APPLICATION OVERVIEW

Dear Board of Adjustment member,

This Special Use Permit application for grading involves a decorative water feature in the rear yard of a residential home in the southwest area of the city, within Washoe County.

The specific section of the Development Code which requires your approval can be found on page 438-9, Item 4, addressing "earthen structures". The code requires approval of all rear yard structures exceeding 6' in height.

The owner wishes to create a naturalistic waterfall feature approximately 18' in height at its highest point. We have attached conceptual sections for your review. Given the size of the property (2.53 acres) and the significant distance from the feature to adjacent properties, as well as the thoughtful design, this attractive water feature will be very much in scale with its surroundings. Please note that the closest adjacent home is over 125' away and is screened by mature evergreen and deciduous trees.

The fountain will be created using weathered Sierra granite, native and ornamental shrub planting and rock mulches to protect against any slope erosion. Our highly experienced team of Landscape Architects, Arborists, Horticulturalists, Civil and Structural Engineers will insure that a handsome and environmentally responsible amenity will be created.

Regarding water loss through evaporation, we estimate a loss of 45 gallons/day during peak summer (or 1350 gal./month. For comparison purposes, a 1000 s.f. irrigated lawn will lose approx.. 4421 gal./month, more than 3 times the amount lost with this water feature.

Within the feature, there will be a short "walk-thru grotto" which will allow the owner and visitors the ability to pass behind the curtain of falling water. This section is expected to be only 6'-7' in length, but will provide a unique landscape experience. From a structural standpoint, the short pass-thru section will be solidly stabilized using boulder-specific structural calculations with field inspected boulder placement/direction from the structural engineer, K2 Engineering.

The owner and the design team look forward to a successful and attractive landscape amenity and we thank you for your consideration.

Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Development staff at 775.328.3600.

Project Information	**Staff Assigned Case No.:**

Project Name: Iremonger Residence Water Feature

Project Description: A natural granite water feature consisting of approx. 900 cyds of imported rock & soil. Height not to exceed 18' above grade. Dense planting and rip-rap will stabilize fountain from erosion

Project Address: 9695 Passa Tempo Drive, Reno NV

Project Area (acres or square feet): 9372 s.f or .21 acre

Project Location (with point of reference to major cross streets **AND** area locator): The residence is located to the S.E. of the intersection of Holcomb Ranch Lane and Thomas Creek Road. See vicinity map on grading plan.

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No(s):	Parcel Acreage:
044-401-03	2.53 ac.		

Section(s)/Township/Range: T 18 R 20 S07

Indicate any previous Washoe County approvals associated with this application:

Case No.(s). none

Applicant Information (attach additional sheets if necessary)

Property Owner:	**Professional Consultant:**
Name: Barry Iremonger	Name: Gail Wilkey Landscaping inc
Address: 9695 Passa Tempo Drive	Address: 9825 S. Virginia street
Reno NV Zip: 89511	Reno NV Zip: 89511
Phone: (775) 247-2851 Fax: n/A	Phone: (775) 853-8733 Fax: 853-3652
Email: Barry.Iremonger@scientificgames.com	Email:
Cell: see above Other:	Cell: Other:
Contact Person: Barry Iremonger	Contact Person:
Applicant/Developer:	**Other Persons to be Contacted:**
Name:	Name: K2 Engineering
Address:	Address: 3100 Mill street # 107
Zip:	Reno NV Zip: 89502
Phone: Fax:	Phone: (775) 355-0505 Fax: 355-0566
Email:	Email: K2eng.net
Cell: Other:	Cell: Other:
Contact Person:	Contact Person: Brandt Kennedy

For Office Use Only

Date Received: Initial:	Planning Area:
County Commission District:	Master Plan Designation(s):
CAB(s):	Regulatory Zoning(s):

Property Owner Affidavit

Applicant Name: Mr. Barry Iremonger

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA)
)
COUNTY OF WASHOE)

I, Barry Iremonger,
(please print name)

being duly sworn, depose and say that I am the owner* of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Development.

(A separate Affidavit must be provided by each property owner named in the title report.)

Assessor Parcel Number(s): 044-401-03

Printed Name Barry Iremonger

Signed

Address 9695 Passa Tempo Drive

Reno NV 89511

Subscribed and sworn to before me this 8th day of December, 2015.

Notary Public in and for said county and state

My commission expires: 12/1/2018

(Notary Stamp)

SUZANNE LANCASTER
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 03-79782-2 - Expires December 1, 2018

*Owner refers to the following: (Please mark appropriate box.)

- ☐ Owner
- ☐ Corporate Officer/Partner (Provide copy of recorded document indicating authority to sign.)
- ☐ Power of Attorney (Provide copy of Power of Attorney.)
- ☒ Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
- ☐ Property Agent (Provide copy of record document indicating authority to sign.)
- ☐ Letter from Government Agency with Stewardship

NEVADA STATE CONTRACTORS BOARD

9670 GATEWAY DRIVE, SUITE 100, RENO, NEVADA, 89521 (775) 688-1141 FAX (775) 688-1271, INVESTIGATIONS (775) 688-1150
2310 CORPORATE CIRCLE, SUITE 200, HENDERSON, NEVADA, 89074 (702) 486-1100 FAX (702) 486-1190, INVESTIGATIONS (702) 486-1110
www.nscb.state.nv.us

NRS 624.031 Applicability of chapter: Exemptions. The provisions of this chapter do not apply to:

4. An owner of property who is **building or improving a residential structure on the property for his own occupancy and not intended for sale or lease**. The sale or lease, or the offering for sale or lease, of the newly built structure within 1 year after its completion creates a rebuttable presumption for the purposes of this section that the building of the structure was performed with the intent to sell or lease that structure. *An owner of property who requests an exemption pursuant to this subsection must apply to the board for the exemption. The board shall adopt regulations setting forth the requirements for granting the exemption.*

If you are seeking an exemption from licensure pursuant to NRS 624.031(4) you must complete the following affidavit, obtain the required signatures, and submit the original to the building department with your application for a building permit.

OWNER BUILDER AFFIDAVIT OF EXEMPTION

I hereby certify that I am the owner of the property listed below, and that I am building or improving a residential structure on this property for my own occupancy and do not intend to sell or lease the property.

Parcel Number: 044-401-03 Description of Work: residential water feature Type of Permit grading

I further acknowledge **and initial** the following obligations and duties:

BI I may not sell or lease this property. If I sell or lease, or offer to sell or lease this property within 1 year after completion, it may be presumed that I have violated the provisions of this exemption and Chapter 624 of NRS.

BI **I MAY NOT HIRE AN UNLICENSED PERSON TO ACT AS MY CONTRACTOR, AGENT, OR CONSTRUCTION MANAGER.**

BI I must directly supervise the construction.

BI Any subcontractor(s) working on this project must be properly licensed by the Nevada State Contractors Board.

BI **Any person working on my project who is not a licensed contractor must work under my direct supervision and must be employed by me. I must comply with all State and Federal laws as an employer in the State of Nevada, including payroll deductions (FICA and income tax withholding), provide industrial insurance coverage, and pay the required unemployment compensation for that employee.**

BI If my project requires the repair, restoration, improvement or construction of a pool or spa, I acknowledge my obligation and duty to comply with the provisions of NRS 624.900 through NRS 624.930 (inclusive).

BI Identify your consultant or contruction manager. Cozil Willey Landscaping inc.

BI I acknowledge that I have received copies of NRS 624.900 through NRS 624.930 (inclusive) and NRS 278.573.

I have read the above owner builder affidavit of exemption and certify that the information provided is true and correct to the best of my knowledge. I certify under penalty of perjury to the truth and accuracy of all statements contained herein.

Dated this 08 **day of** Dec. 2015

Legal Owner of Residential Property (Signature)

Barry Irmonger
(Print Name)

9695 Passa Tempo Drive
Location of Single Family Residence

Reno NV 89511
City **State** **Zip**

Telephone #: 775 - 233-7576

Special Use Permit Application
for Grading
Supplemental Information

(All required information may be separately attached)

Chapter 110 of the Washoe County Code is commonly known as the Development Code. Specific references to special use permits may be found in Article 810, Special Use Permits. Article 438, Grading, and Article 418, Significant Hydrologic Resources, are the ordinances specifically involved in this request.

