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File 1981-0022 Project Name: C.H. Four Commercial Park – Filing No. 1 – Final Plat
Date 10/23/01

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the in some instances, not all entries designated to be scanned by the department 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 provided. **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**
X	X	***General project report**
		Reduced copy of final plans or drawings
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DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X	X	Action Sheet	X	X	Impact Statement
X	X	Review Sheet Summary	X	X	Screening and Landscaping Plan
X		Review Sheets	X	X	Preliminary Draft of Covenants and Design and Design Guidelines
X	X	Letter from Ron Rish to John Elmer re: storm drainage improvements – physical deficiencies have been corrected and all improvements appear to be satisfactory – 12/21/82	X	X	Geologic Report
X		Plat certification – 7/2/81	X		Treasurer's Certificate of Taxes Due
X	X	Letter from Kent Harbert to Planning re: response to comments – 5/26/81	X		Fire Flow Survey
X		Subdivision Summary Form	X	X	Geologic Map
X	X	Planning Commission Minutes - ** 3/31/81, 5/26/81	X		Outline Development Plan
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X	X	Development Application	X	X	Conditions, Covenants and Restrictions affecting the property of CH 4 Development Corp.
X		Ute Water Conservancy District Peak Demand – Data Sheet	X	X	Preliminary Plat
X		Development Schedule	X		Road Plan & Profile
X		Policy copy from Transamerica Title Ins. Co.	X		Preliminary Utility Composite
X		Development Application	X		Preliminary Drainage Plan

X		Radiation Survey			Utility Composite
X		Composite Map			

Motel 6, Inc.
51 Hitchcock
Santa Barbara, CA 93105
#22-81

James F. Squirell
P.O. Box 115
Cimarron, CO 81220
#22-81

Cross Road Properties
P.O. Box 337
Cardiff, CA 92007
#22-81

Schiesswohl & Others
P.O. Box 1003
Grand Junction, CO 81502
#22-81

Bruce Currier
2760 H Road
Grand Junction, CO. 81501
#22-81

Lea Co.
8720 E. Colfax Ave.
Denver, CO 80220
#22-81

Combustion Engine, Inc.
c/o J.D. Townsend
1000 Prospect Hill
Windsor, CT. 06095
#22-81

Crossroad Plaza Venture
601 Valley Federal Plaza
Grand Jct., CO 81501
#22-81

Western Engineers, Inc.
2150 Highway 6 & 50
Grand Junction, CO. 81501
#22-81

Horizon Complex Co.
c/o Nebraska Federal S & L
7160 Ames Ave.
Omaha, Neb. 68104
#22-81

Bruce Ferrell, Jr.
620 Canyon Circle
Grand Juncton, CO 81503
#22-81

Harwood Vallence Properties
c/o Shelter Equity Corp.
P.O. Box 337
Cardiff, CA 92007
#22-81

IMPACT STATEMENT

Rezone:	Mesa County AFT and ER to Grand Junction HO
Area:	71.77 Acres
Location:	South of H Road, West of Horizon Drive, North of the Grand Valley Highline Canal

INTRODUCTION

This 72 acre parcel is planned to be developed as C H Four Commercial Park. It is adjacent to the airport property and within one half mile of the Interstate 70 interchange. This location makes it prime for a commercial development. The park will provide large lots in an attractive environment to meet some of the needs created by the energy development in the area.

COMPATIBILITY OF ZONING

The zoning on this parcel is proposed to change from AFT and ER to HO. As a part of the development process this parcel is being annexed into the City of Grand Junction. The annexation procedure is running concurrently with this rezone application.

The properties to the south and east of this parcel are developed commercially and include such uses as restaurants, motels, office buildings, government offices, and other commercial businesses. The development on C H Four will be of a similar nature. Also adjacent to this property is the portion of the airport property which is proposed to be leased for commercial development; again, a compatable use. The commercial development is also in conformance with the Airport Authority's desire to not have residential developments in close proximity to the airport.

The property to the west and northwest is in its natural undeveloped state. Since it is unused ground C H Four will not have an adverse affect on it. The affect may be that this development will give that property owner incentive to also develop his ground.

DEVELOPMENT SCHEDULE

for
CH4 COMMERCIAL PARK

As soon as the annexation, re-zoning, final approval of the subdivision plat by City Council, and the proper recording have been completed, the following will be started:

1. Construction of the entry road into the subdivision.

2. Necessary landscaping required along Horizon Drive and the entry road into the subdivision.

3. Construction of an office building and appurtenant buildings, parking, utilities and landscaping by Occidental Oil Company on the approximate 5.25 acre lot.

Based upon demand, the balance of the land owned by Bruce C. Currier that is zoned HO will be developed generally as outlined in the attached "Outline Development Plan".

TRANSPORTATION

There will be an increase in vehicular traffic on Horizon Drive because of this project. However, this impact will be mitigated by the projects traffic pattern. There will be an internal road system with a loop road at the center and exit roads connecting to H Road, Horizon Drive and the airport. The road off of Horizon Drive will be a 100 foot parkway with landscaped median and shoulders. The major entrances to the properties will be on the internal road system, thus reducing the driveway cuts off of Horizon Drive. The entry road on the northeast of the park will be designed to align with the exit road of the airports development.

Horizon Drive is designated as a major arterial and as such will eventually be a four lane divided road. Such a road requires 100 feet of right-of-way. Currently there is 140 feet of right-of-way in front of this property so there should be no need for additional dedication. The improvement of Horizon will be a public improvements project and this development will participate in the cost in the same manner as other developments along Horizon.

A new road connecting H Road and Horizon Drive is currently under construction along the northeast side of this property. A fifty foot half street right-of-way has already been given off this property for this purpose.

H Road is the northern border of this property. It currently has a dedicated right-of-way of sixty feet. Additional right-of-way will be dedicated when that portion of the project is platted. The road may be designated as a collector or as a minor arterial. The appropriate amount of right-of-way will be dedicated.

UTILITIES

Water for this project will be provided by the Ute Water system. There is currently an 18 inch water line on the north side of the property and an 8 inch along Horizon Drive. These line will

be supplimented by the new 30 inch Northside Main which will be installed along the northeast side of the property. This water system will provide adequate fire protection as well as domestic water. There will be an internal looped water system within the project to maintain fire protection throughout.

The sewer from C H Four will connect to an existing sewer main in Horizon Drive. The internal system will be built to Grand Junction standards and turned over to them when completed.

Gas will be provided by Public Service Company. There are existing two-inch gas lines in Horizon Drive and H Road.

This property is presently in the area severed by Grand Valley Rural Electric. However, since it will be annexed into the city, it will get its electrical service from Public Service. There are not any Public Service Company lines adjacent to the property at present, so lines will need to be run in. There are lines on the back side of the lots on Horizon Drive opposite this property and in the Crossroads development which is south, across the canal, from this property.

Telephone service will be provided by Mountain Bell. Existing phone lines which could serve the area are in both Horizon Drive and H Road.

CONCLUSION

C H Four Commercial Park will be an attractive addition to the Horizon Corridor. As a composite development it will not be a strip development as is common along Horizon Drive, but will pull the focus into the center of the park. With restrictive covenants and a design review, there is assurance that the landscaping and aesthetic control will be maintained. The development of this park will not be rapid, but will be at a pace that will maintain continuity and design control throughout.

"SCREENING AND LANDSCAPING PLAN"
FOR
CH4 COMMERCIAL PARK

1. The intention of the project is to create a business park with a a campus style plan with abundant landscaping to establish a pleasing setting.

2. All plans would be reviewed by a design review committee for architecture, engineering, siting of buildings and the landscape development aspects.

3. Edges of the project will receive specific treatment.

   a. The peripheral or boundary of the project will receive either berming, fencing, or screen plantings in combination or separately as may be required to inward orient the park.

   b. Each site boundary within the park will receive either screening or edge treatment design to insure that one project site will blend into another.

4. All parking will be screened to an extent to relieve the view of parking areas.

5. All plant materials will be drought resistant and/or native types as possible to reduce water consumption.

"OUTLINE DEVELOPMENT PLAN"

Rezone of Bruce Currier's Property
AFT/ER to HO

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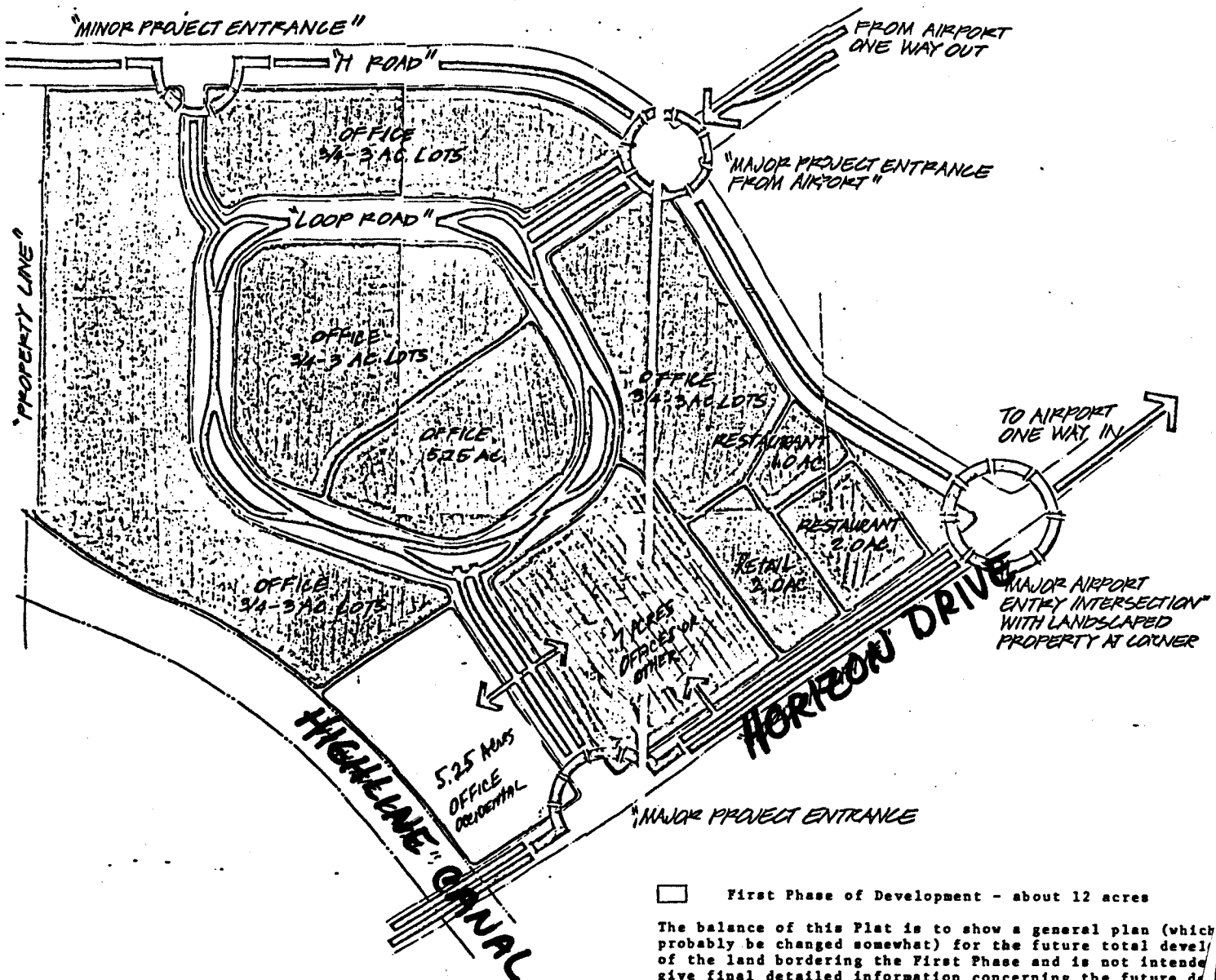
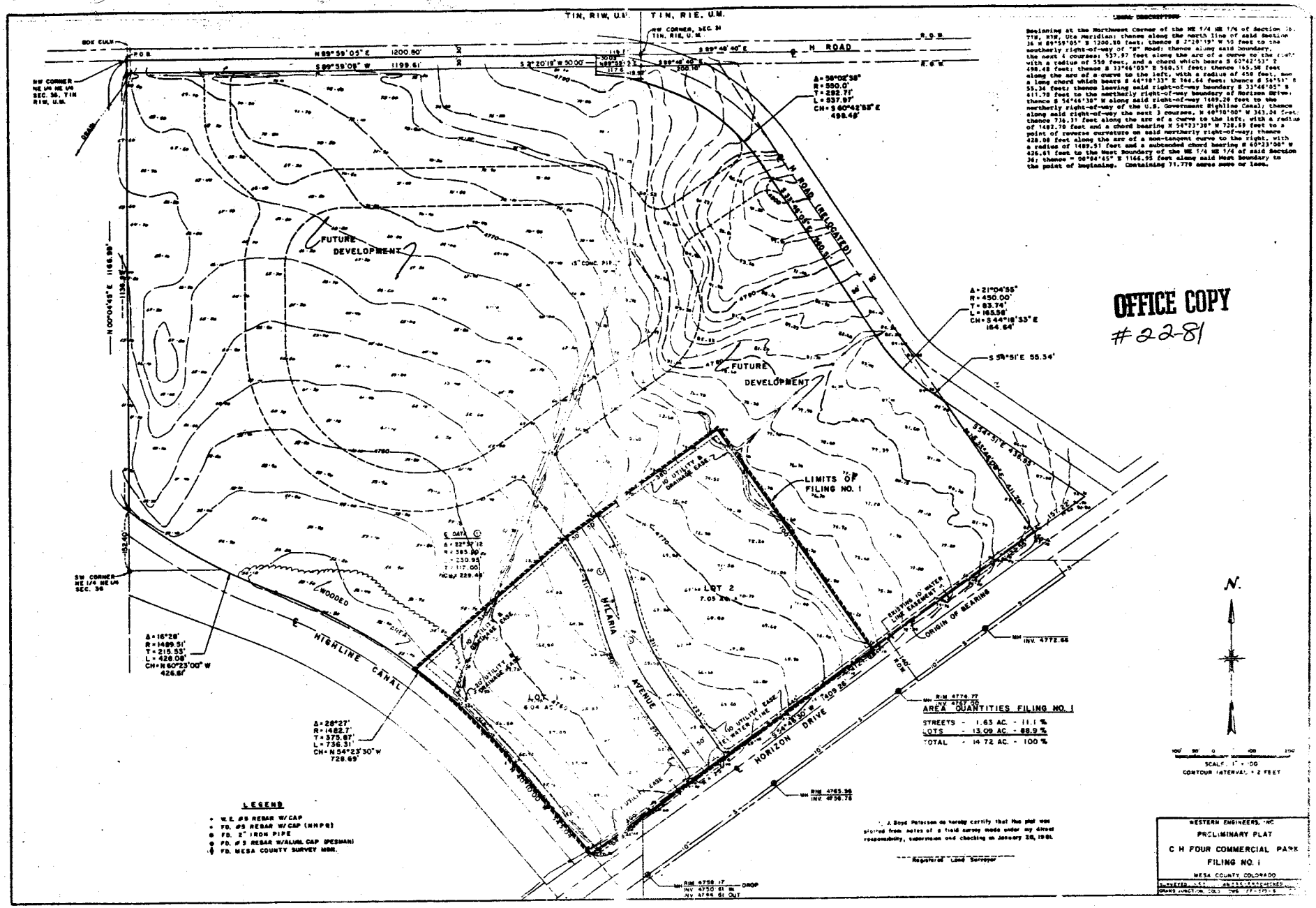


First Phase of Development - about 12 acres

The balance of this Plat is to show a general plan (which probably be changed somewhat) for the future total devel of the land bordering the First Phase and is not intende give final detailed information concerning the future de ment.



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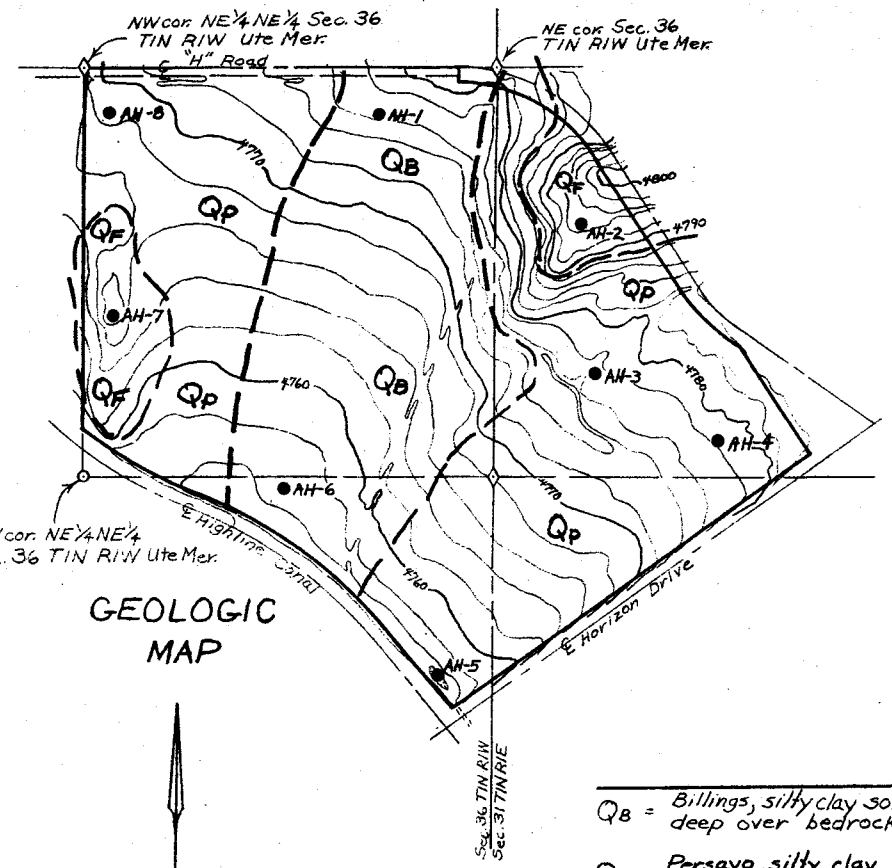
Beginning at the Northwest Corner of the NE 1/4 NE 1/4 of Section 36, T1N, R1W, Ute Meridian; thence along the north line of said Section 36 N 89°59'05" E 1200.80 feet; thence S 2°20'19" W 50 feet to the southerly right-of-way of "H" Road; thence along said boundary, the next 4 courses: 537.97 feet along the arc of a curve to the right with a radius of 550 feet, and a chord which bears S 60°42'59" E 498.48 feet; thence S 33°46'05" E 568.51 feet; thence 165.58 feet along the arc of a curve to the left, with a radius of 450 feet, and a long chord which bears S 44°18'33" E 164.64 feet; thence S 54°51' E 55.54 feet; thence leaving said right-of-way boundary S 33°46'05" E 611.78 feet to the northerly right-of-way boundary of Horizon Drive; thence S 54°48'30" W along said right-of-way 1409.28 feet to the northerly right-of-way of the U.S. Government Highline Canal; thence along said right-of-way the next 3 courses, N 69°10'00" W 383.36 feet; thence 736.31 feet along the arc of a curve to the left, with a radius of 1482.70 feet and a chord bearing N 54°23'30" W 728.69 feet to a point of reverse curvature on said northerly right-of-way; thence 428.08 feet along the arc of a non-tangent curve to the right, with a radius of 1489.51 feet and a subtended chord bearing N 60°23'00" W 426.67 feet to the West Boundary of the NE 1/4 NE 1/4 of said Section 36; thence N 00°04'45" E 1166.99 feet along said West Boundary to the point of beginning. Containing 71.779 acres more or less.

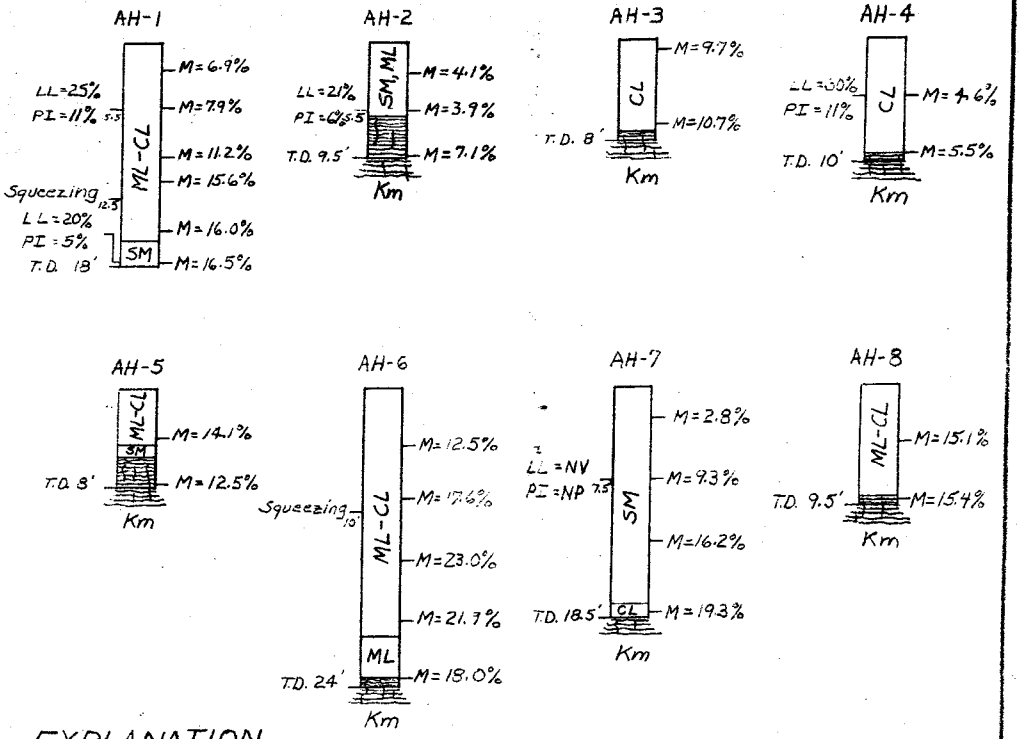


GEOLOGIC MAP

SCALE: 1" = 400'

CONTOUR INTERVAL: 2 feet

TEST HOLE LOGS



EXPLANATION

Q_B = Billings, silty clay soil, 20-30 feet deep over bedrock, alluvial.

Q_P = Persayo, silty clay residual soil, 3-10 feet deep over bedrock, gradational contact.

Q_F = Fruita, very fine silty sand, 6-20 feet deep over bedrock, alluvial.

Km = Mancos Shale, Cretaceous age, forms bedrock under entire site.

$\frac{Q_B}{Km}$ = Type of overburden soils over identified bedrock formation.

= Approximately located boundary between different types of overburden soils.

◇ = Mesa County Survey Marker.

⊙ = No. 5 rebar, with aluminum cap.

●AH-4 = Test hole; 3" power auger, Feb. 18, 19, 1981.

M=21.1% = Natural moisture content of soil at indicated depth.

LL, PI = Liquid limit, plasticity index, Atterberg limits.

T.D. = Total depth of test hole.

