City Hall
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-5855
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DETERMINATION OF NON-SIGNIFICANCE (DNS)
TUM-22-1544
LINCS Modular Building

Description of proposal: Construction of a 1,900 square-foot modular building (school expansion) to serve 18-21 year-old life skills students with associated infrastructure.

Proponent: Tumwater School District, Capital Projects, Mel Muray; 621 Linwood Ave SW, Tumwater, WA 98512

Location of proposal: 621 Linwood Ave SW, Tumwater, WA 98512

Lead agency: City of Tumwater, Community Development Department.

As provided by RCW 43.21C.240 and WAC 197-11-158, the lead agency has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the applicable development regulations and comprehensive plan adopted under RCW 36.70A and in other local, state, or federal laws or rules. Therefore, this proposal is not likely to have a probable significant adverse impact on the environment. An Environmental Impact Statement is not required under RCW 43.21C.030(2)(c), and the lead agency will not require additional mitigation measures under SEPA. 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.

This DNS is issued under WAC 197-11-355, the option DNS process. No comment period is provided with this DNS pursuant to WAC 197-11-355(4)(a).

Date: May 4, 2023

Responsible official:

Mike Matlock, AICP
Community Development Director

Contact person: Alex Baruch, Associate Planner, 360-754-4180
555 Israel Road SW Tumwater, WA 98501

Appeals of this DNS must be made to the City Clerk, no later than May 9, 2023, by 5:00 p.m. All appeals shall be in writing, be signed by the appellant, be accompanied by a filing fee of $175, and set forth the specific basis for such appeal, error alleged and relief requested.

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

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

Instructions for applicants:

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

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

Instructions for Lead Agencies:

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

Use of checklist for nonproject proposals:

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

A. Background [HELP]

1. Name of proposed project, if applicable:

   LINCS Modular Building

2. Name of applicant:

3. Address and phone number of applicant and contact person:

LDC, Inc.
1411 State Avenue NE, Suite 200
Olympia, WA, 98506
Ross Jarvis, Principal Engineer
(360) 634-2065

4. Date checklist prepared:

12/23/2022

5. Agency requesting checklist:

Tumwater School District

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

Commence with construction in spring 2023 and complete in summer 2023.

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

There are no plans for future addition, expansion or further activities related to or connected with this proposal.

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

Drainage report has been prepared by LDC, Inc.
Geotechnical Report has been prepared by Landau Associates

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.

There are no applications pending approval for this site at this time.

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

Preliminary Site Plan Approval
Conditional Use Approval
SEPA Approval
Formal Site Plan Approval

Transportation Concurrency, Site Development Grading, Building 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.)

The proposed development consists installing a modular building about 1900 SF on the small field east of the existing Tumwater District Office for the LINCS Program to serve 18-21 year-old life skills students in their transition from high school to independent living and working. The building will house a classroom, kitchen, office(s) and restrooms. It will be connected to existing sewer and water lines. Six parking spaces will be converted to a bus stop for a short Special Education bus and two parking spaces will be converted to one accessible space.

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.

Address: 621 Linwood Ave S.W. Tumwater, WA, 98512
Parcel #: 09080004000
Legal: Section 34 Township 18 Range 2W

B. Environmental Elements [HELP]

1. *Earth* [help]

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)?

The steepest slope on the site is approximately 3%

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.

Indianola loamy sand, 0 to 3% slopes, per USDA NRCS Web Soil Survey

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

There is no surface indication or history of unstable soils in the immediate vicinity.

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 purpose of any filling and grading will be to prepare the site for the construction of the modular building. Approximately 150 cubic yards of cut/fill are estimated. All fill will be imported from approved sources. The total disturbed area is expected to be kept within the project site seen in the attached site plan.

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

Some erosion is expected during clearing and construction which will be mitigated using BMP's.

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

Approximately 2,500 square-feet of new impervious surfacing is proposed which includes the new portable and associated metal landings/ramps.

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

Best Management Practices (BMPs) will be used to control erosion. Measures may include diverting surface water away from the stripped or disturbed areas. Silt fences and/or straw bales may be erected to prevent muddy water from leaving the site, if necessary. Filter inserts will be temporarily installed in all nearby catch basins. Disturbed areas will be planted as soon as practical and vegetation maintained until established.

2. Air [help]

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

During construction, the primary emissions to the air will be exhaust, odor, and dust generated from construction machinery and activity. After construction, the primary source of emissions to the air would be generated from vehicles using the proposed parking stalls.

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

Vehicle exhaust from nearby traffic on Linwood Ave SW and vehicles using the surrounding parking lot may minimally impact the proposal.

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

There are no current measures to reduce or control emissions.

3. Water [help]

a. Surface Water: [help]

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.

The project site is not near any surface water body. The nearest water body is Barnes Lake about 950 feet west of the limits of the disturbed area associated with the proposal.

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.

The project will not require any work over, in, or adjacent to any surface water body.

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.

No fill or dredge material will be placed in or removed from surface water or wetlands as part of this proposal.

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

No surface withdrawals or diversions are expected.

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

The proposal does not lie within a 100-year floodplain, per FEMA Flood Map 53067C0168G.

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 discharges of waste material to surface waters is expected as part of this proposal.

b. Ground Water: [help]

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 groundwater is planned to be withdrawn for any purposes as part of this proposal.

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.