1. What is the purpose of the grading?

construction of a residential, ornamental water feature requiring importing rock & soil to create a large, berm or "earthen structure". Please see the attached grading plan and sections.

2. How many cubic yards of material are you proposing to excavate on site?

20 cyds. for pond at the lowest point

3. How many square feet of surface of the property are you disturbing?

9300 sf. or .21 acre

4. How many cubic yards of material are you exporting or importing? If none, how are you managing to balance the work on-site?

900 cyds. of soil and granite boulders

5. Is it possible to develop your property without surpassing the grading thresholds requiring a Special Use Permit? (Explain fully your answer.)

no. In order to construct the water feature at the designed height and lenght, the needed volumn of import will surpass the grading thresholds.

6. Has any portion of the grading shown on the plan been done previously? (If yes, explain the circumstances and the year the work was done.)

no.

7. Have you shown all areas on your site plan that are proposed to be disturbed by grading? (If no, explain fully your answer.)

yes. Please see the attached grading plan prepared by project engineer.

8. Can the disturbed area be seen from off-site? If yes, from which directions, and which properties or roadways?

Very limited views from the two adjacent properties due to the distances involved (120' to nearest home) and the existance of mature evergreen and decidious trees. In addition, the proposed tree planting would further screen the decorative feature. The water feature would not be visable from any roadway.

9. Could neighboring properties also be served by the proposed access/grading requested (i.e. if you are creating a driveway, would it be used for access to additional neighboring properties)?

There is no driveway proposed. Not applicable.

10. What is the slope (Horizontal:Vertical) of the cut and fill areas proposed to be? What methods will be used to prevent erosion until the revegetation is established?

The steepest fill slope on the backside of the water feature would be a very small area of 2:1 slope (1100 s.f.) All disturbed areas will be protected with fractured rock rip-rap (3"-8"), weed fabric below, and fully re-vegetated with native and ornamental shrubs. All plant material within the project will be drip irrigated with a fully automatic system.

11. Are you planning any berms?

☑ Yes	☐ No	If yes, how tall is the berm at its highest? 18' at highest point

12. If your property slopes and you are leveling a pad for a building, are retaining walls going to be required? If so, how high will the walls be and what is their construction (i.e. rockery, concrete, timber, manufactured block)?

no retaining walls for buildings or pad construction. the proposed water feature will be located 20% site, approx. 75' from the existing home. Within the water feature, limited retaining conditions will be constructed using field supervision by the team structural engineer. Please see the attached grading plan and sections provided.

13. What are you proposing for visual mitigation of the work?

A dense stand of evergreen and decidious trees will serve as the primary visual mitigation, in addition to the existing mature trees. Also see question # 8 for additional information.

14. Will the grading proposed require removal of any trees? If so, what species, how many and of what size?

none.

15. What type of revegetation seed mix are you planning to use and how many pounds per acre do you intend to broadcast? Will you use mulch and, if so, what type?

No hydroseeding is planned. All plant material shall be 5 gallon shrubs, drip irrigated.

16. How are you providing temporary irrigation to the disturbed area?

See question # 15 (above).

17. Have you reviewed the revegetation plan with the Washoe Storey Conservation District? If yes, have you incorporated their suggestions?

The plans will be submitted to WSCD by the County. Any comments/suggestions will be addressed by the consultant upon receiving them.

18. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that may prohibit the requested grading?

☐ Yes	☑ No	If yes, please attach a copy.

K2 ENGINEERING
AND STRUCTURAL DESIGN

December 10, 2015

Washoe County
Building Department
1001 E. Ninth Street
Reno, Nevada 89512
(775) 328-2020

RE: 9695 Passa Tempo Drive, Landscape Rockery Wall
Iremonger Residence

To whom it may concern,

This letter is to certify that the attached rockery wall design has been reviewed and is acceptable. Please see the attached verifying calculations and drawings.

Thank you for your review of this project and please feel free to call with any questions.

Regards,

DEC 14 2015

Brandt T. Kennedy, PE
Jared A. Krupa, PE

K2 ENGINEERING AND STRUCTURAL DESIGN

Prepared by: CAN Date: 12/9/15

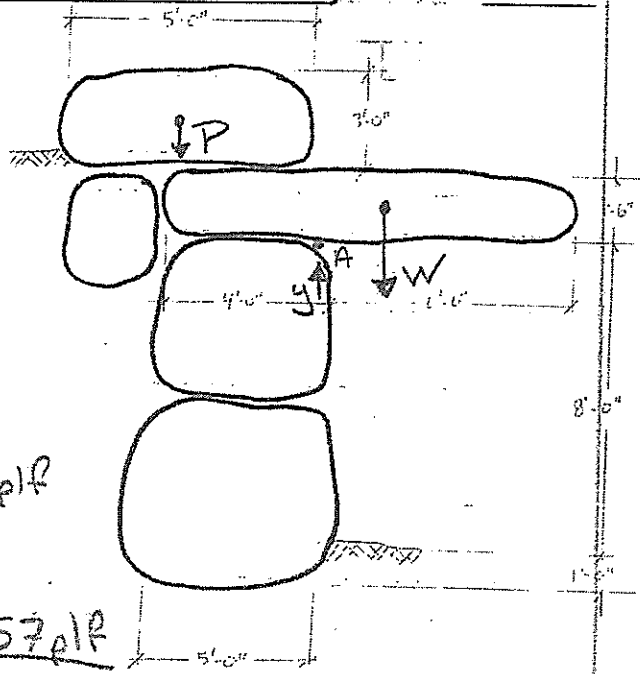
Job No: 15-409 (TREMONGER) Sheet No: 1/1

ASSUMPTIONS:

$\gamma_{Rock} = 175$ pcf

$q = 2000$ psf

$f'_{Rock} = 2500$ psi



$W = (1.5' \times 10') \times 175$ pcf $= 2625$ plf

$\rightarrow \Sigma M_A \Rightarrow W \times 1' = P \times 4'$

$P = 2625 \times 1' \div 4' = 657$ plf

CHECK TOP ROCK:

$(3' \times 5') \times 175$ pcf $= 2625$ plf > 657 plf - OK

$\rightarrow \Sigma F_y \Rightarrow 2625$ plf $- 657$ plf $= y = 1968$ plf

CHECK SHEAR:

$V_{Rock} = 2\sqrt{f'_{Rock}}\, b \cdot d \rightarrow 2\sqrt{2500} \cdot 12" \cdot 18" = 21{,}600$ plf

> 1968 OK

$\rightarrow$ CHECK SOIL BEARING:

TOTAL WEIGHT $= ((4\frac{1}{2}' \times 8') + (1.5' \times 10') + (2' \times 8')) \cdot 175$ pcf

$= 9975$ plf $\div 5' = 1995$ psf < 2000 OK

www.K2eng.net • Ph: 775-355-0505 • Fax: 775-355-0566 • Email: info@K2eng.net
3100 Mill Street • Suite 107 • Reno • NV • 89502

Casazza Ranch Estates Phase

GEOTECHNICAL INVESTIGATION

CASAZZA RANCH ESTATES

- PHASE 4

Washoe County, Nevada

March, 1992

prepared for:

CASAZZA RANCH ESTATES

Reno/Sparks, Nevada
Las Vegas, Nevada
Phoenix, Arizona

sea incorporated
CONSULTING ENGINEERS

sea incorporated

Consulting Engineers

950 INDUSTRIAL WAY
SPARKS, NEVADA 89431-6092
(702) 358-6931
FAX: 358-6954

March 25, 1992
Project No. 2260-01-1

Mr. Don Casazza
Casazza Ranch Estates
1100 West Holcomb Lane
Reno, Nevada 89511

Dear Mr. Casazza:

We are pleased to present the results of our geotechnical investigation for the proposed Phase 4 of the Casazza Ranch Estates in Washoe County, Nevada.

