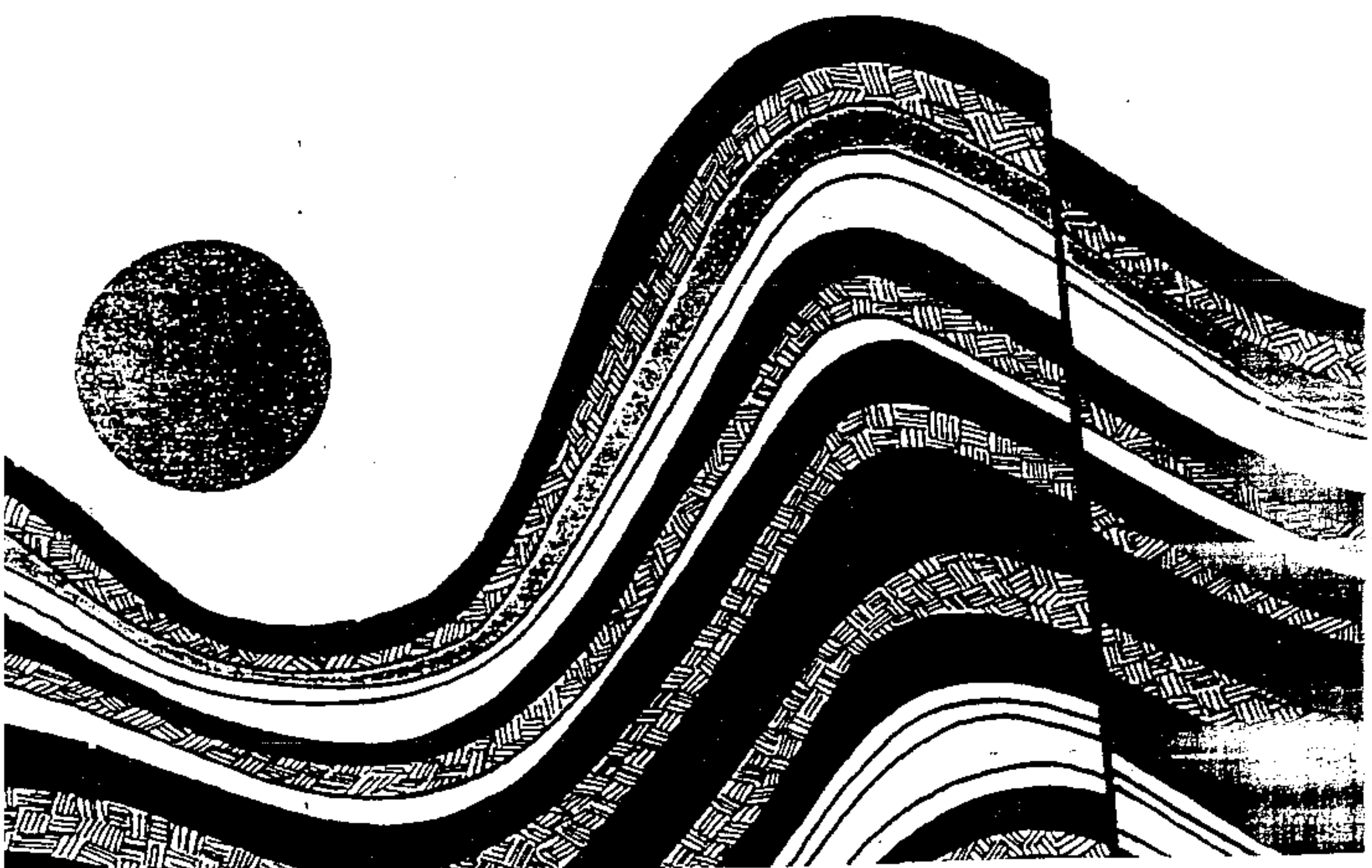
APPENDIX 4.1

Geotechnical Engineering Study

Leighton and Associates

GEOTECHNICAL REVIEW OF
TENTATIVE TRACT 37634,
CITY OF SAN DIMAS,
CALIFORNIA



GEOTECHNICAL REVIEW OF TENTATIVE TRACT 37634, CITY OF SAN DIMAS, CALIFORNIA

August 19, 1980

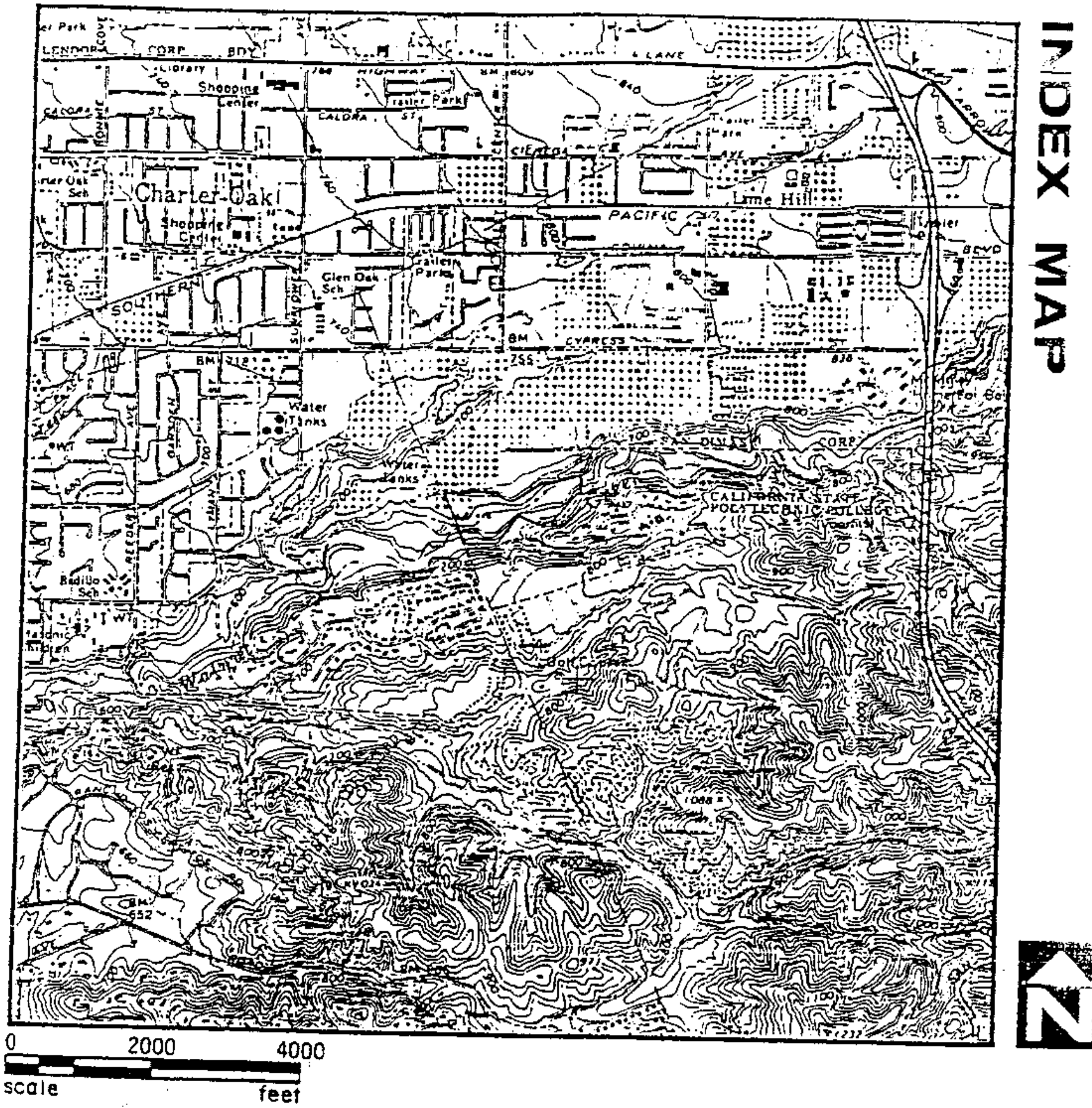
Project No. 280532-01

Prepared For:

Cardinal Point Limited
17842 Irvine Boulevard, Suite 206
Tustin, California 92680

Attention: Patricia L. Taylor

280532-01



TENTATIVE TRACT 37634

CITY OF SAN DIMAS

(Subject Site Shown in Yellow)

BASE MAP: USGS San Dimas
Quadrangle (Photo Revised 1972)

Site Conditions

The subject site is located on the northern edge of the San Jose Hills sloping south to southeast toward Walnut Creek (see Index Map). The northerly portion was terraced and planted in avocado trees prior to 1928. Trees have since been removed from a large part of the site and are now restricted to the western portion. The overall slope angle in the northerly portion is 10 to 20 degrees with angles of 30± degrees between terraces. There are two very gently sloping terraces in the east central and west central portions of the site. The southerly portion of the site encompasses slopes of 15 to 30 degrees (occasionally steeper) along Walnut Creek. A residence exists near the westerly site boundary (Lot 3). A barn and small out buildings are present at the south end of "A" Street. A sewer manhole is located on Lot 15.