There is a bathroom within the proposed portable. All domestic sewage will be routed to the public sanitary sewer system.

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.

Runoff on this site is primarily from rainfall on the site itself and from sheet flows from existing on-site lawn. Proposed roof runoff will be captured via downspouts. Stormwater will then be conveyed to a below-grade infiltration gallery.

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

It is unlikely that waste material will enter ground or surface waters.

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

The proposal will not alter or otherwise affect drainage patterns in the vicinity of the site.

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

Site runoff will be controlled by the proposed on-site stormwater BMPs.

4. Plants [help]

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

__**x**__deciduous tree: alder, maple, aspen, other
____evergreen tree: fir, cedar, pine, other
____shrubs
__**X**__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?

Approximately 2,000 SF of lawn will be cleared for the proposed building.

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

There are currently no known threatened or endangered plant species onsite.

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

Residential lawn and landscaping according to Tumwater requirements.

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

No noxious weeds or invasive species are known to be on or near the site.

5. Animals [help]

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: crow, robin, sparrow
mammals: deer, bear, elk, beaver, **other: Small rodents**
fish: bass, salmon, trout, herring, shellfish, other _____

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

There are currently no known threatened or endangered plant species onsite.

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

All of western Washington is covered by the Pacific Flyway Migration Route.

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

None proposed at this time.

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

No invasive species are known to be on or near the site.

6. Energy and Natural Resources [help]

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

Electrical and natural gas where available. These will be used for heating and general power.

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

No, the proposed development will not impact the potential use of solar energy by adjacent properties.

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:

Buildings to be designed in accordance with energy requirements.

7. Environmental Health [help]

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? If so, describe.

Any fuel or paint spillage will be prevented through the contractor's spill prevention plan.

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

There is no known or possible contamination at 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.

There are no known hazardous chemicals/conditions onsite that may impact project development and design.

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.

None proposed.

4) Describe special emergency services that might be required.

None expected.

5) Proposed measures to reduce or control environmental health hazards, if any:

None proposed.

b. Noise

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

Traffic from surrounding parking area may minimally impact the proposal.

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.

Noise levels would be intermittently high throughout construction but should be limited to normal waking hours. These construction-related sounds will be from large machinery and ground disturbing activities. On a permanent basis, noise created by daily vehicular trips would increase ambient noise levels in the vicinity.

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

Comply with applicable statutes/standard construction measures.

8. Land and Shoreline Use [help]

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 project site is currently developed as a field adjacent to the existing Tumwater School District buildings. To the west and south of the project site are School District buildings. To the east is the North End Fire Station and to the north is parking and Linwood Ave. The proposal will not affect the surrounding land uses.

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?

The project site has never been used as a working farm or forest land.

1. Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

   N/A. Surrounding land uses are all residential.

c. Describe any structures on the site.

There are no structures on the project site. Buildings associated to Tumwater School District occupy the rest of the proposal, outside of the limits of the proposal.

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

N/A. There are no structures on the project site. Buildings associated to Tumwater School District occupy the rest of the proposal, outside of the limits of the proposal.

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

SFM

SFM and Green Belt

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

Single-Family Medium Density Residential

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

Not applicable to this site.

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

No part of the project site has been classified as a critical area by city or county.

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

Approximately five adults will work in the completed project and between 8-16 students will take classes in the completed project.

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

N/A. The project site is currently vacant.

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

N/A. The project site is currently vacant.

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

None necessary as the proposed project is compatible with existing and project land uses and plans.

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

N/A. There are no agricultural or forest lands with long term commercial significance in the immediate vicinity of the project site.

9. Housing [help]

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

There will be no housing units provided. The proposed building will be used as a modular building for teaching purposes.

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

N/A. The site is currently vacant.

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

None necessary. Any impact fees will be paid prior to construction.

10. Aesthetics [help]

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

The building height of the building will be 13 feet at the highest point.

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

No view would be altered or obstructed as a result of this proposal.

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

Landscaping installation per City and District design standards.

11. Light and Glare [help]

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

The proposal will produce light from exterior building and security lighting primarily at night. Light will also be produced from any vehicle use from surrounding parking area primarily at night.

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

Not expected.

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

Light from surrounding land use will minimally impact the proposal.

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

None proposed. Lighting from exterior of building will adhere to City code.

12. Recreation [help]

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

Tumwater School District playing field approximately 500 feet west of the site. Isabella Bush Park approximately 0.5 miles west of the site.

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

The proposed project is currently a grass field with soccer goal posts located on site. The project would decrease the size of the grass field (about 2000 square feet).

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

None proposed.

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

There are no known buildings or structures located onsite that are over 45 years old or are eligible for listings in the nations, state, or local preservation register.

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.

There are no known landmarks, features, or other evidence of Indian or historic use on the site.

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 database map and historical maps were used.

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.

None proposed. If historical objects or artifacts are found, construction will be stopped and local tribes and city agency will be notified.

14. Transportation [help]

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

The site is accessed by Linwood Ave SW which has access ramps to I-5.

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

The site is served by a transit stop approximately 250 feet away from the proposed building at the entrance to the site along Linwood Ave SW.

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

Two accessible parking stalls and a bus stop for a short special education bus is proposed. 9 parking spaces will be removed as part of this proposal to accommodate for the bus stop, accessible spaces, and improvements for the building.

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).

No improvements are expected.

