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File 1977-0070

Date 7/13/00 Project Name: Lamplite Development – Filing #1

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the ISYS retrieval system. In some instances, not all entries designated to be scanned are present in the file. There are also documents specific to certain files, not found on the standard list. For this reason, a checklist has been included. Remaining items, (not selected for scanning), will be marked present on the checklist. This index can serve as a quick guide for the contents of each file. Files denoted with (**) are to be located using the ISYS Query System. Planning Clearance will need to be typed in full, as well as other entries such as Ordinances, Resolutions, Board of Appeals, and etc.
X	X	***Summary Sheet – Table of Contents**
		Application form
		Receipts for fees paid for anything
		***Submittal checklist**
		***General project report**
		Reduced copy of final plans or drawings
		Reduction of assessor's map
		Evidence of title, deeds
		***Mailing list**
		Public notice cards
		Record of certified mail
		Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
		***Final reports for drainage and soils (geotechnical reports)**
		Other bound or nonbound reports
		Traffic studies
		Individual review comments from agencies
		***Consolidated review comments list**
		***Petitioner's response to comments**
		***Staff Reports**
		***Planning Commission staff report and exhibits**
		***City Council staff report and exhibits**
		***Summary sheet of final conditions**
		***Letters and correspondence dated after the date of final approval (pertaining to change in conditions or expiration date)**

DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X	X	Follow-Up Form	X	X	Development Application Form
X		Review Sheets	X	X	Development Summary Form
X	X	Planning Commission Minutes - ** - 10/26/77	X		Roadway Plan & Details
X	X	Handwritten Notes	X		Drainage Plan
X	X	Site Plan	X		Utilities Composite
X	X	Summary Sheet			
X	X	Subsurface Soils Investigation Lamplite Park Subdivision – 8/30/77			
X	X	Letter from Duane Jensen – 5/10/78			
X	X	Letter from Ronald Rish to Robert Gerlofs – 1/24/79			

Subdivision Lamplite Park PD- Final Plat/Plan

Date 5 Oct 77 Item # 70-77

Petitioner Jon Abrahamson - etal

Preliminary Review Agencies Comments	Final Review Agencies Comments
P.S. - Additional Easemts req'd.	
Parks & Rec. - see review sheet some species NOT suitable but sufficient suitable types to provide variety.	
Fire Dept. - Hydrants as req'd.	
City Engineering - all curbwalk to have vert. face Extend curbwalks around all intersections to provide ramps. Address drainage at west end of Olsen ave.	
City Utilities - TRASH truck turn around on Olsen	

Action Taken		Action Taken	
P.C.	Approved 26 Oct 77	P.C.	
C.C.	Approved 16 Nov 77	C.C.	

Comments

Comments

ITEMS REQUIRED FROM DEVELOPER

___ Check ___ Utility Agreement ___ Title Investigation
___ Drainage ___ Landscaping ___ Covenants
___ Improvements Guarantee ___ Annexation ___ Other (Specify)

Lamp Lite Park

1) Require a statement from ~~Bob [illegible]s~~ Paragon Engineering or the geologist addressing stabalization of units built on the edge of the scarp.

2) Present utilities composite shows insufficient hydrants & water line sizes. Prior to recording plat a revised utilities composite must be filed with the development department showing hydrants & waterline sizes as required by city specs. with signatures of appropriate agencies indicating approval. (as per final plat regs.)

3) City Engineer needs specs. on handling irrigation system. This should be included on final utilities composite/roadway plan.

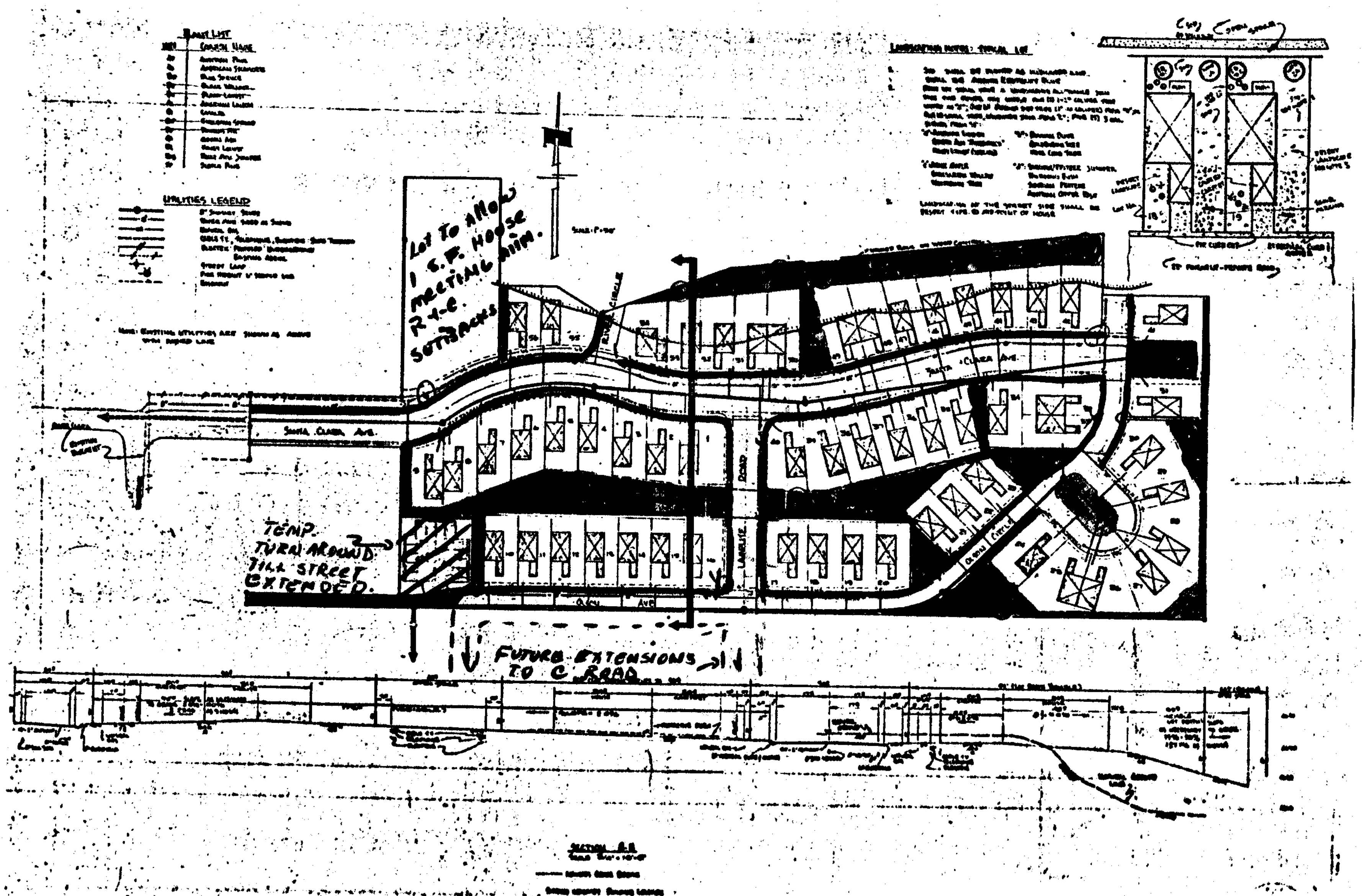
4) City specs. require verticle face curbs on all public streets.

5) On Olson Ave, construct 6' curbwalk & 19' matt with a temporary "undedicated" turn around where recreational vehicle storage will be located when street is fully improved.

6) Require sidewalks on all street frontages in this filing. with single walkway through open space connecting with pedestrian access to school.