Proposed Developement

urrent plans propose the construction of two roads (see Tentative Tract Map) o serve the planned 19 lots which will be sold in a natural (non-graded) ondition. Sewers will be provided in the access roads.

ll cut and fill slopes will be constructed at slope angles of 2:1 or less.

eologic Setting

edimentary bedrock of the Puente Formation underlies the area. These rocks onsist of well bedded, diatomaceous siltstone. The siltstone is unconformably erlain in some areas by recent alluvium, older alluvium and/or terrace posits (see Geotechnical Map).

ructure

e dip of the beds is generally northward at angles of 20 to 60 degrees. A vorable orientation with respect to the southerly natural slopes (see Geochnical Map).

ler Alluvium

er alluvium, generally 2 to 4 feet thick, consisting of silty sand overlies rock on the gently sloping terraces in the west central and east central tions of the site.

race Deposits

race deposits of sandy gravel and boulders overlie the bedrock in the northern tion of the site. Boulders over 8± inches in diameter will require special dling for placement in the fill as outlined in Appendix C.

Fill Slopes

Fill slopes up to 5± feet in height are present along the northerly boundary, adjacent to Valley Center Road and the private road. This material is a result of the road construction and is restricted to the area immediately adjacent to the roads.

Landslides

Landslides are not evident at the site.

Soil Failures

Thin soil failures are present south of the existing residence on the steep slope above Walnut Creek and in the area of Boring 1 at the narrow central part of the property (see Geotechnical Map).

Faults

There is no evidence of active faulting on the property.

Seismicity

The principal potential seismic hazard which could affect the site is ground shaking resulting from an earthquake along any of several active faults and fault systems in southern California. The major seismically active faults of most significance to the proposed development include the San Andreas, San Jacinto, Sierra Madre-Cucamonga, Whittier-Elsinore and Newport-Inglewood fault zones. A ummary of these active faults and their seismic parameters is presented on the ext page.

potentially active fault in close proximity to the site is the Walnut Creek ault. Although close to the site, the Walnut Creek fault has a much lower otential for seismic activity than the above described faults and is not onsidered as important in terms of earthquake-generating potential.

ie occurrence of potential secondary seismic hazards, such as liquefaction and ismically induced settlement, affecting the subsoils of the site is considered be nil. These hazards occur where alluvial or low density soils are underlain a shallow water table. These conditions do not exist on Tract 37634.

oundwater

oundwater was not encountered in any of the subsurface excavations.

pability

earth materials encountered during the field investigations were excavated h little difficulty using conventional equipment in good condition. It is icipated that all materials located at the site are readily rippable.

Potential Causative Fault	Distance From Fault To Site (Miles)	Maximum Credible Earthquake	Maximum Probable Earthquake (Functional Basis Earthquake)			
		Richter Magnitude Note 1	Richter Magnitude	Peak/ Repeatable Horizontal Ground Acceleration (Gravity) Note 1	Predominant Period At Site (In Seconds) Note 2	Duration of Strong Shaking At Site (In Seconds) Note 3
San Andreas	21.0	8.5	7.5	0.35 / 0.23 *	0.35	37
San Jacinto	19.5	8.0	7.2	0.37 / 0.25 *	0.35	34
Sierra Madre-Cucamonga	3.5	7.5	6.1	0.63 / 0.42 *	0.35	30
Whittier-Elsinore	10.5	7.7	6.7	0.42 / 0.28 *	0.35	31
Newport-Inglewood	27.5	7.5	6.5	0.24 / 0.16 *	0.35	30

E: 1. Data from Greensfelder (Reference 1, Appendix D).
2. Data from Seed, Idriss and Kiefer (Reference 8, Appendix D).
3. Data from Housner (Reference 3, Appendix D).

*For design purposes, the repeatable high ground acceleration may be taken as 67% of the peak acceleration (after Ploessel and Slosson, 1974, Reference 7, Appendix D).

Slope Stability

Planned cut and fill slopes are to be constructed with slopes of 2:1 or flatter. These slopes are anticipated to be grossly and surficially stable as designed when constructed in accordance with the City of San Dimas code and our recommendations.

Fill Keys

Prior to fill slope construction, fill keys will be necessary. The specifications for fill keys are presented in Appendix C. Excavations on the order of 2 to 3 feet should be anticipated.

Expansive Soils

For planning purposes, the following expansion properties (as defined by UBC Standard 29-2) may be utilized. Additional testing will be necessary for individual foundation designs on specific lots.

Material	Potential Expansion
Older alluvium (Qalo)	Medium to high
Terrace deposits (Qt)	Low
Siltstone (Slt)	Medium to high

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. From a geotechnical point of view, Tentative Tract 37634 can be safely developed as proposed, provided the recommendations presented below are implemented during preparation of the grading plan, rough grading and residential construction.

2. Moderate ground shaking from a regional seismic event can be expected to occur on the subject property within the projected life of the proposed development. However, wood-frame structures perform very well under such conditions when constructed in accordance with the latest building codes.

3. Ground rupture hazards from fault movement are low to nil for the subject property.

4. The potential for secondary seismic hazards, such as soil liquefaction and other forms of ground failure to occur, is very low.

5. Cut and fill slopes will perform satisfactorily at the designed angles.

6. All earth materials are anticipated to be rippable.

Recommendations

1. Brow ditches should be provided above all cut slopes and are referred to attention of the design civil engineer.

2. A 2.1:1 building setback should be established at the top of the natural slope above Walnut Creek.

3. All fills should be placed in accordance with ASTM D1557-70 as outlined in Appendix C.

4. Utility Trench Backfill which will support construction such as paving or slabs should be placed at a minimum of 90 percent relative compaction. If native materials are used, they should be uniformly moistened to near the optimum moisture content (not flooded) prior to compaction.

5. Street sections should be determined as rough grade is approached. "R"-Values of street subgrade should be determined when rough street grade has been made. The minimum A.C. thickness for streets is 3 inches.

6. Construction: The geotechnical consultant of record should inspect the following stages of construction.

   A. Upon completion of clearing.

   B. During all rough grading operations including removal of unstable materials, precompaction, benching and filling operations.

C. After utility trench backfill but prior to paving or other construction over backfill.

D. When any unusual conditions are encountered.

5. The grading/site plans for the individual residences should be geotechnically reviewed prior to construction. The grading plan should provide for a) the 2.1:1 building setback as recommended above, b) control of surface runoff from roofs and yards to streets or to Walnut Creek via open or closed conduits.

We are pleased to have been able to provide these services. If you have any questions regarding our services, please call.

Respectfully submitted,

David A. Adams
RG 3570

Donald E. Brockway 714 860-7772
RCE 13552

Reviewed by: Lawrence R. Cann
Engineering Geologist EG 584

DA/kac

Distribution: (5) Addressee
(1) Shaller and Lohr, Inc.
Attention: Mr. Ken Harrison

APPENDIX A

APPENDIX B

HILDENBRANDT AND ASSOCIATES

150 San Lorenzo Street
POMONA CALIFORNIA 91766
Telephone (714) 622-0812

PROJECT NO. 70108

SHEET 2 OF 2

PROJECT: LACFCD Regional Project 9706 (San Dimas)

BORING NO. 1

LOCATION OF BORING:

SHEET NO.

DATE DRILLED 11/17/7

DIST FROM SURF		TUBE NO.	BLOWS PER FOOT	WT. PER CU. FT.	MOIST % DRY WT.	OPT. MOIST	MAX DENS	REL. % COMP.	LOG OF MATERIAL
25									
									Hard zone, brecciated with
26									slickensides and pebbles.
27									
28									Moist softer zone.
29									Firm.
30									
	TD								
									(NO GROUND WATER WAS ENCOUNTER AND NO CAVING WAS OBSERVED.)

HILDENBRANDT AND ASSOCIATES

156 San Lorenzo Street
Pomona California 91766
Telephone (714) 622-9012

PROJECT NO. 70108

SHEET 1 OF [illegible]

PROJECT: LACFCD Regional Project 9706 (San Dimas) — BORING NO. 1

LOCATION OF BORING: 380' S/CL intersection Valley Center, 230' E/CL Valley Center prolonged — SHEET NO.