Based on our site exploration the soils within the proposed subdivision appear to be predominately granular. Such soils will provide good foundation support and may be used as structural fill. Groundwater was encountered in the southeastern portion of the site approximately 100 feet west of an active irrigation ditch. We anticipate that a significant rise in the water table will occur during the irrigation season such that a permanent dewatering system must be considered.

The following report presents our geotechnical recommendations for design and construction of the proposed project. We wish to thank you for the opportunity to conduct this investigation and we will be readily available to discuss any related questions.

Sincerely,

SEA, Incorporated
Consulting Engineers

Dal Hunter, Ph. D., P.E.
Geological Engineer
R.E. No. 9343

Larry J. Johnson
Vice President

LJJ:DH:ds
Enclosure

TABLE OF CONTENTS

sea

TABLE OF CONTENTS (continued)

TABLES

PLATES

GEOTECHNICAL INVESTIGATION

PHASE 4, CASAZZA RANCH ESTATES

WASHOE COUNTY, NEVADA

INTRODUCTION

Presented herein are the results of our geotechnical investigation for the proposed Phase 4 of the Casazza Ranch Estates in Washoe County, Nevada. The project is entirely contained in Section 7, Township 18 North, Range 20 East, M.D.M. The objectives of this study were to:

1. Determine general soil and groundwater conditions pertaining to design and construction of the proposed subdivision.

2. Provide recommendations for design and construction of the project, as related to these geotechnical conditions.

The area covered by this investigation is shown on Plate 1 - Plot Plan. The investigation included field exploration, laboratory testing, and engineering analysis to determine the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

PROJECT DESCRIPTION

The proposed development is to consist of a 7 lot custom home residential subdivision. This will be Phase 4 of the Casazza Ranch Estates, with phases 1-3 already completed. Each lot within Phase 4 will be a minimum of 2.5 acres in size. Grading will be individually for each lot. Water, gas, and electricity will be provided by Sierra Pacific Power Company.

Sewage disposal will be provided by the City of Reno/Washoe County. The only access road, Passa Tempo Drive, will be dedicated to Washoe County and will include concrete curb and gutter on both sides. A temporary turn-around will be constructed on the south terminus of Passa Tempo Drive until such time as the road is extended for future phases. Irrigation drain ditches will be provided around the east, west, and northern parcel boundaries to intercept irrigation waters from surrounding pastures. All seven lots will include water rights and access to irrigation waters through a new system of ditches and drains. Some irrigation water will be stored in an existing and proposed pond along the east property line.

SITE CONDITIONS

The site consists of an irregularly shaped parcel of approximately 11.0 acres located in Washoe County, Nevada. Access is available from Holcomb Lane by way of the existing Passa Tempo Drive which presently dead ends at the northern boundary of Phase 4. The parcel is bordered to the north and partially to the east by Phase 1 & 3 of Casazza Ranch Estates. Property to the west, south and most of the east is undeveloped pasture land. Several active irrigation ditches are present across the site. The topography slopes at an average of 2 to 3 percent to the northeast. Vegetation consists of a thick mat of pasture grass. A barbed wire fence surrounds the property and a corral & loading chute is present in the northeast corner. Although the site itself was not being irrigated, the ditch just east of the eastern property boundary was active.

EXPLORATION

Phase 4 was explored in March, 1992 by excavation of 4 test pits. Locations of the test pits are shown on Plate 1. The maximum depth of exploration was 11 feet below the existing ground surface. Bulk samples for index testing were collected from the trench wall sides at specific depths in each soil horizon.

A geologist examined and classified all soils in the field. Logs of the test pits are presented as Plate 2 and a graphic soils classification chart has been included as Plate 3. Representative samples were returned to our Sparks laboratory for testing. Ground water levels were measured where encountered.

LABORATORY TESTING

Samples of each significant soil type were analyzed in SEA's materials testing laboratory to determine their grain size distribution and plasticity (Plate 4). Results of these tests were used to classify the soils according to the Unified Soils Classification System (Plate 3) and to verify the field logs. Classification in this manner is an indication of the soil's strength and mechanical properties. When the soils are clearly granular, as was the case here, and structural loads are light, these index properties can be correlated with published tables (NAVFAC, 1982, PCA, 1988) to obtain a satisfactory and conservative estimate for the angle of internal friction, unit weight and R-value. The angle of internal friction and unit weight are used for calculation of bearing capacity, lateral earth pressures and the coefficient of sliding friction. R-values are a measure of subgrade strength and used for design of asphalt and concrete pavements. For small residential subdivisions, traffic loading is so light that pavement design is almost independent of R-value, as long as the soil is not expansive.

The results of our testing program are summarized in Plate 4. All tests were conducted in accordance with ASTM Standards.

GEOLOGIC AND GENERAL SOIL CONDITIONS

The site lies on a broad alluvial fan derived from erosion of the Carson Range to the west. This unit includes low gradient stream deposits as well as older, reworked glacial outwash and alluvial fan deposits. This material is generally coarsely granular with surficial

sheet-like layers of clayey sand. Soils observed in our test pits ranged from near-surface clayey sand and silty sands to coarse, sandy gravels. Typically, the surface consist of approximately one foot of slightly plastic with 15 to 20 percent fines, 75 to 80 percent very fine to coarse sand and 5 percent gravel. This unit is underlain by a similar sand or by a low plastic clayey sand. The clayey sand contains 20 to 30 percent fines, 65 to 75 percent very fine to coarse sand and 5 percent gravel. Occasionally this unit is found directly at the surface, however, it was never observed in a thickness greater than 1.5 feet. Underlying gravels typically consist of 5 percent fines, 45 percent very fine to coarse sand and 50 percent rounded gravels to a 3-inch diameter with cobbles to a 10-inch diameter comprising 5 to 15 percent of the total mass.

Groundwater was encountered only in test pit No. 3 at a depth of 7.2 feet below the ground surface. This test pit was approximately 100 feet west of an active irrigation ditch and closer to the ditch than the other three test pits.

GEOLOGIC HAZARDS

Much of the Western United States is a region of moderate to intense seismicity related to movement of the crustal masses (plate tectonics). By far, the most active regions, outside of Alaska, center around the San Andreas fault system of western California. Other seismically active areas include the Wasatch Front in Salt Lake City, Utah, which forms the eastern boundary of the Basin and Range physiographic province, and the eastern front of the Sierra Nevada Mountains, which is the western margin of the province. The Reno-Sparks area lies along the eastern base of the Sierra Nevada, within the western extreme of the Basin and Range. It must be recognized that there are probably few regions in the United States not underlain at some depth by older bedrock faults. Even areas within the interior of North America have a history of strong seismic activity.

The Truckee Meadows lies within Seismic Zone 3, an area with a potential for earthquake damage. Seismicity within the Reno-Sparks area is considered about average

for the western Basin and Range Province (Ryall and Douglas, 1976). It is generally accepted that the maximum credible earthquake in this area would be in the range of magnitude 7 to 7.5 and produced along the frontal fault system of the Eastern Sierra Nevada. The most active segment of this fault system in the Reno area is located at the base of the mountains near Thomas Creek, Whites Creek, and Mt. Rose Highway, about 2.5 miles southwest of the project. It has been estimated (Ryall and Douglas, 1976) that an earthquake of magnitude 7 or greater will occur within a return period of about 75 years within a 60 mile radius of Reno. Within a radius of 20 miles, a magnitude 5.3 earthquake will have a return period around 30 years. Although we know that earthquakes will occur in this region, it is impossible to predict which fault will rupture next. In addition, it is impossible to predict the magnitude of any such earthquake.

No faults were observed on the site either at the surface or in the test pits. The published geologic hazards map (Szecsody, 1983) shows several faults within a one mile radius of the site, though none cross Phase 4 or are within 2,000 feet of the boundaries. The criteria for evaluation of earthquake faults are not currently regulated by Washoe County or the State of Nevada. As a consequence, most geological consultants in Nevada rely on methods and criteria established by the State of California. In California, the Alquist-Priolo Act of 1972 defined active faults as those with evidence of displacement within the past 11,000 (Holocene time). Those faults with evidence of displacement during Pleistocene time (11,000 to 2,000,000 years before present) are generally considered potentially active. Based on the geologic hazards map, the faults in the vicinity of the project are considered potentially active. Potentially active is a rather alarming and unfortunate term in that it suggests a higher degree of risk than is justified, in most cases. Recurrence intervals for Nevada earthquakes along faults that have been studied are estimated to be in the range of 6,000 to 18,000 years in western Nevada, (Bell, 1984). The very active eastern boundary faults of the Sierra Nevada mountains may have a shorter recurrence interval of 1000 to 2000 years.