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

The proposal will not use or occur in the immediate vicinity of water, rail, or air transportation.

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?

The proposed use will not generate any PM peak hour trips (4:00 PM to 6:00 PM) to City of Tumwater transportation system. The proposed use will not add staff or trips to the District Office. See Traffic Concurrency Narrative for more details.

AM peak hour trips were evaluated in an updated trip generation assessment showing four AM peak hour trips; none passing through the Tumwater Blvd. I-5 interchange.

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.

Not expected for proposal.

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

Any traffic mitigation fees will be paid as determined by the City.

15. Public Services [help]

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

The project will place additional demands on public services such as fire protection, police protection, public transit and others; however, these systems are typically in place to absorb additional demands from new development.

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

Any required impact or mitigation fees will be paid.

16. Utilities [help]

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.

Utility connections will be made from existing lines servicing the Tumwater School District building. Refer to preliminary plans for details about utility providers and the water/sewer connections required for building operation.

C. Signature [HELP]

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: Ross Jarvis

Name of signee Ross Jarvis, PE

Position and Agency/Organization Principal Engineer / LDC, Inc.

Date Submitted: 12/27/2022

Reviewed by: Alex Baruch, Planner
Date: 03-23-2023

D. Supplemental sheet for nonproject actions [HELP]

(**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:

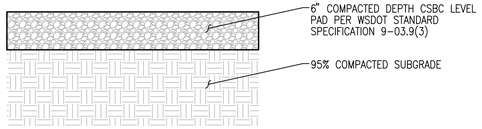
5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

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

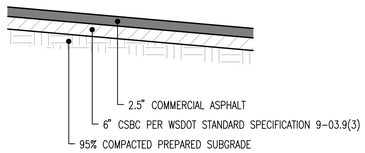
6. How would the proposal be likely to increase demands on transportation or public services and utilities?

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.

