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File 1979-0037
Date 10/31/00

Project Name: White City Subdivision

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		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**
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DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X	X	Action Sheet	X		Preliminary Plan Application
X	X	Review Summary	X		Subdivision Summary Form
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X		Final Plat Recording	X		Plat Plan
X		Certification of Plat	X		Preliminary Plan
X	X	Letter from Susan Drissel to Bertrand and Co. re: item approved – 11/5/79			
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X		Legal Description			
X		Letter from Bruce Marvin to City re: Radiation Survey – 9/27/79			
X		Chicage Title Ins. Co. - Commitment for Title Ins.			
X		Request for Treasurer's Certificate of taxes due			
X		Letter from Phil Bertrand to Karl Metzner - 6/7/79			
X	X	Planning Commission Minutes - ** - 5/29/79			
X		Letter from Lori Hill to Bertrand & Co. re: denial of item – 5/30/79			

Acres 1.337

Units 3

Density

File # 37-79

Zone C-2

Tax Area Code

ACTION SHEET

Activity White City Subdivision

Phase Final

Date Submitted 1 Oct 79

Date Mailed Out

Date Neighbors Notified

Date CIC/MCC Legal Ad

PC Hearing Date 30 Oct 79

Review Agencies

10 Review Period - Return By

Send		Send	
	COUNTY ROAD DEPARTMENT	✓	FIRE City
	COUNTY HEALTH DEPARTMENT		IRRIGATION
✓	COUNTY SURVEYOR	✓	DRAINAGE G.J.
	COMTRONICS		WATER (UTE, CLIFTON)
	GRAND VALLEY RURAL POWER		SEWER
✓	MOUNTAIN BELL	✓	CITY ENGINEER/UTILITIES
✓	PUBLIC SERVICE		MACK, LOMA, MESA, COLLBRAN
	SOIL CONSERVATION SERVICE		FRUITA, PALISADE
	SCHOOL DISTRICT 51	✓	City Trans. Eng.
✓	STATE HIGHWAY	✓	P.D. - Ed Vandertoon
	STATE GEOLOGICAL	✓	Parks & Rec.
	STATE HEALTH - RADIOLOGICAL		
	TRANSAMERICA TITLE		

Board	Date	Comments
APC	10/30/79	Approved subject to staff comments
CIC	11/20/79	CONSENT AGENDA: APPROVED

Common Location 210' S. of North Ave, West of 1st St.

Staff Comments

Original Documents

____ Imp. Agreement	$____	Appraisal x .05 = $____ Open Space;
____ Imp. Guarantee		Receipt #____ Check #____
____ Covenants	____	Open Space Dedication
____ Power of Attorney		
____ Dev. Schedule		

REVIEW SHEET SUMMARY

FILE # 37-79 DATE SENT TO REVIEW AGENCIES 10-3-79

ITEM WHITE CITY SUBDIVISION - FINAL DATE DUE 10-15-79

PETITIONER: Bertrand and Company
LOCATION: 210' South of North Avenue, West of First Street
PETITIONER: Bertrand and Company
ENGINEER: Western Engineers

DATE REC.	AGENCY	COMMENTS
10-12-79	PARKS AND REC.	No comment.
10-12-79	CITY FIRE	One hydrant is needed at the corner of Belford and 1st to meet fire flow requirements min. line size 8".
10-10-79	MTN. BELL	No further request will be made on this item.
10-10-79	CITY TRANS. ENG.	No comment
10-11-79	CITY ENG.	Proposed site drainage improvements and driveways look reasonable. Sidewalk or power of attorney for sidewalk should be provided on First Street.

DESIGN & DEVELOPMENT PLANNER
Previous approval of this subdivision was contingent upon the allowal of only two curb cuts on First Street.

STAFF RECOMMENDATION
Recommend approval of final with the following stipulations to be addressed before the time of the City Council meeting:

1. To meet fire flow requirements, one hydrant is needed at the corner of Belford and 1st, minimum line size 8".
2. POA for sidewalk on 1st Street.
3. Limit curb cuts to two off 1st Street on final plat.

GJPC 10-30-79
Approved subject to staff comments.

Acres 1.337　　　　　　　　　　　　　　　　　　File # 37-79

Units ______　　　　　**ACTION SHEET**　　　　　Zone C1

Density ______　　　　　　　　　　　　　　　　Tax Area Code ______

Activity White City Subdivision

Phase Preliminary　　　　Date Neighbors Notified NA

Date Submitted 5-1-79　　　　Date CIC/MCC Legal Ad ______

Date Mailed Out 5-4-79　　　　PC Hearing Date 5-29-79

Review Agencies　　　　10 Review Period - Return By ______

Send		Send	
	COUNTY ROAD DEPARTMENT	✓	FIRE City
	COUNTY HEALTH DEPARTMENT		IRRIGATION
	COUNTY SURVEYOR	✓	DRAINAGE G.J.
	COMTRONICS		WATER (UTE, CLIFTON)
	GRAND VALLEY RURAL POWER		SEWER
✓	MOUNTAIN BELL	✓	CITY ENGINEER/~~UTILITIES~~ Rish
✓	PUBLIC SERVICE		MACK, LOMA, MESA, COLLBRAN
✓	SOIL CONSERVATION SERVICE		FRUITA, PALISADE
	SCHOOL DISTRICT 51	✓	City Utilities
✓	STATE HIGHWAY	✓	P.D. Ed Vander Took
✓	STATE GEOLOGICAL		
	STATE HEALTH - RADIOLOGICAL		
✓	TRANSAMERICA TITLE		

Board	Date	[redacted]
GJPC	5-29-79	rec. denial on basis of no control of curb cuts
CC	7-5-79	approved subject to the limit of 2 curb cuts.