The Geologic Hazards Map (Szecozody, 1983) shows the area as having the *"Greatest severity of shaking. Depth to groundwater less than 10 feet. Unconsolidated deposits with low*

rigidity. Possible severe liquefaction locally," Materials observed in our test pits were often weakly cemented and very coarse. Based on our limited observations, shallow liquefaction would seem unlikely due to the coarse granular nature of the native soils, however, liquefaction could occur at greater depths or in localized areas if loose clean sands are present.

Detailed analysis of liquefaction requires rotary borings to depths of 40 feet, standard penetration testing on maximum 5 foot centers, and index testing of subsurface soils. In Nevada, there is no specific policy which requires structures to be designed to resist liquefaction. Such designs tend to be very costly, and are usually limited to those structures with a public safety function such as fire and police facilities and hospitals or buildings with high occupancy such as large commercial, retail, office and manufacturing facilities, schools, municipal, or major governmental buildings. These types of structures present a significant potential for loss of life and/or are important enough, from a public safety standpoint, such that a design to minimize liquefaction may be warranted. The decision to mitigate or accept liquefaction risk is a business decision that can only be made by the owner/developer. The decision requires analysis of up-front mitigation costs as compared to the potential for longer range repair costs and liability.

The site lies below the 100-year flood elevation and should be designed accordingly. The Federal Emergency Management Agency map 320019 - 1463C (April 16, 1990) shows the site as lying within Flood Zone AO. Flood Zone AO consists of *"Areas of 100-year shallow flooding with depths between 1 and 3 feet; No flood hazard features are determined."* In this area the water depth is shown as 1 foot with a velocity of 4 feet per second.

A moderate potential for dust generation is present if grading is performed in dry weather. No other geologic hazards were identified.

DISCUSSION AND RECOMMENDATIONS

General Information

The site lies in an area of generally granular soils with no significant foundation problems. A thin unit of clayey sand was observed in three of the test pits. The material tested would not be significantly expansive if properly moisture conditioned and compacted during site preparation. Shallow groundwater was encountered in the southeastern corner of the parcel. Shallow groundwater may occur throughout the site during the irrigation season.

The recommendations provided herein, and particularly under **Site Preparation, Grading and Filling, Foundation Design, Site Drainage** and **Quality Control** are intended to minimize risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the structure and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer.

All structures should be designed for seismic zone 3. Structural areas referred to in this report include all areas of buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures. All compaction requirements presented in this report are relative to ASTM D1557-78. For the purposes of this project fine grained soils are defined as those with more than 40 percent by weight passing the number 200 sieve. Clay soils are defined as those with more than 30 percent passing the number 200 sieve and a plastic index greater than 15. Granular soils are those not defined by the above criteria. Sufficient quality control should be performed to verify that the recommendations presented in this report are followed.

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this investigation. When suspected hazardous substances

are encountered during routine geotechnical investigations they are noted in the exploration logs and immediately reported to the client. No such substances were revealed during our exploration.

The test pits were excavated by backhoe at the approximate locations shown on the site plan. Locations were determined in the field by approximate means. All test pits were backfilled upon completion of the field portion of our study. The backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under **Grading and Filling**. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the test pits, the backfill should be removed and recompacted in accordance with the requirements contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

Ditch Seepage

The parcel is in an area of active irritation and several irrigation ditches will border and cross the Phase 4 development. Since irrigation was very limited at the time of exploration, it was not possible to evaluate the presence of, or potential, for ditch seepage and consequent saturation of crawl space areas. Based on the coarse granular nature of the soils present in the area of the ditch, crawl space flooding from ditch seepage should not be a problem. Final evaluation will require a grading plan and additional test pits several months after irrigation has been halted.

Site Preparation

All vegetation should be stripped and grubbed from the surface and removed from the site. A stripping depth of 0.3 feet is anticipated. All areas to receive structural fill or structural loading should be densified to at least 90 percent relative compaction. If soils are too coarse to allow standard density tests, a proof rolling of a minimum 5 single passes with a minimum 10 ton roller in mass grading, or 5 complete passes with hand compactors in

footing trenches is recommended. In all cases the final surface should be smooth, firm and exhibit no signs of deflection. This alternate has proved to provide adequate project performance as long as all other geotechnical recommendations are closely followed.

Existing ditches which are to be abandoned and are located in structural areas, will require overexcavation to remove organic material and soft, wet, fine grained soils. The overexcavation should extend to a depth of at least 1 to 3 feet below the ditch bottom unless granular soils are encountered at shallower depth. The width of overexcavation will be dependent upon the extent of soft wet soils that cannot be compacted. Ditch bottoms may require stabilization in accordance with later recommendations. Where irrigation ditches are to be perpetuated it will be necessary to either reroute them around structural areas or replace the ditches with gasketed pipes. Piped ditches should underlie only nonstructural lot areas.

If construction is anticipated during or near the irrigation season, stabilization of native soils will likely be necessary. Stabilization may be achieved by placement of an initial 12 to 18 inch thick lift of 12-inch minus rock fill. This fill should be densified with large equipment, such as a self propelled sheeps-foot or a large loader, until no further deflection is noted. Additional lifts of rock may be necessary to achieve adequate stability.

As an alternate, a geofabric may be used for stabilization. The geofabric should meet or exceed the following minimum properties:

TABLE 1 - Minimum Strength Properties for Geofabric

Grab Strength (ASTM D1682)	180 lbs.
Puncture Strength (ASTM D3787-86)	75 lbs.
Burst Strength (ASTM 3786-80)	290 psi.

A minimum of 18 inches of imported coarse structural fill should be placed above the geofabric. Additional lifts of stabilizing fill may be necessary. The stabilizing fill should meet the following guideline specifications:

TABLE 2 - Guideline Specifications for Stabilizing Fill Over Geofabric

Sieve Size	Percent by Weight Passing
3 Inch	100
3/4 Inch	50 - 100
No. 4	30 - 70
No. 200	0 - 8

Trenching and Excavation

Temporary trenches with near vertical side walls should be stable to a depth of approximately 5 feet. Excavations to greater depths will require shoring or laying back of sidewalls to maintain adequate stability. Regulations amended in Part 1926, Volume 54, Number 209 of the Federal Register (Table B-1, October 31, 1989) require that the temporary sidewall slopes be no greater than those presented in Table 3.

TABLE 3 - Maximum Allowable Temporary Slopes

Soil or Rock Type	Maximum Allowable Slopes[1] For Deep Excavations Less Than 20 Feet Deep[2]
Stable Rock	Vertical (90 degrees)
Type A [3]	3H:4V (53 degrees)
Type B	1H:1V (45 degrees)
Type C	3H:2V (34 degrees)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.
3. A short-term (open 24 hours or less) maximum allowable slope of 1H:2V (63 degrees) is allowed in excavations in Type A soil that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth shall be 3H:4V (53 degrees).

These Regulations, including the classification system and the maximum slopes, have been adopted and are strictly enforced by the State of Nevada, Department of Industrial Relations, Division of Occupational Safety and Health. In general, Type A soils are cohesive, non-fissured soils with an unconfined compression strength of 1.5 tons per square foot (tsf) or greater. Type B are cohesive soils with an unconfined compressive strength between 0.5 and 1.5 tsf. While those designated as Type C have an unconfined compressive strength below 0.5 tsf. Numerous additional factors and exclusions are included in the

formal definitions. The client, owner, design engineer and contractor shall refer to Appendix A and B of Subpart P of the previously referenced Federal Register for complete definitions and requirements on sloping and benching of trench sidewalls. Appendices C through F of Subpart P apply to requirements and methodologies for shoring.