ML-CL, SM, etc. = Unified Soil group, field classification.

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WESTERN ENGINEERS, INC.
GEOLOGIC MAP
of the
Grand Junction, Colorado
Geology: LEV. Date: 2/18-19/81
Drawn by: LEV Date: 2/20/81

Lea Co.
8720 E. Colfax Ave.
Denver, Co 80220
#22-81

Horizon Complex Co.
c/o Nebraska Federal S&L
7160 Ames Ave.
Omaha, Neb. 68104
#22-81

James F. Squirell
P.O. Box 115
Cimarron, CO 81220
#22-81

Combustion Engine, Inc.
c/o J.D. Townsend
1000 Prospect Hill
Windsor, CT. 06095
#22-81

Bruce Ferrell, Jr.
620 Canyon Circle
Grand Junction, Co 81503
#22-81

Cross Road Prpperties

Cross Road Properties
P.O. Box 337
Cardiff, CA 92007
#22-81

Crossroad Plaza Venture
601 Valley Federal Plaza
Grand Junction, CO 81501
#22-81

CH FOUR COMMERCIAL PARK, FILING NO. 1

GRADING AND DRAINAGE REPORT

CH Four Commercial Park, Filing No. 1 is the first phase in the development of a 72 acre parcel located west of Horizon Drive between H Road and the U.S. Highline Canal. This first phase contains 14 acres or 20 percent of the parcel. The property slopes to the south where the runoff water is collected in a ditch and drained under Horizon Drive to the Horizon Drive drainage channel.

The runoff from the parcel will increase as it is developed and more land area is covered with impervious surfaces. Since the drainage from the entire parcel will flow through Lot 1 of Filing No. 1, the entire parcel has to be considered in the drainage design for Filing No. 1. In addition to the parcel's own runoff, drainage from the Walker Field Airport will be spilling onto the property. This will be the only external water flowing onto the property. The runoff from the airport is addressed in the "Engineer's Report, Walker Field Airport, Grand Junction, Colorado", Isbill Associates, February 26, 1981.

The attached map shows the drainage scheme for Filing No. 1. The numbered drainage areas indicated on the map are: 1) The area between Lot 2 and H Road plus the north side of Lot 2 for drainage away from the building. The runoff from the airport flows into this basin. 2) The portion of Lot 2 draining into the Horizon Drive borrow ditch. 3) The area draining into Hilaria Avenue. The flow will be in the street gutters, collected in catch basins and piped to the Horizon Drive borrow ditch. 4) The majority of the parcel plus the west part of Lot 1. 5) The balance of Lot 1.

The runoff was estimated using the rational formula. A coefficient of 0.3 was used for the undeveloped ground and a weighted coefficient of 0.8 for the developed ground (25% at 0.3 and 75% at 0.95). The time of concentration is 25 minutes. The historical and developed flows from five year and one hundred year storms are:

Basin	Area	5 Year Historic	5 Year Developed	100 Year Historic	100 Year Developed
1	10.9 Ac	2.4 cfs	6.3 cfs	9.0 cfs	24 cfs
2	2.8	0.6	1.6	2.3	6.2
3	5.8	1.3	3.3	4.8	12.8
4	49	10.6	28	40	108
5	5.5	1.2	3.2	4.5	12.1
TOTAL	74 Ac	16 cfs	42 cfs	61 cfs	163 cfs
From Airport*		45	40	91	60
TOTAL		61 cfs	82 cfs	152 cfs	223 cfs

* See the Isbill report for discussion on the airport's runoff volumes.

To avoid adverse impacting of properties downstream from this development, the rate of flow leaving the property will be controlled. This will be done by constructing flood detention ponds which will impound the excess runoff volume caused by the development of the property. The water will discharge at a controlled rate, but over a longer period of time.

There will be three areas where ponding will occur: in the southern corner of Lot 2, in the southern corner of Lot 1, and northwest of Lot 1. The ponding at the southern corner of Lot 2 will occur when the capacity of the culvert under Hilaria Avenue is exceeded. That culvert will be a 36" RCP with a four foot deep approach channel. The capacity before the channel is overtopped is 50 cfs, which is sufficient to pass the five year storm. The excess flow from larger, less frequent storms will overtop Hilaria Avenue at its sag point.

An area west of Lot 1 will be used as the main flood detention pond for the parcel. A 33-inch culvert will allow the five year developed storm (28 cfs) to pass and will keep a discharge rate of 40 cfs on the 100 year flood. Sixty thousand cubic feet of storage will be provided in the detention pond.

The third detention pond will be located near the southern corner of Lot 1. The exact location and shape of the pond will be designed by the developer of the lot. Since this parcel is zoned HO, the development plans for this and all other lots will be reviewed before they're allowed to proceed. The subdivision plat sitpulates that a 17,500 cubic foot detention be constructed on the lot. The pond area may be used for parking or landscaping, since the ponding will be needed only for storms with a recurrance interval of greater than five years. The outlet of the pond should be designed to pass 82 cfs without ponding and limit the 100 year runoff rate to 150 cfs.

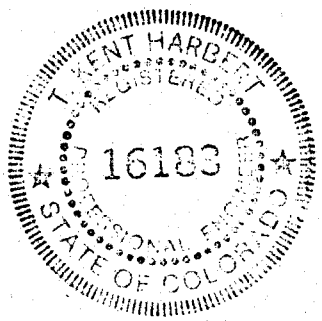
By constructing flood detention ponds, the runoff from CH Four Commercial Park will be controlled. Runoff from storms with recurrance intervals of up to five years will be allowed to flow unimpeded off the property. Larger, less frequent flows will be detained, with the 100 year runoff rate kept to the historical rate for the property.

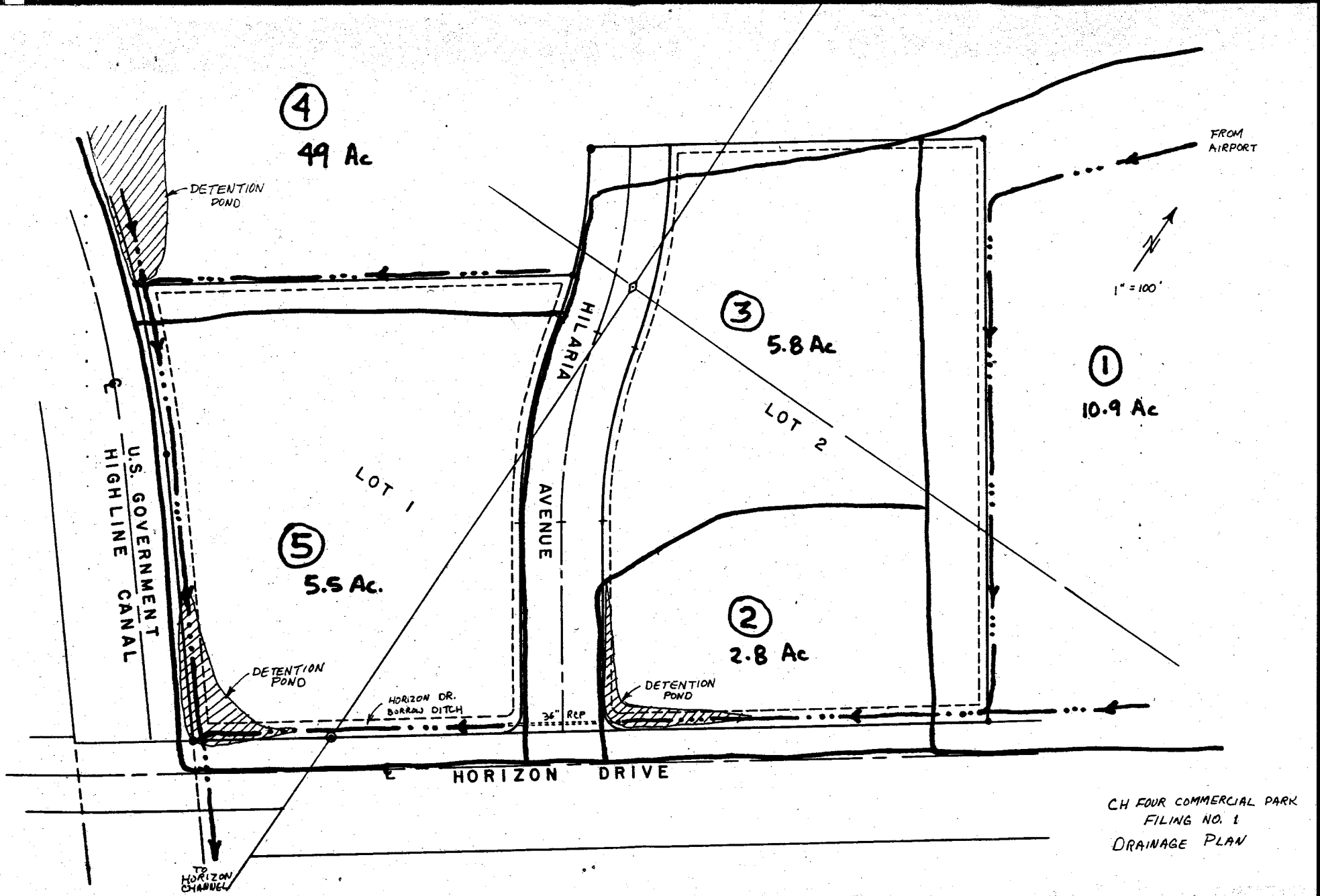
Submitted by:

WESTERN ENGINEERS, INC.

Kent Harbert

T. Kent Harbert, P.E.





CH FOUR COMMERCIAL PARK
FILING NO. 1
DRAINAGE PLAN

GEOLOGIC REPORT
For The

SUBDIVISION

Client:
Bruce Currier
2760 H Road
Grand Junction, CO 81501

Prepared by:
Western Engineers, Inc.
2150 Highway 6 & 50
Grand Junction, CO 81501

INTRODUCTION

The proposed _____ Subdivision is a parcel of land of about 76 acres located in the NW 1/4 of Section 31, T1N, R1E, Ute Meridian and the NE 1/4 of Section 36, T1N, R1W, Ute Meridian. The site is bounded on the north by H Road, on the southeast by Horizon Drive, and on the southwest by the Highline Canal.

A geologic map on a plat of the land is included with this report. The locations and logs of 8 power-auger holes which provide subsurface data are shown.

SUMMARY

The site is underlain by 3 to 25 feet of mostly fine grained soils which overly bedrock of Mancos Shale. These soils are mostly dry and water was not found in the test holes. The deeper soils occupy an ancient stream channel beneath the center third of the property. Two low hills capped by 6 to 15 feet of very fine silty sand soils lie on the property, one on the northeast boundary, the other near the west boundary. The surface of the site slopes from 10% to 2% generally to the Southwest.

Part of the land has been used for agricultural purposes in the past. Seasonal flows in the Highline Canal could create a water table in the deeper soils adjacent to the canal.

No critical geologic hazards exist that would preclude the proposed development at the site. Adequate drainage plans for storm run off will be necessary to prevent ponding of water against the canal. Existing drainage facilities beneath Horizon Drive and the canal are inadequate.

DISCUSSION

The geologic setting is in the Grand Valley on the northeast limb of the Uncompahgre uplift. Beneath the site formations of

late Mesozoic clastic sedimentary rocks dip about 3° to the Northeast. Bedrock beneath the proposed subdivision and much of the Grand Valley is Mancos Shale, a marine deposit of late Cretaceous age. The Mancos Shale has been eroded from its original thickness of approximately 3,800 feet to about 1,100 feet beneath the site.

Soils at the site are all basically fine-grained and relatively dry. Three types of soil are mapped by the SCS at the site although their map does not cover the whole property. These soils are:

(1) Billings silty clay loam, an alluvial soil derived from the Mancos Shale and to a lesser extent from sandstone formations in the Book Cliffs northeast of the site. These soils are up to 25 feet deep and occupy an old channel trending southwest beneath the center third of the site (see the included map). A lenticular stratification exists in the soils creating lenses of silty clay, clay, fine sandy-silt, and silty-clayey fine sand. During periods of water in the Highline Canal a water table can be expected to develop in these soils. The internal drainage of the soils is generally low but varies somewhat within the lensed structure. The soils increase in moisture content with depth to a nearly saturated state just above bedrock but no free water level was found in the test holes. These soils are moderately plastic and can be classified as ML-CL, ML or CL on the Unified Chart. These soils have a high dry strength, and a low shear strength when wet.

(2) Fruita very fine sandy loam, occupies the tops of the two hills on the property. This soil is a dry, very silty very fine sand, lying on a very irregular erosion surface on Mancos Shale. They vary in depth from about 5 feet to over 15 feet on the hill near the west boundary. The internal drainage is medium in these soils, and they are moderately well consolidated. These soils can be classified as a SM or ML on the Unified Chart.

(3) Persayo, silty clay soils underlie the remainder of the site. These are dry, residual soils formed directly from the underlying Mancos Shale. These soils are shallow and rarely exceed 10 feet in depth averaging 3 to 5 feet and grade downward into shale. These soils as well as the Billings soils may contain small amounts of swelling clays and due to the marine nature of the Mancos they do contain soluble sulfate salts. These soils can be classified as a CL or ML-CL on the Unified Chart.

Storm runoff from properties upslope (Northeast) of the site will tend to pond along the southwest boundary in a low area next to the raised north bank of the Highline Canal. A single box culvert drains beneath Horizon Drive and a small pipe drains under the canal. These are not sufficient to properly drain flood runoff. A flood retention pond could be created in the low wooded area adjacent to the Highline Canal along the Southwest border. This area can be designated as open or park space and would provide a place for the temporary storage of storm runoff. A small drain beneath the canal could then discharge the ponded runoff under the canal and off the site. This may not be the only alternative to controlling flood runoff.

Domestic water for this subdivision will be provided by a municiple source. The subdivision will also utilize existing sewage disposal facilities.

Commercial mineral resources of metallic or non-metallic nature are not found in the area. There is a possibility that production of oil and gas from underlying sandstone formations might be developed. There is production from these formations nearby.

CONCLUSIONS

1.) There are no critical geologic hazards that would preclude the proposed development at the site.

2.) The surface soils are generally dry and fine-grained and are characterized by a high dry strength and a low wet strength.

3.) A water table does not presently exist in the soils at the site, but may exist in the deeper soils near the canal during the irrigation season due to water in the canal.

4.) The soils contain soluble sulfate salts and a sulfate resistant cement should be used.

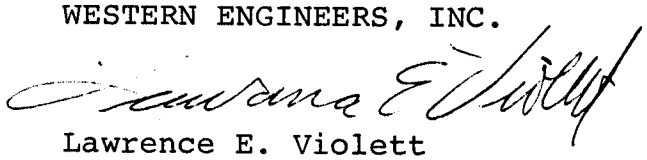
5.) Excavation in the soils will not be particularly hazardous.

6.) Flood water from storm runoff will accumulate in low areas near the canal. Adequate flood-control and drainage will have to be provided. The potential for excessive erosion from storm runoff is moderate to low.

7.) The area has no record of destructive activity.

Submitted by:

WESTERN ENGINEERS, INC.



Lawrence E. Violett

FLOOD HAZARD REPORT

C H Four Commercial Park

C H Four Commercial Park is located south of H Road and northwest of Horizon Drive. It is not in any designated flood way. There is an area above this property which will discharge runoff onto it. That area is the property currently being developed for the expansion of the Walker Field Airport facility. Although the airport expansion includes a storm drain to intercept some of its runoff, there will be an increase in the amount of water discharged onto the C H Four property. Development at the airport should include a means of mitigating this impact. We have corresponded with the airport's engineer, but have not received their response on how they are proposing to control the runoff rate. If the increased runoff is going to discharge onto the property, provisions can be made to route it through the development. As for the increased runoff from C H Four, when it is developed, flood retention ponds will be used to contain the runoff and discharge it at a controlled rate so properties downstream won't be impacted.

Submitted by:

WESTERN ENGINEERS, INC.

Kent Harbert

T. Kent Harbert, P.E.

"SCREENING AND LANDSCAPING PLAN"
for
CH4 Commercial Park

1. The intention of the project is to create a business park with a campus style setting with abundant landscaping to set a pleasing setting.

2. All plans would be reviewed by a design review committee for architecture, engineering, siteing of buildings and the landscape development aspects.

3. Sketches of the project will receive specific treatment.

   a. The peripheral or boundary of the project will receive either berming, fencing or stream plantings in combination or separately as may require to inward orient the park.

   b. Each site boundary within the park will receive either streaming or edge treatment or design will insure that one project site will blend into another.

4. All parking will be screened to an extent to relieve the view of parking areas.

5. All plant materials will be drought resistant and/or native types as possible to reduce water consumption.

TREECE LAND INVESTMENTS
RANCH-COMMERCIAL
770 HORIZON DRIVE
GRAND JUNCTION, COLORADO 81501

JACK TREECE

TELEPHONE
303-243-4170

IRRIGATION COMMITMENT LETTER

May 1, 1981

Planning Commission
Grand Junction, CO 81501

Gentlemen:

I am writing concerning available Highline water for our Campus Style Office Park Development. Because the property is located north of the Highline Canal, there is no Highline Canal water officially designated for the acreage that this Office Park is located on.

Because we do not have irrigation water available, we plan to put in trees, shrubs and grasses that have a low water requirment. We plan to use trickle irrigation, water retaining mulches under the shrubs and to arrange our storm runoff water in such a way that it can be used for irrigation.

Ute Water is installing a large line just north of this property and we plan to use Ute Water in conjunction with our low water use irrigation program along with establishing certain areas as strictly desert type landscaping.

Sincerely,

Bruce C. Currier

Bruce Currier

BC:jm

PERSAYO-CHIPETA SILTY CLAY LOAMS, 0 to 2 percent slopes, Class IVs (Pa)

At least 80 percent of this complex consists of Persayo silty clay loam, 0 to 2 percent slopes. The other member of the complex, Chipeta silty clay loam, 0 to 2 percent slopes, occurs as small irregular bodies of light-gray to gray silty clay loam too small to separate on the map. These soils are similar in most respects, but they differ slightly in a few. Aside from their color difference - the Persayo soil is a pale yellow whereas the Chipeta is gray - the Persayo has a somewhat higher silt content, a slightly deeper surface soil, and a somewhat less compact subsoil.

The 8- to 10-inch surface soil of Persayo silty clay, 0 to 2 percent slopes, is a pale-yellow silty clay loam that contains a few scattered, pale yellow, easily crumbled, shale fragments. Below this depth the shale fragments generally are increasingly more abundant, but in places there are not many to depths of 15 to 18 inches. This material is hard and compact when it is dry. When wet, however, it is less plastic than in the Chipeta soil and therefore is slightly more permeable to plant roots. The soil is calcareous from the surface downward, although the lime is not visible. A small percentage of salts is common, but the cultivated acreage adversely affected is small. A slight scattering of pebblelike aggregates of gypsum over the surface is common. Seams of gypsum occur in the underlying shale strata. Both soils have developed in place from materials weathered from Mancos shale.

The organic-matter content in both soils is very low. Internal drainage and permeability to plant roots are slow.

Soil limitations are classified as severe for sanitary land fill (depth to rock, slope), septic tank absorption fields (depth to rock, slope), and sewage lagoons (depth to rock, slope). Limitations are moderate to severe for local roads and streets (shrink-swell, depth to rock and slope), shallow excavations (depth to rock, slope), dwellings with basements (shrink-swell, depth to rock, slope), dwellings without basements (shrink-swell, depth to rock, slope.)

SUBSURFACE SOIL
AND
FOUNDATION INVESTIGATION
FOR
CH FOUR COMMERCIAL PARK
GRAND JUNCTION, COLORADO

Client:
Bruce Currier
Grand Junction, Colorado 81501

Prepared by:
Western Engineers, Inc.
Grand Junction, Colorado 81501
April, 1981

SUMMARY

The site of the CH Four Commercial Park Subdivision is located southwest of the Walker Field Air Terminal near Grand Junction, Colorado. The soil profile generally consists of the following:

1.) 0 to 22 feet of silt-clay overburden, lensed, dry to moist near the surface to saturated near the shale contact in the areas of deep overburden.

2.) Dark grey to black formational Mancos Shale directly underlying the silts, sands and clays and extending to an undetermined depth. Lenses were found in the shale which vary in soundness. The shale grades generally more competent with depth.

The water table was not encountered in the drill holes, however it is expected that one might seasonally develop in certain areas.

CONCLUSIONS AND RECOMMENDATIONS

The silt-clay overburden soil will not provide totally unyielding support for structures. The soil provides relatively high allowable bearing values in its natural dry state, based on general shear failure. However, some minor settlement will occur prior to achieving the allowable shear load and substantial settlement will occur if the soil becomes wet due to its collapsible characteristics.

The allowable bearing value based on general shear failure of the dry soil is between 2,000 and 3,000 lbs./sq. ft. Settlement estimates indicate that if soil moisture influence reaches very deep below foundations, that settlement under load may be excessive. Soil consolidation and subsequent foundation settlement may be excessive for some structures even under natural soil moisture conditions. To limit differential movement to no more than .75 inch for structures with wall loads of 2,000 lbs./ lin. ft. or

less and column loads of 10 KIPS or less, applied foundation loads must be limited to maximums of 1,400 PSF under natural soil moisture and 500 PSF if soil moisture increases are expected. Adjustments in the allowable soil bearing capacity may be made based on more specific analyses.

Positive moisture protection is important and may include the following:

1.) Positive surface grading and drainage away from foundations.

2.) Collection of roof runoff and transportation away from foundations.

3.) Subsurface foundation drains, to intercept surface moisture, including the use of impermeable membranes.

4.) Compaction of backfill is important.

Foundation areas should be prewetted as deep as practical and compacted. Footing or footing-stemwall combinations should be capable of free spanning at least 10 feet under full design load. Fill under building areas must be compacted to at least 90% Standard Proctor. Minimum footing width should be 12 inches. The soil bearing capacity may be increased by use of a free draining, compacted, granular material under footings. It is recommended that a minimum of 4-inches of gravel be placed and compacted under all load supporting elements and slabs. Preloading of the soil may be considered to reduce potential consolidation. However, elimination of most of the consolidation potential by this means will be impractical due to long time requirements. If preloading is undertaken, the following items must be considered:

1.) Drainage at the existing ground surface beneath surcharge loads must be allowed. Provisions for additional subsurface drainage may also be considered to accelerate consolidation of the upper soils.

2.) Soil bearing pressures must still be limited under footings to prevent exceeding the shear strength of the upper soils.

3.) Prewetting prior to application of the surcharge load may be considered due to the collapsibility of the soil.

4.) The progress of the soil consolidation must be monitored to provide an indication of when sufficient consolidation has been achieved.

All footings should have a minimum cover of 2 feet. Footings should not be used for support of wall loads greater than 2,000 lbs./lin. ft. or column loads greater than 10,000 lbs. unless more site specific analyses are performed.

The shale was found to exhibit a considerable variation in swell potentials with one test indicating a quite high swell. Site specific investigations and design should assure one of the following conditions:

1.) A minimum of 10 feet of soil will remain between the bedrock and foundation elements.

2.) The bedrock does not exhibit significant swell potentials.

3.) The foundation is designed adequate to resist or adjust to uplift pressure without damage.