DATE DRILLED 11/17/7

DIST FROM SURF		TUBE NO.	BLOWS PER FOOT	WT. PER CU. FT.	MOIST % DRY WT.	OPT. MOIST	MAX DENS	REL. % COMP.	LOG OF MATERIAL
0	Top of Hole Elev. = 675±								
									SANDY CLAY: Damp, grey-brown,
1									firm to stiff. (CH)
2									
3									
									Becomes moist, blocky, & sti
4									
5									
		1	20	64.2	55.7	53	64	100	SHALE (BEDROCK): Damp to mois
6									light brown to yellow, firm
									hard, low density, laminated
7									diatomaceous. (MH)
8									
9									
10									Some sandstone strata severa
		2	12	58.6	65.3	53	64	92	inches thick.
11									
12									
13									Grey to cream colored with
									some thin fine sandy strata.
14									
15									
16									
		3	14	56.3	68.0	53	64	88	
17									
18									
19									
20									
									Very hard zone, maroon color
21									concretions or rock fragment
22									
23	[illegible]								
24									
		4	28	74.8	43.8	(rock in	tube)		Hard siliceous zone

HILDENBRANDT AND ASSOCIATES
156 San Lorenzo Street
Pomona California 91766
Telephone (714) 622-0012

ROJECT NO. 20108

SHEET 1 OF 2

JECT: LACFCD Regional Project 9206 (San Dimas)
BORING NO. 2
ATION OF BORING: 587' S/CL La Terracita
30' E/Valley Center CL
SHEET NO.
DATE DRILLED 11/17/70

DEPTH	TUBE NO.	BLOWS PER FOOT	WT. PER CU. FT.	MOIST % DRY WT.	OPT. MOIST	MAX DENS	REL. % COMP.	LOG OF MATERIAL
0	Top of Hole Elev. = 735							
								CLAYEY SILTY FINE SAND: Dry
1								light red-brown, porous and sc
								very dense. (SM)
2								
3								GRAVELLY SILTY SAND: Damp, rust
4								brown, firm, some cobbles. (SM
5								Moist.
	1	13	114.6	9.5	11	123	93	
6								
7								SILTY FINE SAND: Damp, rusty-
								brown, very firm to very hard,
8								well cemented. (SM)
								Extremely hard, well cemented,
9								& difficult to drill from 8' t
								12½'.
10								Some pebbles.
11								
	2	35 for 8"	14.4	(sample badly fractured)				
12								
								SILTY GRAVELLY SAND: Moist,
13								rusty-brown, fairly dense,
								gravel is predominantly granit
14								but weathered soft and brittle
								more than 10% fines. (SM)
15								
	3	20	(no sample)					
16								
17								
18	4	24	111.6	14.7	11½	126½	88	Becomes more moist.
19								
20								
21								
								Very moist.
22								
23								
24								

HILDENBRANDT AND ASSOCIATES

156 San Lorenzo Street
POMONA, CALIFORNIA 91766
TELEPHONE (714) 622-8012

PROJECT NO. 70108

PROJECT: LACFCD Regional Project 9706 (San Dimas)
LOCATION OF BORING:

BORING NO. 2
SHEET NO.
DATE DRILLED 11/17/7?

TEST FROM SURF		TUBE NO.	BLOWS PER FOOT	WT. PER CU. FT.	MOIST % DRY WT.	OPT. MOIST	MAX DENS	REL. % COMP.	LOG OF MATERIAL
									SILTY FINE SAND: Damp, tan, ver little cohesion. (SM)
	TD								
									(NO GROUND WATER WAS ENCOUNTERE AND NO CAVING WAS OBSERVED.)

HILDENBRANDT AND ASSOCIATES
August 1972
Project 7256

22± Acre Mobile Home Site
1160 So. Valley Center
San Dimas, Ca.

SUMMARY OF TEST DATA

Moisture-Density Relationships

Test Location	Dry Density (pcf) In Place	Dry Density (pcf) Maximum	Moisture Content In Place	Moisture Content Optimum	Relative Compaction
TP 1 @ 6'	108.6	123	7.2	10%	88%
TP 3 @ 5'	61.4	83	46.4	32	74
TP 5 @ 6'	118.8	131	11.9	9	91

Densities were determined by the sand cone method. Maximum densities and optimum moisture contents were determined in accordance with ASTMd1557-70.

Expansive Test Data

Specimen No.	1	2
Sample Location	TP 3 @ 5'	TP 5 @ 6'
Molded Dry Density	73.1 pcf	118.0 pcf
Molded Moisture	37%	10.3%
Saturated Moisture	47%	14.7%
Volumetric Swell	3.6%	0.9%
Expansive Classification	Lowly Expansive	Nonexpansive

Material for each test was molded into a 2½-in. ID by 1-in. brass ring. The material was placed in a consolidometer, was loaded to 60 psf, and was inundated with tap water.

Swell in %	Expansive Rating
0-3	Nonexpansive
3-6	Lowly Expansive
6-9	Moderately Expansive
9-12	Highly Expansive
12+	Very Highly Expansive

Supplemental Test Data, Borings 1 and 2

Location	Sand Equivalent	Shear Parameter * Ø	Shear Parameter * c	Liquid Limit	Plasticity Index
Bor. 1 @ 10'		25°	2200 psf	88	22
@ 16'		22°	1700 psf		
Bor. 2 @ 5'	10	36°	800 psf		
@ 10'	22				
@ 17½'	9	38°	800 psf		
@ 24'	36				

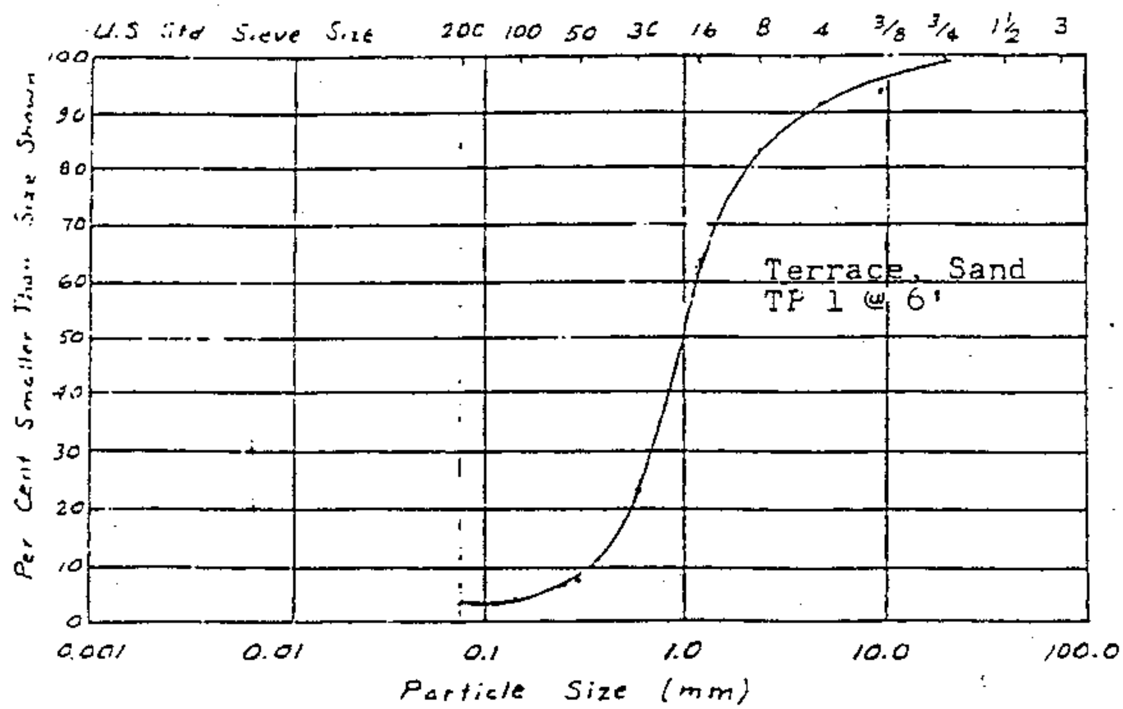
* Shear tests were performed on relatively undisturbed samples at their in place moisture contents. Testing was done at a shearing strain rate of approximately 0.05 in. per min. Result represent ultimate test values.

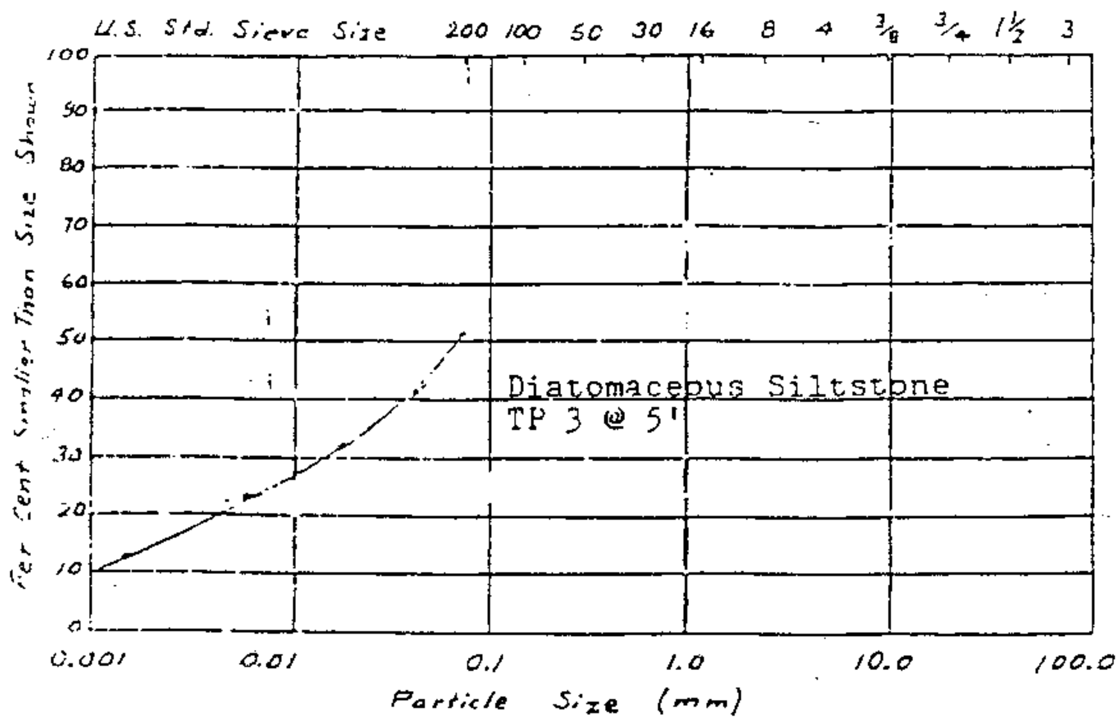
SOIL ENGINEERING
TESTING SERVICES

HILDENBRANDT AND ASSOCIATES
August 1972
Project 7256

22± Acre Mobile Home Site
1160 So. Valley Center
San Dimas, Ca.

