File No. EA2021-136

CITY OF RICHLAND
Determination of Non-Significance

Description of Proposal: ABC Mini Storage: Construction of five (5) buildings containing secured, self-storage units on an approximately 2.9 acre site.

Proponent: ABC Wellsian Way, LLC
Attn: Ryan Daley
421 West Riverside Ave., Suite 470
Spokane, WA 99201

Location of Proposal: The project will occur at 302 Wellsian Way, within the City of Richland, Washington.

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: October 5, 2021

Signature _____

www.ci.richland.wa.us

Development Permitting Division
840 Northgate Drive
Richland, WA 99352
Telephone 509-942-7794

SEPA ENVIRONMENTAL CHECKLIST

UPDATED 2014

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

1. Name of proposed project, if applicable: ABC Mini Storage

2. Name of applicant: ABC Welisian Way LLC - Ryan Daley

3. Applicant contact information:

   Address: 421 West Riverside Ave, Ste 470
   Spokane, WA 99201

   Phone #: (509)951-0341

   email address: ryan@abcministorage.com

4. Date checklist prepared: 9-9-21

5. Agency requesting checklist: City of Richland

6. Proposed timing or schedule (including phasing, if applicable):

   Fall 2021-Summer 2022

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   None at this time

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   A critical aquifer recharge area assessment has been prepared specific for this project.

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.

   The unused Davenport St R.O.W. is to be vacated between Goethals Dr. and Wellsian Way.

10. List any government approvals or permits that will be needed for your proposal, if known.

    Lot Consolidation, Commercial Plan Review, Commercial Construction Permit, Grading Permit, Building Permit, Right of Way Permit

11. Give 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.)

    Construct 5 buildings containing secured, self-storage units on an approximately 2.9 acre site

12. 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.

    Located on the east side of Wellsian Way between Comstock St and Davenport St. Lots 1 and 2 of Block 407, Plat of Richland. NW quarter of Section 14, Township 09 North, Range 28 East.

…location cont'd:

_____

_____

_____

_____

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site
(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)? _____10+/-___ %

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.

Gravelly silt, Silty sand

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No

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.

The site will be re-graded to facilitate the new buildings. Source of fill material is to be determined. Existing uncontrolled fill, such as concrete debris, will be removed from the site and replaced with structural fill--amount is unknown.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. Erosion control measures will mitigate possible erosion. Soil erosion due to water and air could occur during clearing and construction.

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

Approximately 90%

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

Erosion control measures will be used during construction. Development is to be graded and paved. Undeveloped areas will be stabilized. Stormwater runoff will be directed to infiltration facilities.

2. Air

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.

Automobile, truck, and construction related emissions. Dust control measures will be implemented.

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 will be implemented. Disturbed areas will be stabilized at completion of project.

3. Water

a. Surface Water:

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.

None.

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 general description, purpose, and approximate quantities if known.

No

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

No

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:

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 general description, purpose, and approximate quantities if known.

No

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: 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.

None

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.

Onsite stormwater will be collected via catch basins and roof drains and disposed of into percolation facilities. Stormwater will come from drive aisles and roof drainage.
It is anticipated that stormwater runoff from the street improvements for Comstock St will be captured by catch basins and connected to an existing City storm pipe along Wellsian Way.

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

It is possible; however the stormwater facilities will be designed in accordance with local jurisdictional requirements and the SMMEW.

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

No

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

General parking lot sweeping and cleaning. General maintenance of stormwater facilities.

4. Plants

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?

The site will be cleared of vegetation prior to construction.

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

None known

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

None

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

None known

5. Animals

a. List any birds and other animals which 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.
None

c. Is the site part of a migration route? If so, explain.
Yes, Richland is within the Pacific Flyway.
The Columbia Basin area is part of a migration route for waterfowl. There is no evidence, however, that the birds use the proposed site.

d. Proposed measures to preserve or enhance wildlife, if any:
None

e. List any invasive animal species known to be on or near the site.
None known

6. Energy and natural resources

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.
Electric for HVAC

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
No

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:
Lighting will meet WA State Energy Code

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? No.
If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.
None known. Refer to CARA Assessment for this site.

2) 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 known.

3) 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. Gasoline, diesel fuel, grease, etc. will be used for equipment during construction of the project.

4) Describe special emergency services that might be required.
Only those provided by City services.

5) Proposed measures to reduce or control environmental health hazards, if any:
None.

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Street traffic

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.

During the construction phase, normal construction noise, on a short-term basis will occur during normal working hours. Long term, normal traffic noise associated with the development.

3) Proposed measures to reduce or control noise impacts, if any:

None

8. Land and shoreline use

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.

The current site is undeveloped. Adjacent properties to N and S are storage facilities; use to the east is a city park. This proposal will not affect land uses on nearby properties.

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 as a result 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

i) 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

b. Describe any structures on the site.

None.

d. Will any structures be demolished? If so, what?

No.

e. What is the current zoning classification of the site?

General Business (C-3)

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

Commerical

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.

None known.

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

One part-time or full-time employee

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: Use is compatible with zoning and comprehensive plan.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

N/A

9. Housing

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

None

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

None

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

N/A

10. Aesthetics

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

Approx. 16-feet, metal

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

None.

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

Compliance with zoning and building code requirements.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? Normal business and commercial lighting. Site lighting to comply with Richland Municipal Code requirements. Time of day: dark hours.

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:

Lighting to be in accordance with Richland Municipal Code

12. Recreation

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

City park adjacent to the site on the east side.

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

No

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

None

13. Historic and cultural preservation

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 located on or near the site? If so, specifically describe.

None known.

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.

None known.

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.

WISAARD

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.

N/A

14. Transportation

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.

Site is adjacent to Wellsian Way. Driveways will be constructed.

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?

Existing bus stop is adjacent to site on Wellsian Way.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

There are no existing parking spots onsite. Three parking spots are proposed.

d. 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).

It is anticipated that public street frontage improvements, including sidewalk will be required in the existing Comstock St R.O.W. Public sidewalk will be constructed along the Wellsian Way frontage of the property.

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

No.

f. 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?

Per ITE Land Use 151 - Mini Warehouse: 0.03/unit for PM peak hour
Total Units = 541
Estimated trip ends in peak hour: 16.

g. 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

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

N/A

15. Public services

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.

No.

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

N/A

16. Utilities

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 - Richland Engy Svcs - underground trenching
Water - City of Richland - underground trenching
Sewer - City of Richland - underground trenching
Refusal Service - City of Richland
Telephone - Frontier - underground trenching

C. Signature

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.

Signature: _____

Name of signee: Ryan Daley

Position and Agency/Organization: _____

Date Submitted: 9-10-21

Community & Economic Development Department

This application was reviewed by the Planning Division of the Community & Economic Development Department. Any comments or changes made by the Department are entered in the body of the checklist and contain initials of the reviewer.

_____

Reviewer Signature Date

D. supplemental sheet for nonproject actions

(**IT IS NOT NECESSARY** to use this sheet 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.

ABC MINI STORAGE

RICHLAND, WA

SEPTEMBER 2021

PROJECT NO 30-20-008

J-U-B ENGINEERS, INC.

BASIS OF BEARING
NAD 83–91 WASHINGTON SOUTH ZONE CITY OF RICHLAND CONTROL POINTS

VERTICAL DATUM
NAVD 88
CITY OF RICHLAND DATUM
ELEVATION = 359.07
BENCHMARK IS THE BRASS CAP AT THE INTERSECTION OF DAVENPORT AND GOETHALS DRIVE

VICINITY MAP

SHEET INDEX

Know what's below. Call before you dig.

CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

J-U-B ENGINEERS, INC.
J-U-B ENGINEERS, INC.
2810 W. Clearwater Ave.
Suite 201
Kennewick, WA 99336
Phone: 509.783.2144
www.jub.com

DERAL S. MOORE
STATE OF WASHINGTON
37991
REGISTERED
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	BY	APP'D	DATE
	REVISION			

ABC MINI STORAGE
RICHLAND, WA

COVER SHEET

FILE : 30-20-008_C-001
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-001

SHEET: 1 OF 13

Plot Date:9/3/2021 4:49 PM Plotted By: Cole Henderson
Date Created:9/3/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-001.DWG

GENERAL NOTES

1. ALL EXCESS MATERIALS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT LOCATIONS PROVIDED BY THE CONTRACTOR. DISPOSAL SITES SHALL BE IN COMPLIANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.
2. AT COMPLETION OF PROJECT, CONTRACTOR SHALL NOTIFY OWNER AND/OR OWNER'S REPRESENTATIVE FOR FINAL PUNCHLIST WALKTHROUGH. FINAL PUNCHLIST ITEMS SHALL BE COMPLETED NO LATER THAN 3 WEEKS AFTER FINAL PUNCHLIST WALKTHROUGH.
3. PRIOR TO FINAL PROJECT ACCEPTANCE, THE CONTRACTOR SHALL CLEAN ALL UNDERGROUND STRUCTURES INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, SEWER PIPE AND STORM DRAINAGE. UNDERGROUND STRUCTURES SHALL BE CLEANED TO REMOVE ALL DEBRIS AND/OR SEDIMENT.
4. CONTRACTOR SHALL USE "REQUEST FOR INFORMATION" PROCEDURE FOR REQUESTING INFORMATION. RFI SHALL BE SUBMITTED TO THE OWNER AND/OR OWNER'S REPRESENTATIVE. NO PLAN CHANGES AND/OR CHANGE ORDERS WILL BE ACCEPTED UNLESS THEY ARE CLEARLY DOCUMENTED.
5. CONTRACTOR SHALL SUBMIT SUBMITTALS AND SHOP DRAWINGS TO OWNER AND/OR OWNER'S REPRESENTATIVE FOR APPROVAL OF ALL MATERIALS PRIOR TO INSTALLATION. CONTRACTOR SHALL PROVIDE ADEQUATE TIME TO ALLOW FOR REVIEW/APPROVAL OF SUBMITTALS AND SHOP DRAWINGS.
6. CONTRACTOR SHALL PROVIDE ALL MEANS, METHODS, LABOR AND MATERIALS NECESSARY TO CONSTRUCT THIS PROJECT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
7. CONTRACTOR SHALL PROVIDE ALL CONSTRUCTION STAKING FOR VERTICAL AND HORIZONTAL CONTROL. ALL CONSTRUCTION STAKING SHALL BE COMPLETED UNDER THE SUPERVISION OF A P.L.S. LICENSED IN THE STATE.
8. WHERE SPECIFICATIONS CONFLICT, THE STRICTER SHALL OVERRULE.
9. THE CONTRACTOR AND ALL SUB-CONTRACTORS SHALL BE LICENSED BY THE STATE OF WASHINGTON AND BONDED TO DO WORK IN THE PUBLIC RIGHT-OF-WAY.
10. THE CONTRACTOR AND ALL SUB-CONTRACTORS SHALL HAVE A CURRENT CITY OF RICHLAND BUSINESS LICENSE.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CONSTRUCTION DEFICIENCIES FOR A PERIOD OF 1-YEAR FROM THE DATE OF ACCEPTANCE BY THE CITY OF RICHLAND AND THE OWNER.
14. ANY CHANGES OR MODIFICATIONS TO THE PROJECT PLANS SHALL FIRST BE APPROVED BY THE ENGINEER OF RECORD AND CITY ENGINEER OR HIS REPRESENTATIVE.

CLEARING/GRUBBING NOTES

1. CONTRACTOR SHALL PLACE TEMPORARY EROSION AND SEDIMENT CONTROLS PRIOR BEGINNING CLEARING AND GRUBBING.
2. VERIFY LIMITS OF SITE CLEARING PRIOR TO START OF WORK.
3. PROTECT AND MAINTAIN BENCHMARKS AND SURVEY CONTROL POINTS FROM DISTURBANCE DURING CONSTRUCTION.
4. LOCATE, IDENTIFY, DISCONNECT AND SEAL OR CAP OFF UTILITIES INDICATED TO BE REMOVED.
5. DO NOT INTERUPT EXISTING UTILITY SERVICES UNLESS PERMITTED TO DO SO BY THE GOVERNING JURISDICTION AND/OR UTILITY COMPANY.
6. REMOVE OBSTRUCTIONS, TREES, SHRUBS, GRASS OR OTHER VEGETATION TO PERMIT INSTALLATION OF NEW CONSTRUCTION.
7. REMOVE UNSUITABLE MATERIALS THAT ARE OBSTRUCTING CONSTRUCTION ACTIVITIES AND HAVE NO GENERAL USE IN CONSTRUCTION ACTIVITIES.
8. IF ANY UNKNOWN SUBSURFACE STRUCTURES ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE OWNER'S ENGINEER PRIOR TO PROCEEDING.
9. THE CONTRACTOR SHALL PROTECT ADJACENT PROPERTIES, PUBLIC AND PRIVATE, AT ALL TIMES DURING CONSTRUCTION.
10. FILL DEPRESSIONS CAUSED BY CLEARING/GRUBBING OPERATIONS WITH SATISFACTORY SOIL MATERIALS AS NOTED IN THE GEOTECHNICAL REPORT AS PREPARED BY GPI DATED 12/14/2017.
11. STRIP SATISFACOTRY TOPSOILS TO WHATEVER DEPTHS ARE ENCOUTERED IN A MANNER TO PREVENT INTERMINGLING WITH UNDERLYING SUBSOILS OR OTHER WASTE MATERIALS.
12. STOCKPILE TOPSOILS ON-SITE FOR RE-USE. REMOVE EXCESS TOPSOILS FROM SITE IF NOT NEEDED FOR CONSTRUCTION ACTIVITIES.
13. REMOVE SURPLUS SOIL MATERIALS, UNSUITABLE TOPSOIL, OBSTRUCTIONS, AND WASTE MATERIALS AND LEGALLY DISPOSE OF THEM OFF-SITE.
14. UPON COMPLETION OF SITE WORK, CLEAN THE ENTIRE SITE WORK AREA. REMOVE ALL EXCESS EXCAVATED SOIL MATERIALS, ROCKS, BOULDERS, LOGS, TREES, PIPES OR DEBRIS OF ANY TYPE AND DISPOSE FROM THE SITE.

SITE LAYOUT NOTES

1. ALL DIMENSIONS SHOWN ON THESE PLANS AND ANY EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION. ANY DISCREPANCY SHALL WARRANT IMMEDIATE ATTENTION OF ENGINEER TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION
2. ALL SIGNAGE AND STRIPING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MUTCD AND THE STATE SIGN FABRICATION MANUAL.
3. CONCRETE MIX FOR CURBS AND SIDEWALKS SHALL BE IN ACCORDANCE WITH THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
4. PAINT FOR PAVEMENT MARKINGS SHALL BE EITHER LOW VOC SOLVENT BASED OR LOW VOC WATERBORNE MEETING THE REQUIREMENTS OF SECTION 9-34 OF THE WSDOT STANDARD SPECIFICATIONS.

TRENCHING/BACKFILL/COMPACTION NOTES

1. BACKFILL MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY OF RICHLAND STANARD SPECIFICATIONS AND IN ACCORDANCE WITH THE GEOTECHNICAL REPORT RECOMMENDATIONS AS PREPARED BY GPI DATED 12/14/2017.
2. ACCEPTABLE MATERIALS EXCAVATED FROM THE TRENCH SHALL BE IN ACCORDANCE WITH SECTION 7-08.3(3) OF THE WSDOT STANDARD SPECIFICATIONS. MATERIAL EXCEEDING THE OPTIMUM MOISTURE CONTENT SHALL BE CONSIDERED AS UNACEPTABLE FOR BACKFILL WITHIN THE PIPE TRENCH ZONE.
3. CONTRACTOR SHALL IMPORT BACKFILL MATERIAL AS NEEDED TO CONSTRUCT THE IMPROVEMENTS.
4. LAY PIPES TO LINES AND GRADES INDICATED ON THE DRAWINGS. NOTIFY THE ENGINEER OF RECORD OF ANY DISCREPANCIES.
5. TRENCH EXCAVATION SHALL BE IN ACCORDANCE WITH SECTION 7-08.3(1)A OF THE WSDOT STANDARD SPECIFICATIONS.
6. SHORING SHALL BE IN ACCORDANCE WITH SECTION 7-08.3.(1)B OF THE WSDOT STANDARD SPECIFICATIONS.
7. SHORING AND TRENCH SAFETY SYSTEMS SHALL MEET THE REQUIREMENTS OF WASHINGTON STATE INDUSTRIAL SAFETY AND HEALTH ACT, CHAPTER 49.17 RCW.
5. TRENCH BACKFILL SHALL BE IN ACCORDANCE WITH SECTION 7-08.3(3) OF THE WSDOT STANDARD SPECIFICATIONS.
6. REMOVE SURPLUS MATERIALS FROM THE SITE.
7. PROTECT OPEN TRENCH TO PREVENT DANGER TO THE PUBLIC.
8. PROVIDE ROCK EXCAVATION AS NEEDED TO CONSTRUCT UNDERGROUND UTILITY IMPROVEMENTS.

EARTHWORK NOTES

1. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORT AS PREPARED BY GPI DATED 12/14/2017 FOR EARTHWORK SOIL MATERIAL DESCRIPTIONS, DEFINITIONS, CONDITIONS AND RECOMMENDATIONS.
2. REMOVE AND REWORK UNCONTROLLED FILLED AS NOTED IN THE GEOTECHNCIAL REPORT AS PREPARED BY GPI DATED 12/14/2017.
3. PERFORM WORK IN ACCORDANCE WITH ASTM AND AASHTO PROCEDURE STANDARDS.
4. PRIOR TO THE START OF GRADING, ALL EXISTING ORIGINAL MATERIAL, DEBRIS, RUBBLE, ASPHALT PAVEMENT, ETC., SHALL BE REMOVED FROM THE SITE TO THE SATISFACTION OF THE OWNER AND OWNER'S REPRESENTATIVE.
5. IF ANY UNKNOWN SUBSURFACE STRUCTURES ARE ENCOUNTERED DURING CONSTRUCTION, THEY SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE OWNER'S ENGINEER PRIOR TO PROCEEDING.
6. THE CONTRACTOR SHALL PROTECT ADJACENT PROPERTIES, PUBLIC AND PRIVATE, AT ALL TIMES DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPORTING AND/OR EXPORTING ALL MATERIAL AS REQUIRED TO PROPERLY GRADE THIS SITE TO THE FINISHED ELEVATIONS SHOWN HEREON IN ACCORDANCE WITH THE APPROVED PLANS AND THE GEOTECHNICAL REPORT RECOMMENDATIONS PREPARED BY GPI DATED 12/14/2017.
8. ALL FILL SHALL BE TESTED AND APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD PRIOR TO PLACEMENT.
9. ALL FILL MATERIAL SHALL BE PLACED IN LIFTS AND COMPACTED AS RECOMMENDED BY THE GEOTECHNICAL ENGINEERING EVALUATION AS PREPARED BY GPI DATED 12/14/2017.
10. ALL FILL MATERIAL PLACED ABOVE EXISTING GROUND SURFACE SHALL BE COMPACTED TO A MINIMUM OF 95% OF MAX. DRY DENSITY PER ASTM D1557.
11. ALL EXCAVATION SHALL BE CONSIDERED UNCLASSIFIED.
12. THE CONTRACTOR SHALL BE REQUIRED TO CALL 811 A MINIMUM OF TWO BUSINESS DAYS PRIOR TO COMMENCING ANY EXCAVATION ACTIVITIES TO DETERMINE FIELD LOCATIONS OF ALL UNDERGROUND UTILITIES.
13. CONTRACTOR SHALL PROVIDE MATERIAL TESTING AND FREQUENCY OF TESTING IN ACCORDANCE WITH THE GEOTECHNICAL REPORT AS PREPARED BY GPI DATED 12/14/2017.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OFF-SITE CLEANUP OF ANY DISCHARGE OF CONSTRUCTION RELATED STORMWATER AND SILT LADEN MATERIAL.
15. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE TEMPORARY CONSTRUCTION WATER FOR DUST CONTROL AND FOR COMPACTION PURPOSES.
16. ALL DISTURBED AREAS SHALL BE HYDRO-SEEDED WITH A DRYLAND GRASS SEED MIX WITH TACKIFIER. CONTRACTOR SHALL BE RESPONSIBLE TO RE-ESTABLISH VEGETATION ON ALL DISTURBED AREAS. CONTRACTOR SHALL PROVIDE TEMPORARY WATER AS NECESSARY TO PROVIDE SEED GERMINATION. TACKIFIER SHALL BE IN ACCORDANCE WITH WSDOT STND SPECIFICATION 9-14.4(7).

SANITARY SEWER PIPING NOTES

1. INSTALL PIPE, FITTINGS AND ACCESORIES IN ACCORDANCE WITH SECTION 7-08 AND 7-17 OF THE WSDOT STANDARD SPECIFICATIONS AND THE CITY OF RICHLAND STANDARD SPECIFICATIONS. WHERE SPECIFICATIONS CONFLICT; CITY OF RICHLAND STANDARD SPECIFICATIONS SHALL PREVAIL. PERFORM WORK IN ACCORDANCE WITH ASTM, AASHTO AND LOCAL GOVERNING PROCEDURE STANDARDS.
2. SEWER PIPE: PVC PLASTIC PIPE ANSI/ASTM D3034, SDR 35. FITTINGS SHALL BE SAME MATERIAL.
3. BEDDING: CRUSHED SURFACE TOP COURSE MEETING THE REQUIREMENTS OF SECTION 9-03.9(3) OF THE WSDOT STANDARD SPECIFICATIONS.
4. BACKFILL AND COVER. AS NOTED IN THE TRENCHING/BACKFILL/COMPACTION NOTES.
5. PROVIDE PRESSURE TEST, INFILTRATION TEST AND DEFLECTION TEST IN ACCORDANCE WITH SECTION 7-17 OF THE WSDOT STANDARD SPECIFICATIONS.

STORM DRAINAGE PIPING NOTES

1. INSTALL PIPE, FITTINGS AND ACCESORIES IN ACCORDANCE WITH SECTION 7-08 OF THE WSDOT STANDARD SPECIFICATIONS AND THE CITY OF RICHLAND STANDARD SPECIFICATIONS. WHERE SPECIFICATIONS CONFLICT; CITY OF RICHLAND STANDARD SPECIFICATIONS SHALL PREVAIL. PERFORM WORK IN ACCORDANCE WITH ASTM, AASHTO AND LOCAL GOVERNING PROCEDURE STANDARDS.
2. STORM PIPE: PVC PLASTIC PIPE ANSI/ASTM D3034, SDR 35. FITTINGS SHALL BE SAME MATERIAL.
3. BEDDING: CRUSHED SURFACE TOP COURSE MEETING THE REQUIREMENTS OF SECTION 9-03.9(3) OF THE WSDOT STANDARD SPECIFICATIONS.
4. BACKFILL AND COVER. AS NOTED IN THE TRENCHING/BACKFILL/COMPACTION NOTES.

ASPHALT PAVING NOTES

1. INSTALL WORK IN ACCORDANCE WITH SECTION 5-04 OF THE WSDOT STANDARD SPECIFICATIONS.
2. DO NOT PLACE ASPHALT WHEN AMBIENT AIR OR BASE SURFACE TEMPERATURE IS LESS THAN IN ACCORDANCE WITH SECTION 5-04.3(16) OF THE WSDOT STANDARD SPECIFICATIONS.
3. PAVEMENT SECTION: AS SHOWN ON THE DRAWINGS.
4. VERIFY GRADIENTS AND ELEVATIONS OF BASE ARE CORRECT PRIOR TO PLACEMENT OF HMA.
5. SOIL STERILIZATION (WEED KILLER) SHALL BE APPLIED TO TOP OF ROCK IN AREAS TO BE PAVED THE SAME DAY AS PAVING WORK. KEEP 2-FOOT MIN. CLEAR OF EXISTING AND PROPOSED LANDSCAPE AREAS. APPLY AT MANUFACTURER'S RECOMMENDED RATE TO ASSURE 3-INCH MIN. PENETRATION.
6. COMPACT PAVEMENT BY ROLLING TO THE SPECIFIED DENSITY. HAND COMPACT AREAS INACCESBILE TO ROLLING EQUIPMENT.
7. TACK COAT CEMENT SURFACES THAT WILL BE IN CONTACT WITH PAVEMENT. PROTECT CEMENT SURFACES FROM THE TACK APPLICATION METHOD. CLEAN EXCESS TACK FROM EXPOSED CONCRETE SURFACES. STORM PIPE: PVC PLASTIC PIPE ANSI/ASTM D3034, SDR 35. FITTINGS SHALL BE SAME MATERIAL.

UTILITY STRUCTURE NOTES

1. STORM DRAINAGE MANHOLES AND CATCH BASINS SHALL BE AS SHOWN ON THE DRAWINGS.
2. MANHOLE AND CATCH BASIN LID AND GRATES SHALL BE AS SHOWN ON THE DRAWINGS.
3. WATER METER BOXES SHALL BE IN ACCCORDANCE WITH THE CITY OF RICHLAND STANDARD SPECIFICATIONS AND DRAWINGS.
4. EXCAVATE AND BACKFILL TO INSTALL UTILITY STRUCTURES TO THE GRADES AND ELVATIONS SHOWN ON THE DRAWINGS.

GENERAL UTILITY NOTES

1. ALL WORK AND MATERIALS SHALL BE IN COMPLETE ACCORDANCE WITH THE LATEST REVISION OF CITY STANDARDS AND SPECIFICATIONS AND ALL OTHER GOVERNING AGENCY'S STANDARDS.
2. THE CONTRACTOR SHALL OBTAIN AND HAVE AVAILABLE COPIES OF THE APPLICABLE GOVERNING AGENCY STANDARDS AT THE JOB SITE DURING THE RELATED CONSTRUCTION OPERATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATIONS, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION WHETHER SHOWN ON THESE PLANS OR NOT. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE BEST RECORDS AVAILABLE AND ARE SUBJECT TO A DEGREE OF UNKNOWN VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT ENGINEER TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH AND CONTACT ALL OF THE APPROPRIATE UTILITIES INVOLVED PRIOR TO CONSTRUCTION.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE AND CONTACT THE INSPECTOR 24 HOURS IN ADVANCE OF BACKFILLING ALL CONSTRUCTION.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL EXISTING UTILITIES WITHIN THE CONSTRUCTION AREA WHETHER SHOWN OR NOT SHOWN ON THE PLANS.
7. ALL SITE UTILITIES SHALL STOP AT 5' FROM BUILDING FACE. ALL UTILITIES SHALL BE CAPPED AND MARKED AT SURFACE WITH DEPTH NOTED.
8. WHERE DIRECTED BY THE CITY THE CONTRACTOR SHALL PLACE TRAFFIC CONTROL DEVICES, THE PLACEMENT AND TYPE OF WHICH SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.)
9. ALL UTILITIES SHALL BE CONSTRUCTED PRIOR TO SURFACING INCLUDING BUT NOT LIMITED TO SEWER, WATER, TELEPHONE, POWER, AND CABLE TELEVISION.
10. ALL PAVEMENT CUTS TO CONNECT UTILITIES SHALL BE REPAIRED IN CONFORMANCE WITH THE CITY AND TRANSPORTATION DEPARTMENT STANDARD SPECIFICATIONS.
11. CONTRACTOR IS RESPONSIBLE FOR APPLYING FOR AND OBTAINING ALL PERMITS AND ASSOCIATED FEES EXCEPT FOR PLAN REVIEW.
12. CONTRACTOR SHALL COORDINATE W/ ALL UTILITIES FOR TRENCHING REQUIREMENTS. UTILITY LOCATIONS SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR SHALL COORDINATE ACTUAL LOCATIONS WITH THE UTILITIES AT THE TIME OF CONSTRUCTION. CONTRACTOR AND UTILITIES SHALL COORDINATE LOCATION OF EQUIPMENT TO AVOID CONFLICTS.
13. CONTRACTOR SHALL COORDINATE PRIVATE UTILITY WORK AND CONFORM TO THE REQUIREMENTS OF UTILITY COMPANIES. PROVIDE MIN. 48 HOURS NOTICE TO UTILITY COMPANIES PRIOR TO UTILITY TRENCH EXCAVATION.

SITE WATER PIPING NOTES

1. INSTALL PIPE, FITTINGS AND ACCESSORIES IN ACCORDANCE WITH SECTION 7-09 OF THE WSDOT STANDARD SPECIFICATIONS AND THE CITY OF RICHLAND STANDARD SPECIFICATIONS. WHERE SPECIFICATIONS CONFLICT; CITY OF RICHLAND STANDARD SPECIFICATIONS SHALL PREVAIL. PERFORM WORK IN ACCORDANCE WITH ASTM, AASHTO AND LOCAL GOVERNING PROCEDURE STANDARDS.
2. WATER PIPE: DUCTILE IRON PIPE, AWWA C151, CL50 OR PVC, ANSI/AWWA C900, SDR18. FITTINGS AND JOINTS TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF RICHLAND.
3. GATE VALVES: AWWA C509, RESILENT WEDGE TYPE MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
4. WATER SERVICES: MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
5. FIRE HYDRANT ASSEMBLY: MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
6. THRUST BLOCKS: MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
7. BEDDING AND COVER MATERIALS: MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS.
8. REDUCED BACKFLOW PRESSURE ASSEMBLY: MEETING THE REQUIREMENTS OF THE CITY OF RICHLAND STANDARD SPECIFICATIONS. PROVIDE ELECTRICAL POWER SOURCE FOR HEATING ELEMENT.
9. FIRE DEPARTMENT CONNECTION: AS SHOWN ON THE DRAWINGS
10. CONTRACTOR SHALL PROVIDE LEVEL U LICENSE TO OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
11. PROVIDE TESTING IN ACCORDANCE WITH THE CITY OF RICHLAND STANDARD SPECIFICATIONS TO INCLUDE BUT NOT LIMITED TO BACTERLOGICAL TEST, HYDROSTATIC TEST AND BACKFLOW ASSEMBLY TEST.
12. DISENFECT AND FLUSH THE DOMESTIC WATER SYSTEM IN ACCORDANCE WITH THE CITY OF RICHLAND STANDARD SPECIFICATIONS.

CEMENT CONCRETE NOTES

1. PROVIDE ½" MASTIC EXPANSION JOINT WHEN CONCRETE PAVEMENT MEETS CURB. MASTIC SHALL EXTEND THE FULL DEPTH OF THE CONCRETE PAVEMENT.
2. PROVIDE ½" MASTIC EXPANSION JOINT WHEN CONCRETE PAVEMENT MEETS FACE OF BUILDING. MASTIC SHALL EXTEND THE FULL DEPTH OF THE CONCRETE PAVEMENT.
3. CONCRETE PAVEMENT SHALL HAVE A SMOOTH LIGHT BROOM FINISH.
4. ALL JOINT PATTERNS SHALL CLOSELY FOLLOW THE PLAN LAYOUT.
5. CEMENT CONCRETE PAVEMENT SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE ACI 301 AND WSDOT STANDARD SPECIFICATIONS SECTION 5-05.
6. CONCRETE SHALL HAVE A 2 TO 4-INCH SLUMP BEFORE ADDING HIGH-RANGE WATER REDUCING ADMIXTURE OR PLASTICIZING ADMIXTURE, ±1-INCH
7. 6.5 SACK MINIMUM SACK CONTENT
8. MAXIMUM WATER/CEMENT RATIO: 0.45 (NON-AIR ENTRAINED) 0.35 (AIR ENTRAINED)
9. AIR-ENTRAINED: 5.5%, ±1.5% AT POINT OF DELIVERY FOR 1-1/2 INCH NOMINAL MAX. AGGREGATE SIZE. 6%, ±1.5% AT POINT OF DELIVERY FOR 1 TO ¾" NOMINAL MAX. AGGREGATE SIZE.
10. USE OF ACCELERATING ADMIXTURES IN COLD WEATHER IS NOT ALLOWED UNLESS AUTHORIZED BY ENGINEER IN WRITING.
11. USE OF RETARDING ADMIXTURES IN HOT WEATHER IS NOT ALLOWED UNLESS AUTHORIZED BY ENGINEER IN WRITING.
12. CONTRACTOR SHALL APPLY CURING COMPOUND TO THE ENTIRE SURFACE AREA PER SECTION 5-05.3(13)A OF THE WSDOT STANDARD SPECIFICATIONS.

