File No. EA2024-101

CITY OF RICHLAND
Determination of Non-Significance

Description of Proposal: This project includes the construction of 9 various sized mini-storage buildings and an office building with associated parking and improvements. The total square footage of the proposed buildings is approximately 43,000 sf.

Proponent: Paul Knutzen
5401 Ridgeline Dr, Suite 160
Kennewick WA 99338

Location of Proposal: The project site is located at 1975 Hagen Road upon Assessor's Parcel No. 134082000001002. The site is at the southwest corner of Hagen Rd and Snyder Rd in Richland, WA 99352.

Lead Agency: City of Richland

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

( ) There is no comment for the DNS.

(**X**) This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for fourteen days from the date of issuance.

( ) This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.

Responsible Official: Mike Stevens
Position/Title: Planning Manager
Address: 625 Swift Blvd., MS #35, Richland, WA 99352
Date: February 28, 2024
Comments Due: March 14, 2024

Signature _____

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal,** even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

A. Background Find help answering background questions

1. **Name of proposed project, if applicable:**
   Croskrey Mini Storage-Hagen Road

2. **Name of applicant:**
   Paul Knutzen

3. **Address and phone number of applicant and contact person:**
   5401 Ridgeline Drive Suite 160, Kennewick, WA 99338
   Paul Knutzen - (509) 222-0959

4. **Date checklist prepared:**
   1/11/2024

5. **Agency requesting checklist:**
   City of Richland

6. **Proposed timing or schedule (including phasing, if applicable):**
   Construction to begin in the early Spring of 2024
   Project completion to be early Fall of 2024

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**
   No future additions are proposed at this time.

8. **List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.**
   Baer Testing has prepared a geotechnical engineering report. PBS has prepared a critical area report addressing the shrub steppe habitat. Knutzen Engineering has prepared a critical area aquifer recharge report (CARA).

9. **Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**
   None known.

10. **List any government approvals or permits that will be needed for your proposal, if known.**
    The project will require a Grading Permit, Utility Permit, ROW Permit and a Building Permit. Ecology will require an Erosivity Waiver for construction Stormwater Permitting, FAA will need their 7460-1 & 7460-2 Permit.

12. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The project includes the construction of 9 varies sized mini storage buildings with an office building with associated parking and improvements. The total square footage of buildings is approximately 43,000 sf

13. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The site currently has no address at this time. According to the Benton County GIS Maps, it is parcel #134082000001002. The lot is on the south west corner of Hagen Rd and Snyder Rd in Richland, WA 99352

B. Environmental Elements

1. Earth Find help answering earth questions

a. General description of the site:

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)?

The site is relatively flat and, a majority of the site is ~2%, there are a couple small sections on the site which have ~7% slopes.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Silty Sand, Poorly Gradred Sand with Silt, and Well-Graded Gravel with Sand can be found on-site according to our Geotechnical Report Provided by Baer Testing & Engineering, Inc.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. No indications known at this time.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Grading will be performed and will balance the site, approximately 3,800 CY of material will be moved on site.

f. Could erosion occur because of clearing, construction, or use? If so, generally describe.

Erosion could occur on site but will be minimized through implementation of BMPs during construction, including silt fencing, construction entrances, ground cover, wattles, site watering for dust control, catch basin inserts and protection. All stormwater run-off will be contained and managed on site.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Approximately 90% will be made up of impervious surfaces.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

Standard erosion control and BMP methods will be used, such as catch basin protection, silt fencing, and stabilized construction entrances. Dust during construction will be controlled by the use of a water truck as necessary. All Stormwater run-off will be contained and managed on-site.

2. Air Find help answering air questions

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

During construction minor amounts of dust and exhaust from equipment activity may be released into the air. The completed project will not affect air quality.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

None known.

c. Proposed measures to reduce or control emissions or other impacts to air, if any.

Dust control measures will be implemented in accordance with recommendations by the Department of Ecology and the Benton County Clean Air Authority. Measures include but are not limited to watering, lowering speed, limit of construction vehicles, and reducing the amount of dust-generating activities on windy days.

3. Water Find help answering water questions

a. Surface Water: Find help answering surface water questions

1. **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

   No water bodies in the immediate vicinity. The Columbia River is 1.75 miles east and the Yakima River is approximately 1.65 miles southwest of the property.

2. **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

   No.

3. **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

   None.

4. **Will the proposal require surface water withdrawals or diversions? Give a general description, purpose, and approximate quantities if known.**

   None.

5. **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

   The site has not been designated to lie within a 100-year floodplain. FEMA map 5355330010E designates the site as an area of minimal flooding, Zone C.

6. **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No.

b. Ground Water: Find help answering ground water questions

1. **Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give a general description, purpose, and approximate quantities if known.**

Groundwater will not be withdrawn at this site. The site will be supplied with domestic water from the City of Richland.

2. **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (domestic sewage; industrial, containing the following chemicals…; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

N/A.

c. Water Runoff (including stormwater):

1. **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

New impervious area on-site including roofs of buildings, concrete walkways, and the asphalt parking lot. The stormwater system will consist of catch basins, conveyance pipes, CDS units for pre-treatment (if required), and subsurface infiltration trenches.

2. **Could waste materials enter ground or surface waters? If so, generally describe.**

No, the proposed system will have a built-in water oil separator device (inverted tee) to eliminate storm water contamination. The depth to groundwater is between 19 and 24 feet below the ground surface based on well logs in the vicinity. This leaves an adequate vadose zone treatment thickness and will prevent contamination of groundwater.

3. **Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.**

No, all run-off will be retained on-site.

4. **Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any.**

Runoff generated from pervious surfaces will either infiltrate into underlying soils or flow to on-site collection systems. Stormwater generated from impervious surfaces will be collected and treated prior to on-site infiltration and all will be in accordance with City and Eastern Washington Storm Water Management Manual design standards.

4. Plants Find help answering plants questions

a. Check the types of vegetation found on the site:

- ☐ **deciduous tree: alder, maple, aspen, other**
- ☐ **evergreen tree: fir, cedar, pine, other**
- ☐ **shrubs**
- ☑ **grass**
- ☐ **pasture**
- ☐ **crop or grain**
- ☐ **orchards, vineyards, or other permanent crops.**
- ☐ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**
- ☐ **water plants: water lily, eelgrass, milfoil, other**
- ☐ **other types of vegetation**

b. What kind and amount of vegetation will be removed or altered?

Native grasses will be removed during the grading and site improvement phase of the project.

c. List threatened and endangered species known to be on or near the site.

Please refer to the critical area report prepared by PBS

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

Native plants and trees will be planted in landscape areas and around the perimeter of the site. The site will landscaped in compliance with City of Richland standards. Mitigation is proposed in the PBS report.

e. List all noxious weeds and invasive species known to be on or near the site.

None known per the WSDA Noxious Weed Data Viewer.

5. Animals Find help answering animal questions

a. List any birds and other animals that have been observed on or near the site or are known to be on or near the site.

Examples include:

- **Birds: ~~hawk~~, heron, eagle, songbirds, other:**
- **Mammals: deer, bear, elk, beaver, other:**
- **Fish: bass, salmon, trout, herring, shellfish, other:**

b. List any threatened and endangered species known to be on or near the site.

The Ferruginous Hawk has been spotted near the project site according to the Washington Department of Fish and Wildlife (WDFW) PHS on the Web, the PBS report goes into more detail in this topic.

c. Is the site part of a migration route? If so, explain.

Yes, the Columbia Basin is part of a migration route for a number of fowl known as the Pacific Flyway.

d. Proposed measures to preserve or enhance wildlife, if any.

None at this time.

e. List any invasive animal species known to be on or near the site.

None known per the Washington Department of Fish & Wildlife (WDFW) PHS on the Web.

6. Energy and Natural Resources Find help answering energy and natural resource questions

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electrical will be used for lighting and all appliances.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No. There is currently no solar power used in the area. The proposed layout and separation from the property lines and height of buildings will not effect neighbors potential solar needs.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

All structures will meet current building codes and energy efficiency standards.

7. Environmental Health Find help with answering environmental health questions

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur because of this proposal? If so, describe.

No.

1. Describe any known or possible contamination at the site from present or past uses.

None known.

a. Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

None.

b. Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Diesel fuel will likely be used/stored on-site for construction vehicles. No hazardous chemicals will be stored on the completed project.

c. Describe special emergency services that might be required.

Typical emergency services provided through the City of Richland will be used for the completed project.

d. Proposed measures to reduce or control environmental health hazards, if any.

None at this time.

b. Noise

1. **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**
   The noise level in the area is not perceived to have any adverse effect on the project. Noise is mainly generated by vehicle traffic on Hagen St. to the East and the airport.

2. **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site)?**
   Short term: Construction noises.
   Long term: Automobile noise from traffic associated with the site. The site will generate typical industrial noises but will be in a manner consistent with City of Richland code and Washington state Maximum Environmental Noise Levels (Chapter 173-60-040 WAC).

3. **Proposed measures to reduce or control noise impacts, if any.**
   Noise impacts from construction activities and ongoing operations are expected to be Minimal without significant effects on the surrounding area. All operations will be conducted in a manner compliant with Benton County Policy and Washington State Maximum Environmental Noise Levels (Chapter 173-60-040 WAC).

8. Land and Shoreline Use Find help answering land and shoreline use questions

a. **What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.**
   Currently the proposed property is vacant and is zoned Medium Industrial I-M. All surrounding properties share the same zoning designation and are mostly vacant currently. The proposal is not expected to affect the nearby or adjacent properties' land use.

b. **Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses because of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?**
   No.

   1. **Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**
      No.

c. **Describe any structures on the site.**
   No structures are on-site. Site is undeveloped.

d. **Will any structures be demolished? If so, what?**
   N/A.

e. **What is the current zoning classification of the site?**
   I-M (Medium Industrial)

f. **What is the current comprehensive plan designation of the site?**
   The current comprehensive plan designation of the site is Industrial.

g. If applicable, what is the current shoreline master program designation of the site?

N/A.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

The site is within the 10-year Aquifer Recharge and Habitat Critical Area according to the City of Richland's Critical Areas and Geological Hazards Map.

i. Approximately how many people would reside or work in the completed project?

None would reside. This proposal will allow for 4 employees.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any.

N/A.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

The project will be permitted through local jurisdictions in accordance with all applicable zoning ordinances.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any.

N/A.

9. Housing Find help answering housing questions

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

N/A.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

N/A.

c. Proposed measures to reduce or control housing impacts, if any.

N/A.

10. Aesthetics Find help answering aesthetics questions

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The tallest point of the structure will be approximately 20'. They will all be constructed out of steel.

b. What views in the immediate vicinity would be altered or obstructed?

No views are anticipated to be adversely affected.

c. Proposed measures to reduce or control aesthetic impacts, if any.

Landscaping, setbacks, and City of Richland Building Department façade requirements will be used to control aesthetics.

11. Light and Glare Find help answering light and glare questions

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Parking lot and building lighting would be proposed for night time.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None known.

d. Proposed measures to reduce or control light and glare impacts, if any.

All outdoor lighting will be in conformance with the City of Richland code requirements. Outdoor lighting will be shielded per City of Richland Municipal Code.

12. Recreation Find help answering recreation questions

a. What designated and informal recreational opportunities are in the immediate vicinity?

The site is located 0.25 miles southwest to the Horn Rapids Athletic Complex & the Columbia Basin BMX.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No, the proposal would not displace any existing recreational uses.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any.

None known on-site per the Department of Archeology & Historic Preservation.

13. Historic and Cultural Preservation Find help answering historic and cultural preservation questions

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe. None known on-site per the Department of Archeology & Historic Preservation.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

The site is considered an area of interest for multiple native tribes according to the WISAARD system of the DAHP. No evidence of artifacts has been found to our knowledge.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

The WISAARD system of the DAHP was used to assess potential impacts.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Upon any discovery of potential or known archeological resources at the subject properties prior to or during future on-site construction, the developer, contractor, and/or any other parties involved in construction shall immediately cease all on-site construction, shall act to protect the potential or known historical and cultural resources area from outside intrusion, and shall notify, within a maximum period of twenty-four hours from the time of discovery, the City of Richland Community Development Department of said discovery.

14. Transportation Find help with answering transportation questions

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The site will be served off Hagen Rd. The site is south and has an optional access off Snyder Rd., which we understood was being contemplated for vacation by the City.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

The site currently not served by public transit. The closest bus stop is located on Saint St @ Stevens Dr (Bus Stop ID: RC115) half a mile to the east of the site.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

This proposal will improve the frontage for Hagen Road.

d. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Yes, frontage improvements including roadside ditch, street trees, and pedestrian path will be required along Hagen Rd.

e. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

11th Edition ITE Land Use Code 151 is used. Based on 43,000 sf, the # of weekday trips per 1000/sf is equivalent to 62 trips. The peak hour is between 4pm-6pm and the average rate is equivalent to 6.45 trips in the peak hour. The weekend rate is nominally higher.

f. Will the proposal interfere with, affect, or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No

g. Proposed measures to reduce or control transportation impacts, if any.

None

15. Public Services Find help answering public service questions

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

The site will utilize fire and police services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

The completed project will provide additional tax revenue for the City and will pay any impact fees that may be required by the City

16. Utilities Find help answering utilities questions

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity, Water, Sewer - City of Richland, Phone - Ziply or Charter

C. Signature Find help about who should sign

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

X Paul Knutzen

SEPA Responsible Offical

Type name of signee: Paul Knutzen

Position and agency/organization: President/Knutzen Engineering

Date submitted: 1/11/24

D. Supplemental sheet for nonproject actions Find help for the nonproject actions worksheet

IT IS NOT REQUIRED to use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

    - **Proposed measures to avoid or reduce such increases are:**

2. **How would the proposal be likely to affect plants, animals, fish, or marine life?**

    - **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

3. **How would the proposal be likely to deplete energy or natural resources?**

    - **Proposed measures to protect or conserve energy and natural resources are:**

4. **How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**

    - **Proposed measures to protect such resources or to avoid or reduce impacts are:**

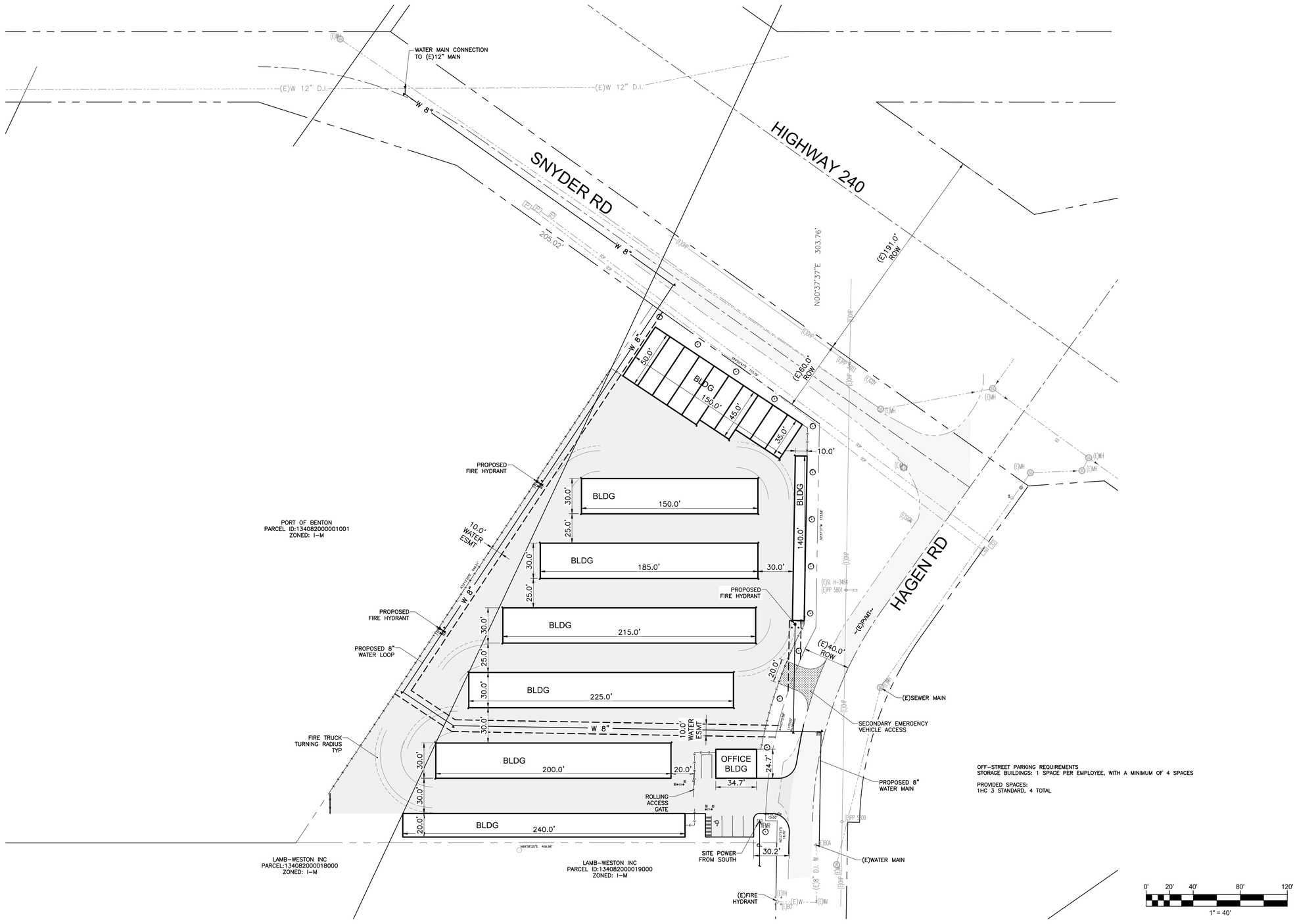
5. **How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

    - **Proposed measures to avoid or reduce shoreline and land use impacts are:**

6. **How would the proposal be likely to increase demands on transportation or public services and utilities?**

    - **Proposed measures to reduce or respond to such demand(s) are:**

7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**



A1 SITE PLAN
SCALE: 1" = 40'-0"

KNUTZEN ENGINEERING
3602 W. 36TH AVENUE
KENNEWICK, WA
1-509-222-0959
www.knutzenengineering.com

No.	REVISIONS	DATE	DESIGN	CHKD	APPD

NOT FOR CONSTRUCTION
SITE PLAN
CROSKREY DEVELOPMENT, LLC
CROSKREY STORAGE
HADEN RD, RICHLAND WASHINGTON

APPROVAL		
DESIGN	JAW	12/21/23
CHECKED	PTK	12/21/23
APPROVED	PTK	12/21/23

SCALE: AS NOTED
CADFILE: 23211SP01
JOB No. 23211
REV. A
DWG. No. SP01

\2023\23211-Croskrey Hagen Road Storage\DWG\23211SP01.dwg - Dec 21,2023 - 08:32am - jwa

HAGEN ROAD
COMMERCIAL DEVELOPMENT
RICHLAND, WASHINGTON

For:

DREW CROSKREY
CROSKREY DEVELOPMENT, LLC
1128 TOMICH AVE
RICHLAND, WA 99337

Provided By:

1106 Ledwich Ave.
Yakima, WA 98902
509-469-3068
general@baertesting.com

October 13, 2023
Project No: 23-318

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

October 13, 2023

Drew Croskrey
Croskrey Development, LLC
1128 Tomich Ave
Richland, WA 99337

RE: GEOTECHNICAL ENGINEERING STUDY; HAGEN ROAD COMMERCIAL DEVELOPMENT, RICHLAND, WASHINGTON

At your request, Baer Testing & Engineering, Inc. (BAER) conducted a Geotechnical Engineering study for the proposed Hagen Road commercial development in Richland, Washington. This report presents the results of the field explorations, laboratory testing, and engineering analyses.

This report presents recommendations for site grading, utility design and construction, drainage, and pavements. Recommendations for structure foundation design and construction, and seismic design for the various project features are also provided.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

Sincerely,

BAER TESTING, INC.

Dee J. Burrie, P.E.
Chief Engineer

Enclosures: Geotechnical Engineering Report

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FIGURES

APPENDICIES

1.0 INTRODUCTION

Baer Testing & Engineering, Inc. (BAER) is pleased to present the results of our geotechnical engineering study for the proposed Hagen Road commercial development in Richland, Washington. This geotechnical engineering study provides subsurface information to support site grading, drainage, utility design and construction, and recommendations for foundation design and construction**,** pavements, and IBC seismic design criteria. Our scope of work included:

- observing 5 test pit excavations;
- collecting soil samples;
- performing one infiltration test;
- conducting laboratory testing to determine soil properties;
- performing engineering analyses; and
- preparing this report.

2.0 PROJECT DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located south of Snyder Street and west of Hagen Road, in Richland, Washington (**Figure 1 – Site Location**). The parcel is in the NE4 of NW4 of S34, T10N, R28E, WM, in Benton County, Washington with approximate mid-site coordinates: 46°18'49.5"N Latitude; 119°17'42.5"W Longitude.

The approximately 2.77-acre parcel is currently undeveloped and vegetated with grass and weeds. The site is generally level, sloping gradually from northwest to southeast, with approximately 5 feet of total elevation change. An approximately 5-foot-tall soil mound is located along the southern edge, adjacent to the neighboring property access road.

The proposed development consists of constructing an approximately 40,000 square-foot, pre-engineered, steel-framed building. Development plans include underground utilities, paved parking, access lanes, and on-site stormwater management and disposal. A site plan was not available at the time of this study.

3.0 FIELD EXPLORATIONS

The exploration plan consisted of excavating five test pits designated TP-1 through TP-5 on the Exploration Plan (**Figure 2 – Exploration Plan**). Stenersen Excavating (SE) excavated the test pits on September 25, 2023, using a Deere 50G excavator equipped with a 24-inch bucket.

Where possible, soil in situ strength was estimated using a dynamic, mini-cone penetrometer (DCP) and our observations of the relative excavation difficulty. The mini cone uses a 15-pound slide hammer dropped 20 inches to drive a conical tip into the soil. The number of hammer blows required to drive the cone 1¾-inch increments is roughly equivalent to a SPT blow count. The blows per increment provide an indication of the relative soil density. The blow counts are recorded on the logs. The mini-cone penetrometer test method is described in ASTM STP399.

BAER's geologist counted the blows required to drive the rod into the ground for each 1¾-inch increment over a given depth. The recorded blow count data was evaluated using correlation charts to estimate the soil bearing capacity.

The subsurface conditions are known only at the test pit locations on the date explored and should be considered approximate. Actual subsurface conditions may vary between excavation locations. The test pit locations are presented in **Figure 2** and the test pit logs are presented in **Appendix A**. Our geologist classified the in situ soil in the field and transported the soil samples to the laboratory for further examination and testing.

4.0 LABORATORY TESTING

BAER performed the following laboratory tests on selected soil samples from our explorations.

- Moisture Content (American Society for Testing and Materials (ASTM) Designation: D 2216) for material characterization and soil index properties; and
- Particle Distribution (ASTM Designation: D 422 and ASTM Designation: D 1140) for material characterization and soil index properties.

Northwest Agricultural Consultants performed the following laboratory tests on selected soil samples.

- Organic Matter Content (ASTM Designation: D 2974) for soil index properties; and
- Cation Exchange Capacity (Environmental Protection Agency (EPA) Designation: 9081) for soil properties.

Copies of the laboratory test reports are enclosed in **Appendix B**.

5.0 SUBSURFACE CONDITIONS

The following information is a summary of the subsurface conditions encountered during the test pit explorations. Please refer to the enclosed logs (Appendix A) for more detailed information regarding subsurface conditions.

5.1 Regional Geologic Setting

The *Geologic Map of the Richland 1:100,000 Quadrangle, Washington*; Washington Division of Geology and Earth Resources, Open File Report 94-8 (1994), shows the site's near-surface geology is primarily mapped as Qfg_4 – Outburst Flood deposits (Pleistocene), and Qds – Stabilized Sand Dunes (Holocene) to the northwest. Qfg_4 includes gravels but ranges from sand to boulders; clasts are chiefly basalt, granite, quartzite, diorite, and volcanic porphyries. Qds consists of Eolian medium to fine sand and silt; composed of quartz, basalt, and/or feldspar; and includes Mazama tephra at numerous places. In our opinion, the materials observed in the test pit excavations are consistent with this mapped geology.

5.2 Soils

The subsurface profile generally consists of loose to medium dense, ***Silty Sand (SM)*** and ***Poorly Graded Sand with Silt (SP-SM)***, underlain by ***Well-Graded Gravel with Sand (GW)*** and ***Poorly Graded Sand with Silt and Gravel (SP-SM)***. The gravelly soils were encountered across the site at approximately 4 to 7 feet below the ground surface (bgs). Test pit TP-4 encountered approximately 3 feet of very loose fill containing wood, concrete, and other debris. The test pits were terminated approximately 9 to 10 feet bgs.

5.3 Groundwater

Groundwater was not encountered in the test pits. Based on well logs from nearby locations, groundwater is approximately 18 to 25 feet below the existing surface elevation. Referenced well logs are presented in **Appendix C.**

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

The approximately 2.77-acre parcel is currently undeveloped and vegetated with grass and weeds. The site is generally level, sloping gradually from northwest to southeast, with approximately 5 feet of total elevation change across the site.

6.1.1 Test Pit Backfill

SE used the excavator to backfill each test pit upon completion using the excavated materials. The operator compacted the backfill using the excavator bucket. Test pits within the building or pavement areas should be over-excavated and backfilled with compacted structural fill during site grading in accordance with Section "6.2 Earthwork" below.

6.2 Earthwork

Test Pit TP-4 encountered approximately 3 feet of debris-laden, undocumented fill in the southwest corner of the site. Site grading must include removal and replacement of debris fill within the building footprint and pavement areas.

Existing vegetation and deleterious debris should be removed from the building and pavement areas. We anticipate approximately 6 inches of topsoil will need to be removed. However, deeper sagebrush root balls may be encountered and require additional effort. Stripped soil materials with debris removed, may be stockpiled for use in future landscape areas but may not be used as structural fill.