On the basis of our exploration, the Phase 4 soils are predominately Type B. Any area in question should be considered Type A unless specifically examined by the geological engineer during construction. All trenching should be performed and stabilized in accordance with local, state and OSHA standards.

Trench backfill should include no particles larger than 4 inches in maximum dimension. In general, bedding and initial backfill 12 inches over the pipe will require import, but native granular soil will provide adequate final backfill as long as oversized particles are excluded. Bedding and initial backfill should conform to the requirements of the utility having jurisdiction. Excavations below the groundwater table will likely require dewatering. Below the waterline bedding and backfill should consist of drainrock graded in accordance with the requirements for Class C drain backfill presented in the County of Washoe Standard Specifications for Public Works Construction. Above the waterline, trenches should be backfilled in maximum 8-inch thick loose lifts in all structural areas. Each lift should be densified to a minimum of 90 percent relative compaction (ASTM D1557-78) except in structural building pad areas where minimum densifications should be to 95 percent relative compaction.

Grading and Filling

Native clay soils, if encountered and as defined previously under **General Information** should be placed only in non structural fills. Native granular soils will be suitable for structural fill provided particles larger than 4 inches are removed. Oversized rock can be stockpiled for later use as erosion protection or placed in the bottom of deep fills. In deep fills oversized rocks must be scattered in such a manner as to preclude development of voids

between the particles (nesting). Imported structural fill should meet the specifications of Table 4.

TABLE 4 - Guideline Specification for Imported Structural Fill

Sieve Size	Percent by Weight Passing
4 Inch	100
3/4 Inch	70 - 100
No. 40	15 - 70
No. 200	5 - 30

Percent Passing No. 200 Sieve	Maximum Liquid Limit	Maximum Plastic Index
5 - 10	50	20
11 - 20	40	15
21 - 30	35	10

These recommendations are intended as guidelines to specify a readily available, prequalified material. Adjustments to the recommended limits can be provided to allow the use of other granular, non-expansive material. Any such adjustments must be made and approved by the geological engineer, in writing, prior to importing fill to the site.

All structural fill, and utility trench backfill in all structural areas, should be densified to a minimum 90 percent relative compaction . Nonstructural fill should be densified to a least 85 percent relative compaction to minimize consolidation and erosion. If the native granular soils have greater than 30 percent retained on the 3/4 inch sieve, standard density testing is not valid. A proof rolling program of at least 5 single passes of a minimum 10 ton roller in mass grading or at least 5 complete passes with hand compactors in footing trenches is recommended. Acceptance of this "rockfill" is based upon observation of lift thickness, moisture content, and applied compactive effort. In all cases the finished surface should be smooth, firm and show no signs of deflection.

Shrinkage and Subsidence

Subsidence of surface native soils should average 0.1 feet. Granular alluvial soils excavated and recompacted in structural fills should experience quantity shrinkage of approximately 10 percent, including removal of oversize particles. In other words, one cubic yard of excavated granular alluvium will generate about 0.9 cubic yards of structural fill.

Foundation Design

Footings underlain by granular native soil or structural fill can be designed for a net maximum allowable bearing pressure of 2500 pounds per square foot. The net allowable bearing pressure is that pressure at the base of the footing in excess of the adjacent overburden pressure. This allowable bearing value should be used for dead plus ordinary live loads. Ordinary live loads are defined as being that portion of the design live load which will be present during the majority of the life of the structure. Design live loads are those loads which are produced by the use and occupancy of the building such as by moveable objects including people or equipment. This bearing value may be increased by 1/3 for total loads. Total loads are defined as the maximum load imposed by the required combinations of dead load, design live loads, snow loads, and wind or seismic loads. With this allowable bearing pressure, total settlements of approximately 1/2-inch should be anticipated with differential settlements of approximately one-half of this amount.

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. The coefficient of friction is 0.40. Design values for active and passive equivalent fluid pressures are 40 and 350 pounds per cubic foot per foot of depth, respectively. These design values are based on spread footings bearing on and backfilled with structural fill. All exterior footings should be placed a minimum 2 feet below adjacent finish grade for frost protection.

Slope Stability and Erosion Control

Stability of cut and filled surfaces involves two separate aspects. The first concerns true slope stability related to mass wasting, landslides, or the enmasse downward movement of soil or rock. Stability of cut and fill slopes is dependent upon shear strength, unit weight, moisture content, and slope angle. The Uniform Building Code adopted by the Washoe County allows cut and fill slopes up to 2:1 (horizontal to vertical) in the type of soils present at this site. The exploration and testing program conducted during this investigation confirms 2:1 slopes will be stable.

The second aspect of stability involves erosion potential and is dependent on numerous factors involving grain size distribution, cohesion, moisture content, slope angle and the velocity of the water or wind on the ground surface. Slopes between 3:1 and 5:1 can be stabilized by hydroseeding. Slopes steeper than 3:1 often require mechanical stabilization. No major cut or fill slopes are expected for this project. Temporary (during construction) and permanent (after construction) erosion (dust) control will be required for all disturbed areas. The contractor shall prevent dust from being generated during construction in compliance with all applicable city, county, state, and federal regulations and shall submit an acceptable dust control plan to the Washoe County District Health Department prior to starting site preparation or earthwork. The project specifications should include an indemnification by the contractor of the owner and engineer for any dust generation during the construction period. The owner will be responsible for mitigation of dust after his acceptance of the project.

Pond

The proposed pond can be constructed in structural fill as described under **Grading and Filling** or in cut. On-site clayey sand soils may be used in a minimum 18 inch thickness to line the pond, provided the material has, at least, 25 percent passing the No. 200 sieve, a plastic index of at least, 12, and no particles larger than 3 inches.

Site Drainage

Subsurface

Groundwater was encountered at depth of 7.2 feet in test pit 3 located in the southeast corner of the site. The test pit was approximately 100 feet east of an active irrigation ditch just beyond the east property line. As Phase 4 area was not under irrigation at the time of our exploration, we anticipate higher groundwater levels during irrigation season. Since the lots and the surrounding area will, likely, continue to be irrigated, some mitigation should be provided. Future homes should be carefully sited and have foundation levels placed a minimum 4 feet above the maximum high water table. Monitoring during the irrigation season would be necessary to establish this elevation.

Storm drains should be designed to be as deep as possible in order to maximize their effectiveness in dewatering the site. The following procedures have been proven to be extremely effective in dewatering most of the east side of the Truckee Meadows. All storm drains should be open jointed and backfilled with drain rock. Other utility trenches, such as for water lines and sewer lines, should also be backfilled rock and should be interconnected with storm drain backfill in order to provide an interior network of subsurface drains. Drain backfill should extend to within 2 feet of the surface. The drain rock should be separated from overlying granular soil backfill by either a 6-inch thick layer of pea-gravel or a 4 ounce nonwoven geofabric, in all structural areas, to prevent infiltration and clogging of drain rock by the native soils. Depending on the severity of the potential groundwater problem, some lots may require design of specific subdrains.

Surface

Each lot buyer should retain a civil engineer to design a project specific grading plan to place finish grade and finish floor elevations above FEMA flood elevations. Adequate surface drainage should be provided away from all structures. A system of roof gutters and downspouts is recommended to collect roof drainage and direct it away from the foundation.

Stemwall backfill should be thoroughly compacted to decrease permeability and reduce the potential for irrigation and storm water to enter the crawl space. Positive crawl space drainage should be provided. This is most easily accomplished by grading the crawl space to drain to one or more localized areas and providing 3-inch diameter pipes to daylight beneath the footings. Often, adequate drainage cannot be attained by daylighting direct drain. An alternate is to grade the crawl space to drain to the sewer lateral and gravel packing the lateral from the crawl space to the sewer main in the street. To minimize entrance of surface waters into the crawl space, visqueen should be draped down the outside perimeter of the stemwall, over the lip of footing, and outward into the yard areas at footing grade levels for a minimum horizontal distance of 5 to 6 feet. Ponding of water on finish grade or at the edge of pavements should be prevented by proper grading.

Asphaltic Concrete

Based on the index testing, an R-value of 35 was estimated for the granular soils that will be exposed along Passa Tempo Drive. For design purposes, a conservative R-value of 20 was used to accommodate minor variations in soil and fill quality.