Common Location 210' South of ~~Hwy~~ North Ave, West side of 1st Street

Staff Comments

Original Documents

___ Imp. Agreement　　$______ Appraisal x .05 = $______ Open Space;

___ Imp. Guarantee　　Receipt # ______ Check # ______

___ Covenants　　______ Open Space Dedication

___ Power of Attorney

___ Dev. Schedule

REVIEW SHEET SUMMARY

FILE # 37-79 DATE SENT TO REVIEW AGENCIES 5-7-79

ITEM WHITE CITY SUBDIVISION-PRELIMINARY DATE DUE 5-18-79

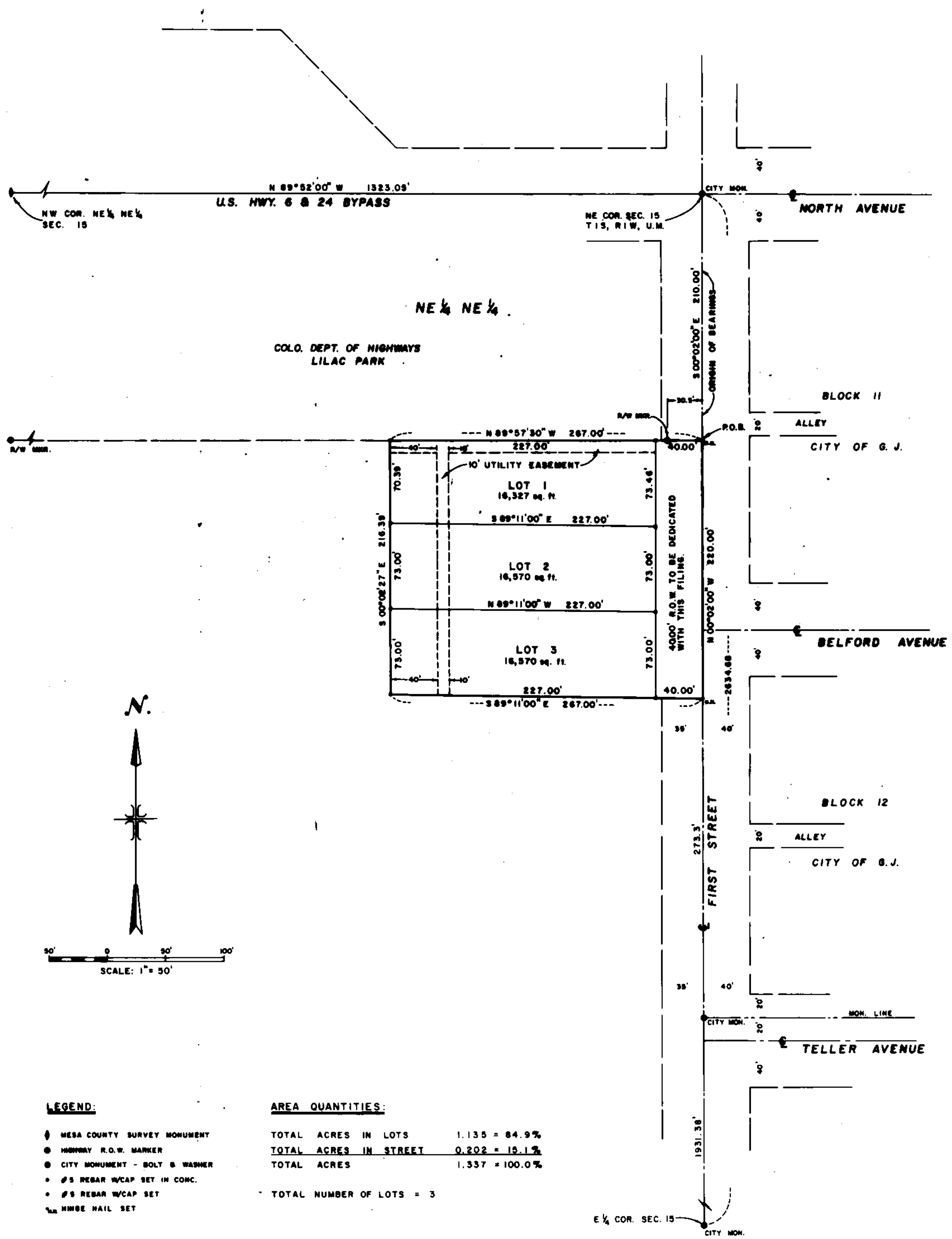
PC MEETING DATE ____________

HCC/CC MEETING DATE ____________

DATE REC.	AGENCY	COMMENTS
5-16-79	CITY UTILITIES	None
5-16-79	GRAND JUNCTION DRAINAGE	Okay
5-16-79	CITY FIRE	No comment
5-22-79	MOUNTAIN BELL	We require ten (10) foot utility easements as highlighted on the attached plat.
5-23-79	PUBLIC SERVICE	Gas: No objection-Gas lines in N. 1st street as shown. Electric: Request 5' easement adjacent to North side of subdivision
5-24-79	CITY ENGINEER(RISH)	1. Power of attorney for full street improvements and appropriate right-of-way dedication consistent with 1st Street Policy Statement should be provided. 2. Existing fill bank on west edge is irregular with broken concrete and other debris end [illegible] dumped on it. Fill construction should be engineered and controlled for stability. 3. Appearance of west and north banks from the' Park is poor. Some appropriate slope treatment is advised. 4. Fill extension to west should not encroach on drainage way and easement for same. 5. Fill settlement is acknowledged in their Geology Report as a potential problem. 6. If site drains to west, the runoff should be contained and carried over the fill at one or two locations in an improved flume or pipe to prevent fill erosion. Proper treatment at toe of flume(s) will also be necessary to avoid erosion at the toe of fill.

GJPC 5-29-79

MIKESELL/FLAGER/PASSED 5-1 (RIDER VOTING AGAINST)/A MOTION TO RECOMMEND DENIAL TO THE CITY COUNCIL, BECAUSE OF THE INABILITY TO CONTROL THE IMPACT OF THE CURB CUTS ON THIS PROPERTY.



LEGEND:

- MESA COUNTY SURVEY MONUMENT
- HIGHWAY R.O.W. MARKER
- CITY MONUMENT - BOLT & WASHER
- #5 REBAR W/CAP SET IN CONC.
- #5 REBAR W/CAP SET
- HINGE NAIL SET

AREA QUANTITIES:

TOTAL ACRES IN LOTS	1.135 = 84.9%
TOTAL ACRES IN STREET	0.202 = 15.1%
TOTAL ACRES	1.337 = 100.0%

TOTAL NUMBER OF LOTS = 3

WHITE CITY SUBDIVISION

DEDICATION

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned Bertrand and Company, Phillip Bertrand, President, is the owner of that real property situated in the City of Grand Junction, County of Mesa, State of Colorado, and located within the Northeast Quarter of the Northeast Quarter of Section Fifteen, Township One South, Range One West of the Ute Principal Meridian, said real property being more particularly described by metes and bounds as follow:

> Beginning 210.00 feet S 00°02'00" E of the Northeast Corner of the Northeast Quarter of Section 15, Township 1 South, Range 1 West of the Ute Principal Meridian, thence N 89°57'30" W 267.00 feet, thence S 00°02'27" E 216.39 feet, thence S 89°11'00" E 267.00 feet, thence N 00°02'00" W 220.00 feet to the Point of Beginning. Containing 1.337 acres more or less.

That said owner has caused the said real property to be laid out and platted as White City Subdivision, a subdivision of a part of the City of Grand Junction, County of Mesa, and State of Colorado.

That said owner does hereby dedicate to the public all the streets, avenues, and roads as shown on the accompanying plat, forever, and dedicate to the UTILITIES those portions of real property which are labeled as utility easements on the accompanying plat, as easements for the installation and maintenance of utilities and drainage facilities, including, but not limited to, electric lines, gas lines, telephone lines; together with the right to trim interfering trees and brush; together with the perpetual right of ingress and egress for installation, maintenance, and replacement of such lines; said easements and rights shall be utilized in a reasonable and prudent manner.

IN WITNESS WHEREOF said owner, Bertrand and Company, Phillip Bertrand, President, has caused his name to be hereunto subscribed this______day of____________, A.D., 1979.

____
Phillip Bertrand

STATE OF COLORADO)
COUNTY OF MESA) SS

The foregoing instrument was acknowledged before me this______day of____________, A.D., 1979 by owner, Bertrand and Company, by its President Phillip Bertrand.
My Commission expires__________________.
Witness my hand and official seal.

____
Notary Public

CITY APPROVAL

This plat of White City Subdivision, a subdivision of the City of Grand Junction, County of Mesa, and State of Colorado was approved and accepted on this_____day of____________, A.D., 19__.

CITY OF GRAND JUNCTION

____
City Manager

By____________________
President of Council

____
Chairman, Grand Junction City Planning Commission

____
City Planner

____
Grand Junction City Engineer

CLERK AND RECORDER'S CERTIFICATE

STATE OF COLORADO)
COUNTY OF MESA) SS

I hereby certify that this instrument was filed in my office at______o'clock ____.M.,____________, A.D., 19____and is duly recorded in Plat Book No._______, Page_______.

____
Clerk and Recorder

By____________________
Deputy

SURVEYOR'S CERTIFICATE

I, J. Boyd Peterson do hereby certify that the accompanying plat of White City Subdivision, a subdivision of the City of Grand Junction, County of Mesa, and State of Colorado, has been prepared under my direction and accurately represents a field survey of same.

J. Boyd Peterson
Registered Land Surveyor

5837 STATE OF COLORADO LAND SURVEYOR

WESTERN ENGINEERS, INC.
PLAT OF
WHITE CITY SUBDIVISION
CITY OF GRAND JUNCTION
MESA COUNTY, COLORADO

SURVEYED T.S. DRAWN R.W.G. CHECKED J.B.P.
GRAND JUNCTION, COLO. DWG. 2439-871-3 9/13/79

#37-79
OFFICE COPY

SUBSURFACE SOILS AND FOUNDATION INVESTIGATION

FOR

WHITE CITY SUBDIVISION GRAND JUNCTION, COLORADO

Client: Bertrand and Company
Grand Junction, Colorado

Prepared by:

WESTERN ENGINEERS, INC.
2150 Highway 6 & 50
P. O. Box 571
Grand Junction, Colorado 81502

SEPTEMBER 1979

SUMMARY

The site under consideration for White City Commercial Subdivision is presently a motel Complex located southwest of the intersection of First Street and North Avenue in Grand Junction, Colorado. The soil profile encountered consists generally of the following:

1.) 2 to 9 feet of miscellaneous dumped fill.

2.) Moist to saturated buff to dark brown silt-clay of low to moderate plasticity and high dry strength approximately 35 feet in thickness.

3.) Red brown clayey, silty sand about 2 feet thick.

4.) River gravel, cobble, boulder outwash in a silty sand matrix about 40 feet below the surface and extending to an undetermined depth.

The water table was not found due to collapse of the test holes.

CONCLUSIONS AND RECOMMENDATIONS

The overburden fill soils will not safely carry more than 500 lbs./sq. ft. imposed by a column footing without excessive settlements. Imposing relatively heavy building loads near the crest of fill slopes may induce slope instability. These poorly consolidated soils will, therefore, not provide adequate support for the proposed structures. Stable foundations can most easily be constructed using piling driven to the river gravels. The surface of the gravel may exhibit undulations, even though the drill logs indicate the approximate depth to gravel. The following items must be considered in the design of piling foundations.

1.) 8 inch piling, either prestressed concrete or concrete filled pipe piling, driven to adequate resistance into the gravel will carry up to 75 KIPS/PILE.

2.) Driven piling lengths should be as close as possible to final expected length while still allowing for variations. Provisions should be made for extending or splicing piling.

3.) Pipe piling must have a minimum 1/4 inch wall.