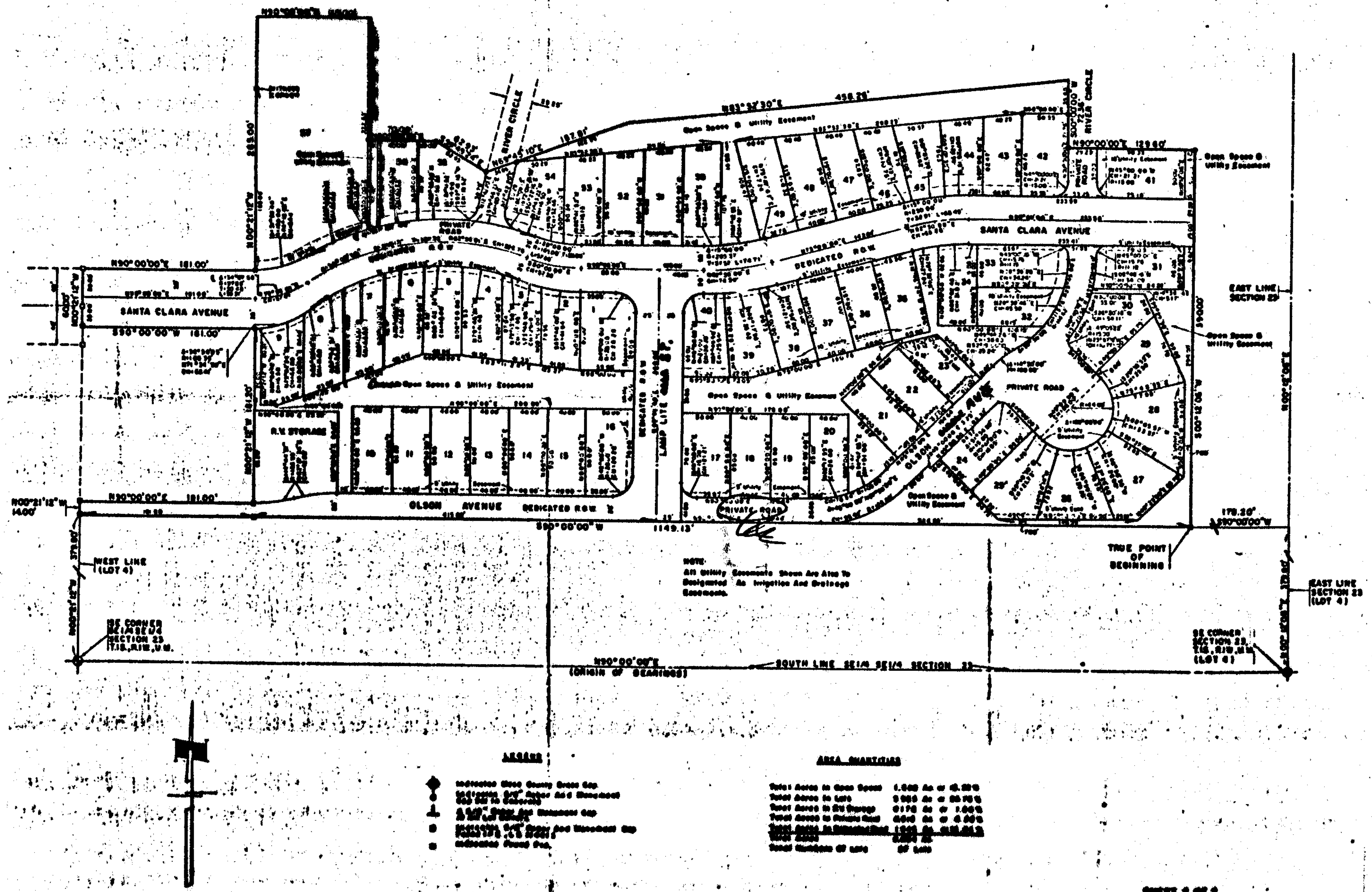
7) Final plat must contain statement that engineered foundation shall be submitted on all lots as required by building department.

Planning and Development Dept.



Lot to allow 1 S.F. house meeting min. R4-C setbacks
SANTA CLARA AVE.
TEMP. TURN AROUND TILL STREET EXTENDED.
FUTURE EXTENSIONS TO C ROAD

LAMP LITE PARK
FILING NO. ONE



SUMMARY SHEET

Soil Sample CH

Location LMAPLITE PARK SUBD.

Boring No. 8 Depth 10'

Sample No. 3

Test No. 17818, J-5

Date 8/12/77

Test by SMS

Natural Water Content (w) 29.4 %

Specific Gravity (Gs) 2.55

In Place Density (γ_o) 87.2 pcf

SIEVE ANALYSIS:

Sieve No.	% Passing
1 1/2"	
1"	
3/4"	
1/2"	
4	
10	100.0
20	99.9
40	99.7
100	99.2
200	98.0

HYDROMETER ANALYSIS:

Grain size (mm)	%
.0200	75.7
.0050	49.8

Plastic Limit P.L. 26.6 %

Liquid Limit L. L. 51.0 %

Plasticity Index P.I. 24.4 %

Shrinkage Limit 13.5 %

Flow Index

Shrinkage Ratio %

Volumetric Change %

Lineal Shrinkage %

MOISTURE DENSITY: ASTM METHOD

Optimum Moisture Content - w_o %

Maximum Dry Density - γ_d pcf

California Bearing Ratio (av) %

Swell: 1 Days 4.0 %

Swell against 1200 psf Wo gain 14.0 %

Allowable side friction - 200 psf

Min. D L side friction - 150 psf

BEARING:

Housel Penetrometer (av) psf

Unconfined Compression (qu) 2000 psf

Plate Bearing: psf

Inches Settlement

Consolidation 5.4% under 4000 psf

PERMEABILITY:

K (at 20°C)

Void Ratio

Sulfates 2000+ ppm.

NOTE: In formational state: qu=16,000 psf max., 1600 psf min. Allowable side friction - 1400 psf; min. D L side friction - 450 psf.

SOIL ANALYSIS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS, COLORADO

SUMMARY SHEET

Soil Sample: CL

Location: LAMPLITE PARK SUBD.

Boring No.: 2   Depth: 2.5'

Sample No.: 2

Test No.: 17818, J-5

Date: 8/12/77

Test by: SMS

Natural Water Content (w): 17.7 %

Specific Gravity (Gs): 2.61

In Place Density (γ_o): 95.3 pcf

SIEVE ANALYSIS:

Sieve No.	% Passing
1 1/2"	
1"	
3/4"	
1/2"	
4	100.0
10	99.8
20	99.2
40	97.2
100	86.1
200	74.4

HYDROMETER ANALYSIS:

Grain size (mm)	%
.0200	46.6
.0050	36.9

Hveem data given at 300 psi exudation:
R = 16
Exp. pressure = 7
Displacement - 3.50

Plastic Limit P.L. 16.1 %
Liquid Limit L. L. 30.9 %
Plasticity Index P.I. 14.8 %
Shrinkage Limit 14.1 %
Flow Index
Shrinkage Ratio %
Volumetric Change %
Lineal Shrinkage %

MOISTURE DENSITY: ASTM METHOD

Optimum Moisture Content - wo %
Maximum Dry Density - γ_d pcf
California Bearing Ratio (av) %
Swell: 1 Days 3.3 %
Swell against 1000 psf Wo gain 8.9 %

BEARING:

Housel Penetrometer (av) 1800 psf
Unconfined Compression (qu) psf
Plate Bearing: psf
Inches Settlement
Consolidation % under psf

PERMEABILITY:

K (at 20°C)
Void Ratio

Sulfates 1500+ ppm.

SOIL ANALYSIS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS, COLORADO

Lincoln DeVore
1000 West Fillmore St
Colorado Springs, Colorado 80907
(303) 632-3593
Home Office

August 30, 1977

Lamplite Development
c/o Paragon Engineers, Inc.
P O Box 2872
Grand Junction, CO 81501

Re: SUBSURFACE SOILS INVESTIGATION

LAMPLITE PARK SUBDIVISION

GRAND JUNCTION, COLORADO

Gentlemen:

Transmitted herewith is the report giving the results of a subsurface soils investigation for a proposed subdivision to be located on the south bank of the Colorado River near the Orchard Mesa section of the metropolitan area of Grand Junction, Colorado.

Respectfully submitted,

LINCOLN-DeVORE TESTING LAB.

George D. Morris, P. E.

GDM/sam
LDTL Job No. 17818, J-5

2700 Highway 50 West
Pueblo, Colo 81003
(303) 546-1150

P O Box 1427
Glenwood Springs, Colo 81601
(303) 945-6020

109 Rosemont Plaza
Montrose, Colo 81401
(303) 249-7838

P.O. Box 607
Gunnison, Colo 81230
(303) 641-2276

P.O. Box 1643
Rock Springs, Wyo 82901
(307) 382-2649

ABSTRACT:

The contents of this report are a subsurface soils investigation and foundation recommendations for a proposed group of residential structures to be located in Lamplite park on the south bank of the Colorado River. Development which is proposed to consist of 82 residential sites is located approximately 1.5 miles south of the central section of Grand Junction, Colorado. At the present time, the Laboratory has not seen plans for any of the proposed units.