The existing section of Passa Tempo Drive serves 12 lots. Phase 4 and all future phases will add 15 more lots for an ultimate total of 27. The EAL for Passa Tempo Drive was estimated in a very conservative manner using the procedure summarized in Table 5.

TABLE 5 - Traffic Analysis For Residential Streets

Design Life	20 years (7300 days)
Maximum Lots	27

10 Trips per day per lot (Institute Transportation Engineers, 1987)

2% Trucks with Truck Factor of 0.30 (Assumed)

Construction Traffic + 20 trucks per lot at T.F.=0.59 (Assumed)

% of Traffic in the Design Lanes = 50

$EAL_{20} = (7300)(27)(10)(.02)(.30)(.5) + (27)(20)(.59)(.5)$

$EAL_{20} = 5{,}913 + 160 = 6.1 \times 10^3$

Using this EAL_{20}, a design R-value of 20 and the Asphalt Institute Pavement Design Manual (1991) results in the structural section presented in Table 6.

TABLE 6 - Recommended Minimum Structural Sections

Street	Classification	AC	Type II Base
Passa Tempo Drive	residential	3"	6"

This structural section also meets current Washoe County requirements.

All aggregate base beneath concrete slabs should be densified to at least 95 percent relative compaction. Aggregate leveling courses will be too thin for proper density testing but should be compacted by a minimum 5 passes with a minimum 10 ton drum roller.

ANTICIPATED CONSTRUCTION PROBLEMS

Depending on the season of construction and irrigation practices, soft wet surface soils may make for difficult travel by construction equipment. Identification and proper preparation and treatment of native clay soils will be difficult during a mass grading operation. Minor problems may be encountered in trenching due to the presence of small to large boulders in areas of granular (outwash) soil.

QUALITY CONTROL

All plans and specifications should be reviewed for conformance with this geotechnical report and approved by the Geological Engineer prior to submitting to the building department for review.

The recommendations presented in this report are based on the assumption that sufficient field testing and construction review will be provided during all phases of

construction. We should review the final plans and specifications for conformance with the intent of our recommendations. Prior to construction, a pre-job conference should be scheduled to include, but not be limited to, the Owner, Architect, Civil Engineer, the General Contractor, Earthwork and Materials Sub-Contractors, Building Official and Geological Engineer. The conference will allow parties to review the project plans, specifications, and recommendations presented in this report and discuss applicable material quality and mix design requirements. All quality reports should be submitted to, and reviewed by, the Geological Engineer.

During construction, we should have the opportunity to provide sufficient on-site observation of preparation and grading, overexcavation, fill placement, foundation installation and paving. These observations would allow us to verify that the geotechnical conditions are as anticipated and that the Contractor's work is in conformance with the approved plans and specifications.

STANDARD LIMITATION CLAUSE

This report has been prepared in accordance with generally accepted geotechnical practices. The analyses and recommendations submitted are based upon field exploration performed at the locations shown on Plate 1 - Plot Plan, of this report. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to insure compliance with our recommendations. The owner shall be responsible for distribution of this geotechnical investigation to all designers and contractors whose work is related to geotechnical factors.

Equilibrium water level readings were made on the date shown on Plate 2 -Log of Borings, of this report. Fluctuations in the water table may occur due to rainfall,

temperature, seasonal runoff, or adjacent irrigation practices. Construction planning should be based on assumptions of possible variations.

This report has been prepared to provide information allowing the Architect or Engineer to design the project. In the event of changes in the design or location of the project from the time of this report, recommendations should be reviewed and possibly modified by the Geological Engineer. If the Geological Engineer is not accorded the privilege of making this recommended review, he can assume no responsibility for misinterpretation or misapplication of his recommendations or their validity in the event changes have been made in the original design concept without his prior review. The Geological Engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

REFERENCES

Bonham, H. F., and Rogers, D.K., 1983, *Geologic map, Mt. Rose Quadrangle*: NBMG, map 4Bg.

Institute of Transportation Engineers, 1987, *Trip Generation*, Code 210, 4th Edition.

NAVFAC (Naval Facilities Engineering Command), 1982, *Foundations and Earth Structure,* Design Manual 7.2.

Portland Cement Association, 1988, *Design of Heavy Industrial Concrete Pavements,* Concrete Information brochure, 15234.01P

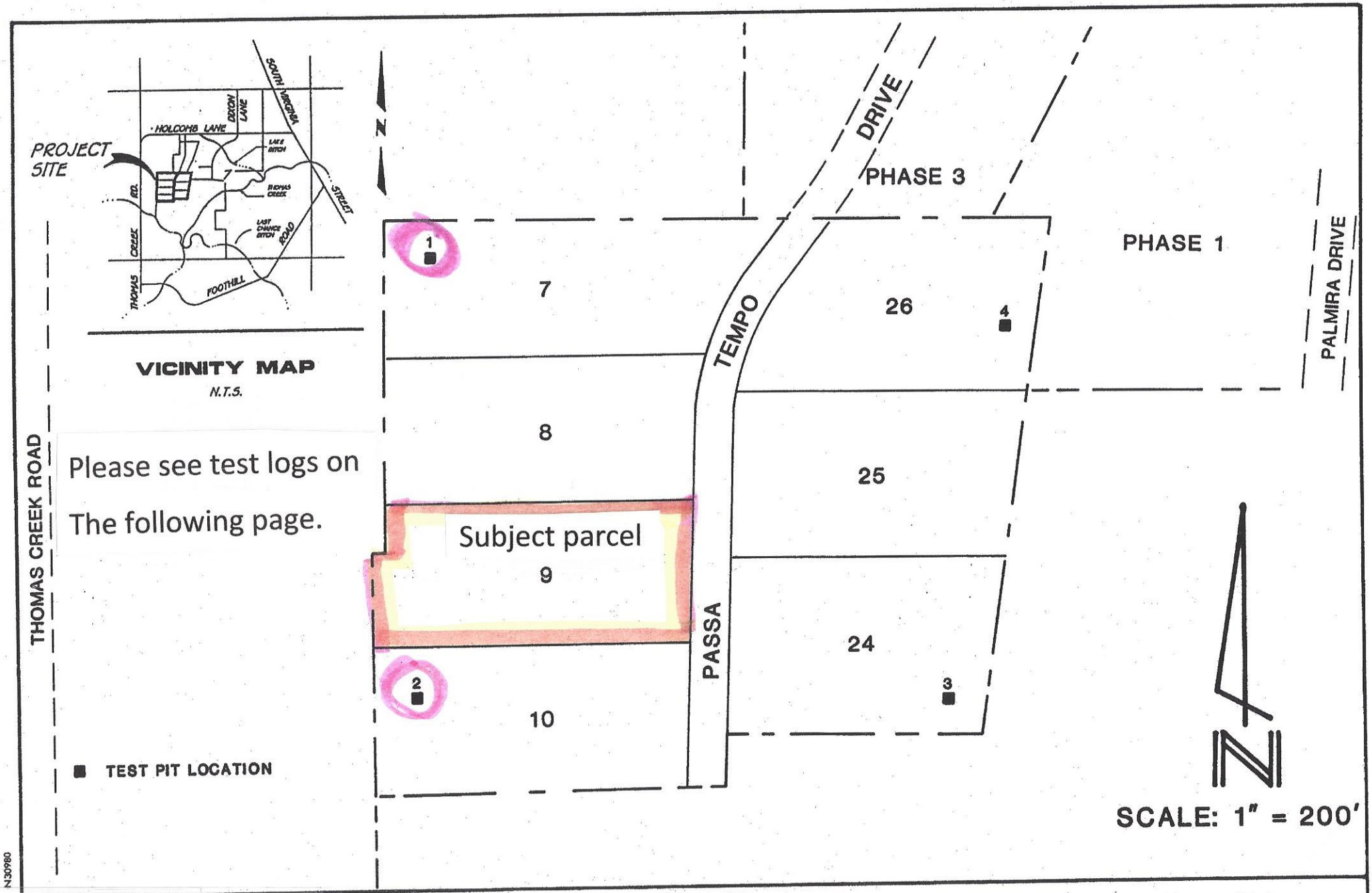
Ryall, A. and Douglas, B. M., 1976, *Regional Seismicity,* Reno Folio: NBMG.