6.2.1 Moisture Conditioning

The soil at the site was typically dry to moist at the time of our explorations. Depending on conditions during construction, the soil may require moisture conditioning, either by adding moisture or drying, prior to being compacted.

Our experience indicates adding moisture to the borrow area prior to excavation is an effective way to moisture condition the material. We recommend adding water by sprinkling the borrow area until the wetted front extends approximately 2 feet below the excavation depth.

6.2.2 Subgrade Preparation

Subgrade soils should be properly moisture conditioned prior to being compacted. The upper 12 inches of the exposed subgrade under the building and pavement areas should be scarified and moisture conditioned to within 2 percent of optimum and compacted to a minimum 95 percent of the maximum laboratory dry density as determined by the ASTM Designation: D 1557 – *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.* We recommend using a heavy, kneading-type compactor (padfoot) in the static mode to compact the near-surface fine-grained materials. Vibratory compactors tend to pump moisture to the surface of fine-grained materials resulting in unstable areas. Where possible, the subgrade should be proof rolled using a loaded water truck or dump truck to identify loose or unstable areas. The geotechnical engineer should observe the proof rolling activities to determine if the intent of this section is met and to aid in determining areas with soft or unsuitable soils.

6.2.3 Material Reuse

We assume the grading plan will be balanced to utilize on-site materials. The various silt and sand and gravel soils, with material larger than 3-inches removed, may be used as general fill and structural fill. If off-site materials are required, we recommend using a well-graded, 2-inch minus, pit-run sand and gravel with less than 5 percent fines. All structural fill and backfill should be placed in accordance with Section "6.2.4 Placement and Compaction".

6.2.4 Placement and Compaction

Fill and backfill should be moisture conditioned to within 2 percent of optimum, placed in maximum 8-inch loose lifts, and compacted to a minimum 95 percent of ASTM D 1557. Structural fill under footings should consist of 5/8-inch minus (Crushed Surfacing Top Course) CSTC. Structural fill should be compacted to 95 percent of ASTM D 1557.

6.2.5 Slopes

Occupational Safety and Health Administration (OSHA) Type C soil best describes the on-site silt and sand. Type C soils may have maximum temporary construction slopes of 1.5 Horizontal to 1 Vertical (1.5H:1V). Permanent cut or fill slopes should be no steeper than 2H:1V and must be protected from both wind and water erosion. Erosion protection may consist of vegetative cover or a minimum 3 inches of coarse concrete aggregate conforming to the requirements of WSDOT Specification 9-03.1(4) c, "Concrete Aggregate AASHTO Grading No. 57."

6.2.6 Utility Trenching

Utility trenching should be accomplished in accordance with American Public Works Association (APWA) Standard Specifications. Based on our explorations, we anticipate excavations may be accomplished using standard excavation equipment. Utility piping should be bedded as recommended in the APWA specifications. Utility trenches should be backfilled using structural fill compacted as specified in section "6.2.4 Placement and Compaction". Enough backfill should be placed over the utility before compacting with heavy compactors to prevent damage.

6.2.7 Wet Weather Construction

The near-surface site soils are typically fine-grained. The stability of the exposed fine soils may deteriorate due to changes in moisture content. If construction occurs during wet weather, we recommend:

- Fill materials consist of clean, granular soil with less than 5 percent fines passing the #200 sieve. Fines should be non-plastic.
- The ground surface in the construction area should be sloped to drain and sealed to reduce water infiltration and to prevent water ponding.
- Work areas and stockpiles should be covered with plastic. Geotextile silt fences, straw bales, straw wattles, and/or other measures should be used as needed to control soil erosion.

6.2.8 Infiltration Rate

We performed an infiltration test in TP-2 at approximately 5 feet bgs. The infiltration test was conducted in general accordance with the Small PIT method described in the 2019 Washington Department of Ecology Stormwater Management Manual Table 6.3 and Appendix 6.B.

Approximately 2 feet of water was placed in the pit. The water was allowed to drain for up to 2 hours. After pre-soaking, the pit was again filled with 2 feet of water and the water level measured

once filling stopped. The water level was then measured at 15-minute intervals. The infiltration rate is determined by the drop in water elevation between the 30-minute and 60-minute readings.

The water in the test pit drained rapidly. The USDA Texture Classification for the fine portion of the soil at the bottom of the test pit is Sand. Based on the infiltration and gradation tests we recommend a maximum infiltration rate of **4 inches** per hour or the maximum allowable design rate, whichever is less. This rate does not include safety factors. Local codes may limit the maximum design infiltration rate. The rate may need to be adjusted if other infiltration methods are used, such as swales. The system designer should verify any other limitations and incorporate an appropriate factor of safety against slowing rates over time due to biological and sediment clogging.

7.0 FOUNDATION DESIGN RECOMMENDATIONS

7.1 Footings

The proposed structure may be supported on conventional spread footings or continuous footings bearing on the native soil, or structural fill extending to the native silt and sand. Exterior footings should be embedded a minimum 24 inches below adjacent grades for bearing considerations and frost protection. It is important footings bear on consistent conditions to avoid differential settlement. We recommend placing a 6-inch layer of 5/8-inch CSTC beneath the footings to create a firm working surface and to prevent the sand surface from deteriorating.

Prior to placing CSTC or structural fill, the footing subgrade should be scarified a minimum 12 inches deep, moisture conditioned and compacted to 95% of ASTM D 1557.

We recommend constructing footings a minimum 2 feet wide for spread footings and minimum 16 inches wide for continuous footing. Footings constructed with these recommendations can be designed with an allowable bearing pressure of 2,000 pounds per square foot (psf). The allowable bearing pressure may be increased by one-third for short-term transient loading conditions (i.e., seismic and/or wind loads).

We anticipate settlement will be the limiting factor for foundation design. Foundation settlement estimates are based on the soil profile and densities encountered at the site. Foundations designed as outlined above should experience less than ½ -inch settlement. We anticipate differential settlement will be less than half of total settlements between adjacent footings or across approximately 20 feet of continuous footings. Settlement should occur rapidly as loads are applied.

Lateral forces may be resisted using a combination of friction and passive earth pressure against the buried portions of the structure. For design, a 0.45 coefficient of friction may be assumed along the interface between the footing base and the compacted CSTC. Passive earth pressure from the silty sand backfill may be calculated using an equivalent fluid weight of 260 psf per foot of embedment depth. The recommended coefficient of friction and passive earth pressure values do not include a safety factor.

7.2 Concrete Slabs-on-Grade

Exposed subgrade in areas to receive concrete slabs-on-grade should be scarified, moisture conditioned and compacted to a minimum of 95 percent of ASTM D 1557.

After compacting the subgrade, we recommend placing a minimum 6-inch layer of 5/8-inch CSTC under the concrete slab. The CSTC should be compacted to a firm, unyielding condition. The geotechnical engineer should observe subgrade preparation prior to gravel placement.

7.3 Retaining Walls

Retaining wall foundations should be designed and constructed in accordance with the footing recommendations. All retaining walls should be designed with a minimum 12-inch-wide drainage zone directly behind the wall. The on-site silty sand soil may be used as backfill behind the drainage zone. The drainage zone should be separated from the backfill using a separation geotextile. Backfill should be placed in maximum 8-inch loose lifts and compacted to 95 percent of ASTM D 1557.

If retaining walls are constructed as recommended above, the values in the following table may be used for design.

Table 7.3-1 Retaining Wall Design

Design Parameter	Value
Active Earth Pressure (unrestrained walls)	35 pcf/ft
At-rest Earth Pressure (restrained walls)	55 pcf/ft
Internal Angle of Friction (silt) – ρ	32°
Wet Unit Weight of Backfill/Retained Soil – γ	115 pcf
Cohesion	0

7.4 Pavement Sections

The buildings will be used for commercial or professional practice purposes. We anticipate traffic will consist of automobiles and light trucks, with occasional garbage or delivery trucks. Based on the anticipated traffic, we recommend the following pavement sections.

Table 7.4-1 Recommended Pavement Section

Material Layer	Layer Thickness, inches	Compaction Standard
	Light duty	
Asphaltic Concrete Pavement (HMACP)	3	91 percent of Maximum Theoretical Specific Gravity (Rice's)
Crushed Stone Top Course (CSTC) WSDOT 5/8-inch minus Top Course	6	95 percent of ASTM D 1557
Compacted Subgrade	12	95 percent of ASTM D 1557

The upper 12 inches of the pavement subgrade should be moisture conditioned and compacted to 95 percent of ASTM D 1557. The geotechnical engineer should observe the subgrade prior to base course placement. Soft or unstable areas should be stabilized or over-excavated and replaced with compacted structural fill prior to paving.

7.5 Seismic Design

Structures should be designed in accordance with the 2018 International Building Code (IBC). The Site Class is based on the average conditions present within 100 feet of the ground surface. The Site Classification is based on shear wave velocity. To establish a higher site class, additional explorations are required, including deep borings and geophysical measurements. Based on the available

information, we recommend using the default classification Site Class D (Stiff Soil). Design values determined for the center coordinates of the site using the United States Geological Survey (USGS) *Earthquake Ground Motion Parameters* utility (ATC Hazards by Location Tool – ASCE 7-16) are summarized in Table 7.5-1 below.

Table 7.5-1 Recommended Earthquake Ground Motion Parameters (2018 IBC)

Parameter	Value
Location (Latitude, Longitude), degrees	46.313749; -119.295131
Mapped Spectral Acceleration Values (MCE, Site Class D):	
Short Period, S_s	0.407 g
1.0 Sec. Period, S_1	0.157 g
Soil Factors for Site Class D:	
F_a	1.474 g
F_v	2.286
S_{DS}	0.4 g
S_{D1}	0.239

7.5.1 Liquefaction

Soil liquefaction occurs when saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Liquefaction typically occurs in loose, granular soils located in the upper 50 feet and below the water table. The groundwater depth is approximately 18 to 25 feet bgs and the on-site silt, sand, and underlying gravel are generally medium dense. In our opinion, the liquefaction potential at this site is low to moderate. Additional exploration and analysis will be required to quantify anticipated settlements due to potential liquefaction.

7.5.2 Fault Rupture Potential

Based on our review of available geologic literature, a hidden, northwest – southeast trending hidden thrust fault generally follows the Yakima River alignment approximately 2.4 miles southwest of the site. A second hidden thrust fault is located at the base of the hills (Badger Mountain, etc.) approximately 4.5 miles southwest of the site. We are not aware of any major movement along these faults in the last 10,000 years. We did not observe any evidence of surface rupture or recent faulting during our field observation. Therefore, we conclude the fault rupture potential is low at this site.

7.5.3 Slope stability

The site is in a relatively level, developing commercial area in the Horn Rapids area of Richland. In our opinion, the potential for slope failure impacting the proposed project site is low.

8.0 ADDITIONAL SERVICES

BAER is available to provide further geotechnical consultation during the project design phase. We should review the final design and specifications to verify earthwork and foundation recommendations have been properly interpreted and incorporated into the project design and construction specifications. We are also available to provide geotechnical engineering and special inspection services during construction. Observation during construction provides the geotechnical engineer the opportunity to assist in making engineering decisions if variations in subsurface

conditions become apparent. If BAER is not retained to provide construction phase services, we cannot be responsible for soil related construction errors or omissions.

Construction observation and special inspection services are not part of this geotechnical engineering study scope of work. We will be pleased to provide a separate proposal for the construction phase services, if desired.

9.0 UNCERTAINTIES AND LIMITATIONS

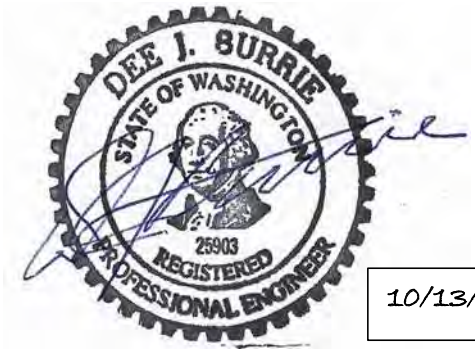
This report was prepared for use the exclusive use of Croskrey Development, LLC and the design team for the proposed commercial development on Hagen Road in Richland, Washington. This report presents the data from observations and field testing and is based on subsurface conditions at the specific locations and depths indicated. No other representation is made. This report should be made available to potential contractors for information on factual data only. Conclusions and interpretations presented in this report should not be construed as a guarantee or warranty of the subsurface conditions. If changes are made to the project components or layout, additional geotechnical data and analyses may be necessary.

Within the limitations of scope, schedule, and budget, BAER attempted to execute these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our services did not include environmental screening of soil samples retrieved from the explorations completed for this project. Further, we did not complete environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, rock, surface water, or air in the project area.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

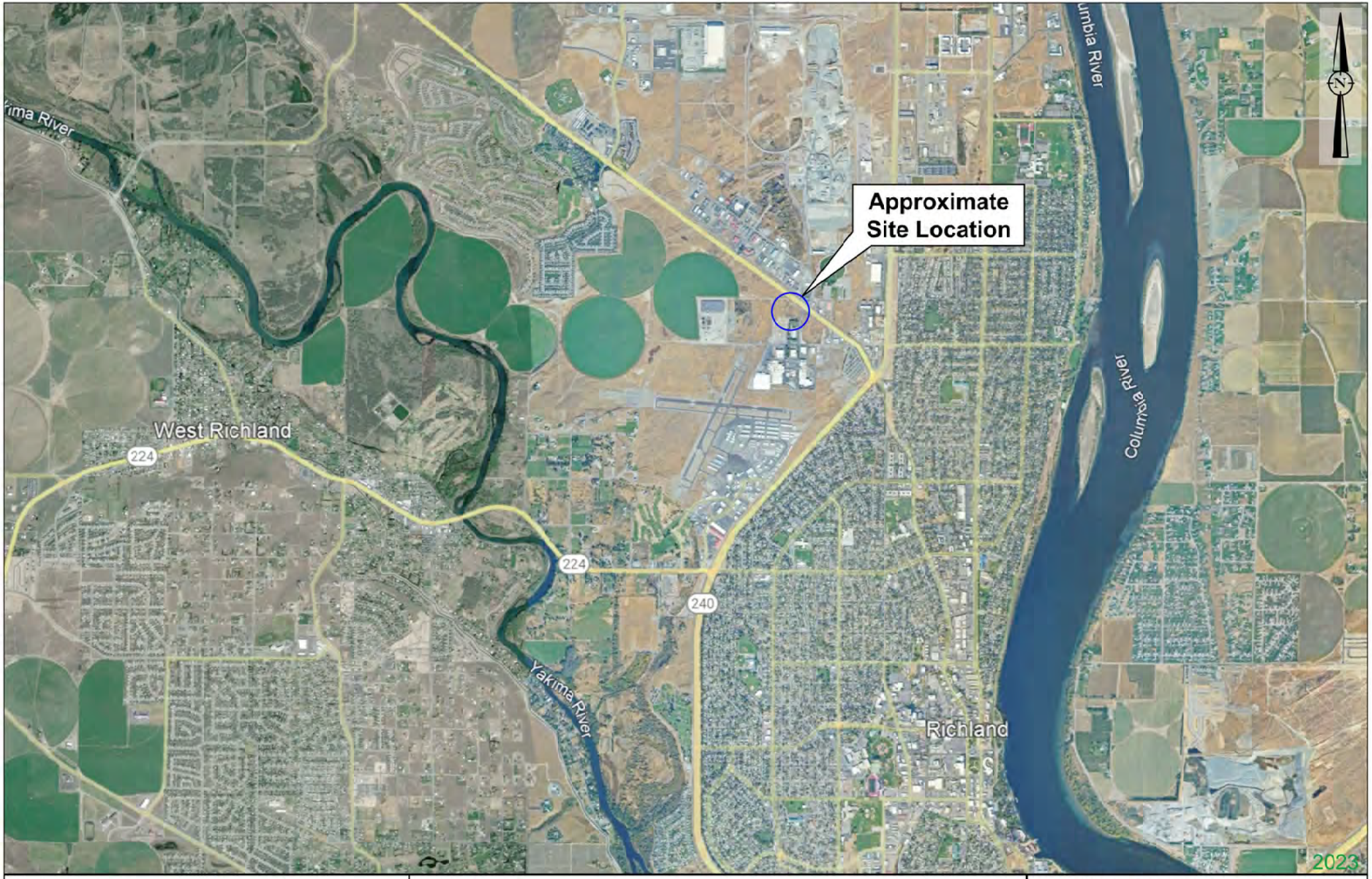
Sincerely,

BAER TESTING & ENGINEERING, INC.



10/13/2023

Dee J. Burrie, P.E.
Chief Engineer



Notes:
Location Map developed using images provided by Google Earth Pro.

0 1/2 1
Approximate Scale (Miles)

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Hagen Road Commercial Development
Richland, Washington

Site Location Map

23-318 | FIG. 1

Legend

TP-1 Approximate test pit designation and location

Notes:
Exploration Map developed using images provided by Google Earth Pro.

0 100 200
Approximate Scale (Feet)

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Exploration Plan

23-318 | FIG. 2

APPENDIX A
TEST PIT LOGS

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LOG OF TP-1

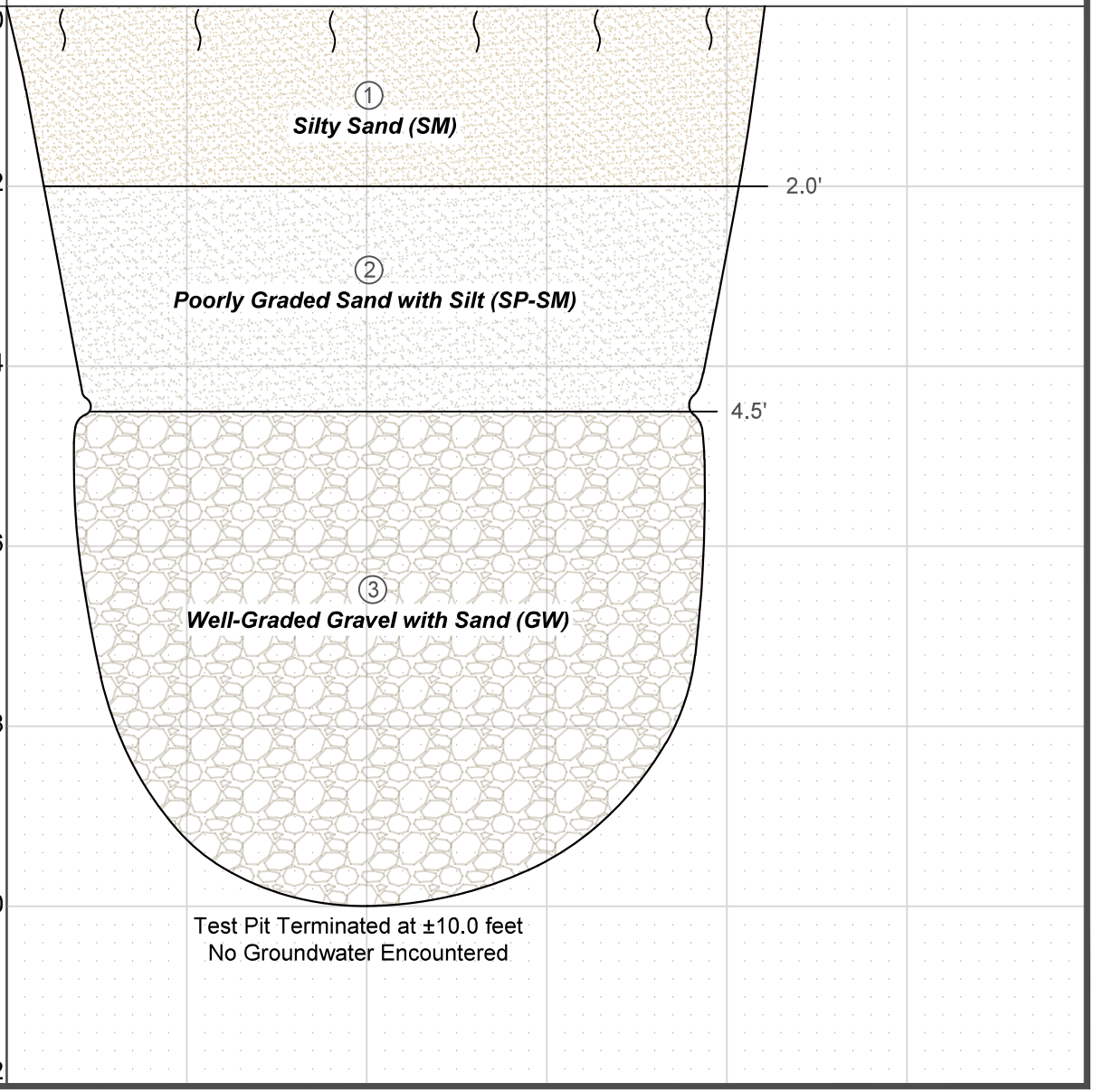
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: North Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3142046 E -119.2952126

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 2.0' Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches).	**None Observed**	2-10-12	S-1	0
② 2.0 - 4.5' Loose to medium dense, gray-brown, ***Poorly Graded Sand with Silt (SP-SM)***; Dry; fine to medium sand; nonplastic silt.			S-2	2
		*10-50/1.75"		4
③ 4.5 - 10.0' Dense, gray-brown, ***Well-Graded Gravel with Sand (GW)***; Dry to moist; round to subround gravel, some cobbles, few boulders, maximum diam. 18 inches; fine to coarse sand; trace nonplastic silt; 4-inch zone of white precipitation at approximately 4.5 feet; clasts horizontally aligned with precipitation on bottoms; some caving.			S-3	6
			S-4	8
Test Pit Terminated at ±10.0 feet No Groundwater Encountered				10
*Blow counts elevated due to oversized gravel				12

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-2

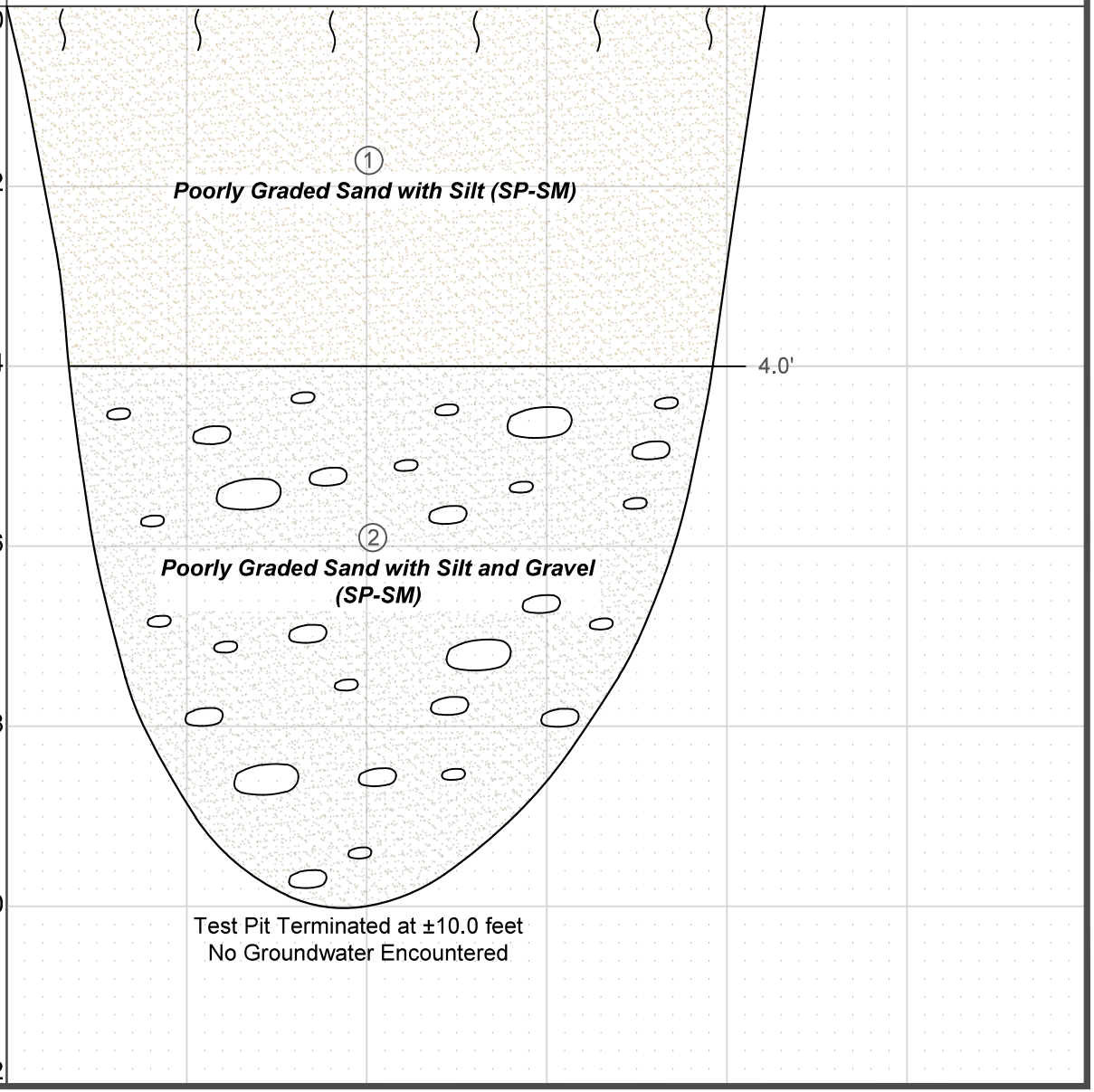
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: East Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3139186 E -119.2946259