After consideration of the investigation and testing program on the site, it is our recommendation that the site should be divided into two approximately equal portions. The southern portion of the site, which consists of slightly over half of the area of the site, is relatively stable with foundation level soils composed of sands and cobbles. A shallow foundation system consisting of continuous wall footings beneath exterior load bearing walls and either continuous footings or isolated spread footings beneath columns in the central portion of the building and other points of concentrated load. In this area, the foundation system can be designed based on a maximum allowable bearing capacity of 3500 psf and a minimum dead load pressure of 400 psf.

In the northern portion of the tract, land movement dictates that each individual foundation should be designed, due to special reinforcing and cross ties which will be necessary. In this area, either a well balanced system of continuous spread footings with cross ties or a well reinforced structural slab is recommended. More recommendations are given, in detail,

for this particular area in the body of the report.

Because of variations in building loads and variations in the soil types over the area, it is recommended that the buildings be well balanced and reinforced. In the case of the spread footing and grade beam system, contact pressures beneath exterior load bearing walls should be balanced to within about 300 psf around the structure. Interior column loads, if used, should be designed for unit loads of approximately 200 psf more than the average of the pressures selected for the exterior walls. If a reinforced structural slab is used, balancing will not be possible, but should be compensated for by the reinforcing of the slab. In the southern portion of the site, basement structures may be used. In the northern portion of the site, basement structures are not recommended.

Adequate drainage must be provided at all times. Water should never be allowed to pond above the foundation materials. Positive surface drainage should be maintained in the vicinity of the structures, both during and after construction. A subsurface peripheral drain around the exterior of foundations at footing level will not be required in the southern portion of the site.

Special drainage conditions exist in the northern portion of the site. These are more fully outlined in the body of the report. In general, however, the northern portion of the site, starting at the existing scarp, should be well drained to remove water as rapidly as possible from the cobbles and sands of the upper portion of the scarp. In this area, peripheral drains around structures should be used unless an overall drainage system is designed for this half of the subdivision.

Floor slabs on grade should be constructed to act independently of other structural portions of the building in the southern portion of the site. In the northern portion of the site, the entire building should be tied together as a unit and no separation should exist.

More detailed recommendations can be found within the body of this report. All recommendations are subject to the limitations set forth herein.

GENERAL:

The purpose of this investigation was to determine the general suitability of the site for construction of a series of lightweight residential structures. Characteristics of the individual soils found in the test borings were examined for use in designing the foundations for these structures. Some data was obtained concerning the surface soils to determine their characteristics as a pavement base or subbase.

The proposed residential site is located along the south bank of the Colorado River, in the Orchard Mesa section of metropolitan Grand Junction. The site generally lies between C Street and the river and immediately east of Roubideau Street. Sites both east and west of the tract are at least partially developed.

The construction site is situated on the middle terrace of the Colorado River and is quite level across the southern portion of the site. An east/west scarp exists across the site which divides it into two roughly equal portions. The southern portion is a bit larger than the northern portion. Drainage in the immediate vicinity of the site will be controlled by the proposed streets so that the direction of drainage may vary from point to point. In general, however, drainage will be northerly into the Colorado River. Both subsurface and surface drainage are fair to good in the area.

The south bank of the Colorado River in this area is characterized by steep riverbank cuts of 10 to 15 feet in depth. For the most part, the exposed beds are of the Mancos Shale formation. On this particular site, the south bank of the Colorado River consists of a sloping surface draining toward the river. This sloping surface is composed of a slide caused by weakening of the Mancos Shale from an irrigation ditch which runs through the tract. The presence of this slide area dictates a different type of design in the northern portion of the tract than in the southern portion. It is noted, on the development plan, that the existing irrigation ditch is to be carried through the subdivision in a pipe. Sealing the ditch in this manner will remove much of the water which presently enters the subdivision and will help to stabilize the existing slide area.

The soils in the slide area consist of a mix of large blocks of Mancos Shale covered by mixed remnants of the upper cobble layer and sands, together with some weathered clays from the Mancos Shale formation. Soil types throughout this area are quite variable and are apt to change from lot to lot.

In the southern portion of the tract, the foundation soils consist mainly of alluvial materials deposited by the action of the Colorado River in the past. Some thin colluvial materials are also found at the surface of the ground having been deposited on the site by sheetwash originating in the highlands further south. The alluvial soils are quite stratified, but tend to consist of 2 or 3 feet of lean clay, with some gravel mixed, overlying a very coarse clayey sand mixed with large quantities of sands, gravels, and some cobbles. With greater depth, the clay content of the soil decreases, probably due to past drainage, and the true classification of the soil is that of silty sand mixed with cobbles and minor amounts of clay. In general, these sand/cobble deposits are dense and stable.

These alluvial materials overlie the Mancos Shale which acts as bedrock in the area. The Mancos Shale is characteristically a thick sequence of shaley beds containing a few sandy zones and thin sandstone beds with some chalk shales. The color is ordinarily gray to black. On this site, the shale is thinly bedded and the bedding plane is nearly horizontal. Vertical fractures within the shale give it a blocky appearance and the material tends to act as a blocky unit under hillside conditions. Formational shale was not found in the southern portion of the tract, due to the very dense cobble and sand gravel mix which resisted attempts at drilling past 19 feet. Both the weathered and the unweathered shale were found in test borings placed in the northern portion of the tract.

BORINGS, LABORATORY TESTS & RESULTS:

Eight test borings were drilled on the site as shown on the attached Boring Location Diagram. These test borings were drilled in such a manner as to obtain a reasonably good profile of the subsurface soils on the southern portion of the tract and they probably form as good a profile as can be determined at this time on the northern portion of the tract. Some variations are noted from point to point, particularly in the northern portion of the tract, but the subsurface profile has been sufficiently defined that no further test borings were deemed necessary at this time. All borings were drilled with a power-driven, continuous auger drill. Samples were taken with the standard split spoon sampler, by thin wall tubes and by bulk methods.

As indicated on the attached drilling logs, the subsurface materials can be roughly divided into a three-layer system. At least in portions of the tract, an upper layer of colluvial clay was found which was mixed with some gravel and sand. This material is relatively thin, being found to a depth of about 3 to 4 feet over the southern portion of the tract. Immediately below this, an alluvial layer of clayey sand was found. This material was found to be quite coarse grained and contained numerous cobbles and gravel. The matrix of this soil is a clayey sand, but the material contains so much coarser grained soil that the effect of the clay binder is minimal. This material varied considerably in depth over the site. In the southern portion of the site, it extended to a depth of 19 to 20 feet, at which point the drill was unable to penetrate the cobbles. Since the soil at this point had lost much of its lay binder, it was actually classified as a silty sand. It is believed to be only a sort distance above the underlying formational shale. In the northern portion of the site, the soil has been considerably more mixe and the number of cobbles and gravel within the upper alluvial soi is much smaller than in the southern portion of the site. Even ere, however, the soil actually classifies as a clayey sand and, in some cases, as a silty sand, except in Test Boring No. 8 where th upper clays extend to the formation.

The third and bottom layer of the profile consists of the hard, dense, formational Mancos Shale. In the southern portion of the site, this hale exists at some depth below 19 feet. It is hard, dense, and reasonably stable. In the northern portion of the tract, the shale has been broken into blocky segments of fairly large size which have moved toward the river. In this area, the shale formation is still ard and dense, but has simply broken along the existing fracture n the original formation. Precise engineering characteristics of all he soil types encountered on the site are shown on the attached summary sheets. The following discussion will be more general in nature.

Soil Type No. 1 was classified as a clayey sand of very coarse grain size. It should be noted that the samples tested by the Laboratory are generally the finer portion of the samples. The coarser gravel and cobbles were not included in the analysis. In general, this soil is plastic, of low permeability, and of high density. Due to the clayey content of the soil, it has a very mild tendency to expand upon the addition of moisture, if it is in a dry, dense condition. This tendency to expand is quite small and will not affect the structural portion of the buildings. It will affect floor slabs on grade and other flatwork. Again, due to the cobble and gravel content of this material, its tendency to long term consolidation is quite low. On both sections of the subdivision, the allowable bearing value of this material will be found to be 3500 psf maximum. A minimum dead load pressure of 300 psf should be maintained on this material. This soil contains sulfates in detrimental quantities.