The use of caissons may be practical and desireable in this subdivision. Caisson designs must consider the following:

1.) Some tests in the shale revealed allowable bearing values of 20 KSF 4 feet into the shale. Bearing capacities will generally increase with penetration depth

into the shale. Caissons must penetrate at least 4 feet into the shale.

2.) Caisson group considerations must be made for closely spaced caissons.

3.) Minimum caisson diameter should be 12 inches.

4.) Caisson holes must be clean and dewatered prior to pouring concrete.

5.) Portions of caissons placed below the surface of the shale may be designed for 500 PSF skin friction.

6.) Caissons must be adequately reinforced and tied to grade beams.

Piling driven into the shale will provide economical and practical support. Based on penetration resistance of this material, it is estimated that 8-inch piling can be driven into this material and provide up to 75 KIPS per pile within the upper 5 feet of the sound shale. Larger piling and deeper penetrations will provide higher load carrying capacities. Exact final penetration depths at which the required load carrying capacity will be achieved cannot be predicted due to the variability of the formation. Piling must meet the following requirements:

1.) Piling must be sized to be capable of being driven to and supporting design loads.

2.) Piling must have a flat tip or flat shoe of 80 sq. in. minimum area.

3.) Piling must be 8-inches diameter of 8" X 8" square, minimum.

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

5.) Piling must use only end bearing for support.

6.) Predrilling must be minimized.

7.) The corrosion potential of the soil and ground water must be considered in designing steel piling.

The load carrying capacity of piles or caissons in groups must be reduced according to some acceptable method. If substantial permanent loads are to be placed on the surface surrounding piling or caissons, the effects of down drag due to soil consolidation must be considered.

Order-of-magnitude estimates of lateral restraint for single piles or caissons are 5,000 lbs. per foot of diameter for hinged joints and 20,000 lbs. per foot of diameter for fully fixed joints.

Rigid floating or raft foundations may also be considered to eliminate the potential for differential foundation movement.

Subgrade under floor slabs must either be compacted or stabilized. A minimum of 4-inches of gravel must be placed and compacted under slabs. If no differential movement between foundation elements and slabs is tolerable, one or more of the following techniques should be considered in the design of floor slabs:

1.) The use of floating slab foundation.

2.) Preloading the slab area.

3.) Floors supported entirely by foundation members.

Either the use of item 3 above or independent slabs should be employed where moisture increases under slabs are possible. If a small amount of slab movement can be tolerated, normal floor slab construction can be employed if the slab is nominally reinforced, strengthened at the edges, and isolated from foundation members.

Heavily loaded slabs will require additional design considerations. Placement of structural fills will induce some consolidation in the supporting soil.

Flexible pavement designs must include the following:

1.) Design for the saturated CBR value.

2.) Provide adequate surface drainage.

3.) Compact subgrade to minimum 95% Standard Proctor.

All structural fills must be uniformly compacted to at least 85% Modified Proctor and consist of an acceptable quality material.

Sulfate resistant cement must be used in all concrete structures to be in contact with the soil or ground water.

Retaining walls must be designed to resist an equivalent fluid pressure of 40 lbs./cu. ft.

SCOPE

The investigation summarized within this report was undertaken to primarily determine the suitability of surface and subsurface soils to support commercial structures to be located within the CH Four Commercial Park Subdivision, which is situated southwest of the Walker Field Air Terminal and is bounded by Horizon Drive to the southeast, the Highline Canal to the southwest, and H Road to the north. Neither the location of the structures nor the magnitude of the building loads were known at the time of this investigation.

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 lengths

of piling and depths for caissons, if used, can be subsequently estimated. 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 swell or consolidation of any base material.

2.) Shear failure of the founding material.

3.) Differential movement of the supporting material.

GEOLOGIC HISTORY

The bedrock, or base material, in the Grand Junction area north of the present Colorado River channel is dark grey to black Mancos Shale. The regional dip of the shale is approximately 3° 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.

In the area of the previous Gunnison and Colorado River Deltas, which at times covered an extensive area in the Grand Junction vicinity, gravel, cobble and boulder outwash has been deposited by the rivers. This outwash, the top elevation of which is quite erratic, 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 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 are identified primarily as Billings Clay in the lower areas of the valley and range to Persayo and Chipeta classifications nearer the Bookcliffs where

the soils are predominately colluvial and pedimental in origin, with some soils having been formed in place as a result of weathering of the underlying formation. These soils were laid down in such a manner as to create lenses ranging from reasonably clean sand and small gravel to dirty silts varying 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.

It is evident from surface geology and the results of previous investigations that an ancient primary drainage channel meandered from the Bookcliffs approximately along Horizon Drive to 12th Street. This channel was cut as much as 50 feet into the Mancos Shale and eventually was filled back with alluvial sediments. At certain elevations in this channel, large amounts of decomposed organic materials can be found. This channel was found to traverse the property being investigated.

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

AREA SURFACE CONDITIONS

The site under consideration is located southwest of the Walker Field Air Terminal in Grand Junction, Colorado. Much of the site is presently being used as an agricultural field. The southern portion is under established alfalfa and the western part was to be cultivated after completion of this investigation. Otherwise surface vegetation was sparse. Several small irrigation ditches traverse the property. The area is bounded on the southeast by Horizon Drive, on the southwest by the Highline Canal and on the north by H Road. The ground surface exhibits moderate drainage generally to the southwest.

SUBSURFACE CONDITIONS

The site subsurface conditions were examined by means of 10 test holes dug with a truck mounted Mobile drill rig. Holes were advanced by use of a combination of continuous flight 4-inch O.D. solid auger, 2.75-inch I.D. hollow stem auger, and BX core barrel. The test hole locations are given on Plate 1 in the APPENDIX and the logs of the holes are shown on Plates 2-11.

The soil profile generally consists of the following:

1.) Distinctly lensed silt-clay with some layers of sand and small gravels ranging from dry to moist near the surface to saturated near the shale contact in the areas of deep overburden. This soil is buff brown to tan in color and generally exhibits low to moderate plasticity (non-plastic up to a plasticity index of 14) and moderate dry strength. Water soluble salts are visible in the soil, particularly when the soil is dried. A small amount of black decomposed organics are found concentrated primarily at distinct horizons. Also found in this soil are lenses of tight clays, well consolidated, fewer silt size particles than the surrounding soil and ranging in thickness. This tight material was found variable in depth and location. The upper silts and clays were encountered in the drill holes ranging in depth from 3 to 22 feet.

2.) The formational Mancos Shale is found underlying the silts and clays. The shale normally found in this area north of Grand Junction consists of lenses of sound shale between layers of softer shale and very tight clays. The lenses mostly vary in thickness from 6 inches to 2 feet. Below the partially weathered and less competent upper horizon of the Mancos Shale formation, the shale becomes very hard and more uniform. However, the depth at which the shale becomes more competent was not reached in the drill holes. The upper

3 to 4 feet of the shale is highly weathered and decomposed grading gradually more competent with depth. Water soluble salts are found in high concentrations in joints and bedding planes in the shale. As discussed in the Geologic History section, this site is located in the vicinity of a relatively deep ancient channel. In this preliminary type of investigation, an insufficient number of holes were drilled to determine with any degree of accuracy the erosional pattern of the shale's surface. However, the data from these test holes along with information from previous holes and the location of shale exposures visible on the ground surface, indicate a general pattern of the surface of the shale. An attempt was made to place contours on the surface of the shale and a general erosional pattern became evident. This information is presented on Plate 12 in the APPENDIX. It should be noted that a good deal of interpolation was necessary to produce this map and the contours are by no means precise. The map indicates that a major drainage channel at one time crossed the western portion of the property running north to south. It also appears possible that a smaller tributary channel may have flowed approximately along Horizon Drive.

The water table was not encountered in any of the holes. However, it would be expected that, due to the proximity of the canal and summertime irrigation practices, a water table could seasonally develop in certain areas of this site.

LOAD SUPPORT

The upper silt-clay soil at the site which overlies the bedrock will not provide totally unyielding support for structure loads. A certain degree of soil consolidation will occur under any applied load and will increase in magnitude with increasing load. The grain size distribution and the manner of deposition of these soils resulted in a material which exhibits low to moderate consolidation potential as well as moderate to high shear

strength in their relatively dry natural state. However, much of this soil possesses a somewhat high natural void ratio and slight cementation resulting in a "collapsible" structure when wetted. Undisturbed soil samples from the overburden material in most locations, when wetted under a constant load, experienced moderate to high consolidation (see consolidation test results, Plates 13-17, APPENDIX). As can be seen, the natural soil consolidates uniformly under natural moisture content. However, upon saturation of the samples under 1,000 lbs./sq. ft. load, consolidation occurred which varied from 1.4 percent to 2.0 percent. A fairly large percentage of the wetted consolidation potential which this soil initially possessed after deposition has been previously experienced from wetting during irrigation and due to the weight of the soil presently in place. The percentage of consolidation which occurs when the soil is wetted increases with increasing loads and decreases with decreasing loads, conversely, swell which occurs upon wetting decreases with increasing loads. After the sample becomes saturated, it again consolidates uniformly under increased loading. The large variation in swell-consolidation characteristics should be noted. In most locations, the only natural consolidation which has occurred has been due to the weight of the soil presently in place, as discussed above.

The heterogeneous nature of these soils results in the fact that settlement which does occur will most likely not be uniform. The maximum potential differential settlement can occur within a horizontal distance as short as 20 feet. A certain degree of soil consolidation will occur under any load and will increase in magnitude with increasing load.

With typical commercial type units which are not designed to withstand large permanent differential movements, the soil movement must be limited to acceptable levels to prevent major cracking of wall coverings and veneers and even the possibility of structural damage. The primary foundation design problem in these soils is to provide a foundation which will not apply loads to the soil sufficiently high to either exceed the soil bearing strength or cause

excessive soil consolidation. The potential for substantial differential foundation movement is great for foundations which do not compensate for these soil conditions. The allowable soil bearing capacity based strictly on preventing general shear failure of the supporting soil for foundations placed within 5 feet of the existing ground surface, varies from 2,000 lbs./sq. ft. to 3,000 lbs./sq. ft. and averages about 2,500 lbs./sq. ft. for the soil in its naturally dry state. These values must be considered with extreme caution in conjunction with certain foundation design considerations. Significant soil strains will be required to mobilize full shear strength of the supporting material. For many structures, excessive soil consolidation may occur under loads substantially less than the allowable bearing values presented above, based strictly on soil shear strength. Rough settlement potential analyses under various foundation configurations and loads have been performed and will be discussed in this paragraph. As will be shown, even when considering the normally dry soil state, allowable soil bearing capacities decrease substantially as the allowable foundation movement decreases. When allowable foundation movement is limited to very low magnitudes, the allowable soil bearing values are decreased to restrictively low values. The settlement potential is impossible to predict with any degree of accuracy in these erratic soils. However, order-of-magnitude settlement estimates were made based on the assumed building load configurations previously described and using theoretical calculations assuming a uniform material. Making use of the elastic theory to determine soils stresses, [1.] and using rough estimates of exterior wall loads and required footing size, a computer analysis was employed to estimate potential foundation movements. Since actual final building loads were not known at the time of this investigation, it was assumed for the purposes of this analysis that the maximum design wall loads would not exceed 2,000 lbs./lin. ft. and that the maximum design column load would not exceed 10,000 lbs. The results of these analyses indicated that, if the soil remains in its relatively dry natural state in areas where the overburden soil is found to be relatively deep (15 to 22 feet), the allowable soil bearing capacity must be reduced to 1,400 PSF to

maintain differential settlements at .75 inch or less due to the consolidation potential of the soil under load. If the soil is to become saturated, differential movements in excess of .75 inch can be expected under applied loads which exceed 500 PSF due to the open structured nature of these overburden soils.

The soils throughout the Grand Junction area vary radically from one location to another. In a preliminary investigation of this magnitude, the soil bearing characteristics at each location can not practically be determined. Some building sites exhibit soil bearing capabilities well in excess of those presented above. The values presented above are intended to provide for safe foundation construction under the worst overburden soil conditions encountered in the proposed development. In addition, where the overburden soil is shallow, swell potential of the underlying shale may govern foundation design rather than settlement due to soil consolidation. The data collected in this investigation must be supplemented with additional field exploration, testing, and determination of the soil bearing capabilities in view of this site specific data and in light of actual building loads and foundation configurations. Factors that must be considered in the determination of allowable bearing values include the size of foundation elements, the depth at which foundations are placed, the magnitude of building loads and their variation across the proposed structures, the depth of overburden soil across the actual building site, the expected depth of soil moisture influence, and the amount of differential movement that the specific structures can experience and maintain their safety and serviceability. Since these soils are so heterogeneous, and the soil conditions at each building location and each depth can not be feasibly determined, as discussed above, any unusual conditions discovered during construction should be reported immediately to the soil engineer for investigation.

While footing-stemwall or monolythic slab-footing configurations with wall loads of 2,000 lbs./lin. ft. or less and column loads of 10 KIPS or less could be expected to perform reasonably well supported on these overburden soils where they are relatively deep and if they are maintained in their natural relatively dry state, significant

soil moisture increases will result in substantial settlements. Very positive moisture protection measures must therefore be employed if these overburden soils are to be safely used for foundation support. Such precautions must include the following:

1.) Drainage of surface water is important. Grading away from the structures, interceptor ditches, and other positive means should be employed to assure drainage of all surface runoff. Grade away from the buildings should be at least 5% for a minimum of 20 feet.

2.) Roof runoff must be collected and discharged well away from the building. Use of roof gutter, downspouts and drainage or a similar system should be considered.

3.) To assure adequate drainage of backfill and to protect the supporting soil from moisture, a subsurface perimeter drain may be considered where practical. Such a drainage system should consist of a perforated pipe surrounded by gravel and sloping to a discharge point away from the structure. The gravel should be underlain by an impervious membrane which is sealed against the foundation and is lapped up on the foundation cut slope. The membrane should also slope down to the discharge point. The membrane is an important part of this system and provisions should be made to protect it from damage during construction. Consideration may also be given to extending the membrane a certain distance away from the structure.

4.) Compaction of backfill is important to prevent backfill settlement after construction is complete. Subsidence in the backfill increases the loads against the structure walls and provides depressions directly adjacent to the foundation for water to collect in. Backfill should be compacted to at least 90% Standard Proctor Density (ASTM D-698). Backfilling must be done with care to avoid overloading or damaging foundation walls.

In order to minimize the potential for hydroconsolidation in the soil under foundations a certain amount of preconsolidation should be achieved in the upper portions of the soil. This can be done by pre-wetting the soil as deep as practical and compacting the upper layers of soil which will support the structure to at least 90% Standard Proctor. Due to the heterogeneous nature of this material and its bearing characteristics, and the potential for isolated areas of hydroconsolidation, footings or footing-stemwall combinations should be designed to free span a minimum 10 feet under full design load. All building loads should be supported on the same type of material. No foundation elements nor floor slabs should be placed on fill unless the fill is uniformly compacted to minimum 90% Standard Proctor Density. In most locations within the subdivision, there is no maximum depth limitation for foundations and slabs as long as positive moisture protection is provided, and the swell potential of the underlying shale is considered.

There are methods by which the load bearing characteristics of the soil may be enhanced. One such method is by replacement of a portion of the existing upper soils with a good quality free draining compacted granular material. By this method, the consolidation potential in the upper zone of major load influence is substantially reduced as well as achieving a reduction of the structure loads applied to the soil by increasing the effective footing width. By this means, loads are transmitted through the gravel at the angle of internal friction of the gravel (approximately 35°). The gravel gives the added advantages of bridging over the "Soft Spots" and of providing partial protection from frost action since coarse, non-cohesive soils are only slightly susceptible to frost heave. If this technique is employed, the granular fill must be placed only on undisturbed soil (not on unconsolidated fill material) and must be compacted to at least 90% Modified Proctor Density (ASTM D-1557). Any increase in load applied to the soil due to the structural fill itself will induce additional consolidation in the supporting soil. Additional loads induced by the fill, which will exceed that presently in place as a result of fill materials higher in unit weight than the soils removed and by fills placed above the existing ground surface, must be considered along with applied building loads. Allowable bearing values on granular fills are dependent on the fill

thickness, structure loads, and underlying soil bearing capacity and should be calculated on a site and structure specific basis. Based on the above discussion, it is recommended that a minimum of 4-inches of gravel be placed and compacted under all load supporting elements and slabs.

Preloading of these soils may be considered to reduce the soil consolidation potential. This alternative entails the temporary placement of a loading surcharge over the foundation areas equivalent to 1.5 to 2 times the final expected foundation loads. This alternative, however, is somewhat impractical due to the expense involved with obtaining and repeated handling of a suitable surcharge material as well as the excessive time which will be required to allow most of the potential consolidation to occur in these saturated, relatively impervious deposits. Little natural internal drainage exists within this deposit. The result of this is that a long period of time will be required to affect a significant percentage of the final long term consolidation in areas where the overburden soil is deep. Full consolidation could not be expected for a period of years in these areas. If preloading is a desireable alternative, the following items must be considered:

1.) A slight decrease in the amount of time required for soil consolidation can be achieved by use of subsurface drains under the surcharge fill to dissipate excess pore pressures. However, installation of drainage provisions deep enough to have a significant effect on the time required for consolidation would be impractical due to the depth of the deposit in some areas. The bottom portion of the surcharge fill should be free draining to allow pore pressure dissipation.

2.) Preloading only reduces the amount of potential soil consolidation but cannot be expected to substantially increase the ultimate shear strength of these fine grained soils.

3.) Effective preconsolidating would also involve prewetting the soil in areas of concern to at least 75% of the soil depth prior to placing surcharge loads on the soil. By this means most of the potential settlement under the saturated soil conditions will occur prior to construction. If this method is used, foundations may be designed for the allowable soil bearing capacity based on shear strength.

4.) Movement monitoring points must be installed on the original surface to provide information on when an acceptable amount of consolidation has occurred under the surcharge load and to monitor rebound as the surcharge is removed.

The alluvial soils found in the Grand Junction area are generally not subject to major frost heave problems. However, since much of the soil at the site is silty in nature and silty soils are most susceptible to frost heave, all footings should have a minimum cover of 2 feet. Frost heave need not be considered for interior foundation elements. Although adequate foundations can be constructed utilizing footing type construction if the techniques discussed herein are employed, extreme caution, and the liberal application of safety factors must be used since any additional load applied to the soils found at the site will result in soil consolidations of a significant magnitude.

It must be recognized that if certain foundation elements support primarily dead loads, while loads on other portions of the foundation consist of a large percentage of live and/or snow loads, the maximum differential movement will occur between these two areas since application of full live and snow loads will occur infrequently if at all.

Although footing-stemwall and column pad type of foundation construction can successfully be used in this area to support light to moderate building loads, it is readily seen that quite wide footings will be required to carry full design building loads if soil

saturation is a possibility. Unless more detailed and specific analyses are performed or unless the soil bearing capabilities are enhanced by one of the previously discussed means, we would not recommend using footings to support buildings loads in excess of 2,000 lbs./lin. ft. for walls and 10,000 lbs. for columns. In addition, as has been previously noted, where the formational shale is located near the existing ground surface, the swell potential of the shale may govern the design of foundations. Three swell tests were performed on undisturbed shale samples, the results of which are shown on Plates 15-17 in the APPENDIX. The tests indicated that most of the shale exhibits low swell potentials. Two of the samples indicated confined saturated swell pressures of 700 PSF and saturated swell volumes of from 0.8 to 1.8 at 1000 PSF confining pressures. However, one sample tested revealed a confined swell pressure of 7000 PSF and a saturated swell volume of 7 percent at 1000 PSF confining pressure, which indicates that layers exist in the shale exexhibing quite high swell characteristics. If the influence of this material due to moisture added as a result of this development can reach the foundation, the combination of the swell potential of the shale with the collapsibility of the overburden soils can have serious detrimental effects on the stability of foundations. This also indicates the importance of site specific subsurface soil investigations. The soil investigation and subsequent foundation design must assure at least one of the following conditions:

1.) A minimum 10 foot vertical distance will remain below the bottom of foundation elements and the top of underlying claystone or shale.

2.) The shale found to comprise the surface of the bedrock does not exhibit swell potentials sufficiently high to cause significant foundation movement. Assurance must be made that this low swell potential material extends across the entire building area and that it is a minimum of 5 feet thick.

3.) If none of the above conditions can be met, the foundation

must be designed to either resist uplift potentials or to undergo movement without damage. Caisson - grade beam, piling - grade beam, or floating slab configurations may be required.

In contrast to the upper fine grained overburden soils which are subject to significant consolidation, the formational Mancos Shale is capable of supporting heavy loads. Probably the most economically and structurally effective alternative for foundation support of all structures involves the use of the Mancos Shale for support. Pratically unyielding support of structure loads can be obtained in this manner. In most areas of this development, caissons will be a very practical alternative. These dry slightly cemented soils will maintain fairly large caisson holes without the need for casing except where the overburden soils are quite deep and become liquid near the bottom. The water table in most areas is sufficiently deep to prevent dewatering problems. As mentioned in previous sections, the shale becomes much more competent with depth. In some areas allowable bearing values in the shale were found to be 20 KSF about 4 feet below the surface of the shale and increase with depth. Caissons must penetrate at least 4 feet into the shale to obtain bearing below the highly weathered zone. Care must be taken to remove all loose material and water from the bottom of caisson holes prior to pouring concrete. When exposed to air, the shale rapidly starts to slake and generally deteriorate. Caissons should therefore be poured immediately or as soon as practical after drilling to assure competent end bearing. Minimum caisson size should be 12-inch diameter. Caisson designs should also include load contributions for downdrag as discussed in subsequent paragraphs for piling. Caisson spacing requirements are also the same as discussed for piling foundations. Other items which must be considered in the design of caisson foundations are as follows:

1.) Portions of the caisson which extend below the surface of the shale may be designed for 500 PSF skin friction. The skin friction contribution of the overburden soil to the

total load carrying capacity of the caissons should be neglected.

2.) Sufficient reinforcing must be provided in caissons to prevent separation of the caissons due to tensile failure under uplift pressures applied by the shale.

3.) Caissons must be adequately tied to grade beams.

Another alternative is the use of driven piling. This shale will provide moderately high support for end bearing piles. Dr. J.H. Schmertman of the University of Florida [3.] has developed a method of predicting pile load carrying capacities based on a standard penetration test soil profile. His method allows correction for depth of embedment of the pile into the bearing strata when a softer material lies above. Using this information along with standard penetration tests performed in the shale, the pile load carrying capacity of the shale, assuming 8-inch piles, varies from 10 to 20 KIPS per pile near the surface of the formation and up to 75 KIPS per pile at depths up to 5 feet into the shale. Larger piles and/or greater penetrations into the shale will provide higher load carrying capacities. The shale formation is non-uniform making it impossible to accurately predict depths at which specific load support capacities will be achieved at any given location. Piles may reach the required resistance within the upper 2 feet of the shale, or they may be driven as much as 10 feet, or more, into the formation. Final penetration into the shale varies with location, pile size and type, and can only be determined with some accuracy by driving test piles. In any case, 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.

