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Geotechnical Report

Nova Business Park South Tentative Parcel Map (P19-00022)
Planning Commission Hearing Date July 15, 2020

R G H
CONSULTANTS, INC.

Geotechnical
Geological
and Laboratory Services

June 23, 2005

Nova Group, Inc.
Attn: Ron Fedrick
P.O. Box 4050
Napa, CA 94558

RE: Geotechnical Study
Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

Project Number: 6106.01.04.2

Dear Mr. Fedrick,

This report presents the results of our geotechnical study for the Nova Group, Inc. grading to be performed at 7411 Napa-Vallejo Highway in Napa, California. The property extends over relatively level to gently sloping terrain and contains construction equipment and debris. The site location is shown on Plate 1.

We understand that you plan to remove fill from the southwestern portion of the property and place it in the southeast portion. Grading plans are not available, but we anticipate that the planned grading will be the minimum amount needed to provide the site with positive drainage.

SCOPE

The purpose of our study, as outlined in our Professional Service Agreement dated June 17, 2005, was to generate geotechnical information for the design and construction of the project. Our scope of services included reviewing selected published geologic data pertinent to the site; evaluating subsurface conditions with test pits; analyzing the field data; and presenting this report with the following geotechnical information:

1. A brief description of soil conditions observed during our study;

2. Conclusions and recommendations regarding:

a. Primary geotechnical engineering concerns and mitigating measures, as applicable;

b. Site preparation and grading including remedial grading of weak, porous and compressible surface soils;

c. Geotechnical engineering drainage improvements; and

d. Supplemental geotechnical engineering services.

STUDY

Site Exploration

On June 20, 2005, we performed a geotechnical reconnaissance of the site and explored the subsurface conditions in the area to be filled by excavating six test pits to depths ranging from about 4½ to 7½ feet. The test pits were excavated with a rubber-tired backhoe at the approximate locations shown on the Exploration Plan, Plate 2. The test pit locations were determined approximately by pacing their distance from features shown on the Exploration Plan and should be considered accurate only to the degree implied by the method used. Our field engineer located and logged the pits and obtained samples of the materials encountered for visual examination and classification. Disturbed "grab" samples were obtained at selected depths from the test pits and placed in plastic bags.

The logs of the pits showing the materials encountered and sample depths are presented on Plates 3 through 8. The soils are described in accordance with the Unified Soil Classification System, outlined on Plate 9.

The test pit logs show our interpretation of subsurface soil conditions on the date and at the locations indicated. Subsurface conditions may vary at other locations and times. Our interpretation is based on visual inspection of soil samples and interpretation of excavation resistance. The location of the soil boundaries should be considered approximate. The transition between soil types may be gradual.

SITE CONDITIONS

The property extends primarily over relatively level to gently sloping terrain. The vegetation consists of tall grasses and weeds with occasional trees and shrubs. The

grading site contains construction equipment and debris, including stockpiles of large boulders.

The proposed grading site is located southeast of the existing office buildings for Nova Group, Inc. In general, the ground surface is moderately hard. However, soils in the area that appear hard and strong when dry will typically lose strength rapidly and settle under the loads of fills, foundations and slabs as their moisture content increases and approaches saturation. This typically occurs because the surface soils are weak, porous and compressible.

Natural drainage consists of sheet flow over the ground surface that concentrates in natural drainage elements. A detailed description of subsurface conditions found in our test pits is given on Plates 3 through 8.

Groundwater

Free groundwater was not observed in out test pits at the time of excavation. Fluctuation in the groundwater level typically occurs because of a variation in rainfall intensity, duration and other factors such as flooding and periodic irrigation.