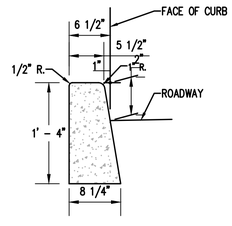


CSBC SECTION (UNDER METAL LANDINGS)
NOT TO SCALE

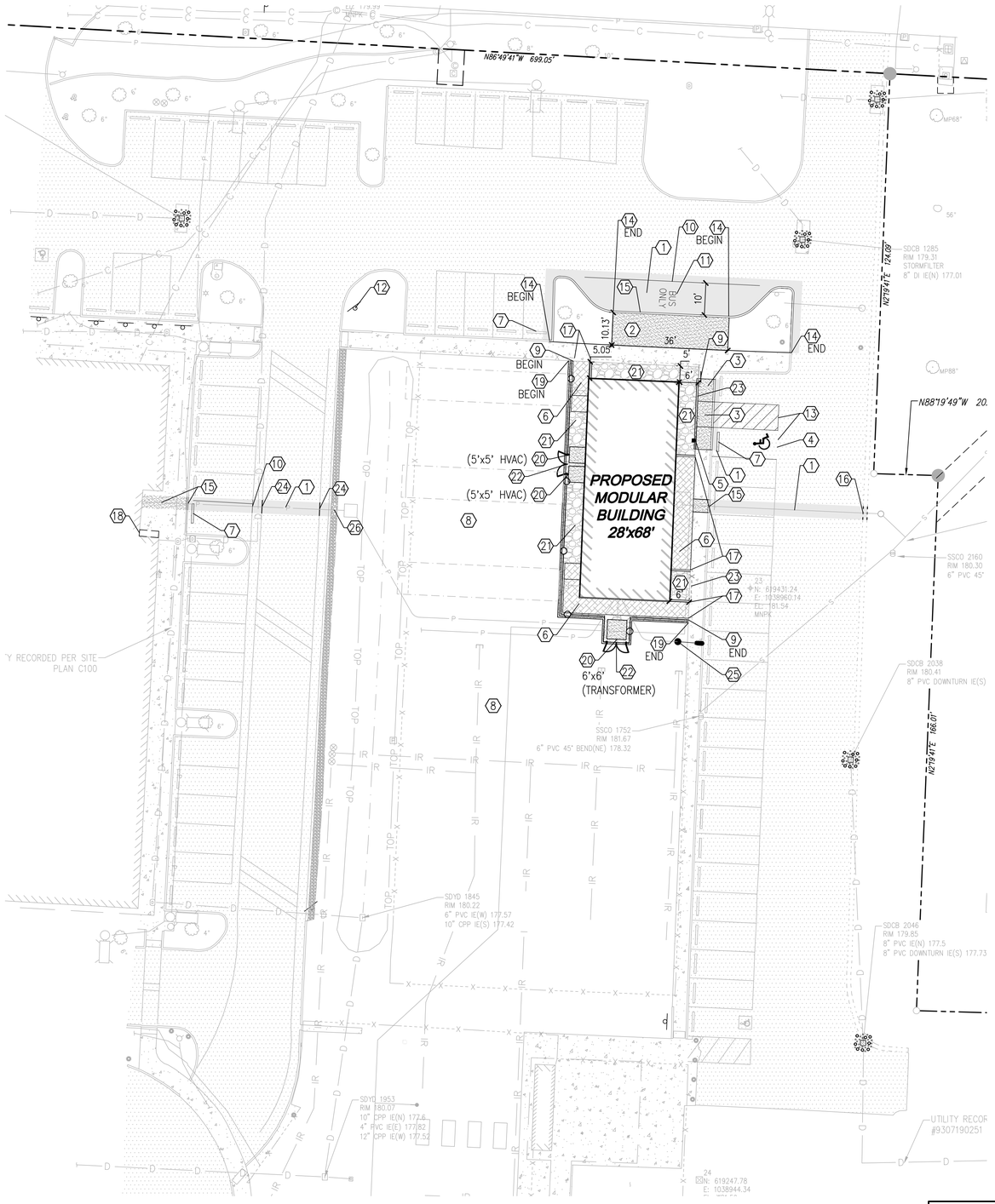


TYPICAL ASPHALT PAVEMENT SECTION
NOT TO SCALE

BIKE RACK
NOT TO SCALE



CONCRETE BARRIER CURB
NOT TO SCALE



SCALE: 1" = 20'
20' 0 20' 40'

LEGEND

- ASPHALT PAVING PER DETAIL ON SHEET C.4.0
- CONCRETE SIDEWALK PER CITY OF TUMWATER STD DETAIL ST-04 ON SHEET C.4.1
- CSBC PER WSDOT STANDARD SPECIFICATION 9-03.9(3)
- PROPOSED MODULAR BUILDING
- PROPOSED METAL RAMP AND LANDING
- CONCRETE BARRIER CURB PER DETAIL ON SHEET C.4.0
- 6' GALVANISED CHAIN LINK FENCE

CONSTRUCTION NOTES

1. INSTALL ASPHALT PAVEMENT PER DETAIL ON SHEET C.4.0
2. INSTALL CONCRETE SIDEWALK PER CITY OF TUMWATER STD. DETAIL ST-04 ON SHEET C.4.1
3. INSTALL ADA ACCESSIBLE PARALLEL CURB RAMP PER WSDOT STD. DETAIL F-40.12-03 ON SHEET C.4.1
4. INSTALL ADA ACCESSIBLE PARKING STALL PER DETAIL ON SHEET C.4.1
5. INSTALL ADA PARKING SIGN MOUNTED ON FENCE PER DETAIL ON SHEET C.4.1
6. INSTALL CSBC SECTION OUTSIDE MODULAR FOUNDATION UNDER METAL RAMP PER DETAIL ON SHEET C.4.0
7. RE-INSTALL WHEEL STOP
8. IMPORT TOPSOIL & HYDROSEED DISTURBED AREAS PER LANDSCAPE & SEEDING SPECIFICATIONS NOTES ON SHEET C.5.0
9. INSTALL 6' GALVANIZED CHAIN LINK FENCE.
10. 4" WIDE WHITE STRIPE (PAINT)
11. WHITE "BUS ONLY" STENCIL (PAINT)
12. INSTALL PLAQUE "TRANSITION PROGRAM" OVER "PRESCHOOL" TEXT
13. PRESSURE WASH ADA STALLS (APPROXIMATELY 400 SF).
14. INSTALL 6" CONCRETE BARRIER CURB PER DETAIL ON SHEET C.4.0
15. INSTALL CEMENT CONCRETE INTEGRAL CURB AND WALK PER DETAIL ON SHEET C.4.1
16. INSTALL ASPHALT WEDGE CURB - MATCH EXISTING
17. INSTALL END POSTS. PROVIDE OPENING IN EXISTING FENCE AS SHOWN ON PLANS
18. INSTALL BIKE RACK PER DETAIL ON SHEET C.4.0
19. INSTALL 6" MOWSTRIP PER DETAIL ON SHEET C.4.1
20. INSTALL HOUSEKEEPING PAD PER CITY OF TUMWATER SIDEWALK STD DETAIL ST-04 ON SHEET C.4.1. COORDINATE LOCATION WITH OWNER
21. INSTALL 6" CRUSHED SURFACE BASE COURSE PER WSDOT STD SPECIFICATION 9-03.9(3)
22. INSTALL 6' WIDE GATE
23. RE-INSTALL FENCE
24. 4" WIDE YELLOW STRIPE (PAINT)
25. SITE LIGHTING BY ELECTRICAL ENGINEER
26. INSTALL WASHED ROCK (MATCH EXISTING)

PAVING NOTE

EMULSIFIED ASPHALT GRADE CSS-1 TACK SHALL BE APPLIED TO EDGES OF EXISTING PAVEMENT. ALL JOINTS SHALL BE SEALED USING PAVING ASPHALT AR400W.

DISCLAIMER

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UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

REVISIONS			
NO.	DATE	DESCRIPTION	BY

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TUMWATER SCHOOL DISTRICT

LINCS MODULAR BUILDING

SITE PLAN

ROSS D. JARVIS
STATE OF WASHINGTON
43668
REGISTERED
PROFESSIONAL ENGINEER
2-10-2023

JOB NUMBER:	C22278
DRAWING NAME:	C22-278-SP-01
DESIGNER:	REW
DRAFTING BY:	AJW
DATE:	FEBRUARY, 2023
SCALE:	AS NOTED
JURISDICTION:	TUMWATER, WA

C.4.0

SHEET 5 OF 9

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Construction\C22-278-SP-01.dwg Plotted: Feb 10, 2023 - 3:19pm