Soil Type No. 2 is a lean clay found mostly near the surface of the ground. This material appears to be mostly colluvial in origin, although some of it may be a river deposit. This material was found primarily in the southern portion of the site, with one major exception. It is fine grained, plastic, of medium permeability, and generally of medium density. In the dry, dense state, this soil has a tendency to expand upon the addition of moisture. This tendency is sufficient to affect structural members of the buildings and must be considered in design. The clays have a tendency to long term consolidation under heavy loads, but under the proposed loading, consolidation will be negligible. For the most part, this clay is not recommended for use as a foundation material since it is expansive and can easily be removed. If it is used, however, in the southern portion of the subdivision, this clay has a bearing value of 2800 psf and a minimum dead load pressure required of 1000 psf. In Test Boring No. 8 - the only boring in which it was found in the northern portion of the site -

the maximum bearing value must be limited to 1800 psf. In this case, however, the minimum dead load pressure required is reduced to 500 psf. This soil contains sulfates in detrimental quantities.

Soil Type No. 3 is a high plastic clay which is typical of the Mancos Shale formation and the weathered clays derived from it. For the most part, these clays are highly plastic, of low permeability, and of high density. Due to the fracturing and fissuring found within the shale mass, the permeability of the material must be considered medium, since water can be carried in these fractures as if in small pipelines. The clay itself is of relatively low permeability, however. In the southern portion of the site, the Mancos Shale acts as bedrock beneath the site, while in the northern portion of the site, that Mancos Shale which was found by the test borings is part of a rotational movement toward the river. In this area, the Mancos Shale can still be considered as a bedrock, but must be divided into large blocks, rather than an overall underlying bedrock. True bedrock would lie beneath the rotational plane which is in excess of 30 feet below the surface of the ground. In both the formational and weathered conditions, this material is expansive upon the addition of moisture. The amount of expansion is capable of moving structural portions of the building as well as floor slabs on grade and other flatwork. This material is so dense that long term consolidation will not be a major problem. In the northern portion of the site, lateral movement should be considered in design of any structures, however. In general, this soil is so deep that it will not affect most foundations directly, but as an overall average, the bearing value can be taken as 16,000 psf maximum with a 1600 psf minimum dead load requirement. One very soft area of weathered Mancos Shale was found near Test Boring No. 8. In this area, the maximum bearing value should be reduced to 2000 psf. The minimum dead load requirement would also be reduced in this area to approximately 300 psf.

A free water table was found in most of the test borings drilled on the site. Those test borings which did not indicate a free water table at the time of drilling may have been plugged by the drilling operation or the permeability may be sufficiently low that the water did not move freely into the test boring. Even those borings which did not find free water found soils quite near saturation, so that a free water table must be assumed over the entire site.

An upper perched water table was found in Test Boring No. 3 at a depth of 6 feet. This is being maintained by a layer of clay, however, and the general water table on the southern portion of the site is believed to average between 13 and 15 feet below the existing surface. At the present time, in the northern portion of the subdivision, the free water table could be at any level from the surface of the ground down at least to the surface of the formational shale. At present, an irrigation ditch runs across the site in an east/west direction and in the southern portion of the site. Parts of this irrigation ditch are lined while other parts, primarily exits, are not. Much of the free water found on the site comes from this irrigation ditch and when the ditch is placed within a pipeline, the source of this water can be cut off. The free water table will pose no particular problems to the buildings on the southern portion of the site, but a special drainage requirement must be made for the northern portion of the site.

CONCLUSIONS & RECOMMENDATIONS:

Since the precise design of the proposed residences on the site is not known to the Laboratory at this time, the following recommendations must be relatively general in nature. Any special loads or unusual design conditions should be reported to the Laboratory so that changes in recommendations can be made, if necessary. Most residential structures consist of relatively lightweight, load bearing walls along the exterior and either load bearing walls or isolated column pads in the central portion of the structure. The actual loading varies considerably, depending on the design of the structure, but can, in general, be considered as uniformly light.

Due to the presence of the slide area previously discussed in the northern section of the site, the general foundation discussion will be divided into two portions.

SOUTH PORTION OF SITE: In this area, the soils are relatively dense and stable. This is the area south of the scarp and contains slightly over half of the subdivision. Residential structures in this area should be designed with shallow foundation systems consisting of continuous footings beneath bearing walls, reinforced as grade beams. The center walls may be either grade beams or isolated spread footings beneath columns, depending upon which of the soils the foundations rest. If foundations rest upon soils of Type No. 2, they must be designed to resist at least mild expansion. Foundations should be proportioned on the basis of a maximum allowable bearing capacity of 2800 psf. A minimum dead load pressure of 1000 psf should be maintained at all times. It should be noted that this layer of clay is quite thin and the expansive problem could be avoided completely simply by removing it and placing the foundations on the underlying clayey sands and cobbles. On this cobble material, foundations should be proportioned on the basis of a maximum allowable bearing value of 3500 psf. A minimum dead load pressure of 300 psf should be maintained.

It is recommended that these shallow foundations be designed to rest upon the underlying soils of Type No. 1, to avoid the expansion problems associated with Soil Type No. 2. Foundations should extend at least 20 inches to 2 feet below the surface of the ground for frost protection.

Due to differences in the alluvial soils on the site, it is recommended that each building be well balanced to lower the amount of potential differential movement. Footing widths should be varied so that the total load on the soil is approximately the same at all points around the building walls. The Laboratory would recommend a balance within ±400 psf around exterior walls. Isolated interior columns should be balanced for loads about 200 psf greater than the exterior walls.

It is recommended that stem walls in the buildings be designed as grade beams capable of spanning at least 12 feet. Horizontal reinforcement should be placed continuously around the structure with no gaps or breaks in the reinforcing steel unless they are specially designed. Beams should be reinforced at both top and bottom. If the foundation rests on Soil Type No. 1, the reinforcing should be approximately balanced between the top and bottom. If the foundation rests on soils of Type No. 2, the major reinforcing should be placed near the top of the wall.

It should be noted that both of these soils are sufficiently strong that they will support a non-footing foundation or a grade beam on grade. In this case, voids would be used to balance the loads. The grade beam reinforcing would be the same as previously described.

If building floor slabs are to be used, they may be placed directly on grade or over a compacted sand blanket of 4 to 6 inches in thickness. If the sand pad is chosen, it must be provided with a free drainage outlet so that it does not trap water beneath the floor slab. All floor slabs on grade in this area should be constructed so as to act independently of the columns and bearing walls. In addition, concrete floor slabs on grade should be placed in sections no greater than 30 feet on a side. Deep construction or contraction joints should be placed at these lines to facilitate even breakage. This will help reduce unsightly cracking caused by differential settlement.

Since the southern portion of the site is quite flat, adequate drainage must be provided in the foundation area both during and after construction to prevent ponding of water. The ground surface around the structure should be graded so that surface water is carried quickly away from the building. Minimum gradient within 10 feet of the structure will depend on surface landscaping. Bare or paved areas should have a minimum gradient of 2%, while landscaped areas should have a minimum gradient of 7%. Roof drains, if any, should be carried across all backfilled areas and discharged well away from structures. If roof drains are not used, the backfill area should be compacted. If the surface drainage provisions cannot be complied with, a peripheral drain consisting of an adequate gravel collector and sand filter should be constructed around the exterior of the building.

To give the building extra lateral stability and to aid in rapidity of runoff, all backfill around the structure and in utility trenches leading to the structure should be compacted to at least 90% of the maximum Proctor density, ASTM D-698. This compaction should be done using the native soils on the site as the backfill material. Compaction should be carried out at the optimum moisture content, plus or minus 2%, and should be accomplished by mechanical means. No flooding techniques of any type should be used in this area.

NORTH PORTION OF SITE: The northern portion of this tract, north of the scarp line consists of a deep circular movement of fairly large proportions. It is not known when this movement occurred, but its cause was the weakening of the shear resistance of the underlying Mancos Shale, and additions of water from the irrigation ditch and other areas to the south over a long period of time. If the source of water is at least partially removed and drainage is improved in the area, the blocks of Mancos Shale and the associated weathered material, cobbles and sand above can be stabilized. Movement within the mass will not be rapid or catastrophic in any event, but will tend to be a slow creeping action, if any movement occurs at all.