DISCUSSIONS AND CONCLUSIONS

Geotechnical Issues

General

Based on our study, we judge the proposed grading can be performed as planned, provided the recommendations presented in this report are incorporated into the design and construction. The primary geotechnical concerns are:

1. The presence of about 2 feet of weak, porous and compressible surface clayey soils.

2. The detrimental effects of uncontrolled surface runoff.

Weak, Porous Surface Soils

Weak, porous surface soils, such as those found at the Nova Group site, appear hard and strong when dry but will lose strength rapidly and settle under the load of fills, foundations, slabs, and pavements as their moisture content increases and approaches

saturation. The moisture content of these soils can increase as the result of rainfall, periodic irrigation or when the natural upward migration of water vapor through the soils is impeded by, and condenses under fills, foundations, slabs, and pavements. The detrimental effects of such movements can be remediated by strengthening the soils during grading. This can be achieved by excavating the weak soils and replacing them as properly compacted (engineered) fill. We understand that the fill area is not currently planned for future development. Therefore, as an alternative to the remedial grading, the new fill can be placed over the weak, porous and compressible surface soils with the understanding that future improvements, such as structures, will require, at a minimum, remedial reworking of both the weak, porous and compressible soils and the new fill. This does not take into account whether these soils are expansive.

Surface Drainage

Surface runoff typically sheet flows over the ground surface but can be concentrated by the planned site grading and drainage. It will be necessary to divert surface runoff around improvements and install energy dissipaters at discharge points of concentrated runoff. This can be achieved by conveying the runoff into man made drainage ditches or natural swales that lead downgradient of the site.

RECOMMENDATIONS

Grading

Site Preparation

Areas to be filled should be cleared of vegetation and debris. Trees and shrubs that will not be part of the proposed grading should be removed and their primary root systems grubbed. Cleared and grubbed material should be removed from the site and disposed of in accordance with County Health Department guidelines. We did not observe septic tanks, leach lines or underground fuel tanks during our study. Any such appurtenances found during grading should be capped and sealed and/or excavated and removed from the site, respectively, in accordance with established guidelines and requirements of the County Health Department. Voids created during clearing should be backfilled with engineered fill as recommended herein.

Stripping

Areas to be graded should be stripped of the upper few inches of soil containing organic matter. Soil containing more than two percent by weight of organic matter should be considered organic. The strippings should be removed from the site, or if suitable,

anticipated if grading must be completed during the winter and early spring or if localized areas of soft saturated soils are found during grading in the summer and fall.

Geotechnical Drainage

The finished fill surface should be sloped to provide positive drainage and surface water should be diverted away from the toe of slopes.

Maintenance

Periodic land maintenance will be required. Surface drainage facilities should be checked frequently, and cleaned and maintained as necessary or at least annually. A dense growth of deep-rooted ground cover must be maintained on all slopes to reduce sloughing and erosion. Sloughing and erosion that occurs must be repaired promptly before it can enlarge.

Supplemental Services

RGH Consultants, Inc. (RGH) recommends that we be retained to review the project plans and specifications to determine if they are consistent with our recommendations. In addition, we should be retained to observe construction, particularly site excavations, compaction of fills and backfills, foundation and subdrain installations, and perform field and laboratory testing. As part of these services, we recommend that prior to construction a meeting be held at the site that includes, but is not limited to, the owner or owner's representative, the general contractor, the grading contractor, the foundation contractor, the underground contractor, any specialty contractors, the project civil engineer, other members of the project design team and RGH. This meeting should serve as a time to discuss and answer questions regarding the recommendations presented herein and to establish the coordination procedure between the contractors and RGH.

If, during construction, we observe subsurface conditions different from those encountered during the explorations, we should be allowed to amend our recommendations accordingly. If different conditions are observed by others, or appear to be present beneath excavations, RGH should be advised at once so that these conditions may be evaluated and our recommendations reviewed and updated, if warranted. The validity of recommendations made in this report is contingent upon our being notified and retained to review the changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or

stockpiled for re-use as topsoil in landscaping. As an alternative, the strippings can be used in the fill provided that prior to grading, the grass and weeds are cut close and the cuttings removed from the site. The stubble should then be thoroughly mixed into the fill.