4.) Piling should have a flat shoe slightly larger than the pile.

5.) Predrilling should be minimized.

6.) Piling must be driven to a predetermined set.

Preconsolidated or "floating" foundation design systems may be considered as alternatives although cost and time elements involved are normally prohibitive.

The fill material has apparently experienced sufficient historic consolidation to provide up to 300 PSF bearing pressure for light loads imposed by floor slabs. Provisions must be made to separate the floor slab from peripheral foundation units, provide gravel under slabs, strengthen slab edges, and protect the supporting soil from moisture.

Trafficked areas may use either the existing gravel surface for subgrade or precompact the subgrade.

Fills under buildings and pavements should be compacted to minimum 85% Modified Proctor and should consist of a good quality of material. Some settlement should be expected due to the weight of fills. Backfills should also be compacted in loaded areas. Fill slopes should be no steeper than 1 1/2:1 for well compacted, well drained, good quality fills and flatter for other types of fills.

SCOPE

The investigation summarized within this report was undertaken to determine the suitability of surface and subsurface soils to support commercial structures at the proposed White City Subdivision. The site is located southwest of the intersection of 1st Street and North Avenue in Grand Junction, Colorado. The proposed structues will probably consist of typical prefabricated metal buildings applying high concentrated foundation loads.

Through examination of field conditions, both surface and subsurface by means of test excavations, and through laboratory testing of recovered samples, it is possible to arrive at a suitable bearing value for each possible bearing material. Required depths for foundation members can be subsequently derived. Any existing anomalies which may be detrimental to foundation support may also be discovered. The bearing values which are derived must include a reasonable factor of safety if they are to be used in the design of reliable foundation elements. Damage due to one or more of the following must be prevented:

1.) Excessive consolidation of any base material.

2.) Shear failure of the founding material.

3.) Differential movement of the base material.

GEOLOGIC HISTORY

The bedrock, or base material, in the Grand Junction area north of the present Colorado River channel is dark gray to black Mancos Shale. The regional dip of the shale is approximately 3 degrees to the northeast. The top surface of this shale is undulating, resulting in exposure at ground surface in places, and as much as 100 feet below the surface in others. Sometimes both cases occur within a few hundred feet. Primarily, exposures of the Mancos Shale occur in the northern portions of the valley near the base of the Bookcliffs and in the southern areas of the valley, south of the existing Colorado River channel.

In several areas are found pediments which were formed as a result of the recession of the Bookcliffs. The pediment deposits are often moderately dry due to their relatively high elevation and good permeability. The pediment soils contain a moderate amount of friable sandstone gravels.

In the area of the previous River Delta, which at times covered an extensive area in the Grand Junction vicinity, gravel, cobble and boulder outwash has been deposited by the Gunnison River. This outwash, the top elevation of which generally lies between 4555 and 4560 feet in the Grand Junction area, varies from a few inches to as much as 25 feet in thickness.

Higher in the soil profile, the outwashes from the Colorado River basin and Bookcliff area to the northeast have deposited silts and clays over the Gunnison River gravel outwash and, in places, directly over the Mancos Shale. These deposits, ranging to seventy feet in depth, have been water borne and water sorted, resulting in a material heterogeneous in nature varying from clayey silts to fat clays in numerous combinations. These soils, being geologically identified as a Billings clay, were laid down in such a manner as to create lenses ranging from reasonably clean sand and small gravel to dirty silts varying in thickness from two inches to more than four feet. These lenses provide paths for water to travel through the surrounding semi-impervious silt-clay matrix. This network of permeable soils keeps the entire area wet when supplied with water from natural and irrigation sources. Organic matter is often found deposited with the silts and clays.

In the area are also found old channels in which the silt-clay material has been combined with sands and small gravels. In these locations, water also travels freely through the material. The free water table may be found at an unusually great depth due to the absence of tight clays to impede percolation.

Due to the high salinity of the underlying shale beds, deposits of sulfate salts can be found interspersed with the silts and clays. The salts are leached out of areas of high concentration through irrigation or natural ground water sources, and re-deposited in the material through which any ground water flows.

AREA SURFACE CONDITIONS:

The site is presently occupied by a relatively old motel complex and its related buildings. The ground surface not occupied by buildings is covered with a gravel surfacing material for parking. The site is bounded on the south by commercial developments, on the east by First Street, and on the north and west by relatively steep fill slopes. The site exhibits moderate to steep drainage to the north and west.

SUBSURFACE CONDITIONS

The site subsurface conditions were examined by means of two 4-inch diameter test holes. The test holes were drilled by means of a truck mounted continuous flight auger. The locations of the test holes are given on PLATE 1, in the APPENDIX, and the logs are shown on PLATES 2 and 3. As can be seen from the test hole logs, the soil profile is not only very heterogeneous vertically, but varies with horizontal location. The soil profile generally consists of the following:

1.) 2 to 9 feet of fill. This material varied from silty clay mixed with a black bituminous material of unknown origin to a sandy gravel. This fill exhibited evidence of poor natural consolidation.

2.) A buff brown to dark brown silty clay exhibiting a wide variation of plasticity, and a moderate dry strength. This material was found in a lensed state with horizons varying from silty clays of moderate plasticity and high dry strength to clean sands and small gravels. The depth of the clay-silt material between the fill and the underlying silty sands is roughly 35 feet. White sulfate crystals are visible throughout this material. These silts and clays flowed liquidly into the hole below the saturation level in the test holes. Decomposed organic matter is found at various depths and in all locations due to the type of water deposition which occured. The concentration of the decomposed organics is minimal with regard to foundation support. These silts and clays are found at varying levels of natural consolidation as evidenced by the differing unit weights and the varying degrees of tightness of the material.

3.) Underlying the silt-clay material is a red brown silty, clayey sand which grades cleaner with depth and lies directly over the river gravels. This material is well consolidated, existing in the saturated state. The thickness of the sands between the brown silt-clays above and the river gravels below was found to be 2 feet.

4.) The river gravel outwash extends to an undetermined depth. Judging from holes drilled in the area previously, approximately 20 to 25 feet of these gravels overlie the Mancos Shale. Due to the nature of the underlying shale and the manner of river deposition of the gravels, the thickness of the gravel stratum may vary radically either increasingly or decreasingly. The material within the gravel stratum consists predominately of gravels, cobbles and some boulders in a tight silty sand matrix. The gravels, cobbles and boulders are comprised of rock of dense hard origin. These river gravels are not uniform existing with layers of sands and small gravels and layers of silts and clays interstratified. In most locations, 2 to 3 feet of smaller gravels and sands overlie the tight gravel cobble outwash material. The upper horizon of the gravel in test hole No. 2 was found at 40 feet.

The water table was not determinable in the test holes due to collapse of the hole below the saturation level. However, the soil saturation level can often be used as an indication of the proximity of the water table.

SUPPORT OF BUILDING LOADS

The natural silt-clay soil in conjunction with the unconsolidated fill at the site will not provide unyielding support of the structures. Water deposited and erosional soil such as the natural material found at the site varies in load bearing characteristics depending on particle size, soil derivation, and type of water deposition. Similarly, the fill material at the site was, by all evidence, loosely dumped with no concern for quality of fill, uniformity of material, or compactive effort.

These soils are termed "collapsible" due to the fact that they often exhibit a rapid decrease in load bearing characteristics with an increase in moisture content, and subsequent minor loading. The upper soils at the site under consideration which would be used for building support appear to be of predominately clay and silt size particles. In order to determine the soil consolidation characteristics under load, a soil sample is laboratory monitored for consolidation under various loading and moisture conditions. The graphical results of 2 such tests performed on the soil we are dealing with are given on Plates 4 and 5 in the APPENDIX. As can be seen, the natural soil consolidates rapidly but uniformly under natural moisture content. Upon saturation of the samples at 1,000 lbs./sq. ft., little movement occurs in the natural soil, while the fill sample from Hole No. 1 consolidated approximately 1.4 percent. It is apparent that the natural soils are reasonably well consolidated, whereas, the only consolidative loads the fill material has experienced are those imposed by the material presently in place under low moisture content and that considerable consolidation potential exists with an increase in soil moisture content of the fill. In most locations, it appears that the only natural consolidation which has occurred has been due to the weight of the soil presently in place.

The upper fill material at the site is subject to moderate to large differential consolidation or settlement. The heterogeneous nature of these soils results in the fact that settlement which does occur will likely have a differential pattern rather than being completely uniform. The maximum potential differential settlement can occur within a horizontal distance as short as 10 feet. With the type of structures considered, differential movement potential is increased due to the application of relatively high column loads. Making use of the elastic theory to determine soil stresses, and using rough estimates of foundation loads and required footing size, the soil should support not more than 500 lbs./sq. ft. imposed by a column footing under full design dead and live loads to assure that the differential settlement which occurs does not exceed allowable magnitudes.