Due to the presence of this slide area, the owner is presented with two choices for development of the area.

1) The area north of the existing scarp can be used by realigning the location of the lots, by construction of a subdrainage system, and by use of special designs of the foundations.

2) The area can be abandoned for use as a building site and the subdivision redesigned to use this area as the open ground.

Due to the type of sliding which took place and the formation of the large blocks of Mancos Shale, it is quite possible to use the Swiss method of deep drainage systems and specially tied structures to safely build on the site. If this is done, however, proper procedures must be followed so that seepage water is removed and the houses are properly reinforced and placed.

If this site is to be used, the exact design of foundations would depend upon the load arrangement within the house. Each structure should be examined and designed separately, with reference to the particular conditions on that specific site. In general, foundations could consist of a series of grade beams with interior cross ties so that the foundation resembles a series of boxes. If movement took place, the foundation would be sufficiently rigid that the structure would be safe. As an alternate foundation, a reinforced structural slab could be used which would support the building in the same manner. Such a slab must be properly and heavily reinforced, however. A simple 4-inch slab would probably not be adequate.

Each site must be inspected to insure that the house rests on only one of the soil blocks. If floor slabs on grade are used, they should be reinforced and tied to the structural portions of the building so that the structure will act as a unit, or should be designed as structural units. These structures will not require balancing, but in general, should be designed for a bearing capacity of 3500 psf maximum. A 300-psf minimum dead load requirement should also be followed, except on the structural type of design. The subdivision should be designed so that a flexibility exists to move the location of each residence if the inspection indicates that it should be moved.

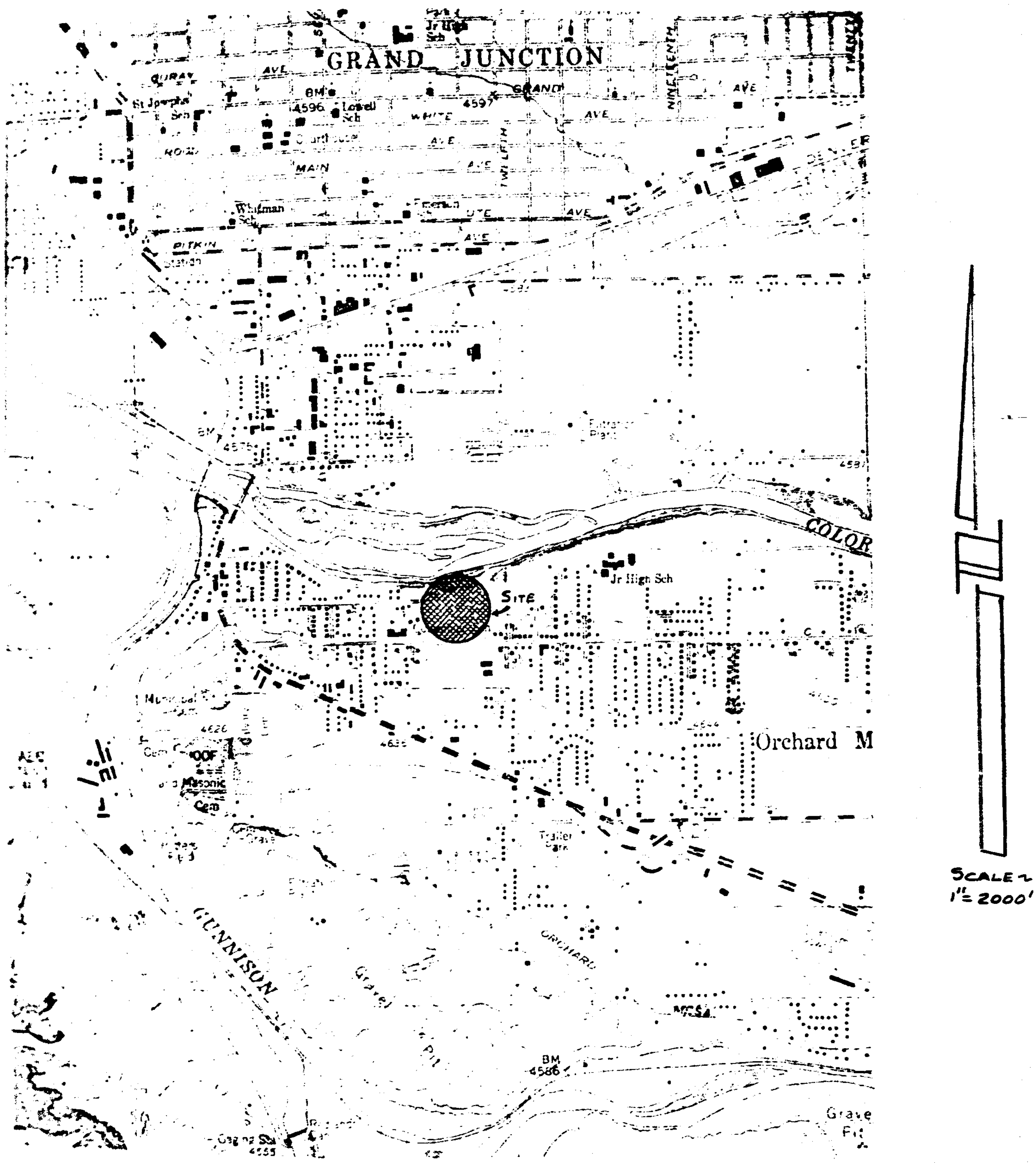
Of primary importance on this site is subsurface drainage. The Laboratory would recommend a drainage system along the entire length of the scarp and around the building areas. Peripheral drains would not be required around each house provided this overall drainage is accomplished. Surface grading around the houses and backfill requirements are the same as on the southern portion of the site. As previously stated, the Laboratory would recommend the Swiss method of deep drains with observation manholes which would act as structural piers. Earthwork should be designed such that load is removed from the upper portion of the slide area and placed on the lower portion, or, preferably not placed on the movement area at all. Sewer lines would generally be incorporated into the subdrainage system by use of a coarse gravel bed beneath the pipe as a drain layer. Flexible connections should be used at the house entry to allow some movement between the house and utility.

The surface soils on this site were tested using the Hveem-Carmany method to determine their characteristics as a pavement base and subbase. Values are shown on the summary sheet for Soil Type No. 2. Based on these testing results, an R-value of 16 was established. For streets of this type, a gravel equivalent of 12 should be used which would result in 2 inches of asphaltic concrete paving and 9 inches of gravel base course.