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Brush				
① 0 - 4.0' Loose to medium dense, brown, ***Poorly Graded Sand with Silt (SP-SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches).	**None Observed**	2-7-10	S-1	0
				2
		*10-30-50/1"	S-2	4
② 4.0 - 10.0' Medium dense to dense, brown to gray-brown, ***Poorly Graded Sand with Silt and Gravel (SP-SM)***; Dry to moist; round to subround gravel, some cobbles, maximum diam. 11 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms; increased sand from 7 to 10 feet.				6
			S-3	8
Test Pit Terminated at ±10.0 feet No Groundwater Encountered				10
*Blow counts elevated due to oversized gravel				12

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-3

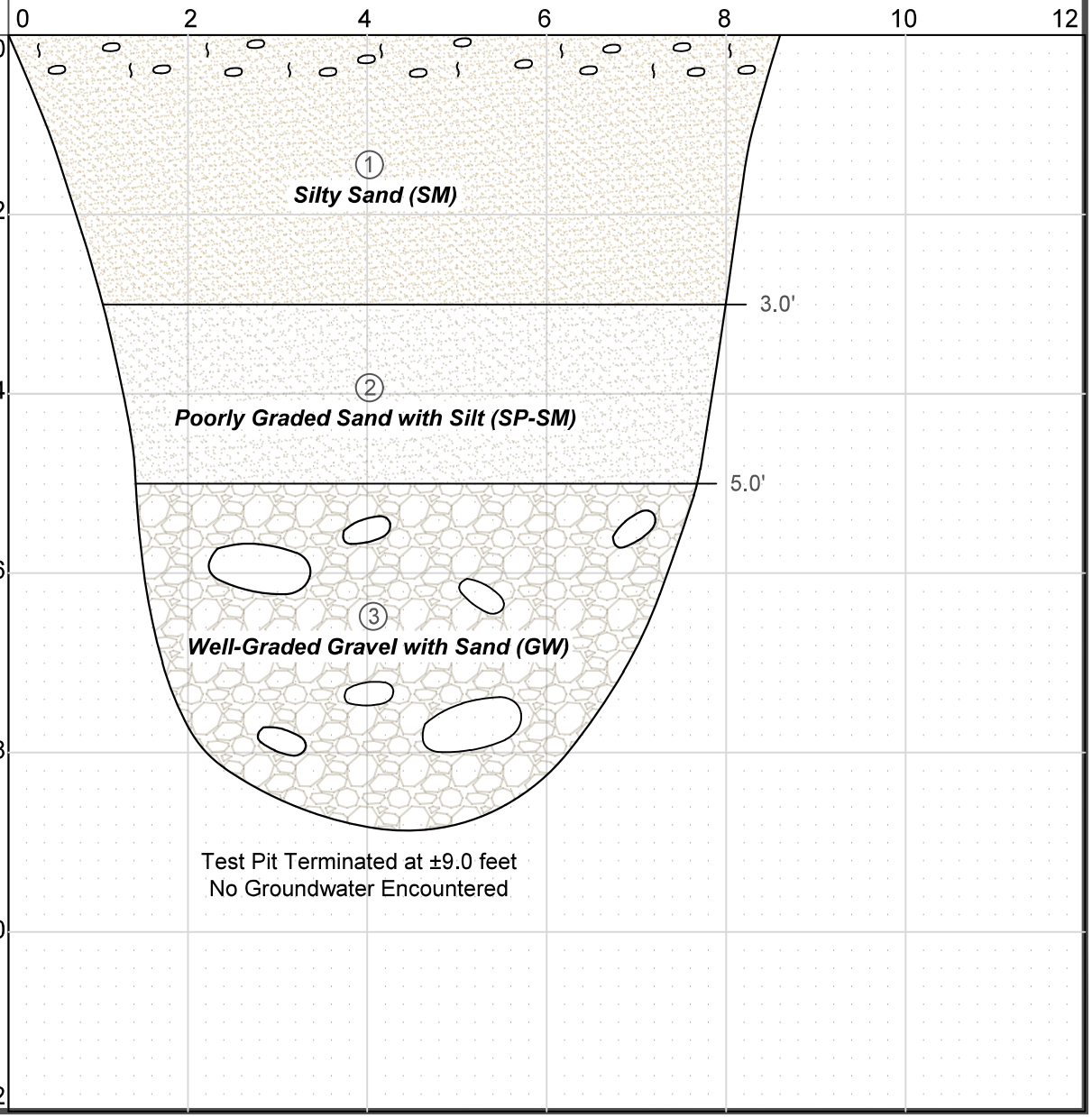
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Middle

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3137333 E -119.2951901

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 3.0' Loose to medium dense, brown, ***Silty Sand (SM)***; Dry to moist; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches); some rounded gravels near surface (6 inches).	**None Observed**	2-10-12	S-1	0
② 3.0 - 5.0' Loose to medium dense, gray-brown, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; nonplastic silt.		2-10-14	S-2	2
③ 5.0 - 9.0' Dense, gray to gray-brown, ***Well-Graded Gravel with Sand (GW)***; Dry to moist; round to subround gravel, some cobbles, few boulders, maximum diam. 18 inches; fine to coarse sand; trace nonplastic silt; 4-inch zone of white precipitation at 4.5 feet; clasts horizontally aligned, with precipitation on bottoms; prone to caving.			S-3	4
				6
				8
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				10
				12

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-4

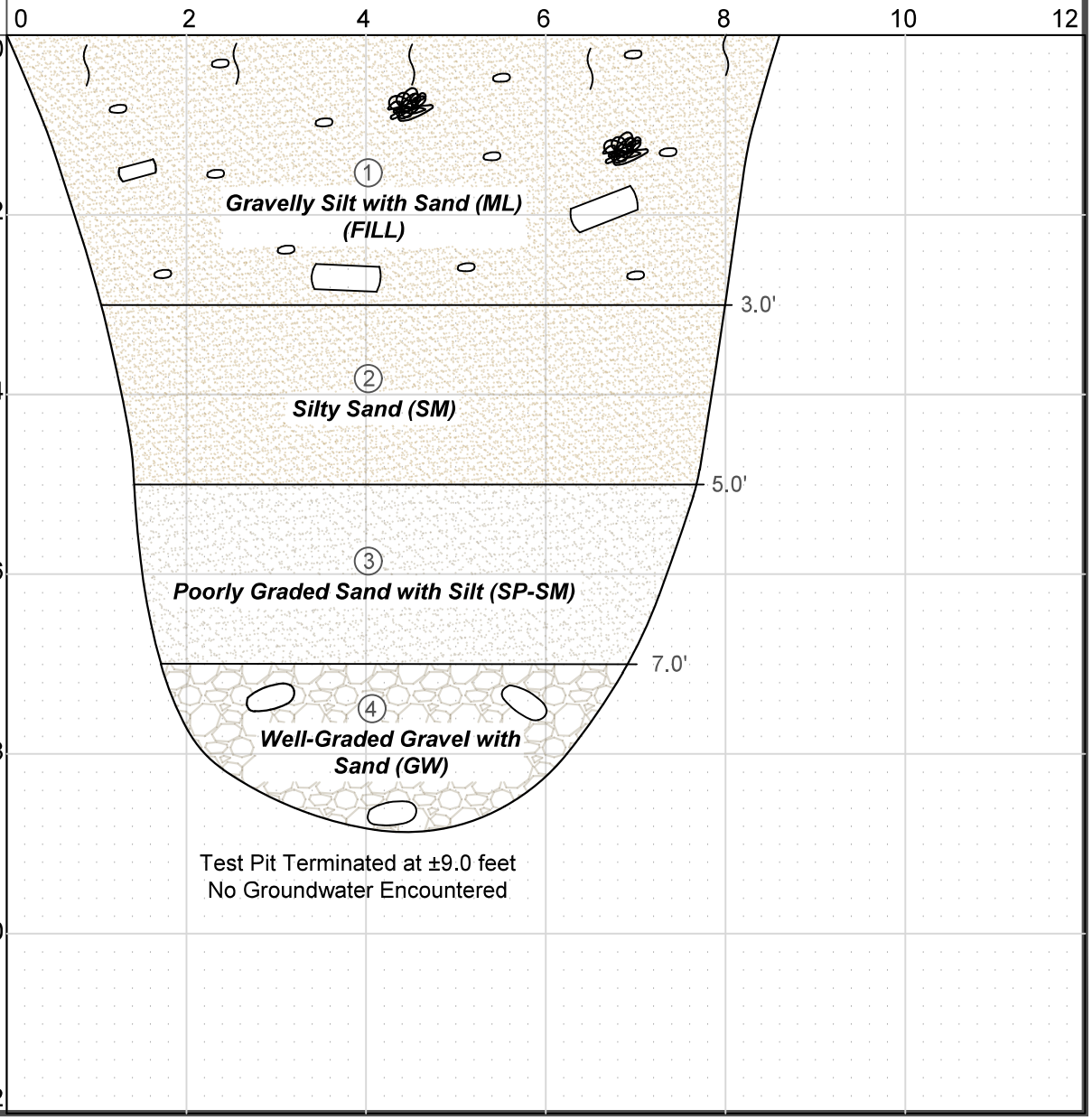
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Southwest Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3133479 E -119.2959468

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass				
① 0 - 3.0' Very loose to loose, brown, ***Gravelly Silt with Sand (ML)***; Dry; round to subrounded gravel, maximum diam 4 inches; fine to coarse sand; nonplastic silt; organics (roots) and rounded gravels near surface (6 inches); debris (wood, wire, etc.) throughout. (FILL)	**None Observed**	2-3-4		0
② 3.0 - 5.0' Medium dense, brown, ***Silty Sand (SM)***; Moist; fine to medium sand; nonplastic silt.		4-11-15	S-1 ☒	3.0
③ 5.0 - 7.0' Medium dense, gray, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; trace nonplastic silt.				5.0
④ 7.0 - 9.0' Medium dense, gray, ***Well-Graded Gravel with Sand (GW)***; Moist; round to subround gravel, some cobbles, maximum diam. 8 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms.			S-2 ☒	7.0
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				9.0

Sketch of South Pit Side Surface Elevation:



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LOG OF TP-5

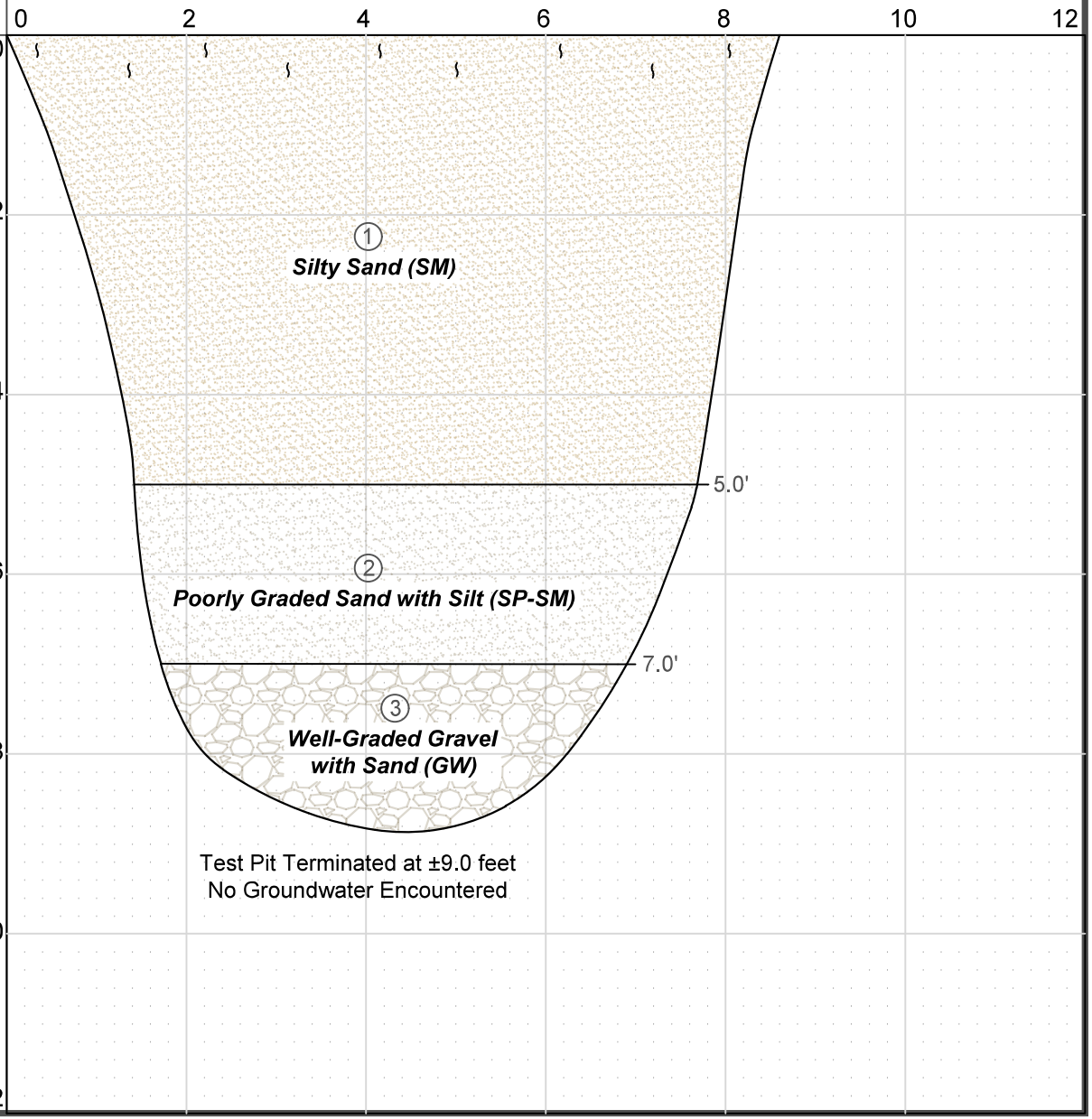
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Southeast Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3132729 E -119.2949588

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 5.0' Medium dense, brown, ***Silty Sand (SM)***; Dry to moist; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches); rounded gravels near surface (6 inches).	**None Observed**	2-13-14 5-13-16	S-1	0 2 4
② 5.0 - 7.0' Medium dense, gray, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; nonplastic silt; zone of white precipitation at 5 to 5.5 feet.			S-2	6
③ 7.0 - 9.0' Medium dense to dense, gray, ***Well-Graded Gravel with Sand (GW)***; Moist; round to subround gravel, some cobbles, maximum diam. 5 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms.				8
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				10 12

Sketch of West Pit Side Surface Elevation:



APPENDIX B
LABORATORY TEST RESULTS

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 1 @ 1'	**SAMPLE NUMBER:**	23-3941-1
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Silty Sand (SM)	**TESTED BY:**	AJD

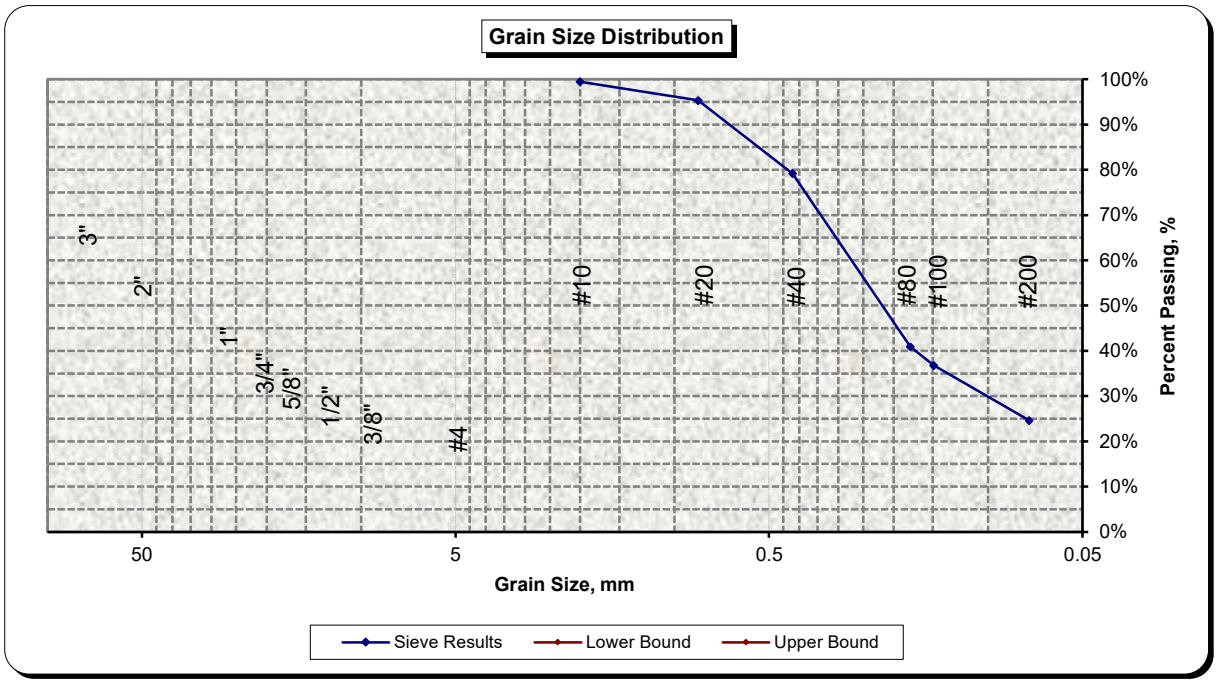
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4		
3"			#8		
2 1/2"			#10	99%	
2"			#16		
1 1/2"			#20	95%	
1 1/4"			#30		
1"			#40	79%	
3/4"			#50		
5/8"			#60		
1/2"			#80	41%	
3/8"			#100	37%	
1/4"			#200	24.6%	

SOIL MOISTURE DETERMINATION ASTM D 2216

2.0%



REVIEWED BY:
Dee Burrie, Technical Director

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

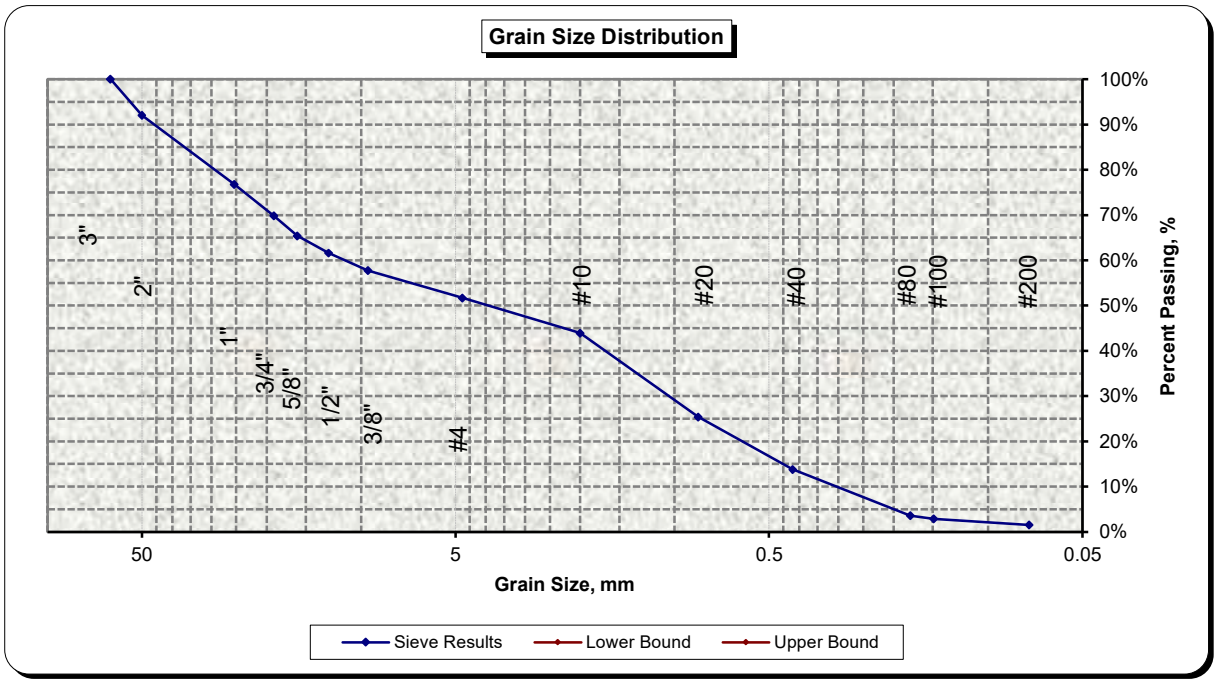
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 1 @ 9'	**SAMPLE NUMBER:**	23-3941-2
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Well-Graded Gravel with Sand (GW)	**TESTED BY:**	AJD

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	52%	
3"			#8		
2 1/2"	100%		#10	44%	
2"	92%		#16		
1 1/2"			#20	25%	
1 1/4"			#30		
1"	77%		#40	14%	
3/4"	70%		#50		
5/8"	65%		#60		
1/2"	62%		#80	4%	
3/8"	58%		#100	3%	
1/4"			#200	1.5%	

SOIL MOISTURE DETERMINATION ASTM D 2216



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Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

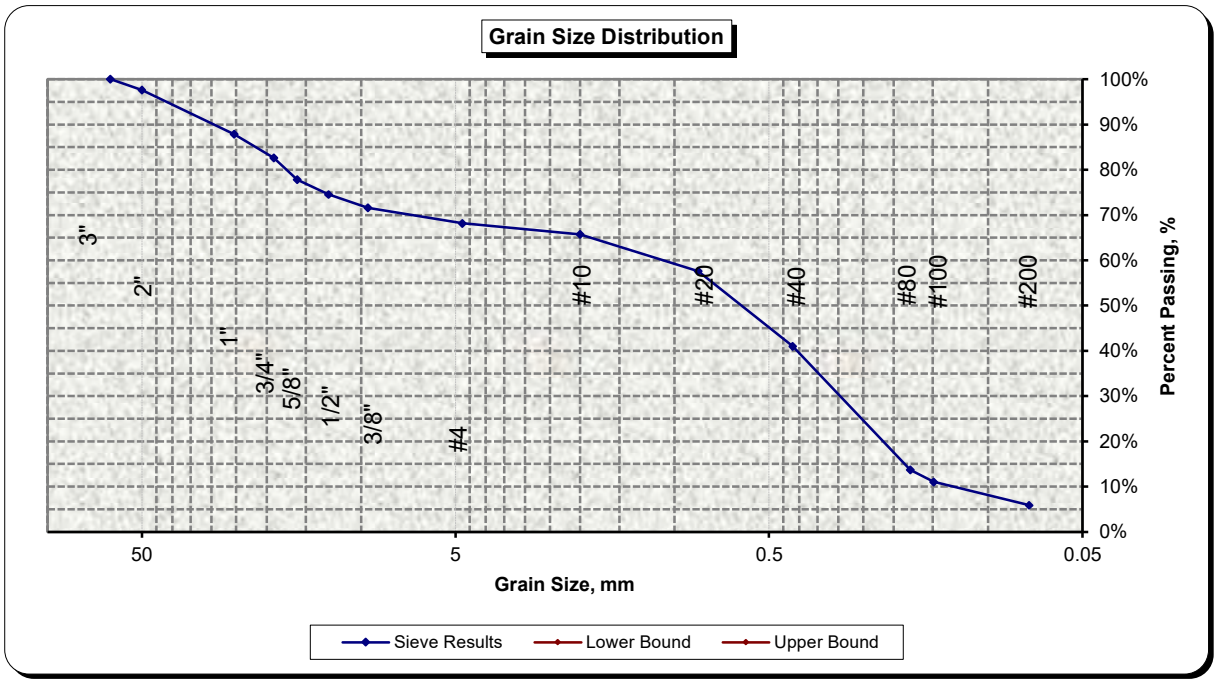
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 2 @ 4'	**SAMPLE NUMBER:**	23-3941-3
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Poorly Graded Sand with Silt and Gravel (SP-SM)	**TESTED BY:**	AJD

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	68%	
3"			#8		
2 1/2"	100%		#10	66%	
2"	98%		#16		
1 1/2"			#20	58%	
1 1/4"			#30		
1"	88%		#40	41%	
3/4"	83%		#50		
5/8"	78%		#60		
1/2"	75%		#80	14%	
3/8"	72%		#100	11%	
1/4"			#200	5.9%	

SOIL MOISTURE DETERMINATION ASTM D 2216



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: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 3 @ 4'	**SAMPLE NUMBER:**	23-3941-4
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Poorly Graded Sand with Silt (SP-SM)	**TESTED BY:**	AJD

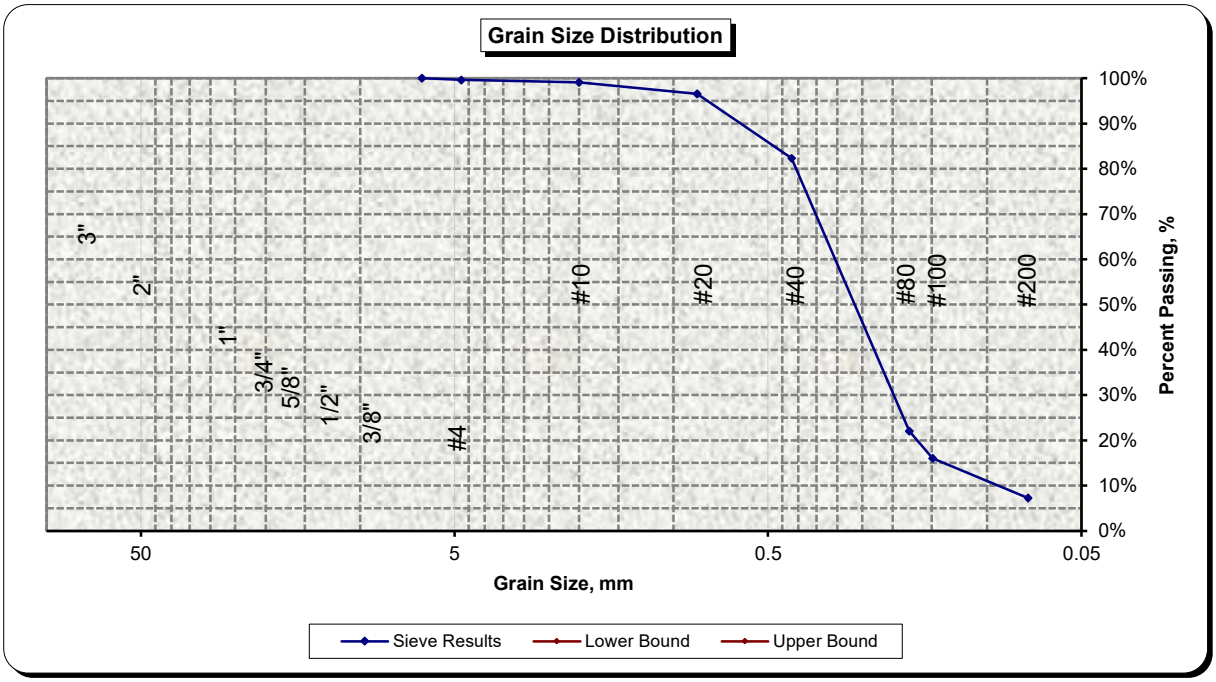
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	100%	
3"			#8		
2 1/2"			#10	99%	
2"			#16		
1 1/2"			#20	97%	
1 1/4"			#30		
1"			#40	82%	
3/4"			#50		
5/8"			#60		
1/2"			#80	22%	
3/8"			#100	16%	
1/4"	100%		#200	7.2%	