PARTIAL GRAIN SIZE ANALYSES





SOIL ENGINEERING
TESTING SERVICES

APPENDIX C

APPENDIX C

GENERAL GRADING AND EARTHWORK SPECIFICATIONS

1. Scope

   a) This section contains general specifications for work relating to the following construction:

      Site Clearing and Grubbing

      Preparation of Subgrade in Areas to be Filled

      Placement of Fill

      Subdrains

      Trench Backfill

   b) The owner shall employ a qualified soil engineer to inspect and test the fill as placed to verify the uniformity of compaction to the specified density requirement. The soil engineer shall advise the owner and grading contractor immediately if any unsatisfactory soil related conditions exist and shall have the authority to reject the compacted fill ground until such time as corrective measures necessary are taken to comply with the specifications. It shall be the sole responsibility of the grading contractor to achieve the specified degree of compaction.

2. Clearing, Grubbing and Preparing Areas to be Filled

   a) All brush, vegetation, rubbish and desiccated top clay soil shall be removed, piled, or otherwise disposed of so as to leave the areas to be filled free of vegetation, debris and desiccated top clay soil. Any soft and swampy spots in the canyon areas shall be corrected by draining or by removal of the unsuitable materials.

   b) The natural ground which is determined to be satisfactory for the support of the filled ground shall then be plowed or scarified to a depth of at least six inches (6") and until the surface is free from ruts, hummocks, or other uneven features which would tend to prevent uniform compaction by the equipment to be used. The scarified ground should be compacted to at least 90 percent of the maximum laboratory density. Where undisturbed bedrock is exposed at the surface, scarification and recompaction may not be required.

   c) Where fills are made on hillsides or exposed slope areas, the existing top unstable materials should be removed. If existing slopes are steeper than 5 horizontal to 1 vertical, horizontal benches shall be cut into firm and competent undisturbed soil or bedrock in order to provide both lateral and vertical stability. (See benching detail Page VIII of this Appendix).

   d) All areas to receive controlled fill, including all removal areas and toe-of-fill benches, shall be inspected and approved by the soil engineer and/or engineering geologist prior to placing controlled compacted fill.

3. Fill Materials and Special Requirements

The fill soils shall consist of select materials approved by the project soil engineer or his representative. These materials may be obtained from the excavation areas and any other approved sources, and by blending soils from one or more sources. The material used shall be free from organic vegetable matter and other deleterious substances, and shall not contain rocks or lumps of greater than eight inches in diameter within a distance of ten feet from any finished compacted surface. If excessive vegetation, rocks, or soil with inadequate strength or other unacceptable physical characteristics are encountered, these shall be disposed of. During grading operation, if potential problem soils are found, these soils shall be tested to determine their physical characteristics. Any special treatment recommended shall become an addendum to these specifications. Boulders greater than eight inches but less than or equal to two feet in diameter should be uniformly distributed in the compacted fill areas but no closer than ten feet from final grade and should be surrounded with sufficient amounts of compacted finer-grained materials. No nesting will be permitted. Boulders greater than two feet in diameter shall be placed in approved disposal areas no closer than ten feet from final grade and shall be placed in windrows in such a manner that voids will not exist around boulders. (See rock disposal detail, Page IX of this Appendix). Continuous inspection by the project soil engineer is required during rock disposal operations.

4. Placing, Spreading and Compacting Fill Materials

a) The suitable fill material shall be placed in approximately level layers which, when compacted, shall not exceed six inches (6"). Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to insure uniformity of material and moisture in each layer.

b) When the moisture content of the fill material is below that specified by the soil engineer, water shall be added until the moisture content is near optimum as specified by the soil engineer to assure thorough bonding during the compacting process.

c) When the moisture content of the fill material is above that specified by the soil engineer, the fill material shall be aerated by blending and scarifying or other satisfactory methods until the moisture content is near optimum as specified by the soil engineer.

d) After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than 90 percent of maximum density in accordance with ASTM D1557-70 (five layers). Compaction shall be accomplished with sheepsfoot rollers, multiple wheel pneumatic-tired rollers or other approved types of compaction equipment. Rollers shall be of such design that they will be able to compact the fill material to the specified density.

e) Special mixing and watering effort may be required where diatomaceous materials are encountered to achieve the recommended moisture content and density.

f) Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting of the slopes shall be accomplished by backrolling the slopes in increments of three to five feet in elevation gain or by other methods producing satisfactory results. Relative compaction shall be at least 90 percent to the finished slope face.

g) The soil engineer and/or his designated representative shall observe the placement of fill and shall take sufficient tests to provide an opinion on the uniformity and degree of compaction being obtained.

5. Subdrains

a) All materials used in the construction of the subdrain systems shall be of the required kinds and sizes shown on the drawings or approved by the soil engineer. Canyon subdrains shall be constructed as shown on the attached drawing, Canyon Subdrain Construction (Page VII of this Appendix).

b) All drain lines shall be installed to conform to the grades and alignment shown on the drawing. Modifications of the subdrain layout as may be required in the field must be approved by the soil engineer and civil engineer.

c) The subdrain pipe (perforated and non-perforated) shall be approved by the soil engineer. If the diameter pipe called for on the drawing is not available in the material chosen by the contractor, the next size larger pipe available shall be used.

d) Prior to backfilling, the locations of all drains shall be surveyed by the civil engineer. It is imperative that the subdrain outlets be kept clear during grading to avoid damage to the exposed pipe.

e) The fill operation shall be continued to six-inch (6") compacted layers, as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plan.

6. Trench Backfills

a) Trench excavations for utility pipes shall be backfilled under engineering supervision.

b) After the utility pipe has been laid, the space under and around the pipe shall be backfilled with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill shall be uniformly jetted into place before the controlled backfill is placed over the sand.

c) The on-site materials, or other soils approved by the soil engineer, shall be watered and mixed as necessary prior to placement in lifts over the sand backfill.

d) The controlled backfill shall be compacted to at least 90 percent of the maximum laboratory density as determined by the ASTM compaction method described above.

e) Field density tests and inspection of the backfill procedures shall be made by the soil engineer during backfilling to see that proper moisture content and uniform compaction is being maintained. The contractor shall provide test holes and exploratory pits as required by the soil engineer to enable sampling and testing.

7. Geologic Inspections

a) Graded slopes are to be periodically inspected by the engineering geologist to provide an opinion on the stability of excavated slopes.

b) Inspection of excavations other than cut slopes may be required to refine geologic parameters related to fault hazards, landslide hazards, or other geotechnical hazards that may be indicated.

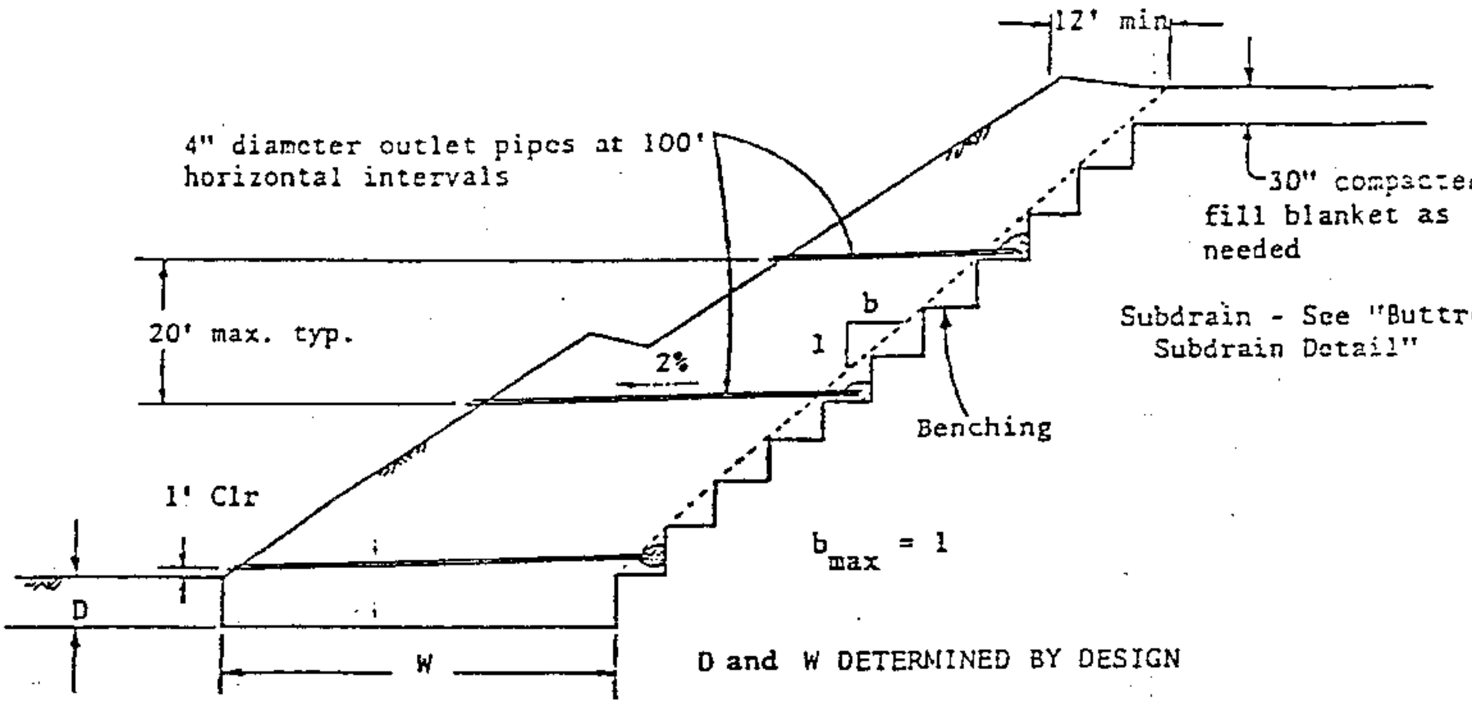
c) Surcharged cuts are to be inspected by the engineering geologist prior to placement of the surcharge fill prism.