LINE LEGEND

LINE DESCRIPTION	PROPOSED LINE	EXISTING LINE
OVERHEAD POWER	OHP	OHP
UNDERGROUND POWER	UP	UP
OVERHEAD TELEPHONE	OHT	OHT
UNDERGROUND TELEPHONE	UT	UT
NATURAL GAS	G	G
STORM DRAIN	SD	SD
ROOF DRAIN	RD	RD
SANITARY SEWER	SS	SS
INDUSTRIAL SEWER	IS	
WATER	W	W
IRRIGATION	IRR	IRR
PROPERTY LINE	P/L	P/L
RIGHT OF WAY	R/W	R/W
PERMANENT EASEMENT		P/E
FENCE	X	X
ROAD CENTERLINE		
ROAD ASPHALT	EP	EP
ROAD GRAVEL	EG	EG

MATERIAL TESTING

1. CONTRACTOR SHALL PROVIDE MATERIAL TESTING BY A CERTIFIED TESTING LABORATORY. MATERIAL TEST REPORTS SHALL INCLUDE CLASSIFICATION IN ACCORDANCE WITH ASTM D2487 OF EACH SOIL MATERIAL PROPOSED FOR FILL AND BACKFILL AND LABORATORY COMPACTION CURVE ACCORDING TO ASTM D1557 FOR EACH SOIL MATERIAL PROPOSED FOR FILL AND BACKFILL.
2. CONTRACTOR SHALL ADHERE TO THE TESTING AND INSPECTION REQUIREMENTS AS NOTED IN THE CITY PERMIT.
3. CONTRACTOR SHALL PROVIDE COMPACTION TESTING IN ACCORDANCE WITH ASTM D 1557, D2167, D2922 AND D 3017. FREQUENCY OF TESTING SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORT RECOMMENDATIONS AS PREPARED BY GPI DATED 12/14/2017.
4. WHEN COMPACTION TEST FAILS, CONTRACTOR SHALL REMOVE WORK, REPLACE AND RETEST AT NO ADDITIONAL COST TO OWNER.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE COMPACTION TESTING REQUIREMENTS.

LEGEND

SYMBOL DESCRIPTION	EXISTING SYMBOL & BLOCK NAME	PROPOSED SYMBOL & BLOCK NAME	SYMBOL DESCRIPTION	EXISTING SYMBOL & BLOCK NAME	PROPOSED SYMBOL & BLOCK NAME
BOLLARD			VAULT	V	V
FLAGPOLE	F	F	FIRE HYDRANT		
MAIL BOX	M	M	WATER METER		
SIGN			IRRIGATION VALVE BOX	I	I
TREE (SHRUB)			CLEANOUT		
TREE (CONIFEROUS)			CATCH BASIN		
TREE (DECIDUOUS)			ELEC. TRANS.	E	E
TELE. PEDESTAL	T	T	POWER POLE		
GUY WIRE			STREET LIGHT		
MANHOLE			CAP		
VALVE					

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DREAL S. MOORE
STATE OF WASHINGTON
9/27/21
37991
REGISTERED PROFESSIONAL ENGINEER

NO.	DESCRIPTION	BY	APPD.	DATE
	REVISION			

ABC MINI STORAGE
RICHLAND, WA

GENERAL NOTES AND LEGEND

FILE : 30-20-008 C-002
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 6/25/2020

DRAWING:
C-002

SHEET: 2 OF 13

Plot Date:9/9/2021 4:49 PM Plotted By: Cole Henderson
Date Created:6/22/2020 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008 C-002.DWG

KEYED NOTES

EROSION CONTROL

- (EC1) VEHICLE TRACKING CONTROL EXIT – ACTUAL LOCATION TO BE DETERMINED BY CONTRACTOR (1/C-501)
- (EC2) INSTALL TEMPORARY FILTER FABRIC AT CATCH BASINS AND ALL OTHER STORM DRAINAGE INLETS AT TIME OF INSTALLATION. REMOVE AT FINAL SITE STABILIZATION. (3/C-501)
- (EC3) SILT FENCE, TYP. (2/C-501)
- (EC4) CONSTRUCTION ENTRANCE AT COMSTOCK IS NOT ALLOWED.

0 30 60
SCALE IN FEET

WELLSIAN WAY
COMSTOCK ST
DAVENPORT ST
GOETHALS DR
EC1
EC2
EC3
EC4

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DESIGNED BY DSM 9-21

NO.	DESCRIPTION	DATE
1	CITY COMMENTS	DSM/DSM/9-21

ABC MINI STORAGE
RICHLAND, WA

TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

FILE: 30-20-008_C-003
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-003

SHEET: 3 OF 13

Plot Date:9/9/2021 4:50 PM Plotted By: Cole Henderson
Date Created:5/11/2020 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-003.DWG

KEYED NOTES

SITE LAYOUT

(SL1) SITE VISION TRIANGLE

0 30 60

SCALE IN FEET

WELLSIAN WAY

BUILDING A

BUILDING B

BUILDING C

BUILDING D

BUILDING E

COMSTOCK ST

GOETHALS DR

DAVENPORT ST

N: 342822.00
E: 1947750.79

N: 342824.74
E: 1947928.14

N: 343562.23
E: 1947739.66

N: 343565.33
E: 1947950.29

N00°51'41"W=740.31'

D=22°40'03"
R=1885.08'
L=745.78'

N89°07'00"E 113.66'

S89°07'00"W 63.71'

N89°09'25"E 145.81'

N89°09'25"E 64.84'

10.00'

35.00'

4.00'

8.00'

5.00'

50.54'

74.28'

34.70'

34.64'

39.00'

20.50'

36.25'

5' UTILITY EASEMENT

10' STORM DRAIN EASEMENT

ROW TO BE VACATED AND GRANTED TO PROPERTY OWNER

30.00'

60.00'

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STATE OF WASHINGTON
37991
REGISTERED
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	BY	DATE
1	CITY COMMENTS	DSM	10-8-21

ABC MINI STORAGE
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GEOMETRIC CONTROL PLAN

FILE : 30-20-008_C-010
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-010

SHEET: 4 OF 13

Plot Date:9/9/2021 4:50 PM Plotted By: Cole Henderson
Date Created:7/22/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-010.DWG

KEYED NOTES

SITE LAYOUT

- SL1 STANDARD DUTY ASPHALT (1 C-500)
- 1 SL2 ACCESSIBLE PARKING SIGN W/VAN ACCESSIBLE, TYP. SIGN BASE AND ACCESSIBLE PARKING SYMBOL. (6 C-501) (7 C-501)
- SL3 CONCRETE PARKING BUMPER, TYP. (6 C-500)
- SL4 4" WIDE SOLID WHITE PAINT STRIPING, 2-FT O.C. @ 45° ANGLE, TYP.
- 1 SL5 TRUNCATED DOMES IN CONCRETE SIDEWALK PER COR STANDARDS.
- SL6 SIDEWALK FLUSH WITH ASPHALT PAVEMENT. (3 C-500)
- SL7 RETAINING WALL AND FENCE. FENCING TO BE ON TOP OF RETAINING WALL. DESIGNED BY OTHERS
- 1 SL8 SIDEWALK RAMP TYPE 2A PER COR STANDARD DETAIL ST5.
- SL9 DRIVEWAY PER COR STANDARD DWG ST2A
- SL10 CONCRETE BARRIER CURB (8 C-440)
- 1 SL11 CONCRETE SIDEWALK PER COR STANDARD DWG ST1
- SL12 4" WHITE SOLID PAINT STRIPE, TYP.
- SL13 MECHANICAL GATE WITH KNOX BOX. COORDINATE WITH COR FIRE MARSHAL FOR INSTALLATION OF KNOX BOX. MECHANICAL GATE DESIGNED BY OTHERS.
- SL14 VERTICAL SAW CUT AROUND DRIVEWAYS AND RAMPS. REMOVE AND REPLACE PAVEMENT AS REQUIRED.
- SL15 REPLACE CURB GUTTER, VERTICAL SAW CUT AND REPLACE ASPHALT AS REQUIRED PER CITY OF RICHLAND STANDARDS.
- SL16 RELOCATE EXISTING LIGHTS TO BACK OF WALKWAY. RUN NEW CONNECTION TO EXISTING LIGHTING CIRCUIT. COORDINATE WITH COR ENERGY SERVICES
- 1 SL17 SIGN TO BE RELOCATED BY CITY CREWS. CONTACT CITY CREWS TO SCHEDULE SIGN RELOCATION.
- SL18 APPROXIMATE LOCATION OF SIGN. SIGN FOUNDATION BY INSTALLER. SUPPLY POWER CIRCUIT.
- SL19 BOLLARD. TYP. (4 C-501)
- SL20 CONCRETE PAD UNDER MAN DOORS. TYP. CONCRETE FLUSH WITH ASPHALT. (8 C-501)
- SL21 "STOP" SIGN (5 C-501)
- SL22 "DO NOT ENTER" SIGN (5 C-501)
- SL23 PAINTED WHITE DIRECTION ARROWS, TYP.
- 1 SL24 CONCRETE SIDEWALK (5 C-500)

1 PROJECT AREAS:

TOTAL SITE AREA: 126,300 SF
IMPERVIOUS SURFACES: 114,400 SF
PERVIOUS SURFACES: 11,600 SF

0 30 60
SCALE IN FEET

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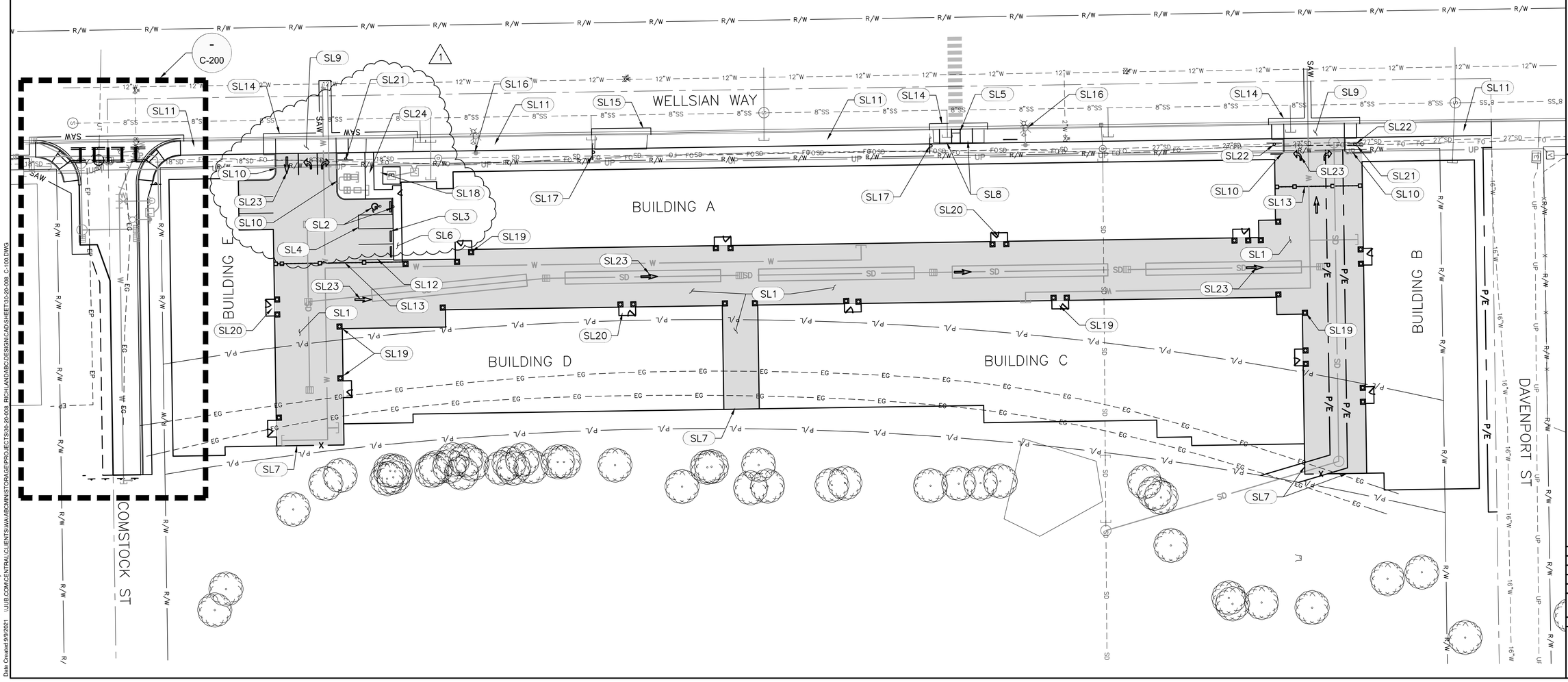

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NO.	DESCRIPTION	BY (APP.)	DATE
1	CITY COMMENTS	DSM (DSM)	9-3-21
	REVISION		

ABC MINI STORAGE
RICHLAND, WA

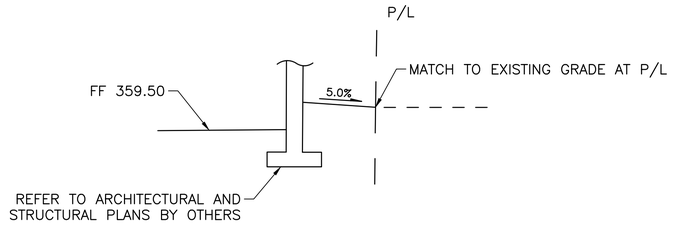
SITE PLAN

FILE : 30-20-008_C-100
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/10/2021

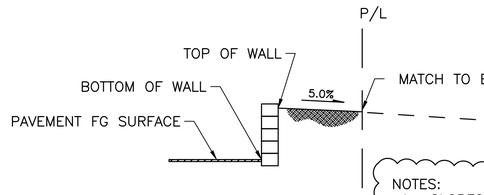
DRAWING:
C-100

SHEET: 5 OF 13

Plot Date:9/10/2021 7:23 AM Plotted By: Darral Moore
Date Created:9/9/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008 RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-100.DWG



SECTION A–A



SECTION B–B

1

NOTES:
1. SLOPES GREATER THAN 2:1 ARE NOT PERMITTED:
2. RETAINING WALLS GREATER THAN 42–INCHES IN EXPOSED HEIGHT AND/OR WALLS ON/OR SUPPORTING A SLOPE GREATER THAN 3:1 WILL REQUIRE A SEPARATE BUILDING PERMIT.

KEYED NOTES

GRADING

- G1 MATCH EXISTING
- G2 GRADE BREAK
- G3 3:1 MAX SLOPE

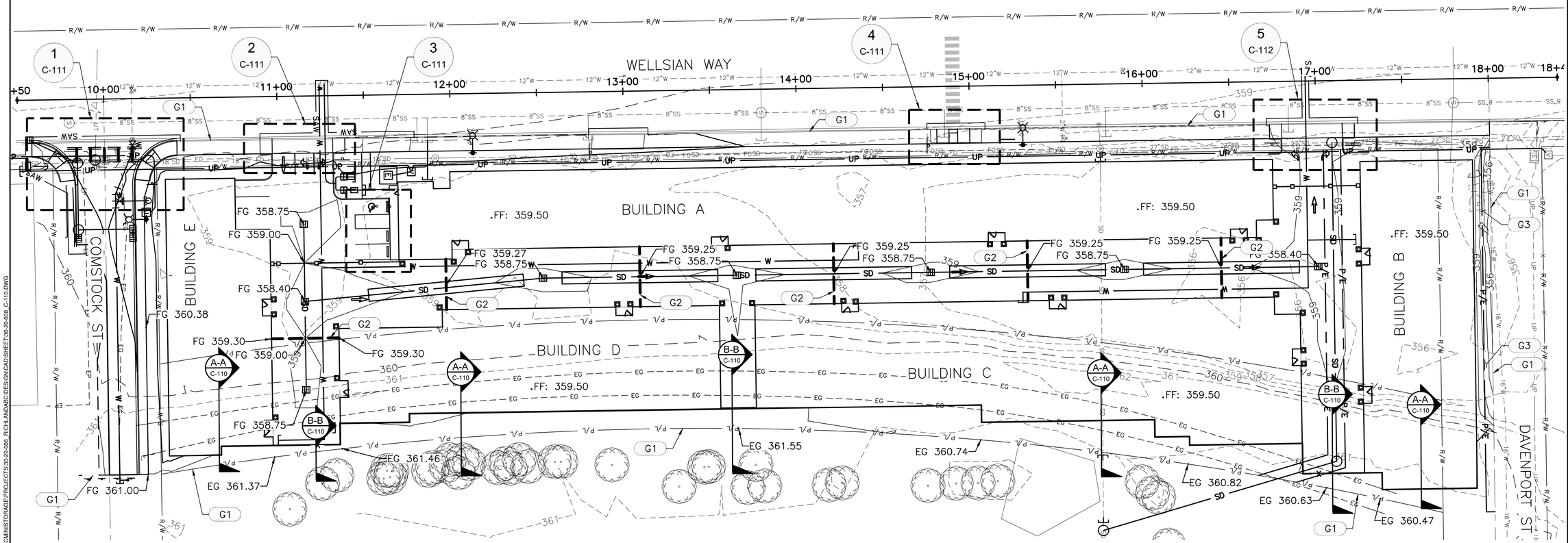
0 30 60

SCALE IN FEET

LEGEND

- 451 EG MINOR CONTOUR
- 450 EG MAJOR CONTOUR
- 451 FG MINOR CONTOUR
- 450 FG MAJOR CONTOUR

EG EXISTING GRADE
FF FINISHED FLOOR
FG FINISHED GRADE



CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE THEIR OWN QUANTITY TAKE–OFF AND SHALL IMPORT/EXPORT MATERIAL AS NEEDED TO GRADE THE SITE AT NO ADDITIONAL COST TO THE OWNER.

NOTES:
1. ALL SPOT ELEVATIONS ARE TOP OF FINISHED GRADE UNLESS OTHERWISE NOTED.
2. ALONG FACE OF CURB, SPOT ELEVATIONS ARE FLOW LINE UNLESS NOTED OTHERWISE.
3. UNCONTROLLED FILL SHALL BE EXAMINED BY GEOTECHNICAL ENGINEER TO DETERMINE COMPACTION OR REMOVAL REQUIREMENTS.
4. CONTRACTOR SHALL PLACE ALL SUITABLE EXCAVATED SOILS ON–SITE IN ACCORDANCE WITH THE PLANS AND SPECIFICATION. IF THERE ARE EXCESS SUITABLE SOILS, THE CONTRACTOR SHALL HAUL, PLACE AND COMPACT AS DIRECTED BY THE ENGINEER OF RECORD ON–SITE.
5. ASPHALT ALONG FACE OF BUILDINGS SHALL BE 2.5–INCHES BELOW FINISHED FLOOR EXCEPT AT DESIGNATED HANDICAP UNITS WHERE THEY SHALL BE 1–INCH BELOW FINISHED FLOOR. DESIGNATED HANDICAP UNIT LOCATIONS SHOWN IN BUILDING PLANS. ASPHALT SHALL RAMP UP AT ALL MAN DOOR TO BE FLUSH WITH CONCRETE PAD AROUND DOORWAY.

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NO.	REVISION / CITY COMMENTS	BY (APP.)	DATE
1	DESCRIPTION	DSM	9-3-21

ABC MINI STORAGE
RICHLAND, WA

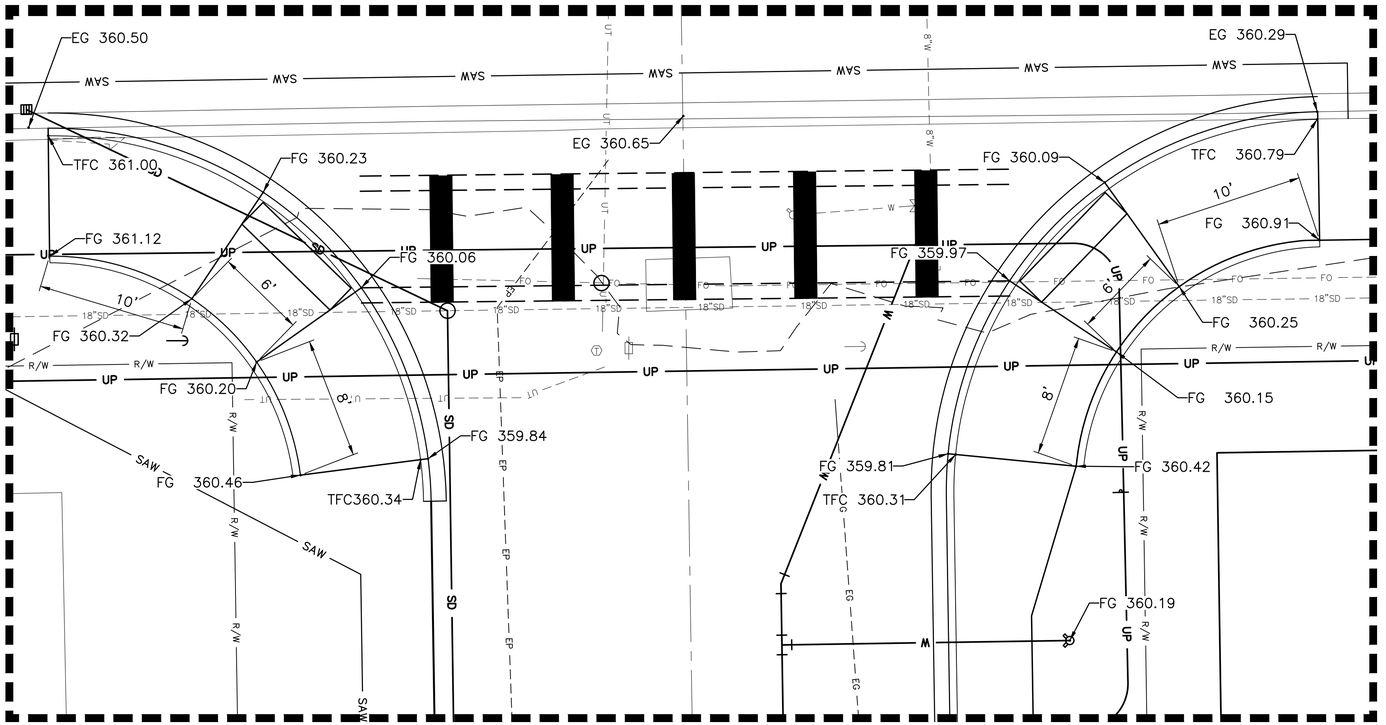
GRADING PLAN

FILE : 30-20-008 C-110
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

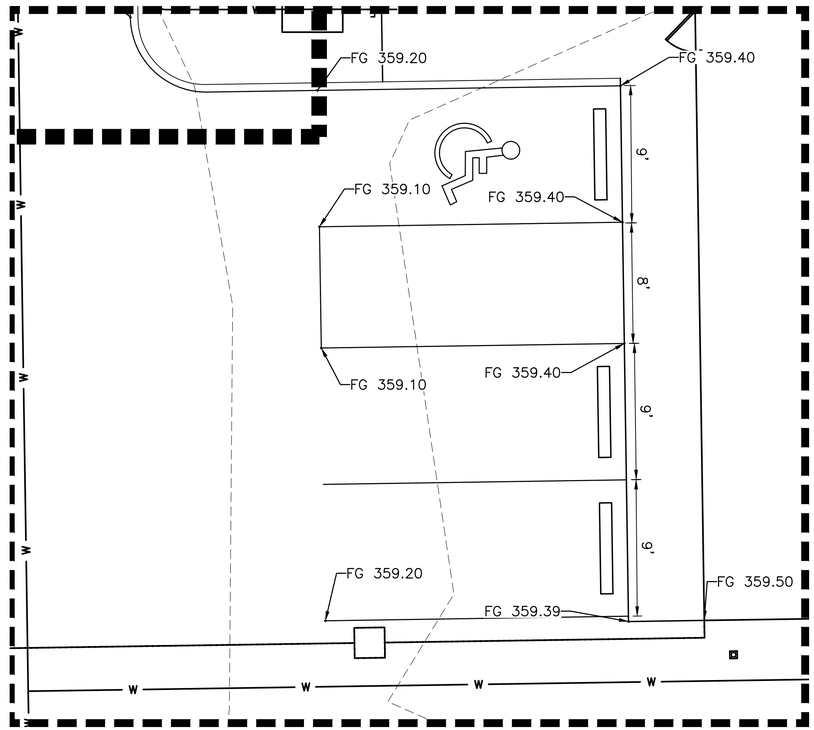
DRAWING:
C-110

SHEET: 6 OF 13

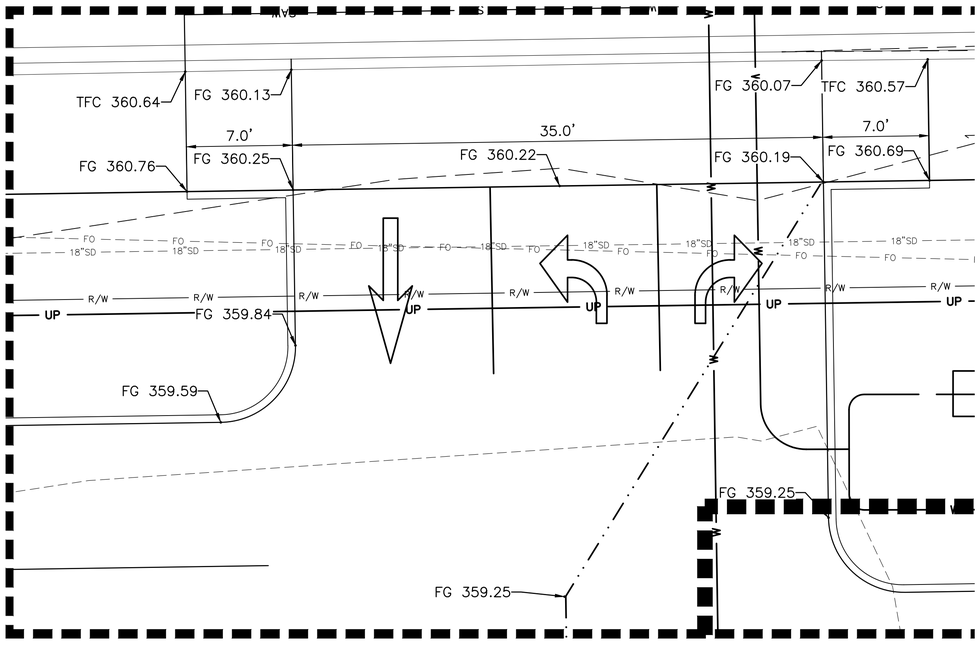
Plot Date:3/9/2021 4:51 PM Plotted By: Cole Henderson
Date Created:3/9/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-110.DWG



1 ENLARGEMENT
SCALE: 1" = 5'



3 ENLARGEMENT
SCALE: 1" = 5'



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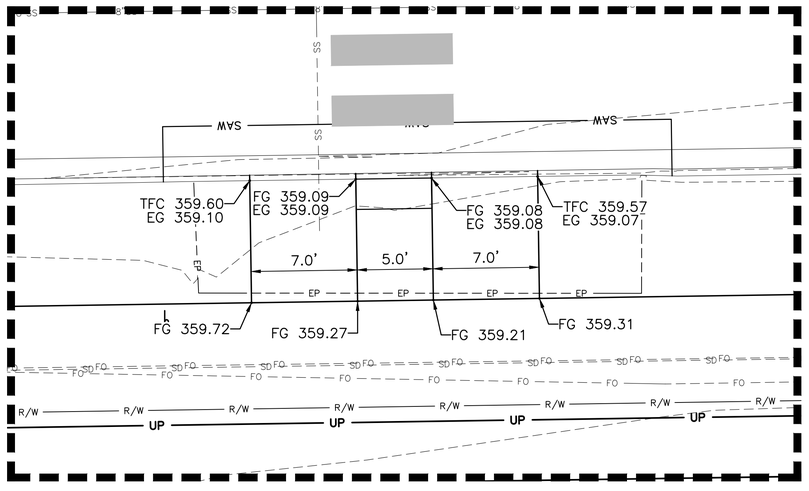

4 ENLARGEMENT
SCALE: 1" = 5'

0 5 10
SCALE IN FEET

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ABC MINI STORAGE
RICHLAND, WA

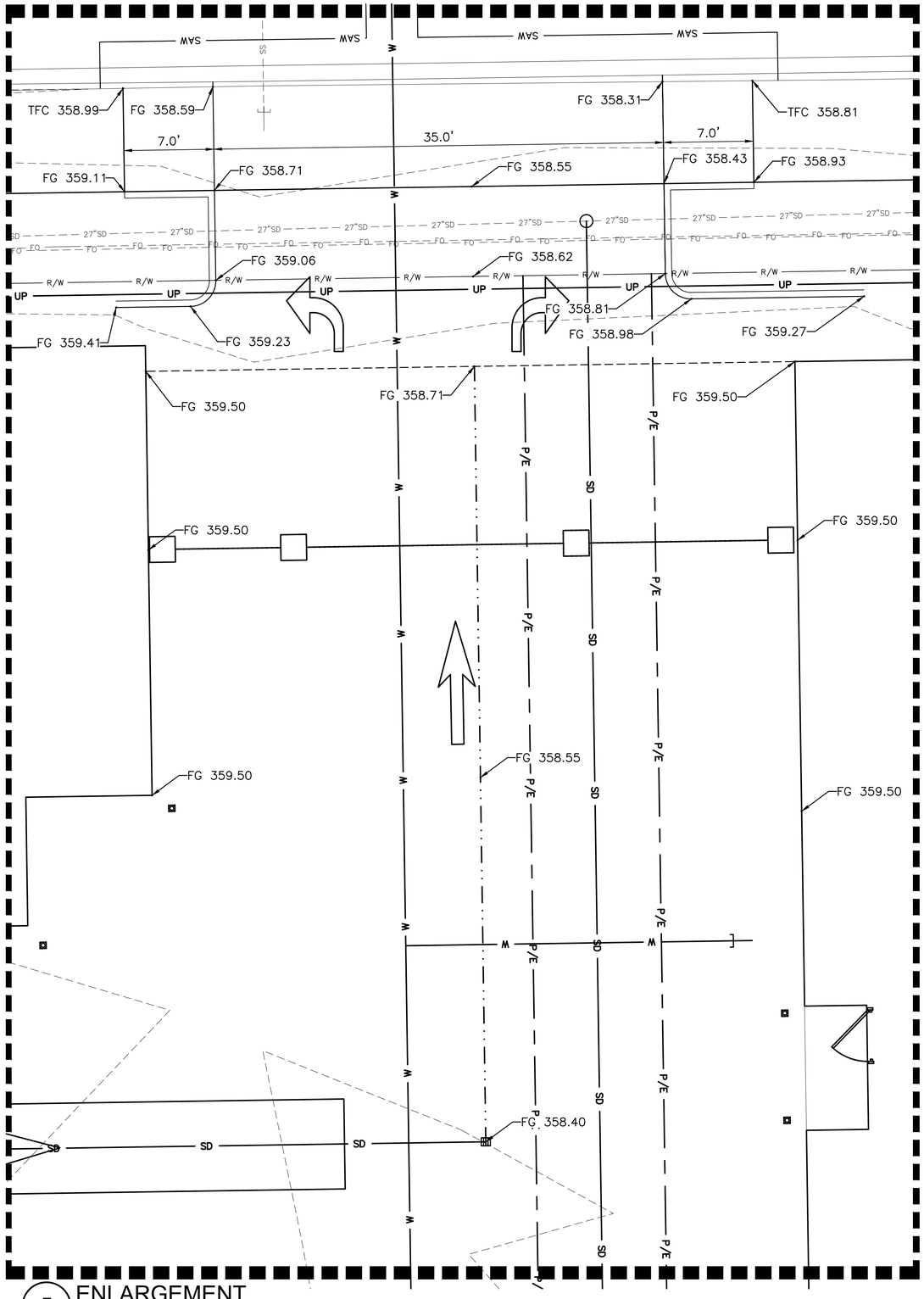
GRADING ENLARGEMENTS

FILE : 30-20-008_C-111
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-111

SHEET: 7 OF 13

Plot Date:9/9/2021 4:51 PM Plotted By: Cole Henderson
Date Created:9/9/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-111.DWG



5 ENLARGEMENT
SCALE: 1" = 5'

0 5 10
SCALE IN FEET

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RICHLAND, WA

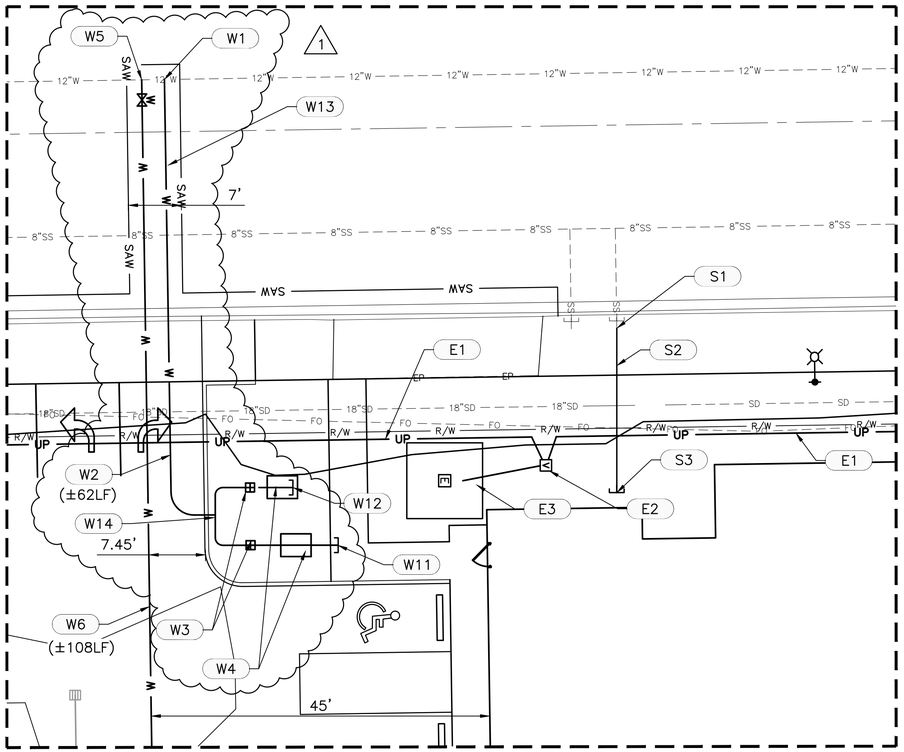
GRADING ENLARGEMENTS

FILE : 30-20-008 C-112
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-112

SHEET: 8 OF 13

Plot Date:9/9/2021 4:51 PM Plotted By: Cole Henderson
Date Created:7/22/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-112.DWG



0 10 20

SCALE IN FEET

KEYED NOTES

ELECTRICAL

- (E1) PRIMARY POWER 4" CONDUIT. COORDINATE WITH COR ENERGY SERVICES.
- (E2) PAD MOUNTED TRANSFORMER. COORDINATE WITH COR ENERGY SERVICES.
- (E3) PAD MOUNTED V11 VAULT. COORDINATE WITH COR ENERGY SERVICES.
- (E4) CONNECT TO EXISTING VAULT. COORDINATE WITH COR ENERGY SERVICES.
- (E5) CAP AND MARK ELECTRICAL CONDUIT.