During the pile driving operation, pile driving formulas may be used to determine the estimated pile capacity at the final depth. More than one equation should be used to provide a comparison since all tests have shown pile driving formulas to be quite erratic in resulting safety factors. The Engineering New Record formula may

be employed for its ease of use if used in conjunction with an acceptable dynamic equation such as the Janbu or Hiley formulas.

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 locations should be minimized. Piling must be driven to a predetermined set (number of blows/inch) as determined by an acceptable pile driving formula for the specific hammer used. By this means assurance may be obtained that each pile is capable of supporting its design load.

By making use of piling to support isolated column loads, exterior wall loads can easily and economically be supported on reinforced concrete grade beams spanning between piling.

It must be recognized that the possibility for differential movement exists should the column loads be supported on piling or caissons and the wall loads supported on a strip footing. The piling will provide essentially unyielding support for column loads while some movement of the strip footings must be expected.

Pilings must be sized on the basis of driving stress calculations as well as experience.

Due to the possible (although unmeasured) moderate to high soil-water conductivities, the corrosion potential effect on steel piles must be taken into account.

Where piles or caissons in groups are placed closer than 6 diameters, the allowable load per member must be reduced. An accurate estimate of group efficiency cannot be made without more precise information on building loads and configurations and pile or caisson size and spacing. The Converse-Labarre formula [4.] is a good

method for determining group efficiency. Minimum spacing should be 2 times the size.

If the surface surrounding a pile or caisson foundation is to be loaded with fill or other relatively heavy permanent loads, and subsequent soil consolidation around the members is anticipated, negative skin friction or down drag will induce additional loads. These additional loads could range from negligible values to 1,000 PSF of surface area depending on the amount of consolidation to be expected. If this possibility exists at any specific site, a more detailed analysis of the down drag load component can be made when more specific information on the magnitude of the loads is available.

Where the shale is found within 10 feet of the ground surface and exhibits significant swell potentials, a layer of non-bearing material must be placed under all grade beams to provide a "swell cushion".

Lateral loads which can be resisted by single piles or caissons are very difficult to predict for many reasons which include nonuniformities in the soil profile, complex shear patterns at failure, lateral consolidation under loads, and flexibility of the pile. The only method of obtaining these values with any acceptable degree of accuracy, is by loading test piles or caissons. However, order-of-magnitude values can be obtained with the use of soil shear strengths determined in the laboratory and application of this data to a passive resistance analysis. It is possible to use either the upper soils or the shale for lateral resistance, depending on the amount of fixity provided at the upper column-foundation member joint. If the joint is designed such that little of the lateral load can be transferred across this interface, (hinged connection), nearly all of the lateral load is carried by the upper soils. In this situation, only those soils above the saturation level are used in this analysis, since saturated cohesive soils act as a heavy liquid, mobilizing horizontally, rather than along the passive failure surface, and since resistance from soils lower in the profile is questionable due to pile or caisson flexibility. An

order-of-magnitude allowable lateral resistance value estimated for this case is 5,000 lbs. per foot of diameter. Alternately, if the column-foundation member joint is fixed, most of the lateral load is carried by the shale into which the lower tip of the member has been set. For the case of a joint designed for full fixity, estimated allowable lateral resistance, is 20,000 lbs. per foot of diameter.

One satisfactory alternative method of foundation support which has successfully been employed in similar circumstances is the use of a "floating foundation". This configuration consists of integrating load-transmitting structural elements into a rigidly designed floor slab. The floor slab must be designed sufficiently strong to support the imposed building loads while acting as a unit. This sometimes involves a "waffle" type reinforced concrete construction depending on the expected loads and building areas. This design method also normally involves placing and compacting up to 2 feet of gravel beneath the structural slab to help distribute building loads and eliminate the need for very conservative design assumptions as well as reducing total expected settlement. This method does not eliminate foundation movement, but uniformly distributes it around the building. The differential foundation movements which cause most building damage are completely eliminated by this method. There are some drawbacks to the use of floating foundations:

1.) The floating configuration is most effectively used with structures in which building loads are distributed and transferred to the slab by wall loadings. This is due to the fact that all building loads must be uniformly distributed across the slab and loads which are already distributed along walls require less slab strength than isolated concentrated loads. For the same reason, narrow buildings and buildings with relatively short roof and floor spans are more easily adaptable to the floating configuration. Buildings with heavy concentrated foundation loads or with long span structural elements may require excessive slab strength and much higher foundation costs in comparison to other alternatives.

2.) Since some movement must be expected with the floating configuration, the building design must anticipate some movement relative to incoming utility lines, parking areas, and peripheral sidewalks.

The primary advantage of the floating slab is that it is reasonably independent of soil consolidation characteristics in its performance. Settlement potentials in poorly consolidated soils are compensated for in the design. The use of a combination of preloading to eliminate a percentage of the potential consolidation and floating slabs, may be considered for time and safety considerations. However, it is also recognized that the use of floating slabs is normally limited to areas of very poor soil conditions where a high bearing capacity material is beyond economic reach with deep foundations.

FLOOR SLAB SUPPORT

After consideration of the unpredictable bearing characteristics of the upper soils, it is apparent that "soft spots" and general areas of low bearing do exist. Thus, although the silt clay soils have sufficient bearing capacity to support expected floor slab loads, precautions should be taken to bridge over the isolated soft spots and to prevent cracking of the slab in the low bearing areas. Such precautions include compacting the top 6-inches of supporting soil to 85% minimum Modified Proctor Density (ASTM D-1557).

For load support, compact gravel has the advantageous characteristics of: 1.) spreading the loads out by transmittal to the supporting soil through the gravel which exhibits an angle of internal friction of approximately 35°, 2.) providing a base which will bridge over isolated "soft spots" frequently found in this soil and generally resulting in more uniform support, and, 3.) providing partial protection against frost heave since coarse, noncohesive soils are only slightly subject to frost action. It is therefore suggested that a minimum of 4-inches of select gravel be placed and compacted under slabs.

As previously discussed, the application of even light loads such as floor slabs will result in soil consolidation and subsequent settlement to some degree. If it is imperative that slab movement relative to building foundation elements be totally eliminated, the following items may be considered:

1.) The floating type foundation configuration previously discussed results in a structure capable of adjusting to those potential movements.

2.) The preloading technique previously discussed in detail will allow construction of totally stable floor slabs with normal foundation construction.

3.) In order to eliminate the possibility of differential floor slab movement transmitted from the underlying soil, the floor can be supported by and attached to load carrying foundation elements. This can most easily be done with the piling-grade beam or caisson-grade beam foundation configuration using a structural slab which does not utilize the underlying soil for support or by use of joist-type construction at the ground level. Floor slabs designed under this method can be poured on grade but designed to act integrally with the foundation members.

Hydroconsolidation of the overburden soils under even light loads, accompanied by the swell of the shale under increased moisture conditions is conceivable. If the possibility exists for an increase in soil moisture under slabs, structures should be designed either for independent slabs which can move without damage to the structure, or for slabs supported only by grade beams on caissons or piling as discussed above.

However, settlements under lightly loaded floor slabs where adequate moisture protection is provided will be small and not significant with regard to the structural integrity or serviceability of normal commercial buildings.

The isolated "soft spots" discussed previously affect the performance of floor slabs also. Under light floor loads, a 4-inch slab on 4-inches of compacted gravel will provide the required strength. However, the movement which will occur in the supporting soils under even these light loads may result in minor cracks. These small stress cracks along with any shrinkage cracks which may occur do not, alone, cause concern, but result in loss of the floor slab's ability to bridge areas of low bearing capacity and may, in turn, result in development of additional cracks and subsequent deterioration of the slab. In order to prevent this from occurring the slab should be capable of retaining its bending strength through cracked sections. This is easily accomplished by the use of Welded Wire Fabric. 6 X 6, 10 X 10, minimum is recommended.

Often, relatively high stresses occur in the floor slab at the edges resulting from differential movement at the slab-foundation interface. In addition, floor slabs usually possess their lowest strength at the edges. Floor slabs on grade should therefore be isolated from foundation elements to allow complete independent movement and should be thickened to provide edge beams. If moderate to heavy loads are anticipated to be carried by the floor slab in any building area, the use of additional reinforcing of slabs, increasing the thickness of the slabs, increasing the gravel base thickness, or a combination of these may be required.

The placement of structural fills under building areas will increase the potential for long term settlement under slabs as previously discussed. Although primary consolidation will occur during the first few months after construction, secondary consolidation may continue for a number of years.

FLEXIBLE PAVEMENTS

The results of the CBR tests performed on proposed roadway subgrade soils indicated that the silty soil, when compacted, will provide moderately high subgrade support even when saturated and subsequently drained. Using the CBR values presented on Plate 19, will

result in minimal base requirements for paved areas. However, the strength of these soils when saturated and loaded immediately after saturation is very low. This factor in addition to the collapsibility of the soils indicate the importance of providing positive roadway drainage. Final street grading must be sufficient to assure maintenance of surface drainage after some settlement occurs. It is not anticipated that such settlement will be sufficient to cause damage to pavement structural layers. However, if drainage is inadequate and if areas of subgrade for pavements are allowed to become saturated and are loaded soon thereafter, pavement deterioration can be expected. All subgrades for trafficked areas must be compacted to at least 95% Standard Proctor Density (ASTM D-698). The subgrade support test data and analyses were performed only on the overburden soils found at the site. Any pavements placed on shale may experience problems associated with the shale's swell potential. Therefore, if any paved areas are to be placed across shale exposures, additional testing and analysis may be necesssary.

GENERAL

The discussions presented in this report emphasized the variability of conditions found at this site. When more specific information on the building loads, structure configurations, and proposed foundation types have been determined, further exploration will probably be desireable to more precisely define the soil conditions under the structures.

All structural fills must be uniformly compacted under controlled conditions. Fill compaction requirements should not be less than 85% Modified Proctor Density (ASTM D-1557). The material used in structural fills must be of acceptable quality, non-organic, not exhibiting any significant swell potentials or any substantial variations in bearing characteristics. Assurance of acceptable fill quality and compaction must be made by field testing during the fill operations.

In most areas, relatively deep excavated trenches will be stable if the soil remains dry.

The previous discussions emphasize the collapsibility of these soils when soil moisture is increased. Due to this soil characteristic, all foundations utilizing these overburden soils for support will include a certain amount of risk if moisture reaches the supporting soil.

When providing surface drainage in this subdivision, the high erodibility of these soils must be considered.

Settlement estimates presented in this report were performed using theoretical calculations assuming a uniform, perfectly elastic material. Settlements calculated by this method must be considered only as order-of-magnitude estimates, since the data used was derived from random samples taken from very heterogeneous silt-sand overburden and since actual and theoretical soil stresses cannot be expected to be identical.

It would be adviseable to provide full or periodic inspection during certain foundation construction phases such as foundation excavation, structural fill placement, and pile or caisson installation. Inspection should be performed by someone familiar with the subsurface soil conditions at the site to assure safe, adequate foundation construction and to detect any soil anomalies not encountered in the exploration.

Due to the high sulfate content of the soils, sulfate resistant cement must be used in all concrete structures to be in contact with the soil or with ground water.

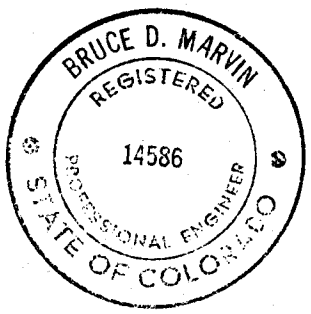
The possibility of increased soil moisture exists in backfill for foundation walls. Substantial increases in backfill moisture content could result in significant loads against foundation walls. Foundation walls carrying more than 2 feet of backfill should be designed to retain an equivalent fluid pressure of 40 PCF, if the backfill is reasonably well protected from moisture and if on-site soils are used for backfill.

We have presented several foundation alternatives for use at this site. The choice of the type of foundation arrangements to

be used will be based on economic comparisons and architectural and landscaping considerations beyond the scope of this report as well as safety considerations. It must be recognized that some significant soil movement will be unavoidable in certain areas where the soil is subject to moisture increases. However, we feel confident that satisfactory foundation designs can be developed for structures in this subdivision with some possible modifications and precautions to accommodate the collapsibility of the soil and swell potential of the shale. We will be pleased to work further with all parties involved in this development.

Submitted by:
WESTERN ENGINEERS, INC.

Bruce D. Marvin, P.E.



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1.) Lambe, T. William; Whitman, Robert V., 1969, Soil Mechanics John Wiley and Sons, Inc., New York, p. 105 and 212.

2.) Terzaghi, Karl, Peck, Ralph B., 1961, Soil Mechanics in Engineering Practice, John Wiley and Sons, Inc., New York, p. 170 and 171.

3.) Nottingham, L.C., Renfro, R.H., 1972, Research Bulletin 121B, A Computer Program To Estimate Pile Load Capacity From Standard Penetration Results, State of Florida Department of Transportation.

4.) Hough, B.K., 1957, Basic Soils Engineering, The Ronald Press Company, New York, p. 416-17.

APPENDIX

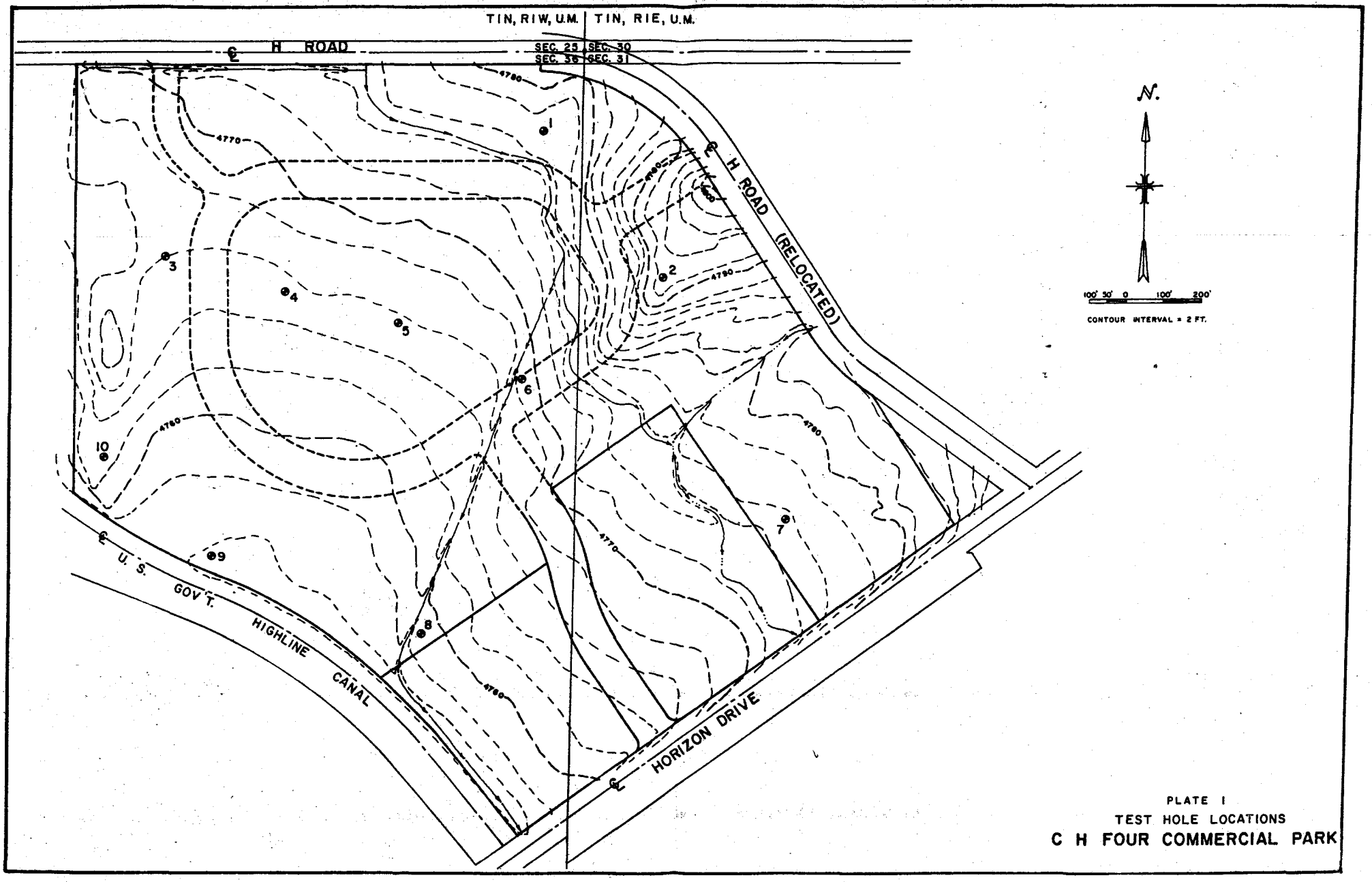


PLATE I

TEST HOLE LOCATIONS

C H FOUR COMMERCIAL PARK

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 1

Project CH Four Subdivision Ground Elev. 4777
Location Southwest of Wlaker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineers Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight 140 Height of Drop 30 Date 3/13/81

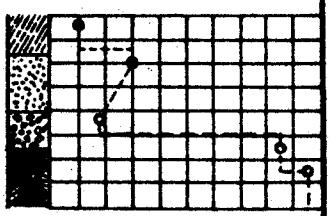
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
					Clay, silty, some sand and small gravels, buff-brown, moist at top, distinctly lensed, low to moderate plasticity (ML-CL)	2		
		75	10	X	Formational Mancos Shale, clayey, moist, decomposed and weathered near the top	4		
					Bottom of Hole	6		

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 INCHS 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.
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PLATE 2

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 2

Project C H Four Subdivision Ground Elev. 4793
Location SW of Walker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineers Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight _____ Height of Drop _____ Date 3/12/81

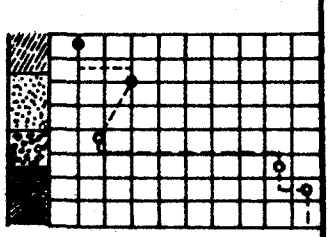
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
Sample Non-Plastic		32	3.2	X	Silt-clay, some sand, buff-brown, dry lensed with silts, sands and some small gravels, sulfates in voids, some organics, low to moderate plasticity, moderate dry strength. (ML-CL)	2 4		
		60			Formational Mancos Shale	6		
					Bottom of Hole			

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 INCHS 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

PLATE 3

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ___ OF ___ PAGES
HOLE NO. 3

Project C H Four Subdivision — Ground Elev. 4766
Location SW of Walker Field Terminal — Depth to Water Table(Ft.) _____
Drill Contract Western Engineers Foreman _____ Date Water Table gaged _____
Hole Logged by SK — Hammer Weight ____ Height of Drop ____ Date 3/4/81

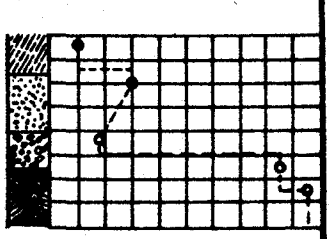
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
LL=18.6 PL=15.2 PI= 3.3				x	Silt, clayey, some sand, buff-brown, moist at top to saturated below, lensed with clays, sands, and some small gravels, soluable salts in voids, non-plasticity, low to moderate dry strength, some decomposed organics, soil quite variable in grain size composition and consistency (ML)	2		
			8	x		4		
Sample Non-Plastic		15				6		
			11	x		8		
						10		
						12		
					(Approx. Saturation Depth)			
		8				14		
			23	x				
Sample Non-Plastic						16		
		108			Formational Mancos Shale, clayey, moist, highly decomposed and weathered near top, grading sounder with depth.	18		
			13	x				
					Bottom of Hole	20		

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

PLATE 4

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 4

Project C H Four Subdivision Ground Elev. 4760
Location SW of Walker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineer Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight _____ Height of Drop _____ Date 3/14/81

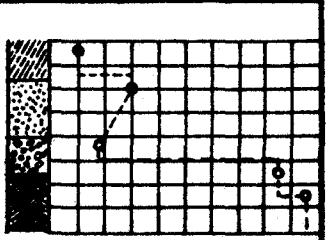
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
LL=21.2 PL=16.6 PI= 4.6			6	X	Silt, clayey, some sand buff-brown, moist at top to saturated below, lensed with clays, sands, and some small gravels, soluable salts in voids, non-plastic to moderate plasticity, low to moderate dry strength, grade generally clayier below 10 ft. depth. Some decomposed organics. Soil quite variable in grain size composition and consistency (ML-CL)	2		
LL=30.7 PL=16.8 PI=13.9		15	9	X		4		
Sample Non-PLastic			7	X		6		
			14	X		8		
						10		
					----------	12		
LL=28.3 PL=17.8 PI=10.5			23	X	(Approx. Saturation Depth)			
						14		
						16		
			21	X		18		
Bottom of hole at 22 ft. depth					----------			
		50/3	13	X	Formational Mancos Shale	20		

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 INCHS 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

PLATE 5

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 5

Project C H Four Subdivision Ground Elev. 4766
Location SW of Walker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineer Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight _____ Height of Drop _____ Date 3/16/81

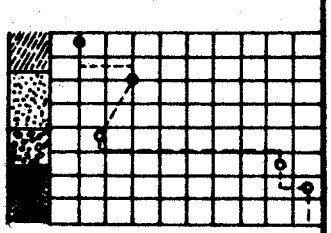
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
		13	13	x	Silt, clayey, some sand, buff-brown, moist, lensed with clays, sands and some small gravels, soluable salts in voids, non-plastic to low plasticity, low to moderate dry strength, some decomposed organics, soil quite variable in grain size, composition and consistency. (ML-CL)	2 4 6 8 10 12		
LL=39.8 PL=24.1 PI=15.7		50	12	x	Formational Mancos Shale			
					Bottom of Hole	14		

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 INCHS 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

PLATE 6

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 6

Project CH Four Subdivision Ground Elev. 4770
Location Southwest of Walker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineers Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight 140 Height of Drop 30 Date 3/16/81

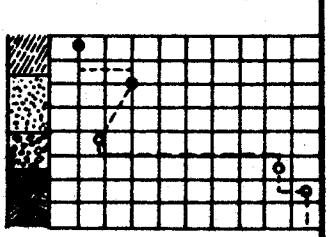
NOTES TYPE & SIZE OF HOLE TYPE OF BIT OR SPOON LOSS OF DRILLING WATER	CORE RECOVERY %	NO. BLOWS	MOISTURE %	SAMPLES FOR TESTING	DESCRIPTION AND CLASSIFICATION OF MATERIAL	DEPTH	LOG	PENETRATION RESISTANCE (BLOWS PER FOOT) ● ACTUAL ○ EXTRAPOLATED 20 40 60 80
					Silt-clay, some sand, buff-brown, dry lensed with silts, sands and some small gravels, sulfates in coids, some organics, low to moderate plasticity, moderate dry strength. (ML-CL)	2		
			9	x		4		
		50/10			Formational Mancos Shale, clayey, moist, highly decomposed and weathered near top, grading sounder with depth.	6		
			8	x		8		
		50/7	8	x	Bottom of Hole	10		
						12		

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 INCHS 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

PLATE 7

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES

HOLE NO. 7

Project C H Four Subdivision — Ground Elev. 4776

Location SW of Walker Field Terminal — Depth to Water Table(Ft.) _____

Drill Contract Western Engineers — Foreman _____ — Date Water Table gaged _____

Hole Logged by SK — Hammer Weight ____ — Height of Drop ____ — Date 3/19/81

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
Hole open to 24 feet NOTE: Highly Decomposed Shale Begins at 22 ft. Depth			25	x	Silt, clayey, some sand, buff-brown, moist at top to saturated below, lensed with clays, sands and some small gravels, soluable salts in voids, nonplasticity, low to moderate dry strength, some decomposed organics, soil quite variable in grain size composition and consistency. (ML) (Approx. Saturation Depth) Bottom of Hole at 28 ft.	2 4 6 8 10 12 14 16 18 20		

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 INCHS PENETRATION WITH 50 BLOWS.