SOIL MOISTURE DETERMINATION ASTM D 2216

3.6%



REVIEWED BY:
Dee Burrie, Technical Director

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: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 5 @ 3'	**SAMPLE NUMBER:**	23-3941-5
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Silty Sand (SM)	**TESTED BY:**	AJD

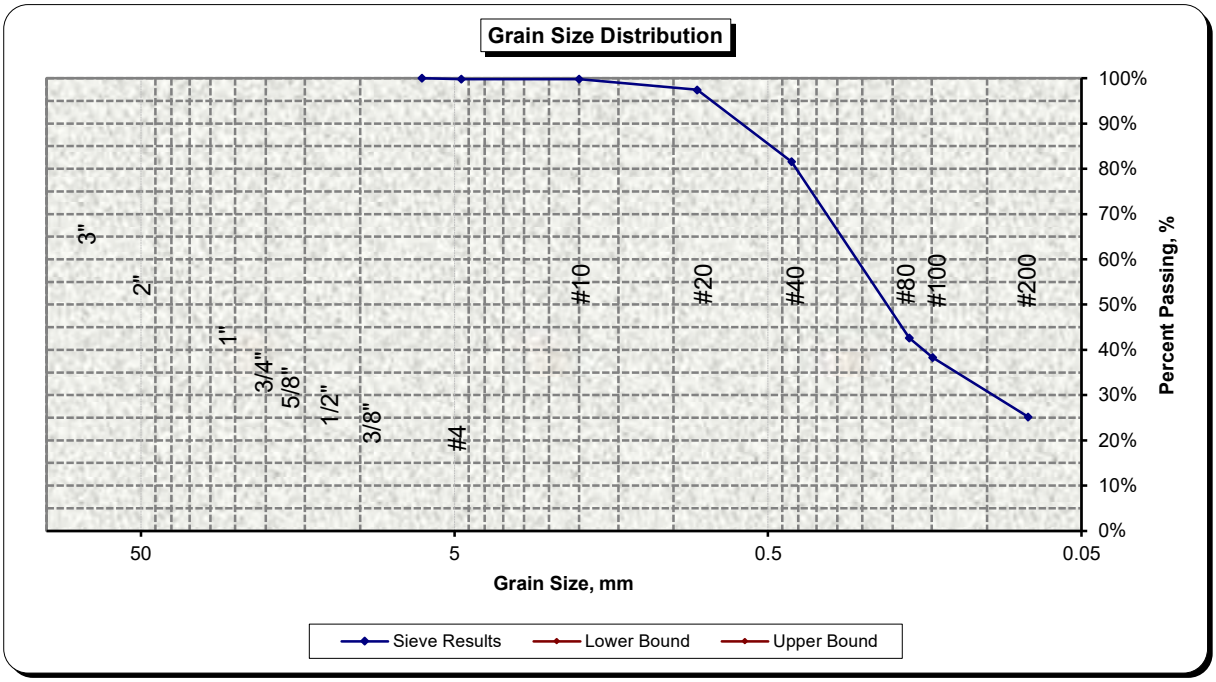
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	100%	
3"			#8		
2 1/2"			#10	100%	
2"			#16		
1 1/2"			#20	97%	
1 1/4"			#30		
1"			#40	82%	
3/4"			#50		
5/8"			#60		
1/2"			#80	43%	
3/8"			#100	38%	
1/4"	100%		#200	25.2%	

SOIL MOISTURE DETERMINATION ASTM D 2216

5.4%



REVIEWED BY:
Dee Burrie, Technical Director

Northwest Agricultural Consultants

2545 W Falls Avenue
Kennewick, WA 99336
509.783.7450
www.nwag.com
lab@nwag.com

PAP-Accredited
NAPT

BAER Testing Inc.
1106 Ledwich Ave.
Yakima, WA 98902

Report: 65811-1-1
Date: September 25,2023
Project No:
Project Name: HOGEN RD COM DEV

Sample ID	Organic Matter	Cation Exchange Capacity
TP-2 @ 10’	0.73%	4.8 meq/100g
	ASTM D2974	**EPA 9081**

Sample ID	Sand	Silt	Clay	Texture Class
TP-2 @ 10’	96.0%	3.0%	1.0%	Sand

Critical Aquifer Recharge Area Report

Croskrey Hagen Road Storage

#134082000001002

Richland, WA 99352

Prepared For:

Drew Croskrey
1128 Tomich Ave
Richland, WA 99337

Prepared By:

Paul Knutzen, PE
Nick Bonnington, EIT
Project No. 23211

1/12/24

Preparation Date:

January 12, 2024

Table of Contents

Appendices

1.0 Project Overview

The Croskrey Hagen Road Storage project site is located at an undetermined address in Richland, WA. The project encompasses Benton County parcel #134082000001002, which is zoned I-M Medium Industrial. The 2.77-acre site has 6-feet of elevation change across the property with a 6-foot mound in the southwest corner. The property is undeveloped and covered with native shrubs and bushes. The property is bordered by similarly zoned industrial properties. The project proposes 8 storage unit buildings totaling 42,000 sq-ft and a 900 sq-ft office. Grading will be designed to keep stormwater runoff away from the buildings and the final construction would cover approximately 93% of the site with impervious surfaces, consisting of roofing and pavement. The remainder of the site will continue to be covered by landscaping and gravel. Refer to *Appendix A* for the Vicinity Map and *Appendix B* for the Site Plan.

The site is located completely within the 10-Year Aquifer Recharge Critical Area as shown by City of Richland's critical area online mapping. As identified in the City's Wellhead Protection Program, the site is near the 10-year time of travel zone for a series of wells near the intersection of Stevens Dr and Saint St. See *Appendix C* for the map taken from the City's program.

2.0 Site Geology

The existing site's topography is sloping with approximately 6' of elevation change across the site. There is no evidence of on-site storm runoff leaving the site. Additionally, there is no evidence of the site receiving storm runoff from off-site sources.

Baer Testing & Engineering, Inc prepared a geotechnical engineering evaluation for the site on October 13, 2023. They performed 5 test pits and one infiltration test varying from 9 to 10 feet below ground surface (BGS). They encountered silty sand (SM), poorly graded sand with silt (SP-SM), gravelly silt with sand (ML), and well graded gravel with sand (GW). No bedrock or groundwater was encountered. See *Appendix D* for the Baer Geotechnical Report.

3.0 Groundwater

Baer did not encounter groundwater in their test pit explorations. Baer identifies the groundwater depth as approximately 18-25 feet below the existing surface elevation based on nearby well logs. The groundwater level is likely to rise and fall with the change of seasons. See *Appendix E* for the well logs.

A report provided by USGS identifies the general hydraulic gradient in the area as towards the northeast. See *Appendix F* for exhibits showing shallow water table level contours, Saddle Mountain basalt water level contours and Wanapum basalt contours.

4.0 Project Impact and Mitigation Plan

It is possible that stormwater produced by the site's impervious surfaces could enter the belowground aquifer. It is unlikely that pollutants in the stormwater could enter the aquifer due to the depth of groundwater. The large barrier of native soils provides natural filtration, preventing pollutants from entering groundwater. To our knowledge, no storage or usage of harmful chemicals are proposed on-site. At the time this report was prepared, it was assumed that infiltration trenches will be constructed to retain and infiltrate the property's stormwater runoff on-site.

The principal component of the site's mitigation plan is ensuring pollutants do not enter groundwater through the stormwater management plan. The site is anticipated to generate approximately 6 vehicular trips during PM Week Peak Traffic Hours, per the 11th Edition ITE Trip Generation Manual (Code 151). Based on the trip count, the site is classified as a low pollutant loading site, per table 5.22 of the Stormwater Management Manual for Eastern Washington (SWMMEW). Baer's geotechnical evaluation identified a fines percentage ranging from 1.5%-25.2%. The Cation Exchange Capacity was found to be 4.8 meq/100g and the organic matter percentage is 0.73%. Based on the percentage of fines, the vadose

zone is classified as low treatment capacity per Table 5.21 of the SWMMEW. Based on the pollutant loading classification and the treatment capacity of on-site soils, the required stormwater runoff treatment per table 5.23 of the SWMMEW is “pre-treatment”.

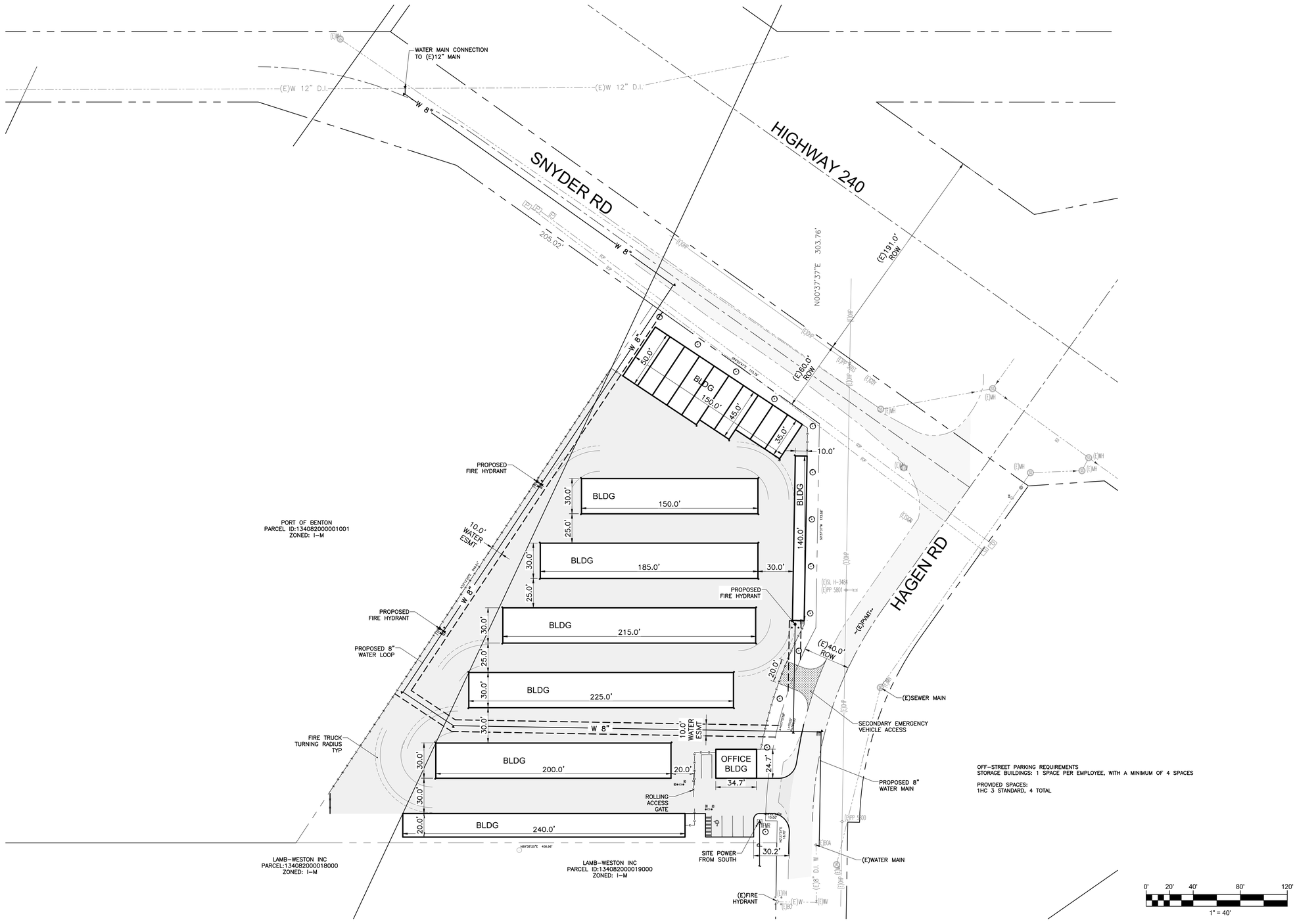
The stormwater management manual recommends a minimum vertical separation of 5.0 feet from subsurface infiltration facilities to groundwater. Based on groundwater elevations provided by Baer and nearby well logs, the usage of subsurface infiltration facilities is feasible while maintaining the required separation. At the time this report was prepared, it was assumed that all on-site runoff would be retained and infiltrated via subsurface infiltration trenches. The trenches shall be designed and maintained according to SWMMEW requirements. It is recommended to install a minimum of 18” of high treatment capacity soils under the trenches, according to Table 5.21 of the SWMMEW.

If proper vertical separation is maintained and the infiltration pond is constructed in compliance with the SWMMEW, the proposed project should have no significant impact to the Critical Aquifer Recharge Area. This report is only intended to address the Critical Aquifer Recharge Area, and not any other critical areas. Specifically, this report does not address the Critical Wetlands Area on-site, or mitigation associated with that designation.

APPENDIX A
Vicinity Map


Snyder Rd
Snyder Rd
Project Site
Snyder Rd
Hagen Rd

APPENDIX B
Site Plan



A1 SITE PLAN
SCALE: 1" = 40'-0"

KNUTZEN ENGINEERING
3602 W. 36TH AVENUE
KENNEWICK, WA
1-509-222-0959
www.knutzenengineering.com

No.	REVISIONS	DATE	DESIGN	CHKD	APPD

NOT FOR CONSTRUCTION
SITE PLAN
CROSKREY DEVELOPMENT, LLC
CROSKREY STORAGE
HADEN RD, RICHLAND WASHINGTON

APPROVAL		
DESIGN	JAW	12/21/23
CHECKED	PTK	12/21/23
APPROVED	PTK	12/21/23

SCALE: AS NOTED
CADFILE: 23211SP01
JOB No. 23211
REV. A
DWG. No. SP01

\2023\23211-Croskrey Hagen Road Storage\DWG\23211SP01.dwg - Dec 21,2023 - 08:32am - jwa

APPENDIX C
Wellhead Map

City of Richland

WELLHEAD PROTECTION PROGRAM

(THIS DRAWING IS DUPLICATED FROM FIGURE 2-5 WITHIN THE FINAL REPORT OF THE JUNE 1998 WELLHEAD PROTECTION PLAN ~ SC NYBY)

Richland

City of West Richland

Richland Airport

City of Pasco

City of Kennewick

Yakima

Umatilla

Pasco

Kennewick

LEGEND

- WELL
- TWODAN GENERATED POTENTIOMETRIC CONTOUR BASE ON ICF NORTHWEST DATA FOR CITY PRODUCTION WELLS
- 1 YEAR TIME OF TRAVEL ZONE
- 5 YEAR TIME OF TRAVEL ZONE
- 10 YEAR TIME OF TRAVEL ZONE

FILE: COR_WELLHEAD_PROTECTION_MAP.DWG DATE: 05.13.2010 DRAWN: SC NYBY

APPENDIX D
Baer Geotechnical Report

HAGEN ROAD
COMMERCIAL DEVELOPMENT
RICHLAND, WASHINGTON

For:

DREW CROSKREY
CROSKREY DEVELOPMENT, LLC
1128 TOMICH AVE
RICHLAND, WA 99337

Provided By:

1106 Ledwich Ave.
Yakima, WA 98902
509-469-3068
general@baertesting.com

October 13, 2023
Project No: 23-318

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

October 13, 2023

Drew Croskrey
Croskrey Development, LLC
1128 Tomich Ave
Richland, WA 99337

RE: GEOTECHNICAL ENGINEERING STUDY; HAGEN ROAD COMMERCIAL DEVELOPMENT, RICHLAND, WASHINGTON

At your request, Baer Testing & Engineering, Inc. (BAER) conducted a Geotechnical Engineering study for the proposed Hagen Road commercial development in Richland, Washington. This report presents the results of the field explorations, laboratory testing, and engineering analyses.

This report presents recommendations for site grading, utility design and construction, drainage, and pavements. Recommendations for structure foundation design and construction, and seismic design for the various project features are also provided.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

Sincerely,

BAER TESTING, INC.

Dee J. Burrie, P.E.
Chief Engineer

Enclosures: Geotechnical Engineering Report

TABLE OF CONTENTS

FIGURES

APPENDICIES

1.0 INTRODUCTION

Baer Testing & Engineering, Inc. (BAER) is pleased to present the results of our geotechnical engineering study for the proposed Hagen Road commercial development in Richland, Washington. This geotechnical engineering study provides subsurface information to support site grading, drainage, utility design and construction, and recommendations for foundation design and construction**,** pavements, and IBC seismic design criteria. Our scope of work included:

- observing 5 test pit excavations;
- collecting soil samples;
- performing one infiltration test;
- conducting laboratory testing to determine soil properties;
- performing engineering analyses; and
- preparing this report.

2.0 PROJECT DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located south of Snyder Street and west of Hagen Road, in Richland, Washington (**Figure 1 – Site Location**). The parcel is in the NE4 of NW4 of S34, T10N, R28E, WM, in Benton County, Washington with approximate mid-site coordinates: 46°18'49.5"N Latitude; 119°17'42.5"W Longitude.

The approximately 2.77-acre parcel is currently undeveloped and vegetated with grass and weeds. The site is generally level, sloping gradually from northwest to southeast, with approximately 5 feet of total elevation change. An approximately 5-foot-tall soil mound is located along the southern edge, adjacent to the neighboring property access road.

The proposed development consists of constructing an approximately 40,000 square-foot, pre-engineered, steel-framed building. Development plans include underground utilities, paved parking, access lanes, and on-site stormwater management and disposal. A site plan was not available at the time of this study.

3.0 FIELD EXPLORATIONS

The exploration plan consisted of excavating five test pits designated TP-1 through TP-5 on the Exploration Plan (**Figure 2 – Exploration Plan**). Stenersen Excavating (SE) excavated the test pits on September 25, 2023, using a Deere 50G excavator equipped with a 24-inch bucket.

Where possible, soil in situ strength was estimated using a dynamic, mini-cone penetrometer (DCP) and our observations of the relative excavation difficulty. The mini cone uses a 15-pound slide hammer dropped 20 inches to drive a conical tip into the soil. The number of hammer blows required to drive the cone 1¾-inch increments is roughly equivalent to a SPT blow count. The blows per increment provide an indication of the relative soil density. The blow counts are recorded on the logs. The mini-cone penetrometer test method is described in ASTM STP399.

BAER's geologist counted the blows required to drive the rod into the ground for each 1¾-inch increment over a given depth. The recorded blow count data was evaluated using correlation charts to estimate the soil bearing capacity.

The subsurface conditions are known only at the test pit locations on the date explored and should be considered approximate. Actual subsurface conditions may vary between excavation locations. The test pit locations are presented in **Figure 2** and the test pit logs are presented in **Appendix A**. Our geologist classified the in situ soil in the field and transported the soil samples to the laboratory for further examination and testing.

4.0 LABORATORY TESTING

BAER performed the following laboratory tests on selected soil samples from our explorations.

- Moisture Content (American Society for Testing and Materials (ASTM) Designation: D 2216) for material characterization and soil index properties; and
- Particle Distribution (ASTM Designation: D 422 and ASTM Designation: D 1140) for material characterization and soil index properties.

Northwest Agricultural Consultants performed the following laboratory tests on selected soil samples.

- Organic Matter Content (ASTM Designation: D 2974) for soil index properties; and
- Cation Exchange Capacity (Environmental Protection Agency (EPA) Designation: 9081) for soil properties.

Copies of the laboratory test reports are enclosed in **Appendix B**.

5.0 SUBSURFACE CONDITIONS

The following information is a summary of the subsurface conditions encountered during the test pit explorations. Please refer to the enclosed logs (Appendix A) for more detailed information regarding subsurface conditions.

5.1 Regional Geologic Setting

The *Geologic Map of the Richland 1:100,000 Quadrangle, Washington*; Washington Division of Geology and Earth Resources, Open File Report 94-8 (1994), shows the site's near-surface geology is primarily mapped as Qfg_4 – Outburst Flood deposits (Pleistocene), and Qds – Stabilized Sand Dunes (Holocene) to the northwest. Qfg_4 includes gravels but ranges from sand to boulders; clasts are chiefly basalt, granite, quartzite, diorite, and volcanic porphyries. Qds consists of Eolian medium to fine sand and silt; composed of quartz, basalt, and/or feldspar; and includes Mazama tephra at numerous places. In our opinion, the materials observed in the test pit excavations are consistent with this mapped geology.

5.2 Soils

The subsurface profile generally consists of loose to medium dense, ***Silty Sand (SM)*** and ***Poorly Graded Sand with Silt (SP-SM)***, underlain by ***Well-Graded Gravel with Sand (GW)*** and ***Poorly Graded Sand with Silt and Gravel (SP-SM)***. The gravelly soils were encountered across the site at approximately 4 to 7 feet below the ground surface (bgs). Test pit TP-4 encountered approximately 3 feet of very loose fill containing wood, concrete, and other debris. The test pits were terminated approximately 9 to 10 feet bgs.

5.3 Groundwater

Groundwater was not encountered in the test pits. Based on well logs from nearby locations, groundwater is approximately 18 to 25 feet below the existing surface elevation. Referenced well logs are presented in **Appendix C.**

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

The approximately 2.77-acre parcel is currently undeveloped and vegetated with grass and weeds. The site is generally level, sloping gradually from northwest to southeast, with approximately 5 feet of total elevation change across the site.

6.1.1 Test Pit Backfill

SE used the excavator to backfill each test pit upon completion using the excavated materials. The operator compacted the backfill using the excavator bucket. Test pits within the building or pavement areas should be over-excavated and backfilled with compacted structural fill during site grading in accordance with Section "6.2 Earthwork" below.

6.2 Earthwork

Test Pit TP-4 encountered approximately 3 feet of debris-laden, undocumented fill in the southwest corner of the site. Site grading must include removal and replacement of debris fill within the building footprint and pavement areas.

Existing vegetation and deleterious debris should be removed from the building and pavement areas. We anticipate approximately 6 inches of topsoil will need to be removed. However, deeper sagebrush root balls may be encountered and require additional effort. Stripped soil materials with debris removed, may be stockpiled for use in future landscape areas but may not be used as structural fill.

6.2.1 Moisture Conditioning

The soil at the site was typically dry to moist at the time of our explorations. Depending on conditions during construction, the soil may require moisture conditioning, either by adding moisture or drying, prior to being compacted.

Our experience indicates adding moisture to the borrow area prior to excavation is an effective way to moisture condition the material. We recommend adding water by sprinkling the borrow area until the wetted front extends approximately 2 feet below the excavation depth.

6.2.2 Subgrade Preparation

Subgrade soils should be properly moisture conditioned prior to being compacted. The upper 12 inches of the exposed subgrade under the building and pavement areas should be scarified and moisture conditioned to within 2 percent of optimum and compacted to a minimum 95 percent of the maximum laboratory dry density as determined by the ASTM Designation: D 1557 – *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.* We recommend using a heavy, kneading-type compactor (padfoot) in the static mode to compact the near-surface fine-grained materials. Vibratory compactors tend to pump moisture to the surface of fine-grained materials resulting in unstable areas. Where possible, the subgrade should be proof rolled using a loaded water truck or dump truck to identify loose or unstable areas. The geotechnical engineer should observe the proof rolling activities to determine if the intent of this section is met and to aid in determining areas with soft or unsuitable soils.

6.2.3 Material Reuse

We assume the grading plan will be balanced to utilize on-site materials. The various silt and sand and gravel soils, with material larger than 3-inches removed, may be used as general fill and structural fill. If off-site materials are required, we recommend using a well-graded, 2-inch minus, pit-run sand and gravel with less than 5 percent fines. All structural fill and backfill should be placed in accordance with Section "6.2.4 Placement and Compaction".

6.2.4 Placement and Compaction

Fill and backfill should be moisture conditioned to within 2 percent of optimum, placed in maximum 8-inch loose lifts, and compacted to a minimum 95 percent of ASTM D 1557. Structural fill under footings should consist of 5/8-inch minus (Crushed Surfacing Top Course) CSTC. Structural fill should be compacted to 95 percent of ASTM D 1557.

6.2.5 Slopes

Occupational Safety and Health Administration (OSHA) Type C soil best describes the on-site silt and sand. Type C soils may have maximum temporary construction slopes of 1.5 Horizontal to 1 Vertical (1.5H:1V). Permanent cut or fill slopes should be no steeper than 2H:1V and must be protected from both wind and water erosion. Erosion protection may consist of vegetative cover or a minimum 3 inches of coarse concrete aggregate conforming to the requirements of WSDOT Specification 9-03.1(4) c, "Concrete Aggregate AASHTO Grading No. 57."