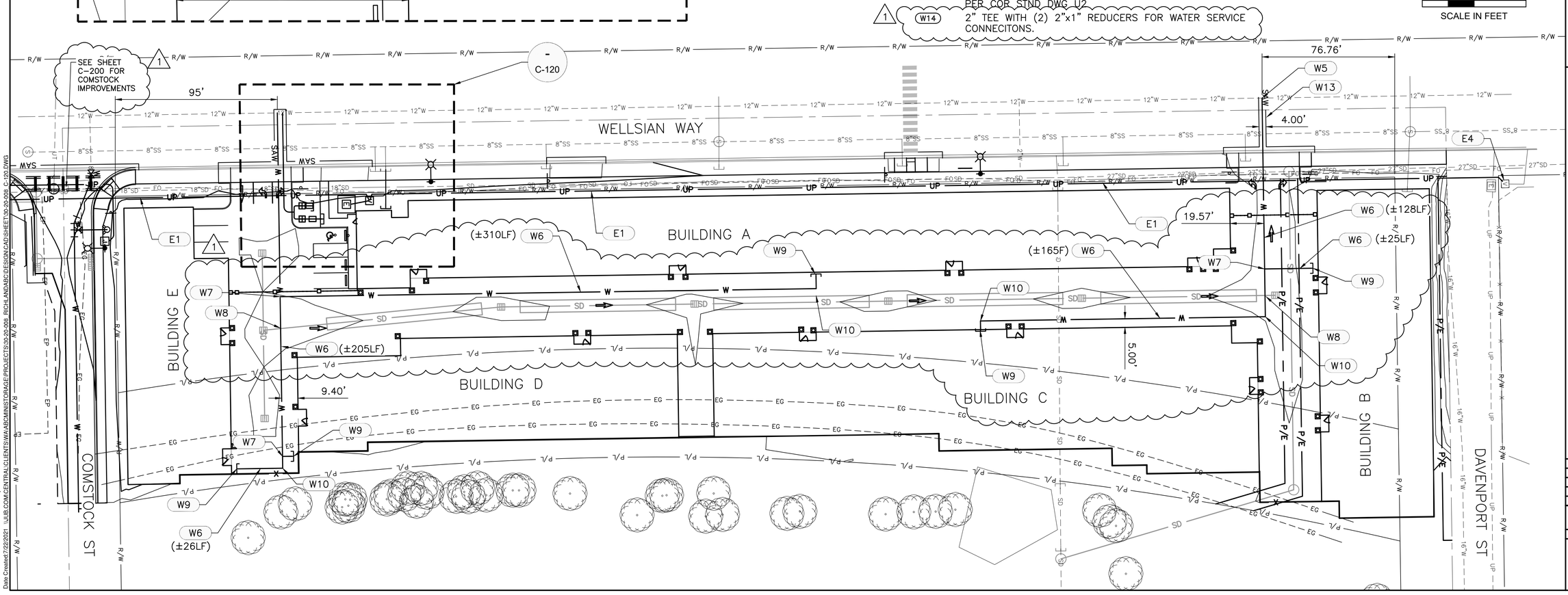
SEWER

- (S1) CONNECT TO EXISTING SANITARY SEWER. DIG AND VERIFY LOCATION, DEPTH AND SIZE.
- (S2) 6" PVC SS (±50 LF) @ 2.0% MIN. SLOPE
- (S3) CAP AND MARK 6" PVC

WATER

1
- (W1) 12"X2" SERVICE SADDLE PER COR STND DWG W2
- (W2) 2" WATER SERVICE "K-TYPE" COPPER, 4-FT MIN. COVER.
- (W3) 1" DOMESTIC WATER METER PER COR STND DWG W3
- (W4) 1" DOUBLE CHECK VALVE ASSEMBLY PER COR STND DWG W20
- (W5) 12"X4" CUT IN TEE AND 4" GATE VALVE PER COR STND DWG W10
- (W6) 4" DI FIRE LINE, 4-FT MIN. COVER
- (W7) 4"x4" DI TEE AND THRUST BLOCK
- (W8) UTILITY CROSSING (12 / C-500)
- (W9) CAP AND MARK FIRE LINE. DOUBLE CHECK DETECTOR ASSEMBLY LOCATED INSIDE BUILDING FIRE RISER ROOM. REFER TO FIRE PROTECTION PLANS FOR CONTINUATION.
- (W10) 4" DI 90° BEND AND THRUST BLOCK
- (W11) 1" WATER SERVICE CAP AND MARKER
- (W12) 1" IRRIGATION SERVICE CAP AND MARKER. REFER TO IRRIGATION PLANS FOR BACKFLOW ASSEMBLY.
- (W13) SAWCUT / TRENCH REPAIR AND TRAFFIC CONTROL PER COR STND DWG U2

1
- (W14) 2" TEE WITH (2) 2"x1" REDUCERS FOR WATER SERVICE CONNECITONS.



0 30 60

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ABC MINI STORAGE
RICHLAND, WA

UTILITY PLAN

FILE : 30-20-008_C-120
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM

ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY

LAST UPDATED: 9/9/2021

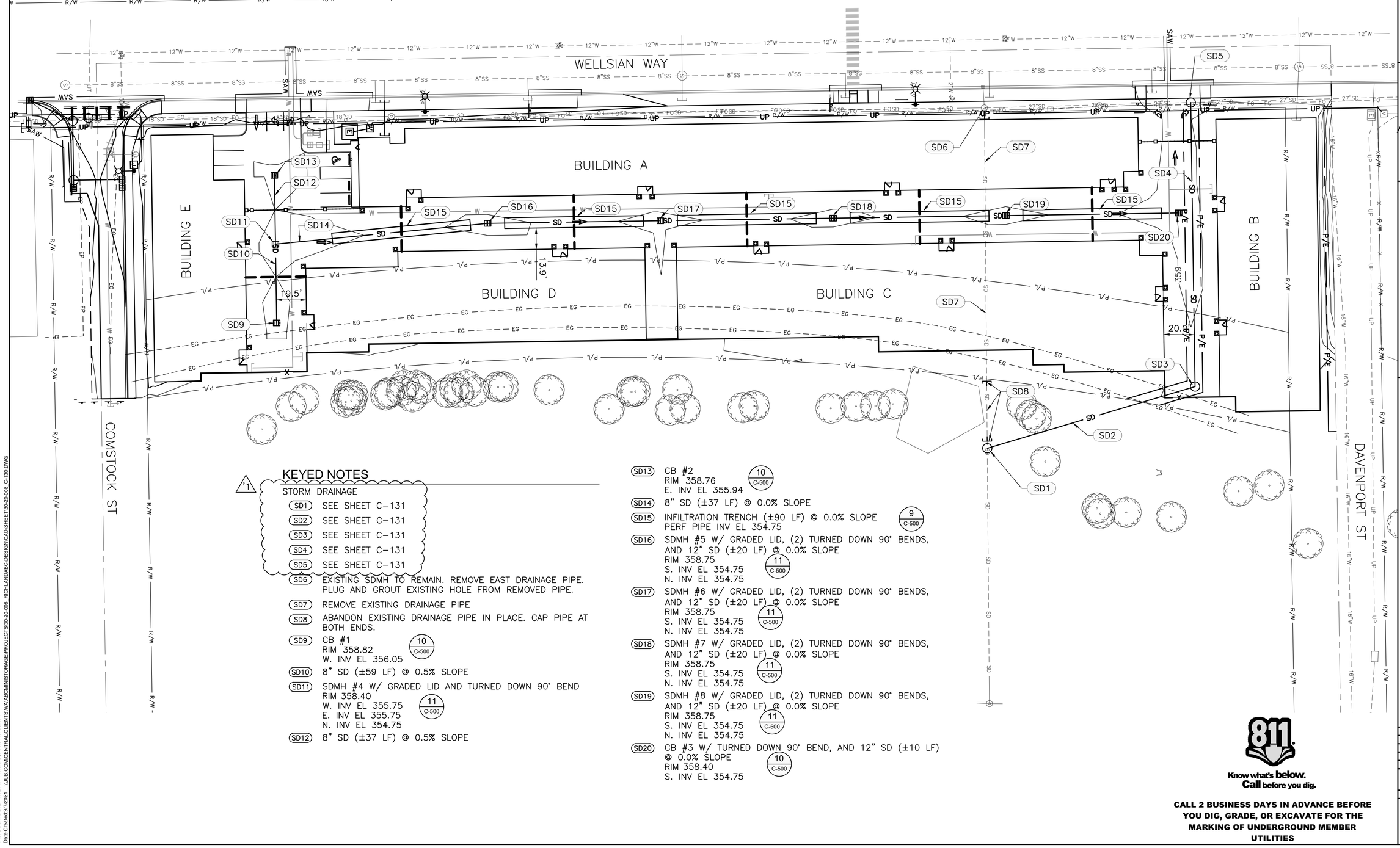
DRAWING:
C-120

SHEET: 9 OF 13

Plot Date:9/9/2021 4:52 PM Plotted By: Cole Henderson
Date Created:7/22/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-120.DWG

NOTES:
1. ALL BUILDING ROOF DRAINS SHALL BE ROUTED TO THE CENTRAL INFILTRATION SYSTEM.

0 30 60
SCALE IN FEET



KEYED NOTES

STORM DRAINAGE

(SD1) SEE SHEET C-131
(SD2) SEE SHEET C-131
(SD3) SEE SHEET C-131
(SD4) SEE SHEET C-131
(SD5) SEE SHEET C-131
(SD6) EXISTING SDMH TO REMAIN. REMOVE EAST DRAINAGE PIPE. PLUG AND GROUT EXISTING HOLE FROM REMOVED PIPE.
(SD7) REMOVE EXISTING DRAINAGE PIPE
(SD8) ABANDON EXISTING DRAINAGE PIPE IN PLACE. CAP PIPE AT BOTH ENDS.
(SD9) CB #1
RIM 358.82
W. INV EL 356.05
(10 / C-500)
(SD10) 8" SD (±59 LF) @ 0.5% SLOPE
(SD11) SDMH #4 W/ GRADED LID AND TURNED DOWN 90° BEND
RIM 358.40
W. INV EL 355.75
E. INV EL 355.75
N. INV EL 354.75
(11 / C-500)
(SD12) 8" SD (±37 LF) @ 0.5% SLOPE
(SD13) CB #2
RIM 358.76
E. INV EL 355.94
(10 / C-500)
(SD14) 8" SD (±37 LF) @ 0.0% SLOPE
(SD15) INFILTRATION TRENCH (±90 LF) @ 0.0% SLOPE
PERF PIPE INV EL 354.75
(9 / C-500)
(SD16) SDMH #5 W/ GRADED LID, (2) TURNED DOWN 90° BENDS, AND 12" SD (±20 LF) @ 0.0% SLOPE
RIM 358.75
S. INV EL 354.75
N. INV EL 354.75
(11 / C-500)
(SD17) SDMH #6 W/ GRADED LID, (2) TURNED DOWN 90° BENDS, AND 12" SD (±20 LF) @ 0.0% SLOPE
RIM 358.75
S. INV EL 354.75
N. INV EL 354.75
(11 / C-500)
(SD18) SDMH #7 W/ GRADED LID, (2) TURNED DOWN 90° BENDS, AND 12" SD (±20 LF) @ 0.0% SLOPE
RIM 358.75
S. INV EL 354.75
N. INV EL 354.75
(11 / C-500)
(SD19) SDMH #8 W/ GRADED LID, (2) TURNED DOWN 90° BENDS, AND 12" SD (±20 LF) @ 0.0% SLOPE
RIM 358.75
S. INV EL 354.75
N. INV EL 354.75
(11 / C-500)
(SD20) CB #3 W/ TURNED DOWN 90° BEND, AND 12" SD (±10 LF) @ 0.0% SLOPE
RIM 358.40
S. INV EL 354.75
(10 / C-500)

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NO.	DESCRIPTION	BY	DATE
1	CITY COMMENTS	DSM	10/8/21

ABC MINI STORAGE
RICHLAND, WA

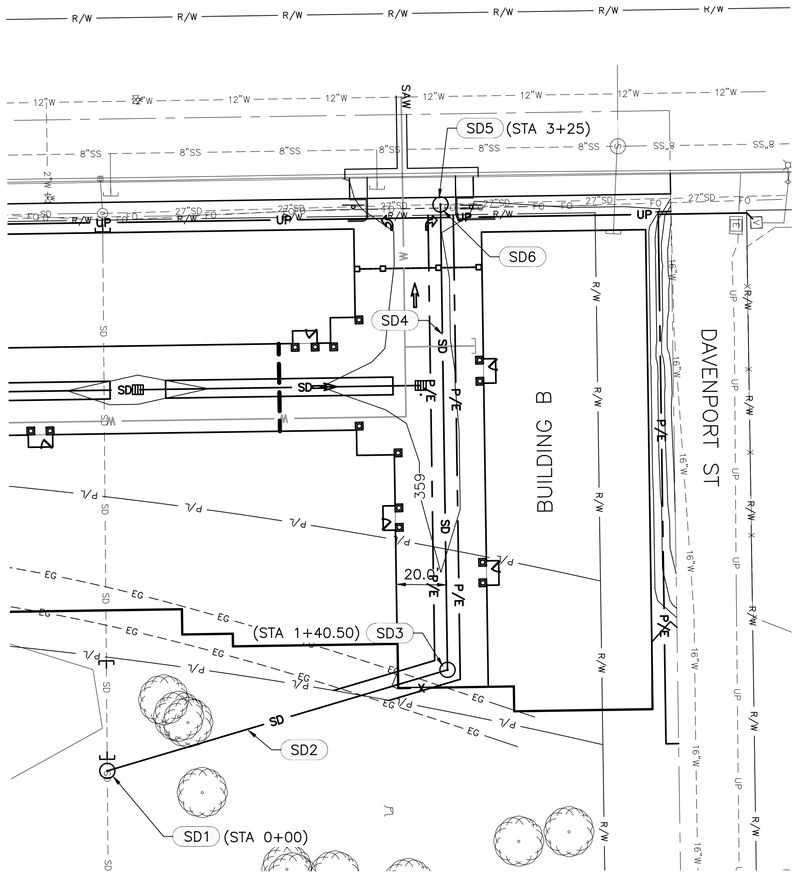
STORM DRAIN PLAN

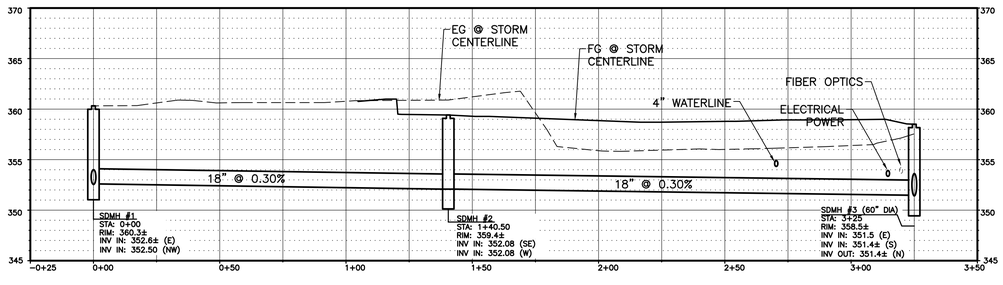
FILE : 30-20-008_C-130
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-130

SHEET: 10 OF 13

Plot Date:9/9/2021 4:52 PM Plotted By: Cole Henderson
Date Created:9/7/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-130.DWG





0 30 60
SCALE IN FEET

KEYED NOTES

STORM DRAINAGE

(SD1) SDMH #1 OVER EXISTING 18" DIA. PIPE
RIM 360.3±
E INV EL 352.6± (EXISTING PIPE)
NW INV EL 352.50

(SD2) 18" SD (±140 LF) @ 0.3% SLOPE

(SD3) SDMH #2 PER COR STND DWG S13
RIM 359.4±
SE INV EL 352.08
W INV EL 352.08

(SD4) 18" SD (±185 LF) @ 0.3% SLOPE

(SD5) SDMH #3 (60" DIA) OVER EXISTING 27" DIA. PIPE
RIM 358.51
E INV EL 351.50
S INV EL 351.4± (EXISTING PIPE)
N INV EL 351.4± (EXISTING PIPE)

(SD6) RETAIN AND PROTECT EXISTING FIBER OPTIC LINES. DIG AND VERIFY DEPTH/LOCATION

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NO.	REVISION	BY	APP'D	DATE
1	CITY COMMENTS	DSM	DSM	9-9-21

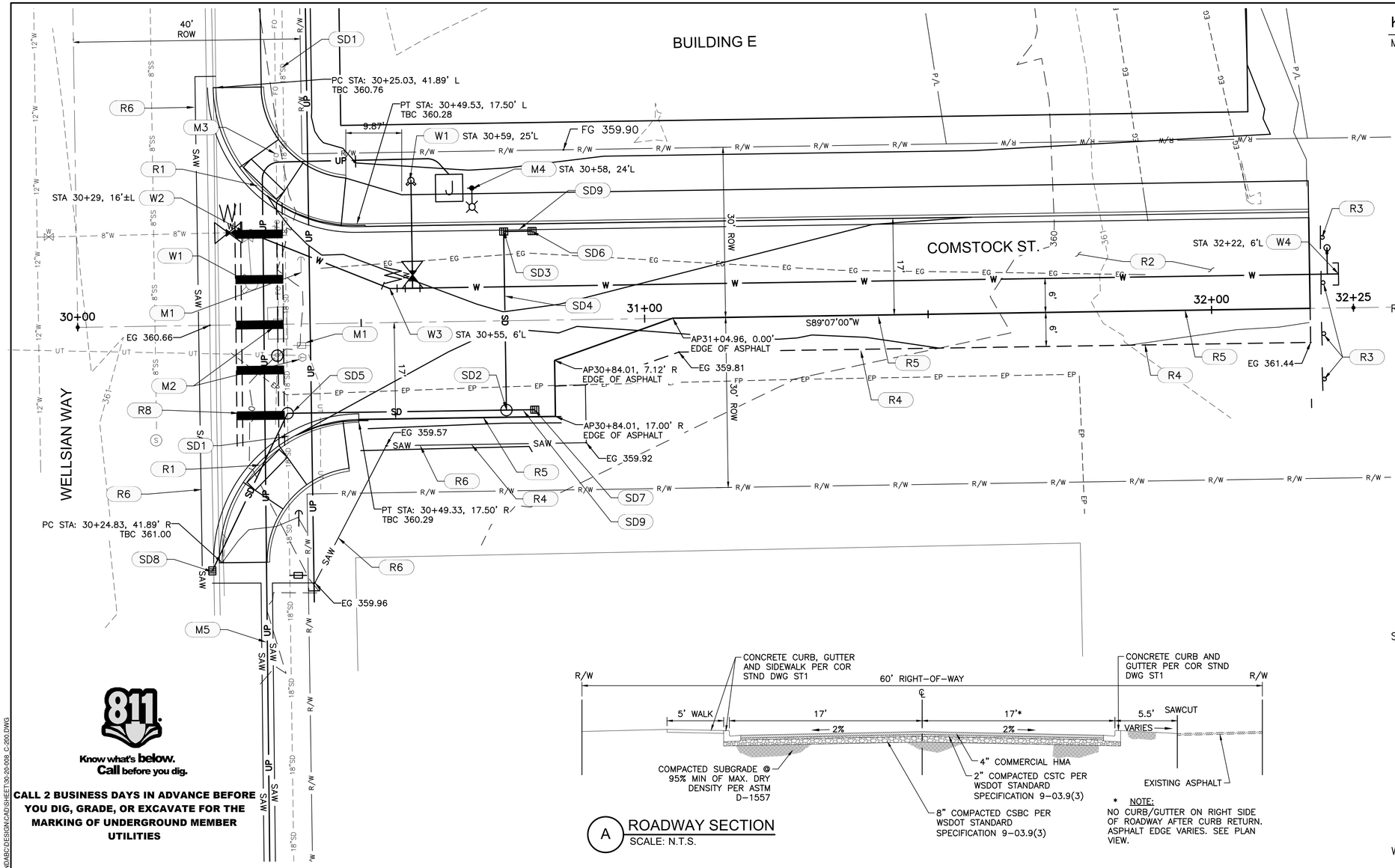
ABC MINI STORAGE
RICHLAND, WA

STORM DRAINAGE PROFILE

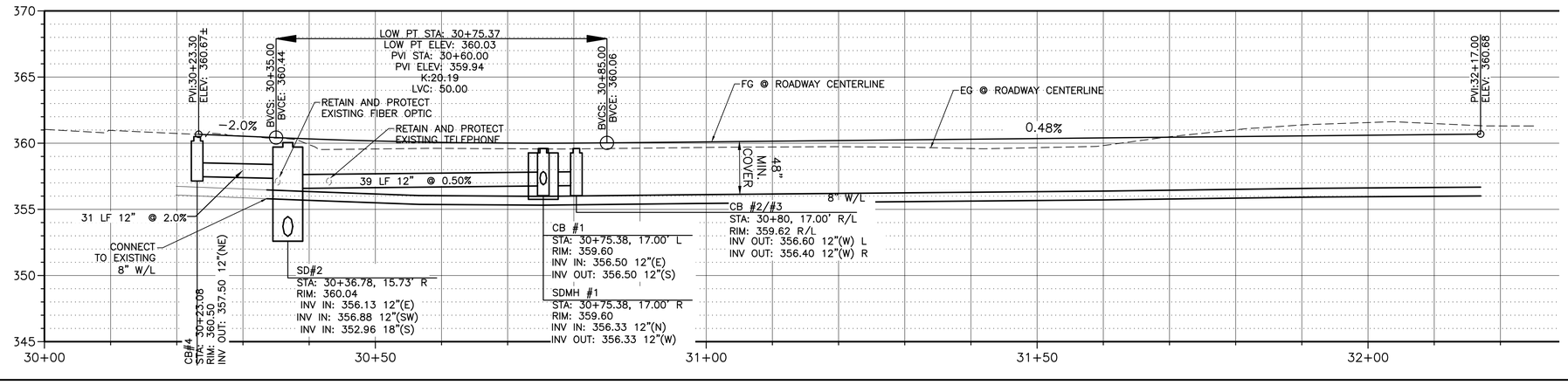
FILE: 30-20-008_C-131
JUB PROJ. #: 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-131
SHEET: 10 OF 13

Plot Date:9/9/2021 4:52 PM Plotted By: Cole Henderson
Date Created:7/22/2021 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-131.DWG



A ROADWAY SECTION
SCALE: N.T.S.



KEYED NOTES

MISCELLANEOUS

- (M1) POWER POLE AND GUY LINE TO BE RELOCATED BY COR ENERGY SERVICES. CONTRACTOR SHALL SCHEDULE/ COORDINATE WITH CITY FOR RELOCATION
- (M2) COMMUNICATION VAULT AND PEDESTAL TO BE RELOCATED BY FRONTIER COMMUNICATIONS. CONTRACTOR SHALL SCHEDULE/ COORDINATE WITH FOR RELOCATION
- (M3) RETAIN AND PROTECT EXISTING FIBER OPTIC UTILITY
- (M4) 30-FT STREET LIGHT PER COR STANDARD DWG SL-1, SL-2 AND SL-3. CONNECT TO EXISTING COR LIGHTING CIRCUIT OF NEAREST CITY LIGHT ON WELLSIAN WAY.
- (M5) CONNECT TO EXISTING COR LIGHTING CIRCUIT OF EXISTING STREET LIGHT ON WELLSIAN WAY. APPROXIMATLEY 180 LF SOUTH OF THE INTERSECTION. PROVIDE SAWCUTTING AND SURFACE REPAIR TO MATCH EXISTING AS NEEDED FOR TRENCHING.

ROADWAY

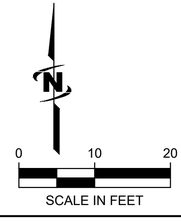
- (R1) SIDEWALK RAMP TYPE 2A PER COR STND DWG ST5. SEE DETAIL 1 ON SHEET C-111 FOR GRADING DETAILS
- (R2) CITY ROADWAY PER COR STND DWG ST11
- (R3) END OF ROADWAY MARKERS (4) AT END OF ROADWAY. MARKERS SHALL BE 18"x18" RED OM4-3 REFLECTIVE 3M DIAMOND GRADE DG3 SERIES 4000. MARKERS SHALL BE SET A 4-FT ABOVE GRADE ON SIGN POST PER COR STANDARD DWG ST-23.
- (R4) MATCH TO EXISTING GRADE
- (R5) EDGE OF ASPHALT
- (R6) NEATLINE SAWCUT EDGE OF ASPHALT. REMOVE AND DISPOSE OF ASPALT.
- (R7) STOP/STREET SIGN PER COR STANDARD SPECIFICATIONS AND STANDARD DWG ST-23. STREET NAME SHALL READ "COMSTOCK ST" AND "WELLSIAN WAY". ADD "NO OUTLET" W14-2A (RIGHT) ABOVE STOP SIGN AND BELOW STREET NAME.
- (R8) PAINTED CROSSWALK STRIPES, 18"Wx8'L @ 8-FT O.C.. PAINT SHALL BE REFLECTIVE WHITE IN ACCORDANCE WITH CITY STANDARS.

STORM DRAIN

- (SD1) RETAIN AND PROTECT EXISTING STORM DRAIN PIPE
- (SD2) SDMH #1 PER COR STD DWG S13. 1-FT MIN. ASPHALT APRON AROUND CATCH BASIN.
- (SD3) CB#1 PER COR STD DWG S11
- (SD4) 12" SD PVC (±34 LF) @ 0.5% SLOPE
- (SD5) SDMH#2 OVER EXISTING 18" SD PIPE PER COR STD DWG S4
- (SD6) CB#2 PER COR STD DWG S11
- (SD7) CB #3 PER COR STD DWG S11. 1-FT MIN. ASPHALT APRON AROUND CATCH BASIN.
- (SD8) CB#4 PER COR STD DWG S11
- (SD9) 12" SD PVC (±4 LF) @ 2.0% SLOPE

WATER

- (W1) FIRE HYDRANT TO BE RELOCATED BY THE COR UTILITY SERVICES. REPLACE WITH NEW HYDRANT IF EXISTING HYDRANT IS NOT UP TO CURRENT CITY STANDARDS. CONTRACTOR SHALL SCHEDULE/ COORDINATE WITH CITY FOR RELOCATION.
- (W2) CONNECT TO EXISTING 8" W/L WITH 8" GATE VALVE AND 45° (FLxFL) ELBOW W/ THRUST BLOCK
- (W3) 8" 45° ELBOW (FLxMJ) W/ THRUST BLOCK ASSEMBLY
- (W4) 2" BLOW OFF ASSEMBLY PER COR STND DWG W13a



SCALE IN FEET

811 Know what's below. Call before you dig.

CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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DEBRAL S. MOORE
STATE OF WASHINGTON
21
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REGISTERED
PROFESSIONAL ENGINEER

NO.	REVISION	BY (APP.)	DATE
1	CITY COMMENTS	DSM	DSM 8-2-21

ABC MINI STORAGE
RICHLAND, WA

FRONTAGE IMPROVEMENTS

FILE : 30-20-008_C-200
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 8/9/2021

DRAWING:
C-200

SHEET: 11 OF 13

Plot Date:8/9/2021 4:52 PM Plotted By: Cole Henderson
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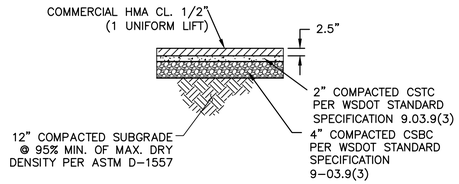
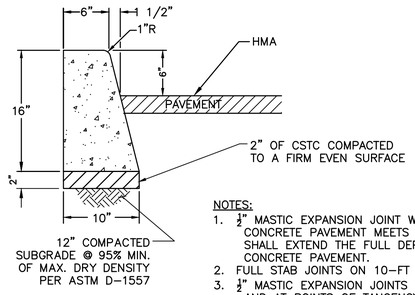


NOTES:

1. ALL GRANULAR BASE/TOP COURSE SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY PER ASTM D1557.
2. HMA SHALL BE COMPACTED TO A MIN. 91% OF THE MAX. SPECIFIC GRAVITY (RICE DENSITY).
3. ASPHALT PAVEMENT SHALL BE COMMERCIAL HMA CL. ½" WITH PG 64-28 ASPHALT BINDER

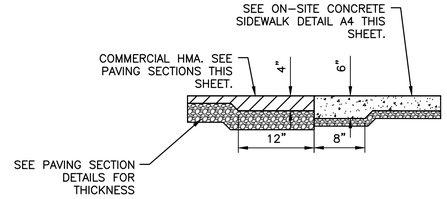
1 STANDARD DUTY ASPHALT
SCALE:N.T.S.