Excavations

Within fill areas, the weak, porous and compressible surface soils should be removed to a depth of 18 inches. The excavation should extend to at least the toe of the fill where the fill is less than 4 feet high or 3 feet beyond the toe if the fill is higher than 4 feet. As an alternative, the new fill can be placed on top of the existing soil with the understanding that future improvements will require remedial grading of weak, porous and compressible surface soils and the new fill.

Fill Placement

The surface exposed by stripping and/or removal of weak, compressible surface soils should be scarified to a depth of at least 6 inches, uniformly moisture-conditioned to near optimum and compacted to at least 90 percent of the maximum dry density of the materials as determined by ASTM Test Method D-1557. In expansive soil areas, if present, moisture conditioning should be sufficient to completely close all shrinkage cracks for their full depth. If grading is performed during the dry season, the shrinkage cracks may extend to a few feet below the surface. Therefore, it may be necessary to excavate a portion of the cracked soils to obtain the proper moisture condition and degree of compaction. Approved fill material should then be spread in thin lifts, uniformly moisture-conditioned to near optimum and properly compacted. All fills should be compacted to at least 90 percent relative compaction as determined in accordance with Test Method ASTM D1557.

Permanent Cut and Fill Slopes

In general, fill slopes should be designed and constructed at slope gradients of 2:1 (horizontal to vertical) or flatter, unless otherwise approved by the geotechnical engineer in specified areas. Fill slopes should be constructed by overfilling and cutting the slope to final grade. "Track walking" of a slope to achieve slope compaction is not an acceptable procedure for slope construction.

Wet Weather Grading

Generally, grading is performed more economically during the summer months when on-site soils are usually dry of optimum moisture content. Delays should be anticipated in site grading performed during the rainy season or early spring due to excessive moisture in on-site soils. Special and relatively expensive construction procedures, including dewatering of excavations and importing granular soils, should be

construction operations at, or adjacent to, the site, the recommendations made in this report may no longer be valid or appropriate. In such case, we recommend that we be retained to review this report and verify the applicability of the conclusions and recommendations or modify the same considering the time lapsed or changed conditions. The validity of recommendations made in this report is contingent upon such review.

These supplemental services are performed on an as-requested basis and are in addition to this geotechnical study. We cannot accept responsibility for items that we are not notified to observe or for changed conditions we are not allowed to review.

LIMITATIONS

This report has been prepared by RGH for the exclusive use of Nova Group, Inc. and their consultants as an aid in the design and construction of the proposed grading described in this report.

The validity of the recommendations contained in this report depends upon an adequate testing and monitoring program during the construction phase. Unless the construction monitoring and testing program is provided by our firm, we will not be held responsible for compliance with design recommendations presented in this report and other addendum submitted as part of this report.

Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided to us regarding the proposed construction, the results of our field exploration, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

The test pits represent subsurface conditions at the locations and on the date indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration on June 20, 2005, and may not necessarily be the same or comparable at other times.

The scope of our services did not include an environmental assessment or a study of the presence or absence of toxic mold and/or hazardous, toxic or corrosive materials in the soil, surface water, groundwater or air (on, below or around this site), nor did it include an evaluation or study for the presence or absence of wetlands. These studies

should be conducted under separate cover, scope and fee and should be provided by a qualified expert in those fields.

We trust this provides the information you require at this time. We are available to provide additional evaluation during your planning phase and can present a proposal for the recommended supplemental services, as appropriate. If you have questions or wish to discuss this further, please call.

Very truly yours,
RGH Consultants, Inc.