d) Canyon cleanouts will be inspected by the engineering geologist prior to subdrain placement or placement of fill.

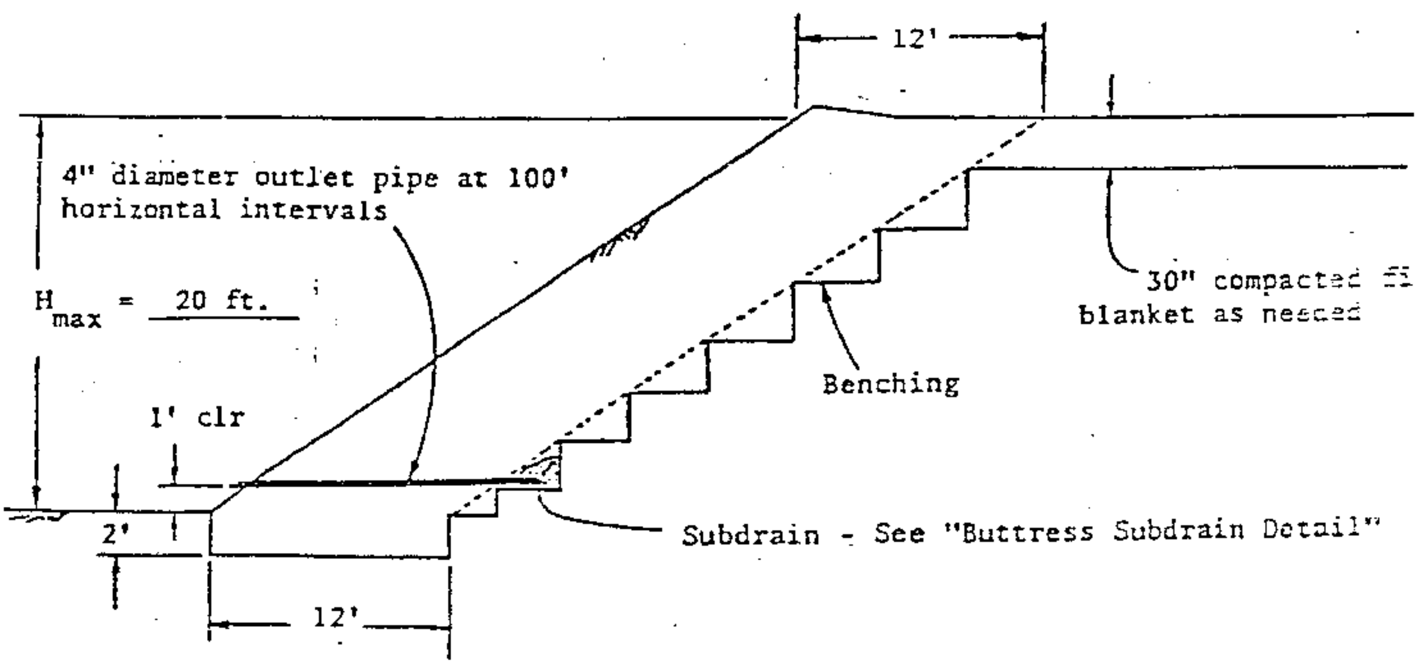
e) Buttress keys will be inspected by the engineering geologist prior to placement of the buttress fill.