NOTES:

1. ½" MASTIC EXPANSION JOINT WHEN CONCRETE PAVEMENT MEETS CURB. MASTIC SHALL EXTEND THE FULL DEPTH OF THE CONCRETE PAVEMENT.
2. FULL STAB JOINTS ON 10-FT CENTERS.
3. ½" MASTIC EXPANSION JOINTS EVERY 30-FT AND AT POINTS OF TANGENCY AND AT ALL POINTS OF TERMINUS.
4. MIN. 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.

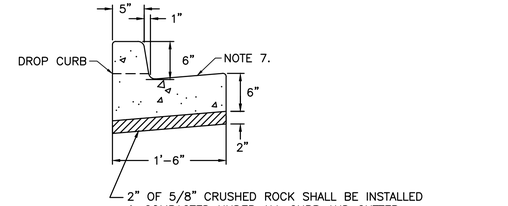
2 CONCRETE BARRIER CURB
SCALE:N.T.S.



NOTES:

1. ALL GRANULAR BASE/TOP COURSE SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY PER ASTM D1557.
2. HMA SHALL BE COMPACTED TO A MIN. 91% OF THE MAX. SPECIFIC GRAVITY (RICE DENSITY).
3. ASPHALT PAVEMENT SHALL BE COMMERCIAL HMA CL. ½" WITH PG 64-28 ASPHALT BINDER

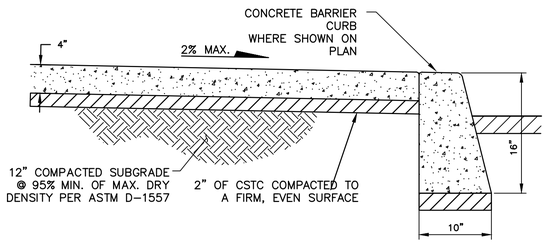
3 FLUSH ASPHALT AND SIDEWALK
SCALE:N.T.S.



NOTES:

1. ½" MASTIC EXPANSION JOINT WHEN CONCRETE PAVEMENT MEETS CURB. MASTIC SHALL EXTEND THE FULL DEPTH OF THE CONCRETE PAVEMENT.
2. FULL STAB JOINTS ON 10-FT CENTERS.
3. ½" MASTIC EXPANSION JOINTS EVERY 20-FT AND AT POINTS OF TANGENCY AND AT ALL POINTS OF TERMINUS.
4. MIN. 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.
5. CSTC SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY PER ASTM D1557.
6. REFER TO CEMENT CONCRETE NOTES DETAIL 6 THIS SHEET.
7. REVERSE GUTTER SLOPE AS NECESSARY.
8. CURB AND GUTTER LOCATED WITHIN THE PUBLIC RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE CITY OF RICHLAND STANDARD DETAILS AND SPECIFICATIONS.

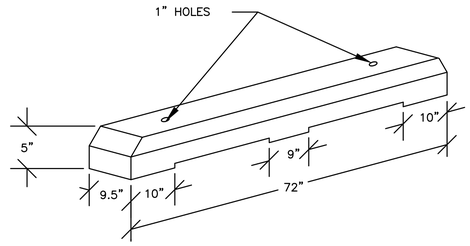
4 ON-SITE CONCRETE CURB AND GUTTER
SCALE:N.T.S.



NOTES:

1. SIDEWALK DUMMY JOINTS AS SHOWN ON THE DRAWINGS. JOINTS SHALL BE AS SQUARE AS POSSIBLE. IF NO JOINTS SHOWN ON PLAN, JOINTS SHALL BE SPACED SAME AS SIDEWALK WIDTH.
2. 1/2" MASTIC EXPANSION JOINTS EVERY 20-FT, AT POINTS OF CURVATURE ON CURB RETURNS, AT POINTS OF TERMINUS AND WHERE SIDEWALK ABUTTS A STRUCTURE.
3. MIN. 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.
4. CSTC SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY PER ASTM D1557.
5. CONCRETE SIDEWALK LOCATED WITHIN THE PUBLIC RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE CITY OF RICHLAND STANDARD DETAILS AND SPECIFICATIONS.
6. REFER TO CEMENT CONCRETE NOTES DETAIL 6 ON THIS SHEET.

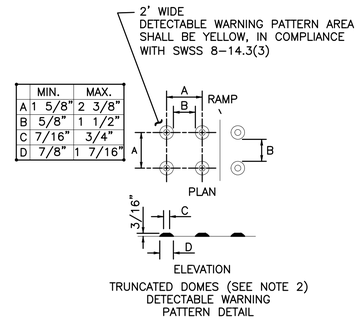
5 ON-SITE CONCRETE SIDEWALK
SCALE:N.T.S.



NOTES:

1. MIN. 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.
2. ANCHOR BUMPERS WITH GROUTED #4 REBAR (2-FT MIN. LENGHT)
3. A MIN. OF TWO (2) #3 BAR LENGTHWISE IN CONCRETE PARKING BUMPER.

6 CONCRETE PARKING BUMPER
SCALE:N.T.S.



7 TRUNCATED DOME
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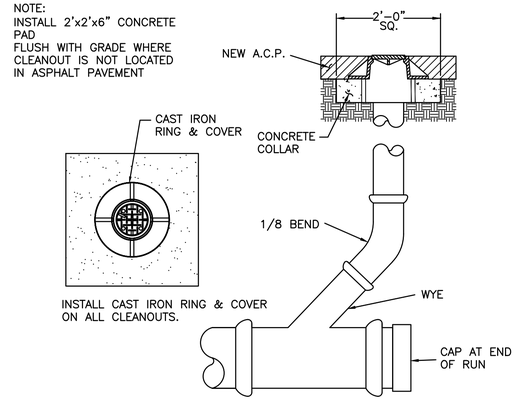

8 CLEANOUT ASSEMBLY
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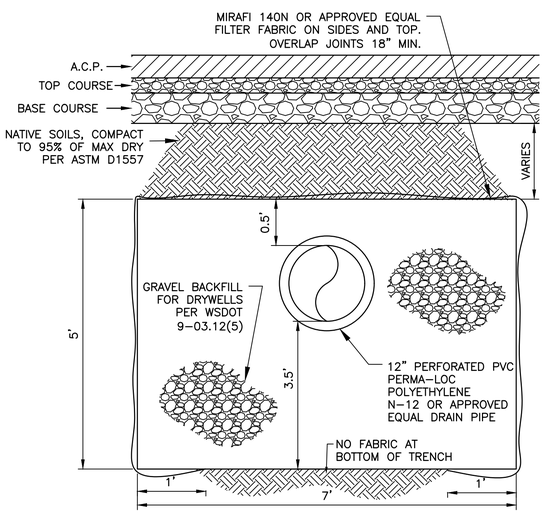

9 INFILTRATION TRENCH
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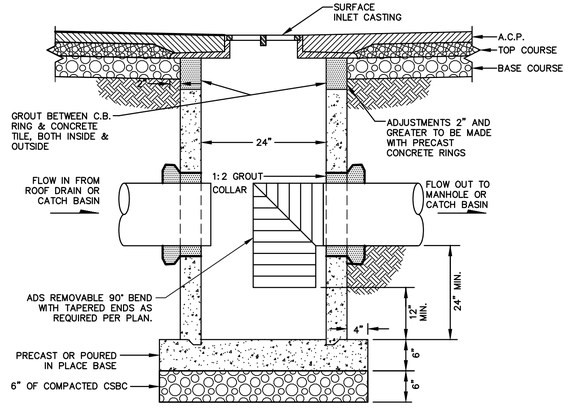
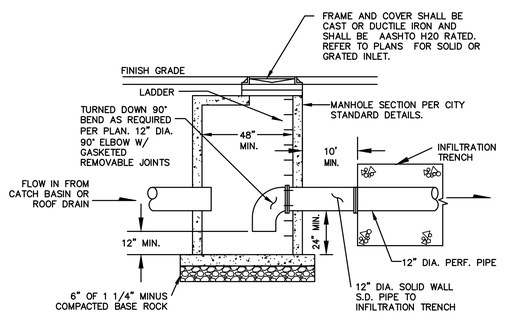


10 CATCH BASIN
SCALE:N.T.S.

NOTES:

1. A RUBBER RING ENTRY COUPLING SHALL BE USED WITH PVC.
2. ALL MANHOLE JOINTS SHALL BE MADE USING A CONTINUOUS FLEXIBLE RUBBER MANHOLE GASKET OR FULL BED GROUT JOINT.
3. ADJUSTMENTS OVER 2" SHALL UTILIZE PRECAST CONCRETE RINGS. GROUT OR PLACE SEALANT (SONNEBORN-SONOLASTIC NPI OR EQUAL) BETWEEN EACH RING AND AT FRAME.



11 SHALLOW STORM DRAINAGE MANHOLE
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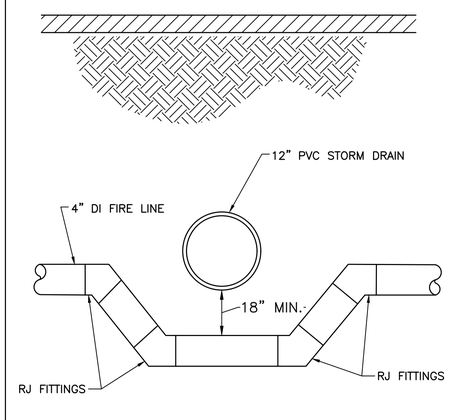

12 UTILITY CROSSING
SCALE:N.T.S.

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37991
REGISTERED
PROFESSIONAL ENGINEER

NO.	DESCRIPTION	BY	APP'L	DATE
	REVISION			

ABC MINI STORAGE
RICHLAND, WA

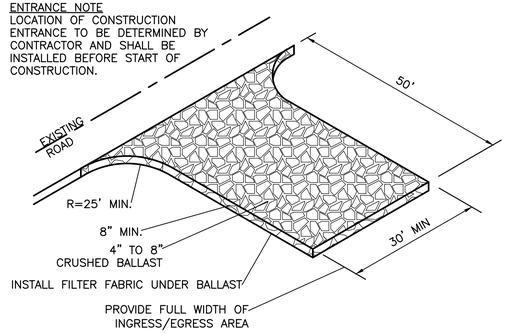
DETAILS

FILE: 30-20-008_C-500
JUB PROJ. #: 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE. IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/29/2020

DRAWING:
C-500

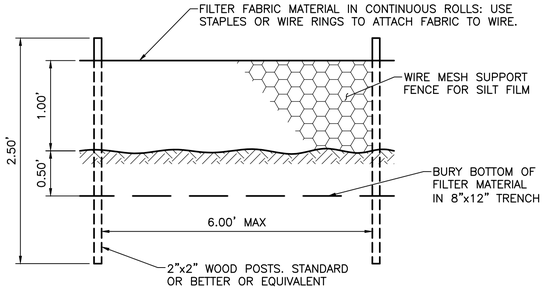
SHEET: 12 OF 13

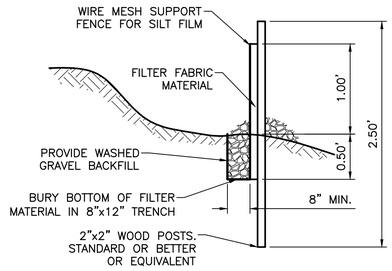
Plot Date:9/3/2021 4:53 PM Plotted By: Cole Henderson
Date Created:9/29/2020 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-500.DWG



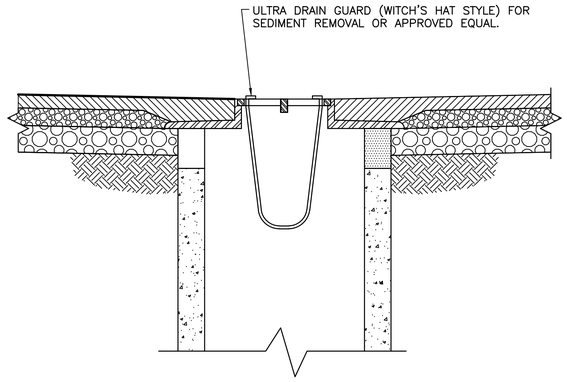
1. THE TEMPORARY CONSTRUCTION ENTRANCE SHOULD BE CLEARED OF ALL VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL. ANY DRAINAGE FACILITIES REQUIRED BECAUSE OF WASHING SHOULD BE CONSTRUCTED ACCORDING TO NOTE #4 IN THIS PLAN. IF WASH RACKS ARE USED, THEY SHOULD BE INSTALLED ACCORDING TO MANUFACTURES SPECIFICATIONS.
2. GRAVEL SHALL BE CRUSHED BALLAST ROCK, 8" TO 12" IN DEPTH AND INSTALLED TO THE SPECIFIED DIMENSIONS AT THE ENTRANCE.
3. THE GRAVEL BALLAST ROCK SHALL BE 4" TO 8" IN DIAMETER AND PLACED ACROSS THE FULL WIDTH OF VEHICULAR INGRESS AND EGRESS AREA. THE LENGTH OF ENTRANCE SHALL BE A MINIMUM OF 50 FEET.
4. IF CONDITIONS ON THE SITE ARE SUCH THAT MOST OF THE MUD IS NOT REMOVED FROM VEHICLE TIRES BY CONTACT WITH GRAVEL, THEN THE TIRES MUST BE WASHED BEFORE VEHICLES ENTER ONTO A PUBLIC ROAD. WASH WATER MUST BE CARRIED AWAY FROM ENTRANCE TO A SETTLING AREA TO REMOVE SEDIMENT. A WASH RACK MAY ALSO BE USED TO MAKE WASHING MORE CONVENIENT AND EFFECTIVE.
5. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 2" STONE, AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAY OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.

1 TEMPORARY VEHICLE TRACKING CONTROL
SCALE: N.T.S.

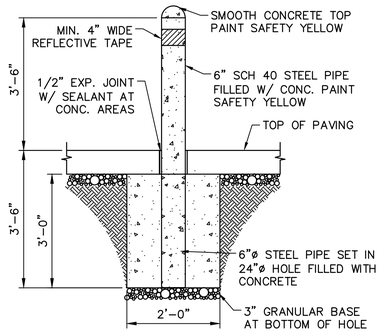




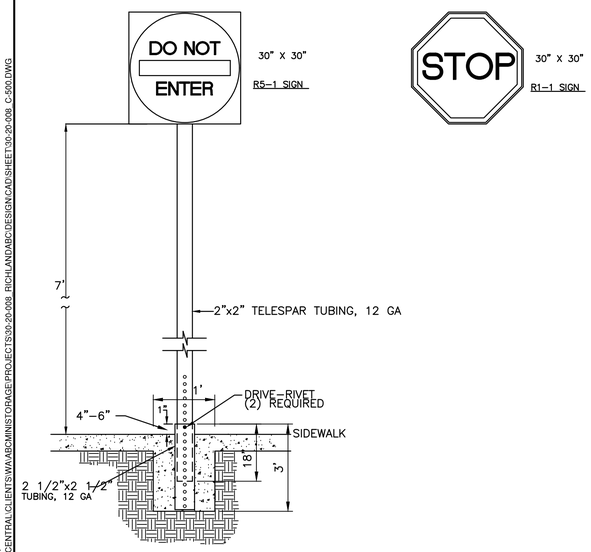
2 SILT FENCE
SCALE:N.T.S.



3 TEMPORARY INLET SEDIMENT CONTROL
SCALE: N.T.S.

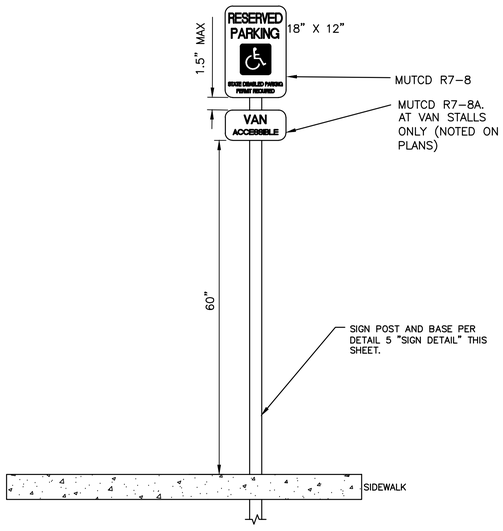


4 BOLLARD
SCALE:N.T.S.



1. SIGNAGE SHALL BE AS REQUIRED BY LOCAL AND STATE ORDINANCES AND MEET THE MOST CURRENT EDITION OF THE MUTCD.
2. POSTS SHALL BE COLD ROLLED STEEL WITH PERFORATIONS OF 0.4375 INCH DIAMETER ON 1-INCH CENTERS ON ALL FOUR SIDES.
3. BASE POST SHALL BE DRIVEN WITH A MECHANICAL DRIVER.

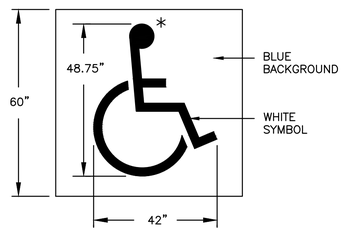
5 SIGN DETAIL
SCALE:N.T.S.



NOTE:
1. SIGNAGE SHALL BE AS REQUIRED BY LOCAL AND STATE ORDINANCES AND MEET THE MOST CURRENT EDITION OF THE MUTCD.

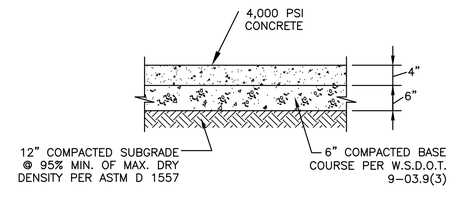
6 PARKING SIGN DETAILS
SCALE:N.T.S.

* SEE STATE FABRICATION MANUAL D-12



NOTES:
1. 60"x60" BLUE BACKGROUND. BLUE SHALL BE IN ACCORDANCE WITH MUTCD/FEDERAL SPECIFICATIONS.
2. 42"x48.75" SYMBOL OF ACCESSIBILITY SHALL BE WHITE

7 PAINTED ACCESSIBLE PARKING SYMBOL
SCALE:N.T.S.



NOTES:
1. JOINTS SHALL BE SQUARE AND EVENLY SPACED.
2. ½"MASTIC EXPANSION JOINTS WHERE PAVEMENT ABUTTS A STRUCTURE.
3. MIN. 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.
4. CSBC SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY PER ASTM D1557.

8 CONCRETE SLAB
SCALE:N.T.S.

J-U-B ENGINEERS, INC.
J-U-B ENGINEERS, INC.
2810 W. Clearwater Ave.
Suite 201
Kennewick, WA 99336
Phone: 509.783.2144
www.jub.com

DARAL S MOORE — STATE OF WASHINGTON — 37891 — REGISTERED PROFESSIONAL ENGINEER

NO.	DESCRIPTION	BY	APPR.	DATE
REVISION				

ABC MINI STORAGE
RICHLAND, WA

DETAILS

FILE : 30-20-008_C-500
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021

DRAWING:
C-501

SHEET: 13 OF 13

Plot Date:9/2/2021 5:10 PM Plotted By: Daral Moore
Date Created:9/29/2020 \\JUB.COM\CENTRAL\CLIENTS\WA\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-500.DWG

ABC Mini Storage

Critical Aquifer Recharge Area (CARA) Assessment

September 7, 2021

Prepared by:

J-U-B ENGINEERS, Inc.

3611 S Zintel Way

Kennewick, Washington 99337

ABC Mini Storage

Critical Aquifer Recharge Area (CARA) Assessment

September 7, 2021

Prepared by:

J-U-B ENGINEERS, Inc.

3611 S Zintel Way

Kennewick, Washington 99337

ABC Mini Storage

CARA Assessment

Contents

Appendix

General

ABC Mini Storage is located at located 302 Wellsian Way, Richland, WA. The proposed project consists of developing a mini storage facility of approximately 80,00 square foot storage building and associated parking improvements on approximately 2.9 acres. The parking area will be paved with hot mixed asphalt. The total area of impervious surfaces is approximately 2.7 acres or covering approximately 90% of the total parcel area. There are no proposed outside material storage areas or above/below ground storage tanks. Refer to Appendix A for Vicinity Map and Appendix B for Site Plan.

Site Geology

Please refer to the geotechnical report as prepared by GPI dated December 14, 2017. for specific soil data testing (Appendix C). From the geotechnical report, the project is in an area with mainly uncontrolled fill over Alluviam (silty sand) soils. Materials encountered in the on-site test pits are consistent with the geological mapping of the area. The geotechnical report prepared in support of the project identified “silty sand (SM)”. Neither basalt nor groundwater was encountered in the test pits. Wells in the area indicate that groundwater is approximately 12.5 to 18-feet below existing grade. Refer to Exhibit D showing static groundwater depths for the existing City water wells located along Wellsian Way.

Additionally, refer to the City of Richland Wellhead Protection Plan as prepared by HDR Engineering, Inc. dated June 1998. This report identifies the project area to have a shallow aquifer with its recharge coming from the Yakima River and discharging to the Columbia River. The water table for this area is between the Hanford and Ringold Formations which is generally around elevation 350. The site elevation is between 360 and 362.

Groundwater

The USGS report previously identified, evaluated flow directions in both the shallow water table aquifer and in the basalt aquifers throughout the Pasco Basin. In the project site area, the general hydraulic gradient in both the shallow water table aquifers (where present) and the basalt aquifers is toward the northeast. Copies of figures from the USGS report showing shallow water table water level contours, Saddle Mountain basalt water level contours and Wanapum basalt contours are included in Appendix E - USGS Water Table Contours, for reference.

Groundwater depths and gradients at the site based on the USGS information are shown below:

Water Table Aquifer:

Depth: None Present at Site

Regional Gradient: 0.023± ft/ft

Saddle Mountain Basalt:

Depth: 200 ft to water bearing zone
Regional Gradient: 0.012 ft/ft

Wanapum Basalt:

Depth: Unknown
Regional Gradient: 0.004 ft/ft

Site Groundwater Considerations

The project is predominately covered with impervious surfaces with an on-site stormwater collection system. Direct discharge to a State body of water is not possible; however, indirect discharge of stormwater into the ground will occur during stormwater events. This injected stormwater will infiltrate into the subsurface soils and more than likely migrate into the shallow aquifer.

The stormwater system has been designed in accordance with the Stormwater Management Manual for Eastern Washington (SWMMEW) as required by the City of Richland. Water quality has been provided in the design to meet the SWMMEW requirements. Therefore, the injection of stormwater indirectly into the ground meets the Washington State Department of Ecology's guidelines. Refer to Appendix F for stormwater calculations.

Existing Adjacent Groundwater Wells

The project is located near the City of Richland Wellsian Way Wellfield (SO2). The following is an excerpt from the City of Richland Water System Plan Chapter 5 – Source Water Protection that describes the existing municipal wells in the project vicinity. Also, refer to Exhibit D showing well data information for these wells.

Wellsian Way Wellfield (S02)

"There are a series of wells along Wellsian Way that collect water in a commercially developed part of the City. Well No. 5 (S13) is located in the middle of a commercial parking lot area in a well house that is adjacent to a gasoline station, a big box store, and mini mall. Well No. 14 (S14) is in a grass berm next to commercial offices and Wellsian Way. Well No. 4 (S12) is located in a landscaped area just north of Wellhouse Loop near Wellsian Way. The wellhead is surrounded by paved surfaces. This well is not currently connected to the water system. Well No. 13A (S15) is located near the playfields on Wellsian Way between Railroad and Elliot Streets. This well is on standby and under study for being converted to a non-potable well supply. The Wellsian Way Wellfield is vulnerable from a sanitary control perspective and pumps out of a shallow groundwater table influenced by current and past industrial and commercial practices. Groundwater in this area is contaminated with volatile organic compounds (VOCs) requiring treatment. The Wellsian wells all pump back through a raw water line to the air stripping facility at Lee Boulevard. The facility uses polyphosphate sequesterant as a reagent. The water is treated and released to the 1182 Reservoirs, then pumped again by the 1182 Booster Pump Station to the Core 545 Zone's 5 and 10 million-gallon (MG) reservoirs."

Critical Areas

The project is located in a Critical Aquifer Recharge Area (CARA) as identified in the City of Richland Critical Area Mapping. As previously noted, the project is in the vicinity of the Wellsian Way Wellfield (S02). Refer to the CARA Map located in Appendix G.

Per the City of Richland Wellhead Protection Plan prepared by HDR Engineering, Inc. dated June 1998, the project is located in the wellhead protection area of the Wellsian Way Wellfield (S02).

Water Quality Data

As noted in the City of Richland Water System Plan Chapter 5 – Source Water Protection "The Wellsian Way Wellfield is vulnerable from a sanitary control perspective and pumps out of a shallow groundwater table influenced by current and past industrial and commercial practices. Groundwater in this area is contaminated with volatile organic compounds (VOCs) requiring treatment.

Evaluation of Project Impact and Mitigation Plan

The proposed project meets the zoning requirements (C-3 General Business) as adopted by the City of Richland Municipal Code (CORMC) and is therefore allowable under the CORMC. The project is directly adjacent to other similar commercial businesses. The project will be covered with impervious surfaces of around 90% of the total site area. There are no proposed outside material storage areas or above/below ground storage tanks. The project will indirectly discharge stormwater from impervious surfaces in accordance with the SWMMEW.

Based upon the described project and existing conditions, the proposed project should not have a significant impact to the CARA. There are no plans to provide project mitigation to limit the impact on CARA.

Appendices

Appendix A – Vicinity Map


PROJECT
LOCATION

Appendix B – Site Plan

KEYED NOTES

SITE LAYOUT

(SL1) SITE VISION TRIANGLE

SCALE IN FEET

0 30 60

WELLSIAN WAY

BUILDING A

BUILDING B

BUILDING C

BUILDING D

BUILDING E

DAVENPORT ST

COMSTOCK ST

GOETHALS DR

N00°51'41"W 740.31'

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E: 1947750.79

N: 342824.74
E: 1947928.14

N: 343562.23
E: 1947739.66

N: 343565.33
E: 1947950.29

N89°09'25"E 145.81'

N89°09'25"E 64.84'

S89°07'00"W 63.71'

N89°07'00"E 113.66'

D=22°40'03"
R=1885.08'
L=745.78'

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5' UTILITY EASEMENT

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ABC MINI STORAGE
RICHLAND, WA

GEOMETRIC CONTROL PLAN

FILE: 30-20-008 C-010
JUB PROJ. # : 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 7/22/2021

DRAWING:
C-010

SHEET: 4 OF 13

Appendix C – Geotechnical Report

GeoProfessional Innovation.

December 14, 2017
File: PU17268A

Mr. Ryan Daley
ABC Mini Storage
421 W. Riverside Ave. Ste. 470
Spokane, Washington 99201

RE: **Geotechnical Engineering Evaluation**
ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

Greetings Mr. Daley:

GeoProfessional Innovation Corporation (GPI) presents this geotechnical engineering evaluation for the ABC Mini Storage facility in Richland, Washington. Our geotechnical engineering evaluation's purpose was to explore the subsurface conditions within the development area and provide geotechnical opinions and recommendations to assist project planning, design, and construction. Our geotechnical services to perform exploration and provide a *Subsurface Exploration Letter* dated October 31, 2017, was authorized on October 23, 2017, referencing our proposal dated October 20, 2017. We were later authorized on November 29, 2017 to perform laboratory testing and provide the *Geotechnical Engineering Evaluation* contained herein.

This report provides specific geotechnical recommendations for earthwork activities, shallow foundation design, concrete slab-on-grade floors, flexible asphalt pavement section design, and stormwater disposal based on the conditions we encountered and observed. The geotechnical recommendations presented herein must be read and implemented in their entirety; portions or individual sections of our report cannot be relied upon without the supporting text in other pertinent sections.

Our opinion is that project construction success will depend, in part, upon the design-build contractor following our report recommendations, adhering to good construction practices and the owner and/or contractor providing the necessary construction monitoring, testing, and geotechnical consultation to document the work has been accomplished as recommended herein. We recommend GPI be retained to provide observation, testing and consultation services to document our report recommendations are incorporated into construction. If we are not given the opportunity to provide geotechnical continuity during construction, we cannot be responsible for designer or contractor errors, omissions, or report misinterpretations.

We appreciate the opportunity to continue to work with ABC Mini Storage and the design team on this project. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,
GPI

Adam J. Rushold, P.E.
Project Engineer

Travis J. Wambeke, P.E.
Principal Engineer

TJW/ac

Geotechnical Engineering Evaluation
ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

PREPARED FOR:
Mr. Ryan Daley
ABC Mini Storage
421 W. Riverside Ave. Ste. 470
Spokane, Washington 99201

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December 14, 2017

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Geotechnical Engineering Evaluation

ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

INTRODUCTION

Our geotechnical engineering evaluation's purpose was to assess subsurface soil conditions within the proposed project area and to prepare geotechnical recommendations to assist final design and construction document development. This report represents the deliverable associated with our authorized proposal dated October 20, 2017. To accomplish our scope we performed the following tasks:

1. Coordinated exploration with the Washington Utility Notification Center to help reduce the risk of damage to existing utilities.
2. Observed subsurface exploration at the site accomplished via a subcontracted excavator and operator, including 7 exploratory test pits at the project site extending 6.5 to 8.5 feet below existing site grades. Test pits were loosely backfilled approximately level with the ground surface upon completing exploration.
3. Performed 1 field infiltration tests during exploration to evaluate the near-surface soils' infiltration characteristics.
4. Provided a *Subsurface Exploration Letter* dated October 31, 2017, including a summary of the subsurface conditions observed, exploration map, and exploration logs.
5. Performed laboratory testing on select soil samples obtained during exploration referencing *ASTM International* (ASTM) test standards.
6. Discussed current project plans with the project team, reviewed subsurface conditions, laboratory test results and proposed construction, conducted geotechnical analyses, and prepared geotechnical recommendations to assist project design and construction.
7. Prepared and provided 1 electronic copy of this report, including our geotechnical findings and opinions, exploration logs, laboratory test results, and exploration map illustrating exploration locations.

PROJECT UNDERSTANDING

We understand Baker Construction & Development, Inc. (Baker) is retained by ABC Mini Storage (ABC) as the design-build contractor to complete design and construction for the project. Our *Project Understanding* is based on conversations with Mr. Ryan Daley with ABC, Mr. Lucas Holmquist with Baker, and with Mr. Darral Moore, P.E., and the project civil engineer with J-U-B Engineers, Inc. (J-U-B) during a project meeting on December 4, 2017. Additional information including structural loads and planned foundation types were provided by Baker through electronic correspondence following the meeting.