Drainage Report

LINCS Modular Building
Tumwater, WA

Prepared For:
Tumwater School District
621 Linwood Ave SW
Tumwater, WA

Prepared By:
LDC, Inc.
1411 State Ave. NE Suite 200
Olympia, WA 98506
(425) 806-1869

LDC | Surveying Engineering Planning

February 2023

Drainage Report

Project Information

Project:	**LINCS Modular Building**
Prepared for:	**Tumwater School District** 621 Linwood Ave SW Tumwater, WA Contact Name: Mel Murray Contact Phone: (360) 709-7005

Reviewing Agency

Jurisdiction:	City of Tumwater

Project Representative

Prepared by:	**LDC, Inc.** 1411 State Ave. NE, Suite 200 Olympia, WA 98506 (425) 806-1869 ldccorp.com
Contact:	Ross Jarvis, PE
Project Reference:	C22-278 Path: P:\Civil\2022\C22-278 LINCS Modular Building\Data Engineer\Drainage Report\Working Report\2022-xxxx Stormwater Site Plan.docx

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Drainage Control Plan for the LINCS Modular Building project has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Tumwater does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

Kyle Herrera 02/10/2023

Prepared by: Kyle Herrera, EIT
KHerrera@ldccorp.com
(360) 634-2080

Date

02/10/2023

Approved by: Ross Jarvis, PE
RJarvis@ldccorp.com
(425) 806-1869

Date

LIST OF FIGURES

DRAINAGE CONTROL PLAN ATTACHMENTS

LIST OF APPENDICES

1. PROPOSED PROJECT DESCRIPTION

The following report was prepared for the LINCS Modular Building project in Tumwater, WA. This report was prepared to comply with the minimum technical standards and requirements that are set forth in the City of Tumwater 2022 *Drainage Design and Erosion Control Manual (DDECM).*

Project Proponent: Tumwater School District

Parcel Numbers: 09080004000

Total Parcel Area: 19.15 Acres

Current Zoning: SFM: Single-Family Medium Density Residential, GB: Greenbelt

Required Permits: Grading, Utility, Paving, Building, etc.

Site Addresses: 621 Linwood Ave SW

Section, Township, Range: Section 34, Township 18, Range 2 W

The proposed LINCS Modular Building site is located on a 19.15-acre parcel in Tumwater, WA. The project is located within the Tumwater School District, north of Barnes Lake and Michael T Simmons Elementary School off Linwood Ave SW and S 7th Ave SW. The proposed project includes construction and installation of a 1,896 SF portable classroom to be placed on the northeast corner of the existing soccer field. A bus loading zone, ADA ramps and parking lot improvements are proposed around the portable building for accessibility. Approximately 0.22 acres will be disturbed, but less than 5,000 SF of new impervious surface will be added. Specifically, the proposed site improvements/construction activities for this project include the following:

- Site preparation, grading, and erosion control activities
- Construction and installation of new portable building
- Construction of bus loading zone
- Construction/installation of on-site stormwater management BMPs
- Extension of available utilities (i.e., water, sewer, etc.)

A site vicinity map of the proposed project location, an Existing and Proposed Basin Map, and a worksheet for determining the number of Core Requirements for this project has been prepared and is enclosed as **Appendix 3**. According to figures 2.1 and 2.2, the proposed project is considered a redevelopment that triggers Minimum Requirements 1-5 for the new and replaced hard surfaces and the land disturbed. Table 1 below describes the land use of the disturbed area of the parcel.

Table 1: Land Type Designations Existing vs. Proposed

LAND TYPE DESIGNATIONS	AREA (ACRES)	% OF TOTAL AREA
Total Disturbed On-Site Area	**0.22**	**100**
Existing Pervious Surface	0.16	72.70
Existing Impervious Surface	0.06	27.30
Proposed Pervious Surface	0.10	45.50
Proposed Impervious Surface	0.12	54.50

1.1 SUMMARY OF COMPLIANCE ON-SITE

Per Section 2.3.2 of the *2022 DDECM* and the flowchart provided in Figure 2.2 therein, this project must comply with Minimum Requirements #1-5. A copy of the flowchart used to determine the triggered Minimum Requirements is provided in **Appendix 3.** In accordance with the *2022 DDECM*, the project satisfies all of the Minimum Requirements as follows:

Minimum Requirement #1 – Preparation of Stormwater Site Plans – A Stormwater Drainage Plan has been prepared per the *2022 DDECM* and submitted to the City of Tumwater. The Storm Drainage Plan, along with the drainage report, satisfies this requirement.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention – An erosion control plan has been prepared and is part of the engineering plan set in **Attachment No. 1**. A Construction Stormwater Pollution Prevention Plan (SWPPP) addressing the 13 required elements will be completed and included herein as **Attachment No. 2** at the time of civil permit submittal.

Minimum Requirement #3 – Source Control of Pollution – At minimum, the source control BMPs listed below shall be implemented for the site in accordance with the *2022 DDECM.* Note that additional BMPs not listed here may be required at the City's direction.