Tonya L. Johnson

Tonya L. Johnson
Staff Engineer

Eric G. Chase

Eric G. Chase
Geotechnical Engineer - 2628

EGC:TLJ:tlj:jj
Three copies submitted

Attachment: Plates 1 through 9

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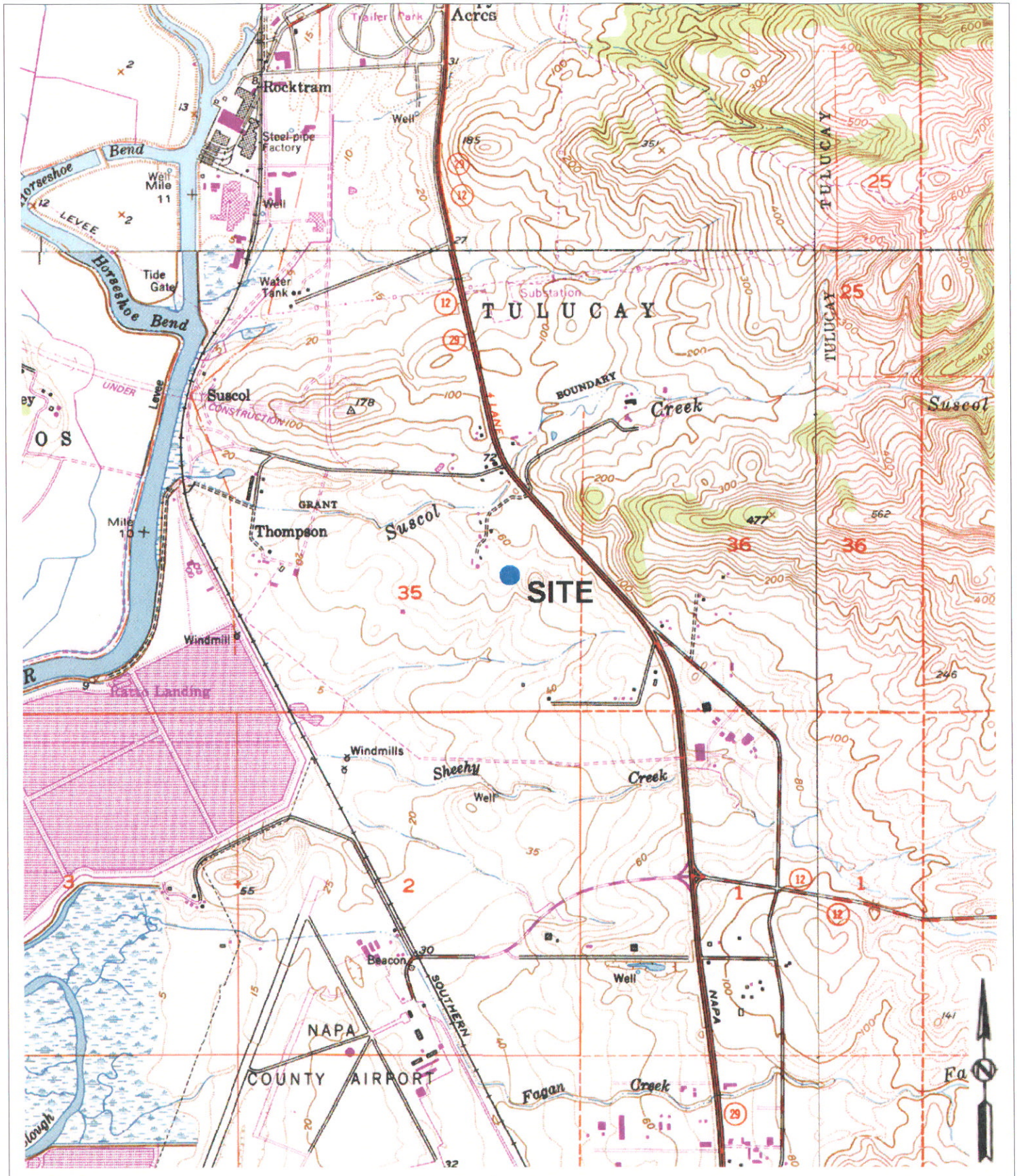
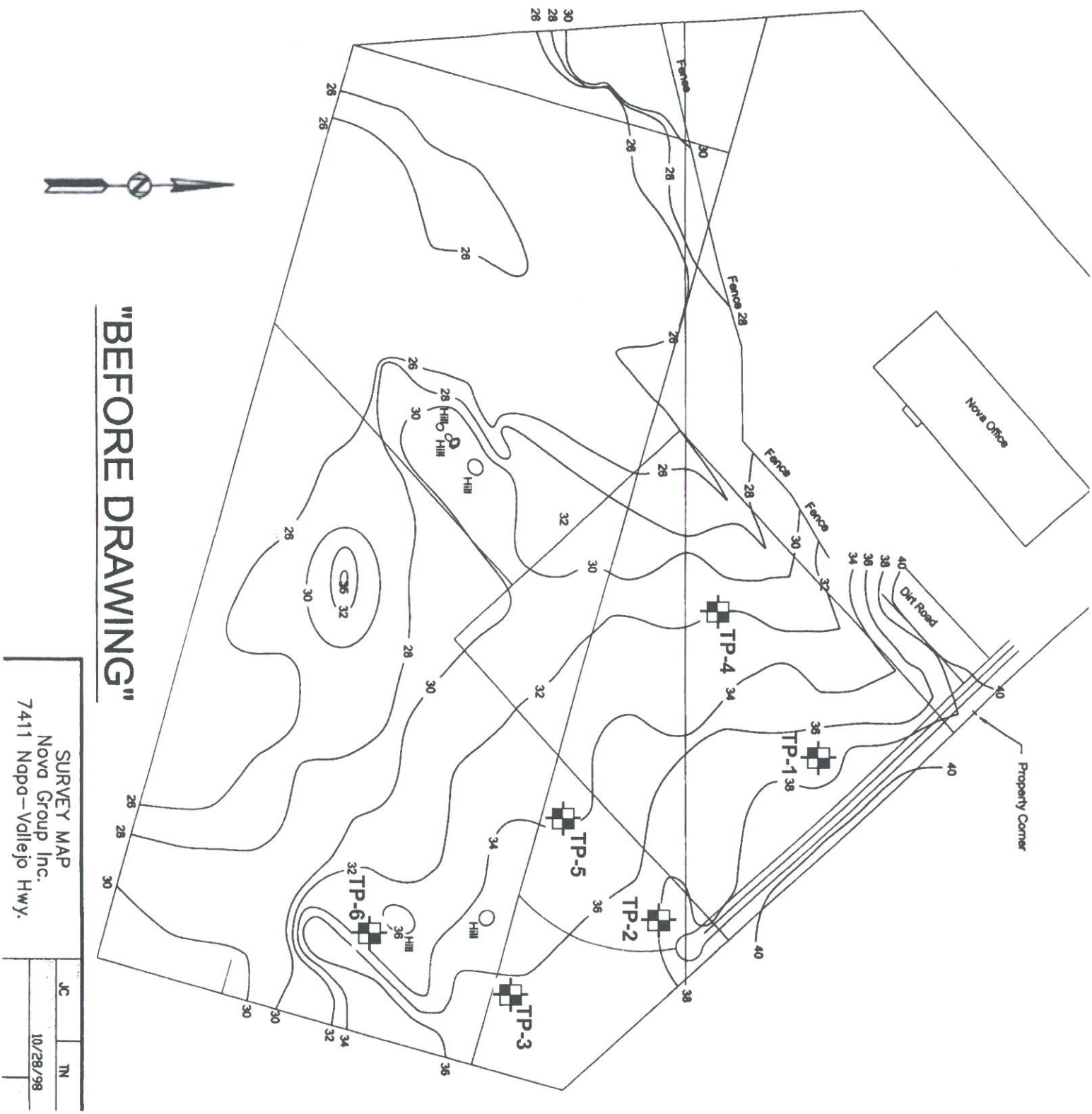