6.2.6 Utility Trenching

Utility trenching should be accomplished in accordance with American Public Works Association (APWA) Standard Specifications. Based on our explorations, we anticipate excavations may be accomplished using standard excavation equipment. Utility piping should be bedded as recommended in the APWA specifications. Utility trenches should be backfilled using structural fill compacted as specified in section "6.2.4 Placement and Compaction". Enough backfill should be placed over the utility before compacting with heavy compactors to prevent damage.

6.2.7 Wet Weather Construction

The near-surface site soils are typically fine-grained. The stability of the exposed fine soils may deteriorate due to changes in moisture content. If construction occurs during wet weather, we recommend:

- Fill materials consist of clean, granular soil with less than 5 percent fines passing the #200 sieve. Fines should be non-plastic.
- The ground surface in the construction area should be sloped to drain and sealed to reduce water infiltration and to prevent water ponding.
- Work areas and stockpiles should be covered with plastic. Geotextile silt fences, straw bales, straw wattles, and/or other measures should be used as needed to control soil erosion.

6.2.8 Infiltration Rate

We performed an infiltration test in TP-2 at approximately 5 feet bgs. The infiltration test was conducted in general accordance with the Small PIT method described in the 2019 Washington Department of Ecology Stormwater Management Manual Table 6.3 and Appendix 6.B.

Approximately 2 feet of water was placed in the pit. The water was allowed to drain for up to 2 hours. After pre-soaking, the pit was again filled with 2 feet of water and the water level measured

once filling stopped. The water level was then measured at 15-minute intervals. The infiltration rate is determined by the drop in water elevation between the 30-minute and 60-minute readings.

The water in the test pit drained rapidly. The USDA Texture Classification for the fine portion of the soil at the bottom of the test pit is Sand. Based on the infiltration and gradation tests we recommend a maximum infiltration rate of **4 inches** per hour or the maximum allowable design rate, whichever is less. This rate does not include safety factors. Local codes may limit the maximum design infiltration rate. The rate may need to be adjusted if other infiltration methods are used, such as swales. The system designer should verify any other limitations and incorporate an appropriate factor of safety against slowing rates over time due to biological and sediment clogging.

7.0 FOUNDATION DESIGN RECOMMENDATIONS

7.1 Footings

The proposed structure may be supported on conventional spread footings or continuous footings bearing on the native soil, or structural fill extending to the native silt and sand. Exterior footings should be embedded a minimum 24 inches below adjacent grades for bearing considerations and frost protection. It is important footings bear on consistent conditions to avoid differential settlement. We recommend placing a 6-inch layer of 5/8-inch CSTC beneath the footings to create a firm working surface and to prevent the sand surface from deteriorating.

Prior to placing CSTC or structural fill, the footing subgrade should be scarified a minimum 12 inches deep, moisture conditioned and compacted to 95% of ASTM D 1557.

We recommend constructing footings a minimum 2 feet wide for spread footings and minimum 16 inches wide for continuous footing. Footings constructed with these recommendations can be designed with an allowable bearing pressure of 2,000 pounds per square foot (psf). The allowable bearing pressure may be increased by one-third for short-term transient loading conditions (i.e., seismic and/or wind loads).

We anticipate settlement will be the limiting factor for foundation design. Foundation settlement estimates are based on the soil profile and densities encountered at the site. Foundations designed as outlined above should experience less than ½ -inch settlement. We anticipate differential settlement will be less than half of total settlements between adjacent footings or across approximately 20 feet of continuous footings. Settlement should occur rapidly as loads are applied.

Lateral forces may be resisted using a combination of friction and passive earth pressure against the buried portions of the structure. For design, a 0.45 coefficient of friction may be assumed along the interface between the footing base and the compacted CSTC. Passive earth pressure from the silty sand backfill may be calculated using an equivalent fluid weight of 260 psf per foot of embedment depth. The recommended coefficient of friction and passive earth pressure values do not include a safety factor.

7.2 Concrete Slabs-on-Grade

Exposed subgrade in areas to receive concrete slabs-on-grade should be scarified, moisture conditioned and compacted to a minimum of 95 percent of ASTM D 1557.

After compacting the subgrade, we recommend placing a minimum 6-inch layer of 5/8-inch CSTC under the concrete slab. The CSTC should be compacted to a firm, unyielding condition. The geotechnical engineer should observe subgrade preparation prior to gravel placement.

7.3 Retaining Walls

Retaining wall foundations should be designed and constructed in accordance with the footing recommendations. All retaining walls should be designed with a minimum 12-inch-wide drainage zone directly behind the wall. The on-site silty sand soil may be used as backfill behind the drainage zone. The drainage zone should be separated from the backfill using a separation geotextile. Backfill should be placed in maximum 8-inch loose lifts and compacted to 95 percent of ASTM D 1557.

If retaining walls are constructed as recommended above, the values in the following table may be used for design.

Table 7.3-1 Retaining Wall Design

Design Parameter	Value
Active Earth Pressure (unrestrained walls)	35 pcf/ft
At-rest Earth Pressure (restrained walls)	55 pcf/ft
Internal Angle of Friction (silt) – ρ	32°
Wet Unit Weight of Backfill/Retained Soil – γ	115 pcf
Cohesion	0

7.4 Pavement Sections

The buildings will be used for commercial or professional practice purposes. We anticipate traffic will consist of automobiles and light trucks, with occasional garbage or delivery trucks. Based on the anticipated traffic, we recommend the following pavement sections.

Table 7.4-1 Recommended Pavement Section

Material Layer	Layer Thickness, inches	Compaction Standard
	Light duty	
Asphaltic Concrete Pavement (HMACP)	3	91 percent of Maximum Theoretical Specific Gravity (Rice's)
Crushed Stone Top Course (CSTC) WSDOT 5/8-inch minus Top Course	6	95 percent of ASTM D 1557
Compacted Subgrade	12	95 percent of ASTM D 1557

The upper 12 inches of the pavement subgrade should be moisture conditioned and compacted to 95 percent of ASTM D 1557. The geotechnical engineer should observe the subgrade prior to base course placement. Soft or unstable areas should be stabilized or over-excavated and replaced with compacted structural fill prior to paving.

7.5 Seismic Design

Structures should be designed in accordance with the 2018 International Building Code (IBC). The Site Class is based on the average conditions present within 100 feet of the ground surface. The Site Classification is based on shear wave velocity. To establish a higher site class, additional explorations are required, including deep borings and geophysical measurements. Based on the available

information, we recommend using the default classification Site Class D (Stiff Soil). Design values determined for the center coordinates of the site using the United States Geological Survey (USGS) *Earthquake Ground Motion Parameters* utility (ATC Hazards by Location Tool – ASCE 7-16) are summarized in Table 7.5-1 below.

Table 7.5-1 Recommended Earthquake Ground Motion Parameters (2018 IBC)

Parameter	Value
Location (Latitude, Longitude), degrees	46.313749; -119.295131
Mapped Spectral Acceleration Values (MCE, Site Class D):	
Short Period, S_s	0.407 g
1.0 Sec. Period, S_1	0.157 g
Soil Factors for Site Class D:	
F_a	1.474 g
F_v	2.286
S_{DS}	0.4 g
S_{D1}	0.239

7.5.1 Liquefaction

Soil liquefaction occurs when saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Liquefaction typically occurs in loose, granular soils located in the upper 50 feet and below the water table. The groundwater depth is approximately 18 to 25 feet bgs and the on-site silt, sand, and underlying gravel are generally medium dense. In our opinion, the liquefaction potential at this site is low to moderate. Additional exploration and analysis will be required to quantify anticipated settlements due to potential liquefaction.

7.5.2 Fault Rupture Potential

Based on our review of available geologic literature, a hidden, northwest – southeast trending hidden thrust fault generally follows the Yakima River alignment approximately 2.4 miles southwest of the site. A second hidden thrust fault is located at the base of the hills (Badger Mountain, etc.) approximately 4.5 miles southwest of the site. We are not aware of any major movement along these faults in the last 10,000 years. We did not observe any evidence of surface rupture or recent faulting during our field observation. Therefore, we conclude the fault rupture potential is low at this site.

7.5.3 Slope stability

The site is in a relatively level, developing commercial area in the Horn Rapids area of Richland. In our opinion, the potential for slope failure impacting the proposed project site is low.

8.0 ADDITIONAL SERVICES

BAER is available to provide further geotechnical consultation during the project design phase. We should review the final design and specifications to verify earthwork and foundation recommendations have been properly interpreted and incorporated into the project design and construction specifications. We are also available to provide geotechnical engineering and special inspection services during construction. Observation during construction provides the geotechnical engineer the opportunity to assist in making engineering decisions if variations in subsurface

conditions become apparent. If BAER is not retained to provide construction phase services, we cannot be responsible for soil related construction errors or omissions.

Construction observation and special inspection services are not part of this geotechnical engineering study scope of work. We will be pleased to provide a separate proposal for the construction phase services, if desired.

9.0 UNCERTAINTIES AND LIMITATIONS

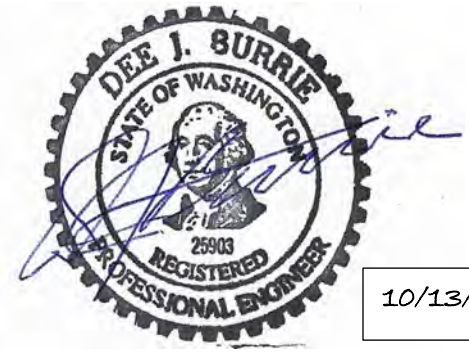
This report was prepared for use the exclusive use of Croskrey Development, LLC and the design team for the proposed commercial development on Hagen Road in Richland, Washington. This report presents the data from observations and field testing and is based on subsurface conditions at the specific locations and depths indicated. No other representation is made. This report should be made available to potential contractors for information on factual data only. Conclusions and interpretations presented in this report should not be construed as a guarantee or warranty of the subsurface conditions. If changes are made to the project components or layout, additional geotechnical data and analyses may be necessary.

Within the limitations of scope, schedule, and budget, BAER attempted to execute these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our services did not include environmental screening of soil samples retrieved from the explorations completed for this project. Further, we did not complete environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, rock, surface water, or air in the project area.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

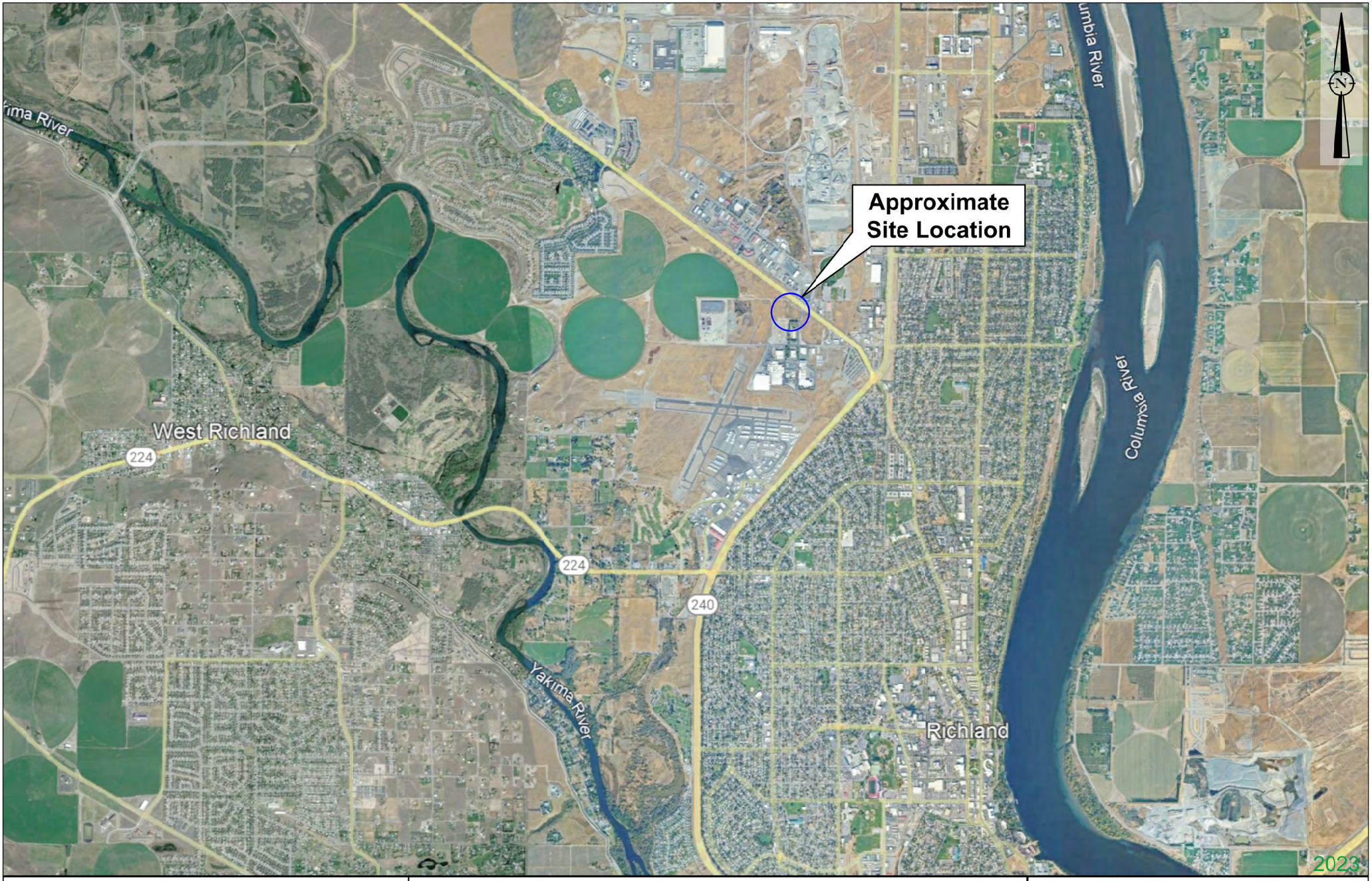
Sincerely,

BAER TESTING & ENGINEERING, INC.



10/13/2023

Dee J. Burrie, P.E.
Chief Engineer



Notes:
Location Map developed using images provided by Google Earth Pro.

0 1/2 1
Approximate Scale (Miles)

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Hagen Road Commercial Development
Richland, Washington

Site Location Map

23-318 | FIG. 1

Legend

TP-1 Approximate test pit designation and location

Notes:
Exploration Map developed using images provided by Google Earth Pro.

0 100 200
Approximate Scale (Feet)

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Exploration Plan

23-318 | FIG. 2

APPENDIX A
TEST PIT LOGS

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LOG OF TP-1

JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: North Corner

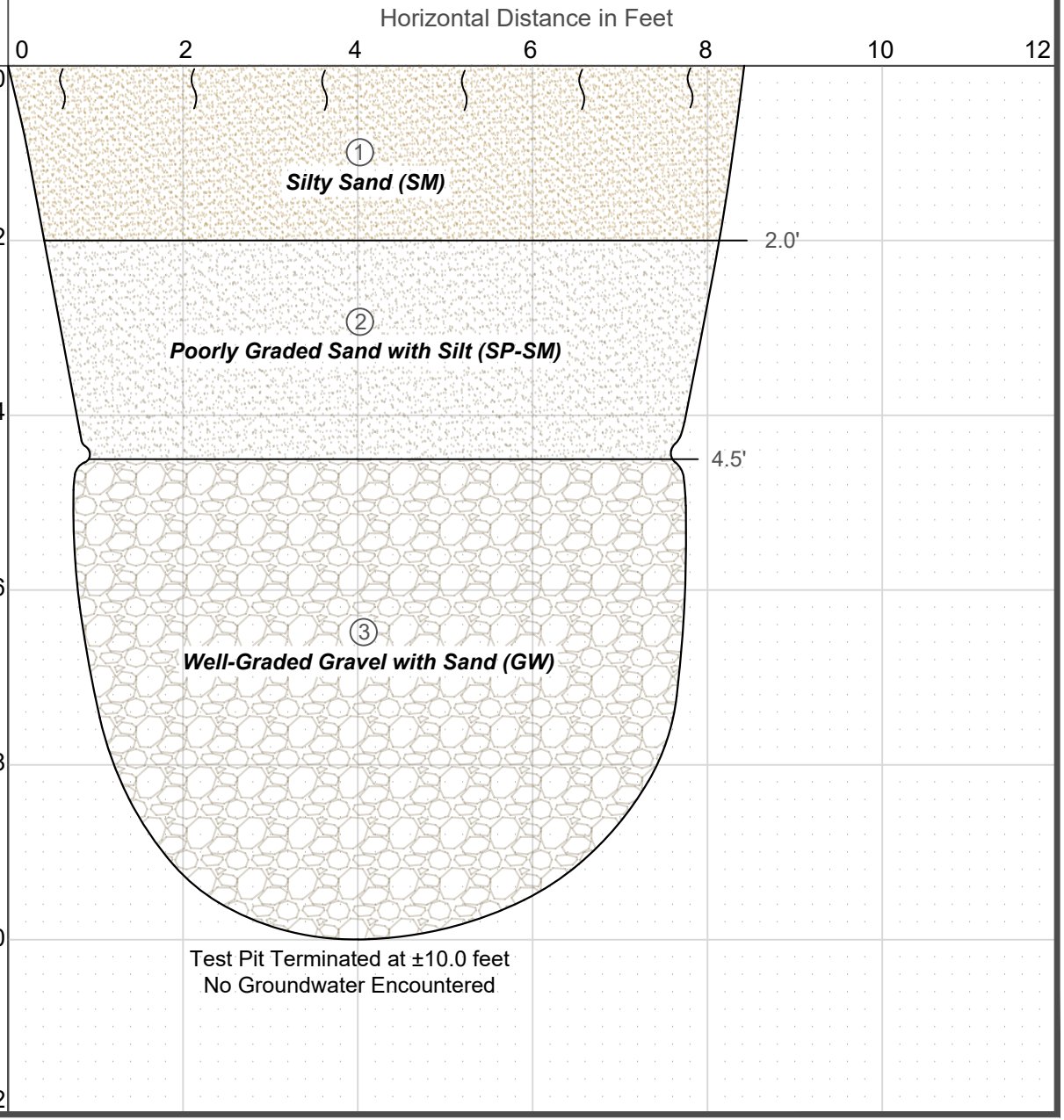
PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3142046 E -119.2952126

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 2.0' Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches).	**None Observed**	2-10-12	S-1	0
② 2.0 - 4.5' Loose to medium dense, gray-brown, ***Poorly Graded Sand with Silt (SP-SM)***; Dry; fine to medium sand; nonplastic silt.			S-2	2
③ 4.5 - 10.0' Dense, gray-brown, ***Well-Graded Gravel with Sand (GW)***; Dry to moist; round to subround gravel, some cobbles, few boulders, maximum diam. 18 inches; fine to coarse sand; trace nonplastic silt; 4-inch zone of white precipitation at approximately 4.5 feet; clasts horizontally aligned with precipitation on bottoms; some caving.		*10-50/1.75"	S-3	4
				6
				8
			S-4	10
Test Pit Terminated at ±10.0 feet No Groundwater Encountered				12

*Blow counts elevated due to oversized gravel

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-2

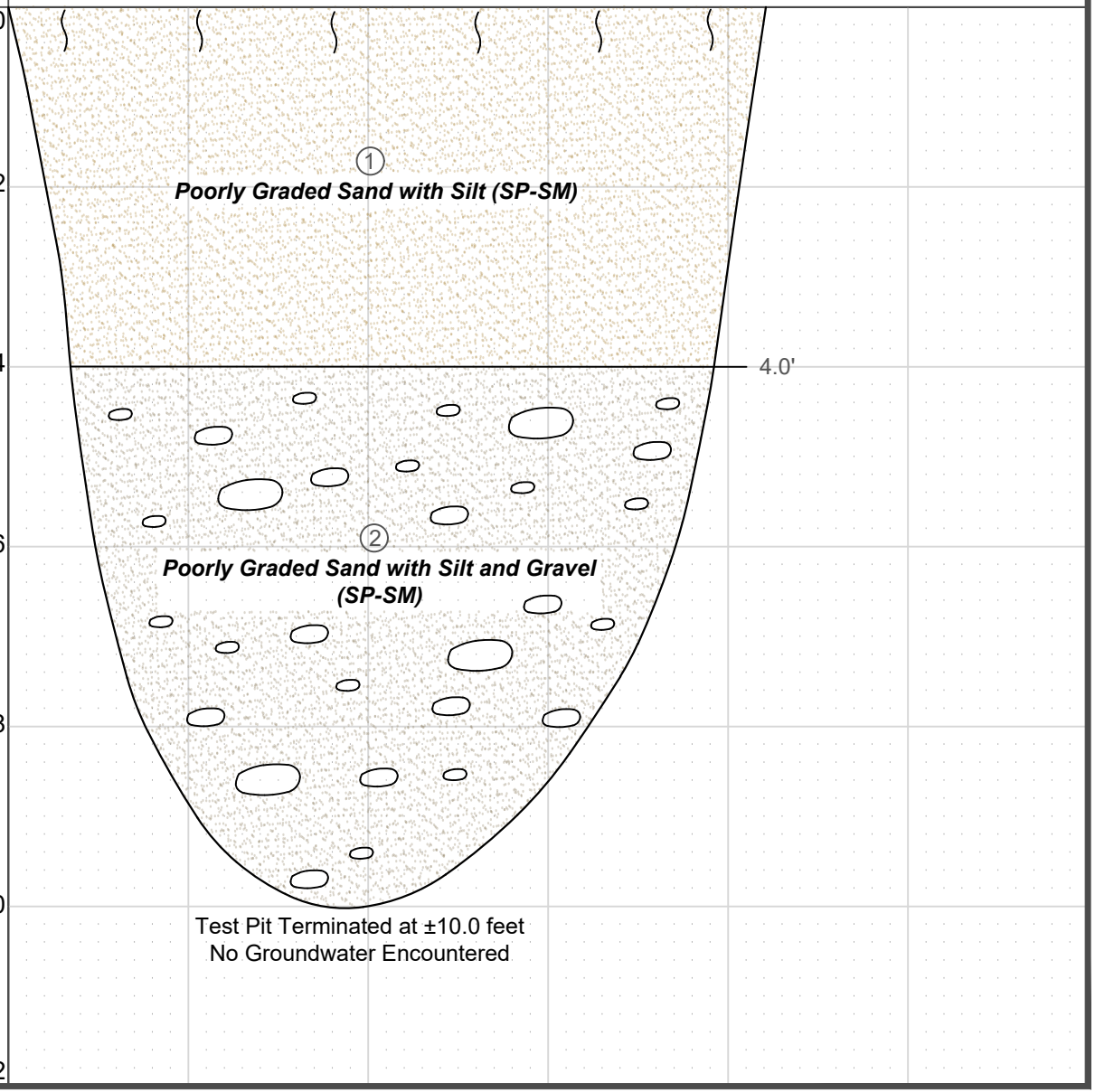
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: East Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3139186 E -119.2946259

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Brush				
① 0 - 4.0' Loose to medium dense, brown, ***Poorly Graded Sand with Silt (SP-SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches).	**None Observed**	2-7-10	S-1 ☒	0
			S-2 ☒	2
② 4.0 - 10.0' Medium dense to dense, brown to gray-brown, ***Poorly Graded Sand with Silt and Gravel (SP-SM)***; Dry to moist; round to subround gravel, some cobbles, maximum diam. 11 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms; increased sand from 7 to 10 feet.		*10-30-50/1"		4
			S-3 ☒	6
				8
Test Pit Terminated at ±10.0 feet No Groundwater Encountered				10
*Blow counts elevated due to oversized gravel				12

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-3

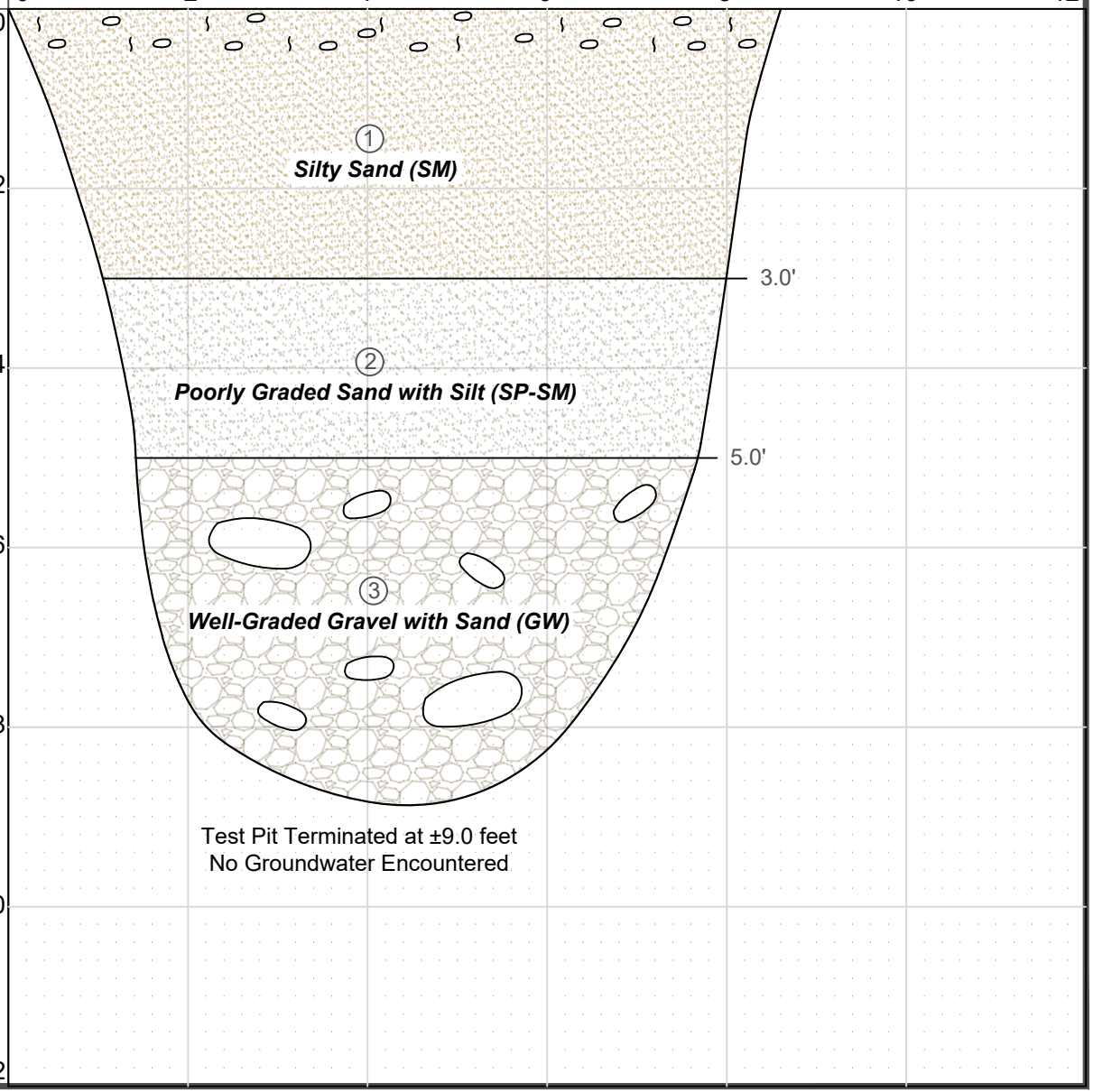
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Middle