In addition, the shear strength of these heterogeneous fill soils is impossible to accurately determine. The imposition of relatively heavy loads near the top of these moderately steep fill slopes greatly increases the possibility of inducing slope instability and of initiating slope movement. It is, therefore, seen that it is somewhat impractical to support moderate to heavy foundation loads on these fill soils, due to the extensive problems involved.

In contrast to the poorly consolidated fills, the river gravels lower in the soil profile are capable of carrying large loads. Unyielding support of the structure loads can be most easily obtained by supporting these loads on the river gravels found at the depths indicated on the Test Hole Logs. Use of drilled and poured-in-place caissons is impractical due to the water table, the instability of the saturated clays and sands overlying the gravels, the relatively high permeability of certain lenses and zones of the overburden as well as the gravel, and the depth at which the gravel is found. The obvious alternative and our first recommendation, is the use of driven piling.

The gravel is relatively deep with the upper zones generally being found 40 feet below the existing ground surface. A layer of less consolidated gravels generally is found in the upper 1 to 3 feet of the gravel. Piles with relatively light design loads (30 KIPS or less) normally reach the required driving resistance within the upper 2 to 3 feet of the gravel, but isolated areas in which greater penetrations into the gravel are possible do exist. Undulations have also been found to exist in the gravel surface in the area meaning that, although the test holes drilled indicated the depth to gravel, such may not be the situation throughout the site. The foundation design and construction procedure must, therefore, allow for these variations. The river gravels, being a well consolidated, sound material, and underlain by a firm base of Mancos Shale are capable of supporting large loads.

Steel pipe piling, 8-inch diameter, minimum 1/4 inch minimum wall filled with concrete after driving, have been used in the area under similar circumstances to support loads as high as 100 KIPS per pile. Experience has indicated that, with these piles, 100 KIPS is an upper limit to prevent pile damage during driving and that 75 KIPS is a safe maximum. It has also been seen that the worst pile damage, during driving, has occurred as a result of driving excessively long piles, leading to buckling above ground and subsequent buckling below ground. Emphasis should be placed on driving piles which are as close to the final expected cut-off length as possible to prevent this from occurring. Provisions must be made for splicing or extending piles, should isolated spots (not encountered in the drilling program) be discovered during the pile driving operation, at which unusually high penetrations occur.

Good results in the Grand Valley have been obtained in the past by use of prestressed concrete piling, or steel pipe piling filled with concrete after driving. Piling must be 8 - inch diameter minimum or 8 - inch square minimum (if solid piles are used). The lower tip must be flat and have a minimum area of 80 square inches. Flat steel shoes larger than the pile dimension are acceptable. Predrilling to set the piles in location should be minimized. Piling must be driven to a predetermined set (number of blows/inch) as determined by an acceptable pile driving formula (such as the Engineering News Formula, or Hiley Dynamic Formula) for the specific hammer used. By this means assurance may be obtained that each pile is capable of supporting its design load. The foundation design should include an analysis of the proposed piling under driving loads as well as long term design loads to determine stability against buckling.

Two additional foundation design alternatives which may be considered will now be discussed. They will not be discussed in depth, however, due to the relative impracticality. First, the bearing capacity of the upper soils may be increased by removing the majority of the potential consolidation by preloading the supporting soil. This entails loading the soil to at least 1.5 times the expected maximum design footing loads with gravel, cobble, or some other means of providing a uniform load. The preloading material must be left in place for 3 to 4 months in order to allow maximum preconsolidation to be established. Although preloading is very effective, time and cost elements usually limit its use to structures in which large interior building loads are expected.

The second of the two alternatives previously mentioned is to "float" the building loads on the soil. By this means, individual building units are designed with a slab foundation sufficiently strong to experience the expected maximum differential movements while supporting structural loads as a unit. Floating slabs may be designed using either conventional reinforced concrete or using field prestressing. Each individual building unit must be designed to move independent of adjacent units. Again, this method is usually limited to areas of very low bearing capacity where a firm base capable of supporting piling is beyond economical reach, since settlement is not eliminated but controlled.

<u>FLOOR SLAB SUPPORT</u> -

Unless either the preloading or floating foundation design and preparation techniques as discussed above are employed, the consolidation characteristics of the fill soil as previously discussed may present some potential problems with support of floor slabs. Although floor slab loads are normally light, the lateral extent of the loading area results in only a minimal decrease in soil stresses with depth and a larger settlement potential under the same unit loads than would be expected under a strip or column footing. Using the soil consolidation characteristics determined, settlement analysis of floor slab loads indicated a potential for .50 to 1.0 inch of movement under floor loads not exceeding 300 PSF.

This magnitude of movement is not excessive if the following items are considered in floor slab design:

1.) A minimum of 6 inches of gravel must be placed under floor slabs to bridge soft spots in the fill material unless the slab can be placed directly on the existing parking area surface with only minor regrading. The gravel must be compacted to at least 85% Modified Proctor Density (ASTM D-1557).

2.) The floor slab must be allowed to move independent of foundation elements to prevent distress in the slab due to differential movement at the slab - foundation interface.

3.) The floor slab edges must be thickened and reinforced to prevent slab weakness at the edges.

4.) Much of the potential foundation problems are associated with allowing the fill material to become wet and subsequently consolidate. Precautions should, therefore, be taken to assure good drainage of all roof and surface water away from the foundations.

<u>TRAFFIC LOAD SUPPORT</u>

The existing gravel surface in traffickable areas has undergone substantial consolidation and stabilization over the number of years it has been in place and will provide a good subgrade for travelled areas. The subgrade soils in areas not previously subjected to traffic loads must be inspected for suitable quality and must be compacted to at least 90% Modified Proctor.

<u>EXCAVATION AND FILLING</u>

All fill should consist of a good quality of material without major shrink or swell characteristics and should be compacted to minimum 85% Modified Proctor (ASTM D-1557) where buildings or pavements will be placed on the fills. It must be recognized that the weight imposed by any appreciable amount of fill on the existing soil will cause consolidation of the soil and subsequent settlement. Any backfill which will be placed under building or paved areas must be compacted to at least the same density as that of the surrounding soil.

The stability of fill slopes is variable with both degree of compaction and quality of fill material placed. It is not recommended that fill slopes be placed any steeper than 1 1/2 horizontal to 1 vertical and only this steep when the soil is well drained, well compacted, adequate surface drainage is provided to prevent runoff from saturating and eroding the slope, and the fill consists of a good quality material. Fill sections not meeting these criteria will need to be placed with flatter fill slopes.