Szecsody, G. C., 1983, *Earthquake Hazards Map, Mt. Rose Quadrangle*: NBMG, map 4Bi.

The Asphalt Institute, 1991, *Thickness Design - Asphalt Pavements for Highways and Streets*, Manual Series No. 1 (MS-1).

sea

PLATES



DATAPRINT N30980

sea CONSULTING ENGINEERS

RENO/SPARKS, NEVADA
LAS VEGAS, NEVADA
PHOENIX, ARIZONA

Plot Plan

CASAZZA RANCH ESTATES PHASE 4

PROJECT NO. 2260-01-1

PLATE NO. 1

TEST PIT LOG

TEST PIT NO. 1
LOGGED BY T. Loken
DATE 3-13-92
GROUND ELEVATION 4571
GROUND WATER DEPTH Not Encountered
DATE MEASURED

NOTES	SAMPLE NUMBER	MOISTURE PERCENT	DEPTH	LOG	DESCRIPTION
	1A	11.4	2		0 - 2.0 Moist, compact, dark brown Silty Gravelly Sand with 15% slightly plastic fines, 60% very fine to coarse sand, 25% rounded gravel; minor cobbles to 6" diameter.
			4		2.0 - 3.0 Moist, compact, brown Silty Sand with 20% non-plastic fines, 80% very fine to coarse sand. Trace rounded gravel of cobbles.
	1B	10.9	6		3.0 - 9.0 Moist, dense, brown Sandy Gravel with 5% non-plastic fines, 45% very fine to coarse sand, 50% gravel to 3" diameter. Cobbles to 10" diameter comprise 5% to 10% of mass.
			8		
			10		9.0 - 11.0 Moist, dense, brown moderately cemented Sand with 5% non-plastic fines, 95% very fine to coarse sand. Minor gravel and cobbles to 6" diameter.
			12		

TEST PIT NO. 2
LOGGED BY T. Loken
DATE 3-13-92
GROUND ELEVATION 4586
GROUND WATER DEPTH Not Encountered
DATE MEASURED

NOTES	SAMPLE NUMBER	MOISTURE PERCENT	DEPTH	LOG	DESCRIPTION
	2A		2		0 - 1.0 Moist, compact, dark brown Clayey Sand with 20% low plastic fines, 75% very fine to coarse sand, 5% gravel to 3" diameter. Trace rounded cobbles to 6" diameter.
	2B	12.8	4		1.0 - 2.5 Moist, compact, brown Silty Gravelly Sand with 15% non-plastic fines, 55% very fine to coarse sand, 30% gravel to 3" diameter. Trace cobbles.
			6		2.5 - 5.0 Moist, compact to dense, weakly cemented silty sand with 10% to 25% slightly plastic fines, 75% to 90% very fine to medium sand. Minor coarse sand, 5% gravelto 3" diameter.
			8		
			10		5.0 - 9.5 Moist, dense, brown Sandy Gravel with 5% non-plastic fines, 45% very fine to coarse sand, 50% rounded gravel to 3" diameter. Cobbles to 8" diameter, comprise 5% of mass.
			12		

Description: Describe soil type by unified soil classification system with emphasis on in-place or natural condition.

TEST PIT LOG

TEST PIT NO. 3
LOGGED BY T. Loken
DATE 3-13-92

GROUND ELEVATION 4573
GROUND WATER DEPTH 7.2'
DATE MEASURED 3-13-92

NOTES	SAMPLE NUMBER	MOISTURE PERCENT	DEPTH	LOG	DESCRIPTION
	3A	13.3	2 4 6 8 10 12		0 - 1.5 Moist, compact, dark brown Silty Sand with 20% slightly plastic fines, 80% very fine to coarse sand. Minor gravel and cobbles to 6" diameter. 1.5 - 3.0 Moist, compact, brown Clayey Sand with 30% low to medium plastic fines, 65% very fine to coarse sand, 5% gravel; minor cobbles to 8" diameter. Grades into sandy gravel: 3.0 - 9.5 Moist, to wet, dense, brown Sandy Gravel with 5% non-plastic fines, 40% very fine to coarse sand, 55% rounded gravel to 3" diameter. Cobbles to 10" comprise 10% to 15% of mass.

TEST PIT NO. 4
LOGGED BY T. Loken
DATE 3-13-92

GROUND ELEVATION 4563
GROUND WATER DEPTH Not Encountered
DATE MEASURED

NOTES	SAMPLE NUMBER	MOISTURE PERCENT	DEPTH	LOG	DESCRIPTION
			2 4 6 8 10 12		0 - 1.0 Moist, compact, dark brown Silty Sand with 15% non-plastic fines, 85% very fine to coarse sand. Trace gravel and cobbles to 6" diameter. 1.0 - 2.0 Moist, compact, brown Silty to Clayey Sand with 10% low plastic fines, 90% very fine to coarse sand. Trace gravel and cobbles to 6" diameter. 2.0 - 10.2 Moist, dense, brown Sandy Gravel with 5% non plastic fines, 45% very fine to coarse sand, 50% gravel to 3" diameter. Cobbles to 8" diameter comprise 10% of mass.

Description: Describe soil type by unified soil classification system with emphasis on in-place or natural condition.

GRAPHIC SOIL CLASSIFICATION CHART

COARSE GRAIN SOILS (LESS THAN 50% PASSING NO. 200 SIEVE)	GRAVELS	LITTLE OR NO FINES		GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		APPRECIABLE AMOUNT OF FINES		GM	SILTY GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS	CLEAN NO FINES		SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		APPRECIABLE AMOUNT OF FINES		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURE
FINE GRAIN SOILS (MORE THAN 50% PASSING NO. 200 SIEVE)	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS
				CL	SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
				OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICTY.
		LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
				PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
					MATERIAL CHANGE
					ESTIMATED MATERIAL CHANGE

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Size Range
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300 mm to 75 mm)
Gravel	3 in. to #4 sieve (75 mm to 2 mm)
Sand	#4 to #200 sieve (2 mm to .074 mm)
Silt or Clay	Passing #200 sieve (0.074 mm)

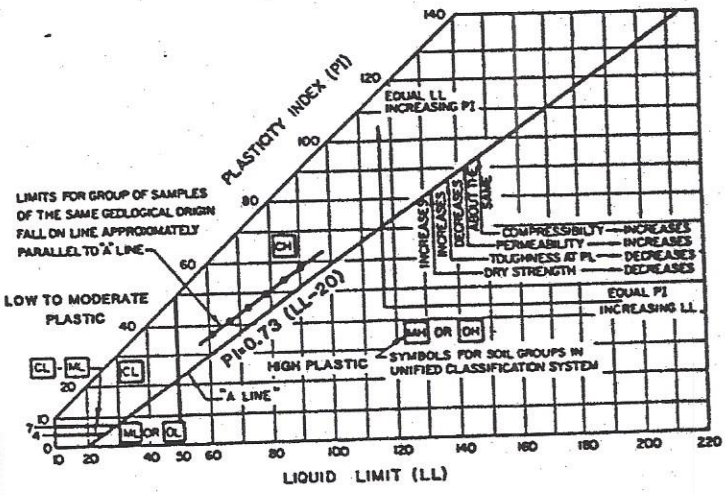
RELATIVE DENSITY OF GRANULAR SOILS:

N-Blows/ft.	Relative Density
0-4	Very Loose
5-10	Loose
11-30	Compact
31-50	Dense
greater than 50	Very Dense

CONSISTENCY OF COHESIVE SOILS:

Unconfined Compressive Strength, /Qu, psf	N-Blows/ft.	Consistency
less than 500	0-1	Very Soft
500-1,000	2-4	Soft
1,000-2,000	5-8	Firm
2,000-4,000	9-15	Stiff
4,000-8,000	16-30	Very Stiff
8,000-16,000	31-60	Hard
greater than 16,000	greater than 60	Very Hard