The planned ABC Mini Storage facility will be located on an approximate 4.0-acre lot located to the northeast of the Wellsian Way and Wyman Street intersection in Richland, Washington. The site currently is undeveloped and relatively level. The site surface is covered with various shrubs, grass, and weeds. The lot is bordered by Wellsian Way to the west, a Sunwest Sportswear building to the south, an

abandoned railroad alignment and mature trees to the east, and a Metro Services, Inc. warehouse and storage yard to the north.

Based on initial site maps provided by ABC, construction will include 5 storage buildings ranging from 11,300 to 23,300 square feet each. The development will include 1 building on the north, 1 on the south, 2 on the east, and a single 520-foot-long building on the west a side of the site, bordering Wellsian Way. The storage units will be single story structures, supported on shallow pier footings located around the building perimeter, supporting monolithic grades beams and slabs-on-grade. The piers will support loads no greater than 10 kips per pier.

The storage units will be surrounded by asphalt pavement, with concrete hardscapes (i.e., sidewalks and curbs) constructed between the storage units and Wellsian Way. Stormwater design will include a combination of dry wells and sheet flow to the east side of the site. Utilities are expected to extend from Wellsian Way to service the new facility. No substantial grading is expected outside of foundations and utility alignments.

FIELD AND LABORATORY EVALUATION

Site Exploration

We evaluated subsurface conditions within the ABC Mini Storage site by observing 7 exploratory test pits on October 26, 2017. We coordinated exploration with a subcontracted Wacker Neuson excavator and operator, and advanced test pits to depths ranging from 6.5 and 8.5 feet below the existing ground surface. We obtained select soil samples within test pits for laboratory testing and to assist soil classification. The test pits were loosely backfilled upon completion.

Plate 1 illustrates approximate exploration locations established by approximate measurement from existing site features. A GPI GeoProfessional visually described, classified and logged the subsurface conditions encountered during exploration referencing the *Unified Soil Classification System* (USCS). Appendix A presents exploratory test pit and a USCS explanation, which should be used to interpret soil descriptions and terminology throughout this report and on the exploratory logs.

Subsurface Conditions

We encountered silty sand (topsoil) at the ground surface in test pits TP-1 through TP-3, and TP-6 and TP-7. Topsoil contained vegetation and organics to depths ranging between 2 to 4 inches beneath the ground surface. Topsoil was tan to brown, loose, and moist. Beneath these surface layers, we encountered 3 primary subsurface units, summarized as follows:

- Uncontrolled Fill
  - Silt with Sand and Gravelly Silt with Sand (ML) – Tan to brown, loose to medium dense, and moist. We encountered uncontrolled fill in each test pit extending from 2.0 to greater than 7.0 feet below the ground surface. Test pit TP-7 was terminated at roughly 7.0 feet below the ground surface due to refusal upon asphalt debris. Therefore, uncontrolled fill depths may encountered large debris along with various other materials such as brick fragments resulting from previous site operations.

- Ash (ML) – White to tan, stiff, and moist. Ash was encountered beneath the silt uncontrolled fill in test pits TP-1, TP-3, and TP-4 ranging from 2.0 to 5.5 feet below the ground surface. The ash is suspect fill due to its inconsistent thicknesses and locations, leading to the interpretation that it was dumped on the site from clearing surrounding areas, following the Mount St. Helens eruption in 1980.

- Alluvium – Silty Sand and Silty Sand with Gravel (SM) – Tan to brown, medium dense, and moist. We encountered this soil in test pits TP-1 through TP-6 beneath the uncontrolled fill and to test pit terminations from 6.5 to 8.5 below the ground surface.

We measured the soil infiltration rate in test pit TP-1, via the single-ring infiltrometer method outlined in Appendix 6B of the *Washington State Department of Ecology* (Ecology) *Stormwater Management Manual for Eastern Washington* (SMMEW). The test was performed in the native silty sand alluvium at roughly 5.5 feet below the ground surface within TP-1. Infiltration test results and associated recommendations are provided in the *Site Drainage* report section. Groundwater was not encountered in exploration locations. However, groundwater in the Tri-Cities area can fluctuate with seasonal variations in irrigation and precipitation. Our opinion is that localized perched water tables may be encountered at the site in the future, depending in part on the time of year construction is initiated.

Laboratory Testing

We performed laboratory testing on select soil samples collected in the field referencing ASTM procedures. We used laboratory test results to verify soil classification and to estimate soil engineering properties. Exploration logs in Appendix A include index laboratory test results; Appendix B provides graphical and analytical laboratory test results. Laboratory tests included:

- Natural Moisture Content
- Grain Size Distribution
- Atterberg Limits
- Modified Proctor
- In-place Density

GEOTECHNICAL OPINIONS AND RECOMMENDATIONS

The following geotechnical recommendations are presented to assist the design-build contractor with design and construction document development for the ABC Mini Storage facility described in this report. We base our geotechnical recommendations on our experience with similar soil and geologic conditions, findings from our field and laboratory evaluation, and our understanding of the proposed construction. If development plans change, we should be contacted to review the project modifications and revise our recommendations, if necessary. Additionally, if subsurface conditions exposed during construction are different than what we encountered during exploration, GPI should be contacted to review our recommendations and provide any necessary revisions or modifications.

Earthwork

Site Stripping

We recommend all topsoil containing vegetation and organics be removed from beneath the planned buildings, pavement, hardscapes and structural fill areas. Topsoil containing vegetation and organics was

approximately 2 to 4 inches thick in our explorations. However, varying thicknesses of vegetation and organic deposits should be expected.

Site stripping must extend laterally at least 5 feet outside of planned improvement areas. Soil containing vegetation and organics should be disposed off-site or may be reused on-site for landscaping. Topsoil may not be re-used as structural fill beneath the buildings or any site feature.

Uncontrolled Fill Removal

GPI encountered uncontrolled fill in most explorations at the project site, extending 2.0 to 7.0 feet below the existing ground surface. Uncontrolled fill has the potential to settle below new foundations, slabs, and pavements, and can negatively impact performance for site improvements. Settlement beneath even lightly loaded slab or pavement areas could occur as the existing uncontrolled fill comes to equilibrium with new loads and changing moisture conditions. Depending on actual in-place fill conditions and the selected building configuration, loading, and other factors, differential settlement beneath slabs, pavements, and foundations could exceed typical differential settlement tolerances (0.7 inches in 30 feet). Settlement would likely occur after construction is complete as the fine-grained soil consolidates. The risks of uncontrolled fill settlement include misalignment and damage to overlying structures, as well as ongoing maintenance and possibly premature replacement. Therefore, the standard of care is to remove fill from below buildings.

To help reduce project costs, and based on the discussions with ABC and Baker, ABC reports electing to leave uncontrolled fill beneath non-critical site aspects such as slabs-on-grade, pavements, exterior hardscapes, and landscaping areas. However, at a minimum, GPI recommends removing all uncontrolled fill from beneath the foundations. Thus, ABC accepts differential performance risks and the associated investment in maintenance and/or premature replacement for the non-critical site aspects. The extent ABC and the design-build team elects to leave uncontrolled fill below such at-grade, exterior areas should be carefully evaluated based on the associated cost savings and differential performance risks.

Based on exploration findings, we anticipate uncontrolled fill removal will require excavations extending roughly 1 to 2 feet below the existing ground surface after topsoil stripping across the southern 2/3rds of the site. The site's northern 1/3rd will require uncontrolled fill removal from roughly 4 to greater than 6 feet below the existing ground surface. Recompact uncontrolled fill subgrades to help reduce the risks of differential performance below slabs-on-grade, pavements, hardscapes, and structural fill. This process is outlined in the *Establishing Subgrades* section. In addition, *Concrete Slab-on-Grade Floors* report sections provide over-excavation and replacement requirements beneath the footings and slabs. Backfill excavations that remove uncontrolled fill with structural fill, placed and compacted per the *Structural Fill* report section requirements. In addition, contractors should anticipate and budget with the understanding that uncontrolled fill depths will vary across the site.

Based on our explorations, our opinion is excavated silt with sand and gravelly silt with sand uncontrolled fill may be re-used as *General Structural Fill*, but will require processing to remove debris, vegetation and other unsuitable material. We do not recommend that ash be used as structural fill as significant effort and time will likely be required for the soil to be processed and meet the compaction requirement. We recommend GPI work with the design-build contractor to provide additional consultation regarding uncontrolled fill removal at the site during earthwork operations.

Test Pit Remediation

We recommend all test pits be remediated during earthwork construction. Excavations for test pit remediation shall be backfilled with *General Structural Fill* meeting the requirements in this report. If authorized, GPI can review test pit areas with the contractor following site stripping and uncontrolled fill removal to identify test pit remediation locations.

Establishing Subgrades

Following site stripping, excavating to remove uncontrolled fill, and prior to fill placement; expose subgrades for foundations, slabs, and all other subgrades as outlined below:

- Foundation subgrades:
  Prior to placing *General Structural Fill* beneath foundations, over-excavate uncontrolled fill exposing native alluvial silty sand.
- Slab-on-grade subgrades:
  Prior to placing aggregate support sections beneath slabs, over-excavate a minimum 12 inches below the slab bearing elevation.
- All other subgrades:
  Prior to placing structural fill for improvements outside the planned foundations, prepare subgrades by exposing either native soil or uncontrolled fill.

After exposing the resulting subgrade, scarify all subgrades a minimum 12 inches and recompact to a minimum 92 percent of the soil's maximum dry density, referencing ASTM D 1557.

After preparing subgrades, it is the contractor's sole responsibility to protect subgrades from degradation, freezing, saturation, or other disturbance. The on-site soil is moderately moisture-sensitive and susceptible to disturbance when moist or wet. Soil disturbance will negatively impact the soil's performance beneath foundations, slabs, and other improvements. Disturbed and/or uncompacted soil shall not be allowed beneath any structure. Equipment with large tracks, lugs or having toothed buckets has a significant potential to disturb the site soil prior to or following compaction. Rubber-tired transport vehicles should not access prepared subgrades unless the subgrade is sufficiently stiff to allow construction traffic without disturbance. We recommend project earthwork specifications specifically outline that the contractor is required to maintain the subgrade in a compacted condition and protect subgrades from construction traffic disturbance after they have been prepared and meet compaction requirements.

Our opinion is that careful construction and earthwork procedures are critical to achieving adequate subgrade preparation and reducing over-excavation. Specifically, these procedures could include, but are not limited to, carefully staging equipment and/or stockpiles, routing construction equipment away from subgrades, and implementing aggressive site drainage procedures to help reduce saturating subgrades during wet weather conditions. As stated above, it is the contractor's responsibility to protect subgrades throughout construction. Subgrade disturbance that occurs due to the contractor's means and methods must be repaired at no cost to the owner. GPI will remain available to consult with ABC and Baker as the project moves forward regarding subgrade preparation procedures.

Excavation Characteristics

We anticipate the on-site soil may be excavated using conventional soil excavation techniques. In general, slopes and excavations must be excavated, shored, or braced in accordance with the *Washington Industrial Safety and Health Act* (WISHA) regulations and local codes. The near-surface on-site soil generally is classified as a "C" type soil according to WISHA requirements. As such, we recommend provisions be made to allow temporary excavations of any type, and soil to be sloped back to at least 1.5H:1V (horizontal to vertical) or as otherwise determined to be safe according to the selected contractor's competent personnel.

The contractor should be prepared to encounter large debris within the uncontrolled fill which may require equipment with mechanical thumbs, or hydraulic hammers to remove. Ultimately, the selected contractor is responsible for site safety and determining appropriate excavations for the conditions and soil types encountered during construction. GPI is not responsible for temporary excavation stability, or for protecting existing site features during construction.

Excavation Near Existing Structures

It is expected that excavation will be required immediately adjacent to the existing Wellsian Way side walk on the west side of the site. We recommend the design-build contractor develop project documents requiring existing structures be protected while excavating to achieve site grades for the planned facility. At a minimum, we recommend soil excavation near existing structures adhere to the guidelines in Washington Administrative Code (*WAC) Section 296-155.* In general, we recommend soil within a 1.5H:1V prism extending down and away from the existing ground surface adjacent to the existing structures or other facilities must remain in place and be protected. Where excavations for new construction including footings, utility connections, or other purposes must extend below and expose the base of the existing structures, contractors must exercise extreme care to avoid undermining the existing structures.

Structural Fill

Place all fill as structural fill meeting the requirements presented in Table 1 below. The on-site uncontrolled fill and alluvial soil are expected to be suitable for re-use as *General Structural Fill*, but will require processing to remove debris and may require moisture-conditioning prior to placement.

Table 1. Soil Fill Specifications and Allowable Use

Soil Fill Product	Allowable Use	Material Specifications
General Structural Fill[1]	• General site grading • Foundation wall backfill and utility trench backfill • Utility trench backfill • Over-excavation beneath foundations	• Soil must be classified as GP, GM, GW, SP, SM, or SW according to the USCS. • Soil may not contain particles larger than 6 inches in median diameter. • Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances. • Site soil meets these requirements after being processed to remove debris and organics.
Crushed Surfacing[2]	• General Structural Fill applications • Slab support aggregate	• Soil meeting requirements stated in *Section 9-03.9(3) – Crushed Surfacing* of WSDOT Standards.
Bedding Course	• Utility pipe bedding	• Soil meeting requirements stated in *Section 9-03.12(3) - Gravel Backfill for Pipe Zone Bedding* of WSDOT Standards.
Unsatisfactory Soil	• NONE	• Soil classified as CL, CH, MH, OH, OL or PT may not be used at the project site. • Any soil containing more than 3 percent (by weight) of organics, vegetation, wood, metal, plastic or other deleterious substances. • Variable moisture content does not render a soil unsatisfactory. Soil must be moisture conditioned to facilitate the required compaction.

1. The on-site soil generally meets the intent of our recommendations for *Structural Fill*.
2. *Crushed Surfacing* includes both "top course" and "base course" referencing WSDOT Standards.

Required Compaction

Table 2 summarizes soil product compaction requirements.

Table 2. Required Soil Compaction for Designated Project Areas

Project Area	Required Soil Product	Compaction Requirement[1]
Soil subgrades beneath structural fill placements, concrete or other improvements.	Native Soil or Uncontrolled Fill	92%
General site grading fill placement, utility trench backfill, stemwall backfill, over-excavations beneath foundations	General Structural Fill	95%
Over-excavations, slab support aggregate	Crushed Surfacing	95%

1. Reference ASTM D1557 modified Proctor

Place structural fill over approved subgrades. Never place structural fill over frozen, saturated, or soft subgrades. Structural fill must be moisture conditioned to near optimum moisture content and placed in maximum 12-inch-thick, loose lifts, providing compaction equipment weighs at least 5 tons. If smaller or lighter compaction equipment is provided, reduce the lift thickness to meet the compaction requirements presented herein. The contractor is responsible for selecting compaction equipment suitable for achieving compaction.

Imported structural fill products may be too coarse for conventional Proctor testing if it contains more than 30 percent particles retained on the No. ¾ sieve (i.e., oversize material). If excessive oversize material is present within imported structural fill products, we recommend oversize material be compacted using a "method specification". Method compaction should occur by applying at least 5 complete passes over the soil using vibratory compaction equipment with a drum energy rating of at least 10 tons. We do not recommend smaller compaction equipment for method compaction. Method compaction must be observed on a full-time basis by GPI to document a dense, unyielding and interlocking *Structural Fill* surface is achieved.

Wet Weather, Wet Soil Construction and Over-Excavations

Once the subgrade elevation is achieved, it is the contractor's responsibility to protect the soil from degrading under construction traffic, freezing and/or wet weather. Initial footing excavations should not be completed within 24 hours of expected precipitation. Footing or slab concrete placement should never be attempted following a significant precipitation event and the subgrade should never be allowed to freeze prior to concrete or fill placement. The condition of the subgrade and careful construction procedures are critical to foundation and slab stability and the long-term performance of the structure.

We strongly recommend earthwork construction take place during dry weather conditions. Portions of the on-site soil will be susceptible to pumping or rutting from heavy loads such as rubber-tired equipment or vehicles any time of the year. If construction commences before soil can dry after precipitation or during wet periods of the year (November through April), earthwork at the subgrade elevation should be completed by low pressure, track-mounted equipment that spreads and reduces vehicle loads. Work should not be performed immediately after rainfall or until soil can dry to below

optimum moisture content. Time for proper moisture conditioning during dry weather is critical to reducing excessive over-excavations and the need to import coarse structural fill products.

Geosynthetics

Geosynthetic separation fabric is recommended for flexible pavement section construction. Geogrid is not anticipated to be required, but help maintain site access roads during construction. Geogrid can also help improve persistently soft subgrades encountered during construction. If required, geosynthetics shall meet the minimum requirements in WSDOT Standards Section 9-33.2(1) – Table 3, and the minimum properties shown in Table 3 below:

Table 3. Geosynthetic Specifications

Geosynthetic Type	Use	Minimum Material Specifications
Non-Woven Geosynthetic	• Asphalt pavement construction	• Must meet Soil Stabilization – Non-Woven requirements in WSDOT Standards Section 9-33.2(1). Table 3. • Grab tensile strength: 200 pounds (ASTM D4632) • Puncture resistance: 430 pounds (ASTM D6241) • Apparent opening size: US Sieve #40 (ASTM D4751) • Permittivity: 0.1 $seconds^{-1}$ (ASTM D4491)
Triaxial or Biaxial Geogrid	• Gravel-surfaced site access roads • Construction access roads • Persistent soft subgrade conditions	• 93 percent junction efficiency (GRI-GG2-05) • 3.0 kg-cm/degree Aperture Stability (U.S. Army Corp of Engineers Ref. 3.3.1.2000) • Minimum Radial Stiffness of 15,400 lb/ft at 0.5% Strain (ASTM D6637)

Apply geosynthetics directly on approved subgrades, taut, free of wrinkles, and over-lapped at least 12 inches. Consult GPI to review geosynthetic applications or other subgrade improvement alternatives.

Utility Trench Construction Considerations

Pipe bedding for utility construction should conform to WSDOT *Section 9-03.12(3)-Gravel Backfill for Pipe Zone Bedding* and Table 1 of this report. Loose soil must be removed from the base of utility trenches prior to placing pipe bedding. In addition, if water is encountered, it must be removed from the base of the utility trench before placing pipe bedding. We recommend utility pipes be placed on at least 4 inches of bedding placed and supported according to the pipe manufacturer's specifications and WSDOT requirements.

Thoroughly place and compact bedding below pipe haunches or the zone between the pipe invert and the spring line. Then place pipe bedding and compact it from the pipe invert to 1.0 foot above the top of the pipe with tamping bars and/or plate compactors to render the backfill to a dense and unyielding condition. To accomplish bedding compaction, the distance between the side of the pipe at the spring line and the trench wall should be at least 12 inches. The remainder of the utility trench should be backfilled in accordance with this report's *Required Compaction* section.

Shallow Foundations

If our recommendations are followed, the foundation design criteria presented herein can be applied to building foundations, assuming the loading conditions stated in our *Project Understanding* report section are accurate. Uncontrolled fill must be removed from beneath the foundations. Footings must be constructed on native subgrades prepared per the *Establishing Subgrades* report section requirements, or *General Structural Fill* placed over prepared native subgrades. Subgrades must remain in a compacted condition during foundation preparations, construction of concrete formwork, and reinforcing steel placement. All foundation bearing surfaces should be free of loose soil and debris and be compacted to requirements presented in the *Required Compaction* report section.

Design Criteria

Based on preparing the foundation bearing soil units as described herein, the following items provide our recommended shallow foundation design criteria:

- Maximum allowable bearing pressure: 3,000 pounds per square foot (psf)
  - Design may utilize a maximum 30 percent allowable bearing pressure increase for short term load increases such as wind or seismic.
  - Pier footing skin friction must be neglected.
- Estimated foundation vertical settlement:
  - Total settlement: 1.0 inch.
  - Differential settlement: 0.7 inch in a 30.0-foot horizontal span or between adjacent, differently loaded footings.
- Lateral load resistance:
  - Foundation base friction coefficient:
    - 0.35 for foundations cast directly on alluvial soil.
    - Reduce friction by 2/3 for precast elements.
  - Passive soil resistance on foundation sides:
    - Equivalent fluid pressure: 350 pcf (requires ¾-inch lateral movement to mobilize full resistance).
    - Neglect upper 12-inches of wall backfill due to frost action.
- Footing embedment:
  - Exterior footings must extend at least 24 inches below the final, exterior ground surface to help protect against frost action.
- Site Class – 2015 IBC Section:
  - Based on our field exploration and knowledge of the upper 100 feet of the soil profile, we preliminarily recommend using a Site Class D as a basis for structural frame seismic design. A site-specific study seismic response was not performed.

Concrete Slab-On-Grade Floors

We recommend concrete slab-on-grade floors be supported by a minimum of 12 inches of C*rushed Surfacing* meeting the requirements shown in Table 1. This assumes compacted subgrades will be

prepared beneath slabs per the *Earthwork* report section. Slabs must be designed for the anticipated use and equipment or storage loading conditions. Based on correlations to our field and laboratory test results, if our recommendations are followed, we recommend concrete slab design utilize an allowable modulus of subgrade reaction (k) of 200 pounds per cubic inch (pci). To realize the estimated subgrade modulus, drained conditions and a minimum 12 inch of support section must be provided, helping to reduce the impacts of underlying uncontrolled fill.

Moisture Protection

Based on discussions with Baker, vapor retarder is not currently planned as part of slab-on-grade construction. Floors will primarily consist of exposed concrete and will not receive addition floor covering that are susceptible to moisture damage. However, if vapor retarders are being considered, they must consist of thick, puncture-proof polyethylene sheeting, such as a 15-mil Stego Wrap™ retarder, placed immediately below the floor slab. Even if vapor retarders are used, water vapor migration through the concrete floor slab is still possible. Floor coverings should be selected accordingly and, when practical, flooring manufacturers should be consulted regarding moisture barriers, their location and product warranties.

Site Drainage

Surface Grading

We recommend the ground surface outside the structure be sloped at least 5 percent away for a minimum of 10 feet to rapidly convey surface water away from foundations. Site grades beyond 10 feet from structures should slope at least 2 percent away and toward designated stormwater collection features designed by J-U-B. *Americans with Disabilities Act* (ADA) hardscapes may not meet the above site grading recommendations adjacent to structures. We recommend ADA-pertinent hardscapes be sloped away from structures to the maximum extent practical while satisfying ADA requirements. We recommend elastomeric sealant be considered between hardscapes and foundation walls to reduce moisture infiltration at joints near building structures. Well-designed site drainage and careful final grading will help reduce moisture infiltration near building and paved areas, which will also help reduce impacts from frost heave, vapor intrusion to interior spaces and help improve long-term performance of such structures.

Runoff from precipitation or snowmelt must be routed down gradient and away from structures and must not be allowed to infiltrate, or be diverted towards building walls, foundations, or slab subgrades. Runoff or water migrating along the ground surface must be conveyed away from structures by surface water management procedures established and designed by J-U-B.

Infiltration

We accomplished infiltration testing in test pit TP-1, referencing methods outlined in Appendix 6B.6 of Ecology's SMMEW. We performed the field infiltration tests at roughly 5.5 feet below the ground surface in the alluvial, silty sand encountered in our exploration. To accomplish the test, we saturated the soil beneath the infiltration test location for a period of about 1.0 hour prior to performing the test. Upon pre-saturation, the infiltration test was initiated and performed over a period of 0.5 hours. The infiltration test results yielded the estimated un-factored infiltration rate 8.0 inches per hour.

The infiltration rate measured during our exploration is moderate. However, many factors can reduce infiltration rates. Therefore, prudent engineering judgment must be used when selecting an infiltration rate for designing stormwater disposal facilities. We recommend project civil designers apply a safety factor to the measured infiltration rate, based on their engineering judgment and design intent. Safety factors for infiltration facilities in various regional central Washington municipalities typically range from 2 to 4. Also, specifying additional infiltration testing be performed once subgrades are established can help confirm infiltration rates meet the project design.

Soil infiltration rates can dramatically decrease when the subgrade is compacted, backfill is plugged with fines, or the soil becomes frozen or saturated. Saturation due to spring runoff and summer irrigation can create localized, perched groundwater tables, which can reduce the soil's ability to infiltrate stormwater. We recommend project specification include provisions regarding careful construction practices, which do not reduce the soil's infiltration capacity, including:

- Accomplishing careful subgrade preparations which do not compact soil beneath or around the swales or chambers.
- Protecting drainage aggregate from soil contamination via a separation geotextile.

Stormwater Disposal

Planned stormwater design currently includes the use of dry well infiltration to help discharge on site stormwater. Stormwater facilities must be designed in accordance with Ecology's SMMEW requirements. Groundwater was not encountered during exploration; however, Ecology's website provides local publicly available well driller logs indicating the groundwater to be located up to 10 feet below the ground surface. Groundwater elevations must be factored into stormwater design. According to the SMMEW, dry well bottoms should be a minimum 5 feet above seasonal high groundwater. Stormwater must infiltrate into the alluvial silty sand as infiltration into uncontrolled fill cannot be predicted. We recommend stormwater be disposed as far from the planned buildings as possible, at least 2 feet below the base of the building foundations, and outside any planned structures.

Pavement Section Thickness

The following pavement section design is provided referencing the *American Association of State Highway and Transportation Officials* (AASHTO) *Guide for Design of Pavement Structures* (1993 Pavement Design Guide). Estimated traffic loading was provided by ABC via electronic correspondence on December 12, 2017. Other design parameters are based on typical pavement design criteria in the central Washington area, results from laboratory testing, and our understanding of the subsurface conditions. The following tables present our design parameters and references as well as the resulting pavement section design recommendations using the AASHTO 1993 Pavement Design Guide.

Table 4. Pavement Section Design Parameters

Design Parameter	Value Used	Reference
Reliability (R)	85%	AASHTO 1993 guidelines
Standard Deviation (S)	0.45	AASHTO 1993 guidelines
Initial Serviceability (PSI_i)	4.2	Typical central Washington area values
Terminal Serviceability (PSI_z)	2.2	Typical central Washington area values
Traffic Loading	11,000 ESALS[1]	Estimated Traffic Loading • 6,000 lb GVW (Passenger vehicles) – 156 per day • 9,000 lb GVW (Moving van) – 2 trips per week • 40,000 lb GVW (Garbage truck) – 1 trip per week
Design Life (Flexible Asphalt Pavement)	20 years	Typical central Washington value
Resilient Modulus (M_r)	5,000 psi[2]	Based on California Bearing Ratio (CBR) and M_r correlations (see paragraph below)
Asphalt Layer Coefficient (a_1)	0.42	Figure 2.5 AASHTO 1993
Top Course Layer Coefficient (a_2)	0.14	Figure 2.6 AASHTO 1993
Top Course Drainage Coefficient (m_2)	0.95	Table 2.4 AASHTO 1993 for "fair" drainage, 1 to 5 percent saturation

1 Equivalent Single Axle Loads (ESALs)
2 Pounds per square inch (psi)
3 Pounds per square inch, per inch of subgrade (pounds per cubic inch, pci).

Based on CBR and resilient modulus correlations published by AASHTO, and our experience with resilient modulus testing, we estimate the on-site soil will exhibit a resilient modulus value of at least 5,000 pounds per square inch (psi), provided the subgrade is prepared as recommended in the *Earthwork* report section. Based on the above pavement design parameters, Table 6 provides our flexible pavement design recommendations for pavements.

Table 5. Flexible Pavement Section Design

Pavement Section Material	Section Thickness (inches)	Material Specifications
Asphalt Pavement	2.5	Hot-mix asphalt (HMA) conforming to *Section 5-04* of the latest edition of WSDOT Standards. HMA should consist of Class 1/2-inch or Class 3/4-inch.
Crushed Surfacing	6.0	Top course or base course conforming to the latest WSDOT Standards *Section 9-03.9(3) Crushed Surfacing.*
Non-woven Geosynthetic Fabric	Recommended	Conforming to *Geosynthetics* report section requirements.

The above sections assumes *no construction traffic* will access pavements. Significant pavement damage can occur after just a single pass with heavily loaded construction equipment.

Pavement Maintenance and Drainage

We recommend crack maintenance be accomplished on all pavement surfaces every 3 to 5 years to reduce the potential for surface water infiltration into the underlying pavement subgrade. Surface and subgrade drainage are extremely important to the performance of the pavement section. Therefore, we recommend the subgrade, crushed surfacing, and paved surfaces slope at no less than 2 percent to an appropriate stormwater disposal system or other appropriate location that does not impact adjacent buildings or properties. Pavement performance will depend upon achieving adequate drainage throughout the section and especially at the subgrade. Water ponding at the pavement subgrade surface can induce heaving during the freeze-thaw process, which can readily damage pavement. We recommend the ABC annually review pavement surface performance to help identify and address any pavement maintenance issues.

The above pavement sections assume the pavement subgrade will be prepared as described in the *Site Preparation* report section. We recommend GPI be retained to observe and traverse the pavement subgrade to identify areas that deviate from what we have assumed for design and to help identify soft, rutting or pumping soil areas, or other potentially problematic conditions.

ADDITIONAL RECOMMENDED SERVICES

Geotechnical Design Continuity

The information contained in this report is based on anticipated site grading and provided structural loads from Baker. The final floor elevation, floor configuration, loading conditions, as well as site geometry, can significantly alter our opinions and design recommendations. Specifically, changes in structural design loads and planned site grading may require additional foundation and earthwork evaluations specific to the actual anticipated construction conditions. We should be contacted once final designs are completed to review our opinions and design recommendations contained herein.

Plan and Specification Review

We recommend GPI be retained to review geotechnical related plan and specification sections prior to issuance of the construction documents. It has been our experience that having the geotechnical consultants from the design team review the construction documents reduces the potential for errors and reduces costly changes to the contract during construction.

Geotechnical Observation During Construction

We recommend GPI be retained to provide construction observation and testing to document the report recommendations have been followed. If for some reason we are not retained to provide the recommended construction observation services, we cannot be responsible for soil engineering-related construction errors or omissions. Providing these services during construction will help to identify potential earthwork and foundation construction issues, thus allowing the contractor to proactively remedy problems and reduce the potential for errors and omissions.

EVALUATION LIMITATIONS

This geotechnical engineering report has been prepared to assist in planning, design, and construction for the ABC Mini Storage facility to be constructed at Wellsian Way and Wymans Street in Richland, Washington. Our scope does not include an engineering evaluation for deep foundations, shoring, underpinning, concrete section design, landscaping, or soil nutrient analysis. Variation in subsurface conditions may exist between or beyond our explorations, which can necessitate changes to the geotechnical recommendations in this report. Also, changes to the planned development can drastically affect our recommendations. If the improvement plans change from those described herein, we must be notified so that we may make modifications to our recommendations with respect to the modified improvements. If unforeseen conditions are encountered during earthwork, GPI must be afforded the opportunity to review our recommendations and provide necessary consultation, revision, or modifications to information contained herein. We recommend GPI be retained to review the final project plans and specifications, to provide geotechnical continuity throughout construction, and to identify any soil variations which could impact our recommendations.

This report was prepared for the exclusive use of the ABC Mini Storage and their project design team, for the specific project referenced herein. GPI cannot be held responsible for unauthorized duplication or reliance upon this report or its contents without written authorization. The geotechnical recommendations provided herein are based on the premise that an adequate program of tests and observations will be conducted by GPI during construction in order to verify compliance with our recommendations and to confirm conditions between exploration locations. Subsurface conditions may vary from the locations explored and the extent of variation may only be known at the time of construction. Where variations occur, it is critical GPI be afforded the opportunity to modify our report to reflect the site conditions exposed. This acknowledgment is in lieu of all warranties either express or implied.