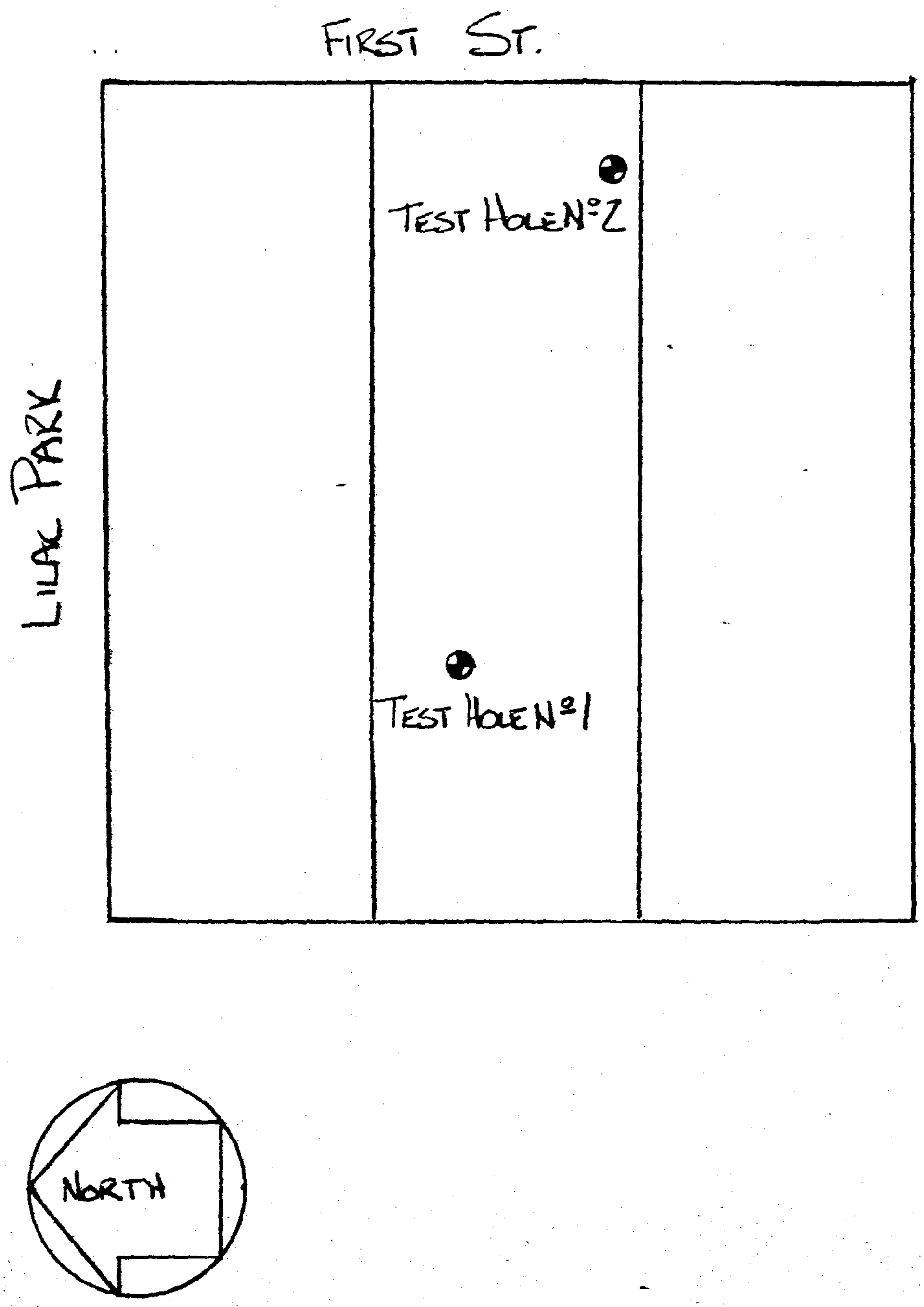
Submitted by,

WESTERN ENGINEERS, INC.

Bruce D. Marvin, P.E.

BRUCE D. MARVIN
REGISTERED
14586
PROFESSIONAL ENGINEER
STATE OF COLORADO

APPENDIX



TEST HOLE LOCATIONS
WHITE CITY SUBDIVISION
PLATE 1

WORK ORDER NUMBER ________

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 1

Project: WHITE CITY SUBDIVISION — Ground Elev. ________
Location: First and North, Grand Junction, Colorado — Depth to Water Table (Ft.) NF
Drill Contract: Western Engineers — Foreman ________ — Date Water Table gaged 4/26/79
Hole Logged by: BVG — Hammer Weight ____ — Height of Drop ____ — Date 4/26/79

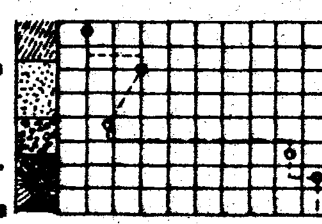
NOTES (Type & size of hole, Type of bit or spoon, Loss of drilling water)	Core Recovery %	No. Blows	Moisture %	Samples for Testing	Description and Classification of Material	Depth	Log	Penetration Resistance (Blows per foot) ● Actual ○ Extrapolated (20 40 60 80)
					Gravel Surfacing Material			
			14.7	X	Miscellaneous fill material, clay, small gravels mixed with bituminous and other miscellaneous material. Dry to moist, loose	4, 8		
			27.5	X				
Approximate Saturation Depth = 9 feet			26.4	X	Clay, silty, buff brown, semi-saturated to saturated, lenses varying in clay content, mostly low plasticity and moderate to high dry strength - some sand and fine gravel lenses. (ML - CL)	12, 16		
			24.7	X		20, 24		
			25.1	X				
			24.1	X	Clay, silty, dark brown, moderately tight, sulfates in voids, lensed, high plasticity, high dry strength (CL)	28		
Note: Hole callapsed at 10 foot depth			24.1	X		32		
					Bottom of Hole	36, 40		

EXPLANATION

No. OF BLOWS .... RECORD NUMBER OF BLOWS REQUIRED FOR ONE FOOT PENETRATION IF 50 BLOWS RESULT IN LESS THAN 1 FOOT PENETRATION, RECORD DEPTH PENETRATED; THUS, 50/4 INDICATES 4 INCHES PENETRATION WITH 50 BLOWS.

DESCRIPTION AND CLASSIFICATION OF MATERIAL .... DESCRIBE SOIL TYPE, WITH EMPHASIS ON INPLACE OR NATURAL CONDITION. INCLUDE SOIL CLASSIFICATION GROUP SYMBOL. EXAMPLE: *SAND*, MEDIUM, CLEAN, MOIST, FIRM, DENSE, UNCEMENTED, (SP)

PENETRATION RESISTANCE .... PLOT AS SHOWN AT RIGHT, WITH DASHED LINES SHOWING THE MATERIALS CONSIDERED TO BE REPRESENTED BY EACH PENETRATION VALUE.



WESTERN ENGINEERS, INC.
Soil Mechanics Engineers

WORK ORDER NUMBER ________

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 2

Project: WHITE CITY SUBDIVISION — Ground Elev. ________
Location: First and North, Grand Junction, Colorado — Depth to Water Table (Ft): NF
Drill Contract: Western Engineers — Foreman: ________ — Date Water Table gaged: 4/26/79
Hole Logged by: BVG — Hammer Weight: ____ — Height of Drop: ____ — Date: 4/26/79

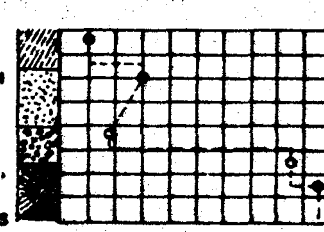
NOTES (Type & size of hole, Type of bit or spoon, Loss of drilling water)	Core Recovery %	No. Blows	Moisture %	Samples for Testing	Description and Classification of Material	Depth	Log	Penetration Resistance (Blows per foot) ● Actual ○ Extrapolated 20 40 60 80
					Gravel Surfacing Material			
			19.6	X	Miscellaneous Fill			
Approximate Saturation depth = 18 feet			12.1	X	Silt, clayey, buff brown, moist to saturated, lenses varying from silty clays to sands and fine gravels, mostly low plasticity and moderate dry strength grading slightly clayier with depth (ML - CL)	4, 8, 12		
Note: Hole collapsed at 20 foot depth			22.2	X		16		
			26.0	X				
			25.5	X		20		
			24.8	X	Clay, silty, dark brown, moderately tight, sulfates in voids, lensed. Moderate plasticity, high dry strength. Saturated (CL - ML)	24, 28		
Bottom of Hole at 40 feet								
River gravels below 40 feet depth			24.3	X		32, 36		
			23.1	X				
					Sand, silty, red brown, moderately tight, saturated (SM)	40		

EXPLANATION

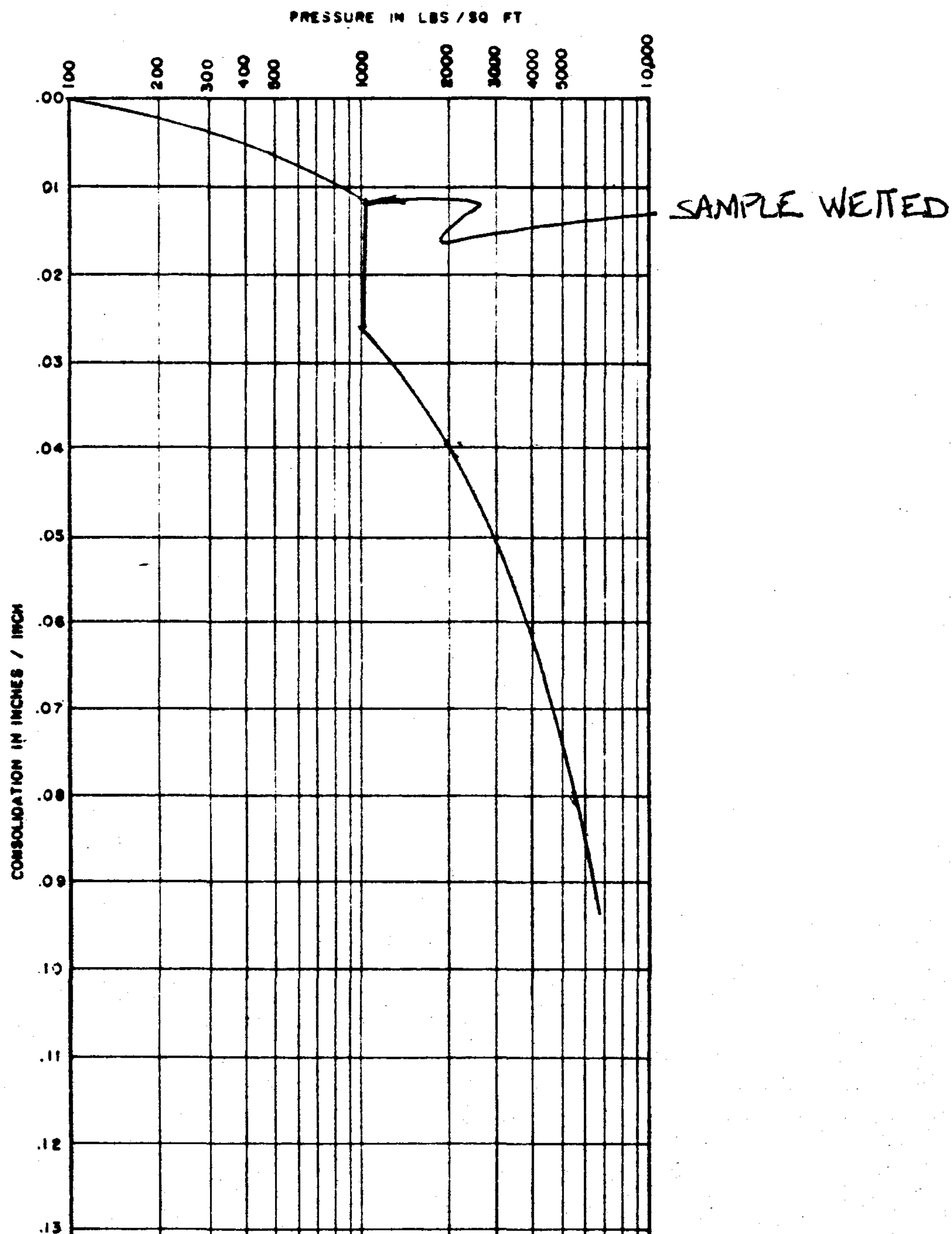
No. OF BLOWS .... RECORD NUMBER OF BLOWS REQUIRED FOR ONE FOOT PENETRATION IF 50 BLOWS RESULT IN LESS THAN 1 FOOT PENETRATION, RECORD DEPTH PENETRATED; THUS, 50/4 INDICATES 4 INCHES PENETRATION WITH 50 BLOWS.