Reference: Maptech TopoQuad, Cuttings Wharf, California Quadrangle

Scale: 1" = 2000'

RGH Consultants, Inc.	Job No: 6106.01.04.2 Appr: TLJ Drwn: jj Date: JUN. 05	**SITE LOCATION MAP** Nova Group, Inc. 7411 Napa-Vallejo Highway Napa, California	PLATE 1



Reference: "Before Drawing" provided by Nova Group, Inc. dated October 28, 1998.

Not to Scale

RGH Consultants, Inc.	Job No: 6106.01.04.2 Appr: TJ Drwn: jj Date: JUN 2005	**EXPLORATION PLAN** Nova Group, Inc. 7411 Napa-Vallejo Highway Napa, California	PLATE 2

EQUIPMENT: **Case 580K Backhoe: 24" Bucket**

LOGGED BY: **TLJ** DATE: **6/20/05**

EXCAVATOR: **Heide & Williams** ELEVATION: **37.0 feet ***

Other Laboratory Tests	Dry Density (pcf)	Moisture Content (%)	% Passing #200 Sieve	Sample	DEPTH (FEET)	
					0	DARK BROWN SANDY CLAY (CL), medium stiff to stiff, moist, porous and compressible to 1 foot.
					2	increasing moisture at 1½ feet
					4	MOTTLED BROWN AND GRAY SANDY CLAY (CH), very stiff to hard, moist, with roots (Claystone?).
						Bottom of Test Pit. No free groundwater encountered.

* Approximate elevations based on contours shown on "Before Drawing," by Nova Group, Inc., dated October 28, 1998 (scale unknown).

R G H Consultants, Inc.

Job No: 6106.01.04.2

Appr: TLJ

Drwn: jj

Date: Jun 2005

LOG OF TEST PIT 1

Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE

3

Other Laboratory Tests	Dry Density (pcf)	Moisture Content (%)	% Passing #200 Sieve	Sample	DEPTH (FEET)	
					0	BROWN SANDY CLAY (CL), medium stiff, dry, with gravel, porous and compressible.
					2	MOTTLED DARK BROWN AND DARK GRAY SANDY CLAY (CH), medium stiff to very stiff, moist.
					4	MOTTLED BROWN AND GRAY SANDY CLAY (CH), very stiff to hard, moist (Claystone?).
					6	Bottom of Test Pit. No free groundwater encountered.

EQUIPMENT: **Case 580K Backhoe: 24" Bucket**

LOGGED BY: **TLJ** DATE: **6/20/05**

EXCAVATOR: **Heide & Williams** ELEVATION: **38.0 feet ***

* Approximate elevations based on contours shown on "Before Drawing," by Nova Group, Inc., dated October 28, 1998 (scale unknown).

RGH Consultants, Inc.

Job No: 6106.01.04.2

Appr: TLJ

Drwn: jj

Date: Jun 2005

LOG OF TEST PIT 2

Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE

4

Other Laboratory Tests	Dry Density (pcf)	Moisture Content (%)	% Passing #200 Sieve	Sample	DEPTH (FEET)	EQUIPMENT: Case 580K Backhoe: 24" Bucket LOGGED BY: TLJ DATE: 6/20/05 EXCAVATOR: Heide & Williams ELEVATION: 36.5 feet *
					0	BROWN SANDY CLAY (CL), medium stiff, dry, with gravel, with roots, porous and compressible.
					2	MOTTLED DARK BROWN AND DARK GRAY SANDY CLAY (CH), medium stiff to very stiff, moist to wet.
					4	
					6	MOTTLED BROWN AND GRAY SANDY CLAY (CH), very stiff to hard, moist (Claystone and sandstone?)
						Bottom of Test Pit. No free groundwater encountered.

* Approximate elevations based on contours shown on "Before Drawing," by Nova Group, Inc., dated October 28, 1998 (scale unknown).

R G H Consultants, Inc.