LEGEND

TP-1 (1.0) *	Approximate boring location observed by GPI on October 26, 2017. Approximate depth of observed uncontrolled fill (feet). Infiltration test

Site Vicinity Map

TP-7 (7.0)

TP-6 (5.0)

TP-5 (5.0)

TP-4 (2.5)

TP-3 (3.5)

TP-2 (2.5)

TP-1* (3.0)

Wellhouse Loop

Wyman St

Wellsian Way

Goethals Dr

North

EXPLORATION MAP
ABC Mini Storage
Wellsian Way
Richland, Washington

GeoProfessional Innovation.

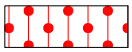
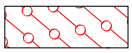
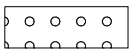
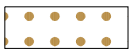
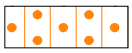
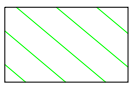
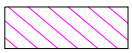
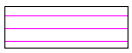
PU17268	PLATE 1

Reference: © 2017 Google. No Scale Intended

APPENDIX A

Unified Soil Classification System (USCS)
Exploratory Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
				GP	POORLY-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
		GRAVEL WITH FINES		GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES.
				GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES.
	SAND	CLEAN SAND		SW	WELL-GRADED SAND, GRAVELLY SAND.
				SP	POORLY-GRADED SAND, GRAVELLY SAND.
		SAND WITH FINES		SM	SILTY SAND, SAND-SILT MIXTURES.
				SC	CLAYEY SAND, SAND-CLAY MIXTURES.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	INORGANIC SILT, SANDY OR CLAYEY SILT.
				CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, SANDY OR SILTY CLAY.
				CL-ML	INORGANIC MIXED CLAY AND SILT.
				OL	ORGANIC SILT AND CLAY OF LOW PLASTICITY.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILT, MICA- CEOUS SILT, PLASTIC SILT.
				CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY.
				OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY.
				PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS.

BORING LOG SYMBOLS

STANDARD 2 INCH OD SPLIT SPOON SAMPLE

CALIFORNIA MODIFIED 3 INCH OD SPLIT SPOON SAMPLE

ROCK CORE

SHELBY TUBE 3 INCH OD UNDISTURBED SAMPLE

TEST PIT LOG SYMBOLS

GRAB BAG SAMPLE

BG

BULK SAMPLE

BK

RING SAMPLE

RG

GROUNDWATER SYMBOLS

GROUND WATER AFTER 24 HOURS

GROUND WATER AT TIME OF DRILLING

GROUND WATER AT THE END OF DRILLING

GeoProfessional Innovation®

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist	0.0	SM								Trace vegetation and organics encountered to approximately 4 inches BGS.
UNCONTROLLED FILL - SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist		ML		BG						
	2.5			BG			15.1			
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist		ML								
	5.0			BG			15.5			ASTM D4318: Atterberg Limits = Non-plastic Infiltration testing was performed at approximately 5.5 feet BGS. Unfactored Infiltration Rate: 8 inches/hour
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist		SM								
	7.5									
Test Pit Terminated at 7.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-1	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/13/17 16:15 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist UNCONTROLLED FILL - SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	SM ML		BG			12.0			Trace vegetation and organics encountered to approximately 3 inches BGS.
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5	SM								
	5.0									
Test Pit Terminated at 6.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-2	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist	0.0	SM								Trace vegetation and organics encountered to approximately 4 inches BGS.
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist		ML		BG						
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist	2.5	ML								
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist		SM		BG						
ALLUVIUM - SILTY SAND WITH GRAVEL, (SM) tan to brown, medium dense, moist	5.0	SM								
Test Pit Terminated at 6.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-3	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	ML		BK						Pea gravel surfacing to approximately 2-inches BGS.
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist		ML								
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5	SM								
Test Pit Terminated at 7.0 Feet.	5.0									Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-4
Project: PU17268	**Date Excavated:** 10-26-2017
Backhoe: Wacker Neuson	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RLH

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	ML		BK	51.0					Bricks encountered at approximately 3.0 feet BGS. Crushed gravel encountered at approximately 4 feet BGS. ASTM D1557: Modified Proctor Maximum Dry Density = 121.5 pcf Optimum Moisture Content = 7.5% ASTM D4318: Atterberg Limits = Non-plastic
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5 5.0	SM								
Test Pit Terminated at 7.0 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-5
Project: PU17268	**Date Excavated:** 10-26-2017
Backhoe: Wacker Neuson	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RLH

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (SM) black, soft, moist UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0 2.5	SM ML		BG						Trace vegetation and organics encountered to approximately 2 inches BGS. Tile debris encountered at approximately 1.5 feet BGS.
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	5.0 7.5	SM		BG						
Test Pit Terminated at 8.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-6	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	SM		BG						Trace vegetation and organics encountered to approximately 3 inches BGS.
	2.5	ML		BG						
	5.0			BG			15.2			Test pit refused on asphalt debris at approximately 7.0 feet BGS.
Test Pit Terminated at 7.0 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-7	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

APPENDIX B

Laboratory Test Results

Project No.: PU17268A
Project Name: ABC Mini Storage
Client: ABC Mini Storage

Report Date: 12/8/2017

Test Results Summary								
Test Pit (TP)	Depth (feet)	Lab Number	Description (U.S.C.S. Classification)	In situ Moisture, %	Max Dry Density, pcf	Optimum Moisture, %	Atterberg Limits	#200 Sieve Passing, %
1	3.0-3.5	PUL17-0347A	Silt with Sand (ML)	15.1	-	-	-	-
1	5.0-5.5	PUL17-0347B	Ash (ML)	15.5	-	-	Non-plastic	-
2	1.0-1.5	PUL17-0347D	Silt with Sand (ML)	12.0	-	-	-	-
5	4.5-5.0	PUL17-0347C	Gravelly Silt with Sand (ML)	-	121.5	7.5	Non-plastic	51
7	5.5-6.0	PUL17-0347E	Gravelly Silt with Sand (ML)	15.2	-	-	-	-

GeoProfessional Innovation.

Reviewed by: _____

MOISTURE-DENSITY RELATIONSHIP CURVE
ASTM D 1557
Method C

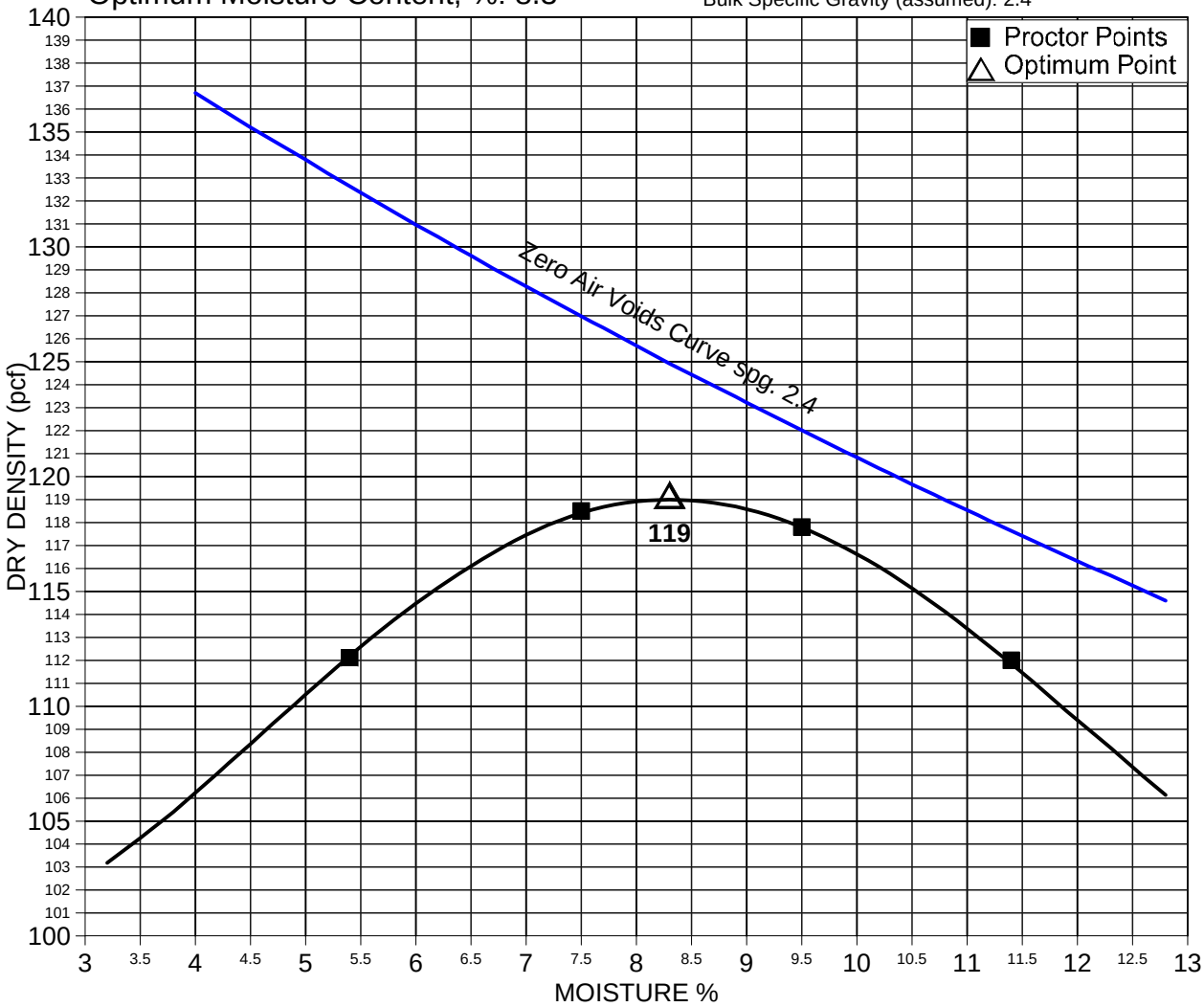
Project: ABC Mini Storage
Client: ABC Mini Storage
File Name: PU17268A
Lab Number: PUL17-0347C
Sample Location: TP-5 @ 4.5-5.0 feet BGS
Sample Classification: Gravelly Silt with Sand (ML)
Date Tested: 12/7/17 By: JBM/MCM
Rammer Type: Mechanical

GRADING ANALYSIS

SCREEN SIZE	% PASSING	AS TESTED
1 inch	100	100
3/4 inch	92	100
1/2 inch	78	78
#4	69	69
#8	68	68
#16	67	67
#40	65	65
#100	62	62
#200	51	51

Maximum Dry Density, pcf : 119.0
Optimum Moisture Content, %: 8.3

Corrected Dry Density, pcf: 121.5
Corrected Moisture Content, %: 7.5
Coarse Aggregate Correction, %: 8.0
Bulk Specific Gravity (assumed): 2.4



Reviewed By: _____

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Appendix D – Water Well Data

TABLE 2-2. Well Summary and Fixed Radius Results

Wellfield	Well Number	X-Coord.	Y-Coord.	Ground Elevation (feet)	Depth (feet)	Screen Diameter (inches)	Top of Screen (depth-feet)	Bottom of Screen (depth-feet)	Static Water Depth [1](feet)	Static Water Elevation (feet)	Aquifer Thickness [2](feet)	Available Drawdown [3](feet)	Aquifer Tests: Data Source	Yield (gpm)	Drawdown (feet)	Time (hours)	Spec. Capacity [4](gpm/ft)	Transmissivity [5](gpd/ft)	Transmissivity [6](gpd/ft)	Rated Pump Capacity (gpm)	1 Year Fixed Radius (feet)	5 Year Fixed Radius (feet)	10 Year Fixed Radius (feet)
North Richland	3000-A	1949622.90	365986.20	395	88	20	47	82	37	358	46	41	Log '48	1000	3	12	333	517,000		1000	1704	3811	5389
	3000-B	1950158.20	366026.00	390	89	20	45	82	30	360	52	49	Log '48	2000	5		400	629,000					
													Log '48	1000	4	12	250	379,000		1000	1658	3706	5242
	3000-C	1950182.67	365203.26	370.3	65	20	30	60	11	359.3	54	44	Log '48	2000	14		143	206,000					
													Log '48	1100	6.5	12	169	248,000		1000	1841	4116	5821
	3000-D	1949770.02	364999.22	385.3	75	20	40	70	23	362.3	>50	42	Log '48	2000	14.5		138	199,000					
													Log '48	1000	3	12	333	517,000		1000	1841	4116	5821
	3000-D5	1950360.74	367473.03	407.5	134	12	55	125	49	358.5	76	75	Log '48	2000	6		333	517,000					
													Log '44	1125	4.55	16	247	435,000		1000	1205	2695	3811
	3000-E	1950098.94	364729.77	367.8	61	17	21	57	11	356.8	46	40	Dec, '60	650	5.42	1	120	159,000					
	3000-H	1950226.39	365583.98	380	56	20	26	50	30	350	>25	16	Log '48	1085	2.33	16	466	622,000		2300	2548	5698	8059
													Log ???	2000	15		133		200,000	2000	2911	6508	9204
	3000-J	1949646.19	365312.17	392	71	20	45	66	43	349	>26	18	ICF, '87	1340	4	1	335	445,000					
													Log ???	1800	18		100		150,000	1400	2435	5445	7701
	3000-K	1950054.32	364344.65	365.4	57	20	15	50	15	350.4	36	32	ICF, '87	300	0	24	300		450,000				
													Log ???	2000	25		80		120,000	2000	2410	5389	7622
	3000-L	1949837.11	364725.17	392.1	83	20	55	80	50	342.1	>30	23	Dec, '60	1200	7.6	1.25	158	199,000					
													June '54	1000						1400	2386	5335	7545
Duke	1100-D	1949058.47	359556.40	367.75	86	20	42	78	18	349.75	>30	58	Log ???	1260	38	9	33	43,500		2000	2376	5314	7515
	1100-S	1948972.09	359578.13	369	120	10	44	120	19	350	75	91	Log '48	985		5	200-250		400,000	1000	1157	2586	3657
Columbia	1100-B	1952437.19	358529.76	377	77	20	37	73	36	341	36	31	Log '48	1040	9.2		113		170,000	1000	1680	3757	5314
													Log '48	1770	32.7		54		81,000				
Wellsian Way	4	1947525.03	341876.90	355	70	24	37	64	2	353	63	58	Log '43		33.3					1500	2376	5314	7515
	5	1947567.91	340902.89	360	72	18	46	68	7	353	63	55	Log '43	1560						1500	2633	5887	8325
	14	1947517.12	342774.16	354.83	58	10	33	56	12	342.83	40	34	Log '91	700	0	2	700		1,050,000	1000	2102	4701	6648
Harrison	(Heritage)	1948758.04	335546.26	615.5	360	12	340	360	132	483.5		218	Log '78	500						700	1886	4218	5965
Tapteal	Tapteal	NOT YET INSTALLED																					
Willowbrook	Willowbrook	1955524.00	324229.45	489.14	1208	14	1014	1208	88	401.14	200	1110	Log '80	600	104	2	6	7,700		1000	724	1618	2289
														800	174	4	5	6,000					
														1000	277	6	4	4,600					
														1200	362	8	3	4,200					

[1] Mainly from original drill data or old test data.
[2] Aquifer Thickness estimated from drill logs of wells.
[3] Available drawdown defined as static water level minus 10 feet above bottom of hole.
[4] Specific Capacity = Q/s, when drawdown(s)=0 a value of 1 is used.
[5] Transmissivity calculated by T=264Q/s*log(0.37t/r²S).
[6] Transmissivity calculated by T=Q*1500/s for unconfined aquifer and T=Q*2000/s for confined aquifer.
where: Q=yield(gpm), s=drawdown(ft), T=transmissivity(gpd/ft), t=time(days), r=radius(ft), S=storativity(.075 unconfined, .005 confined)
Boldfaile - estimated

Appendix E – USGS Water Table Contours

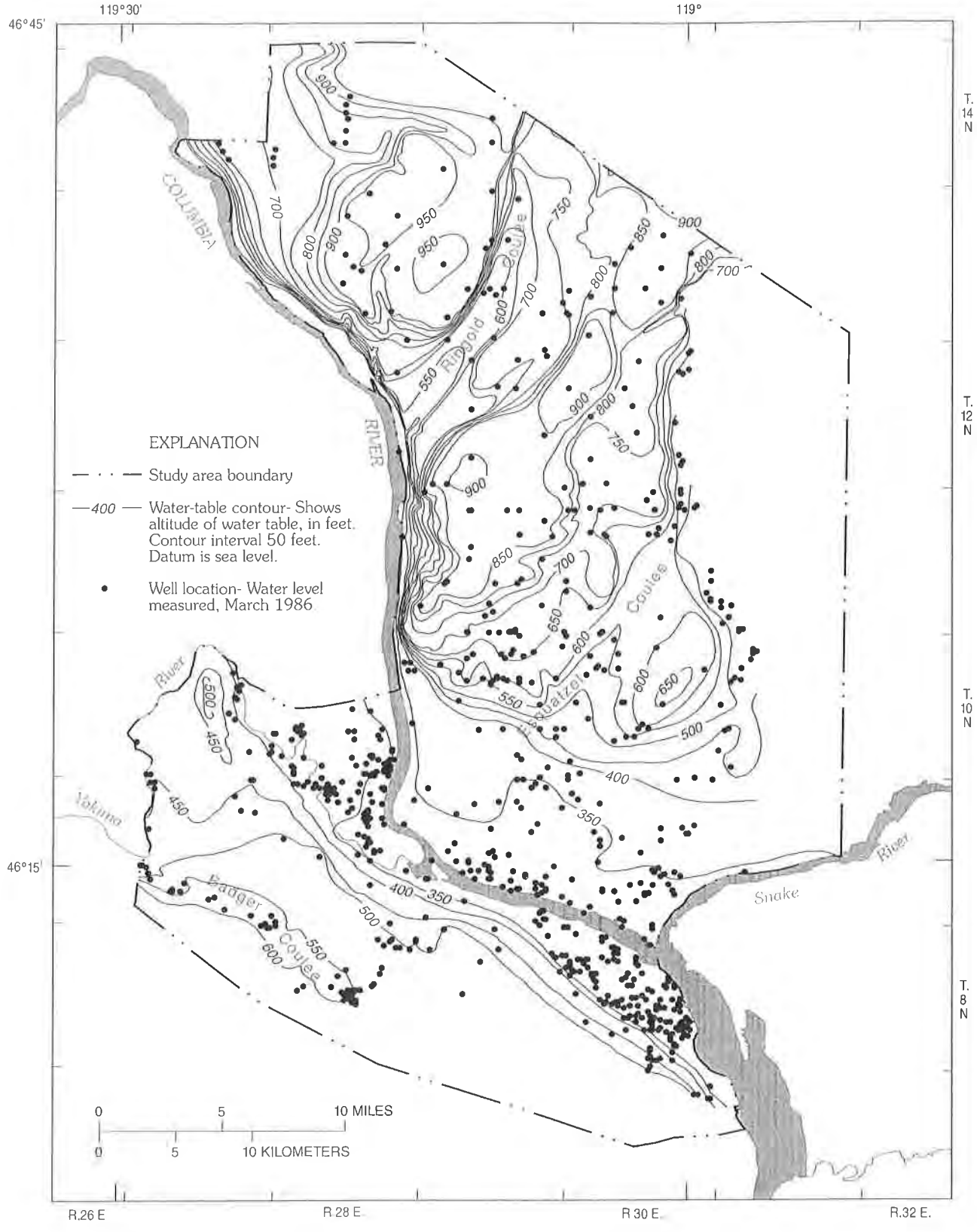


Figure 26.--Water-table altitude, March 1986

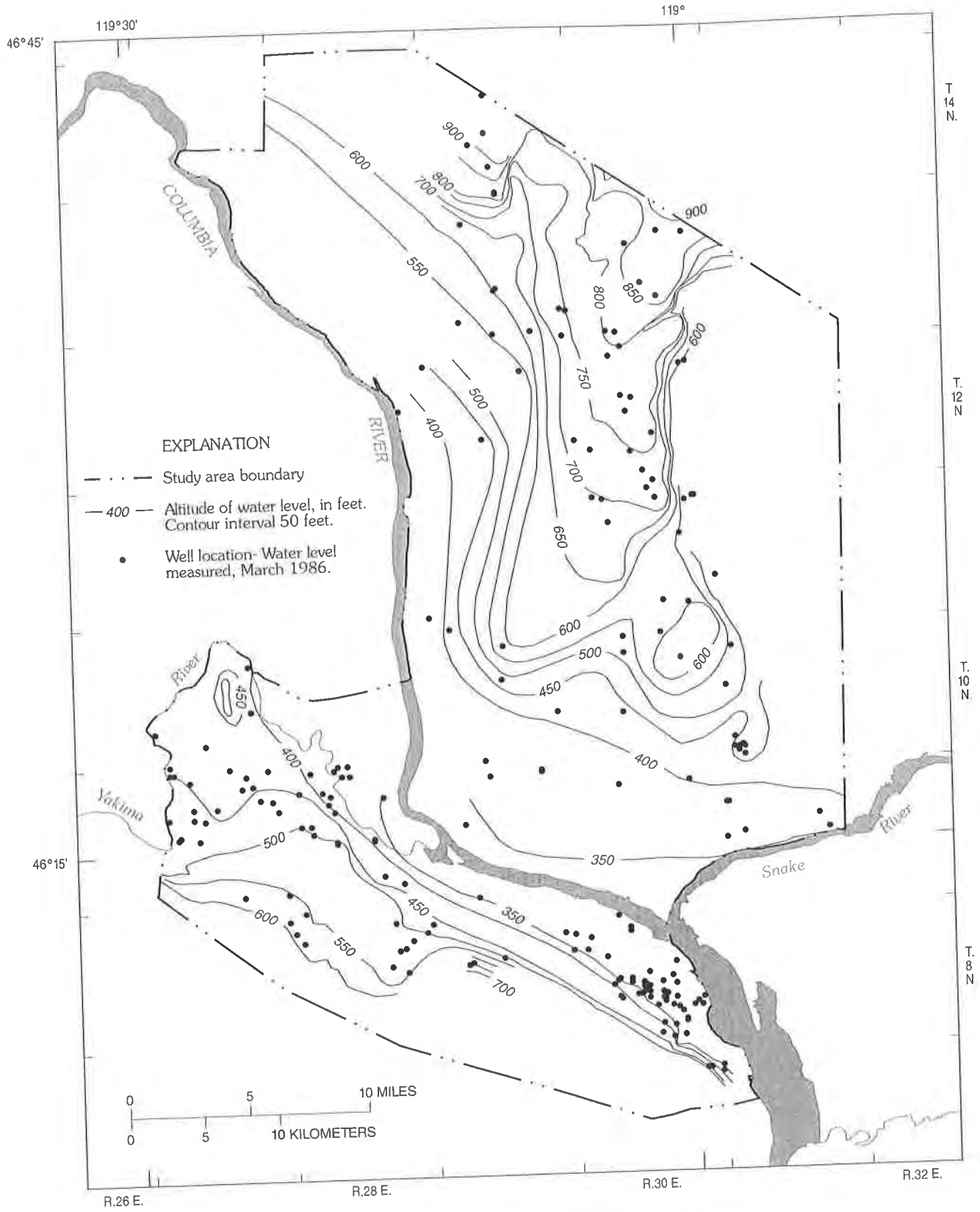


Figure 27.--Water-level altitudes in the Saddle Mountains Basalt, March 1986.

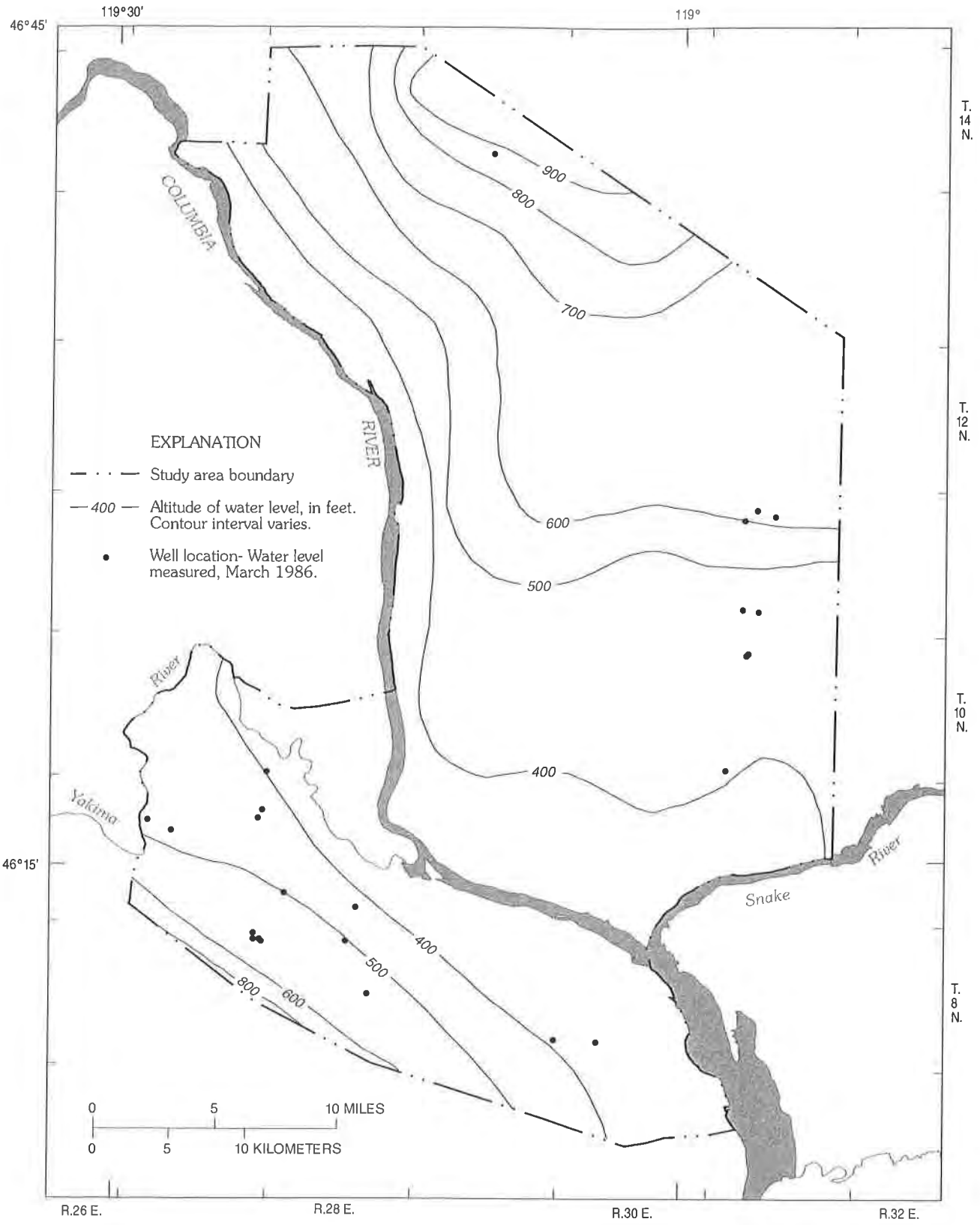


Figure 28.--Water-level altitudes in the Wanapum Basalt, March 1986 (Modified from Bauer, Vaccaro, and Lane, 1985).

Appendix F – Stormwater Calculations

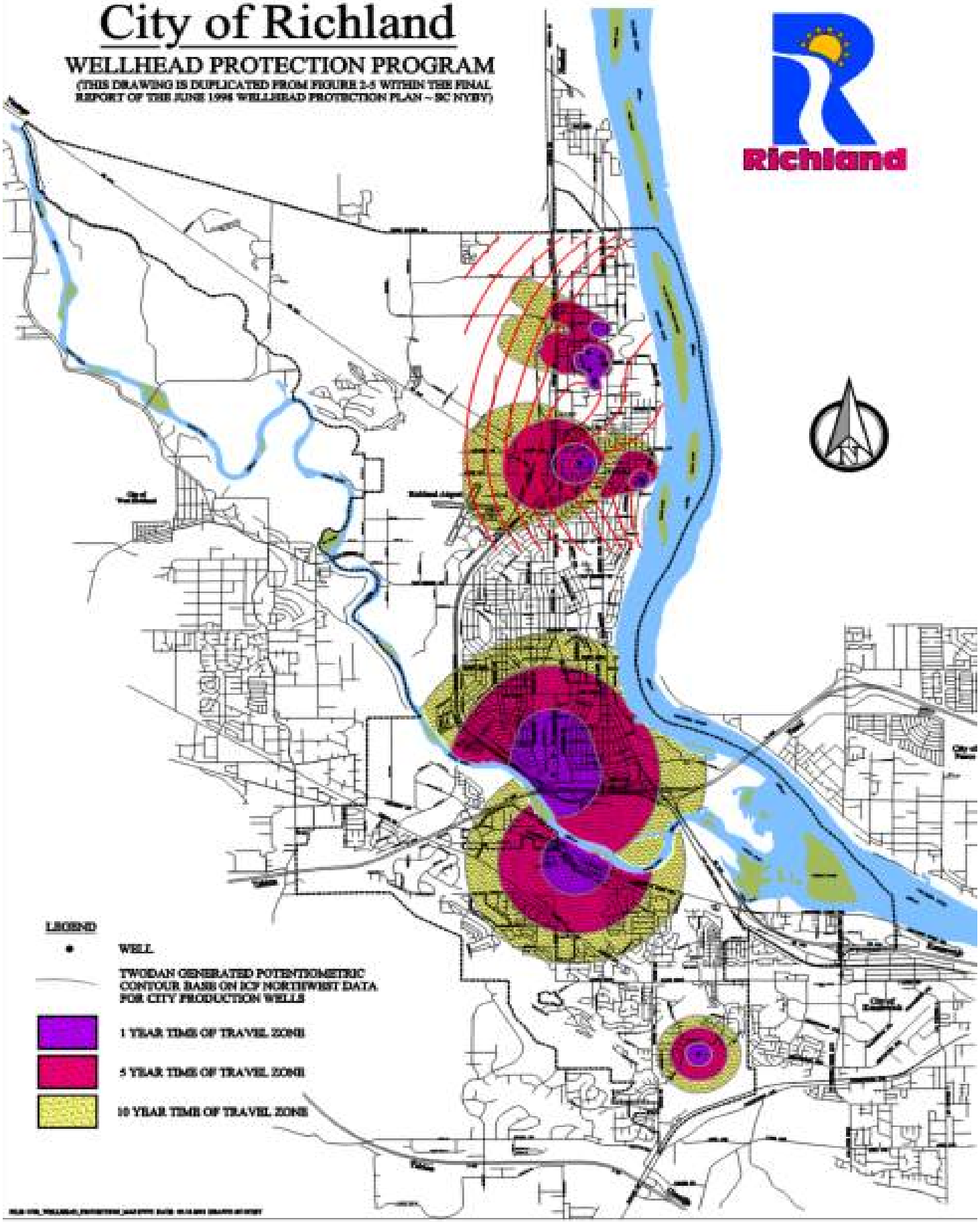
Appendix G – CARA Map

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



DEPARTMENT OF ECOLOGY
State of Washington

EROSIVITY WAIVER CERTIFICATION

Exclusion from the construction stormwater general permit
for small construction activity (under 5 acres of soil disturbance).
See specific requirements in the attached General Rules.
(Please print legibly in ink or type)

SECTION I Operator (applicant) Information

Original ■ Amended ☐

Contact name Ryan Daley	Phone no. 509-951-0341
Title	E-mail address ryan@abcministorage.com
Company ABC Mini STorage	
Mailing address 421 W. Riverside Ave, Ste 470	
City Spokane	State Zip + 4 WA 99201

SECTION II Facility/Site Location Information

Site name ABC Mini Storage		
Street address (or location description) 302 Wellsian Way		
City (or nearest city) Richland	Zip + 4 99352	County Benton

Region: ■ Central basin of Eastern Washington ☐ Western Washington ☐ Remainder Eastern Washington

The central basin is an area of central Eastern Washington with less than 12 inches of rainfall per year.
For the exact boundary of this area, see Region 2 on the map attached to the instructions for this form.