TYPICAL BUTTRESS SECTIONS

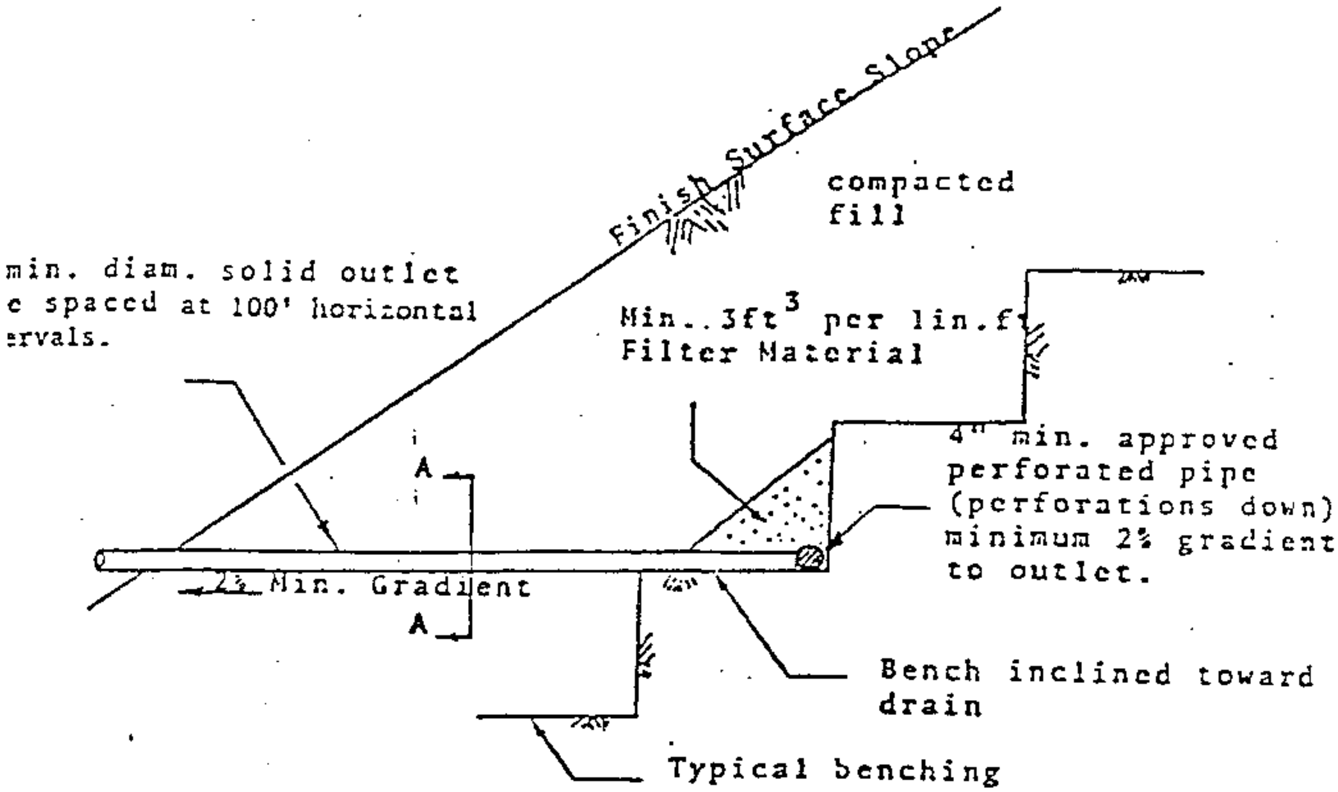
General Buttress Fill Section

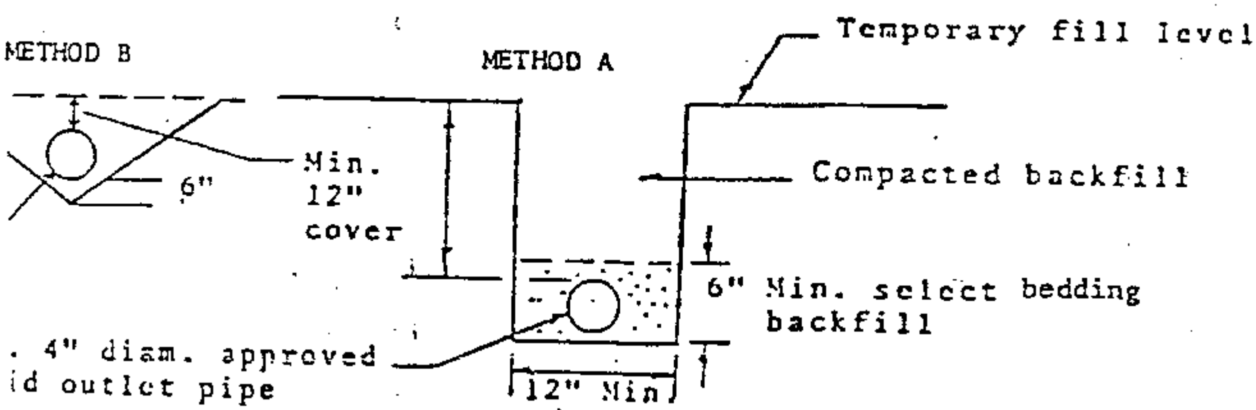


Small Buttress Section



TYPICAL SUBDRAIN DETAILS FOR SIDEHILL FILLS & BUTTRESS FILLS





DETAIL A-A

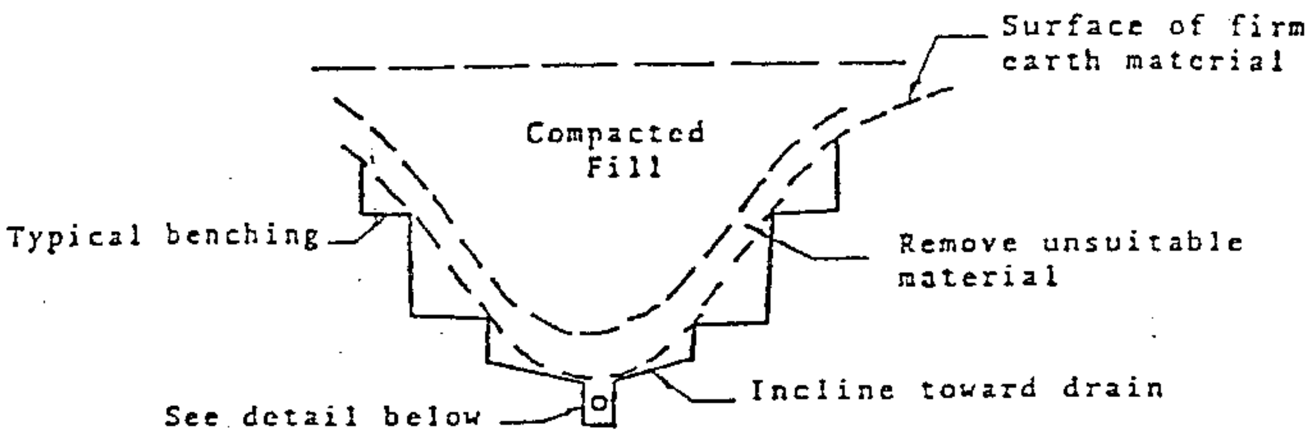
material to meet following
ication or approved equal:

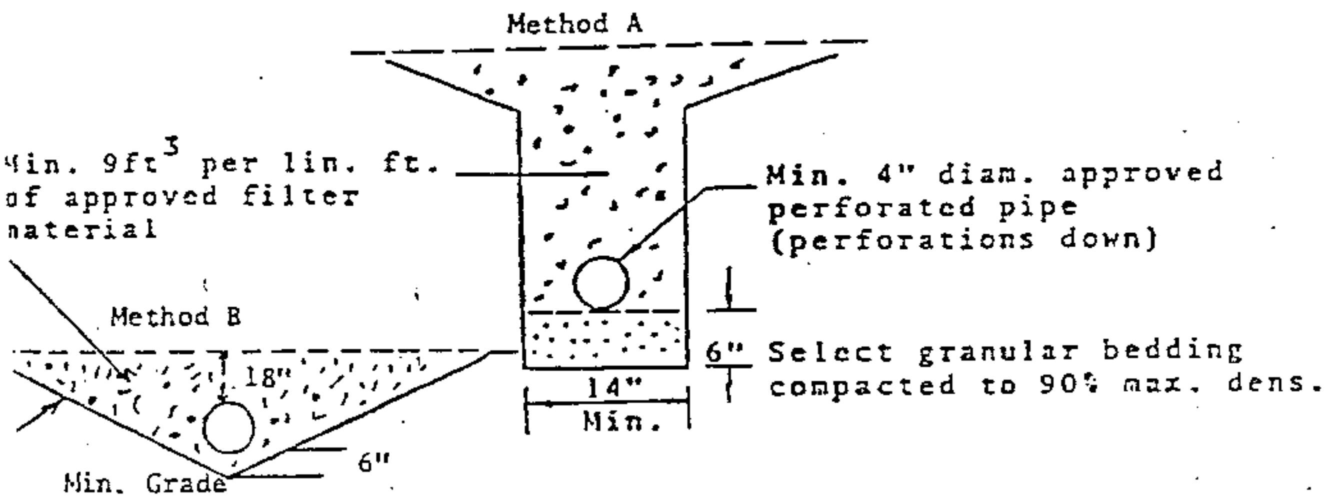
Size	Percentage Passing
	100
1"	90-100
"	40-100
4	25-40
8	18-33
30	5-15
50	0-7
200	0-3

Approved Pipe Types:

1. Schedule 40 Poly-Vinyl-Chloride
2. Corrugated Metal Pipe 14ga. 6" AC dipped
3. Aluminum Corrugated Pipe 1000 psi AC dipped
4. Acrylonitrile Butadinenne Styrene Schedule 40

CANYON SUBDRAIN DETAILS





DETAIL

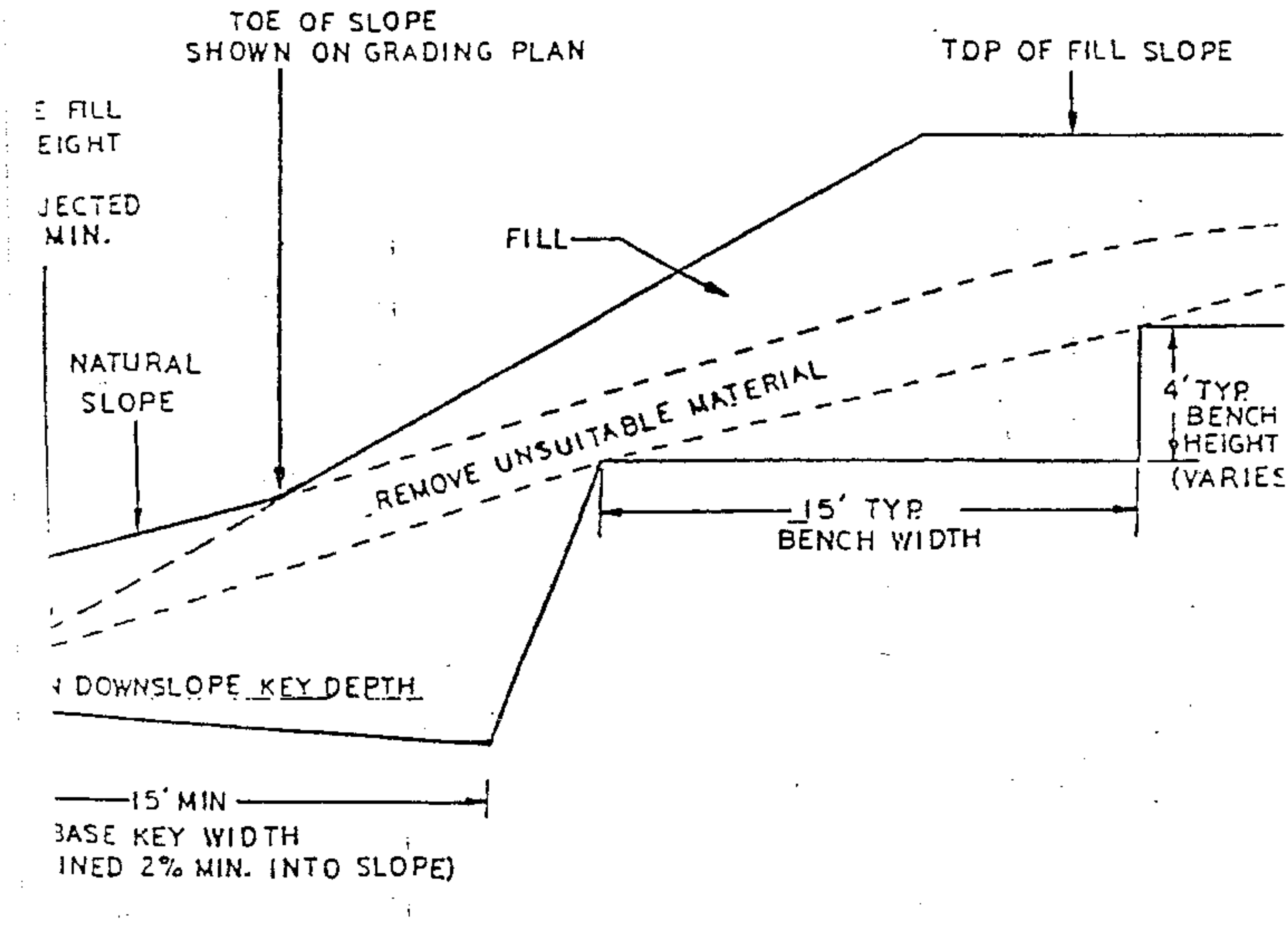
er material to meet following
ification or approved equal:

e Size	Percentage Passing
"	100
/4"	90-100
/8"	40-100
.4	25-40
.8	18-33
.30	5-15
.50	0-7
.200	0-3