- Volume IV, Chapter 5, Section S.2 Dispose of Collected Runoff and Waste Materials Properly
- Volume IV, Chapter 5, Section S.6 Pave the Activity Area and Slope to a Sump or Holding Tank
- Volume IV, Chapter 5, Section S.9 Clean Catch Basins

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls – Currently, the site is developed with various buildings and associated parking etc. for the Tumwater School District. Existing stormwater facilities throughout the parcel consist of catch basins, Contech stormfilters, and biofiltration swales. The proposed location is currently being used as a grass sports field and it appears that the sports field slopes towards the middle of the field. It is assumed that the stormwater runoff disperses through the vegetation of the sports field. However, if stormwater does not infiltrate in the sports field it will flow into either the bio swale and catch basin to the west of the field or the filter strip and catch basin off the southwest corner. After construction, the stormwater runoff from the proposed roof area will be tightlined to a downspout dispersion system where it will be infiltrated on-site. The downspout dispersion system was sized to meet minimum requirement #5. The sidewalk and parking lot stormwater runoff will continue to be treated and conveyed by the existing catch basins while the pervious areas will infiltrate on site. See Section 4 of this report for more information.

Minimum Requirement #5 – On-Site Stormwater Management – Using Figure 2.3: The Flow Chart for Determining Core Requirement #5 Requirements, the proposed project is considered a redevelopment triggering minimum requirements #1-5, therefore the project shall employ the On-Site Stormwater Management BMPs in accordance with List #1. The project will demonstrate compliance with List #1, see below.

Lawn and Landscaped Areas:

- Per Volume V Chapter 6 Section of the *2022 DDECM*, Post Construction Soil Quality and Depth (Ecology BMP T5.13) will be utilized to the maximum extent practicable. See landscape plans for details.

Roofs:

- Full Dispersion (Volume V, Section 7.2) or Downspout Infiltration/Dispersion System (Volume V, Section 15.3): A downspout dispersion system is feasible for this project due to the availability of vegetative lawn pathing on the western and southern portion of the building. The proposed system will accommodate the roof runoff using three splash blocks with three separate 10' by 50' vegetated flow paths in accordance with Chapter 15.4.5 of the *2022 DDECM*. The on-site geotechnical investigation confirmed 12 inches or more of permeable soil with a moderately high infiltration rate of 3.3 in/hr. See Section 4 for more details.

Other Hard Surfaces:

- Full Dispersion (Volume V, Section 7.2): Full dispersion is infeasible for this project due the surrounding existing development and the size of the proposed improvements. The replaced hard surfaces are located within an existing parking area and does not allow for the required vegetated flow paths.
- Permeable Pavement (Volume V, Chapter 11): Permeable pavement is infeasible for this project due to the size, location, and use of the proposed improvements. Only a small portion of the existing parking lot will be replaced and therefore permeable pavement is not a desired design option.
- Bioretention (Volume V, Chapter 9): Bioretention is infeasible for this project due to the small size of the project. The replaced impervious surfaces are located within the parking lot with minimal to no grading changes and therefore the stormwater runoff will utilize the existing systems located on-site.
- Sheet flow dispersion (Volume V, Section 7.3) and concentrated flow dispersion (Volume V, Section 7.4): Sheet flow or concentrated dispersion is not feasible for this project due to the existing developments and small surface area of the proposed project.
- The proposed project will replace 2,020 SF of other hard surfaces on-site for the reasons mentioned above. The stormwater runoff from these surfaces will continue flow onto the parking lot and enter the existing stormwater treatment, conveyance systems, and infiltration systems on-site. All of these areas are replaced impervious surfaces and therefore stormwater runoff flows and drainage patterns are anticipated to remain the same after construction with no anticipated adverse effects to the downstream systems.

2. EXISTING CONDITIONS DESCRIPTION

2.1 EXISTING ON-SITE CONDITIONS

The subject site is +/- 19.15 acres in size. In 1990, the southern portion of the parcel was developed and contained the Michael T Simmons Elementary School. The parcels adjacent to the west are residential developments and to the east is the North End Fire Station along with commercial developments. The developments on the surrounding parcels were constructed before 1990 while the Tumwater School District building was added to the project parcel in 2009. See Figures 1 and 2 below for existing conditions of the site.

Figure 1: Existing Conditions (1990)

Figure 2: Existing Conditions (2022)

2.2 CRITICAL AREAS

Flood Zones: The project parcel is located with Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 53067C0168G. According to the FIRM Map the project parcel is located within Zone X. Zone X is determined to be an area of minimal flood hazard. See **Appendix 3** for the FIRM Map.

Wellhead Protection Areas: According to the Thurston County GeoData Center, the proposed project is not located within the wellhead protection area. See **Appendix 3** for the Wellhead Protection Area Map.

Critical Aquifer Recharge Areas: According to the Thurston County GeoData Center, the proposed project is located within the Category I Critical Aquifer Recharge Area. The proposed on-site stormwater management facilities have been designed in accordance with the City of Tumwater's *2022 DDECM* and satisfies the 16.24.050 Aquifer protection standards outlined in Tumwater's municipal code. See **Appendix 3** for the Critical Aquifer Recharge Area Map.

2.2.1 On-Site Soils Information

The final on-site geotechnical investigation by Landau Associates in December 2022 revealed a topsoil layer approximately 5 to 6 inches deep, followed by a medium dense fill comprised of crushed concrete, sand, and gravel with silt. The fill layer roughly extends from 0.8 to 3 ft below ground surface. The concrete debris ranged from 6 to 14 inches in diameter with some smaller 1-inch pieces mixed in. Recessional outwash, consisting of sand, silt, and gravel, was observed beneath the fill and extended approximately 9.0 ft below ground surface. No groundwater was observed during the geotechnical exploration. The investigation determined that the medium dense concrete fill material will provide suitable support for the portable building. The design infiltration rates were calculated using laboratory tests and the soil grain method in the City of Tumwater's *2022 DDECM.* The infiltration rates of the native soils ranged from 3.3 to 6.2 in/hr and were determined to be appropriate for the design of small-scale facilities such as downspout dispersion via splash blocks. See **Attachment No. 3** for the geotechnical report.