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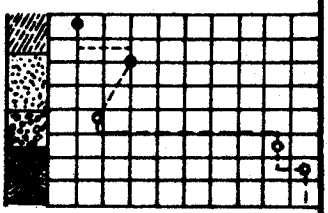

WESTERN ENGINEERS, INC.
Soil Mechanics Engineers

PLATE 8

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 8

Project CH Four Subdivision — Ground Elev. 4759
Location Southwest of Walker Field Terminal — Depth to Water Table(Ft.) _____
Drill Contract Western Engineers — Foreman _____ — Date Water Table gaged _____
Hole Logged by SK — Hammer Weight 140 — Height of Drop 30 — Date 3/17/81

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
LL = 43.4 PL = 23.7 PI = 19.7					Silt-clay, some sand, buff-brown, dry lensed with silts, sands and some small gravels, sulfates in coids, some organics, low to moderate plasticity, moderate dry strength. (ML-CL)	2		
					Formational Mancos Shale, clayey, moist, decomposed and weathered near the top.	4		
					Bottom of Hole	6		

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 INCHS PENETRATION WITH 50 BLOWS.

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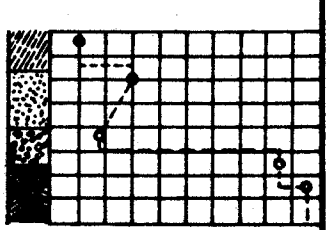
PENETRATION RESISTANCE ..... PLOT AS SHOWN AT RIGHT, WITH DASHED LINES SHOWING THE MATERIALS CONSIDERED TO BE REPRESENTED BY EACH PENETRATION VALUE.



WESTERN ENGINEERS, INC.
Soil Mechanics Engineers

PLATE 9

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES
HOLE NO. 9

Project C H Four Subdivision Ground Elev. 4756
Location SW of Walker Field Terminal Depth to Water Table(Ft.) _____
Drill Contract Western Engineers Foreman _____ Date Water Table gaged _____
Hole Logged by SK Hammer Weight _____ Height of Drop _____ Date 3/17/81

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
					Silt, clayey, some sand, buff-brown, moist, lensed with clays, sands and some small gravels, soluable salts in voids, non-plastic to low plasticity low to moderate dry strength, some decomposed organics, soil quite variable in grain size, composition and consistency. (ML-CL)	2		
		9				4		
						6		
						8		
						10		
						12		
		26				14		
					Bottom of Hole			

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 INCHS PENETRATION WITH 50 BLOWS.

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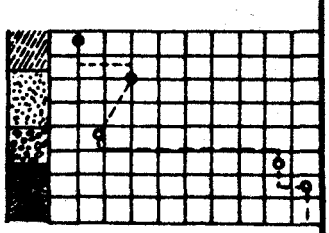

WESTERN ENGINEERS, INC.
Soil Mechanics Engineers

PLATE 10

WORK ORDER NUMBER _____

SUBSURFACE EXPLORATION
DRILL HOLE LOG AND PENETRATION RESISTANCE

PAGE ____ OF ____ PAGES

HOLE NO. 10

Project C H Four Subdivision Ground Elev. 4763

Location SW of Walker Field Terminal Depth to Water Table(Ft.) _____

Drill Contract Western Engineer Foreman _____ Date Water Table gaged _____

Hole Logged by SK Hammer Weight _____ Height of Drop _____ Date 3/14/81

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
Sample Non-Plastic			7	x	Silt-clay, some sand, buff-brown, dry lensed with silts, sands and some small gravels, sulfates in voids, some organics, low to moderate plasticity, moderate dry strength. (ML-CL)	2 4		
						6		
			8	x	Formational Mancos Shale, , clayey, moist, highly decomposed and weathered near top, grading sounder with depth.	8		
					Bottom of Hole	10 12 14 16		

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 INCHS PENETRATION WITH 50 BLOWS.

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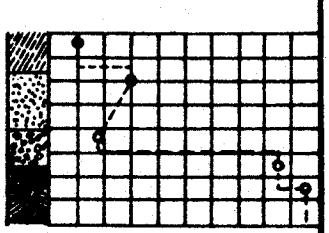
PENETRATION RESISTANCE ..... PLOT AS SHOWN AT RIGHT, WITH DASHED LINES SHOWING THE MATERIALS CONSIDERED TO BE REPRESENTED BY EACH PENETRATION VALUE.



WESTERN ENGINEERS, INC.
Soil Mechanics Engineers

PLATE 11

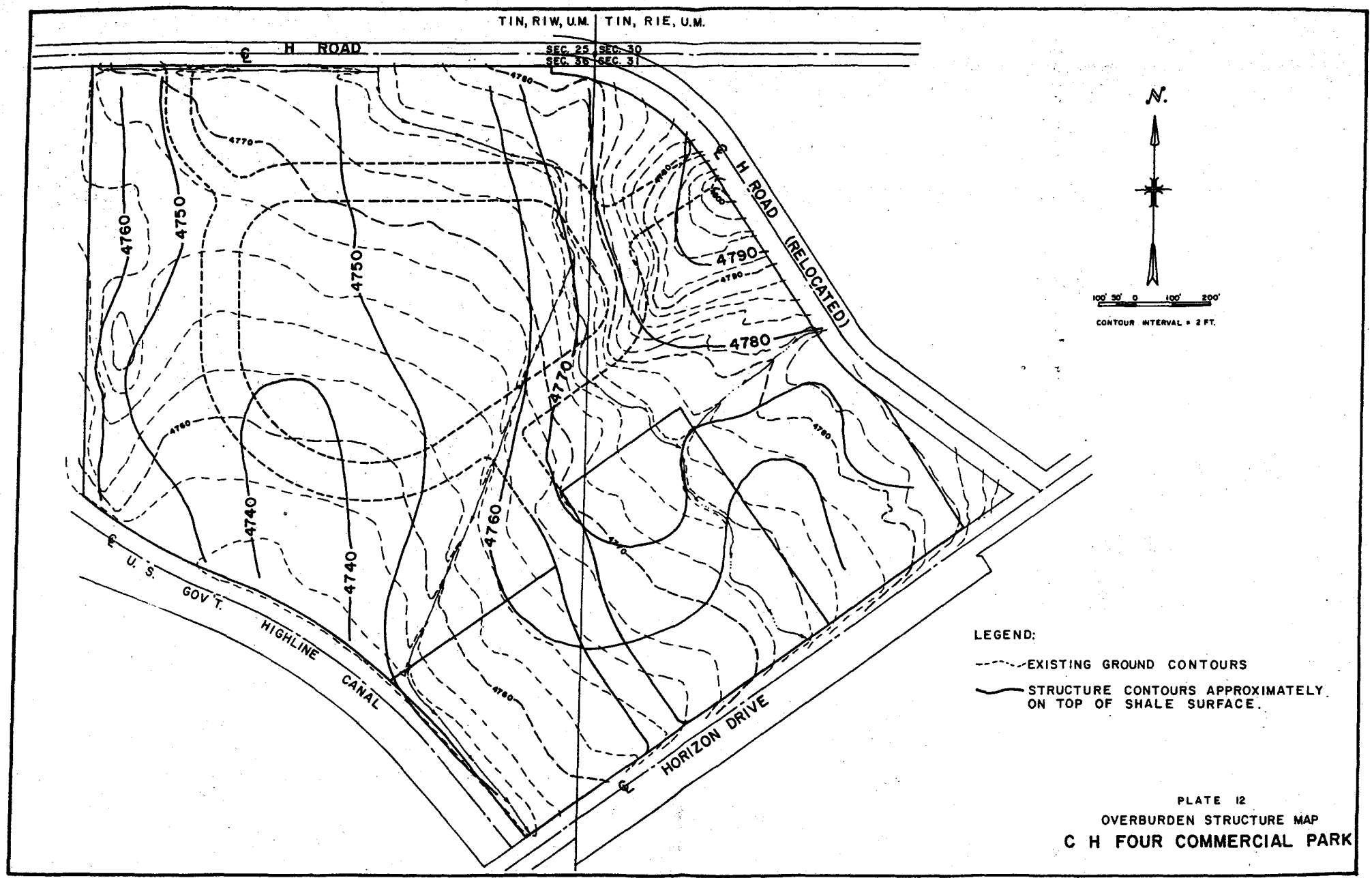
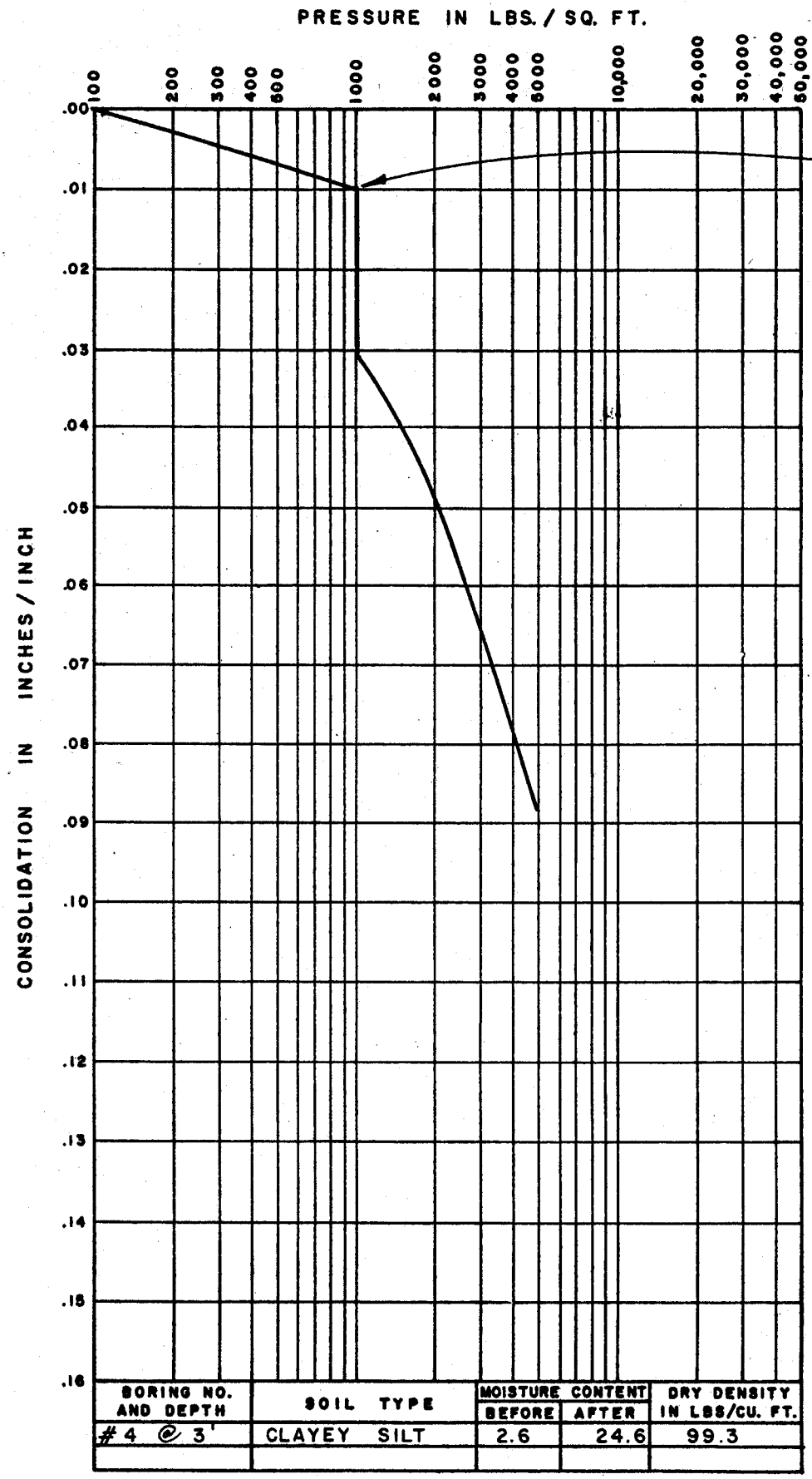


PLATE 12

OVERBURDEN STRUCTURE MAP

C H FOUR COMMERCIAL PARK

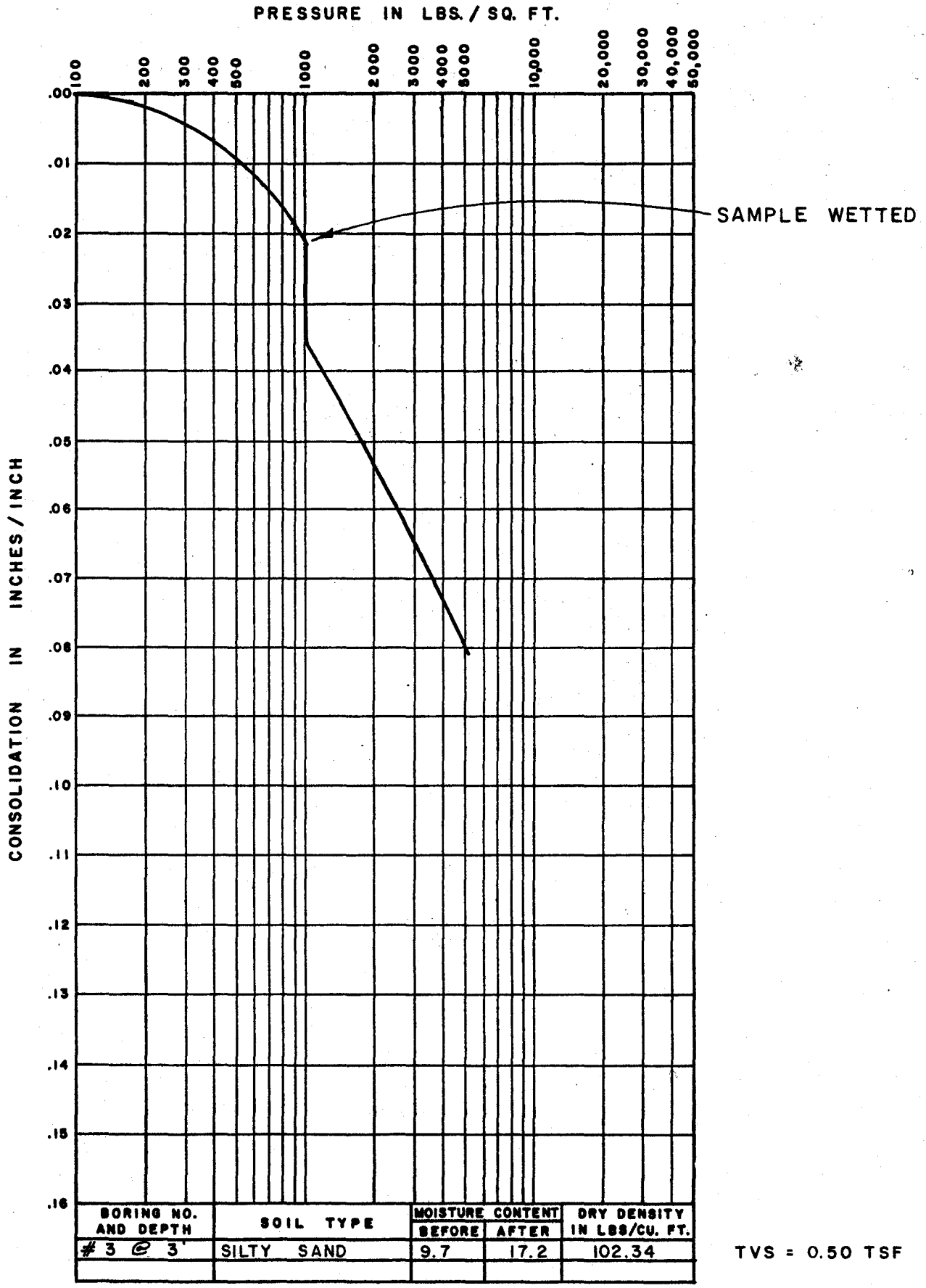


BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT		DRY DENSITY IN LBS/CU. FT.
		BEFORE	AFTER	
#4 @ 3'	CLAYEY SILT	2.6	24.6	99.3

TVS = 0.4 TSF

C H FOUR COMMERCIAL PARK
CONSOLIDATION DATA

PLATE 13
WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO

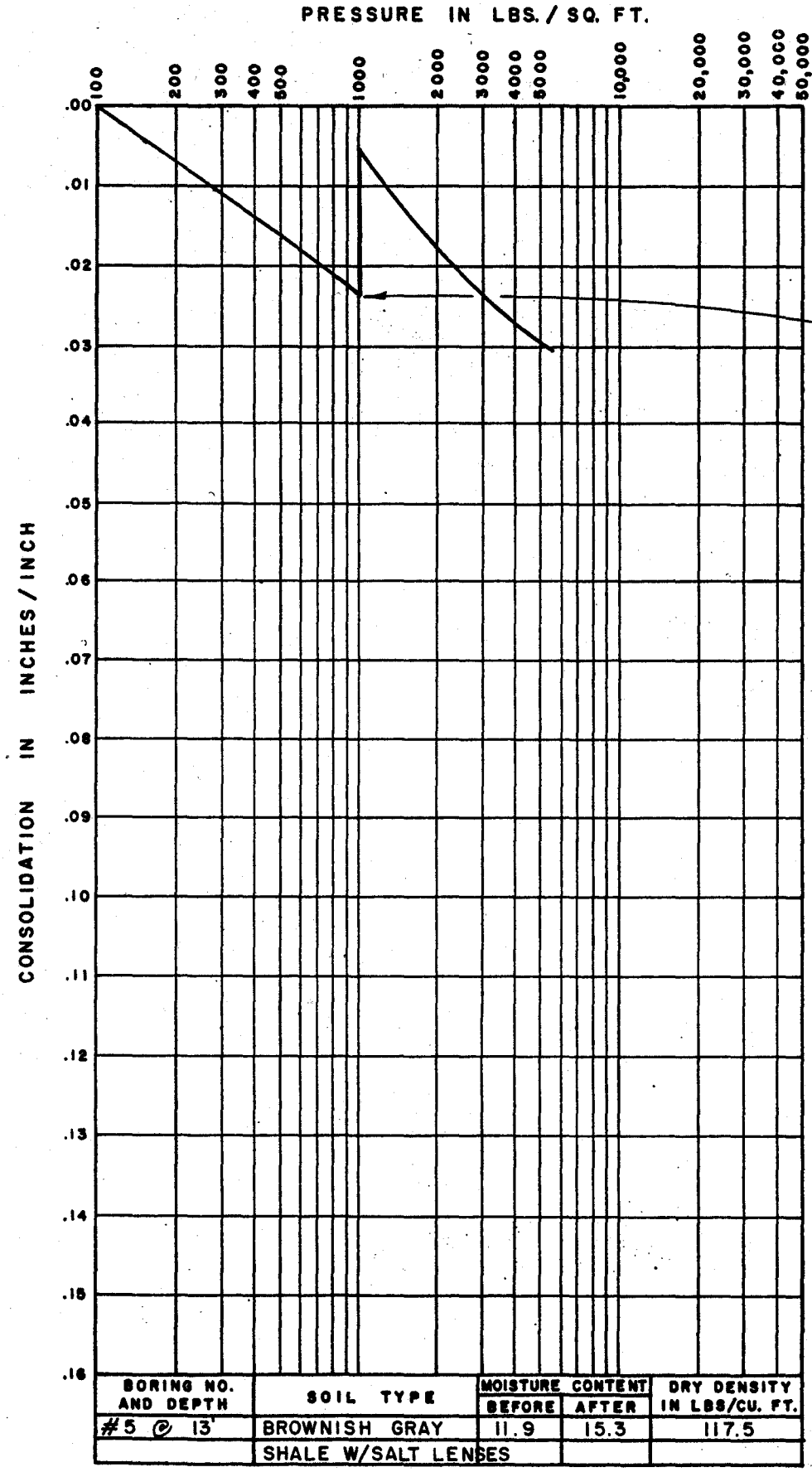


BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT		DRY DENSITY IN LBS/CU. FT.
		BEFORE	AFTER	
#3 @ 3'	SILTY SAND	9.7	17.2	102.34

TVS = 0.50 TSF

C H FOUR COMMERCIAL PARK
CONSOLIDATION DATA

PLATE 14
WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO

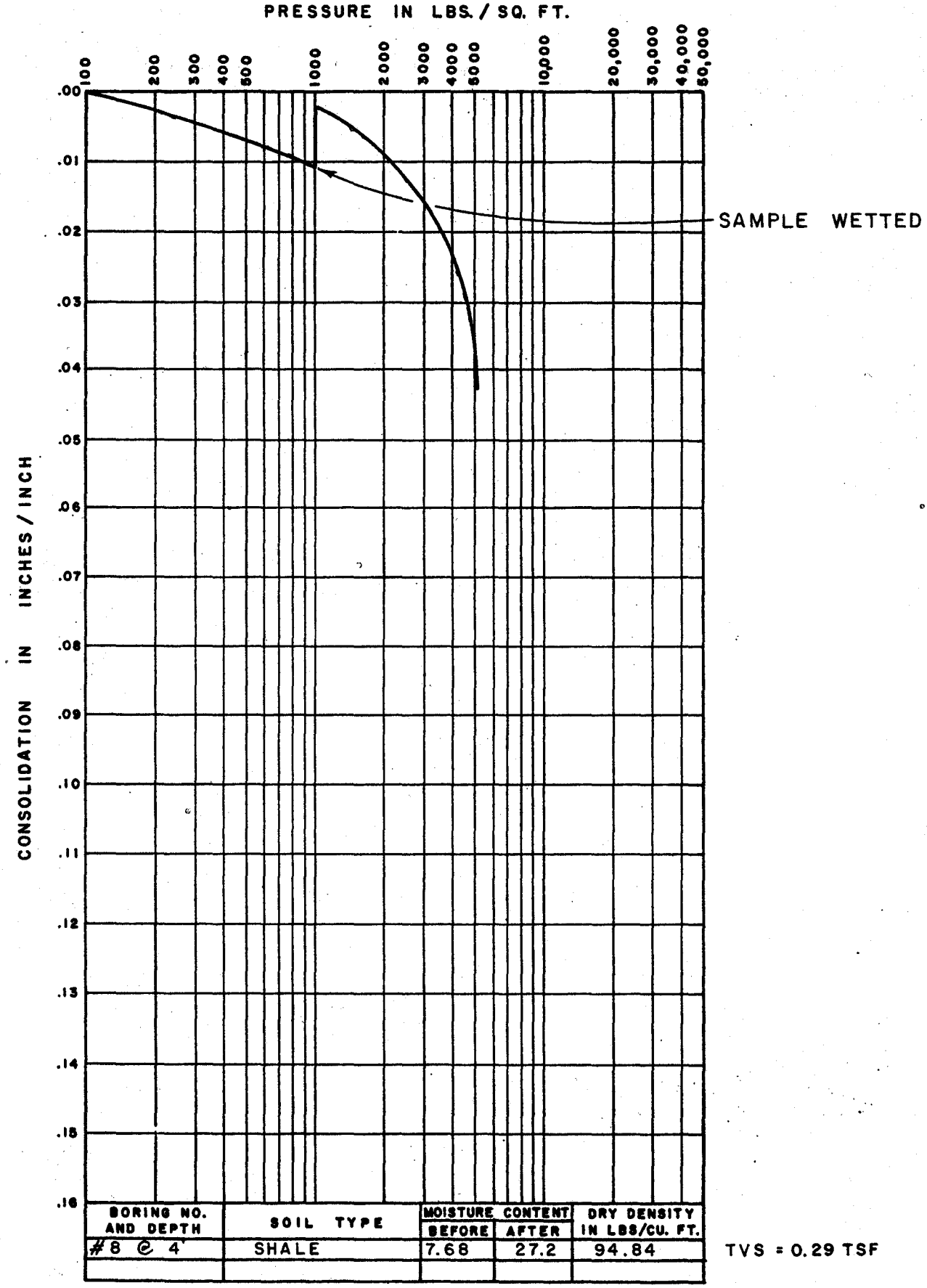


BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT BEFORE	MOISTURE CONTENT AFTER	DRY DENSITY IN LBS/CU. FT.
#5 @ 13'	BROWNISH GRAY	11.9	15.3	117.5
	SHALE W/SALT LENSES			