Approved Pipe Types:

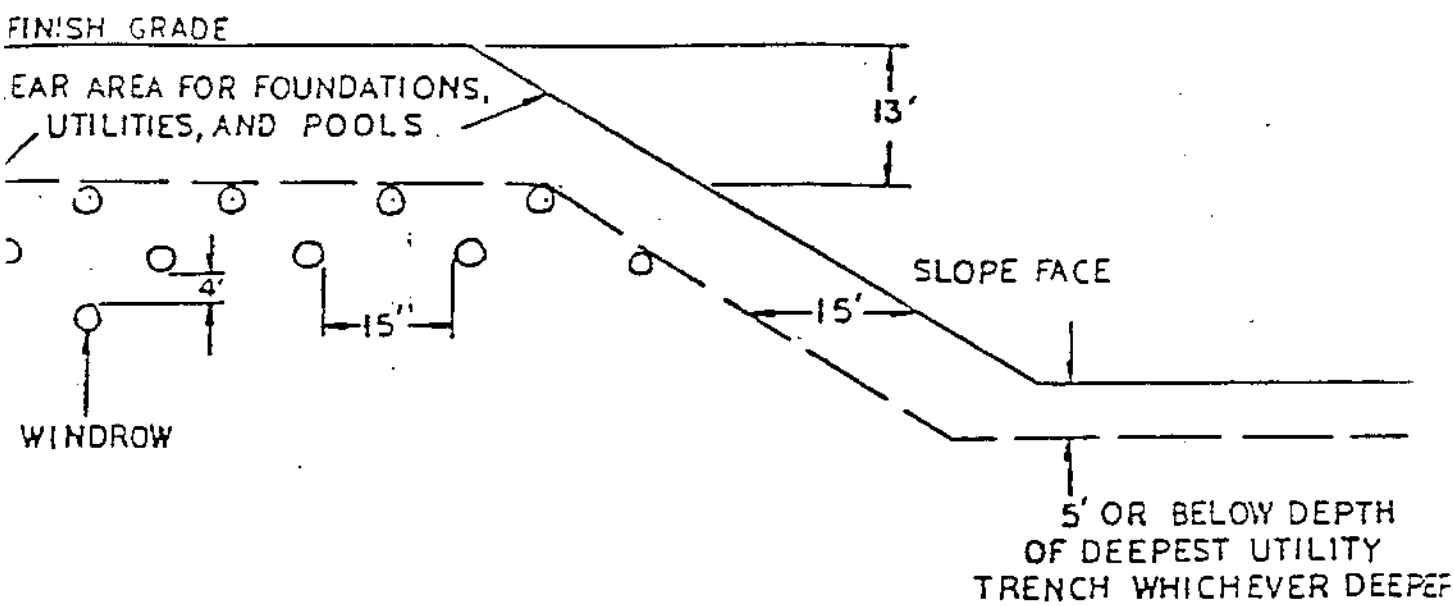
1. Schedule 40 Poly-Vinyl-Chloride
2. Corrugated Metal Pipe 14ga. 6"AC dipped
3. Aluminum Corrugated Pipe 1000 psi AC dipped
4. Acrylonitrile Butadienne Styrene Schedule 40

BENCHING DETAIL

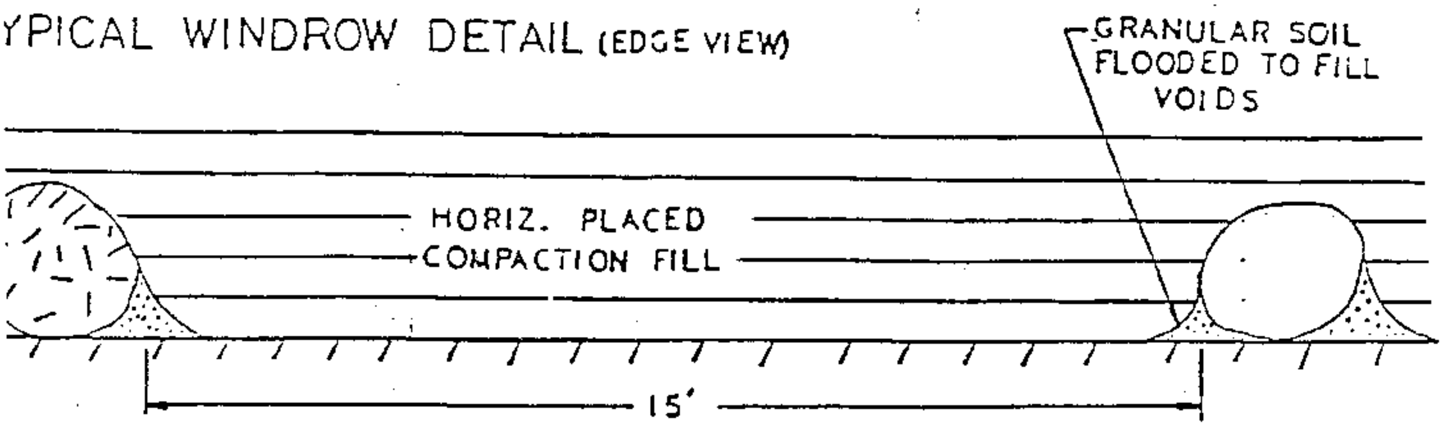


ROCK DISPOSAL DETAIL

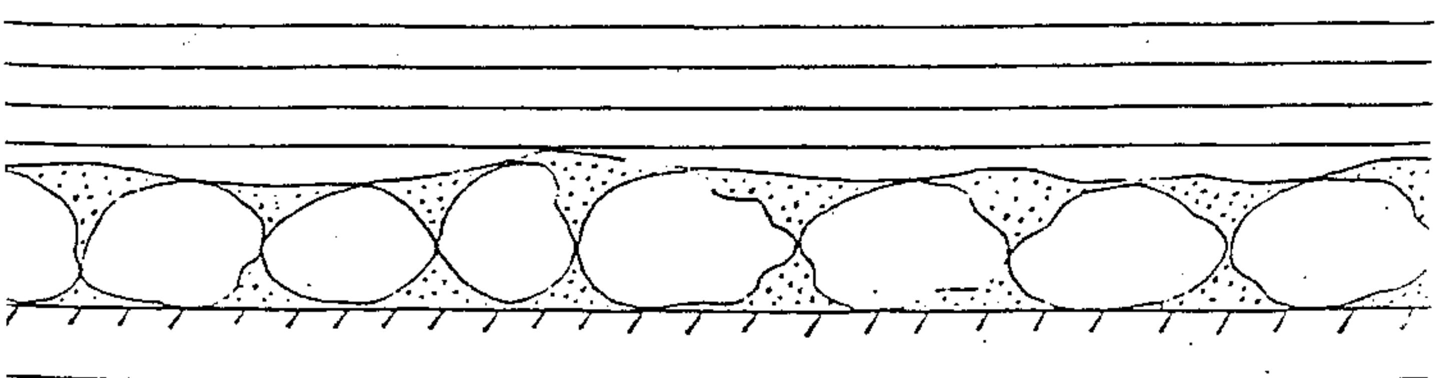
UILDING



YPICAL WINDROW DETAIL (EDGE VIEW)