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3137333 E -119.2951901

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 3.0' Loose to medium dense, brown, ***Silty Sand (SM)***; Dry to moist; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches); some rounded gravels near surface (6 inches).	**None Observed**	2-10-12	S-1	0
② 3.0 - 5.0' Loose to medium dense, gray-brown, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; nonplastic silt.		2-10-14	S-2	3.0'
③ 5.0 - 9.0' Dense, gray to gray-brown, ***Well-Graded Gravel with Sand (GW)***; Dry to moist; round to subround gravel, some cobbles, few boulders, maximum diam. 18 inches; fine to coarse sand; trace nonplastic silt; 4-inch zone of white precipitation at 4.5 feet; clasts horizontally aligned, with precipitation on bottoms; prone to caving.			S-3	5.0'
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				10
				12

Sketch of East Pit Side Surface Elevation:



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LOG OF TP-4

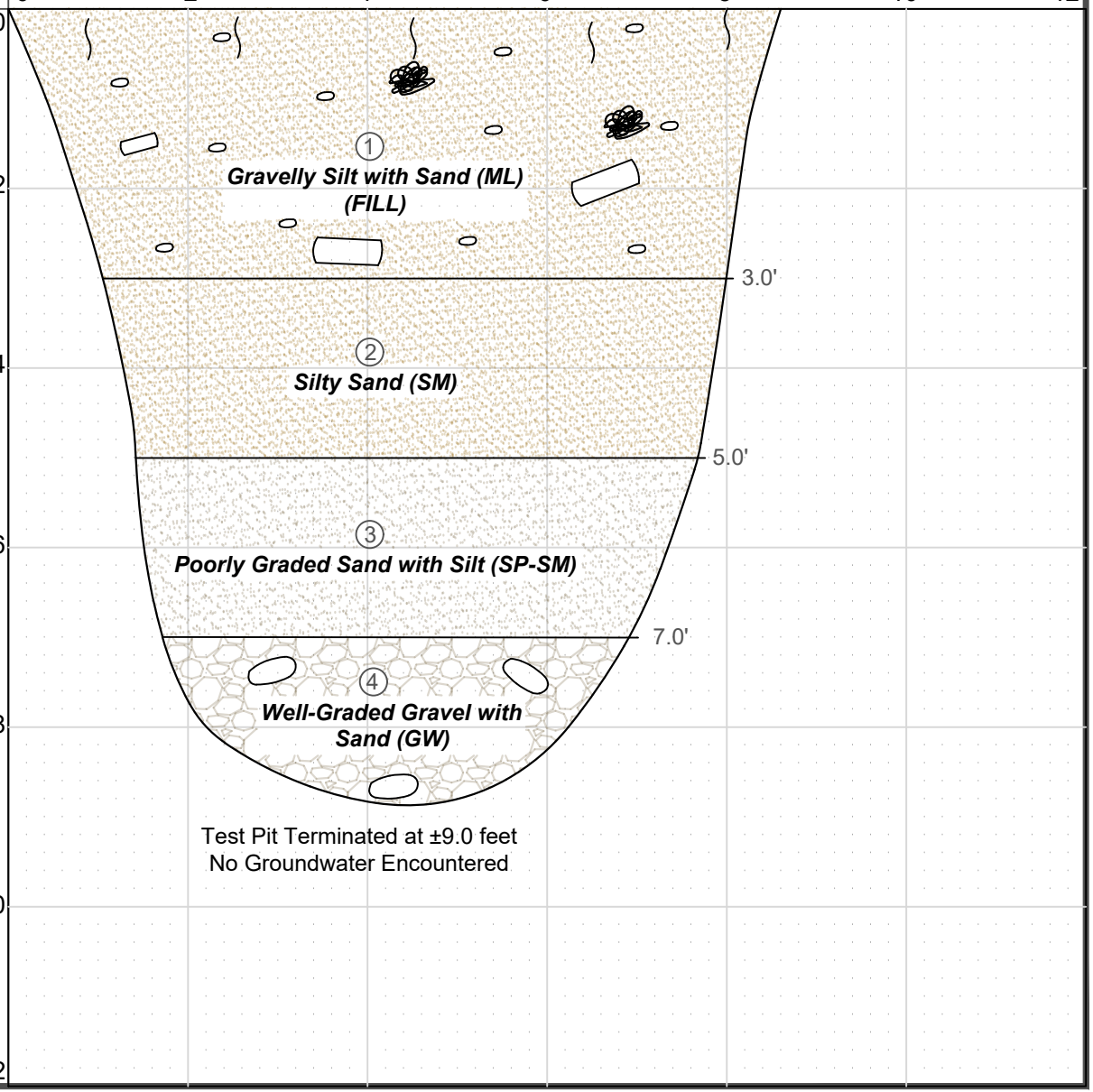
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Southwest Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3133479 E -119.2959468

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass				
① 0 - 3.0' Very loose to loose, brown, ***Gravelly Silt with Sand (ML)***; Dry; round to subrounded gravel, maximum diam 4 inches; fine to coarse sand; nonplastic silt; organics (roots) and rounded gravels near surface (6 inches); debris (wood, wire, etc.) throughout. (FILL)	**None Observed**	2-3-4		0
② 3.0 - 5.0' Medium dense, brown, ***Silty Sand (SM)***; Moist; fine to medium sand; nonplastic silt.		4-11-15	S-1 ☒	3.0'
③ 5.0 - 7.0' Medium dense, gray, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; trace nonplastic silt.				5.0'
④ 7.0 - 9.0' Medium dense, gray, ***Well-Graded Gravel with Sand (GW)***; Moist; round to subround gravel, some cobbles, maximum diam. 8 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms.			S-2 ☒	7.0'
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				9.0'

Sketch of South Pit Side Surface Elevation:



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LOG OF TP-5

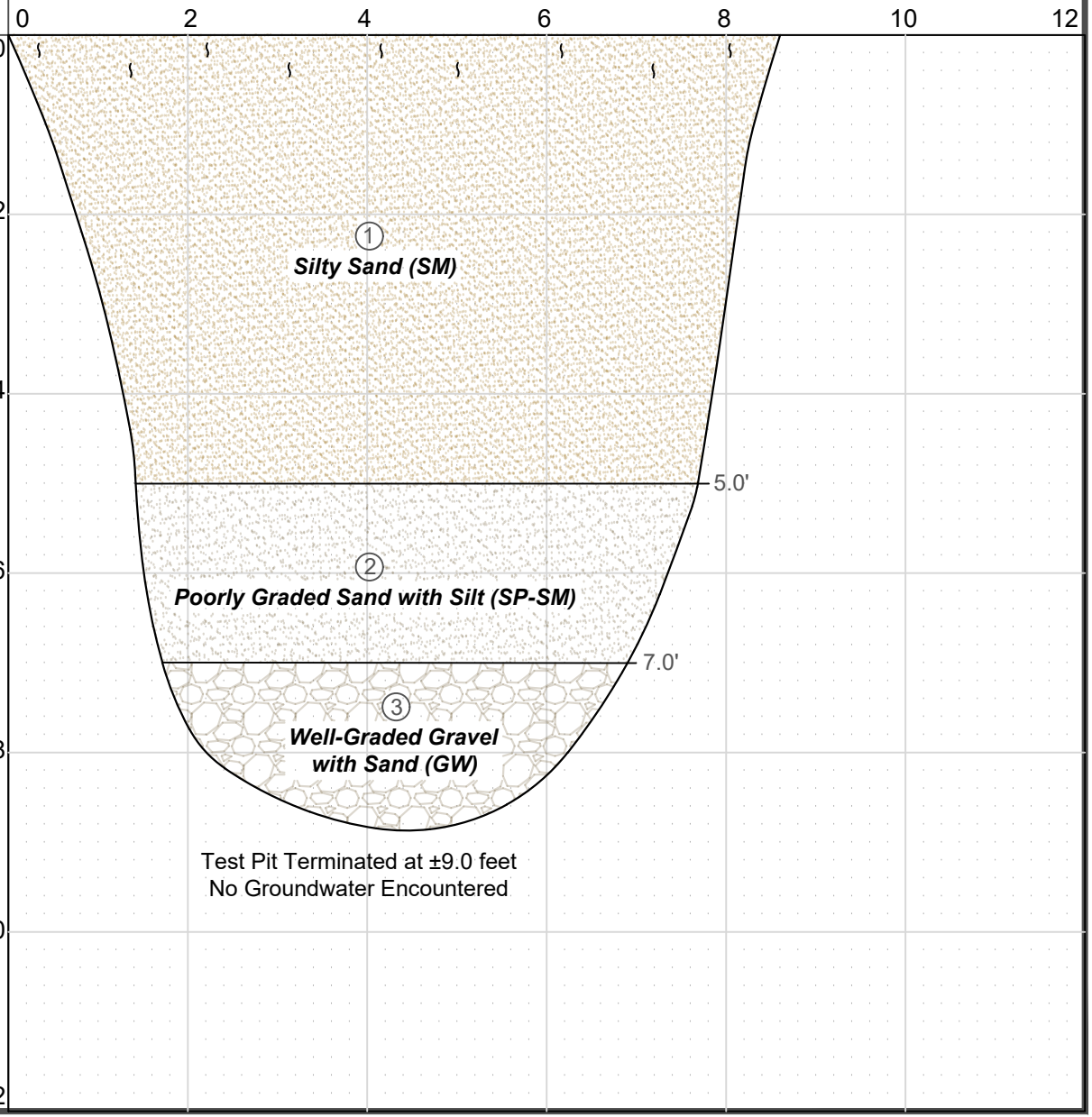
JOB NO: 23-318 EX. DATE: 9/25/23 LOCATION: Southeast Corner

PROJECT: Hagen Road Commercial Development, Richland, Washington

Logged By: BH GPS Coordinates: N 46.3132729 E -119.2949588

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Grass / Brush				
① 0 - 5.0' Medium dense, brown, ***Silty Sand (SM)***; Dry to moist; fine to medium sand; nonplastic silt; organics (roots) near surface (6 inches); rounded gravels near surface (6 inches).	**None Observed**	2-13-14 5-13-16	S-1	0
② 5.0 - 7.0' Medium dense, gray, ***Poorly Graded Sand with Silt (SP-SM)***; Moist; fine to medium sand; nonplastic silt; zone of white precipitation at 5 to 5.5 feet.			S-2	5.0
③ 7.0 - 9.0' Medium dense to dense, gray, ***Well-Graded Gravel with Sand (GW)***; Moist; round to subround gravel, some cobbles, maximum diam. 5 inches; fine to coarse sand; trace nonplastic silt; clasts horizontally aligned, with precipitation on bottoms.				7.0
Test Pit Terminated at ±9.0 feet No Groundwater Encountered				9.0

Sketch of West Pit Side Surface Elevation:



APPENDIX B
LABORATORY TEST RESULTS

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CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 1 @ 1'	**SAMPLE NUMBER:**	23-3941-1
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Silty Sand (SM)	**TESTED BY:**	AJD

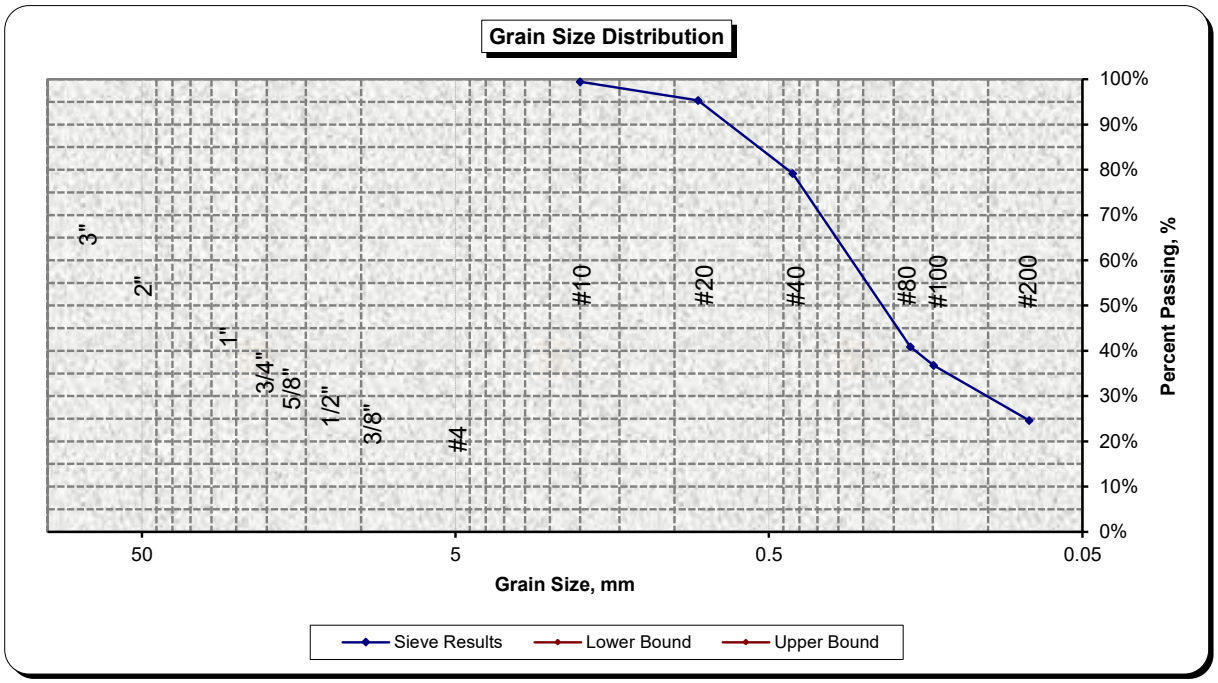
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4		
3"			#8		
2 1/2"			#10	99%	
2"			#16		
1 1/2"			#20	95%	
1 1/4"			#30		
1"			#40	79%	
3/4"			#50		
5/8"			#60		
1/2"			#80	41%	
3/8"			#100	37%	
1/4"			#200	24.6%	

SOIL MOISTURE DETERMINATION
ASTM D 2216

2.0%



REVIEWED BY:
Dee Burrie, Technical Director

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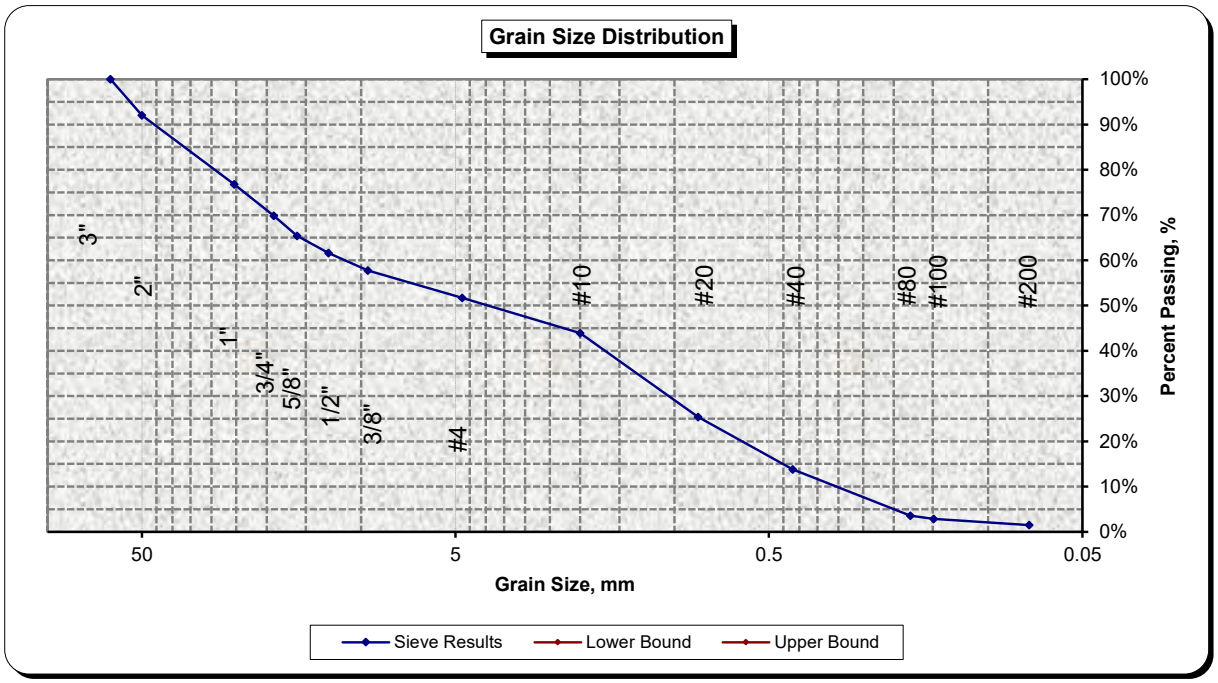
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 1 @ 9'	**SAMPLE NUMBER:**	23-3941-2
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Well-Graded Gravel with Sand (GW)	**TESTED BY:**	AJD

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	52%	
3"			#8		
2 1/2"	100%		#10	44%	
2"	92%		#16		
1 1/2"			#20	25%	
1 1/4"			#30		
1"	77%		#40	14%	
3/4"	70%		#50		
5/8"	65%		#60		
1/2"	62%		#80	4%	
3/8"	58%		#100	3%	
1/4"			#200	1.5%	

SOIL MOISTURE DETERMINATION
ASTM D 2216



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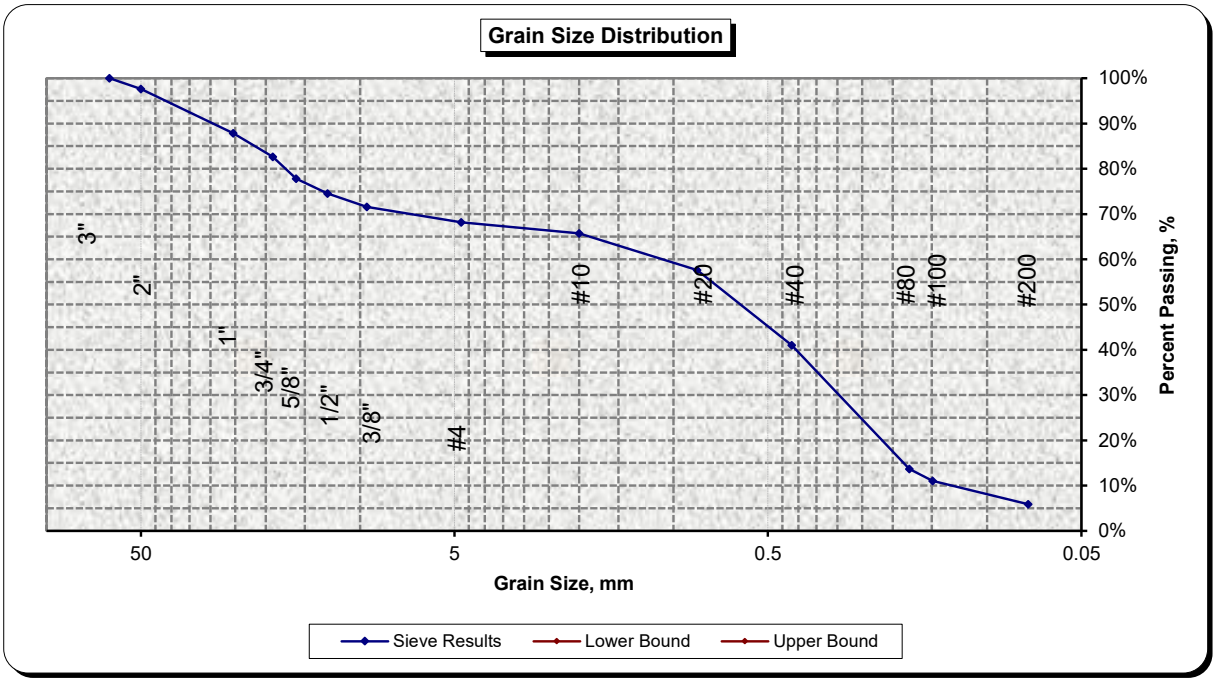
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 2 @ 4'	**SAMPLE NUMBER:**	23-3941-3
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Poorly Graded Sand with Silt and Gravel (SP-SM)	**TESTED BY:**	AJD

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	68%	
3"			#8		
2 1/2"	100%		#10	66%	
2"	98%		#16		
1 1/2"			#20	58%	
1 1/4"			#30		
1"	88%		#40	41%	
3/4"	83%		#50		
5/8"	78%		#60		
1/2"	75%		#80	14%	
3/8"	72%		#100	11%	
1/4"			#200	5.9%	

SOIL MOISTURE DETERMINATION
ASTM D 2216



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: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 3 @ 4'	**SAMPLE NUMBER:**	23-3941-4
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Poorly Graded Sand with Silt (SP-SM)	**TESTED BY:**	AJD

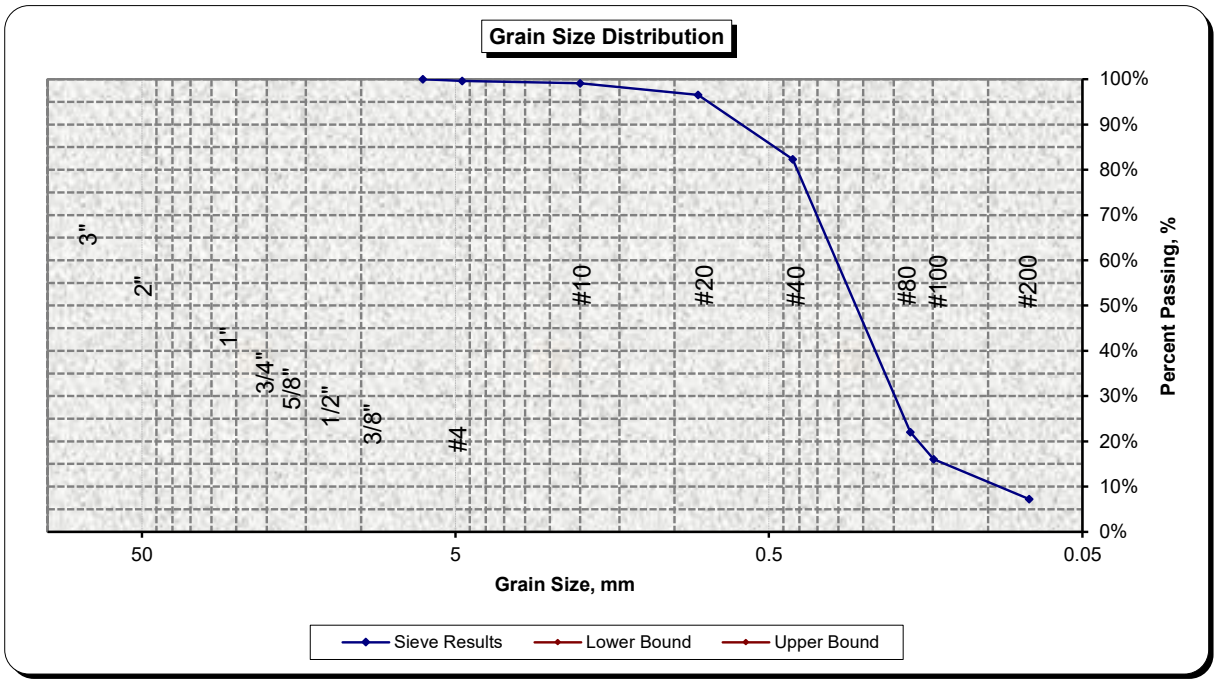
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	100%	
3"			#8		
2 1/2"			#10	99%	
2"			#16		
1 1/2"			#20	97%	
1 1/4"			#30		
1"			#40	82%	
3/4"			#50		
5/8"			#60		
1/2"			#80	22%	
3/8"			#100	16%	
1/4"	100%		#200	7.2%	

SOIL MOISTURE DETERMINATION ASTM D 2216

3.6%



REVIEWED BY:
Dee Burrie, Technical Director

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-318
PROJECT:	Hagen Road Com Dev	**WORK ORDER #:**	23-3941
SAMPLE SOURCE:	TP 5 @ 3'	**SAMPLE NUMBER:**	23-3941-5
DATE SAMPLED:	9/25/2023	**DATE TESTED:**	9/26/2023
MATERIAL TYPE:	Silty Sand (SM)	**TESTED BY:**	AJD