TVS = 0.45 TSF

C H FOUR COMMERCIAL PARK
CONSOLIDATION DATA

PLATE 15
WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO

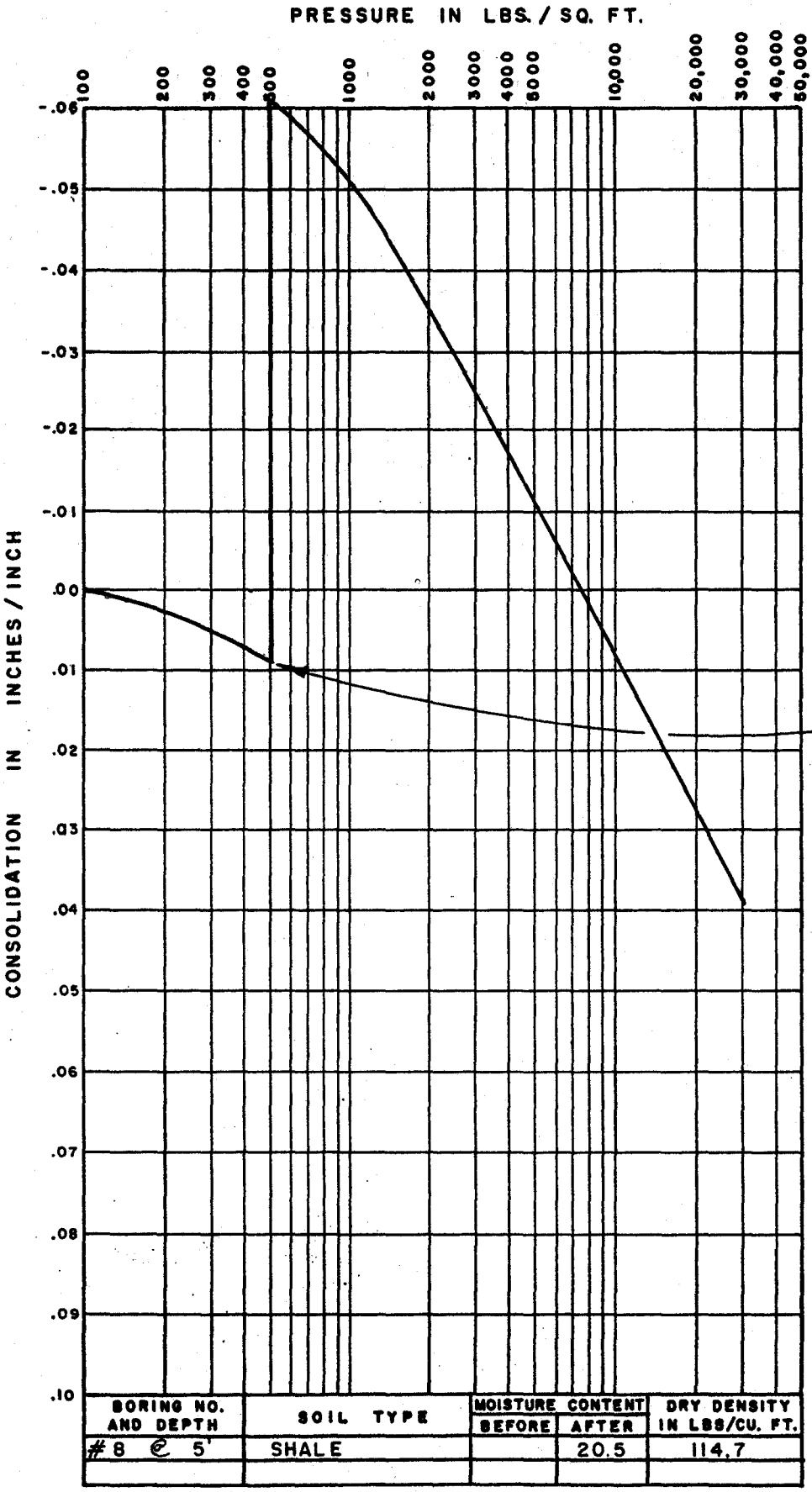


BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT		DRY DENSITY IN LBS/CU. FT.
		BEFORE	AFTER	
#8 @ 4'	SHALE	7.68	27.2	94.84

TVS = 0.29 TSF

C H FOUR COMMERCIAL PARK
CONSOLIDATION DATA

PLATE 16
WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO



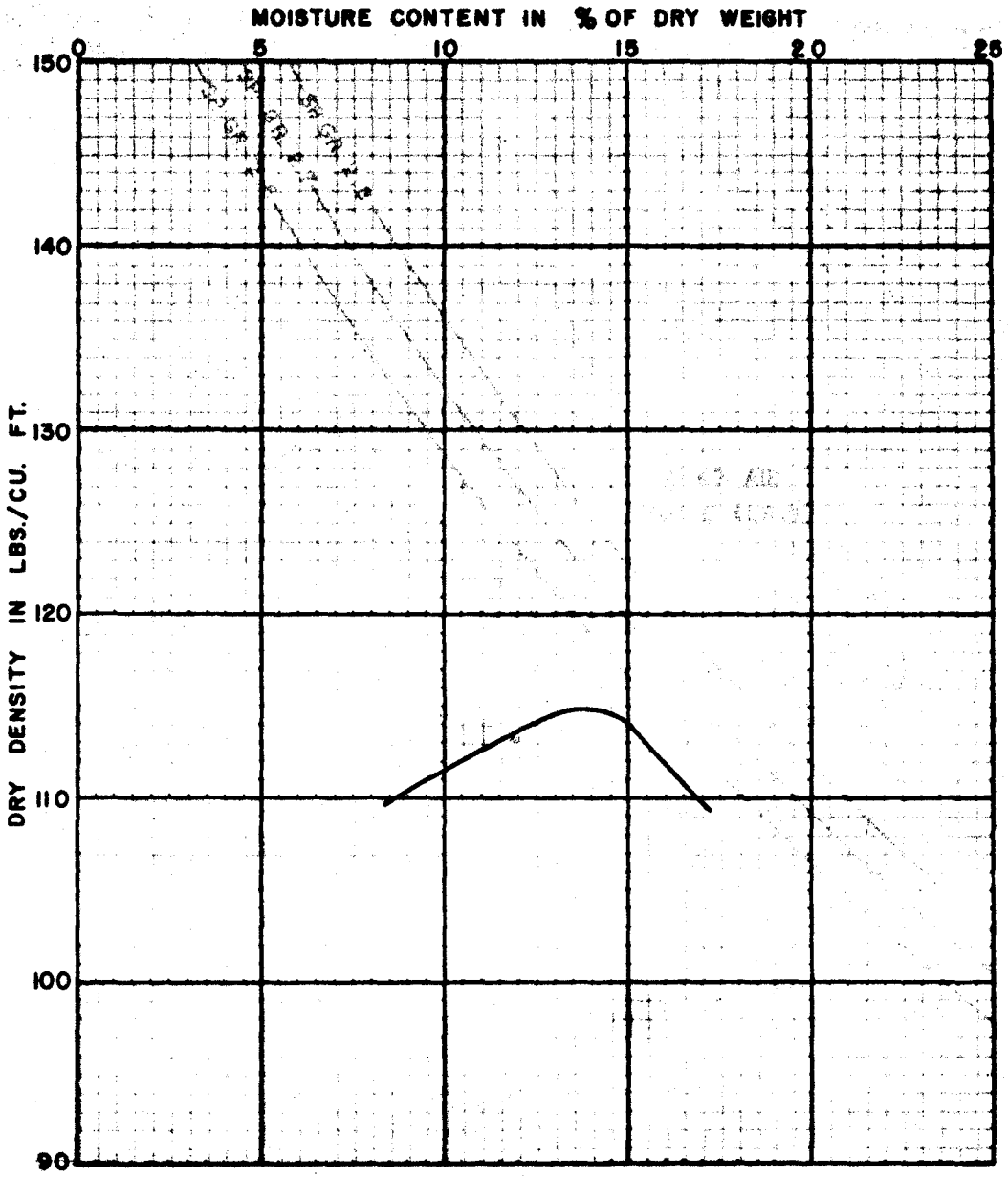
BORING NO. AND DEPTH	SOIL TYPE	MOISTURE CONTENT BEFORE	MOISTURE CONTENT AFTER	DRY DENSITY IN LBS/CU. FT.
#8 @ 5'	SHALE		20.5	114.7

C H FOUR COMMERCIAL PARK
CONSOLIDATION DATA

PLATE 17

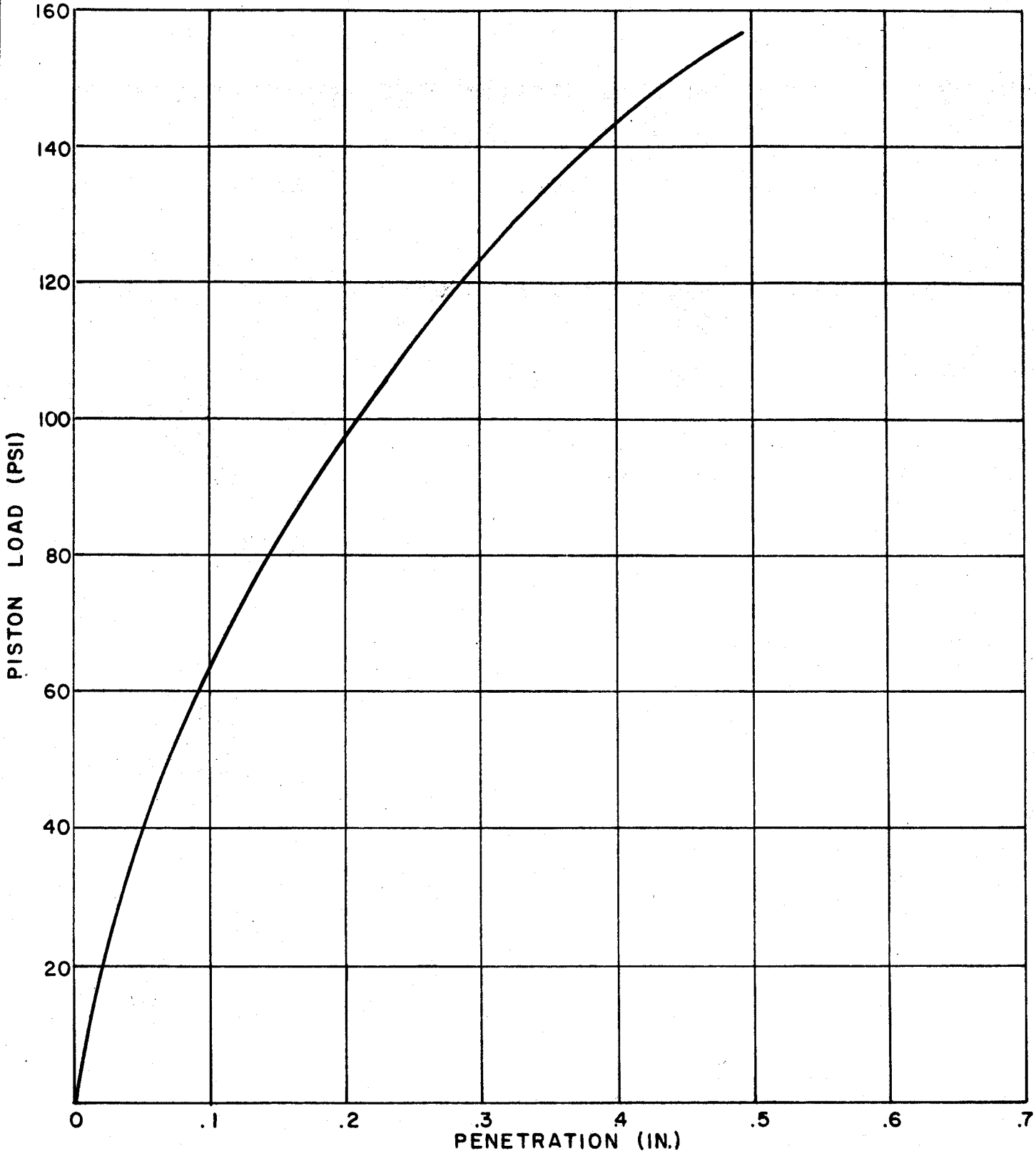
WESTERN ENGINEERS, INC.
GRAND JUNCTION COLORADO

SAMPLE NO. 14-N DEPTH _____ ELEVATION _____
SOIL SILTY CLAY
LOCATION C H FOUR COMMERCIAL PARK
OPTIMUM MOISTURE CONTENT 14.0
MAXIMUM DRY DENSITY 115.0
METHOD OF COMPACTION ASTM D698



COMPACTION TEST DATA

PLATE 18



SAMPLE: C H FOUR COMMERCIAL PARK
DENSITY: 95 % ASTM D698
CBR .1" PEN. = 6.3
CBR .2" PEN. = 6.5
BEFORE SOAKING:
MOISTURE CONTENT: 14.8
DRY UNIT WEIGHT: 110.1
AFTER SOAKING:
MOISTURE CONTENT, TOP 1": 17.7 %
AVG. MOISTURE CONTENT: 15.3 %
SWELL: 0.2 %
SURCHARGE WEIGHT: 20 lbs.

PLATE 19
CALIFORNIA BEARING RATIO
(ASTM D-1883)

C H FOUR COMMERCIAL PARK

FILING NO. 1

PRELIMINARY DRAFT OF

COVENANTS AND

DESIGN GUIDELINES

DRAFT

FOR DISCUSSION ONLY

4-15-81

1/12

I. INTRODUCTION

These Design Guidelines are known as the CH 4 Design Standards as referred to in the Declaration of Conditions, Covenants, and Restrictions recorded against property located in the CH 4 Commercial Park in Grand Junction. They provide a documented basis for directing and evaluating the site and architectural design of each building lot within the development. The standards are intended to protect and enhance development within the development, while allowing for a variety of design. These standards shall apply to all properties within the CH 4 Commercial Park, and are in addition to the requirements of the HO (Highway Oriented) zone category and the Subdivision regulations of the City of Grand Junction.

The CH 4 Commercial Park Design Standards shall run concurrent with the Declaration of Covenants, Conditions and Restrictions recorded against the property in Grand Junction, Mesa County, Colorado.

II. GENERAL PROVISIONS

A. Definitions

1. Design Review Committee: A special committee established for the purpose of reviewing and approving all ~~building~~ improvements on individual lots within CH 4 Commercial park.

2. Improvements: Structures and construction of any kind, above or below ground, such as, but not limited to: buildings; parking and loading areas; driveways and walkways; fences, earth ~~mounds and~~ WORK AND DRAINAG plantings; and utilities (sewer, water, gas, and electric distribution). SIGNS, LIGHTS,

B. Design Review and Approval Procedure

No building structure or other improvement shall be erected or altered in CH 4 Commercial Park until the design and construction plans, specifications, site plan and landscaping plans have been approved by the Design Review Committee (DRC).

All occupants or prospective occupants of CH 4 Commercial Park seeking to undertake projects or improvements must pay an application fee and submit the following information to the Design Review Committee in the stated order. If any submission is not approved, the applicant must resubmit and obtain approval before proceeding with the next submission. SUMMARY OF THE REVIEW PROCESS.

1. PREAPPLICATION CONFERENCE (DISCUSSION OF GUIDELINES AND APPLICANTS INTENT)

2. Land Use/Site Planning Submission - The applicant shall submit two sets (2) of complete site plans indicating the location and extent of the following items:

   a. Building location showing setbacks; building site coverage (footprint), expressed in square feet, and in percent of site coverage.

b. Site and location of parking areas, loading areas and driveways, expressed in square feet and in percent of site coverage.

c. Landscaped areas, and pedestrian courtyards expressed in square feet and in percent of site coverage, AND GENERAL INTENT.

d. Other information as may be required.

3.2. Building Plan Submission - The applicant shall submit two (2) sets of preliminary drawings and two (2) sets of architectural working drawings. All submissions shall include but not be limited to the following:

a. Site Plan
Setbacks
Landscape Areas
Parking Areas
Number of Parking Spaces
Driveways
Building Location
Sign Locations
Any other information pertinent to the development

b. Floor Plans
Areas
Decks and Plazas
Typical Floor Plans
Roof Plan

c. Elevations and Sections
Heights
Materials
Colors

Finishes
Sign Locations and Sizes

d. Perspective sketch or sketches (as requested by the DRC)

4.3. Landscape Plan Submission - The applicant shall submit two (2) sets of complete landscape drawings. Plans shall include but not be limited to the following:

a. Trees
b. Ground Cover
c. Shrubs
d. Walkways
e. Plazas and Decks
f. Walks, Trellis, Fences
g. Slope Stabilization
h. Land - Berming and Mounding
i. Grading
j. Material lists including size, quantity and specification
k. Any other pertinent information

5.4. Signing Submission - For temporary and permanent signing, the applicant shall submit two (2) copies of each of the following:

a. Graphic Layout
b. Size
c. Location
d. Construction/Details and Material
e. Color

6.5. Certificate of Compliance - Upon completion of the work called for by the final plans, the Design Review Committee will prepare and issue a certificate of compliance advising that all construction, grading and planting is completed in accordance with the approved

construction documents and overall development concept for CH 4 Commercial Park.

C. Design Review Committee

A Design Review Committee will be established to fulfill the following responsibilities:

1. Interpretation of the CH 4 Design Guidelines;
2. Issuance of approvals and certificates of compliance with the CH 4 Design Guidelines;
3. Inspection and enforcement of the CH 4 Design Guidelines.

The Design Review Committee will consist of four voting members with the following composition:

1. One technical advisor from the design professions appointed by the property owner;
2. Three other appointees by the Owner.

A quorum will consist of three members.

The Design Review Committee will select one of the members to act as Chairman.

Decisions will be determined by a simple majority vote unless otherwise required.

D. Enforcement, Variance, Amendment

Each owner and/or occupant shall have the duty of and responsibility for conforming to the CH 4 Design Guidelines as administered and interpreted by the Design Review Committee.

If a standard does not seem justified in a particular case, bacause of special conditions and unique circumstances, the Design Review Committee may approve a variance as applied only to that particular case.

The Design Review Committee shall have the right to amend any of the Standards by a ~~two-thirds~~ three-fourths majority vote of the entire Committee. This shall not be construed as the right to constantly change the requirements but only to formulate revisions in response to changing conditions and needs.

7/12

III. DESIGN GUIDELINES

A. Applicable Government Codes

All site improvements within CH4 Commercial Park will be subject to the Municipal Code of the City of Grand Junction.

B. Permitted Uses

All uses included within the City's HO zoning category will be permitted in the CH4 office park except the following:

- Gas Stations
- Automotive Businesses

OTHERS ?

C. Site Design

1. Construction Controls

To prevent wind and water erosion during construction, the following principles should be followed:

Expose smallest practical area of cleared land during construction. Temporary ditches, dikes, vegetation, and/or mulching should be used to protect critical areas exposed during development or construction if reasonably needed. Sediment basins (debris basins, desilting basins, or silt traps) should be installed and maintained to remove sediment from runoff waters from land during development if reasonably needed. Provisions should be made to effectively accommodate the increased runoff caused by changed soil and surface conditions during and after development or construction.

2. Site Grading

Lot grading should be kept to a minimum. Parking lots of buildings should be located for maximum preservation of the natural grade. Any grades, berms, channels, and swales should be an integral part of the overall site deisgn. Maximum site grading of landscape areas should not exceed 3:1; berms should have a flat 3' wide crown.

3. Vehicular Circulation, Parking and Service Loading Areas

8/12

a. Parking spaces shall be provided on each lot in an amount and in a manner as specified by the HO zone district regulations. In addition, the following parking guidelines also apply:

Parking will not be permitted in any space other than paved and designated parking spaces. Each owner and occupant shall be responsible for compliance by thier respective employees and visitors. Parking will not be permitted on any street. Visitor drop-off zones and parking should be provided near visitor entrances. All day employee parking should be separated from visitor and front entrance traffic.

valley? A poured in place concrete curb shall be provided at the perimeter of planted areas within and at the edge of parking lots to prevent vehicular intrusion. Curbs should be continuous. An access driveway shall be provided and maintained between each automobile parking area and a street or alley, or a private street. Parking aisles should not exceed twenty (20) cars in a row. Total parking area should be broken into sections not to exceed ~~400~~ 200 cars. Separate each section by internal drives to improve traffic circulation. Landscaping islands (1 parking space minimum) must be provided at maximum intervals of every single row of ten (10) parking spaces. All parking spaces must be designated by painted lines or other approved methods.

200 cars on lots 5 acre & above)
150 cars on lots less than 5 acre

adjacent properties? All parking areas shall be visually screened from adjacent roadways by appropriate earth forming, walls, or plant material. Screening should have an effective height of approximately 42".

4. Pedestrian Circulation

On-site sidewalks should be a minimum of 5' wide. Site design should provide convenient pedestrian access from all parking areas to building entrances, and provide pedestrian access from building entrances to adjacent pedestrian path systems. Suitable and adequate parking space should be provided for bicycles.

5. Landscaping

Landscape and irrigation plans must be submitted to the Design Review Committee for review and approval prior to installation. The permanent landscaping should be installed as soon as practicable during construction activities. Landscaping in accordance with the plans submitted must be installed before occupancy of the building. If seasonal conditions do not permit planting, interim erosion control measures must be approved by the Design Review Committee. Plants should be selected from the recommended list in the appendix or as approved by the Design Review Committee.