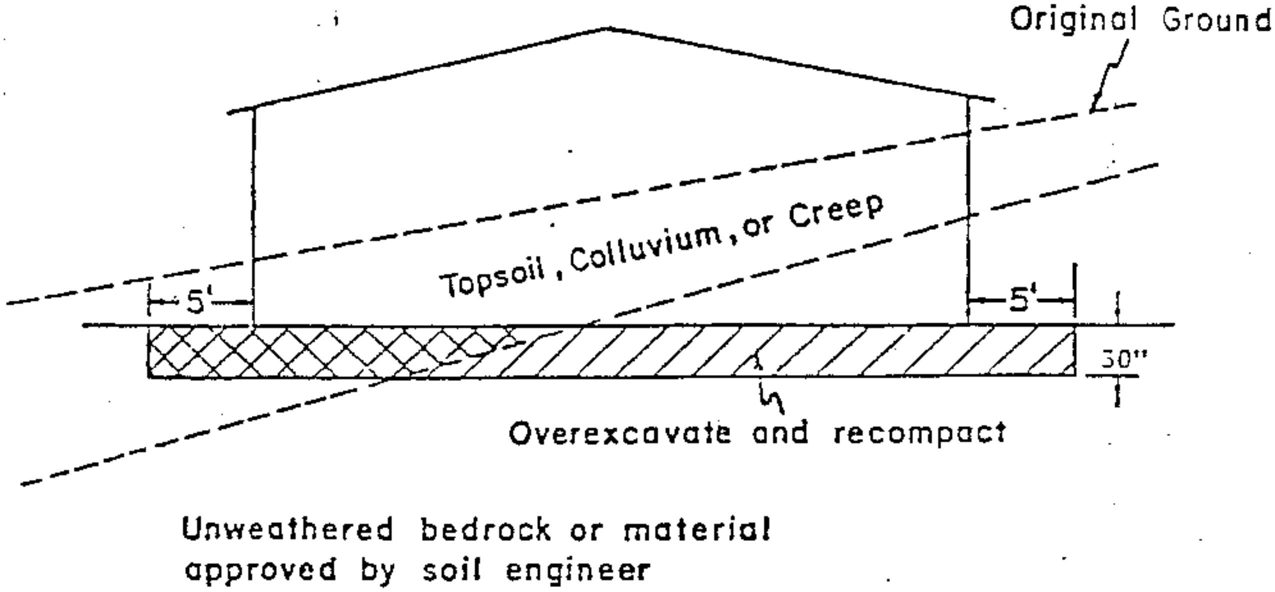


ROFILE VIEW

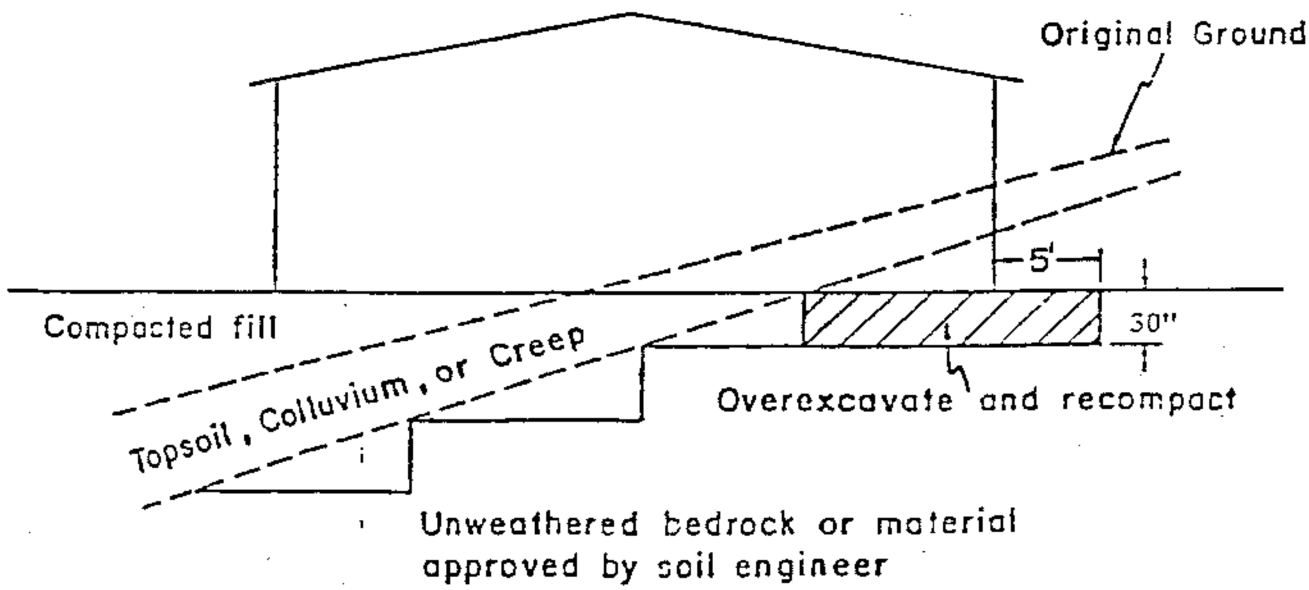


TRANSITION LOTS

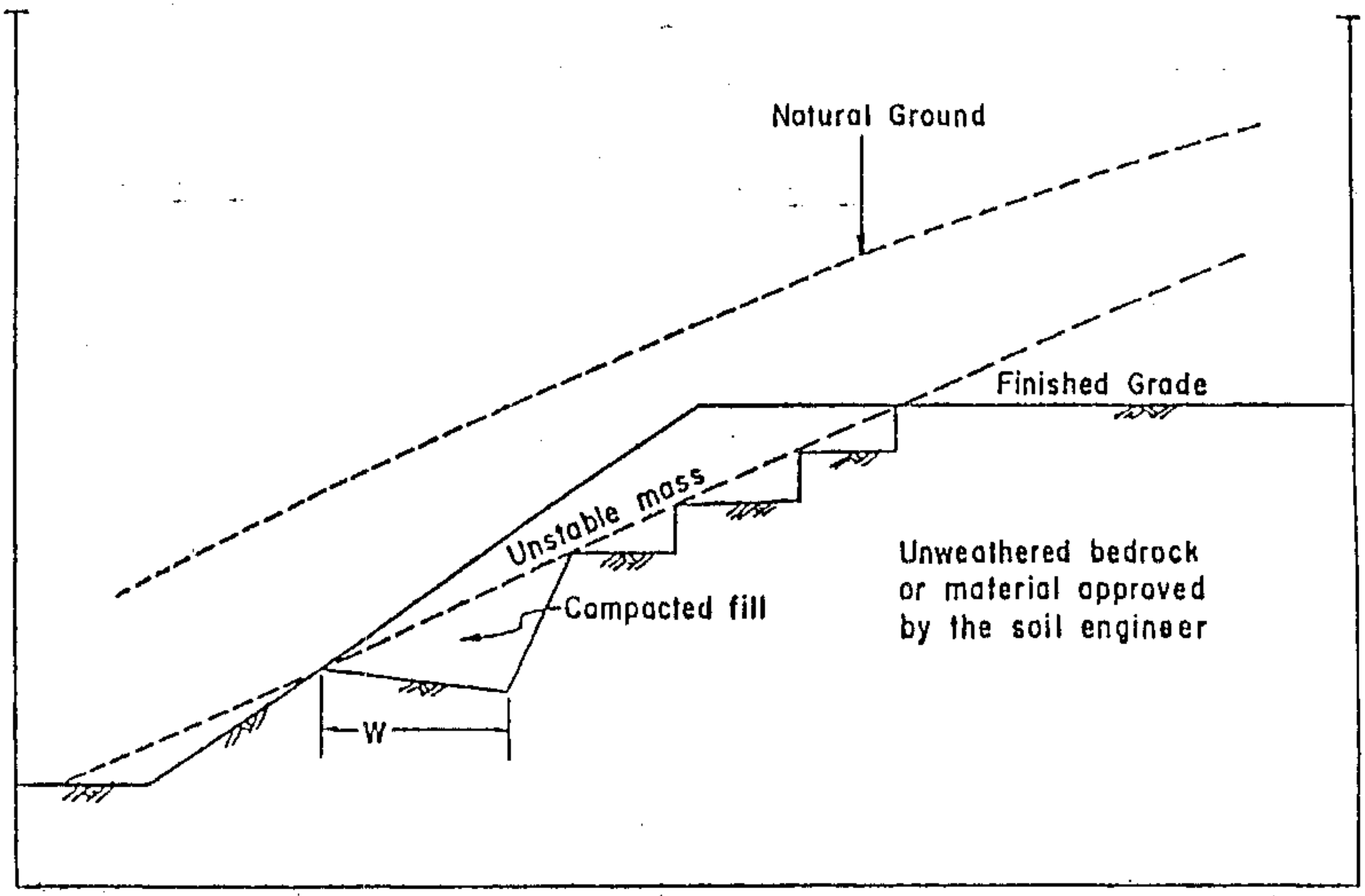
CUT LOT



CUT-FILL LOT



STABILIZATION FILL IN PORTION OF CUT SLOPE



Note : 1. Subdrains not required unless specified.

2. "W" shall be specified by the soil engineer

APPENDIX D

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REFERENCED REPORTS

1. Greensfelder, R.W., 1974, Maximum Credible Rock Acceleration from Earthquakes in California, Map Sheet 23.

2. Hildenbrandt and Associates, 1972, Preliminary Soils Investigation, 22± Acre Mobile Home Site, 1160 South Valley Center, San Dimas, California, dated August 23, 1972.

3. Housner, G.W., 1970, Strong Ground Motion in Earthquake Engineering, Robert Wiegel, Editor, Prentice Hall, pp. 75-92.

4. Lampman and Associates, 1974, San Dimas General Plan, 75 pages, dated March 6, 1974.

5. F. Beach Leighton and Associates, 1972, Preliminary Geologic Report of 22± Acre Site, 1150 South Valley Center, City of San Dimas, California, dated August 15, 1972.

6. Leighton-Yen and Associates, Inc., 1973, Slope Stability of Proposed Mobile Home Site, Walnut Creek Terrace, City of San Dimas, County of Los Angeles, California, dated January 25, 1973.

7. Ploessel, Michael R., and Slosson, James E., 1974, Repeatable High Ground Accelerations from Earthquakes Important Design Criteria: California Geology, Volume 27, pp. 195-199.

8. Seed, H.B., Idriss, I.M., and Kiefer, F.N., 1968, Characteristics of Rock Motions During Earthquakes, Report No. EERC 68-5, Earthquake Engineering Research Center, University of California, Berkeley.