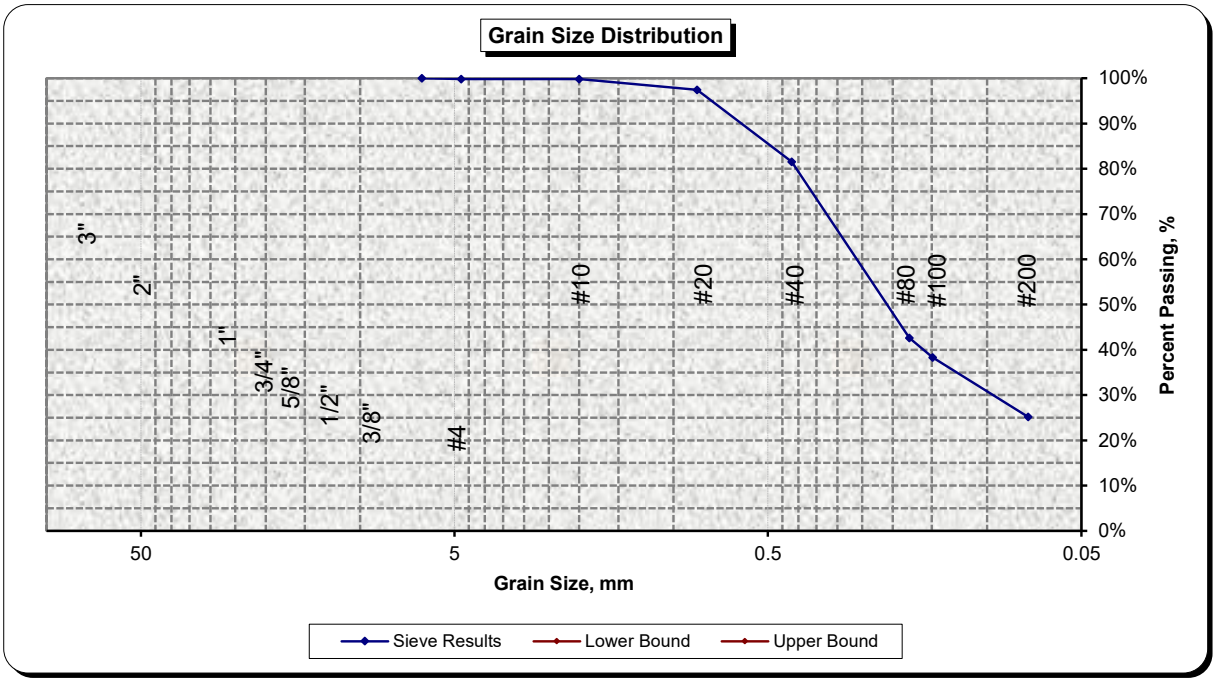
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	100%	
3"			#8		
2 1/2"			#10	100%	
2"			#16		
1 1/2"			#20	97%	
1 1/4"			#30		
1"			#40	82%	
3/4"			#50		
5/8"			#60		
1/2"			#80	43%	
3/8"			#100	38%	
1/4"	100%		#200	25.2%	

SOIL MOISTURE DETERMINATION ASTM D 2216

5.4%



REVIEWED BY:
Dee Burrie, Technical Director

Northwest Agricultural Consultants

2545 W Falls Avenue
Kennewick, WA 99336
509.783.7450
www.nwag.com
lab@nwag.com

PAP-Accredited
NAPT

BAER Testing Inc.
1106 Ledwich Ave.
Yakima, WA 98902

Report: 65811-1-1
Date: September 25,2023
Project No:
Project Name: HOGEN RD COM DEV

Sample ID	Organic Matter	Cation Exchange Capacity
TP-2 @ 10’	0.73%	4.8 meq/100g
	ASTM D2974	**EPA 9081**

Sample ID	Sand	Silt	Clay	Texture Class
TP-2 @ 10’	96.0%	3.0%	1.0%	Sand

APPENDIX E
Well Logs

WATER WELL REPORT

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent No. WE 42659.
Unique Ecology Well ID Tag No. BMS708
Site Well Name (if more than one well): N/A
Water Right Permit/Certificate No. N/A.
Property Owner Name Black Dog Industries
Well Street Address 2000 Saint Street.
City Richland County Benton.
Tax Parcel No.
Was a variance approved for this well? ☐ Yes ☒ No
If yes, what was the variance for?

Type of Work:
☐ Construction
☐ Decommission ⇒ Original installation NOI No. WE 42659.

Proposed Use: ☒ Domestic ☐ Industrial ☐ Municipal ☐ Dewatering ☐ Irrigation ☐ Test Well ☐ Other

Construction Type: ☒ New well ☐ Alteration ☐ Deepening ☐ Other
Method: ☐ Driven ☐ Jetted ☐ Cable Tool ☐ Dug ☒ Air- ☐ Mud-Rotary

Dimensions: Diameter of boring 8 in., to 134 ft.
Depth of completed well 134 ft.

Construction Details:

Casing	Liner	Diameter	From	To	Wall Thickness	Steel	PVC	Welded	Thread
☒	☐	8 in.	+1.5	114	.250 in.	☒	☐	☒	☐
☐	☐	____ in.	____	____	____ in.	☐	☐	☐	☐
☐	☐	____ in.	____	____	____ in.	☐	☐	☐	☐
☐	☐	____ in.	____	____	____ in.	☐	☐	☐	☐

Perforations: ☐ Yes ☒ No Type of perforator used
No. of perforations ____ Size of perforations ____ in. by ____ in.
Perforated from ____ ft. to ____ ft. below ground surface

Screens: ☐ Yes ☒ No ☐ K-Packer ⇒ Depth ____ ft.
Manufacturer's Name
Type ____ Model No. ____
Diameter ____ in. Slot size ____ in. from ____ ft. to ____ ft.
Diameter ____ in. Slot size ____ in. from ____ ft. to ____ ft.

Sand/Filter pack: ☐ Yes ☒ No Size of pack material ____ in.
Materials placed from ____ ft. to ____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 18 ft.
Material used in seal Bentolite Hole Plug.
Did any strata contain unusable water? ☒ Yes ☐ No
Type of water? Salty. Depth of strata 34-70/80-110
Method of sealing strata off 8" CASING

Pump: Manufacturer's Name ____ Type: ____
H.P. ____ Pump intake depth: ____ ft. Designed flow rate: ____ gpm

Water Levels: Land-surface elevation above mean sea level ____ ft.
Stick-up of top of well casing 1. ft. above ground surface
Static water level 24 ft. below top of well casing Date MARCH. 31/21
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (cap, valve, etc.)

Well Tests:
Was a pumping test performed? ☒ No ☐ Yes ⇒ by whom?
Yield ____ gpm with ____ ft. drawdown after ____ hrs.
Yield ____ gpm with ____ ft. drawdown after ____ hrs.
Yield ____ gpm with ____ ft. drawdown after ____ hrs.

Recovery data (time = zero when pump is turned off – water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of pumping test
Bailer test ____ gpm with ____ ft. drawdown after ____ hrs.
Air test 30 gpm with stem set at 114 ft. for 1 hrs. Date
Artesian flow ____ gpm
Temperature of water 58 °F Was a chemical analysis made? ☐ Yes ☒ No

Driller's Log/Construction or Decommission Procedure
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each layer penetrated, with at least one entry for each change of information. Use additional sheets if necessary.

Material	From	To
BROWN SAND.	0	8 FT
COBBLES & SAND	8	12 FT
GRAVELS W/ BLACK GRAY SAND	12	18 FT
GRAVELS W/ BROWN SAND	18	34 FT
GRAVEL W BROWN SAND (WATER)	34	78 FT.
BROWN CLAY.	78	80 FT
GRAVEL W BLACK SAND (WATER.	80	110 FT
GREEN CLAY / WEATHERED BASALT	110	114 FT.
BROKEN BASALT (WATER)	114	134 FT

RECEIVED
MAY 14 2021
Dept of Ecology
Central Regional Office

Start Date MARCH 27/21 Completed Date MARCH 31/21.

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ PE – Print Name
Signature
License No. 2820.
IF TRAINEE: Sponsor's License No.
Sponsor's Signature

Drilling Company Black Dog Industries
Address 2019 Rather Loop.
City, State, Zip Richland WA. 99354
Contractor's Registration No. BLACKDI198BD Date APR 16/21

ECY 050-1-20 (Rev 11/18) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6872. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

106812

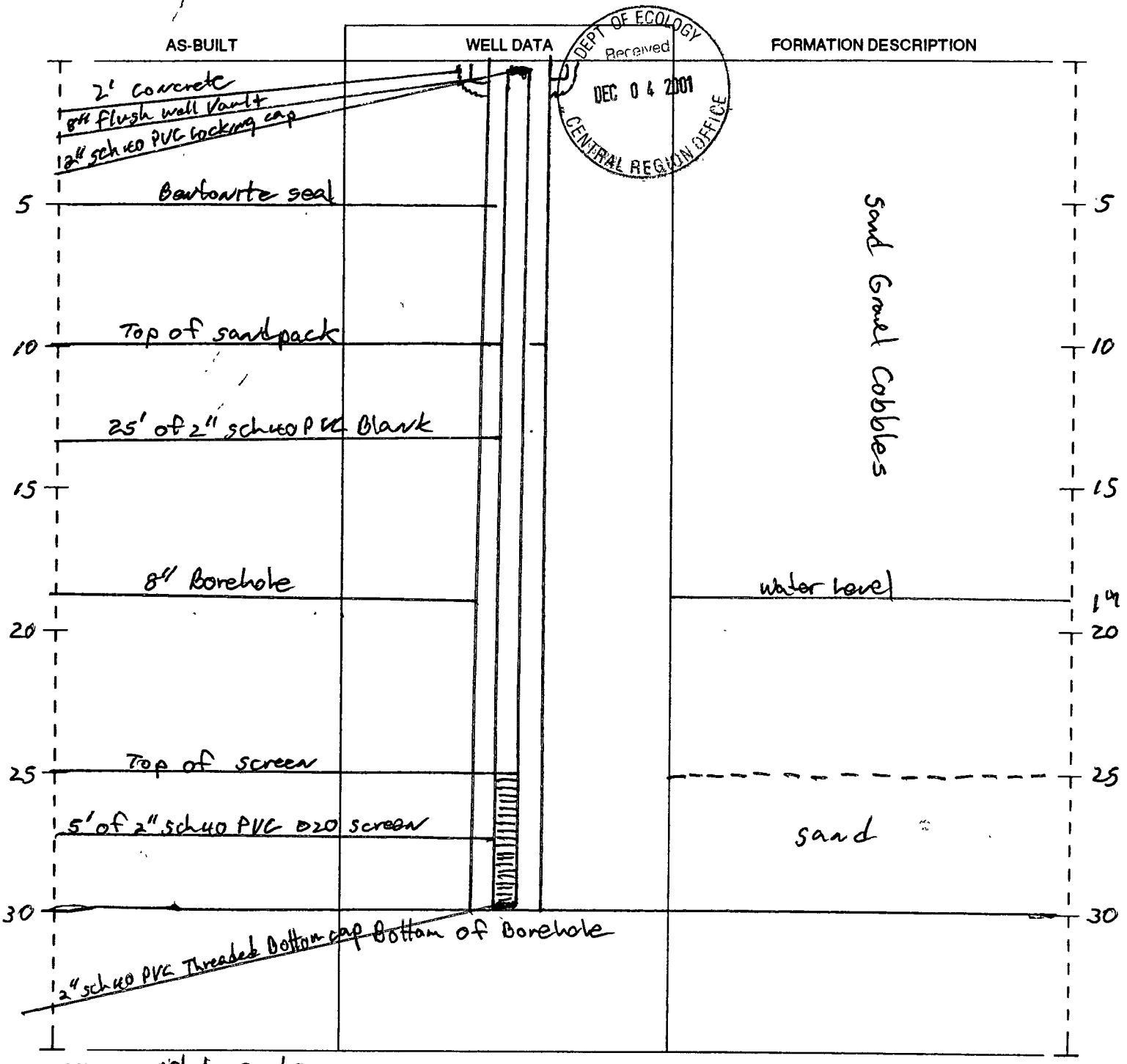
RESOURCE PROTECTION WELL REPORT

START CARD NO. R 42028

PROJECT NAME: Horn Rapids Sewer
WELL IDENTIFICATION NO. AGS 190
DRILLING METHOD: Auger
DRILLER: Randall E Wilder
FIRM: Environmental West Exploration
SIGNATURE: Randall Eller
CONSULTING FIRM: Shannon + Wilson
REPRESENTATIVE: Gregg Lee

COUNTY: Benton
LOCATION: NW¼ NE¼ Sec 34 Twn 10N R 28E
STREET ADDRESS OF WELL: near Intersection of Hagan Rd + Hwy 240
WATER LEVEL ELEVATION: from surface 19'
GROUND SURFACE ELEVATION: unknown
INSTALLED: 11-14-01
DEVELOPED: no

B



DEPT OF ECOLOGY Received DEC 04 2001 CENTRAL REGION OFFICE

SCALE: 1" = not to scale

PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

APPENDIX F
USGS Maps

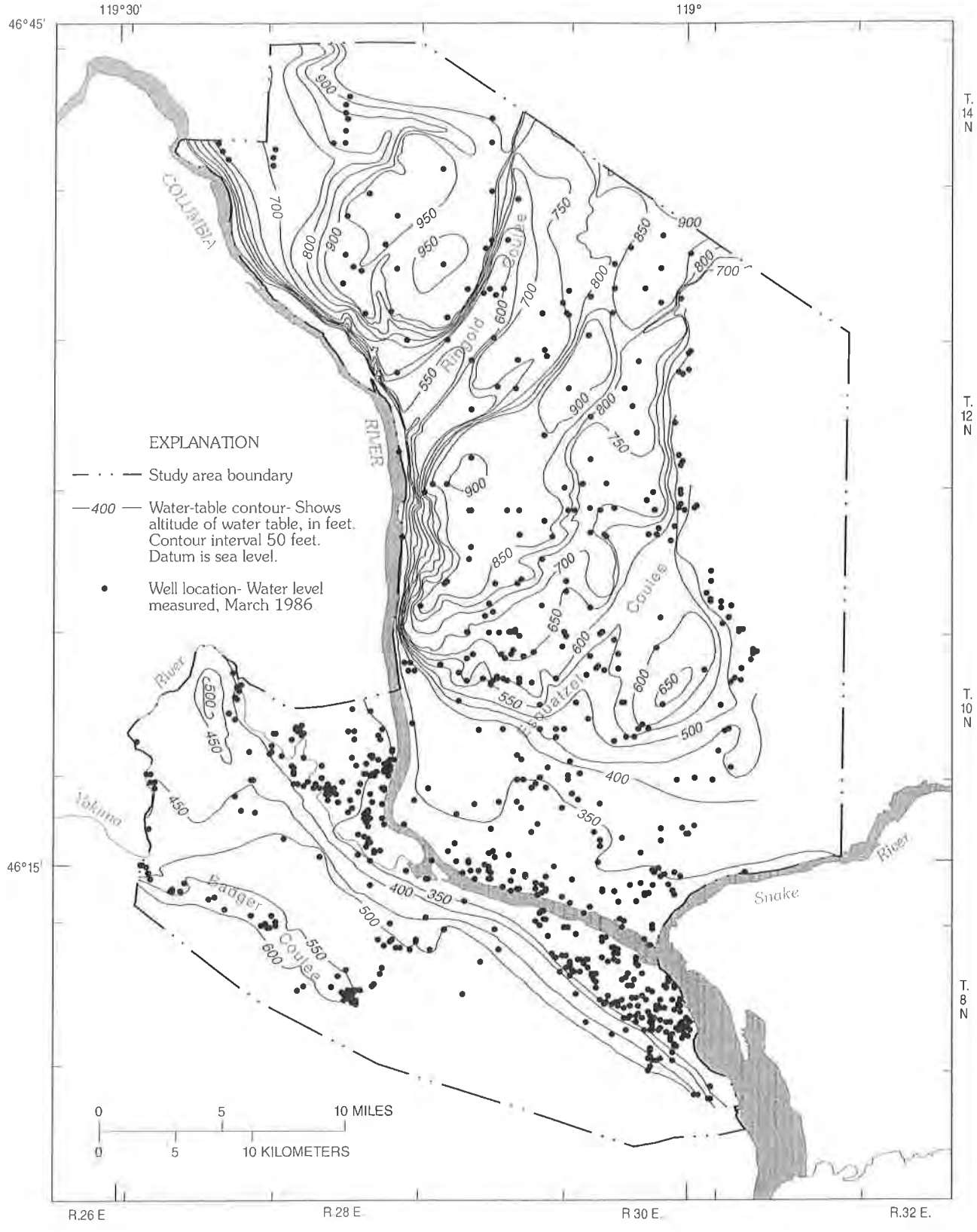


Figure 26.--Water-table altitude, March 1986

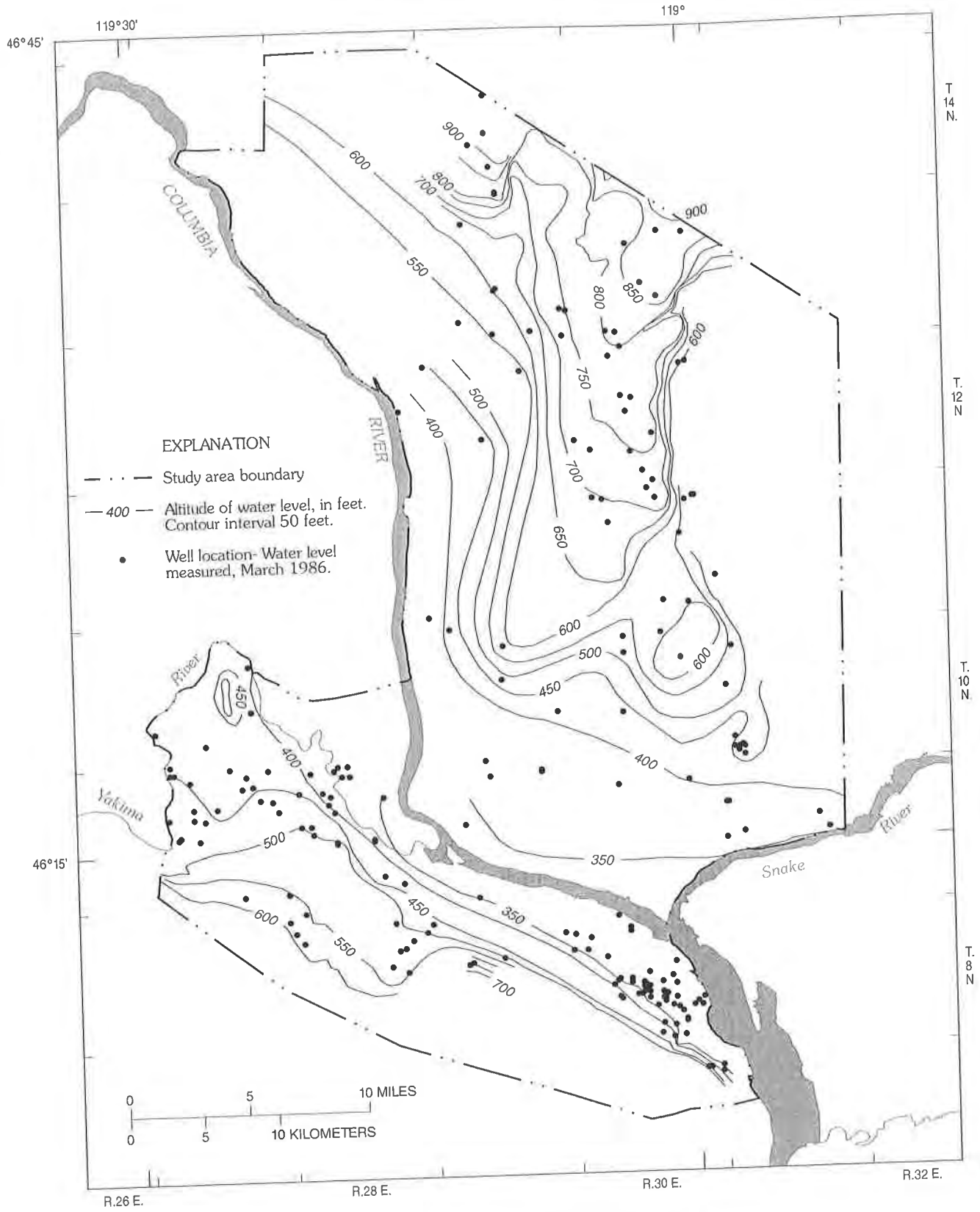


Figure 27.--Water-level altitudes in the Saddle Mountains Basalt, March 1986.

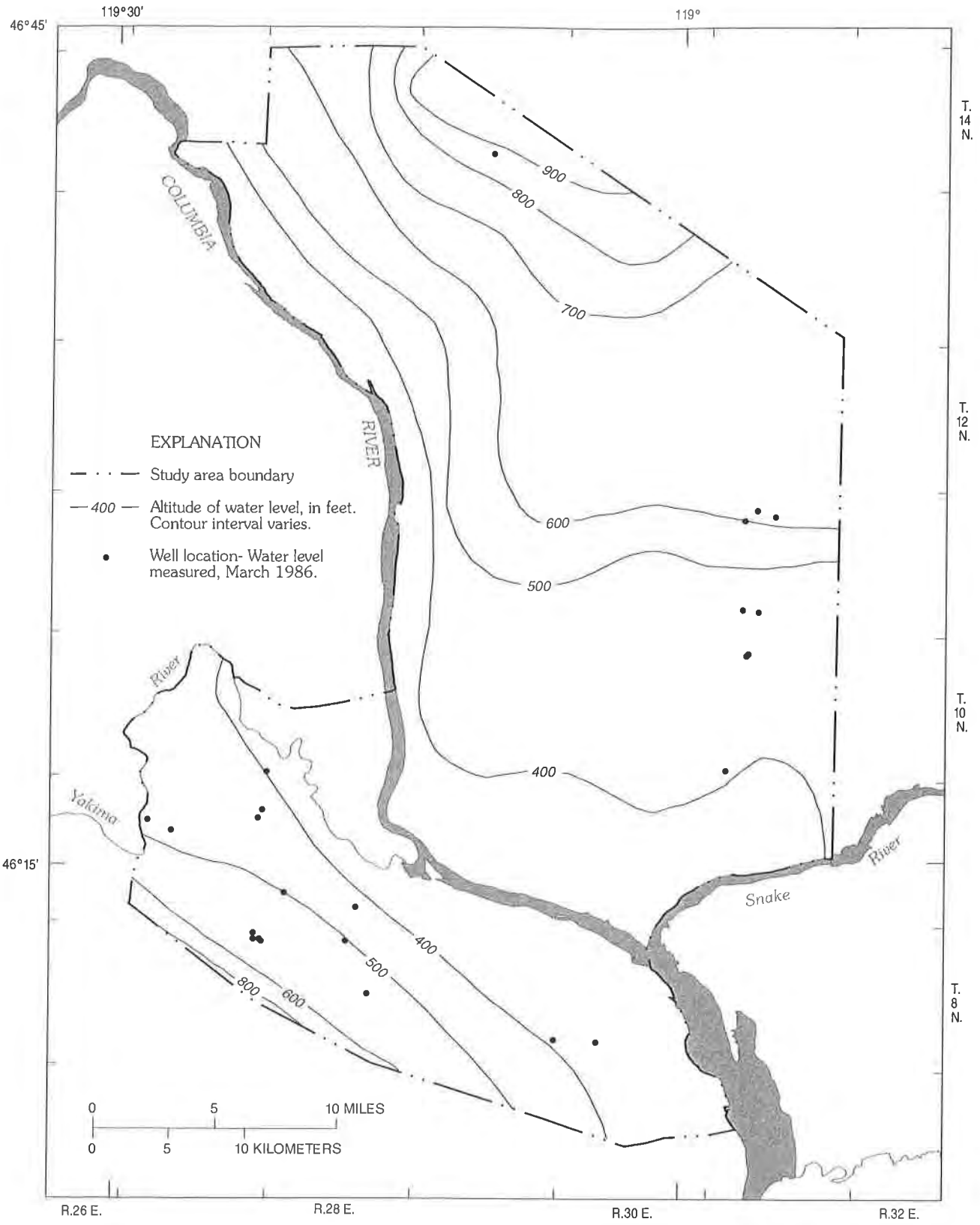


Figure 28.--Water-level altitudes in the Wanapum Basalt, March 1986 (Modified from Bauer, Vaccaro, and Lane, 1985).

Critical Area Report
Hagen Road Project

Richland, Washington

Prepared for:
Drew Croskey
Croskey Development LLC
1128 Tomich Ave
Richland, WA 99352

January 9, 2024
PBS Project 78196.000

1325 SE TECH CENTER DRIVE, SUITE 140
VANCOUVER, WA 98683
360.695.3488 MAIN
866.727.0140 FAX
PBSUSA.COM

Table of Contents

Supporting Data

FIGURES

APPENDICES

1 PROJECT OVERVIEW

Applicant:	Croskey Development LLC
Site Coordinates:	46.313639, -119.295194 (See Figure 1)
Project Area Size:	2.77-acres
Benton County Parcel ID:	134082000001002
Township and Range:	Section 34, Range 28 East, Township 10 North
Proposed Project:	Industrial Development
Critical Areas Present:	Fish and Wildlife Habitat Conservation Areas

2 INTRODUCTION

PBS Engineering and Environmental (PBS) was contracted by Croskey Development (Client) to conduct a critical areas assessment for a planned development within the City of Richland, Washington (City). The purpose of this critical areas report is to detail the extent of regulated critical areas within the study area. Current Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) maps indicate the potential presence of shrub-steppe habitat and potential utilization of the site by Ferruginous Hawks. These elements, if present, would be regulated by the City of Richland as Fish and Wildlife Habitat Conservation Areas (FWHCAs).