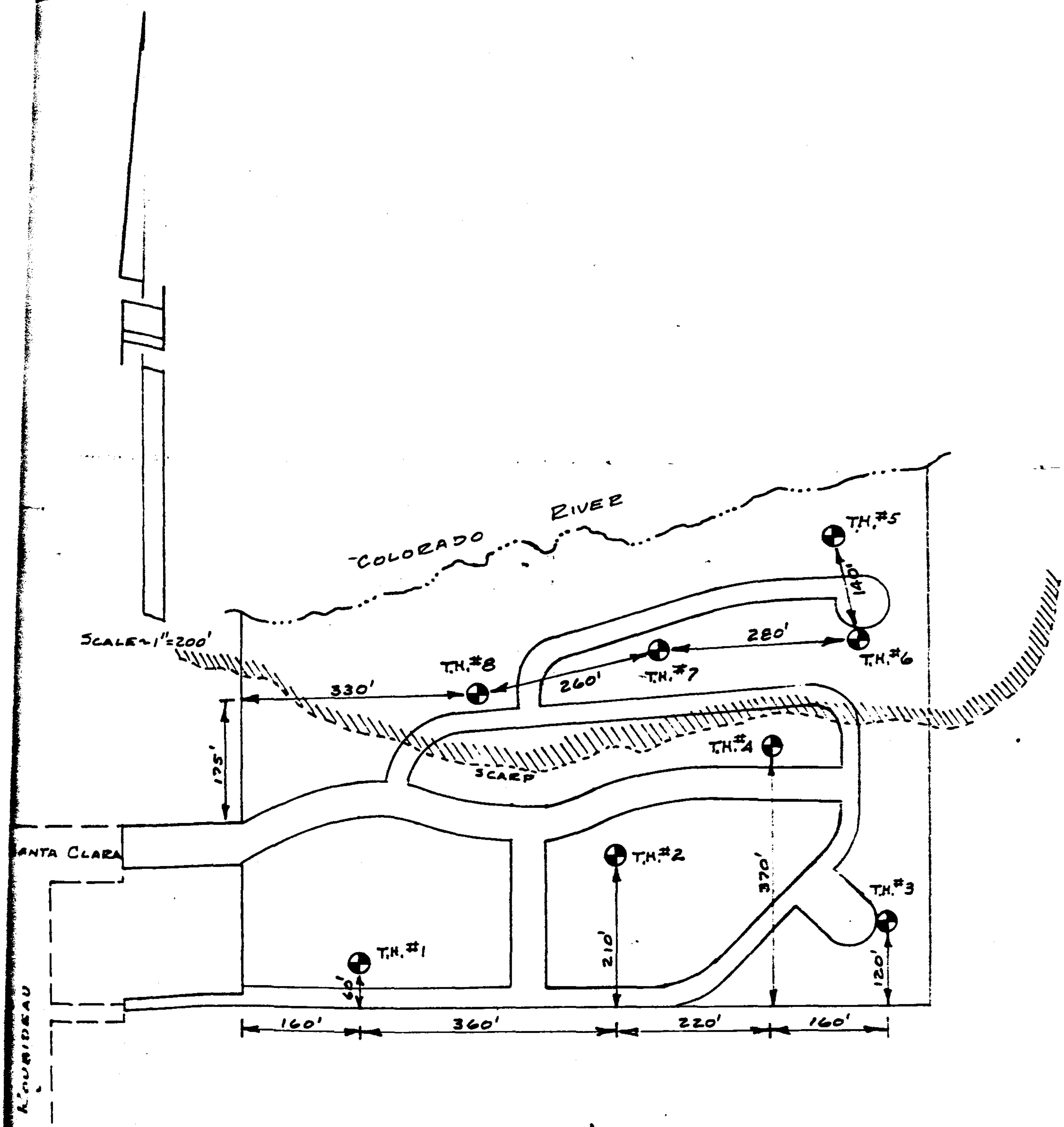
Most of the foundation soils on the site were found to contain sulfates in detrimental quantities. Type II Cement is therefore recommended for use in all concrete which will be in contact with the foundation soils on this site. Calcium chloride should never be added to Type II Cement.

It should be reiterated that the Laboratory believes that construction can take place on the northern portion of the tract, if the owner wishes to do so. Proper drainage design will be essential to this construction as well as special foundation design and inspection. Special requirements have been covered in a general way in this report to allow the owner to decide if such construction is economically feasible at this time. If the owner decides to construct units on the north portion of this site, detailed recommendations for a drain system can be supplied almost immediately. Special foundation design could wait for the individual building plans to be completed.

It is believed that all pertinent points concerning the subsurface soils on this site have been covered in this report. If questions arise or further information is required, please feel free to contact the Laboratory.



GENERAL SITE LOCATION DIAGRAM LAMP LITE PARK SUBDIV. ~ GRAND JUNCTION	THE LINCOLN-DeVORE TESTING LABORATORY COLORADO: Colorado Springs, Pueblo, Glenwood Springs, Montrose, Gunnison. WYOMING: Rock Springs



TEST BORING LOCATION DIAGRAM
LAMP LITE PARK SUBDIV.~GRAND JUNCTION

THE LINCOLN-DeVORE TESTING LABORATORY
COLORADO: Colorado Springs, Pueblo, Glenwood Springs, Montrose, Gunnison. WYOMING: Rock Springs

SOILS DESCRIPTIONS:

SYMBOL	USCS	DESCRIPTION
	———	Topsoil
	———	Man-made Fill
	GW	Well-graded Gravel
	GP	Poorly-graded Gravel
	GM	Silty Gravel
	GC	Clayey Gravel
	SW	Well-graded Sand
	SP	Poorly-graded Sand
	SM	Silty Sand
	SC	Clayey Sand
	ML	Low-plasticity Silt
	CL	Low-plasticity Clay
	OL	Low-plasticity Organic Silt and Clay
	MH	High-plasticity Silt
	CH	High-plasticity Clay
	OH	High-plasticity Organic Clay
	Pt	Peat
	GW/GM	Well-graded Gravel, Silty
	GW/GC	Well-graded Gravel, Clayey
	GP/GM	Poorly-graded Gravel, Silty
	GP/GC	Poorly-graded Gravel, Clayey
	GM/GC	Silty Gravel, Clayey
	GC/GM	Clayey Gravel, Silty
	SW/SM	Well-graded Sand, Silty
	SW/SC	Well-graded Sand, Clayey
	SP/SM	Poorly-graded Sand, Silty
	SP/SC	Poorly-graded Sand, Clayey
	SM/SC	Silty Sand, Clayey
	SC/SM	Clayey Sand, Silty
	CL/ML	Silty Clay

ROCK DESCRIPTIONS:

SYMBOL	DESCRIPTION
	SEDIMENTARY ROCKS
	CONGLOMERATE
	SANDSTONE
	SILTSTONE
	SHALE
X X X	CLAYSTONE
	COAL
	LIMESTONE
	DOLOMITE
	MARLSTONE
	GYPSUM
	Other Sedimentary Rocks
	IGNEOUS ROCKS
	GRANITIC ROCKS
+ + +	DIORITIC ROCKS
	GABBRO
	RHYOLITE
	ANDESITE
	BASALT
	TUFF & ASH FLOWS
	BRECCIA & Other Volcanics
	Other Igneous Rocks
	METAMORPHIC ROCKS
	GNEISS
	SCHIST
	PHYLLITE
	SLATE
	METAQUARTZITE
	MARBLE
	HORNFELS
	SERPENTINE
	Other Metamorphic Rocks

SYMBOLS & NOTES:

SYMBOL	DESCRIPTION
	9/12 Standard penetration drive Numbers indicate 9 blows to drive the spoon 12" into ground.
	ST 2-1/2" Shelby thin wall sample
	W_o Natural Moisture Content
	W_x Weathered Material
Free water	Free water table
	γ^o Natural dry density
	T.B. – Disturbed Bulk Sample
②	Soil type related to samples in report
15' W_x Form.	Top of formation
	Test Boring Location
	Test Pit Location
	Seismic or Resistivity Station. Lineation indicates approx. length & orientation of spread (S = Seismic, R = Resistivity)