6. Fences and Screens

No outdoor storage of equipment or materials shall be allowed unless provisions are made to screen such material from direct view. ~~Screening fences and buffer areas~~ shall be of a height at least equal to that of the materials or equipment being stored. Fence materials and colors should be selected from Architectural Exterior Materials and Colors List in the appendix. Objects such as water towers, storage tanks, processing equipment, cooling towers, communication towers, vents and any other structures or equipment shall be architecturally compatible or effectively shielded from view from any street and shall be approved, in writing, by the Development Standards Committee before construction or erection of said structures or equipment. No fence or wall of ay kind shall be constructed unless specifically approved by the Development Standrds Committee after review of complete plans.

7. Signage

Identification signs are restricted to advertising only the person or company located on the lot. Moving or flashing signs are prohibited. Internally lit signs are preferred. Identification signs must be constructed to the specifications on the sign requirements drawing in the appendix.

On lots of three acres or less, one identification sign per lot is permitted. On lots of more than three acres but less than six acres, two identification signs, and on lots of six acres or more, three identification signs. Identification signs may be ground or wall signs except specialty retail uses may utilize a pole sign.

No sign shall exceed one (1) square foot in area for each one thousand (1,000) square feet of total lot area. However, no sign shall exceed fifty (50) square feet per face for ground signs and one hundred (100) square feet in area for wall identification signs.

Wall signs shall not comprise more than ten (10) percent of the area of the elevation upon which the sign is located. Wall signs shall be fixture signs; signs painted directly on the surface of the wall or projecting more than twelve (12) inches shall noat be permitted. In the instance of a multiple tenancy building, each individual company may have a wall sign over the entrance to identify the company. Said sign shall give only the name of the company and shall be limited to six (6) inch high letters. Said signs must be oriented toward the parking area for that building.

Directional signs can be used to give directions to traffic or pedestrians or give special instructions. All directional signs will be constructed to the dimensions, color, lettering, style and layout specified on the sign requirements drawing.

On lots of three acres or less, one temporary sign per lot is permitted at any one time. On lots of more than three acres but less than six acres, two temporary signs, and on lots of six acres or more, three temporary signs. Temporary signs can be used for sale or leasing information, construction and design team information or future tenant identification. All temporary signs shall be constructed to the dimensions, color, lettering style and layout specified on the sign requirements drawing in the appendix.

8. Lighting

A lighting plan describing the exterior illumination layout and fixture selection must be approved by the Design Review Committee prior to construction. Exterior lighting fixtures must be selected from the recommended list provided in the appendix.

Lights shall not be placed to cause glare or excessive light spillage on neighboring sites. All parking lot and driveway lighting should provide uniform illumination. Accent illumination is recommended at key points such as entrances, exits, loading zones, and drives. Concealed light sources are recommended. Security light sources shall be kept in operation all night. All exterior lighting shall be color corrected for true white but with allowanced for modest amounts of blue or green.

9. Utilities

All site designs will provide utility easements as required. All utility lines shall be underground. No pipe, conduit, cable, line for water, gas, sewage, drainage, steam, electricity or any other energy or service shall be installed or maintained upon any lot (outside of any building) above the survace of the ground, except for hoses, movable pipes used for irrigation or other purposes during construction, or transformers. No cesspool, septic tank or sewage disposal plant shall be erected or maintained within the development. Utility meters and transformers should be grouped together where possible and concealed with vegetation or screening.

C. Architectural Design

1. Site relationships: Height, Bluk, Setback

The Dimensional Standards for the HO zone will apply to the CH4 Commercial Park at a minimum. These standards specify a maximum structural lot coverage of 35%, and set no minimum open space requirements beyond the yard setback requirements. THE DRC FEELS The CH4 Commercial Park believes that the highest design quality can be achieved through a site planning standard of approximately [redacted]% building, [redacted]% parking, and 30% open space area on each lot. These are averages and do not rigidly apply to each lot. One and two

THIS REQ. COVERAGE IS TOO HIGH GIVEN THE PURITY AND ...

story buildings can achieve quality design with a lower ratio of open space ([redacted]%) while taller buildings will have to increase open space to mitigate the affect of larger parking areas. Site plan review by the Design Review Commiteee will consider not only the amount of total open space provided, but also the effectiveness of that open space in contributint to quality design.

All sides of a building should receive appropriate design consideration. All mechanical rooms shall be screened from a horizontal line of sight in all directions. Exterior storage of waste materials is not permitted except in covered containers and must be in an area enclosed by a wall of sufficient height to visually screen any refuse from pedestrian or vehicular views. No exterior display of products is permitted. Exterior service areas shall be screened by landscaping and/or walls designed to be in character with the building design as specified in the "Fences and Screens" section.

2. Building Materials and Design Character

Building materials will be reviewed as part of the architectural review process. Design of materials should be selected to create a sense of order and harmony appropriate to a quality commercial park.

OFF OOOOOO' OOOOOOOOOO ction sheet O

Acres ~~71.77~~ 9.24A.
Units _____
Density _____

rezone & preliminary plan

File No. #22-81
Zone _____
Tax Parcel Number _____

Activity Rezone ER & AFT to H.O. — C.H FOUR COMMERCIAL PARK
Phase RE-ZONE TO H.O. - FINAL - PLAN (Prelim)
Common Location ~~HORIZON & "H" Rd.~~
NW of Horizon Dr. & So. of H Rd.

Date Submitted _____ Date Mailed Out 3-6-81 Date Posted 3-20-81
10 day Review Period Return by 3-16-81 MCC Information Sent _____
Date Adjacent Property Owners Notified of MCPC/GJPC _____ Date Adjacent Property Owners Notitfied of MCC/CTC _____

review agencies

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG
● Development Dept.	■	■	■	■	■	●		■	●								X					●				X			X			
○ County Road	●	●	●	●	●	●		●	●				●				●										●			●			
○ County Health	■	■	■	■	■	●		●	●		■	●															●			●			
○ County Surveyor	●	●	●	●	●	●																					●						
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● Transportation Engineer	■	■	■	■	■	●								■	■		X										●		■		■		
● City Engineer	■	■	■	■	■	●		■	●		■	■	■	■	■		●										●		■		■		
● City Utilities	■	■	■	■	■	●								■	■												●		■		■		
● City Parks/Recreation	■	■	■	■	■	●										■											●		■		■		
● City Police Dept.	■	■	■	■	■	●																					●						
○ County Sheriff	●	●	●	●	●	●																					●						
● Floodplain Administration	■	■	■	■	■	●					■																●		■		■		
● Comprehensive Planning	■	■	■	■	■	●																					●						
○ G.J. Dept. of Energy	●	●	●	●	●	●																					●						
● Fire CITY	■	■	■	■	■	●					■						X		■								●		■	●	■		
○ Irrigation _____	●	●	●	●	●	●							●														●		●	●			
● Drainage G.J.	■	■	■	■	■	●					■	■	■														●		■	●	■		
● Water (Ute, ~~[illegible]~~	■	■	■	■	■	●						■							■								●		■	●	■		
○ Sewer _____	●	●	●	●	●	●													●								●		●	●			
○ G.V. Rural Power	●	●	●	●	●	●																					●		●	●			
● Mountain Bell	■	■	■	■	■	●							■														●		■	●	■		
● Public Service (2 sets)	■	■	■	■	■	●							■														●		■	●	■		
○ Soil Conservation	●	●	●	●	●	●		●																			●						
○ State Highway Dept.	●	●	●	●	●	●		●	●					●			●										●						
○ State Geological	●	●	●	●	●	●		●	●					●													●						
○ State Health Dept.	●	●	●	●	●	●		●	●		●																●						
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○ Water & Power Resources	●	●	●	●	●	●																					●						
○ Mack, Mesa, Collbran, Palisade, Fruita, DeBeque, G.J., Mesa Cnty.	●	●	●	●	●	●										●	●										●						
● OTHER: AIRPORT	■	■	■	■	■	●																					●		■		■		
totals	16	16	16	16	16		2			2	4	9	4	3	1		1	3		1			1	1			1		13		13	1	1

■ - Items submitted 3/2/81

BOARDS

DATE	
GJPC 3/31/81	Appl of zone to H.O. & Rec. appl on Prelim Plat subj. to marking out location of Polaris Dr. & sub to staff & review comments.

STAFF

Lgt ok Polaris Ave Request it be changed to conform w/ street Horizon Guide to Polaris Dr

PC Approved 4/15/81 subject to staff + review comments + PC comments

Open Space Dedication (acreage) _____ 5% O. S. Fee Required $_____ Paid Receipt # _____
Recording Fee Required $_____ Paid (Date) _____ Date Recorded _____
Date Resolution Mailed _____

City
County
Development
Department

OOOOOOOOOOOOOOOOOOOO

REVIEW SHEET SUMMARY

FILE NO. 22-81 DUE DATE 5/18/81

ACTIVITY C H Four Commercial Park, Filing No. 1

PHASE Final Plat

LOCATION NW of Horizon Dr., NE of Highline Canal

PETITIONER Bruce Currier

PETITIONER ADDRESS 2760 H Rd., Grand Junction, CO 81501

ENGINEER Western Engineers, Inc., 2150 Hwy. 6 & 50, Grand Jct., CO 81501

DATE REC.	AGENCY	COMMENTS
5/7/81	Walker Field Airport	Airport comments on final plat are no different than preliminary plan comments, as there is no indication of different use planned for the area. Airport concerns are same as expressed with preliminary package.
5/12/81	Water & Power Resources See "Easement Statement" behind review sheet.	The United States Water and Power Resources Service claims rights-of-way on all water conveyance systems associated with the Government Highline Canal and Lateral System. The rights-of-way in most cases are by prescription for construction, reconstruction, operation, and maintenance. The United States claims by prescription a right-of-way of about 35 feet, from the northeast bank of the canal in the vicinity of the proposed development (File No. 22-81). We recommend that this right-of-way be indicated on appropriate plat maps.
5/12/81	City Fire Dept.	We will okay this as long as Ute Water can confirm that you can get 1125 gpm out of the hydrants proposed. We do need a hydrant guarantee and we reserve the right to ask for a on sight hydrant on the sprinklered building if we deem it necessary during construction of the building depending upon location of the sprinkler connections.
5/12/81	Public Service Gas & Electric	Gas: No objections. CB 5-6-81 Electric: Label the 20' utility easement in Lot 2 adjacent to Horizon Drive. Electric will not be in Median. Will be joint-use in front lot line easement.
5/18/81	Ute Water	With regard to the Fire Departments review comments, the adequacy of the proposed water line size to meet necessary flow requirements will be determined before installation. The water line to be placed in Hilaria Ave. must extend beyond the limits of street paving for future continuance connection. This will eventually be a looped system from Horizon to H Road. Each separate building will have individual metered service from lines installed in dedicated Road or Street R.O.W. Any Fire Lines to on-site hydrants or building sprinkler systems will be isolated by Detector Checks. Wet tap connection fees, tap or development fees and fire line Detector fees will be payable to Ute Water before installations by Ute Water crews. Policies and fees in effect at the time of application will apply.

5/18/81	City Utilities	None.
5/18/81	Mountain Bell	The easements on the plat are adequate for our use.
5/18/81	Transportation Engineer	No comments.
5/19/81	City Engineer	The proposed location of Hilaria Avenue opposite the GSA driveways looks good. Proposed street section looks good. They have corrected both these items since Preliminary Plat. Power of attorney for full street improvements on Horizon Drive must be submitted prior to recording plat. Since Hilaria Avenue street improvements will not extend as far northwest as the lots will, will some guarantee such as power of attorney for the unimproved frontage be granted? A manhole should be placed in the storm sewer next to the catch basin where they show that sharp curve in the pipe. The Soils and Foundations Report should be carefully following in buildings design. Detailed construction plans should be submitted to me for review and approval prior to construction for street, storm sewers and sanitary sewers. This is a very comprehensive and complete submittal.
5/19/81	Staff Comments:	POA on Horizon Drive. Bikepath along Highline Canal. Need covenants.

5/26/81 KAMICAR/QUIMBY PASSED 6-0 A MOTION TO RECOMMEND APPROVAL TO THE CITY COUNCIL OF #22-81, CH FOUR COMMERCIAL PARK, FILING No. 1, FINAL PLAN, SUBJECT TO STAFF AND REVIEW SHEET COMMENTS, AND SUBJECT TO SATISFACTORY REVIEW OF THE CONVENANTS BY STAFF.

Applicant Responses:
City Rezoning Request

The following agencies had no specific comments concerning the rezoning application:

Mountain Bell
Grand Junction Drainage
City Parks and Recreation
County Health

PUBLIC SERVICE:

Gas lines will be placed in easements shown. The applicant agrees to increase the utility easement to 20 feet wide along Horizon Drive to accommodate the existing water line and future gas and electric lines. Annexation to Grand Junction will automatically transfer the property from G.V. Rural Power Lines, Inc., to Public Service.

UTE WATER:

Streets and roadways will be dedicated and available for utility lines.

WALKER FIELD, COLORADO PUBLIC AIRPORT AUTHORITY:

1. According to P.J. Muller, Isbill Associates, Airport Engineer: "We think that the position shown for the proposed access road off the relocated portion of H Road is good. Having it opposite the new terminal exit should pose no problems other than slightly increasing the need to signalize this intersection" and;

   "It would appear that the majority of the traffic access to the proposed development will be via the Horizon Drive intersection with secondary access via the H Road intersection and essentially only airport generated traffic using the intersection in question".

2. The proposed re-routing of Horizon Drive at the eastern tip of the property does not affect the Filing #1 presented here; the proposed re-routing will be shown conceptually on future maps, and should be designed in detail at the appropriate time.

3. The applicant will conform to all FAA regulations concerning structure height, skyward lighting, electronic signal generation or interference, and smoke or dust generation. No additional avigation easement should be necessary.

CITY UTILITY:

According to the consulting engineer for the Airport Authority, the position shown for the access road is good (see Walker Field response above). The

applicant is willing to work with G.J. traffic engineers to study the need for a left-turn lane from north-bound H Road into the property.

G.J. FIRE:

Engineering documents to be submitted at time of final platting will show the location of hydrants, and the location and size of water lines.

TRANSPORTATION ENGINEER:

The applicant agrees to provide a left-turn capability on Hilaria Avenue at Horizon Drive. The four lane divided street will be adequate for left-turns at median openings on Hilaria Avenue. No on-street parking is allowed on Hilaria Avenue or other interior streets.

According to the engineer for the Airport Authority, the position shown for the access road opposite the airport exit is good. (See Walker Field response above.)

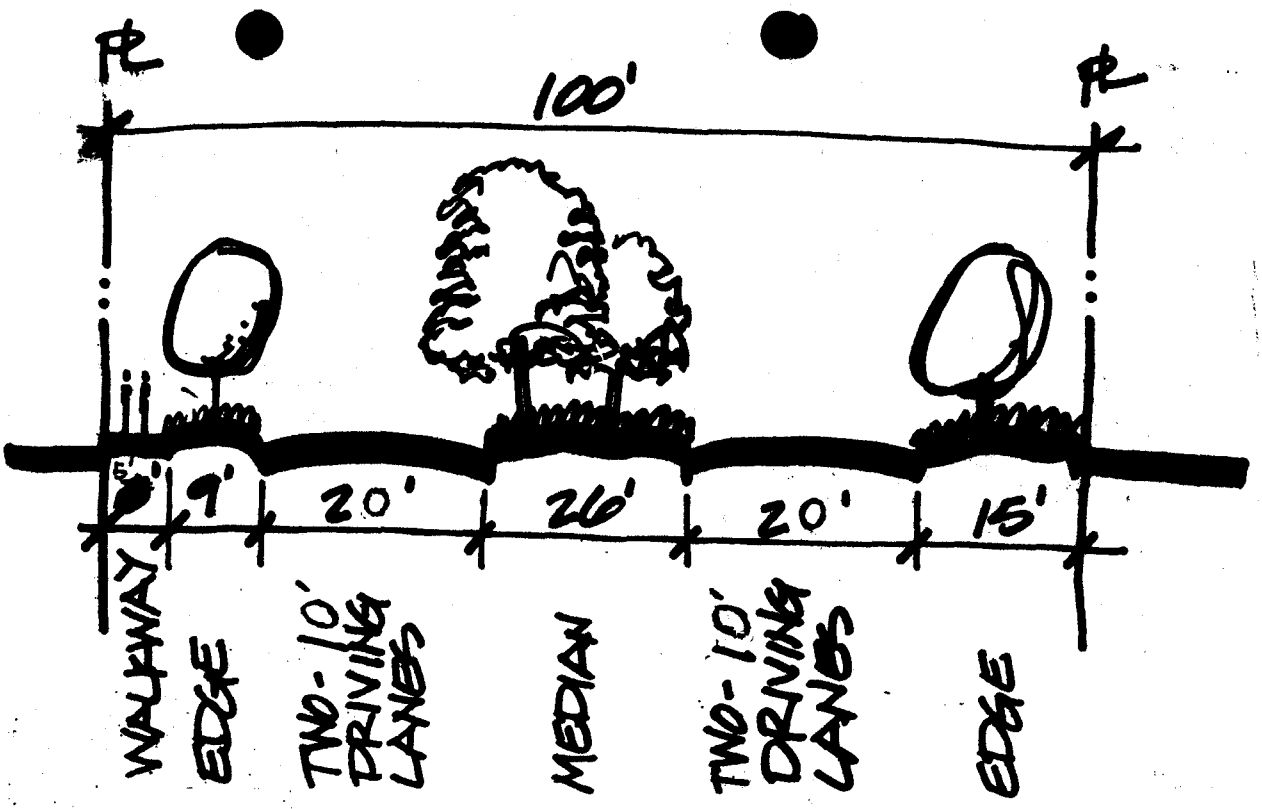
CITY ENGINEER:

The applicant is willing to study further the alignment of Hilaria Avenue with respect to driveways across Horizon Drive into the GSA complex and will submit the change on the final plat.

According to the consulting engineer for the Airport Authority, the position shown for the access road is good, aligned directly across from the airport exit (see Walker Field response above).

Powers of Attorney will be granted with each phase of final plat recording; improvement guarantees also will be provided with each phase. Final utility designs will be submitted in phases as each separate filing is processed. The drainage plan detention figures were calculated for full site development, and ponding areas are located to confine the ponds to landscape or parking areas; no structures will be located in ponding areas.

The proposed 100 foot wide street cross section exceeds by 50% the City's adopted standard for "Local Street in a Commercial Zone" and is intended to provide a major development amenity. A high-quality commercial park of this type will provide adequate parking on each lot to satisfy the requirements of each use so that no on-street parking will be required. In the interest of creating a quality development, the applicant would request that all streets within the development be posted with "No Parking" signs. The applicant agrees to provide curb and gutter on both sides of the asphalt driving mat, and to adjust all earth berms and landscaping to provide proper sight distances. The applicant agrees with the need for a pedestrian facility through the development, but believes that sufficient pedestrian space can be provided on one side only of the roadway. The applicant proposes the alternative cross-section shown below:



This cross-section accommodates two 10-foot travel lanes each way, with a pedestrian walkway on one side only, and provides no on-street parking as discussed above. This alternative retains the significant landscaped center median and bermed and landscaped edge treatment. The center median will allow median cuts.

Vertical curves will be included in the final road design, as requested.

The existing dikes along the Highline Canal are within the existing ROW and should require no additional easement from the applicant for protection.

The applicant's engineer is studying further the sewer layout, but it now appears that there will be a need for a sanitary sewer in an easement adjacent to the canal ROW to reach the drop manhole in Horizon near the canal.

Relocated H Road could reasonably exist as a 100 foot ROW only between Horizon Drive and the one-way airport exit. According to the Mesa County road Department, H Road west of the airport exit will most likely be a collector (66' ROW) or a minor arterial (80' ROW); the actual ROW requirement for H Road should be determined as the adjacent land is platted.

CITY STAFF:

Site layout for the balance of the project, including curb cuts of restaurants, will be determined at time of platting. Buffering, landscaping, and architectural design will be included in the Design Guidelines to be prepared by applicant.

OFFICE ROUTING sheet

Acres 14.2
Units
Density

final plat

File No. #22-81
Zone
Tax Parcel Number

Activity C H Four Commercial Park, Filing No. 1
Phase Final Plat
Common Location NW of Horizon Dr., NE of Highline Canal

Date Submitted _____ Date Mailed Out _____ Date Posted _____

_____ day Review Period Return by _____ MCC Information Sent _____

Date Adjacent Property Owners Notified of MCPC/GJPC _____ Date Adjacent Property Owners Notitfied of MCC/CIC N/A

review agencies

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG
● Development Dept.	●			●	●	●				●		●	●		●	●		●				●	●					●			●	●	
○ County Road	●			●	●	●			●	●			●	●		●	●																
○ County Health	●			●	●	●			●			●	●																		●		
● County Surveyor	●			●	●																												
○ County Parks/Recreation	●			●	●	●										●				●													
○ County Engineer	●			●	●	●			●	●		●	●	●	●	●	●																
● Transportation Engineer	●			●	●	●						●				●	●																
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○ Floodplain Administration	●			●	●	●						●																					
○ Comprehensive Planning	●			●	●	●																											
○ G.J. Dept. of Energy	●			●	●	●																											
● Fire CITY	●			●	●	●			●	●		●	●	●	●	●	●			●													
○ Irrigation	●			●	●	●														●													
○ Drainage	●			●	●	●							●	●	●																		
● Water (Ute) Clifton	●			●	●	●			●	●		●	●			●	●			●	●												
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● Public Service (2 sets)	●			●	●	●																											
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○ Mack, Mesa, Collbran, Palisade, Fruita, DeBeque, G.J., Mesa Cnty.	●			●	●	●																											
● OTHER: AIRPORT	●			●	●								●																				
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totals	14			14	14	14	1		2	3			10	3	6			3	3	2	2		1	2	1						6	1	

BOARDS

	DATE	
~~STR~~	5/26/81	Appl - subject to staff & review comments
CIC	6/17/81	Appl

STAFF

Open Space Dedication (acreage) _____ 5% O. S. Fee Required $_____ Paid Receipt #_____

Recording Fee Required $_____ Paid (Date) _____ Date Recorded _____

Date Resolution Mailed _____

City County Development Department

REVIEW SHEET SUMMARY

FILE# 22-81

ITEM Final Rezone AFT & ER to HO/& CH Four Commercial Park, Filing #1 - Prel. Plan

DATE SENT TO REVIEW DEPT. _____

DATE DUE 3/16/81

PETITIONER Bruce Currier, 2760 H Rd., G.J. (Western Engineers)

LOCATION S. of H Road, NW of Horizon Dr.