PLASTICITY CHART



DATAPRINT N30980

CONSULTING ENGINEERS
RENO/SPARKS, NEVADA
LAS VEGAS, NEVADA
PHOENIX, ARIZONA

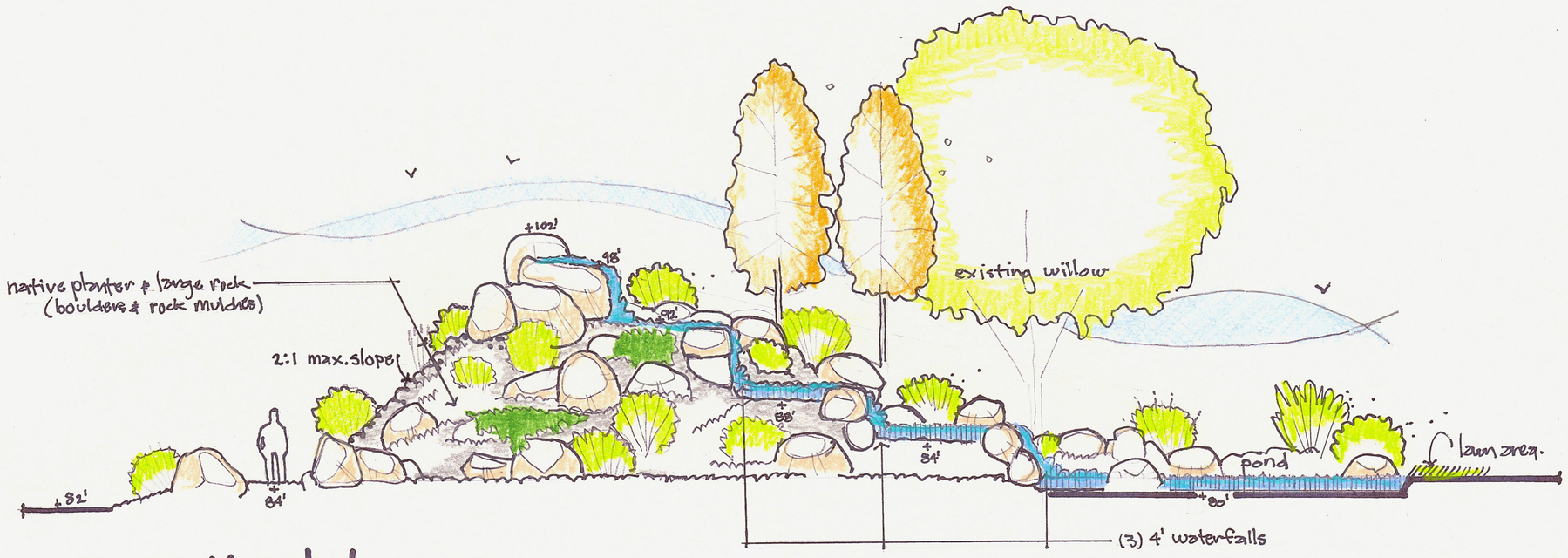
Project No.2260-01-1

Plate 3

TEST RESULTS

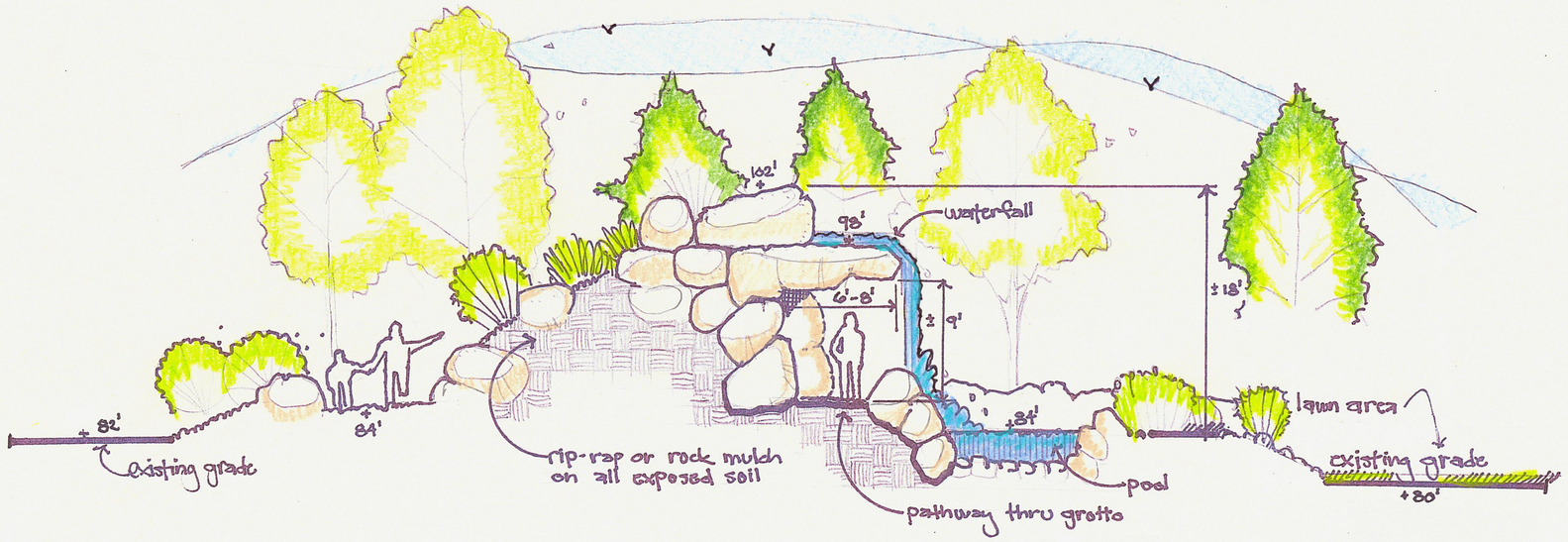
MECHANICAL ANALYSIS

Sample Number	1A	1B	2B	3A
Sieve Size	Percent By Weight Passing			
3 Inch		97		
2 Inch	100	88		
1 Inch	85	71		
3/4 Inch	85	65	100	100
1/2 Inch	81	60	98	99
3/8 Inch	78	55	98	99
No. 4	72	48	95	95
No. 10	65	39	90	89
No. 40	47	25	74	69
No. 100	24	10	40	40
No. 200	14	6	26	31
Liquid Limit	-	-	-	30
Plastic Index	-	NP	-	15
Moisture Content	11.4	10.9	12.8	13.3



section b-b

1/8" = 1'-0"



section a-a

1/8" = 1'-0"

Conceptual Water Feature Sections

1/8" = 1'-0"

Iremonger Residence

9695 Passa Tempo Drive

Reno NV

12.8.15
Issue & Date:

Sheet

Gail Willey Landscaping, Inc.
9825 S. Virginia St.
Reno, Nevada 89511
(775) 853-8733

limits of S.U.P. grading

retaining wall @ 1' height
arborvitae privacy screen
quartzite path 5'-4' wide
wooden shade structure 20' x 20' for future playground area
large natural stream w/ water features 12' height max.
path under waterfall
(2) composite bridges
12' circular composite deck - to overhang pond
retention basin
4' boulder typ.
6' boulder typ.
large decid. shrub
decid. shade tree
perennial
mod. decid. shrub
maintain mountain view
4' wide path
overhead wood shade structure aluminum shade - semi-solid
water feature
honeysuckle climber
quartzite flagstone path @ 3'-4' wide
drain to street
property line
columns w/ motor driven gate @ 6'
path pebbles
flagstone path 6' wide
vineyard
3' x 3' wood planter boxes
chicken wire fencing
vinyl fence extension
water tap
composite edging board-typ.
replace driveway w/ Brunswick Blue rock
gate
path pebbles in all planter beds
black wrought fence/ gate @ 4'
black wrought iron fence @ 4'
existing fence

Gail Willey Landscaping, Inc.

Iremonger Residence

9695 Passa Tempo Drive, Reno NV 89511

Design Lead:
Designer:
Project Number:
Date: 2015.11.11

Revisions

By:	Date:

Landscape Master Plan

L 1.0

Scale: 1" = 20'