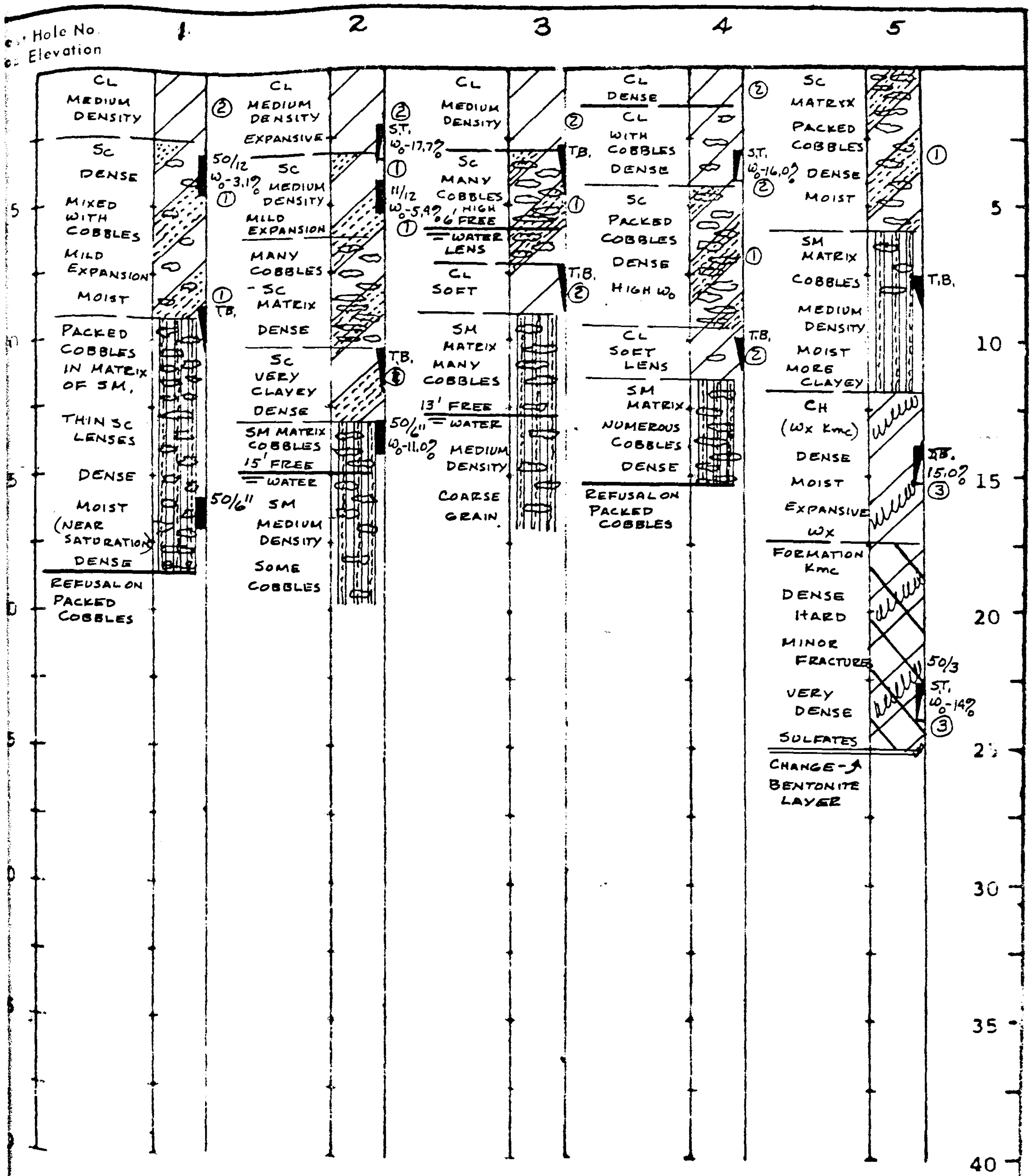
Standard Penetration Drives are made by driving a standard 1.4" split spoon sampler into the ground by dropping a 140 lb. weight 30". ASTM test des. D-1586.

Samples may be bulk, standard split spoon (both disturbed) or 2-½" I.D. thin wall ("undisturbed") Shelby tube samples. See log for type.

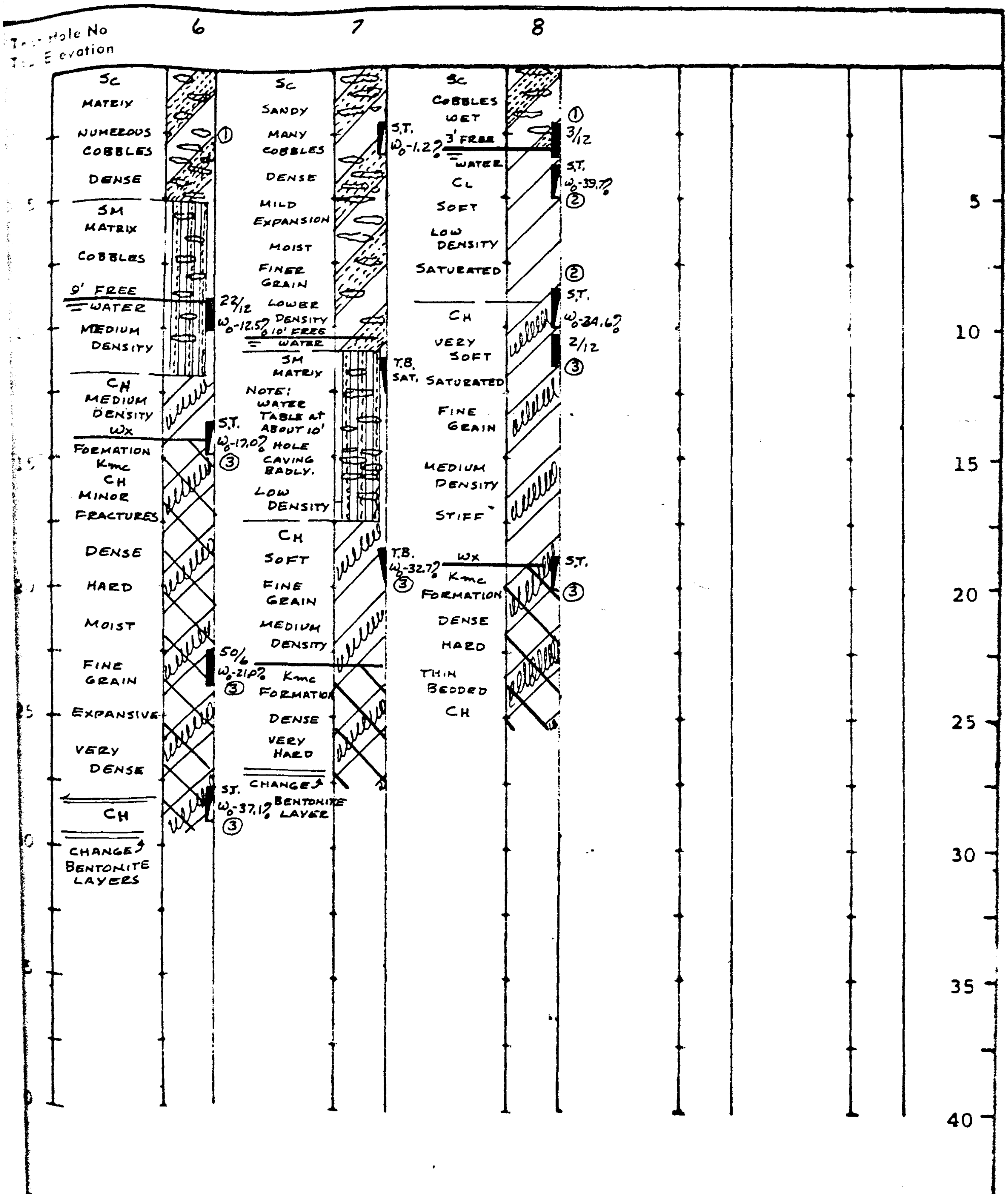
The boring logs show subsurface conditions at the dates and locations shown, and it is not warranted that they are representative of subsurface conditions at other locations and times.

LINCOLN DeVORE TESTING LABORATORY | COLORADO: Colorado Springs, Pueblo, Glenwood Springs, Montrose, Gunnison, Grand Junction.– WYO.– Rock Springs

EXPLANATION OF BOREHOLE LOGS AND LOCATION DIAGRAMS



DRILLING LOGS	LINCOLN-DeVORE TESTING LABORATORY COLORADO SPRINGS–PUEBLO, COLORADO



DRILLING LOGS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS-PUEBLO, COLORADO