An assessment of the project site was completed by PBS biologists to determine the presence of FWHCAs. The assessment revealed that portions of the study area contain shrub-steppe habitats that would be regulated as FWHCs by the City. Impacts to these habitats would require mitigation to offset the loss of shrub-steppe functions and values. The results of the critical areas assessment are provided below.

3 PREPARER

The background investigation, field work, and report were completed by PBS Biologist Masten Summerfield. Mr. Summerfield has a Bachelor of Arts in Biology and has over 4 years of consulting experience in natural resources. Final review of field notes and reporting was completed by Senior Scientist/Project manager Brian Bieger who has over 23 years of natural resource assessment and permitting.

4 DEFINITIONS

4.1 Fish and Wildlife Habitat Conservation Areas

Section 22.10.185 of the Code defines FWHCAs as:

1. Areas where state or federal designated endangered, threatened, and sensitive species have a primary association.

a. Federal designated endangered and threatened species are those fish, wildlife and plant species identified by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service that are in danger of extinction or threatened to become endangered. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service should be consulted as necessary for current listing status.

b. State designated endangered, threatened and sensitive species are those fish, wildlife and plant species native to the state of Washington identified by the State Department of Fish and Wildlife and/or

State of Washington Natural Heritage Program that are in danger of extinction, threatened to become endangered, vulnerable, or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. The state of Washington's Department of Fish and Wildlife and/or Natural Heritage Program maintains the most current listings and should be consulted as necessary for current state listing status;

2. State priority habitats and areas associated with state priority species.

a. State of Washington priority habitats and species are considered priorities for conservation and management. The state of Washington's Department of Fish and Wildlife should be consulted for current listing of priority habitats and species;

3. Habitats and species of local importance. The city of Richland hereby adopts by reference those priority habitats and species considered priorities for conservation and management identified by the State Department of Fish and Wildlife and State of Washington Natural Heritage Program as now exist or as may be amended.

Priority habitats and shrub-steppe are further defined by the Code as follows:

22.10.040 A priority habitat may be described by a unique vegetation type or by a dominant plant species that is of primary importance to fish and wildlife (such as oak woodlands or eelgrass meadows or shrub steppe habitat). A priority habitat may also be described by a successional stage (such as old growth and mature forests). Alternatively, a priority habitat may consist of a specific habitat element (such as a consolidated marine/estuarine shoreline, talus slopes, caves, snags) of key value to fish and wildlife. A priority habitat may contain priority and/or nonpriority fish and wildlife.

4.2 WDFW Shrub-steppe Definition

The WDFW has the following definition of shrub-steppes (WDFW 2008):

"A non-forested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs. Although big sagebrush is the most widespread shrubsteppe shrub, other dominant (or codominant) shrubs include antelope bitterbrush, three-tip sagebrush, scabland sagebrush, and dwarf sagebrush. Dominant bunchgrasses include (but are not limited to) Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, Thurber's needlegrass, and needle-and thread. Sites can also have a layer of algae, mosses, or lichens. In areas with greater precipitation or on soils with higher moisture-holding capacity, shrubsteppe can also support a dense layer of forbs (i.e., broadleaf herbaceous flora). Shrubsteppe contains various habitat features, including diverse topography, riparian areas, and canyons. Another important component is habitat quality (i.e., degree to which a tract resembles a site potential natural community), which may be influenced by soil condition and erosion; and the distribution, coverage, and vigor of native shrubs, forbs, and grasses. At some more disturbed sites, non-natives such as cheatgrass or crested wheatgrass may be co-dominant species. Fire disturbance is an ecological component of shrubsteppe. Shrubsteppe disturbed by fire may lack the aforementioned habitat components during periods of post-fire recovery".

5 BACKGROUND INVESITGATION

5.1 Project Location

The study area is located at the intersection of Hagen Road and Snyder Street, off SR 240 in Richland, Washington (Figure 1). The study area consists of a single tax lot (134082000001002) and is approximately 2.77 acres in size. The study area is composed of a single tax lot that is bound by Hagen Rd to the east and Snyder Rd to the north. The study area is an undeveloped lot with portions that have been subject to a small amount of past disturbance.

5.2 Landscape Position

The study area is located within the Pleistocene Lake Basin level IV ecoregion within the Columbia Plateau geographic region. This area is characterized by level to undulating lake plain that historically contained Pleistocene lakes following flooding from glacier lakes Missoula and Columbia. This area is one of the driest climates within the Columbia Plateau with annual precipitation averaging between 7 to 10 inches. The present-day landscape is characterized by sagebrush steppe grasslands in addition to irrigated agriculture lands, and to a much smaller extent, developed urban lands. The site is surrounded by various land uses including commercial farmland, a heavily utilization transportation corridor in the form of SR 240, and industrial land uses.

5.3 Topography

The study area exhibits a gradual slope towards the north with a notable concave depression situated along the western edge of the site (Fig 2).

5.4 Soils

According to the NRCS (NRCS 2023), there are three soil mapping units within the study area (Fig 3): Quincy loamy sand 2-15% slopes, Burbank loamy fine sand, gravelly substratum, 2-15% slopes, and Burbank loamy fine sand 0-2% slopes. None of the soil units on the site are classified as hydric. Soil descriptions as generated by the NRCS soil survey website are as follows:

> **QuD— Quincy loamy sand, 2 to 15 percent slopes.** The Quincy component makes up 100 percent of the map unit. Slopes are 2 to 15 percent. This component is on hummocky or dunelike terraces. The parent material consists of eolian sands. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria.
>
> **BlD— Burbank loamy fine sand, gravelly substratum, 2 to 15 percent slopes.** The Burbank component makes up 100 percent of the map unit. Slopes are 2 to 15 percent. This component is on terraces. The parent material consists of mixed alluvium and/or eolian deposits over gravelly and stony alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria.
>
> **BbA— Burbank loamy fine sand, 0 to 2 percent slopes.** The Burbank component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on terraces. The parent material consists of mixed alluvium and/or eolian deposits over gravelly and stony alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water

movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria.

5.5 Mapped Habitats / Species

This section summarizes the potential regulated features that may be present on the project site based on existing, readily available public information.

5.5.1 Presumptive shrub-steppe and shrub-steppe.

The WDFW priority habitat and species (PHS) maps (WDFW, 2023) suggest the potential presence of critical areas within the study area, specifically in the form of shrub-steppe habitat. The PHS report for the study area is available in Appendix A. It is important to highlight that the WDFW shrub-steppe mapping includes presumptive shrub-steppe. The identification of presumptive shrub-steppe locations results from algorithmic analysis of aerial imagery, leading to the generation of vegetation maps. WDFW provides the following information regarding the mapping of presumptive shrub-steppe on PHS layers.

> *We have less certainty that locations classified as "Presumptive Shrubsteppe" or "Presumptive Eastside Steppe" contain Shrubsteppe or Eastside Steppe vegetation than we do in locations identified as Shrubsteppe or Eastside Steppe. In other words, it is less likely that locations identified as "Presumptive" actually contain Shrubsteppe or Eastside Steppe vegetation.*
>
> *The Shrubsteppe or Eastside Steppe vegetation that is present in "Presumptive" locations may be degraded by non-native or introduced vegetation. Despite this greater uncertainty, we include these "Presumptive" vegetation types to err on the side of over-identifying potential Shrubsteppe and Eastside Steppe critical areas (an error which can be often be* (sic) *corrected with a rapid site visit or review of aerial photography) as opposed to under-identifying Shrubsteppe and Eastside Steppe critical areas (an error likely to result in the loss of critical areas if these are not "caught" in the project review process)*. (Folkers et al. 2023).

The PHS shrub-steppe layers are intended to be a general indication that shrub-steppe could occur on a site. The WDFW recognizes that accurate mapping of these habitats requires site specific assessment.

5.5.2 Priority Species

The WDFW PHS report shows the potential for Ferruginous hawks to utilize the site. Descriptions of this species and its habitat needs are detailed below.

Ferruginous hawk (Buteo regalis)

The ferruginous hawk, a State Threatened species, is an uncommon breeding species and rare winter visitor east of the Washington Cascades (Washington Department of Fish and Wildlife 1996). This species is local and declining in steppe vegetation of south-central Washington and east along the Snake River.

Ferruginous hawks inhabit dry open country of the plains, grasslands, and shrub-steppe habitats of Eastern Washington during the breeding season which runs from roughly March 1 through August 15. In these areas they typically construct nests on cliffs, rock outcrops, small trees, transmission line towers, and artificial platforms far from human disturbance. Ferruginous hawks nest father away from human disturbance zones than other raptor species and often have more than a single nest within a range to allow for relocation if a particular nest is threatened during nesting season. This is apparently an adaptive strategy since Ferruginous hawks are very sensitive to disturbance during the nesting season and do not become acclimatized to repeated disturbance like many wildlife species (White and Thurow, 1985).

Ferruginous hawks are strongly associated with undisturbed areas. The hawks avoid cropland, and it was found that populations decline consistently once cultivated land makes up 30% of a particular area's land use (Schmutz 1987, 1989). The diet of Ferruginous hawks includes mostly small and medium sized mammals with a preference for northern pocket gophers in Washington (WDFW, 1996). The major limiting factors for viable Ferruginous hawks in Washington state is the availability of adequate prey populations and undisturbed habitat (Schmutz, 1984, 1987). This species is also sensitive to human disturbance, particularly early in the breeding cycle (Smith and Murphy 1978, Schmutz 1984, White and Thurow 1985, Olendorff 1993). The amount of undisturbed natural habitat within the ferruginous hawk's Washington range has been reduced, which may make the population vulnerable.

This species is apparently declining throughout Washington. They have been reported as nesting as far north as Chelan, though recent records are limited to Kittitas, Yakima, Douglas, Grant, Benton, Klickitat, Lincoln, Adams, Franklin, Walla Walla, Whitman and Columbia Counties. Serious declines have occurred recently in Washington. For example, five pairs were seen in Yakima County in 1985, but these had been reduced to only one nesting pair by 1995. In fact, this species has also declined across North America in recent years, possibly a permanent trend due to increased human presence in its range, or possibly a temporary fluctuation in its relation to prey variability, or both. 72.8% of the nests surveyed for this Hawk were more than 1.25 miles from roads or areas with people, a testament to the need of disturbance-free areas for the conservation of this species. Temporal fluctuations in nest-site use and the decline of this species overall will affect the current distribution, which is probably smaller than that shown. Where it overlaps with the Swainson's Hawk, the Ferruginous Hawk generally nests on the ground or lower than the Swainson's, though Ferruginous Hawks are more likely to utilize utility towers where they are available. On the Hanford site, a population of seven to ten pairs nests on utility towers, foraging over steppe and irrigated agricultural areas. A 1990 study in Washington showed that 83% of the nests were located between 650 and1000 feet elevation, with a maximum elevation of 1825 feet. This species is at the extreme edge of its range in Washington and may be susceptible to drought conditions, which can limit prey availability. For a recent study of the status of the Ferruginous Hawk in Washington go to the Washington Department of Fish and Wildlife.

5.6 Historic Disturbances

An analysis of historical aerial photographs from Google Earth was conducted to discern past land uses that may have impacted the current habitat conditions within the study area. It appears that clearing and grading activities occurred in the southwestern corner in 2013 (Fig 5) and occurred again along the northern edge of the study area in 2017 (Fig 6). The central or "core" area of the study area has not been subject to these impacts.

6 EXISTING CONDITIONS

A site visit was completed on December 21, 2023, by Masten Summerfield. The entire study area was traversed on foot to observe and record habitat conditions on the property. Evidence of wildlife usage, in the form of tracks, scat, or potential nesting areas, was recorded. Photographs of the site are presented in Appendix B.

The property is crossed by a series of machine tracks and trails. A gravel access road traverses the property, running parallel to the southern terminus of the study area. In the southwest corner of the study area, an extensive mound of soil, approximately 8 feet in height, appears to serve as a stockpile. Additionally, in the southwest corner, there's a large area filled with soils and plastic materials, reaching a depth of at least 2 feet. Portions of the site showed evidence of recent grading and clearing (see photo sheet).

Outside of the cleared areas, the site is characterized by a discontinuous shrub layer with dense cheat grass (Bromus tectorum) dominating the understory vegetation. Other non-native vegetation in these areas include: Russian thistle (Kali tragus), Russian knapweed (*Rhaponticum repens*), Canadian thistle (*Cirsium arvense*), skeleton weed (*Chondrilla juncea),* tumble mustard (*Sisymbrium altissimum*), prickly lettuce (*Lactuca serriola*), and panicled willowherb (*Epilobium brachycarpum*). Native forb species were observed throughout the site, but their overall abundance is in general, very low. Observed native forb species was limited to shaggy fleabane (*Erigeron pumilus*) and yarrow *(Achillea millefolium*). Identifying native grass species was challenging due to the fact that most grasses are dormant at the time of the site visit.

Shrub coverage occurs throughout the study area, with the densest shrub patches found in the southern half of the area. The dominant shrub species in this area align with those typically found in shrub-steppe regions, including big sagebrush *(Artemisia tridentata)* and rubber rabbitbrush *(Ericameria nauseosa)*. Cryptobiotic crust was observed in a handful of locations throughout the site, primarily within areas of dense shrub cover that have not been subject to disturbance. A row of twelve ponderosa pines (*Pinus ponderosa)* and a field of Bermuda grass (*Cynodon dactylon)* borders the gravel access road in the southern terminus of the study area.

6.1 Shrub-steppe Habitat

Shrub-steppe habitat, distinguished by a discontinuous shrub layer comprised of big sagebrush and rubber rabbitbrush, complemented by the presence of cryptobiotic crust, was identified in the study area. Shrub-steppe habitat within the study area was mapped on foot using a Trimble DA2 with RTK error correction and an accuracy of =/- one meter. Habitat polygons were encircled in the field based on the locations of contiguous shrubs. In general, shrubs within 100-feet of one another were included in the shrub-steppe polygons. These polygons were imported into ArcMap software and compared to high-resolution, geo-referenced aerial photographs of the site that were obtained from satellite imagery.

A sum of 1.72 acres of shrub-steppe habitat was identified within the study area, aligning with the Washington Department of Fish and Wildlife's (WDFW) stipulated definition of shrub-steppe.

6.2 Evidence of Wildlife Utilization

Evidence of wildlife was limited on the site. Direct evidence of wildlife utilization included observations of coyote scat, rodent droppings, and various passerine bird species using habitat on the site. There were several wildlife “runways” observed in locations that are likely a result of rodents moving through the shrub habitats.

6.3 Priority wildlife Utilization

This section attempts to predict if shrub-steppe wildlife species are currently present on the site. Each of the identified priority species that have been identified as potentially utilizing the site are addressed individually below.

6.3.1 Ferruginous hawk (Buteo regalis)

Ferruginous hawks are notably scarce in the City of Richand area, primarily attributed to the extensive conversion of habitats for agricultural purposes and their strong aversion to human activity and disturbances. The study site, lacking cliffs or suitable perching and nesting habitat for Ferruginous hawks, further contributes to their absence. Additionally, the site's close proximity to high-intensity land uses and human activities likely deters Ferruginous hawks from utilizing the area. There are no documented individuals at this location and it is extremely unlikely that Ferruginous hawks are utilizing the project site at any time.

7 CONCLUSIONS

A critical areas assessment was conducted to determine if the site contains regulated FWHCAs in anticipation of potential development activities. The assessment revealed that the study area contains 1.72 acres of shrub-steppe habitat. This shrub-steppe habitats would be regulated by the City. If the proposed project results in the loss of identified shrub-steppe habitats, mitigation to offset the loss of shrub-steppe functions and values would be required. Typical mitigation for these types of impacts takes the form of the conservation of shrub-steppe habitat either on or off-site at a ratio of 2:1 (conservation/Impact).

Lastly, although the site is included within a potential Ferruginous hawk utilization polygon, the conditions of the site area not suitable for Ferruginous hawks and it is extremely unlikely that they are utilizing the site.

8 DISCLAIMER

This report is based on observations of existing conditions at the time of the study. Changing environmental conditions or human activities may alter those parameters which may change the conclusions presented in this report. The conclusions in this report represent the investigator's interpretation of the specified technical manuals and best available science and may not correspond with observations or conclusions of others, including government agencies.

This report was prepared to meet current local, state, and federal regulations. PBS is not responsible for changes made to regulations and reporting requirements after the report has been completed. Final authority regarding jurisdiction and permitting requirements rests with the appropriate federal, state, and local agencies.

This report is for the exclusive use of the Client for design of the development and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without the expressed written consent of the Client and PBS.

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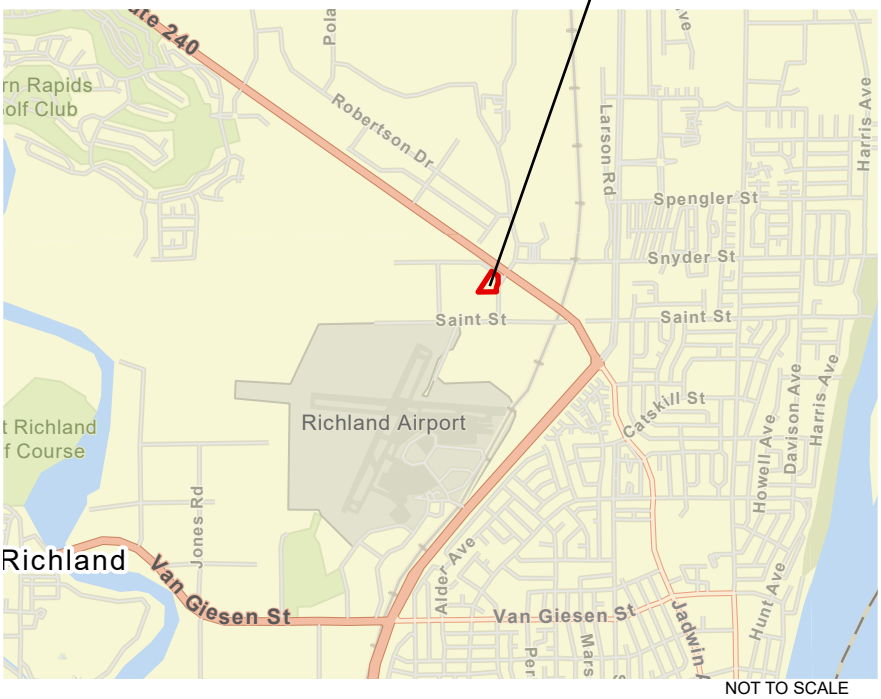
SOURCE: ESRI Basemap (2023)



NOT TO SCALE

Legend

Study Area

SCALE: 1" = 200' (8.5X11 SHEET)

0' 100' 200' 400'

PREPARED FOR: Croskey Development

PBS

LOCATION MAP

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
1

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:09 AM

SOURCE:NOAA (2023)

Legend

- Study Area
- 2ft Contours

SCALE: 1" = 150' (8.5X11 SHEET)

0' 75' 150' 300'

PREPARED FOR: Croskey Development

PBS

TOPOGRAPHIC MAP

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
2

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:02 AM

SOURCE: USDA NRCS (2023)

Legend

- Study Area
- NRCS Soil Polygons

SCALE: 1" = 150' (8.5X11 SHEET)

0' 75' 150' 300'

PREPARED FOR: Croskey Development

PBS

NRCS SOIL MAP

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
3

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:03 AM

SOURCE: WDFW (2023)

Legend

- Study Area
- Benton County Shrubsteppe

SCALE: 1" = 150' (8.5X11 SHEET)

0' 75' 150' 300'

PREPARED FOR: Croskey Development

PHS MAP

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
4

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:04 AM

SOURCE: Google Earth (2024)

Legend

Study Area

SCALE: 1" = 100' (8.5X11 SHEET)

0' 50' 100' 200'

PREPARED FOR: Croskey Development

2013 AERIAL PHOTO

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
5

SOURCE: Google Earth (2024)

Legend

Study Area

SCALE: 1" = 100' (8.5X11 SHEET)

0' 50' 100' 200'

PREPARED FOR: Croskey Development

2017 AERIAL PHOTO

Hagen Road Critical Area Assessment
Richland, Washington

JAN 2024
78196.000

FIGURE
6

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:05 AM

SOURCE: PBS GENERATED SHAPE FILES, NearMap (2023)

Legend

- Study Area
- Shrub-Steppe

SCALE: 1" = 100' (8.5X11 SHEET)

0' 50' 100' 200'

PREPARED FOR: Croskey Development

PBS

SHRUB-STEPPE HABITAT

Hagen Road Critical Area Assessment
Richland, Washington

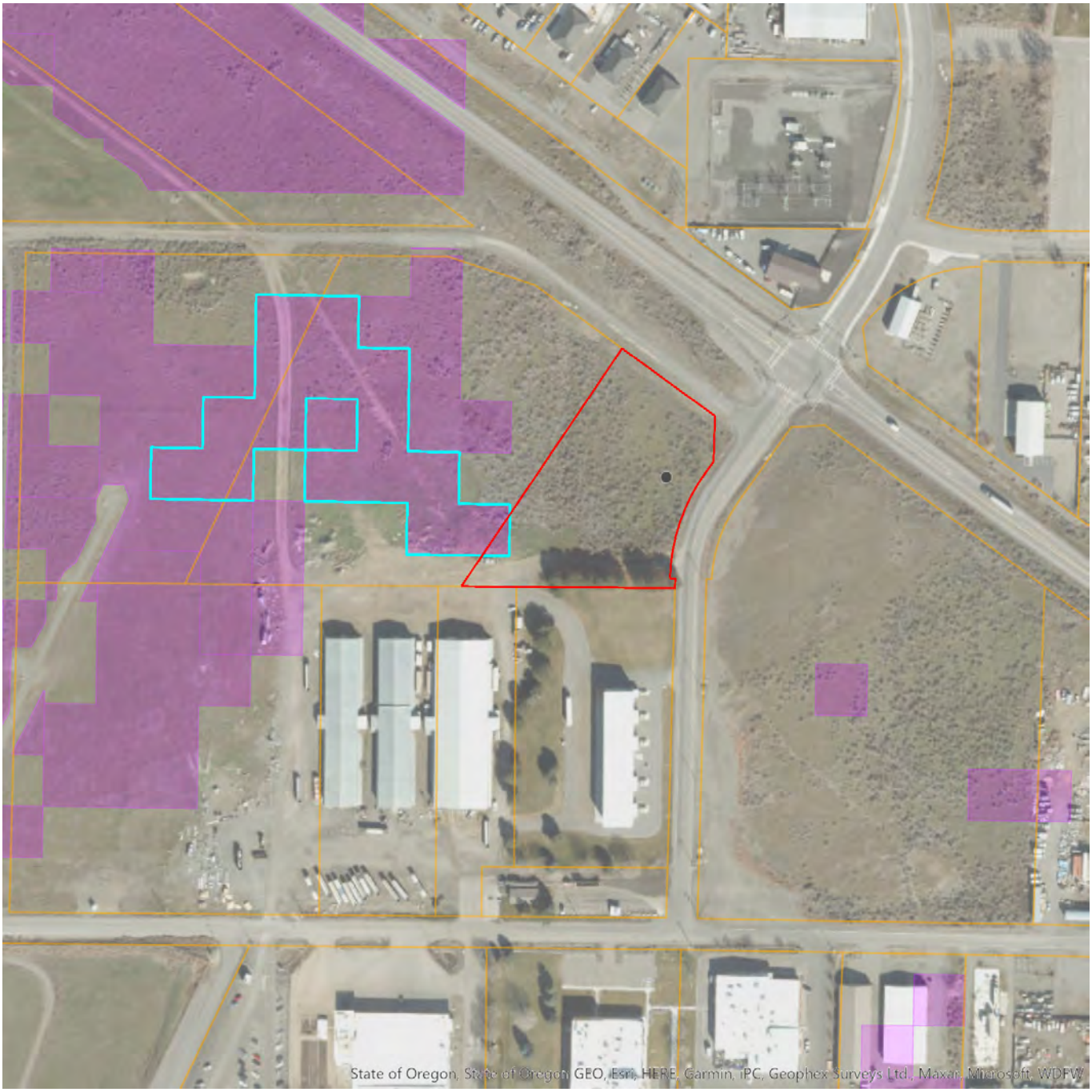
JAN 2024
78196.000

FIGURE
7

Filename: L:\Projects\78000\78196\78196-000\NR\GIS\Project\Hagen_78196\Hagen_78196.aprx Plot Date/Time: 1/11/2024 9:08 AM

Appendix A
WDFW PHS Report

Priority Habitats and Species on the Web



Report Date: 12/22/2023, Parcel ID: [134082000001002]

User Comments/Notes:

Hagen Critical Area Assessment. Site visit competed 12/21/2023 by PBS staff biologist Masten Summerfield.

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Shrubsteppe	N/A	N/A	No
Ferruginous hawk	N/A	Threatened	Yes

PHS Species/Habitats Details:

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Benton County Presumptive Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920858
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Ferruginous hawk	
Scientific Name	*Buteo regalis*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release at phsproducts@dfw.wa.gov for obtaining information about masked sensitive species and habitats.
Federal Status	N/A
State Status	Threatened
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

Appendix B

Photo Sheet

Photo 1. NE corner of study area (facing southeast)

Photo 2. Tire track depressions seen at northern terminus of study area

Photo 3. Game trail transecting study area (facing west)

Photo 4. Large area dominated by cheat grass (facing south)

Photo 5. One of multiple cleared areas in study area (facing southeast)

Photo 6. Evidence of brush clearing was throughout study area (facing southeast)

Photo 7. Typical shrub steppe habitat in study area (facing northwest)

Photo 8. Soil fill area (facing east)

Photo 9. Tire track depressions seen in southwestern corner of study area (facing northeast)

Photo 10. Gravel driveway along southern terminus of study area with pine trees (facing east)

Photo 11. Soil stockpile (facing southwest)

Photo 12. Overview of study area (facing northeast)