DESCRIPTION AND CLASSIFICATION OF MATERIAL .... DESCRIBE SOIL TYPE, WITH EMPHASIS ON INPLACE OR NATURAL CONDITION. INCLUDE SOIL CLASSIFICATION GROUP SYMBOL. EXAMPLE: *SAND*, MEDIUM, CLEAN, MOIST, FIRM, DENSE, UNCEMENTED, (SP)

PENETRATION RESISTANCE .... PLOT AS SHOWN AT RIGHT, WITH DASHED LINES SHOWING THE MATERIALS CONSIDERED TO BE REPRESENTED BY EACH PENETRATION VALUE.



WESTERN ENGINEERS, INC.
Soil Mechanics Engineers



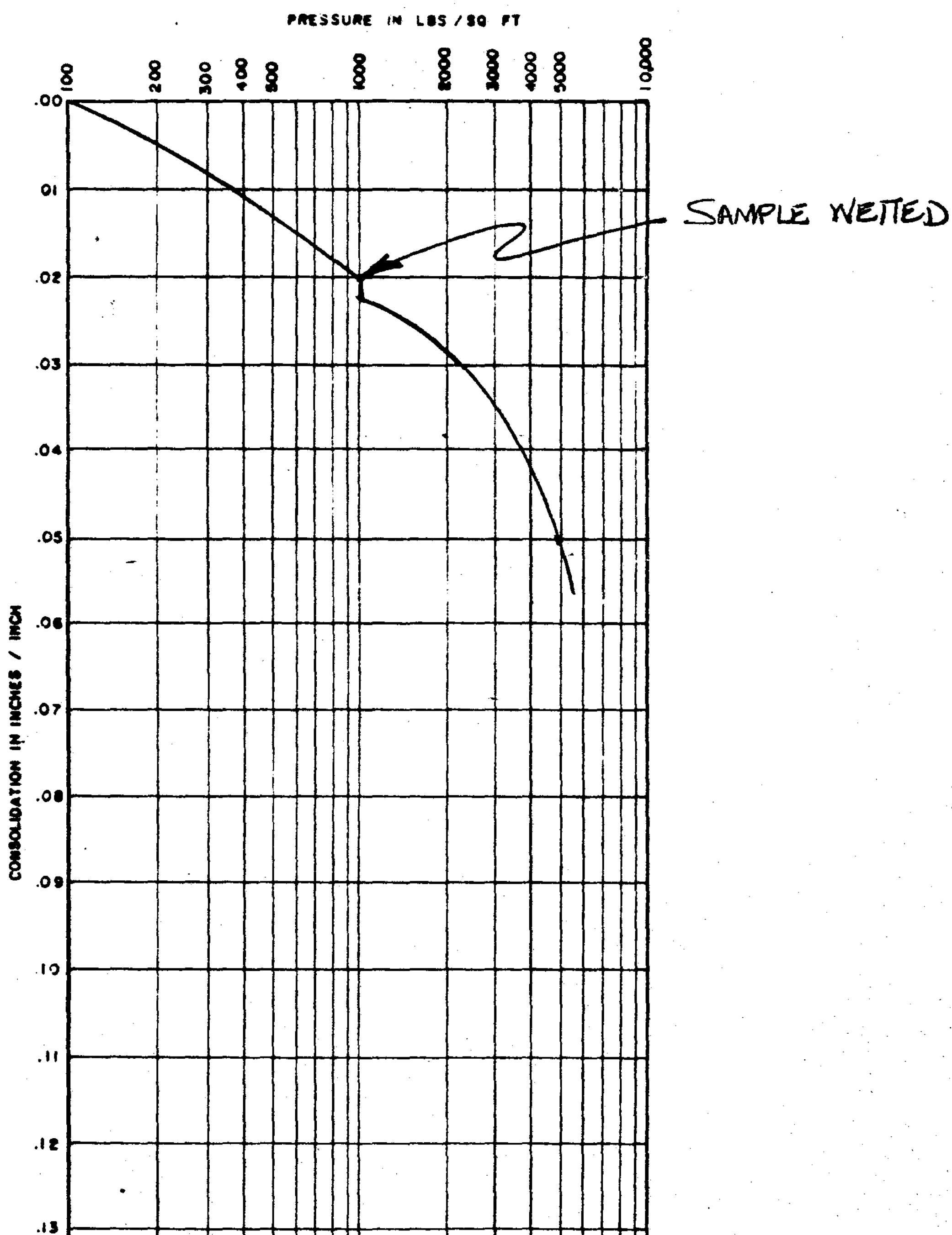
BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT BEFORE	MOISTURE CONTENT AFTER	DRY DENSITY IN LBS/ CU. FT.
1G3-4	FILL	6.8	17.8	102

WHITE CITY SUB'D

CONSOLIDATION DATA

PLATE 4

WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO



BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT BEFORE	MOISTURE CONTENT AFTER	DRY DENSITY IN LBS/CU. FT.
2Q3-4	SILT-CLAY	16.5	19.8	100.2

WAITE CITY SUB'D

CONSOLIDATION DATA

PLATE 5

WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO

CITY AND COUNTY PLANNING & DEVELOPMENT PROCESSING—CITY AND COUNTY BUILDING PERMIT & INSPECTION

City County Development Department

CITY OF GRAND JUNCTION—MESA COUNTY—COLORADO 81501
559 WHITE AVE.—ROOM 60—DIAL (303) 243-9200 EXT. 343

November 5, 1979

Bertrand and Co.
798 - 25 Road
Grand Junction, Colo. 81501

Dear Sir,

On October 30, 1979 your petition for White Subdivision was approved by the Grand Junction Planning Commission subject to staff and review sheet comments.

This petition has been scheduled to be presented to the Grand Junction City Council on November 20, 1979. Please be present or have a representative in attendance.

Sincerely,

Sue Drissel

Susan K. Drissel
P.T.I.

cc file # 37-79
West. Eng.
enclosure

ESTERN ENGINEERS, INC.
CONSULTING ENGINEERS / LAND SURVEYORS

September 27, 1979

To Whom It May Concern:

RE: White City Subdivision Radiation Survey

Gentlemen:

The accompanying map shows the results of the radiation survey at the above subdivision. As can be seen, an anomalous area was found along the south boundary of the subdivision. The readings were unusually high along this area varying from .025 milliroentgens/hr as shown, to .080 milliroentgens/hr. The exact cause of this anomally was undetermined, but the subsurface soils investigation revealed a substantial amount of fill existing throughout the subdivision.

Submitted by,

WESTERN ENGINEERS, INC.