Estimated Initial Soil Disturbance Date Fall 2021	Estimated Final Stabilization Date Summer 2022	Rainfall Erosivity Factor (R factor) 3.88

Latitude	Degrees	Minutes	Seconds	**Longitude**	Degrees	Minutes	Seconds	
	46.2676 °	46 °	°		-119.2847 °	°	°	

Estimate of total acres to be disturbed (to the ¼ acre) within the entire construction project (common plan of development)	Estimate of total acres (to the ¼ acre) to be disturbed with this project 2.9 AC

- By submitting this Erosivity Waiver Certification, the applicant is certain they do not require a permit for their stormwater discharges associated with construction activity because the period of construction activity meets the conditions of low erosivity described below. This applies only to the location described in Section II.
- Submission of this form does not relieve the operator of permitting requirements for other regulated activities/discharges, which may pertain to the construction activity. Examples of these types of discharges include excavation dewatering activities, process wastewater discharges, and non-stormwater discharges.
- In order to meet the low erosivity condition, construction activity must begin and reach final stabilization within the time periods below. The project must also have a Rainfall Erosivity Factor (R factor) of less than 5 for the construction period.
  - Eastern Washington within "central basin" (as defined by the *Stormwater Management Manual for Eastern Washington*) - Any time period
  - Remainder of Eastern Washington - June 15 to October 15
  - Western Washington - June 15 to September 15
- Small construction activities include sites that will grade less than 5 acres and are not part of a 5 acres or greater common plan of development (see general permit for definition).
- If construction activity extends beyond the certified waiver period for any reason, the operator must either:
  - Recalculate the rainfall erosivity R factor using the original start date and a new projected ending date and, if the R factor is still under 5, complete and sign a new waiver certification before the end of the original waiver period. The operator must submit the new certification to Ecology before the end of the current certification or
  - Submit a complete permit application to Ecology as specified the Construction Stormwater General Permit before the end of the certified waiver period (see section S2.A-B).

Additional comments and clarifying information:
(please attach a map of the site)
Project is located off of Welsian Way in Richland, WA. See attached site map.

SECTION III Certification Statement

I certify under penalty of law that: 1) I have read and understand the eligibility requirements for claiming a condition of "low erosivity" and obtaining an exclusion from NPDES stormwater permitting, 2) construction activity covered under this waiver will comply with applicable local stormwater requirements, 3) appropriate erosion and sediment control BMPs will be implemented to prevent violations of water quality standards, and 4) this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.

This certification must be signed by:

(i) In the case of corporations, by a responsible corporate officer.
(ii) In the case of a partnership, by a general partner.
(iii) In the case of sole proprietorship, by the proprietor.
(iv) In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

Print name	Title
Signature	Date

Please sign and return this document to the following address:

Department of Ecology
Attn: Water Quality Program, Construction Stormwater
PO Box 47696
Olympia, WA 98504-7696

If you have any questions, please call:

- 360-425-7000 for the Northwest Regional Office serving: *Island, King, Kitsap, & Snohomish Counties*
- 360-715-5200 for the Bellingham Field Office serving: *San Juan, Skagit, & Whatcom Counties*
- 509-329-3400 for the Eastern Regional Office serving: *Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, & Whitman Counties*
- 509-575-2490 for the Central Regional Office serving: *Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, & Yakima Counties*
- 360-407-6300 for the Southwest Regional Office serving: *Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, & Wahkiakum Counties*

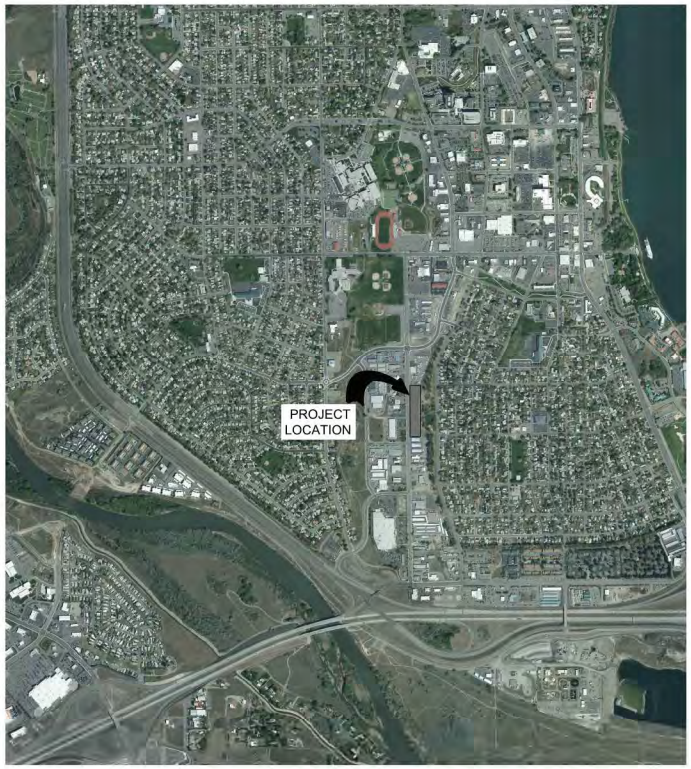
(Please keep a copy of this form for your records.)

To request ADA accommodation including materials in a format for the visually impaired, call the Water Quality Program at 360-407-6600 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability can call 877-833-6341.

ABC MINI STORAGE

RICHLAND, WA

SEPTEMBER 2021



VICINITY MAP

SHEET INDEX

PROJECT NO 30-20-008

J-U-B ENGINEERS, INC.

BASIS OF BEARING
NAD 83-91 WASHINGTON SOUTH ZONE CITY OF RICHLAND CONTROL POINTS

VERTICAL DATUM
NAVD 88
CITY OF RICHLAND DATUM
ELEVATION = 359.07
BENCHMARK IS THE BRASS CAP AT THE INTERSECTION OF DAVENPORT AND GOETHALS DRIVE

811
Know what's below.
Call before you dig.

CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

J-U-B ENGINEERS, INC.
2810 W. Clearwater Ave.
Suite 201
Kennewick, WA 99336
Phone: 509.783.2144
www.jub.com

DRAWN BY: DSM
DATE: 9/9/2021
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
21991

NO	DESCRIPTION	DATE	BY
	REVISION		APR

ABC MINI STORAGE
RICHLAND, WA

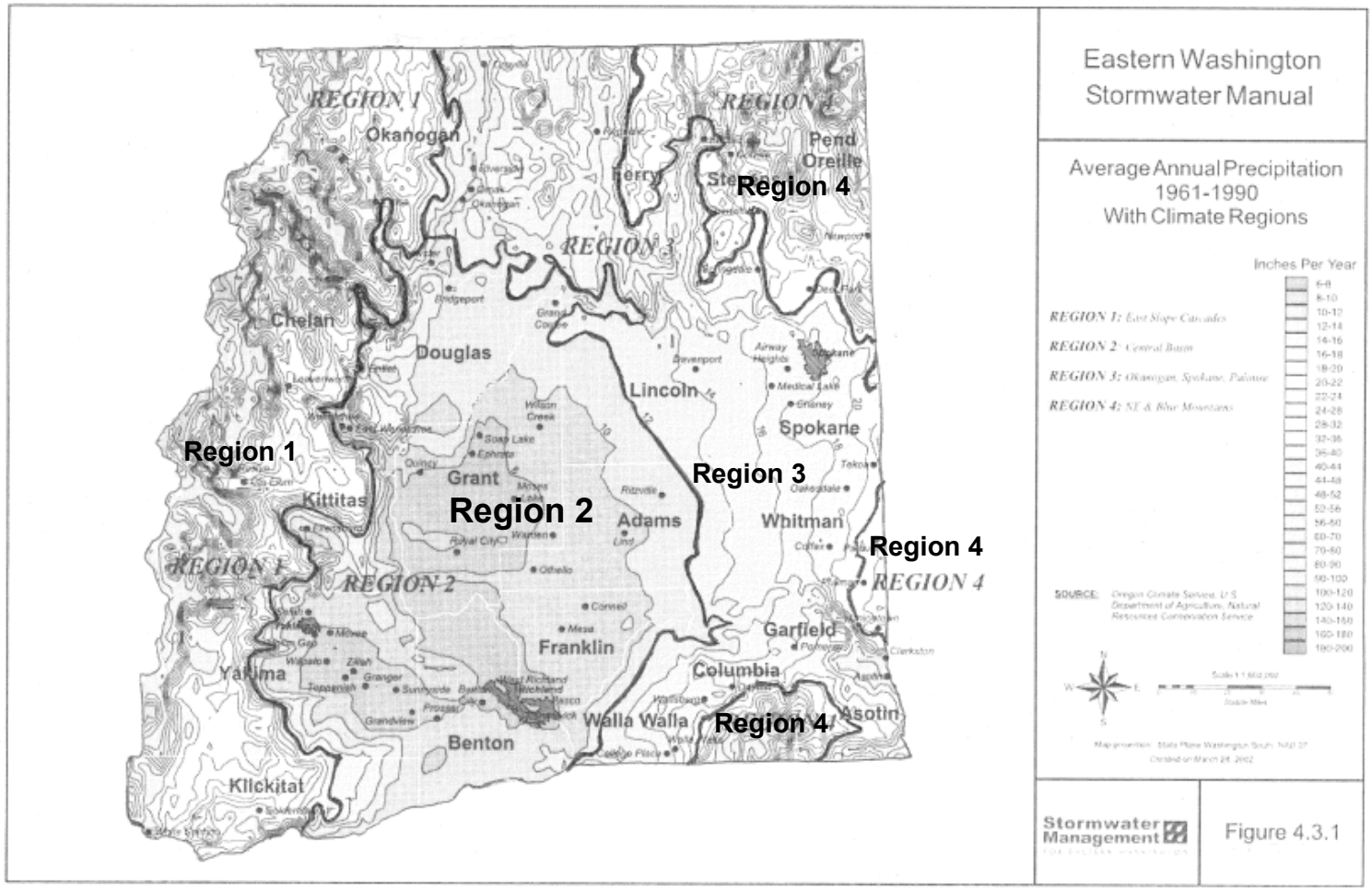
COVER SHEET

FILE: 30-20-008 C-001
JUB PROJ. #: 30-20-008
DRAWN BY: CCH
DESIGN BY: DSM
CHECKED BY: DSM
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 9/9/2021
DRAWING:
C-001
SHEET: 1 OF 13

Plot Date/9/9/2021 12:08 PM Plotted By: Darrel Moore
Dwg Created:7/23/2021 J:\JUB.COM\CENTRAL\CLIENTS\WA\RICHLAND\ABCMINISTORAGE\PROJECTS\30-20-008_RICHLAND\ABC\DESIGN\CAD\SHEET\30-20-008_C-001.DWG

Map of Eastern Washington & Central Basin*:
Central Basin for the Construction Stormwater Permit Erosivity Waiver is *Region 2* on this map.

Cities in Region 2 include: Benton City, Connell, East Wenatchee, Ephrata, Grand Coulee, Grandview, Granger, Kennewick, Lind, Mesa, Moxee, Othello, Pasco, Prosser, Quincy, Richland, Ritzville, Royal City, Selah, Soap Lake, Sunnyside, Toppenish, Yakima, Union Gap, Warden, Wapato, Wenatchee, Wilson Creek, and Zillah.



This map is also available in color on the construction stormwater web page under the Erosivity Waiver tab:
www.ecology.wa.gov/constructionstormwaterpermit or follow this publication link:
https://fortress.wa.gov/ecy/publications/publications/0410076maps.pdf#page=4

*The original map was scanned in black and white and regional lines were darkened.

Instructions for
EROSIVITY WAIVER CERTIFICATION

For exclusion from the construction stormwater general permit
for small construction activity

General Rules:

1) This waiver is not available for the following types of construction sites:
   - Projects that are 5 acres or larger;
   - Smaller individual filings, phases, or other portions of a common plan of development or sale that will **disturb 5 acres or greater**;
   - Sites with an existing construction stormwater NPDES permit;
   - Where Ecology determines the site to be a significant contributor of pollutants or Ecology reasonably expects the site to violate water quality standards;
   - Sites with non-stormwater discharges. Some examples of non-stormwater discharges include excavation dewatering, wash waters and hydrostatic test waters. You must get NPDES permit coverage for non-storm water discharges.

   Refer to the general permit section S1 for more details or contact your Ecology regional office stormwater staff if you have questions about whether a project needs a permit.

2) The use of this waiver is voluntary for those who qualify. Potential permittees may always seek the assurance and flexibility of permit coverage.

3) If your site is disturbing less than one acre or not discharging to surface water, you do not need permit coverage. However, you may choose to apply for the erosivity waiver. By signing the waiver certification, you accept the conditions in the general permit section S2.C. This includes a requirement to apply for permit coverage if construction activity extends beyond the final stabilization date.

4) In order to receive the waiver, you must submit a complete and accurate application on time. You must also meet the following conditions:

   a) Calculation of Rainfall Erosivity Waiver: The small construction project's rainfall erosivity factor calculation is **less than 5** during the period of construction activity ("R" in the Revised Universal Soil Loss Equation).

      To determine the erosivity factor, see the Construction Stormwater General Permit (CSWGP) homepage https://ecology.wa.gov/constructionstormwaterpermit for a link to the EPA's calculator and step-by-step instructions on computing the "R" Factor in the EPA Erosivity Waiver Fact Sheet.

   b) The entire period of construction activity (including all phases of a phased project) used above must also fall within the following timeframes:
      i) For sites west of the Cascades Crest: June 15 – September 15.
      ii) For sites east of the Cascades Crest, excluding the Central Basin: June 15 – October 15.
      iii) For sites east of the Cascades Crest, within the Central Basin (see Region 2 of attached map for location): no additional timeframe restrictions apply.

   c) Operators must submit a complete and qualifying erosivity waiver certification **at least one week before starting soil disturbing activities.**

   d) You must submit a separate erosivity waiver certification for each construction site that qualifies for the waiver.

   e) Use the comments and additional information to specify the location of construction site. Record latitude and longitude of the main entrance to the site in Section II. Attach a detailed map of the construction site.

   f) This waiver applies only to the requirements of this permit. It does not supersede or preempt the authority of other agencies to prohibit, restrict, or control discharges of stormwater to storm drain systems or other water courses in their jurisdiction.

5) Keep a copy of the Erosivity Waiver Certification on site, or within reasonable access to the site, for use by the operator or for on-site review by Ecology or the local jurisdiction.

Form Instructions:

1. Section I & II: Fill out and complete Facility Operator & Facility Location information.
2. Note: Phased projects that ultimately disturb 5 acres or greater or the construction activity extends beyond timeframes listed in the General Rules above (see 4b) are not eligible for a waiver.

3. Section III: Fill out and sign the certification statement.

   The statement testifies that:
   i) the operator will comply with applicable local stormwater requirements; and
   ii) the operator will implement appropriate erosion and sediment control Best Management Practices (BMPs) to prevent violations of water quality standards.

   A qualifying individual must sign the certification:
   i) in the case of corporations, by a responsible corporate officer;
   ii) in the case of a partnership, by a general partner;
   iii) in the case of sole proprietorship, by the proprietor; and
   iv) in the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

3. Mail a signed copy of the completed certification to the address indicated **at least one week before land disturbing activity starts.** Applicants are responsible for submitting an accurate and complete erosivity certification form. Ecology recommends that you use a mailing process that gives you a delivery record and that you retain a copy of your waiver.

GeoProfessional Innovation.

December 14, 2017
File: PU17268A

Mr. Ryan Daley
ABC Mini Storage
421 W. Riverside Ave. Ste. 470
Spokane, Washington 99201

RE: **Geotechnical Engineering Evaluation**
ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

Greetings Mr. Daley:

GeoProfessional Innovation Corporation (GPI) presents this geotechnical engineering evaluation for the ABC Mini Storage facility in Richland, Washington. Our geotechnical engineering evaluation's purpose was to explore the subsurface conditions within the development area and provide geotechnical opinions and recommendations to assist project planning, design, and construction. Our geotechnical services to perform exploration and provide a *Subsurface Exploration Letter* dated October 31, 2017, was authorized on October 23, 2017, referencing our proposal dated October 20, 2017. We were later authorized on November 29, 2017 to perform laboratory testing and provide the *Geotechnical Engineering Evaluation* contained herein.

This report provides specific geotechnical recommendations for earthwork activities, shallow foundation design, concrete slab-on-grade floors, flexible asphalt pavement section design, and stormwater disposal based on the conditions we encountered and observed. The geotechnical recommendations presented herein must be read and implemented in their entirety; portions or individual sections of our report cannot be relied upon without the supporting text in other pertinent sections.

Our opinion is that project construction success will depend, in part, upon the design-build contractor following our report recommendations, adhering to good construction practices and the owner and/or contractor providing the necessary construction monitoring, testing, and geotechnical consultation to document the work has been accomplished as recommended herein. We recommend GPI be retained to provide observation, testing and consultation services to document our report recommendations are incorporated into construction. If we are not given the opportunity to provide geotechnical continuity during construction, we cannot be responsible for designer or contractor errors, omissions, or report misinterpretations.

We appreciate the opportunity to continue to work with ABC Mini Storage and the design team on this project. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,
GPI

Adam J. Rushold, P.E.
Project Engineer

Travis J. Wambeke, P.E.
Principal Engineer

TJW/ac

Geotechnical Engineering Evaluation
ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

PREPARED FOR:
Mr. Ryan Daley
ABC Mini Storage
421 W. Riverside Ave. Ste. 470
Spokane, Washington 99201

PREPARED BY:
GeoProfessional Innovation Corporation
6, O Donnell Rd,
Pullman, Washington 99163
Telephone (509) 336-3555
Facsimile (509) 339-2001

December 14, 2017

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REPORT PLATES AND APPENDICES

Plate 1:	Exploration Map
Appendix A:	Unified Soil Classification System (USCS) & Exploration Logs
Appendix B:	Laboratory Test Results

Geotechnical Engineering Evaluation

ABC Mini Storage
Wellsian Way & Wyman Street
Richland, Washington

INTRODUCTION

Our geotechnical engineering evaluation's purpose was to assess subsurface soil conditions within the proposed project area and to prepare geotechnical recommendations to assist final design and construction document development. This report represents the deliverable associated with our authorized proposal dated October 20, 2017. To accomplish our scope we performed the following tasks:

1. Coordinated exploration with the Washington Utility Notification Center to help reduce the risk of damage to existing utilities.
2. Observed subsurface exploration at the site accomplished via a subcontracted excavator and operator, including 7 exploratory test pits at the project site extending 6.5 to 8.5 feet below existing site grades. Test pits were loosely backfilled approximately level with the ground surface upon completing exploration.
3. Performed 1 field infiltration tests during exploration to evaluate the near-surface soils' infiltration characteristics.
4. Provided a *Subsurface Exploration Letter* dated October 31, 2017, including a summary of the subsurface conditions observed, exploration map, and exploration logs.
5. Performed laboratory testing on select soil samples obtained during exploration referencing *ASTM International* (ASTM) test standards.
6. Discussed current project plans with the project team, reviewed subsurface conditions, laboratory test results and proposed construction, conducted geotechnical analyses, and prepared geotechnical recommendations to assist project design and construction.
7. Prepared and provided 1 electronic copy of this report, including our geotechnical findings and opinions, exploration logs, laboratory test results, and exploration map illustrating exploration locations.

PROJECT UNDERSTANDING

We understand Baker Construction & Development, Inc. (Baker) is retained by ABC Mini Storage (ABC) as the design-build contractor to complete design and construction for the project. Our *Project Understanding* is based on conversations with Mr. Ryan Daley with ABC, Mr. Lucas Holmquist with Baker, and with Mr. Darral Moore, P.E., and the project civil engineer with J-U-B Engineers, Inc. (J-U-B) during a project meeting on December 4, 2017. Additional information including structural loads and planned foundation types were provided by Baker through electronic correspondence following the meeting.

The planned ABC Mini Storage facility will be located on an approximate 4.0-acre lot located to the northeast of the Wellsian Way and Wyman Street intersection in Richland, Washington. The site currently is undeveloped and relatively level. The site surface is covered with various shrubs, grass, and weeds. The lot is bordered by Wellsian Way to the west, a Sunwest Sportswear building to the south, an

abandoned railroad alignment and mature trees to the east, and a Metro Services, Inc. warehouse and storage yard to the north.

Based on initial site maps provided by ABC, construction will include 5 storage buildings ranging from 11,300 to 23,300 square feet each. The development will include 1 building on the north, 1 on the south, 2 on the east, and a single 520-foot-long building on the west a side of the site, bordering Wellsian Way. The storage units will be single story structures, supported on shallow pier footings located around the building perimeter, supporting monolithic grades beams and slabs-on-grade. The piers will support loads no greater than 10 kips per pier.

The storage units will be surrounded by asphalt pavement, with concrete hardscapes (i.e., sidewalks and curbs) constructed between the storage units and Wellsian Way. Stormwater design will include a combination of dry wells and sheet flow to the east side of the site. Utilities are expected to extend from Wellsian Way to service the new facility. No substantial grading is expected outside of foundations and utility alignments.

FIELD AND LABORATORY EVALUATION

Site Exploration

We evaluated subsurface conditions within the ABC Mini Storage site by observing 7 exploratory test pits on October 26, 2017. We coordinated exploration with a subcontracted Wacker Neuson excavator and operator, and advanced test pits to depths ranging from 6.5 and 8.5 feet below the existing ground surface. We obtained select soil samples within test pits for laboratory testing and to assist soil classification. The test pits were loosely backfilled upon completion.

Plate 1 illustrates approximate exploration locations established by approximate measurement from existing site features. A GPI GeoProfessional visually described, classified and logged the subsurface conditions encountered during exploration referencing the *Unified Soil Classification System* (USCS). Appendix A presents exploratory test pit and a USCS explanation, which should be used to interpret soil descriptions and terminology throughout this report and on the exploratory logs.

Subsurface Conditions

We encountered silty sand (topsoil) at the ground surface in test pits TP-1 through TP-3, and TP-6 and TP-7. Topsoil contained vegetation and organics to depths ranging between 2 to 4 inches beneath the ground surface. Topsoil was tan to brown, loose, and moist. Beneath these surface layers, we encountered 3 primary subsurface units, summarized as follows:

- Uncontrolled Fill
  - Silt with Sand and Gravelly Silt with Sand (ML) – Tan to brown, loose to medium dense, and moist. We encountered uncontrolled fill in each test pit extending from 2.0 to greater than 7.0 feet below the ground surface. Test pit TP-7 was terminated at roughly 7.0 feet below the ground surface due to refusal upon asphalt debris. Therefore, uncontrolled fill depths may encountered large debris along with various other materials such as brick fragments resulting from previous site operations.

- Ash (ML) – White to tan, stiff, and moist. Ash was encountered beneath the silt uncontrolled fill in test pits TP-1, TP-3, and TP-4 ranging from 2.0 to 5.5 feet below the ground surface. The ash is suspect fill due to its inconsistent thicknesses and locations, leading to the interpretation that it was dumped on the site from clearing surrounding areas, following the Mount St. Helens eruption in 1980.

- Alluvium – Silty Sand and Silty Sand with Gravel (SM) – Tan to brown, medium dense, and moist. We encountered this soil in test pits TP-1 through TP-6 beneath the uncontrolled fill and to test pit terminations from 6.5 to 8.5 below the ground surface.

We measured the soil infiltration rate in test pit TP-1, via the single-ring infiltrometer method outlined in Appendix 6B of the *Washington State Department of Ecology* (Ecology) *Stormwater Management Manual for Eastern Washington* (SMMEW). The test was performed in the native silty sand alluvium at roughly 5.5 feet below the ground surface within TP-1. Infiltration test results and associated recommendations are provided in the *Site Drainage* report section. Groundwater was not encountered in exploration locations. However, groundwater in the Tri-Cities area can fluctuate with seasonal variations in irrigation and precipitation. Our opinion is that localized perched water tables may be encountered at the site in the future, depending in part on the time of year construction is initiated.

Laboratory Testing

We performed laboratory testing on select soil samples collected in the field referencing ASTM procedures. We used laboratory test results to verify soil classification and to estimate soil engineering properties. Exploration logs in Appendix A include index laboratory test results; Appendix B provides graphical and analytical laboratory test results. Laboratory tests included:

- Natural Moisture Content
- Grain Size Distribution
- Atterberg Limits
- Modified Proctor
- In-place Density

GEOTECHNICAL OPINIONS AND RECOMMENDATIONS

The following geotechnical recommendations are presented to assist the design-build contractor with design and construction document development for the ABC Mini Storage facility described in this report. We base our geotechnical recommendations on our experience with similar soil and geologic conditions, findings from our field and laboratory evaluation, and our understanding of the proposed construction. If development plans change, we should be contacted to review the project modifications and revise our recommendations, if necessary. Additionally, if subsurface conditions exposed during construction are different than what we encountered during exploration, GPI should be contacted to review our recommendations and provide any necessary revisions or modifications.

Earthwork

Site Stripping

We recommend all topsoil containing vegetation and organics be removed from beneath the planned buildings, pavement, hardscapes and structural fill areas. Topsoil containing vegetation and organics was

approximately 2 to 4 inches thick in our explorations. However, varying thicknesses of vegetation and organic deposits should be expected.

Site stripping must extend laterally at least 5 feet outside of planned improvement areas. Soil containing vegetation and organics should be disposed off-site or may be reused on-site for landscaping. Topsoil may not be re-used as structural fill beneath the buildings or any site feature.

Uncontrolled Fill Removal

GPI encountered uncontrolled fill in most explorations at the project site, extending 2.0 to 7.0 feet below the existing ground surface. Uncontrolled fill has the potential to settle below new foundations, slabs, and pavements, and can negatively impact performance for site improvements. Settlement beneath even lightly loaded slab or pavement areas could occur as the existing uncontrolled fill comes to equilibrium with new loads and changing moisture conditions. Depending on actual in-place fill conditions and the selected building configuration, loading, and other factors, differential settlement beneath slabs, pavements, and foundations could exceed typical differential settlement tolerances (0.7 inches in 30 feet). Settlement would likely occur after construction is complete as the fine-grained soil consolidates. The risks of uncontrolled fill settlement include misalignment and damage to overlying structures, as well as ongoing maintenance and possibly premature replacement. Therefore, the standard of care is to remove fill from below buildings.

To help reduce project costs, and based on the discussions with ABC and Baker, ABC reports electing to leave uncontrolled fill beneath non-critical site aspects such as slabs-on-grade, pavements, exterior hardscapes, and landscaping areas. However, at a minimum, GPI recommends removing all uncontrolled fill from beneath the foundations. Thus, ABC accepts differential performance risks and the associated investment in maintenance and/or premature replacement for the non-critical site aspects. The extent ABC and the design-build team elects to leave uncontrolled fill below such at-grade, exterior areas should be carefully evaluated based on the associated cost savings and differential performance risks.

Based on exploration findings, we anticipate uncontrolled fill removal will require excavations extending roughly 1 to 2 feet below the existing ground surface after topsoil stripping across the southern 2/3rds of the site. The site's northern 1/3rd will require uncontrolled fill removal from roughly 4 to greater than 6 feet below the existing ground surface. Recompact uncontrolled fill subgrades to help reduce the risks of differential performance below slabs-on-grade, pavements, hardscapes, and structural fill. This process is outlined in the *Establishing Subgrades* section. In addition, *Concrete Slab-on-Grade Floors* report sections provide over-excavation and replacement requirements beneath the footings and slabs. Backfill excavations that remove uncontrolled fill with structural fill, placed and compacted per the *Structural Fill* report section requirements. In addition, contractors should anticipate and budget with the understanding that uncontrolled fill depths will vary across the site.

Based on our explorations, our opinion is excavated silt with sand and gravelly silt with sand uncontrolled fill may be re-used as *General Structural Fill*, but will require processing to remove debris, vegetation and other unsuitable material. We do not recommend that ash be used as structural fill as significant effort and time will likely be required for the soil to be processed and meet the compaction requirement. We recommend GPI work with the design-build contractor to provide additional consultation regarding uncontrolled fill removal at the site during earthwork operations.

Test Pit Remediation

We recommend all test pits be remediated during earthwork construction. Excavations for test pit remediation shall be backfilled with *General Structural Fill* meeting the requirements in this report. If authorized, GPI can review test pit areas with the contractor following site stripping and uncontrolled fill removal to identify test pit remediation locations.

Establishing Subgrades

Following site stripping, excavating to remove uncontrolled fill, and prior to fill placement; expose subgrades for foundations, slabs, and all other subgrades as outlined below:

- Foundation subgrades:
  Prior to placing *General Structural Fill* beneath foundations, over-excavate uncontrolled fill exposing native alluvial silty sand.
- Slab-on-grade subgrades:
  Prior to placing aggregate support sections beneath slabs, over-excavate a minimum 12 inches below the slab bearing elevation.
- All other subgrades:
  Prior to placing structural fill for improvements outside the planned foundations, prepare subgrades by exposing either native soil or uncontrolled fill.

After exposing the resulting subgrade, scarify all subgrades a minimum 12 inches and recompact to a minimum 92 percent of the soil's maximum dry density, referencing ASTM D 1557.

After preparing subgrades, it is the contractor's sole responsibility to protect subgrades from degradation, freezing, saturation, or other disturbance. The on-site soil is moderately moisture-sensitive and susceptible to disturbance when moist or wet. Soil disturbance will negatively impact the soil's performance beneath foundations, slabs, and other improvements. Disturbed and/or uncompacted soil shall not be allowed beneath any structure. Equipment with large tracks, lugs or having toothed buckets has a significant potential to disturb the site soil prior to or following compaction. Rubber-tired transport vehicles should not access prepared subgrades unless the subgrade is sufficiently stiff to allow construction traffic without disturbance. We recommend project earthwork specifications specifically outline that the contractor is required to maintain the subgrade in a compacted condition and protect subgrades from construction traffic disturbance after they have been prepared and meet compaction requirements.

Our opinion is that careful construction and earthwork procedures are critical to achieving adequate subgrade preparation and reducing over-excavation. Specifically, these procedures could include, but are not limited to, carefully staging equipment and/or stockpiles, routing construction equipment away from subgrades, and implementing aggressive site drainage procedures to help reduce saturating subgrades during wet weather conditions. As stated above, it is the contractor's responsibility to protect subgrades throughout construction. Subgrade disturbance that occurs due to the contractor's means and methods must be repaired at no cost to the owner. GPI will remain available to consult with ABC and Baker as the project moves forward regarding subgrade preparation procedures.

Excavation Characteristics

We anticipate the on-site soil may be excavated using conventional soil excavation techniques. In general, slopes and excavations must be excavated, shored, or braced in accordance with the *Washington Industrial Safety and Health Act* (WISHA) regulations and local codes. The near-surface on-site soil generally is classified as a "C" type soil according to WISHA requirements. As such, we recommend provisions be made to allow temporary excavations of any type, and soil to be sloped back to at least 1.5H:1V (horizontal to vertical) or as otherwise determined to be safe according to the selected contractor's competent personnel.

The contractor should be prepared to encounter large debris within the uncontrolled fill which may require equipment with mechanical thumbs, or hydraulic hammers to remove. Ultimately, the selected contractor is responsible for site safety and determining appropriate excavations for the conditions and soil types encountered during construction. GPI is not responsible for temporary excavation stability, or for protecting existing site features during construction.