DATE REC.	AGENCY	COMMENTS
3/10/81	Mt. Bell	No requests.
3/11/81	G.J. Drainage	Out of District.
3/12/81	Public Serv. Gas & Elect.	Public Service Co. may have objections to this application. Due to the volume of applications being received for review from both Mesa County and the City of Grand Junction, we will not be able to complete our review of this project by the deadline shown. Our detailed comments will be forwarded as soon as possible.
3/13/81	City Parks & Recreation	No Comments.
3/13/81	Ute Water	No objections to "Rezone" or plan. Water services for this development will be provided from Horizon Dr. and from H Road as indicated on the utility composit, and the Impact Statement. It is assumed that streets and roadways will be dedicated by the dementions indicated.
3/11/81	County Health	Okay as applied for.
3/16/81	City Utility	None.
3/16/81	Walker Field, Colorado, Public Airport Authority	Please consider the following review agency comments from the Walker Field, Colorado, Public Airport Authority regarding the above, as requested. Specific concerns are as follows: 1. Vehicular traffic flow within this parcel exits and enters at the departure for the proposed terminal building exit. This will be a unidirectional exit entering a four corner intersection with bidirectional traffic entering from three directions. It appears this will cause significant traffic congestion, although it is conceivable that this is the best location for such an intersection. The Airport Authority has requested our Airport Engineer, Isbill Associates, as well as City of Grand Junction Traffic Engineer Jim Bragdon, to review this plan. We will forward their comments to you as soon as they are received. 2. The proposed reroute of Horizon Drive which affects this property is shown only on an overview layout (which shows relative location of this parcel to the Airport, Horizon Drive and Interstate 70). This reroute (adjacent to the existing Motel 6) is not shown on the "Outline Development Plan", as it should be. 3. The rerouted "H" Road 100' right of way will split both Currier land and airport property as agreed by both parties. This is for your information, in case you have questions in this regard.

4. Normal airport area restrictions such as control of structure heights, skyward lighting, electronic signal generation or interference, smoke and/or dust generation or other interference with normal air traffic patterns should be considered and addressed in an avigation easement, but should create no problems with the proposed uses as described. Noise, vibrations and fumes associated with flight operations should also be addressed in such an easement.

5. The initial development includes a seven acre parcel defined as "offices or other": no definition of "other" is provided. (This is not critical, but from a noise consideration point of view a non residential use is preferred.)

No other apparent problems exist with this proposal. In fact, it appears to compliment very well the area adjacent to the airport.

Paul D. Bowers

3/16/81	City Utility	A major entrance at intersection of H Road and one way exit from airport terminal could cause traffic problems. This could cause the need of a traffic signal otherwise not needed. Also a left turn lane from northbound H Road traffic into this site might be needed. This should be studied and coordinated with Grand Junction transportation engineers.
3/17/81	G.J. Fire	We will need a set of plans showing hydrants, line sizes, and proposed hydrants. We also need a plat map showing types and sizes of occupancies so we can do a fire flow. Thank you.
3/19/81	Public Service	Gas: No objection - gas in utility easement as shown. Electric: G.V. Rural Power Lines, Inc. territory as of now; but otherwise no objections.
3/19/81	Transportation Engineer	No comment on rezone.
3/19/81	Transportation Engineer	Filing 1: A left turn storage bay should be provided within the median on Hilaria Avenue at Horizon Drive. This will separate and facilitate left and right turn movements. Consideration should be given to provede left turn bays at all median openings, especially since the pavement is only 16' wide. Overall Layout: The plan shows an access onto H Road directly opposite the airport exit. The airport exit will be one-way south and very busy. Since this project (CH Four Comm. Park) already proposes another access onto H Road and one onto Horizon Drive, I would suggest that the access opposite the airport exit be eliminated. This will greatly reduce confusion and congestion at this intersection.
3/19/81	Isbill Assoc. P.J. Muller	We have reviewed the preliminary plat plan packet for a 70 odd acre parcel of land adjacent to airport property which you sent us earlier this week. We think that the position shown for the proposed access road off the relocated portion of H Road is good. Having it opposite the new terminal exit should pose no problems other than slightly increasing the need to signalize this intersection.

		It would appear that the majority of the traffic access to the proposed development will be via the Horizon Drive intersection with secondary access via the H Road intersection and essentially only airport generated traffic using the intersection in question
3/20/81	City Engineer	It seems to me that Hilaria Avenue should be made to align with at least one of the major driveways across Horizon Drive at the GSA complex. Does it? Intersections along H Road should be carefully coordinated with the Airport traffic circulation plan. I'm not sure how that one-way exit from the Airport will work opposite a "major entrance" to this development. It is also important to keep the sanitary sewers in dedicated streets. Will that "Loop Road" work for gravity sewers to serve all sites? Power of Attornery should be granted for full street improvements on both Horizon Drive and H Road. Based on the 100 Ft. right-of-way for Relocated H Road, shouldn't H Road half right-of-way be dedicated out to 50 Ft.? No utilities are shown for any area except Filing 1. If those dikes along Highline Canal aren't protected by easements, there is no assurance they will remain intact. The "ponding areas" shown on the Preliminary Drainage Plan don't mean much unless one knows what the site improvements will be and where they will be located. For all I know a building might be planned in a "ponding area". In summary, a drainage plan for raw land is not of much value when you know a lot of valuable improvements will end up on that land. Their proposed street section is not approved by this office. The asphalt mat should be 20 Ft. minimum wide on each side for a commercial area with on-street parking. Pedestrian facilities must be provided. With a 100 Ft. wide right-of-way, surely there is room for pedestrian facilities. The components of the City's adopted "Local Street in a Commercial Zone" apply to this street. Those 2 Ft. "V-Pans" are absolutely not acceptable on a city street. A 3 Ft. high berm with landscaping on top of it will have to be adjusted at driveways and intersections so as to not have sight-distance hazards. Vertical curves are to be provided at all vertical P.I.'s. I do not know if the grade on Horizon Drive will be lowered when it is improved. A financial guarantee in accordance with Development Regulations Section 27-2.3 should be obtained for all public improvements. No comments on rezoning.
3/20/81	Staff Comments:	Rezone - Looks good. Good use of land. ODP - Is a curb cut contemplated for restaurant? Should be a shared access with the rest of the development. Major buffering/landscaping needed along Horizon and H Rd. Nice buffering along Canal to incorporate water view would be appropriate. Offices should not just back onto the Canal - a landscaped walkway or at least buffer would be better for such an important visual attribute approaching the airport. Open space linkages should run throughout the development as walkways, easements and visual seperation. Could be a real attractive addition to the airport area if well landscaped and buildings positioned in a variety of ways.

3/31/81

RIDER/SIMONETTI PASSED 5-0 A MOTION TO RECOMMEND APPROVAL TO THE CITY COUNCIL OF #22-81, C.H. FOUR COMMERCIAL PARK, PRELIMINARY PLAN, SUBJECT TO STAFF COMMENTS, WITH POSSIBLE RELOCATION OF POLARIA DRIVE ON THE FINAL PLAT, AFTER DISCUSSION WITH APPROPRIATE AGENCIES.

RIDER/SIMONETTI PASSED 5-0 A MOTION TO RECOMMEND APPROVAL TO THE CITY COUNCIL OF #22-81, ZOINING OF ANNEXATION TO H. O.

(FIRST DRAFT MAY 6, 1981)

MESA COUNTY, GRAND JUNCTION, COLORADO
CONDITIONS, COVENANTS AND RESTRICTIONS
AFFECTING THE PROPERTY OF CH 4 DEVELOPMENT CORPORATION

THIS DECLARATION, made ___ day of_____, A.D. 19__, by CH 4 Development Corporation hereinafter called Declarant.

WITNESSETH:

WHEREAS, Declarant if the owner of the real property described in Section 1 of this declaration, and is desirous of subjecting said real property to the conditions, covenants, and restrictions hereinafter set forth, each and all of which is and are for the benefit of said property and each owner thereof, and shall inure to the benefit of and pass with said property, and each and every parcel thereof;

NOW, THEREFORE, CH 4 Development Corporation hereby declares that the real property described in and referred to in Section 1 hereof is, and shall be, held, transferred, sold, conveyed, and occupied subject to the conditions, covenants, and restrictions (sometimes hereinafter collectively referred to as "Covenants") hereinafter set forth.

SECTION 1: PROPERTY SUBJECT TO THIS DECLARATION

The real property which is, and shall be, held, transferred, sold, conveyed, and occupied subject to the Covenants set forth herein is located in the County of Mesa, Colorado, in the City of Grand Junction, and is more particularly described as follows, to-wit:

(LEGAL DESCRIPTION)

all of which real property is hereinafter referred to collectively as CH 4 Commercial Park, or simply "the Development".

SECTION 2: GENERAL PURPOSES OF THIS DECLARATION

The real property in Section 1 hereof is subjected to the Covenants hereby declared to insure proper use and appropriate development and improvement of every part thereof; to protect the owners of property therein against such improper use of surrounding lots as may depreciate the value of their property; to gaurd against the erection thereon of buildings built of improper or unsuitable materials; to insure adequate and reasonable development of said property; to encourage the erection of attractive improvements thereon, with appropriate locations thereof; to prevent haphazard and inharmonious improvement; to secure and maintain proper setbacks from streets, and adequate free spaces between structures; and in general to provide adequately for highest type and quality of improvement in the Development; and to insure desired high standards of maintenance and operation of individual facilities which will in turn benefit all owners of property by maintaining and promoting the desired character of the entire development complex and convenience to all residents.

SECTION 3: DEFINITIONS

Definitions for termonology included in these Covenants shall be as specified in the Municipal Code of the City of Grand Junction, Colorado, as the same may be amended from time to time. In addition, the following definitions shall apply to the CH 4 Commercial Park:

Design Review Committee: A special committee established for the purpose of reviewing and approving all improvements on individual lots within CH 4 Commercial Park.

Improvements: Structures and construction of any kind, above or below ground, such as, but not limited to: buildings; parking and loading areas; driveways and walkways; fences, earthwork and drainage, plantings; and utilities (sewer, water, gas, and electric distribution).

SECTION 4: GENERAL RESTRICTIONS

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1. Use of Property

All site improvements within CH 4 Commercial Park will be subject to the Municipal Codes of the City of Grand Junction as it may be amended from time to time.

Permitted Uses

All uses included within the City's HO zoning category as it may be amended from time to time will be permitted in the CH 4 Office Park except the following:

- Gas Stations
- Automotive Maintenance Businesses, including gasoline service stations
- Retail Business, unlimited
- Used Goods Business
- Service Business, unlimited
- Amusement Business, inside or out, when not accessory to permitted use.

2. Lot Bulk Requirements

Dimensional standards in the CH 4 Commercial Park shall conform to the requirements of the Grand Junction HO zone category as it may be amended from time to time, or to the standards described below, whichever is more restrictive:

A. Lot frontage: 50' on a public street
B. Minimum lot area: 1/2 acre
C. Maximum lot coverage: 35%
D. Maximum building height: 35'
E. Street setback: 75' minimum from the centerline of the street right-of-way, but no less than 25' minimum from the proprety line.
F. Interior side yard setback: 15' minimum
G. Rear yard setback: 25'

All portions of the required setback from a street shall be used only as a landscaped planting area or for building identification signage as approved by the Design Review Committee.

3. Parking and Loading

Off-street parking and loading requirements shall be provided, at a minimum, to satisfy the requirements of the Grand Junction HO zone district, as it may be amended from time to time. In addition, the Design Guidelines administered by the Design Review Committee will be used to evaluate and approve the design of all parking and loading areas on each site.

No parking shall be permitted on any street or access road, either public or private, or at any other place than the paved parking spaces provided for and described hereinbelow, and each owner and tenant shall be responsible for compliance by its employees and visitors.

No permanent elevated tanks of any kind shall be erected, placed, or permitted upon any part of said property. Any permanent tanks to be used in connection with any use on any lot, including tanks for the storage of gas, oil, or water must be below ground. All types of refrigerating, cooling or heating apparatus must be concealed from public view. Temporary propane tanks, installed prior to natural gas hookup and permanent service, may be installed upon approval of declarant and must be concealed by nautral screening or fencing approved by the Design Review Committee.

7. Maintenance

Each lot at all times shall be kept in a clean, sightly and wholesome condition. No trash, litter, junk, boxes, containers, bottles, cans, implements, machinery, lumber, or other building materials shall be permitted to remain exposed on any lot so as to be visible to any neighboring lot or road.

In the event that a structure is destroyed wholly or partially by fire or any other casualty, said structure shall be properly rebuilt or repainted to conform to this declaration or, all the remaining structure including the foundations and all debris shall be removed from the lot.

8. Owners and Tenants Association

There is hereby established the Owners and Tenants Association for the CH 4 Commercial Park, sometimes referred to as the "Owners and Tenants Association" or simply "the Association". Each fee owner of land in CH 4 Commercial Park including Declarants, shall be a member of the Association. Each fee owner shall be entitled to one vote in the Association for each full acre of land owned, provided that such fee owner of a building site shall be entitled to at least one vote in all events. Each fee owner may assign any vote to which he is entitled to his tenant or tenants on such terms as they may agree upon, and while any tenant is entitled to a vote, he or it shall be deemed a member of the Association.

4. Landscaping

Building sites shall be landscaped in accordance with a plan reviewed and approved by the Design Review Committee. Such landscaping shall include grasses, shrubs and other customary landscape design over the entire site. The DRC will evaluate proposed landscape plans against the "CH 4 Commercial Park Design Guidelines". The landscape development, having once been installed, shall be maintained in a neat and adequate manner which shall include irrigation, moving, pruning, fertilizing, and disease prevention as necessary. The installed site landscaping may not be altered substantially without submitting a revised plan to the DRC for review and approval.

5. Utilities

All site designs will provide utility easements as required. All utility lines shall be underground. No pipe, conduit, cable, or line for water, gas, sewage, drainage, steam, electricity or any other energy or service shall be installed or maintained upon any lot (outside of any building) above the surface of the ground, except for hoses, movable pipes used for irrigation or other purposes during construction, or transformers. No cesspool, septic tank or sewage disposal plant shall be erected or maintained within the development. Utility meters and transformers shall be grouped together and when above ground, shall be concealed with vegetation or fence screening to the approval of the Design Review Committee.

6. Appurtanances

No derrick or other structure designed for the use of boring for water, oil, or natural gas shall be erected, placed or permitted upon any part of said property nor shall any water, oil, or natural gas be produced or extracted therefrom except by the declarant. All rights to water, oil, and natural gas underlying same are reserved to the Declarant.

The Association is formed to provide for the maintenance, improvement and beautification of any areas or facilities of CH 4 Commercial Park used in common such as open space areas and storm detention areas, and to undertake such other activities as are related to maintaining CH 4 Commercial Park as a desirable development for members of the Association. The Association shall cause to be organized or designated some legal entity or nominee which shall be authorized to hold title to real property. Such legal entity or nominee shall accept and retain legal title to such other open or storm detention areas as may hereafter be deeded thereto by Declarants. Such legal entity or nominee shall hold such legal title for the use and benefit of the members of the Association. The Association shall be responsible for the maintenance and upkeep of such areas, and any improvements thereon. The Association shall pay, or arrange for payment directly by its members on an equitable basis, for such services as may be required in connection with such commonly used facilities. To these ends set forth hereinabove, the Association may assess its members, provided that such assessments are made upon affirmative vote of not less than two-thirds of the members, and provided further that such assessments shall be made against the members in direct proportion to the number of votes which each has.

The Association may establish its own By-Laws for the conduct of its affairs, which shall include reasonable notice to each member prior to any meeting. Decisions of the Association shall be by majority of votes cast at any meeting, except as otherwise provided hereinabove.

9. Design Review Committee

There is hereby established a Design Review Committee (DRC) which shall ultimately consist of five members. The initial Committee shall consist of three members and shall include a licensed architect, a professional land planner, and a representative of Declarants. The Committee shall be expanded to five members, at such time as declarants may decide, from among members of the Owners and Tenants Association. While the Design Review Committee consists of three members, all of such members shall be appointed by Declarants. After the Design Review Committee has been

expanded to five members, the Declarants shall continue to appoint all members until such time as the Owners and Tenants Association is organized and By-Laws are adopted; upon the adoption of such By-Laws, the Owners and Tenants association shall elect from its membership two qualified people who will immediately replace the two members appointed by the Declarants from among owners or tenants. Declarants shall continue to appoint the remaining three members among whom shall be a licensed architect and a professional land planner, until such time as Declarants assign the right of the designation of the full Committee to the owners and Tenants Association. Declarants shall pay any fees charged by the licensed architect and the professional land planner for their service on the Design Review Committee a long as they are appointed by Declarants.

The term of office of the members of the Design Review Committee shall be for one year, and shall run from the 30th day of January each year, through the 29th day of January of the succeeding year.

A Chairman of the Design Review Committee shall be selected annually from the members of the Committee by a majority vote of the members. The Chairman following his selection shall take charge and conduct all meetings and shall provide for reasonable notice to each member of the Committee prior to any meeting, setting forth the place and time of said meeting.

Three members of the Design Review Committee, one of which shall be the Chairman, shall constitute a quorum. Actions of the Design Review Committee will be by majority vote of those members in attendance at any meeting at which there is a quorum present.

The Design Review Committee is formed to fulfill the following responsibilities:

a. Interpret and enforce the CH 4 Commercial Park Design Guidelines.
b. Review proposed improvements within the CH 4 Commercial Park, inspect completed improvements, and issue certificates of compliance with those guidelines.

No improvement shall be erected, placed or altered on any building site nor shall any construction be commenced thereon until plans for such building or other improvement have been approved by the Design Review Committee, provided that improvements and alterations which are completely within a building may be undertaken without such approval.

The Design Review Committee shall either approve or disapprove any plans submitted to it within thirty (30) days from the date on which they are submitted to said Committee and failure to either approve or disapprove within this period shall constitute approval of said plans.

The Design Guidelines contain a list of information which must be submitted to the Committee for its review purposes.

The decisions of the Design Review Committee shall be binding upon the owners, Declarants and all parties submitting plans for approval of said Committee.

Neither the Design Review Committee, nor any member, employee or agent thereof shall be liable to any owner or tenant or to anyone submitting plans for approval, or to any other party by reason of mistake in judgement, negligence, or non-feasance, arising out of or in connection with the approval, disapproval, or failure to approve any such plans or for any other action in connection with its or their duties hereunder. Likewise, anyone so submitting plans to the Design Review Committee for approval, by submitting such plans, and any person when he becomes an owner or tenant agrees that he or it will not bring any action or suit to recover any damages against the Design Review Committee, or any member, employee or agent of said Committee.

10. Enforcement

The conditions, covenants, restrictions and reservations herein contained shall run with the land, and be binding upon and inure to the benefit of the Declarants and owners of every part and parcel of the premises. These conditions, covenants, restrictions and reservations

may be enforced, as provided hereinafter, by each Declarant and owner, as well as the Design Review Committee acting for itself and as Trustees on behalf of the Declarants and owners. Each owner, by acquiring an interest in the premises, shall be conclusively deemed to appoint irrevocably the Design Review Committee as his Trustees for such purposes. Violation of any condition, covenant, restriction or reservation herein contained shall give to the Declarants, the Design Review Committee and to the owners, or any of them, the right to bring proceedings in law or equity against the party or parties violating or attempting to violate any of said covenants, conditions, restrictions and reservations, to enjoin them from so doing, to cause any such violation to be remedied, or to recover damages resulting from such violation. In addition, violation of any such covenants, conditions, restrictions and reservations shall give to the Design Review Committee, acting as such Trustees, the right to enter upon the premises and remove at the expense of the owner thereof any structure, thing or condition that may be or exist thereon contrary to the provisions hereof. Every act, omission to act, or condition which violates the covenants, conditions, reservations herein contained shall constitute a nuisance and every remedy available in law or equity for the abatement of public or private nuisances shall be available to the Declarants, the owners and Design Review Committee. In any legal or equitable proceeding to enforce the provisions hereof or to enjoin their violation, the party or parties against whom judgment is entered shall pay the attorneys' fees of the party or parties for whom judgment is entered in such amount as may be fixed by the court in such proceeding. Such remedies shall be cumulative and not exclusive.

WESTERN ENGINEERS, INC.
CONSULTING ENGINEERS / LAND SURVEYORS

May 26, 1981

City-County Development
P.O. Box 897
Grand Jct., CO 81502

RE: Response to Agency Review Comments, CH Four Commercial Park, Filing No. 1

Gentlemen:

Walker Field Airport:

Since the comment is no different than preliminary plan comments, the response we made on preliminary is the same also.

Water and Power Resources:

The southwestern boundary of the subdivision is the northerly right-of-way line of the Government Highline Canal as recorded on Book 197, Page 165. This line conforms with the "right-of-way of about 35 feet from the northeast bank of the canal", although it is actually recorded as 50 feet from the described centerline.

City Fire Department:

The water supply system as designed will provide 1,250 gpm with a residual pressure of 45 psi or 1,500 gpm with 30 psi, which exceeds the required fire flow.

The hydrant guarantee has been provided to the Development Department as part of the Improvements Guarantee.

Public Service Company:

The utility easement has been labelled as requested and electric line location corrected.

Ute Water:

The line has been adequately sized to meet fire flow requirements.

The water line will extend beyond street paving.

The rest of the comments on installation, policies, fees, etc. will be adhered to.

2150 HIWAY 6 & 50 P. O. BOX 571 GRAND JUNCTION, COLORADO 81501 PHONE 242-5202

City Utilities, Mountain Bell, Transp. Engineer:

No comments

City Engineer:

The power of attorney will be submitted prior to recording.

The storm sewer will have a manhole added or will be realigned to eliminate the need for a manhole. Construction plans on this and other improvements will be submitted prior to construction.

Copies of the Soils and Foundation Report will be provided to the developers of each of the lots. It will be the responsibility of the lot developer and his architect or engineer to design their building accordingly.

Staff:

The power of attorney will be provided. A bike path along Highline Canal will be considered. Since such a path would be within the canal's right-of-way, they will need to be consulted prior to a decision being made.

A copy of a draft of the covenents is being submitted for staff review. They are not in final form as they are still beign reviewed by the developer and his consultants. The final form will be submitted for recording with the plat.

Submitted by:

WESTERN ENGINEERS, INC.

Kent Harbert

T. Kent Harbert, P.E.

TKH:slv

City of Grand Junction, Colorado 81501
250 North Fifth St.,

December 21, 1982

John Elmer
ARIX
760 Horizon Drive
Grand Junction, CO 81501

Dear John:

Re: CH4 Commercial Park - Filing No. 1 - Street Improvements

The street and storm drainage improvements for the above were jointly final-inspected on August 20, 1982, and our requested re-inspection on December 8, 1982, showed that all noted physical deficiencies have been corrected and all improvements appear to be satisfactory. On October 12, 1982, you submitted the as-built drawings and construction tests results which acknowledge the facilities have been constructed in accordance with the approved plans and specifications.

In light of the above, the street and storm drains constructed in the above are accepted by the City and we are now responsible for maintenance of those facilities.

Upon receipt of the easement, I am also prepared to accept the sanitary sewer. In response to your November 30, 1982, letter concerning the sewer grade being flatter than minimum standards, we have considered all the constraints and efforts on your part to correct the situation and are prepared to accept the conditions as-constructed.

Thanks for your continued cooperation.

Very truly yours,

Ronald P. Rish

Ronald P. Rish, P.E.
City Engineer

RPR/hm

cc - Jim Brown, Occidental Oil
Bruce Currier
Bob Goldin ✓
John Kenney
Darrel Lowder
Jim Patterson
File