Soil Sample SC

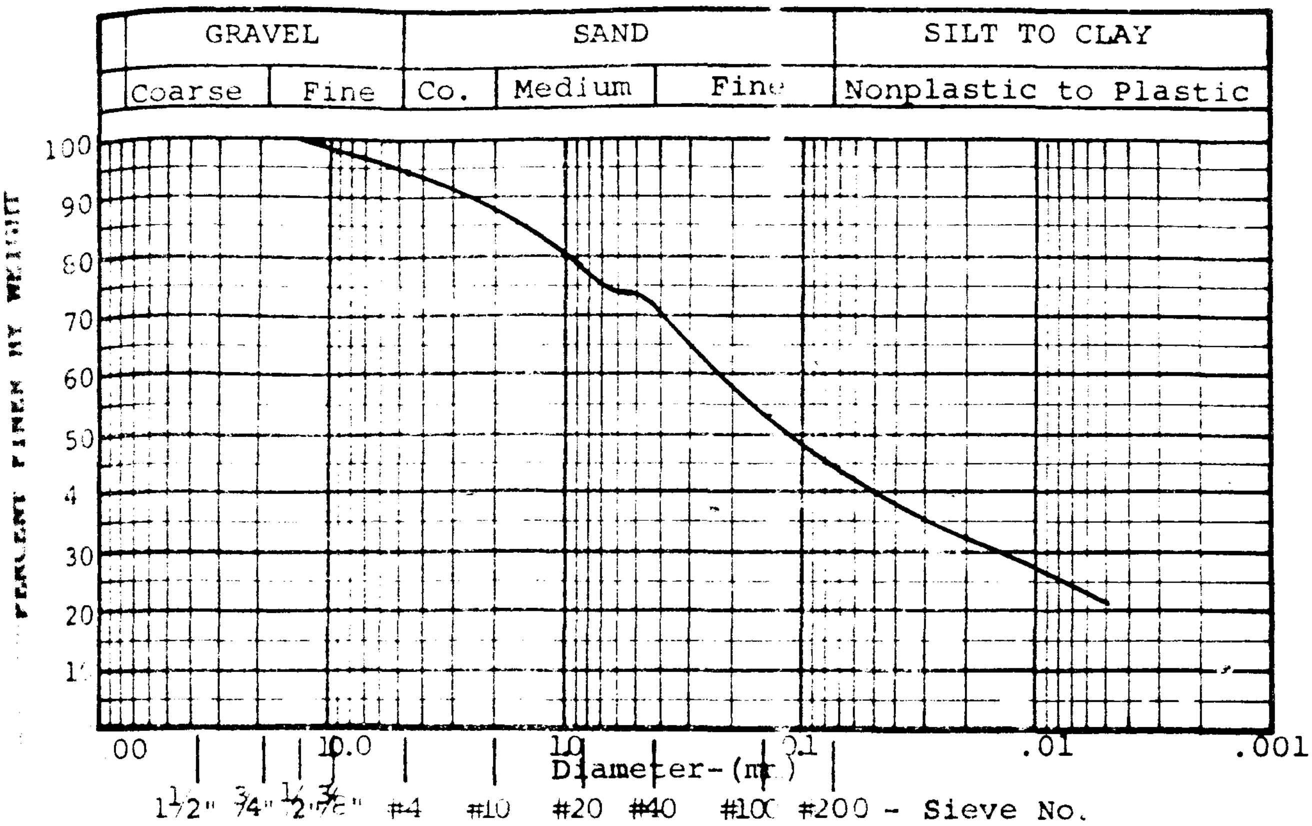
Project LAMPLITE PARK SUBD.

Sample Location T.H. #1 @ 5'

Test No. 17818, J-5

Date 8/12/77

Test by SMS



Sample No. 1

Specific Gravity 2.61

Moisture Content 3.1%

Effective Size ---

Cu ---

Cc ---

Fineness Modulus

L.L. 23.6% P.I. 8.9 %

BEARING 3500 psf

Sieve Size	% Passing
1 1/2"	
1"	
3/4"	
1/2"	100.0
3/8"	97.8
4	94.3
10	87.2
20	77.5
40	71.3
100	53.3
200	44.8
0200	32.7
0050	21.3

Sulfates 500+ ppm

GRAIN SIZE ANALYSIS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS, COLORADO

City of Grand Junction, Colorado 81501
250 North Fifth St., 303 243-2633

May 10, 1978

File

Mr. James R. Roberts
Paragon Engineering, Inc.
P. O. Box 2872
Grand Junction, CO 81501

Dear Jim:

70-77

Re: Tamarack Meadows Sub. Filing No. 2, Stroute Sub. First Addition, Arbor Village Sub., Lamplite Park Filing No. 1, Ridges Filing No. 3 West

I have reviewed the plans and specifications for the sewage collection facilities for the subject project. I take no exception with the contents of the documents. We will maintain these in our files until construction is complete.

Please notify the City Engineer's office as soon as construction is complete. At that time our office will inspect the system and insure properly constructed manholes, cleanliness of the system, proper grade, and that deflection of P.V.C. pipe does not exceed 7% of the diameter.

Prior to the acceptance of the subject collection system by the City for maintenance purposes, it will be necessary to file with the City Engineer's office a complete set of mylar plans marked "as built" bearing a properly executed seal of a professional engineer.

If you have any question, please feel free to let me know.

Sincerely,

Duane R. Jensen, P.E.
City Engineer-Utilities

DRJ/hm

cc - District Engineer, Colorado Department of Health
City-County Planning Department

Lamp Lite Park-Filing One
name of subdivision

Name and address of land owners and/or subdividers.

Jon Abrahamson etal		
name	name	name
P. O. Box 2966		
address	address	address
245-0084		
business phone	business phone	business phone

A. Total Subdivision submitted No., portion Filing One
Eighteen (18) copies submitted x date 10/3/77

B. Revisions to Preliminary Plat? x (yes) ____ (no)

If so, list (add attached sheets if necessary) NA

The following check list shall be completed to insure that the maps contain the essential information required by the subdivision regulations: (See regulations for detailed information).

27-2.3

b. (2) Scale of Map x

c. (1) Name of Subdivision x
(2) Date x
(3) Legal Description of Property x
(4) Control points, dimensions, angles, bearings x
(5) Boundary lines, right-of-way lines, easements, ditches and lot lines with bearings and distances x
(6) Streets and other rights-of-way - names and dimensions x
(7) Location and Dimensions of easements x
(8) Lots numbered and area of each lot in square feet x
(9) Location and description of all monuments x
(10) Statement of land ownership x
(11) Dedication statement - easements, rights-of-way and public sites x

(12) Sur_yor or Engineer Certifica_on x
(13) Appropriate certification blocks x
(14) Clerk and Recorder Certification Block x

Supporting Documents

27-2.3 c. (13) Copy of certificate of title with list of all mortgates, judgments, liens, easements, contracts and agreements of record. Sub/ w/ Prel Plan x
(14) Proof of easement dedication x

d. (1) Improvements Guarantee x
(2) Composite Utility Plan x

The following check list shall be completed to insure that design standards required by the subdivision regulations are met. (See regulations for complete details)

27-3.1	Site Considerations	x
27-3.2	Streets, Alleys and Easements	x
27-3.3	Blocks	x
27-3.4	Lots	x
27-3.5	Sidewalks	x
27-3.6	Irrigation sytems and design	x
37-3.7	Public Sites Reservations and Dedications	x

This application completed by:

Paragon Engineering, Inc.	
name	name
P .O. Box 2872, Grand Junction, Co.	
address	address
Thomas A. Logue (signature)	10/3/77
signature	date

Thomas A. Logue

DEVELOPMENT SUMMARY FORM

CITY OF GRAND JUNCTION

Date: Oct 3, 1977

Development Name: Lamp Lite Park

Filing One

Location of Development: TOWNSHIP 1W RANGE 1S SEC 23 1/4 SE

Owner(s) NAME

ADDRESS

Developer (s) NAME

ADDRESS

Type of Development	Number of Dwelling Units	Area* (Acres)	% of * Total Area
(x) Single Family	57	5.6	56.8
( ) Apartments			
( ) Condominiums			
( ) Mobile Homes			
( ) Commercial	N. A.		
( ) Industrial	N. A.		
( ) Other (specify)			
Dedecated Street		1.9	19.8
Walkways			
Dedicated School Sites			
Reserved School Sites			
Dedicated Park Sites			
Reserved Park Sites			
Private Open Areas		1.5	15.3
Easements			
Other (Specify) Private Roads		0.6	6.3
R. V. Storage		0.2	1.8
TOTAL		9.8	100%

*By Map Measure

Estimated Water Requirements 11,800 gallons/day.

Proposed Water Source(s) Ute Water

Estimated Sewage Disposal Requirement 10,950 gallons/day.

ACTION:

Planning Commission Recommendation

Approval ( )

Disapproval ( )

Remarks ____________________

Date ____________________, 19______.

City Council

Approval ( )

Disapproval ( )

Remarks ____________________

Date ____________________, 19______.

Note: This form is required by C.R.S. 106-3-37 (4) but is not a part of the regulations of the City of Grand Junction.

City of Grand Junction. Colorado 81501
250 North Fifth St., 303 243-2633

January 24, 1979

File

Mr. Robert P. Gerlofs
Paragon Engineering, Inc.
P. O. Box 2872
Grand Junction, CO 81501

Dear Bob:

Re: Lamplite Park Filing No. 1

As requested, I have reviewed ~~the revised~~ detailed construction plans for streets and storm drains for the above as submitted on January 16, 1979. All previous review comments have been adequately addressed. Please consider these detailed plans to be approved by this office for construction. Thanks for your cooperation.

Very truly yours,

Ronald P. Rish, P.E.
City Engineer-Public Works

RPR/hm

cc - Del Beaver
John Kenney
Jim Patterson