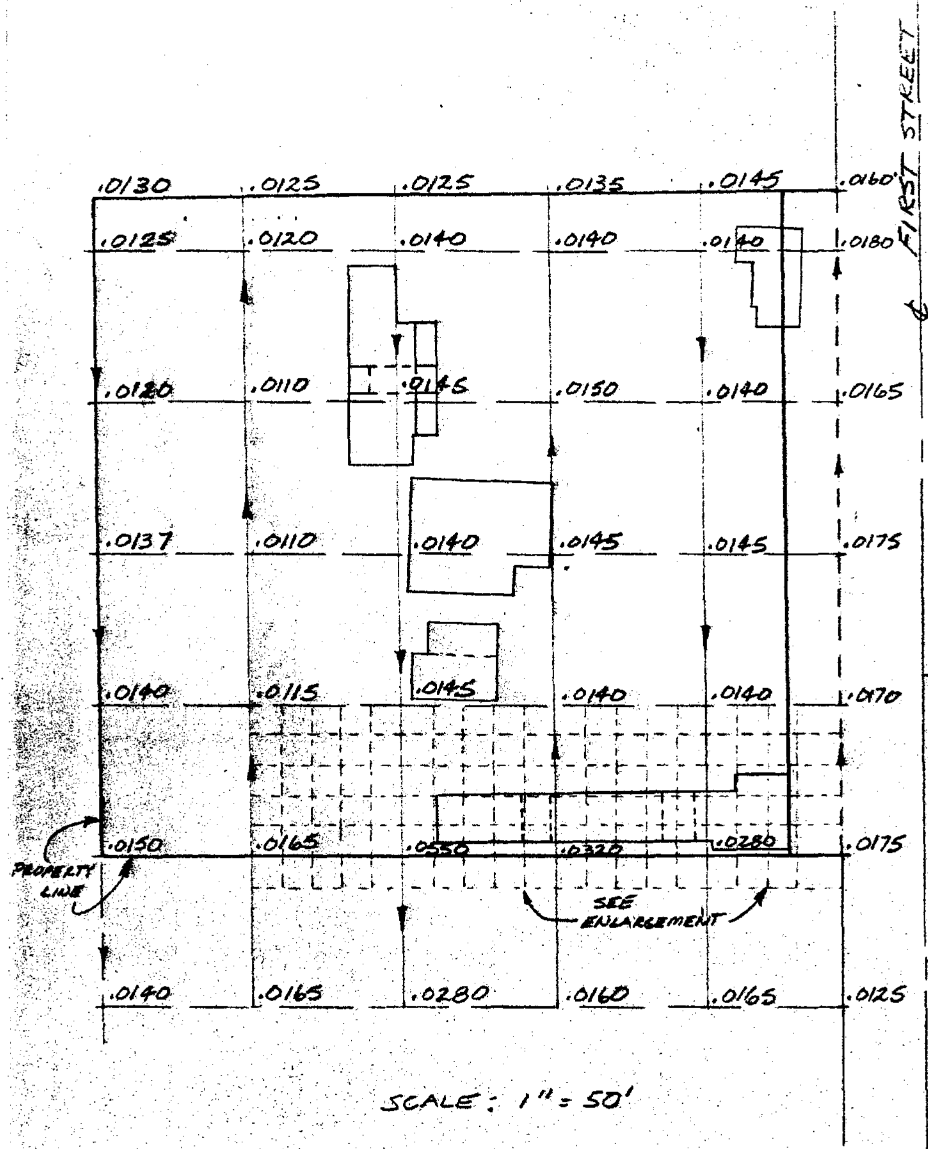
Bruce D. Marvin, P.E.

BRUCE D. MARVIN REGISTERED 14586 PROFESSIONAL ENGINEER STATE OF COLORADO

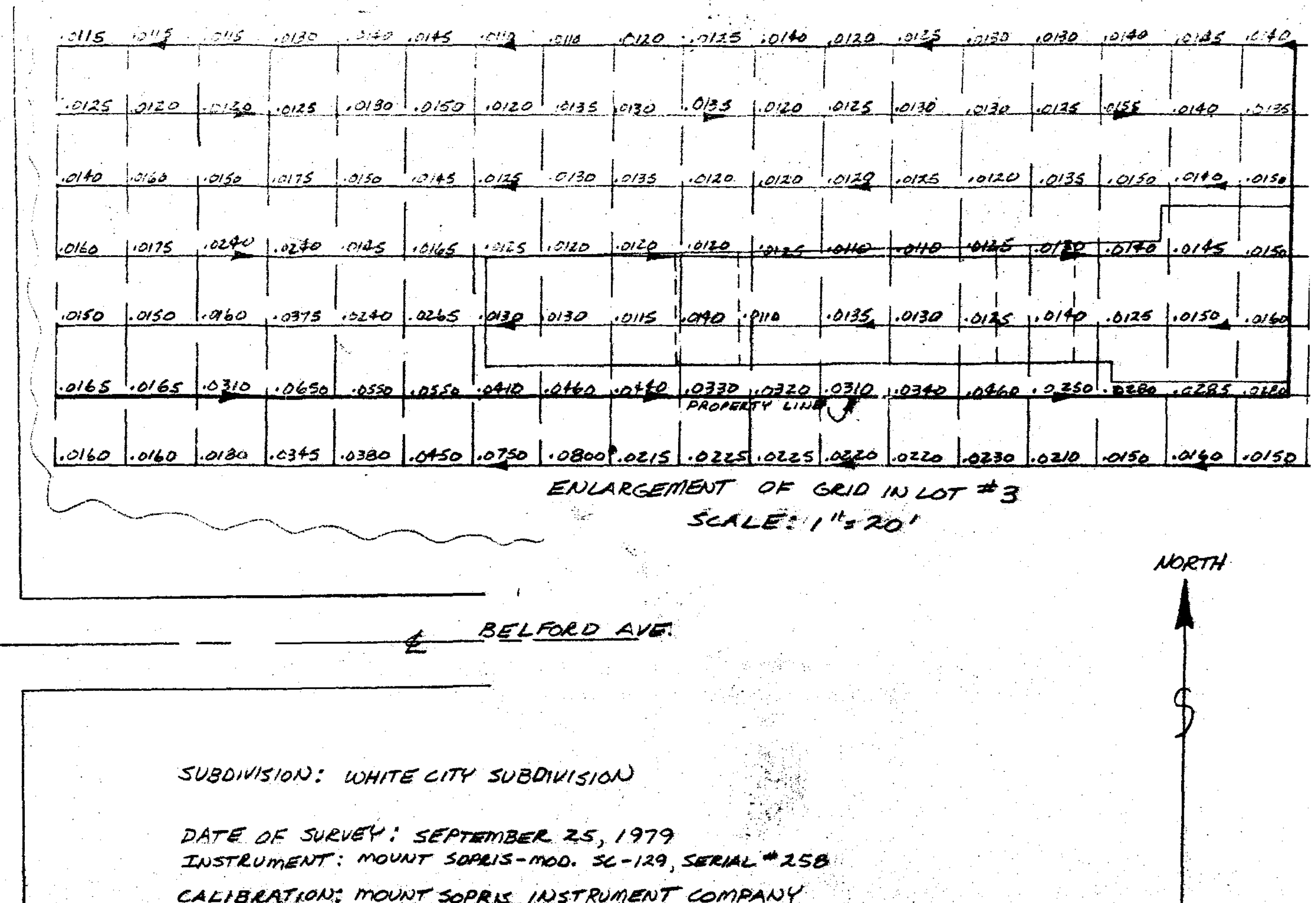
BDM:kms

Enclosure

2150 HIWAY 6 & 50 P. O. BOX 571 GRAND JUNCTION, COLORADO 81502 PHONE 242-5202



SCALE: 1" = 50'



SUBDIVISION: WHITE CITY SUBDIVISION

DATE OF SURVEY: SEPTEMBER 25, 1979
INSTRUMENT: MOUNT SOPRIS-MOD. SC-129, SERIAL # 258
CALIBRATION: MOUNT SOPRIS INSTRUMENT COMPANY
DELTA, COLORADO

