		'R' Value	Remarks
			3"	#4	#10	#40	#200	LL	PI	Dry Density pcf	Optimum Moisture %	Meth.		Dry Density pcf	Water Content %	Corrected 'R'	
RS-1	4-5.5	SC	100	57	41	22	12							1.7		2, 6	
RS-7	4-5.5	GP/GC	100	45	32	18	10							0.8		2	
RS-13	4-5	SC	100	80	66	44	25	37	12					9.6		2, 6	
RS-19	9-10.5	SP/SC	100	55	38	18	9							1.7		2, 6	
RS-20	5-6.5	GP/GC	100	51	35	17	9							0.9		2, 6	
RS-24	4-5.5	GC	100	52	40	25	16							4.3		2, 6	
RS-27	5-6	GC	100	48	36	23	14	37	17				118	4.2		2	
RS-30	5-6	SC	100	65	50	34	22	31	9				127	4.6		2, 6	
RS-31	5-6	CL	100	95	89	78	61	34	12				102	5.8		2, 6	
RS-32	10-11	SP/SC	100	75	57	35	6	40	15				106	11.6		2, 6	
RS-34	10-11	GP/GC	100	53	32	14	10	35	15				112	8.4		2, 6	
BH-2	10-11	SM	100	77	62	45	27	50	17				111	8.5		2, 6	
SD-1	2-3	GP/GM	100	20	16	12	8		NP					0.9		2, 6	
SD-2	10-12	GP/GC	100	25	19	14	10	28	8					0.9		2	
SD-3	4-6	GP/GC	100	24	17	14	11	33	11					1.0		2, 6	
SD-4	12-13	SC	100	66	47	30	19	37	16					3.4		2, 6	
Boring No.	Depth, ft	Comments															

REMARKS

Classification/Particle Size

- 1. Visual
- 2. Laboratory Tested
- 3. Minus #200 Only

Moisture Density Relationship

- 4. Tested ASTM D698/AASHTO T99
- 5. Tested ASTM D1557/AASHTO T180

Specific Gravity

- 7. Minus #4
- 8. Plus #4

Permeability

- 9. Constant Head
- 10. Falling Head

'R' Value

11. Expansion Pressure _____ psf

12. Exudation Pressure _____ psi

Note: NP = nonplastic

6 Other _____ Laboratory classification does not correspond with field classification

Howard Needles Tammen & Bergendoff
Job No. 2126J313

SOIL RESISTIVITY

<u>Boring Number</u>	<u>Probe Spacing</u>	<u>Resistance ohm/cm)</u>
SD1	20'	13,941
SD2	20'	13,175
SD3	20'	11,605
SD4	20'	13,788
SD5	20'	12,984
SD6	20'	9,039
SD7	20'	7,392