Job No: 6106.01.04.2
Appr: TLJ
Drwn: jj
Date: Jun 2005

LOG OF TEST PIT 3
Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE 5

Other Laboratory Tests	Dry Density (pcf)	Moisture Content (%)	% Passing #200 Sieve	Sample	DEPTH (FEET)	
					0	BROWN SANDY CLAY (CL), soft to medium stiff, moist, with roots to 1½ feet, compressible to 1½ feet.
					2	MOTTLED BROWN AND GRAY SANDY CLAY (CH), very stiff to hard, moist (Claystone and sandstone?).
					4	Bottom of Test Pit. No free groundwater encountered.

EQUIPMENT: **Case 580K Backhoe: 24" Bucket**

LOGGED BY: **TLJ** DATE: **6/20/05**

EXCAVATOR: **Heide & Williams** ELEVATION: **32.0 feet ***

* Approximate elevations based on contours shown on "Before Drawing," by Nova Group, Inc., dated October 28, 1998 (scale unknown).

RGH Consultants, Inc.

Job No: 6106.01.04.2

Appr: TLJ

Drwn: jj

Date: Jun 2005

LOG OF TEST PIT 4

Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE 6

Other Laboratory Tests	Dry Density (pcf)	Moisture Content (%)	% Passing #200 Sieve	Sample	DEPTH (FEET)	
					0	DARK BROWN SANDY CLAY (CL), medium stiff, moist, with gravel, with roots to 1½ feet, compressible to 1½ feet.
					2	MOTTLED DARK BROWN AND DARK GRAY SANDY CLAY (CH), very stiff, moist.
					4	MOTTLED BROWN AND GRAY SANDY CLAY (CH), very stiff to hard, moist (Claystone and sandstone?).
					6	Bottom of Test Pit. No free groundwater encountered.

EQUIPMENT: **Case 580K Backhoe: 24" Bucket**

LOGGED BY: **TLJ** DATE: **6/20/05**

EXCAVATOR: **Heide & Williams** ELEVATION: **34.0 feet ***

* Approximate elevations based on contours shown on "Before Drawing," by Nova Group, Inc., dated October 28, 1998 (scale unknown).

RGH Consultants, Inc.

Job No: 6106.01.04.2

Appr: TLJ

Drwn: jj

Date: Jun 2005

LOG OF TEST PIT 6

Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE 8

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVEL, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVEL WITH FINES (OVER 12% OF FINES)		GM	SILTY GRAVEL, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVEL, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SAND, GRAVELLY SAND, LITTLE OR NO FINES
				SP	POORLY-GRADED SAND, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (OVER 12% OF FINES)		SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
				SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS — LIQUID LIMIT GREATER THAN 50			MH	ORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS AND OTHER SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KEY TO TEST DATA

Consol - Consolidation
LL - Liquid Limit (in %)
PL - Plastic Limit (in %)
Gs - Specific Gravity
SA - Sieve Analysis
■ - "Undisturbed" Samples
☒ - Bulk or Disturbed Sample
◥ - Standard Penetration Test
□ - Sample Attempt With No Recovery

	Shear Strength, psf	Confining Pressure, psf	
Tx	320	(2600)	- Unconsolidated Undrained Triaxial
TxCU	320	(2600)	- Consolidated Undrained Triaxial
DS	2750	(2600)	- Consolidated Drained Direct Shear
UC	2000		- Unconfined Compression
FVS	470		- Field Vane Shear
LVS	700		- Laboratory Vane Shear

SS - Shrink Swell
EXP - Expansion
P - Permeability

Note: All strength tests on 2.8-in. or 2.4-in. diameter sample, unless otherwise indicated.

RGH Consultants, Inc.

Job No: 6106.01.04.2
Appr: TLJ
Drwn: jj
Date: JUN. 05

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
Nova Group, Inc.
7411 Napa-Vallejo Highway
Napa, California

PLATE 9