Excavation Near Existing Structures

It is expected that excavation will be required immediately adjacent to the existing Wellsian Way side walk on the west side of the site. We recommend the design-build contractor develop project documents requiring existing structures be protected while excavating to achieve site grades for the planned facility. At a minimum, we recommend soil excavation near existing structures adhere to the guidelines in Washington Administrative Code (*WAC) Section 296-155.* In general, we recommend soil within a 1.5H:1V prism extending down and away from the existing ground surface adjacent to the existing structures or other facilities must remain in place and be protected. Where excavations for new construction including footings, utility connections, or other purposes must extend below and expose the base of the existing structures, contractors must exercise extreme care to avoid undermining the existing structures.

Structural Fill

Place all fill as structural fill meeting the requirements presented in Table 1 below. The on-site uncontrolled fill and alluvial soil are expected to be suitable for re-use as *General Structural Fill*, but will require processing to remove debris and may require moisture-conditioning prior to placement.

Table 1. Soil Fill Specifications and Allowable Use

Soil Fill Product	Allowable Use	Material Specifications
General Structural Fill[1]	• General site grading • Foundation wall backfill and utility trench backfill • Utility trench backfill • Over-excavation beneath foundations	• Soil must be classified as GP, GM, GW, SP, SM, or SW according to the USCS. • Soil may not contain particles larger than 6 inches in median diameter. • Soil must contain less than 3 percent (by weight) of organics, vegetation, wood, metal, plastic, or other deleterious substances. • Site soil meets these requirements after being processed to remove debris and organics.
Crushed Surfacing[2]	• General Structural Fill applications • Slab support aggregate	• Soil meeting requirements stated in *Section 9-03.9(3) – Crushed Surfacing* of WSDOT Standards.
Bedding Course	• Utility pipe bedding	• Soil meeting requirements stated in *Section 9-03.12(3) - Gravel Backfill for Pipe Zone Bedding* of WSDOT Standards.
Unsatisfactory Soil	• NONE	• Soil classified as CL, CH, MH, OH, OL or PT may not be used at the project site. • Any soil containing more than 3 percent (by weight) of organics, vegetation, wood, metal, plastic or other deleterious substances. • Variable moisture content does not render a soil unsatisfactory. Soil must be moisture conditioned to facilitate the required compaction.

1. The on-site soil generally meets the intent of our recommendations for *Structural Fill*.
2. *Crushed Surfacing* includes both "top course" and "base course" referencing WSDOT Standards.

Required Compaction

Table 2 summarizes soil product compaction requirements.

Table 2. Required Soil Compaction for Designated Project Areas

Project Area	Required Soil Product	Compaction Requirement[1]
Soil subgrades beneath structural fill placements, concrete or other improvements.	Native Soil or Uncontrolled Fill	92%
General site grading fill placement, utility trench backfill, stemwall backfill, over-excavations beneath foundations	General Structural Fill	95%
Over-excavations, slab support aggregate	Crushed Surfacing	95%

1. Reference ASTM D1557 modified Proctor

Place structural fill over approved subgrades. Never place structural fill over frozen, saturated, or soft subgrades. Structural fill must be moisture conditioned to near optimum moisture content and placed in maximum 12-inch-thick, loose lifts, providing compaction equipment weighs at least 5 tons. If smaller or lighter compaction equipment is provided, reduce the lift thickness to meet the compaction requirements presented herein. The contractor is responsible for selecting compaction equipment suitable for achieving compaction.

Imported structural fill products may be too coarse for conventional Proctor testing if it contains more than 30 percent particles retained on the No. ¾ sieve (i.e., oversize material). If excessive oversize material is present within imported structural fill products, we recommend oversize material be compacted using a "method specification". Method compaction should occur by applying at least 5 complete passes over the soil using vibratory compaction equipment with a drum energy rating of at least 10 tons. We do not recommend smaller compaction equipment for method compaction. Method compaction must be observed on a full-time basis by GPI to document a dense, unyielding and interlocking *Structural Fill* surface is achieved.

Wet Weather, Wet Soil Construction and Over-Excavations

Once the subgrade elevation is achieved, it is the contractor's responsibility to protect the soil from degrading under construction traffic, freezing and/or wet weather. Initial footing excavations should not be completed within 24 hours of expected precipitation. Footing or slab concrete placement should never be attempted following a significant precipitation event and the subgrade should never be allowed to freeze prior to concrete or fill placement. The condition of the subgrade and careful construction procedures are critical to foundation and slab stability and the long-term performance of the structure.

We strongly recommend earthwork construction take place during dry weather conditions. Portions of the on-site soil will be susceptible to pumping or rutting from heavy loads such as rubber-tired equipment or vehicles any time of the year. If construction commences before soil can dry after precipitation or during wet periods of the year (November through April), earthwork at the subgrade elevation should be completed by low pressure, track-mounted equipment that spreads and reduces vehicle loads. Work should not be performed immediately after rainfall or until soil can dry to below

optimum moisture content. Time for proper moisture conditioning during dry weather is critical to reducing excessive over-excavations and the need to import coarse structural fill products.

Geosynthetics

Geosynthetic separation fabric is recommended for flexible pavement section construction. Geogrid is not anticipated to be required, but help maintain site access roads during construction. Geogrid can also help improve persistently soft subgrades encountered during construction. If required, geosynthetics shall meet the minimum requirements in WSDOT Standards Section 9-33.2(1) – Table 3, and the minimum properties shown in Table 3 below:

Table 3. Geosynthetic Specifications

Geosynthetic Type	Use	Minimum Material Specifications
Non-Woven Geosynthetic	• Asphalt pavement construction	• Must meet Soil Stabilization – Non-Woven requirements in WSDOT Standards Section 9-33.2(1). Table 3. • Grab tensile strength: 200 pounds (ASTM D4632) • Puncture resistance: 430 pounds (ASTM D6241) • Apparent opening size: US Sieve #40 (ASTM D4751) • Permittivity: 0.1 $seconds^{-1}$ (ASTM D4491)
Triaxial or Biaxial Geogrid	• Gravel-surfaced site access roads • Construction access roads • Persistent soft subgrade conditions	• 93 percent junction efficiency (GRI-GG2-05) • 3.0 kg-cm/degree Aperture Stability (U.S. Army Corp of Engineers Ref. 3.3.1.2000) • Minimum Radial Stiffness of 15,400 lb/ft at 0.5% Strain (ASTM D6637)

Apply geosynthetics directly on approved subgrades, taut, free of wrinkles, and over-lapped at least 12 inches. Consult GPI to review geosynthetic applications or other subgrade improvement alternatives.

Utility Trench Construction Considerations

Pipe bedding for utility construction should conform to WSDOT *Section 9-03.12(3)-Gravel Backfill for Pipe Zone Bedding* and Table 1 of this report. Loose soil must be removed from the base of utility trenches prior to placing pipe bedding. In addition, if water is encountered, it must be removed from the base of the utility trench before placing pipe bedding. We recommend utility pipes be placed on at least 4 inches of bedding placed and supported according to the pipe manufacturer's specifications and WSDOT requirements.

Thoroughly place and compact bedding below pipe haunches or the zone between the pipe invert and the spring line. Then place pipe bedding and compact it from the pipe invert to 1.0 foot above the top of the pipe with tamping bars and/or plate compactors to render the backfill to a dense and unyielding condition. To accomplish bedding compaction, the distance between the side of the pipe at the spring line and the trench wall should be at least 12 inches. The remainder of the utility trench should be backfilled in accordance with this report's *Required Compaction* section.

Shallow Foundations

If our recommendations are followed, the foundation design criteria presented herein can be applied to building foundations, assuming the loading conditions stated in our *Project Understanding* report section are accurate. Uncontrolled fill must be removed from beneath the foundations. Footings must be constructed on native subgrades prepared per the *Establishing Subgrades* report section requirements, or *General Structural Fill* placed over prepared native subgrades. Subgrades must remain in a compacted condition during foundation preparations, construction of concrete formwork, and reinforcing steel placement. All foundation bearing surfaces should be free of loose soil and debris and be compacted to requirements presented in the *Required Compaction* report section.

Design Criteria

Based on preparing the foundation bearing soil units as described herein, the following items provide our recommended shallow foundation design criteria:

- Maximum allowable bearing pressure: 3,000 pounds per square foot (psf)
  - Design may utilize a maximum 30 percent allowable bearing pressure increase for short term load increases such as wind or seismic.
  - Pier footing skin friction must be neglected.
- Estimated foundation vertical settlement:
  - Total settlement: 1.0 inch.
  - Differential settlement: 0.7 inch in a 30.0-foot horizontal span or between adjacent, differently loaded footings.
- Lateral load resistance:
  - Foundation base friction coefficient:
    - 0.35 for foundations cast directly on alluvial soil.
    - Reduce friction by 2/3 for precast elements.
  - Passive soil resistance on foundation sides:
    - Equivalent fluid pressure: 350 pcf (requires ¾-inch lateral movement to mobilize full resistance).
    - Neglect upper 12-inches of wall backfill due to frost action.
- Footing embedment:
  - Exterior footings must extend at least 24 inches below the final, exterior ground surface to help protect against frost action.
- Site Class – 2015 IBC Section:
  - Based on our field exploration and knowledge of the upper 100 feet of the soil profile, we preliminarily recommend using a Site Class D as a basis for structural frame seismic design. A site-specific study seismic response was not performed.

Concrete Slab-On-Grade Floors

We recommend concrete slab-on-grade floors be supported by a minimum of 12 inches of C*rushed Surfacing* meeting the requirements shown in Table 1. This assumes compacted subgrades will be

prepared beneath slabs per the *Earthwork* report section. Slabs must be designed for the anticipated use and equipment or storage loading conditions. Based on correlations to our field and laboratory test results, if our recommendations are followed, we recommend concrete slab design utilize an allowable modulus of subgrade reaction (k) of 200 pounds per cubic inch (pci). To realize the estimated subgrade modulus, drained conditions and a minimum 12 inch of support section must be provided, helping to reduce the impacts of underlying uncontrolled fill.

Moisture Protection

Based on discussions with Baker, vapor retarder is not currently planned as part of slab-on-grade construction. Floors will primarily consist of exposed concrete and will not receive addition floor covering that are susceptible to moisture damage. However, if vapor retarders are being considered, they must consist of thick, puncture-proof polyethylene sheeting, such as a 15-mil Stego Wrap™ retarder, placed immediately below the floor slab. Even if vapor retarders are used, water vapor migration through the concrete floor slab is still possible. Floor coverings should be selected accordingly and, when practical, flooring manufacturers should be consulted regarding moisture barriers, their location and product warranties.

Site Drainage

Surface Grading

We recommend the ground surface outside the structure be sloped at least 5 percent away for a minimum of 10 feet to rapidly convey surface water away from foundations. Site grades beyond 10 feet from structures should slope at least 2 percent away and toward designated stormwater collection features designed by J-U-B. *Americans with Disabilities Act* (ADA) hardscapes may not meet the above site grading recommendations adjacent to structures. We recommend ADA-pertinent hardscapes be sloped away from structures to the maximum extent practical while satisfying ADA requirements. We recommend elastomeric sealant be considered between hardscapes and foundation walls to reduce moisture infiltration at joints near building structures. Well-designed site drainage and careful final grading will help reduce moisture infiltration near building and paved areas, which will also help reduce impacts from frost heave, vapor intrusion to interior spaces and help improve long-term performance of such structures.

Runoff from precipitation or snowmelt must be routed down gradient and away from structures and must not be allowed to infiltrate, or be diverted towards building walls, foundations, or slab subgrades. Runoff or water migrating along the ground surface must be conveyed away from structures by surface water management procedures established and designed by J-U-B.

Infiltration

We accomplished infiltration testing in test pit TP-1, referencing methods outlined in Appendix 6B.6 of Ecology's SMMEW. We performed the field infiltration tests at roughly 5.5 feet below the ground surface in the alluvial, silty sand encountered in our exploration. To accomplish the test, we saturated the soil beneath the infiltration test location for a period of about 1.0 hour prior to performing the test. Upon pre-saturation, the infiltration test was initiated and performed over a period of 0.5 hours. The infiltration test results yielded the estimated un-factored infiltration rate 8.0 inches per hour.

The infiltration rate measured during our exploration is moderate. However, many factors can reduce infiltration rates. Therefore, prudent engineering judgment must be used when selecting an infiltration rate for designing stormwater disposal facilities. We recommend project civil designers apply a safety factor to the measured infiltration rate, based on their engineering judgment and design intent. Safety factors for infiltration facilities in various regional central Washington municipalities typically range from 2 to 4. Also, specifying additional infiltration testing be performed once subgrades are established can help confirm infiltration rates meet the project design.

Soil infiltration rates can dramatically decrease when the subgrade is compacted, backfill is plugged with fines, or the soil becomes frozen or saturated. Saturation due to spring runoff and summer irrigation can create localized, perched groundwater tables, which can reduce the soil's ability to infiltrate stormwater. We recommend project specification include provisions regarding careful construction practices, which do not reduce the soil's infiltration capacity, including:

- Accomplishing careful subgrade preparations which do not compact soil beneath or around the swales or chambers.
- Protecting drainage aggregate from soil contamination via a separation geotextile.

Stormwater Disposal

Planned stormwater design currently includes the use of dry well infiltration to help discharge on site stormwater. Stormwater facilities must be designed in accordance with Ecology's SMMEW requirements. Groundwater was not encountered during exploration; however, Ecology's website provides local publicly available well driller logs indicating the groundwater to be located up to 10 feet below the ground surface. Groundwater elevations must be factored into stormwater design. According to the SMMEW, dry well bottoms should be a minimum 5 feet above seasonal high groundwater. Stormwater must infiltrate into the alluvial silty sand as infiltration into uncontrolled fill cannot be predicted. We recommend stormwater be disposed as far from the planned buildings as possible, at least 2 feet below the base of the building foundations, and outside any planned structures.

Pavement Section Thickness

The following pavement section design is provided referencing the *American Association of State Highway and Transportation Officials* (AASHTO) *Guide for Design of Pavement Structures* (1993 Pavement Design Guide). Estimated traffic loading was provided by ABC via electronic correspondence on December 12, 2017. Other design parameters are based on typical pavement design criteria in the central Washington area, results from laboratory testing, and our understanding of the subsurface conditions. The following tables present our design parameters and references as well as the resulting pavement section design recommendations using the AASHTO 1993 Pavement Design Guide.

Table 4. Pavement Section Design Parameters

Design Parameter	Value Used	Reference
Reliability (R)	85%	AASHTO 1993 guidelines
Standard Deviation (S)	0.45	AASHTO 1993 guidelines
Initial Serviceability (PSI_i)	4.2	Typical central Washington area values
Terminal Serviceability (PSI_z)	2.2	Typical central Washington area values
Traffic Loading	11,000 ESALS[1]	Estimated Traffic Loading • 6,000 lb GVW (Passenger vehicles) – 156 per day • 9,000 lb GVW (Moving van) – 2 trips per week • 40,000 lb GVW (Garbage truck) – 1 trip per week
Design Life (Flexible Asphalt Pavement)	20 years	Typical central Washington value
Resilient Modulus (M_r)	5,000 psi[2]	Based on California Bearing Ratio (CBR) and M_r correlations (see paragraph below)
Asphalt Layer Coefficient (a_1)	0.42	Figure 2.5 AASHTO 1993
Top Course Layer Coefficient (a_2)	0.14	Figure 2.6 AASHTO 1993
Top Course Drainage Coefficient (m_2)	0.95	Table 2.4 AASHTO 1993 for "fair" drainage, 1 to 5 percent saturation

1 Equivalent Single Axle Loads (ESALs)
2 Pounds per square inch (psi)
3 Pounds per square inch, per inch of subgrade (pounds per cubic inch, pci).

Based on CBR and resilient modulus correlations published by AASHTO, and our experience with resilient modulus testing, we estimate the on-site soil will exhibit a resilient modulus value of at least 5,000 pounds per square inch (psi), provided the subgrade is prepared as recommended in the *Earthwork* report section. Based on the above pavement design parameters, Table 6 provides our flexible pavement design recommendations for pavements.

Table 5. Flexible Pavement Section Design

Pavement Section Material	Section Thickness (inches)	Material Specifications
Asphalt Pavement	2.5	Hot-mix asphalt (HMA) conforming to *Section 5-04* of the latest edition of WSDOT Standards. HMA should consist of Class 1/2-inch or Class 3/4-inch.
Crushed Surfacing	6.0	Top course or base course conforming to the latest WSDOT Standards *Section 9-03.9(3) Crushed Surfacing.*
Non-woven Geosynthetic Fabric	Recommended	Conforming to *Geosynthetics* report section requirements.

The above sections assumes *no construction traffic* will access pavements. Significant pavement damage can occur after just a single pass with heavily loaded construction equipment.

Pavement Maintenance and Drainage

We recommend crack maintenance be accomplished on all pavement surfaces every 3 to 5 years to reduce the potential for surface water infiltration into the underlying pavement subgrade. Surface and subgrade drainage are extremely important to the performance of the pavement section. Therefore, we recommend the subgrade, crushed surfacing, and paved surfaces slope at no less than 2 percent to an appropriate stormwater disposal system or other appropriate location that does not impact adjacent buildings or properties. Pavement performance will depend upon achieving adequate drainage throughout the section and especially at the subgrade. Water ponding at the pavement subgrade surface can induce heaving during the freeze-thaw process, which can readily damage pavement. We recommend the ABC annually review pavement surface performance to help identify and address any pavement maintenance issues.

The above pavement sections assume the pavement subgrade will be prepared as described in the *Site Preparation* report section. We recommend GPI be retained to observe and traverse the pavement subgrade to identify areas that deviate from what we have assumed for design and to help identify soft, rutting or pumping soil areas, or other potentially problematic conditions.

ADDITIONAL RECOMMENDED SERVICES

Geotechnical Design Continuity

The information contained in this report is based on anticipated site grading and provided structural loads from Baker. The final floor elevation, floor configuration, loading conditions, as well as site geometry, can significantly alter our opinions and design recommendations. Specifically, changes in structural design loads and planned site grading may require additional foundation and earthwork evaluations specific to the actual anticipated construction conditions. We should be contacted once final designs are completed to review our opinions and design recommendations contained herein.

Plan and Specification Review

We recommend GPI be retained to review geotechnical related plan and specification sections prior to issuance of the construction documents. It has been our experience that having the geotechnical consultants from the design team review the construction documents reduces the potential for errors and reduces costly changes to the contract during construction.

Geotechnical Observation During Construction

We recommend GPI be retained to provide construction observation and testing to document the report recommendations have been followed. If for some reason we are not retained to provide the recommended construction observation services, we cannot be responsible for soil engineering-related construction errors or omissions. Providing these services during construction will help to identify potential earthwork and foundation construction issues, thus allowing the contractor to proactively remedy problems and reduce the potential for errors and omissions.

EVALUATION LIMITATIONS

This geotechnical engineering report has been prepared to assist in planning, design, and construction for the ABC Mini Storage facility to be constructed at Wellsian Way and Wymans Street in Richland, Washington. Our scope does not include an engineering evaluation for deep foundations, shoring, underpinning, concrete section design, landscaping, or soil nutrient analysis. Variation in subsurface conditions may exist between or beyond our explorations, which can necessitate changes to the geotechnical recommendations in this report. Also, changes to the planned development can drastically affect our recommendations. If the improvement plans change from those described herein, we must be notified so that we may make modifications to our recommendations with respect to the modified improvements. If unforeseen conditions are encountered during earthwork, GPI must be afforded the opportunity to review our recommendations and provide necessary consultation, revision, or modifications to information contained herein. We recommend GPI be retained to review the final project plans and specifications, to provide geotechnical continuity throughout construction, and to identify any soil variations which could impact our recommendations.

This report was prepared for the exclusive use of the ABC Mini Storage and their project design team, for the specific project referenced herein. GPI cannot be held responsible for unauthorized duplication or reliance upon this report or its contents without written authorization. The geotechnical recommendations provided herein are based on the premise that an adequate program of tests and observations will be conducted by GPI during construction in order to verify compliance with our recommendations and to confirm conditions between exploration locations. Subsurface conditions may vary from the locations explored and the extent of variation may only be known at the time of construction. Where variations occur, it is critical GPI be afforded the opportunity to modify our report to reflect the site conditions exposed. This acknowledgment is in lieu of all warranties either express or implied.

LEGEND

TP-1 (1.0) *	Approximate boring location observed by GPI on October 26, 2017. Approximate depth of observed uncontrolled fill (feet). Infiltration test

Site Vicinity Map

TP-7 (7.0)

TP-6 (5.0)

TP-5 (5.0)

TP-4 (2.5)

TP-3 (3.5)

TP-2 (2.5)

TP-1* (3.0)

Wellhouse Loop

Wyman St

Wellsian Way

Goethals Dr

North

EXPLORATION MAP
ABC Mini Storage
Wellsian Way
Richland, Washington

GeoProfessional Innovation.

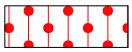
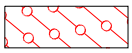
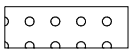
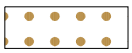
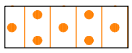
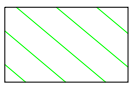
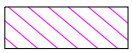
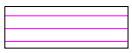
PU17268	PLATE 1

Reference: © 2017 Google. No Scale Intended

APPENDIX A

Unified Soil Classification System (USCS)
Exploratory Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE GRAINED SOIL	GRAVEL	CLEAN GRAVEL		GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
				GP	POORLY-GRADED GRAVEL, GRAVEL-SAND MIXTURES.
		GRAVEL WITH FINES		GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES.
				GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES.
	SAND	CLEAN SAND		SW	WELL-GRADED SAND, GRAVELLY SAND.
				SP	POORLY-GRADED SAND, GRAVELLY SAND.
		SAND WITH FINES		SM	SILTY SAND, SAND-SILT MIXTURES.
				SC	CLAYEY SAND, SAND-CLAY MIXTURES.
FINE GRAINED SOIL	SILT AND CLAY LIQUID LIMIT LESS THAN 50%			ML	INORGANIC SILT, SANDY OR CLAYEY SILT.
				CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, SANDY OR SILTY CLAY.
				CL-ML	INORGANIC MIXED CLAY AND SILT.
				OL	ORGANIC SILT AND CLAY OF LOW PLASTICITY.
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILT, MICA- CEOUS SILT, PLASTIC SILT.
				CH	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY.
				OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY.
				PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS.

BORING LOG SYMBOLS

STANDARD 2 INCH OD SPLIT SPOON SAMPLE

CALIFORNIA MODIFIED 3 INCH OD SPLIT SPOON SAMPLE

ROCK CORE

SHELBY TUBE 3 INCH OD UNDISTURBED SAMPLE

TEST PIT LOG SYMBOLS

GRAB BAG SAMPLE

BG

BULK SAMPLE

BK

RING SAMPLE

RG

GROUNDWATER SYMBOLS

GROUND WATER AFTER 24 HOURS

GROUND WATER AT TIME OF DRILLING

GROUND WATER AT THE END OF DRILLING

GeoProfessional Innovation®

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist	0.0	SM								Trace vegetation and organics encountered to approximately 4 inches BGS.
UNCONTROLLED FILL - SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist		ML		BG						
	2.5			BG			15.1			
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist		ML								
	5.0			BG			15.5			ASTM D4318: Atterberg Limits = Non-plastic Infiltration testing was performed at approximately 5.5 feet BGS. Unfactored Infiltration Rate: 8 inches/hour
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist		SM								
	7.5									
Test Pit Terminated at 7.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-1	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/13/17 16:15 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist UNCONTROLLED FILL - SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	SM ML		BG			12.0			Trace vegetation and organics encountered to approximately 3 inches BGS.
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5	SM								
	5.0									
Test Pit Terminated at 6.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-2	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist	0.0	SM								Trace vegetation and organics encountered to approximately 4 inches BGS.
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist		ML		BG						
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist	2.5	ML								
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist		SM		BG						
ALLUVIUM - SILTY SAND WITH GRAVEL, (SM) tan to brown, medium dense, moist	5.0	SM								
Test Pit Terminated at 6.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-3	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	ML		BK						Pea gravel surfacing to approximately 2-inches BGS.
UNCONTROLLED FILL - ASH, (ML) white to tan, stiff, moist		ML								
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5	SM								
Test Pit Terminated at 7.0 Feet.	5.0									Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-4
Project: PU17268	**Date Excavated:** 10-26-2017
Backhoe: Wacker Neuson	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RLH

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	ML		BK	51.0					Bricks encountered at approximately 3.0 feet BGS. Crushed gravel encountered at approximately 4 feet BGS. ASTM D1557: Modified Proctor Maximum Dry Density = 121.5 pcf Optimum Moisture Content = 7.5% ASTM D4318: Atterberg Limits = Non-plastic
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	2.5 5.0	SM								
Test Pit Terminated at 7.0 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-5
Project: PU17268	**Date Excavated:** 10-26-2017
Backhoe: Wacker Neuson	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RLH

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILT, (SM) black, soft, moist UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0 2.5	SM ML		BG						Trace vegetation and organics encountered to approximately 2 inches BGS. Tile debris encountered at approximately 1.5 feet BGS.
ALLUVIUM - SILTY SAND, (SM) tan to brown, medium dense, moist	5.0 7.5	SM		BG						
Test Pit Terminated at 8.5 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-6	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPJ TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
TOPSOIL - SILTY SAND, (SM) tan to brown, loose, moist UNCONTROLLED FILL - GRAVELLY SILT WITH SAND, (ML) tan to brown, loose to medium dense, moist	0.0	SM		BG						Trace vegetation and organics encountered to approximately 3 inches BGS.
	2.5	ML		BG						
	5.0			BG			15.2			Test pit refused on asphalt debris at approximately 7.0 feet BGS.
Test Pit Terminated at 7.0 Feet.										Test pit loosely backfilled with site soil.

Client: ABC Mini Storage	**Test Pit Number:** TP-7	GeoProfessional Innovation.	**EXPLORATORY TEST PIT LOG**
Project: PU17268	**Date Excavated:** 10-26-2017		
Backhoe: Wacker Neuson	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RLH		Sheet 1 Of 1

GPI TEST PIT - STRATA.GDT - 12/12/17 09:55 - C:\USERS\ARUSHOLD\DESKTOP\GINT FILES\PU17268 ABC MINI STORAGE TP-1 TO TP-7.GPJ

APPENDIX B

Laboratory Test Results

Project No.: PU17268A
Project Name: ABC Mini Storage
Client: ABC Mini Storage

Report Date: 12/8/2017

Test Results Summary								
Test Pit (TP)	Depth (feet)	Lab Number	Description (U.S.C.S. Classification)	In situ Moisture, %	Max Dry Density, pcf	Optimum Moisture, %	Atterberg Limits	#200 Sieve Passing, %
1	3.0-3.5	PUL17-0347A	Silt with Sand (ML)	15.1	-	-	-	-
1	5.0-5.5	PUL17-0347B	Ash (ML)	15.5	-	-	Non-plastic	-
2	1.0-1.5	PUL17-0347D	Silt with Sand (ML)	12.0	-	-	-	-
5	4.5-5.0	PUL17-0347C	Gravelly Silt with Sand (ML)	-	121.5	7.5	Non-plastic	51
7	5.5-6.0	PUL17-0347E	Gravelly Silt with Sand (ML)	15.2	-	-	-	-

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MOISTURE-DENSITY RELATIONSHIP CURVE
ASTM D 1557
Method C

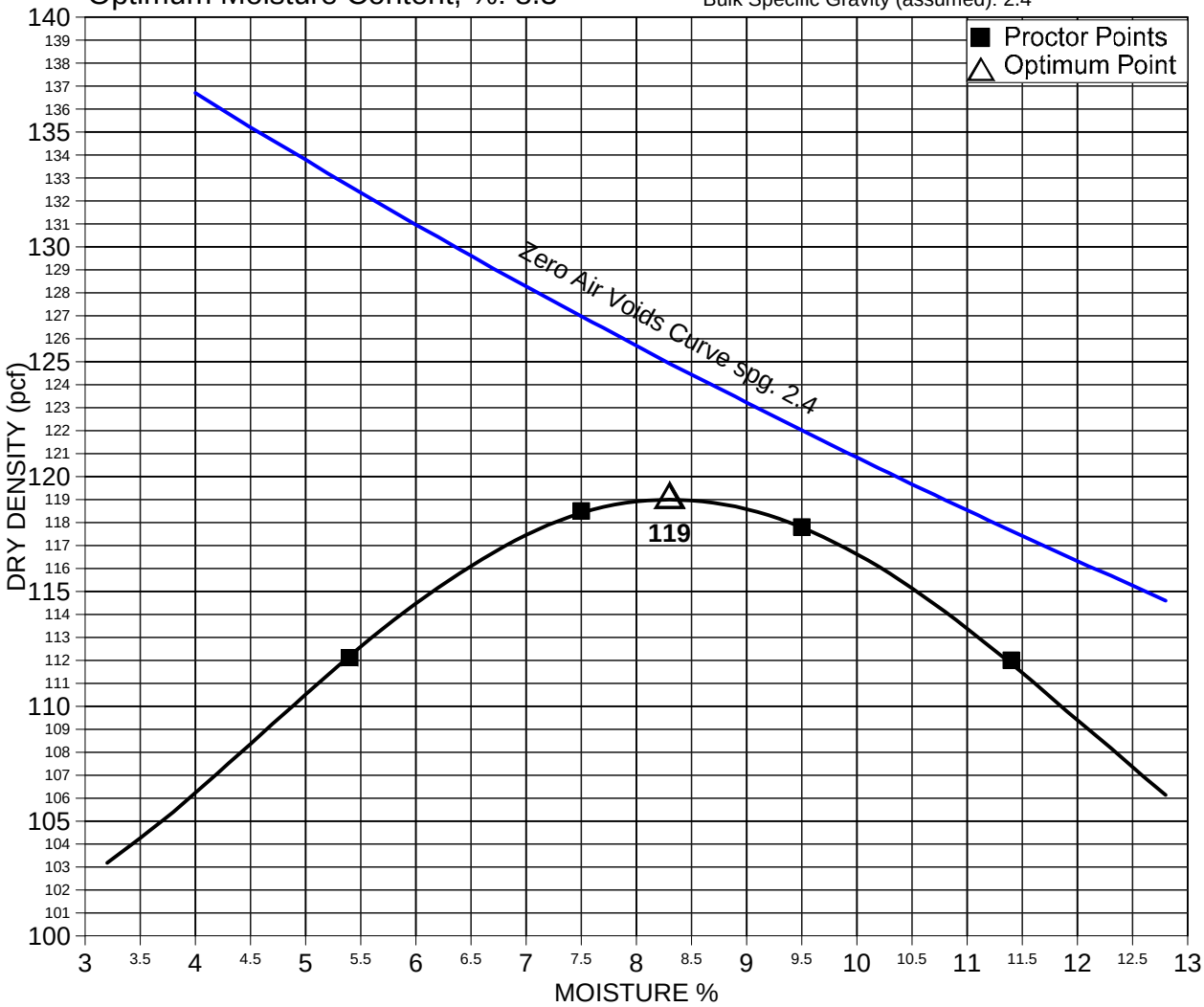
Project: ABC Mini Storage
Client: ABC Mini Storage
File Name: PU17268A
Lab Number: PUL17-0347C
Sample Location: TP-5 @ 4.5-5.0 feet BGS
Sample Classification: Gravelly Silt with Sand (ML)
Date Tested: 12/7/17 By: JBM/MCM
Rammer Type: Mechanical

GRADING ANALYSIS

SCREEN SIZE	% PASSING	AS TESTED
1 inch	100	100
3/4 inch	92	100
1/2 inch	78	78
#4	69	69
#8	68	68
#16	67	67
#40	65	65
#100	62	62
#200	51	51

Maximum Dry Density, pcf : 119.0
Optimum Moisture Content, %: 8.3

Corrected Dry Density, pcf: 121.5
Corrected Moisture Content, %: 7.5
Coarse Aggregate Correction, %: 8.0
Bulk Specific Gravity (assumed): 2.4



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