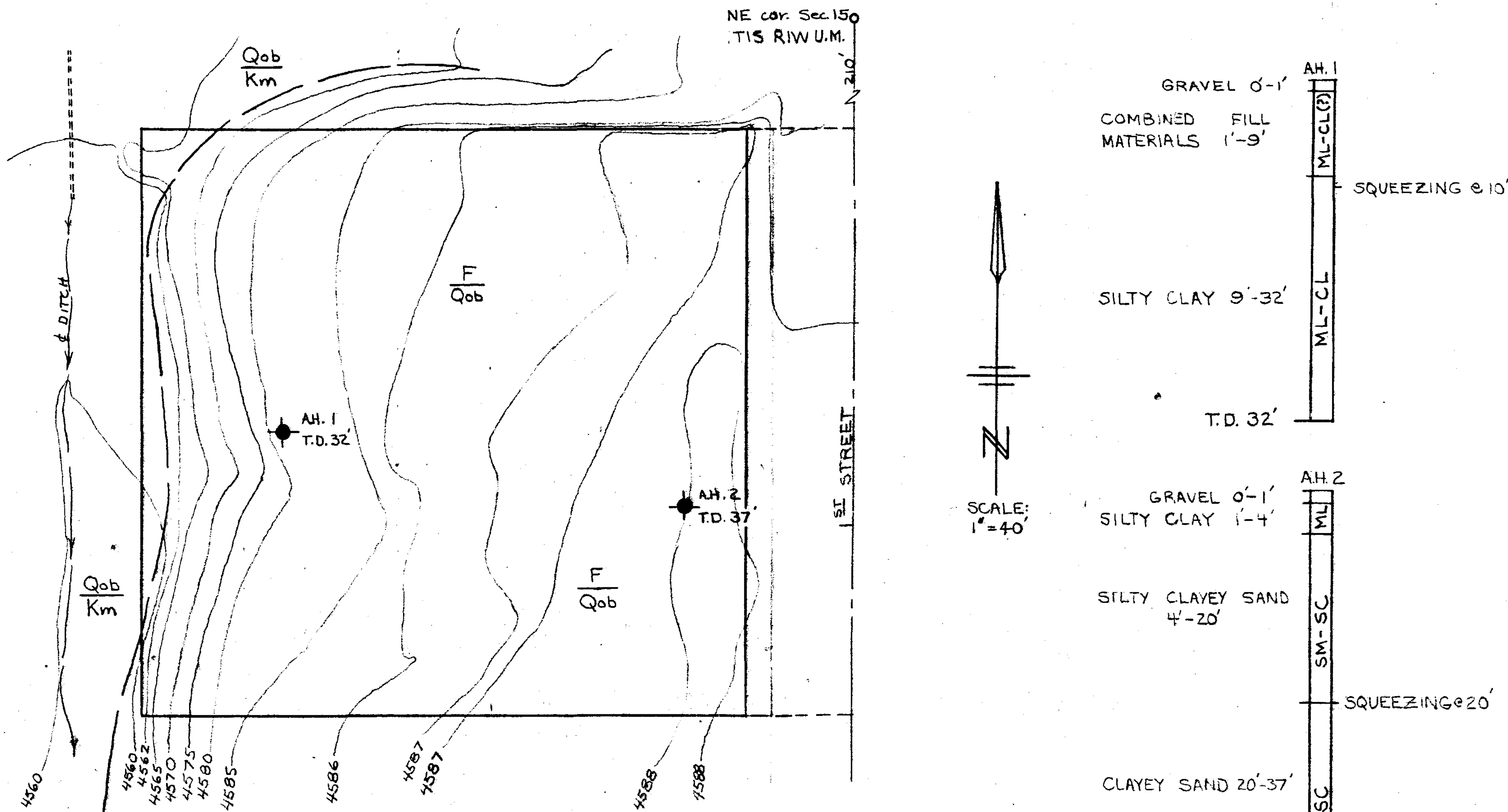
SEE ACCOMPANYING LETTER FOR RESULTS AND COMMENTS

LEGEND:
APPROXIMATE PATH OF SURVEY
APPROXIMATE LOCATION OF READING IN MILLIROENTGENS/HR.

BRUCE D. MARVIN-PE

BRUCE D. MARVIN REGISTERED 14586 PROFESSIONAL ENGINEER STATE OF COLORADO

WESTERN ENGINEE
RADIATION S
OF THE
WHITE CITY SU
MEAS. BY: BVG
GRAND JUNCTIO



LEGEND

4570 ———	CONTOUR	F / Qob	FILL MATERIAL OVERLYING SILTY CLAY OVERBURDEN
——— ———	GEOLOGIC CONTACT		
└———	SUBDIVISION BOUNDARY	Qob / Km	SILTY CLAY OVERBURDEN, SANDY IN PLACES OVERLYING MANCOS SHALE.
◆ A.H.	AUGER HOLE	T.D.	TOTAL DEPTH

WESTERN ENGINEERS, I

GEOLOGY MAP
of
WHITE CITY
SUBDIVISION

MESA COUNTY, COLORAD

GEOLOGY: L.V. DRAWN BY

GRAND JUNCTION, COLO. 5

GEOLOGY REPORT

WHITE CITY SUBDIVISION

GRAND JUNCTION, COLORADO

APRIL 1979

Client: Phil Bertrand
Grand Junction, Colorado

Prepared by:
Western Engineers, Inc.,
Grand Junction, Colorado

INTRODUCTION

The proposed White City Subdivision is a parcel of land of about 1.2 acres. The property is bounded on the east by First Street and lies just south of the west end of North Avenue. Lilac Park lies immediately north of the proposed subidivison.

A geology map on a plat of the land is included at the end of this report. The locations of 2 auger holes, which provide subsurface data are shown.

SUMMARY

The proposed subdivision is underlain primarily by fill material. This material has been in place for at least 20 years. Substantial differential settlement can be expected on this fill material. Additional fill is to be added at the west end of the property. This fill will also be subject to some differential settlement. The water table lies well below the fill and was not encountered in the auger holes.

The fill overlies a relatively thick accumulation of slope soils which were formed as a pediment on the underlying Mancos Shale formation.

The surface drains to the west and the slope varies from 4% on the east 3/4 of the property to over 60% at the west end. This steep slope is the western limit of the face over which the fill was end-dumped.

No critical geologic hazards exist that should preclude the proposed development at this site. The fill material upon which the site lies, however, will require proper engineering consideration in order to provide an adequate design for footing and foundation structures.

DISCUSSION

The geologic setting of the proposed White City Subdivision is on the northeast flank of the Uncompahgre Plateau, and north of the Colorado River, in the Grand Valley. The property lies at the west edge of a line of bluffs carved from the northeasterly dipping Mancos Shale of Late Cretaceous age. Here the Mancos Shale, a marine deposit, has been eroded from its original thickness of about 3800 feet to a thickness of only about 350 feet. The Mancos bedrock is overlain by over 25 feet of silty-clay soils formed by air slaking of the shales. At the base of the bluff line are found Quaternary gravel and alluvial deposits of the Colorado river at depths below 30 feet. All these natural overburden deposits are covered with fill at the site of the proposed subdivision. This fill was end dumped from the top of the old bluff line (approximately where First Street lies) and was extended westward some 200 feet. The fill has been in place for at least 20 years.

The plan for development calls for additional fill to be added at the west end of the property. This is to be done to increase the area available for development. This fill must be properly emplaced and compacted in order to insure a minimum of differential settlement between it and the older fill. The end dump face of the older fill is partially covered with shrubs and sage growth, and dumped trash and parts of woody plants. All this must be stripped off the face to provide a clean surface for the additional fill to be compacted against. End-dumping of this additional fill is not a satisfactory method of emplacement. The fill should be emplaced in thin level layers which should be compacted before another layer is emplaced.

The fill at the site of the proposed sbudivision consists of various materials including trash, soil, asphalt chunks and other fill materials. The fill is primarily a clayey silty soil about 9 feet thick at the west end of the property. Underlying this fill is a thick accumulation of silty clay soil derived primarily from the Mancos Shale. This soil layer is over 25 feet thick. This soil is classified as ML-CL on the Unified Chart. The water table was not encountered in the auger holes, but the soil below the fill was very wet and squeezed into the holes, eliminating the possibility of measuring the water table.

The site is presently occupied by a motel with several small buildings and gravel drives and parking lots. The surface drains west at about 4% and no large drains cross the property. Severe erosion would not be expected on this gently sloping surface. Heavy rains, however, could create enough runoff over the steepened toe of the fill to result in gullying and rill formation. This can be avoided if the added fill is properly compacted and the final drain plan does not allow water to flow over the toe.

The Mancos Shale is a marine formation and contains soluble salts. Groundwater and percolation have concentrated the salts in the soil layers of the Grand Valley. Although the source of the fill at the site of this proposed subdivision is not known, it can be assumed to contain some of these soluble salts. As a result, a sulfate resistant cement should be used where concrete founding structures will be in contact with the soil.

Water for this subdivision will be provided by a municipal source. The subdivision will also utilize existing sewage disposal facilities.

Since the subdivision is located in a filled area, a radiation survey should be made to identify any anomolously active areas which might exist.

Commercial mineral resources of metallic or non-metallic nature are not found in the area. There is, however, a potential for oil and gas production from sandstone formations underlying the Mancos Shale. Production from these sandstone formations exists in nearby areas.

CONCLUSIONS

The proposed White City Subdivision is a commercial development located on an old fill surface. A thick accumulation of silty-clay soil underlies the fill. The water table lies below the fill within the alyer of silty-clay soils beneath.

The area has no record of destructive seismic activity and is not located near any active flood ways.

There are no critical geologic hazards that would interfere with the development of this site. Properly designed footing and founding structures will be required to prevent damage caused by differential settlement of the fill upon which the subdivision is to be located.

Submitted by:

Lawrence E. Violett, Geologist

Reviewed by:

Bruce D. Marvin, P.E.