3. VICINITY ANALYSIS AND SUBBASIN DESCRIPTION

There are no known flooding or bank overtopping problems, and no steep slopes are located near the project site. The project site is located within the Category I Critical Aquifer Recharge Area therefore requiring enhanced treatment. However, no new pollution generating impervious surfaces will be constructed with this project and treatment is not required. There are no known fuel tanks on-site.

3.1 QUALITATIVE UPSTREAM ANALYSIS

The surrounding areas around the project site consist of sidewalks and parking areas with curbs and stormwater systems. Therefore, the project site does not receive any upstream run-on from the adjacent areas.

3.2 QUALITATIVE/QUANTITATIVE DOWNSTREAM ANALYSIS

Currently, stormwater runoff from the existing sports field appears to infiltrate within the field. The stormwater runoff from the existing sidewalks and parking areas sheet flow across the parking lot and into various catch basins, where the stormwater runoff is conveyed to an existing Contech stormfilter that provides basic treatment. After treatment, the stormwater runoff is conveyed to an underground infiltration trench. After construction, the stormwater runoff from the portion of the sports field that is converted to roof area will be tightlined to an

underground downspout dispersion system sized to meet minimum requirement #5. The replaced sidewalk and parking areas will continue to utilize the existing facilities and therefore no adverse effects are anticipated at this time. In the event that the downspout dispersion system fails, the stormwater runoff will overtop the facility and flow into the adjacent biofiltration swale. The stormwater runoff that does not infiltrate within the biofiltration swale will be collected by a catch basin that conveys the stormwater runoff to an underground infiltration facility where the stormwater runoff will infiltrate as it does today.

4. FLOW CONTROL AND WATER QUALITY FACILITY SIZING

4.1 SUMMARY SECTION

Following Figures 2.1 and 2.2 (See **Appendix 3**), this project classifies as a redevelopment that triggers Minimum Requirements 1 through 5. The site has 35% or more of existing impervious coverage, and the project will add more than 2,000 S.F. of new plus replaced hard surfaces but less than 5,000 S.F. The proposed project will not add any new pollution-generating impervious surfaces to the site. The proposed project will not result in the addition of new impervious surface totaling 25 percent or more of existing impervious surface nor will the construction cost of proposed improvements be 25 percent or more of the assessed value. Therefore, no additional requirements are triggered following Figure 2.2. See Drainage Control Plan **Attachment No. 1** for the proposed stormwater facility locations and details. See **Appendix 3** for the basin maps.

4.1.1 Performance Standards and Goals

Following Figure 2.1 – Flow Chart for Determining Requirements for New Development, the project site qualifies as a redevelopment. Per Figure 2.2, the project triggers the use of Minimum Requirements #1-5 for the new and replaced hard surfaces, and the land disturbed. All of the new and replaced hard surfaces and the land disturbed will meet Minimum Requirement #5 to the maximum extent feasible.

4.1.2 Flow Control System

Per Figures 2.1 and 2.2, flow control is not required for this project. However, the project is required to meet Minimum Requirement #5 to the maximum extent feasible. The proposed project will meet Minimum Requirement #5 by using on-site stormwater management BMPs from List #1 for all surfaces within each type of surface in List #1. For the proposed roof surface, stormwater runoff will be managed by a downspout dispersion system where the runoff will be directly conveyed via gutters and pipes to one of three splash blocks and discharged along 50 ft long vegetated paths to fully infiltrate on-site. The proposed downspout dispersion splash blocks are located in the soccer field to the west of the proposed building location. The proposed downspout dispersion system was designed in accordance with Chapter 15.4.5 of the *2022 DDECM*. A roof drain capacity of 700 SF per splash block was used in the design sizing. The roof area of 1,904 SF requires three splash blocks to sufficiently disperse the stormwater runoff across the vegetated flow paths. By these minimum requirements, three splash blocks measuring 2’ by 3’ by 6” deep have been provided in the stormwater design. The other proposed new and replaced hard surfaces will utilize existing stormwater systems for stormwater treatment and management as there are no additional proposed pollution-generating impervious surfaces. Postconstruction soil quality and depth BMPs (Volume V, Chapter 6) will be utilized to the maximum extent possible for proposed lawn and landscaped areas. See **Appendix 1** for the design calculations.

4.1.3 Water Quality System

Core Requirement #6 is not triggered by this project; therefore, runoff treatment is not required. All of the replaced pollution generating impervious surfaces within the parking lot will continue to utilize the existing

treatment systems on-site. Additionally, the project will not create any new pollution-generating impervious surfaces and therefore no adverse effects to the existing systems are anticipated at this time.

5. AESTHETIC CONSIDERATIONS FOR FACILITIES

The proposed stormwater systems will only include splash block structures that will be evenly inset with the surrounding mow strip to provide an aesthetic finish. There are no other proposed above ground stormwater management systems and therefore will maintain the aesthetics of the development.

6. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The proposed conveyance systems have been sized to convey the stormwater runoff from the developed conditions for a 25-year, 24-hour storm event within the pipe.

7. COVENANTS, DEDICATIONS, EASEMENTS

In accordance with the City of Tumwater policy, the property owner shall privately maintain on-site stormwater drainage facilities and ensure that all installed drainage facilities remain functional in accordance with the proposed design. A copy of the maintenance plan shall be kept available at the project site at all times.

A Maintenance and Source Control Manual has been completed and included herein as **Attachment No. 4**.

8. AGREEMENTS AND GUARANTEES

Maintenance and/or operational bonding or other appropriate financial guarantees are required for all projects to ensure construction and maintenance of proposed drainage facilities in compliance with applicable standards. These guarantees are to be consistent with the most recent edition of the City of Tumwater Development Guidelines and Public Works Standards.

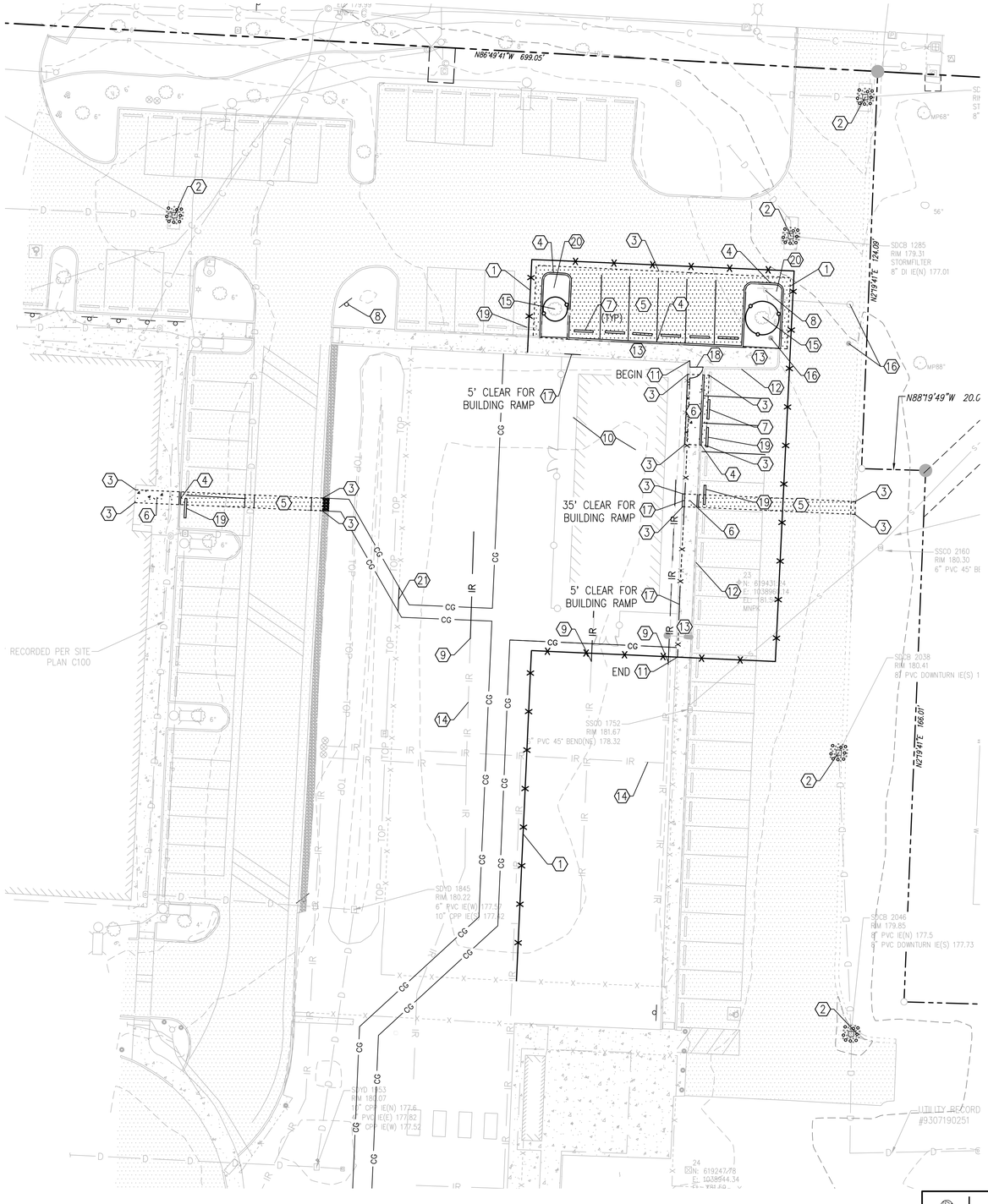
9. OTHER PERMITS OR CONDITIONS PLACED ON THE PROJECT

There are no other known required permits at this time.

END OF STORMWATER SITE PLAN

DRAINAGE CONTROL PLAN
ATTACHMENT 1
SITE DEVELOPMENT DRAWINGS

A PORTION OF SEC 34, TOWNSHIP 18, RANGE 2 WEST, W.M., THURSTON COUNTY, WASHINGTON



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

- CG — CLEARING LIMITS
- TEMPORARY CONSTRUCTION FENCE
- SAWCUT
- STORM DRAIN INLET PROTECTION SEE DETAIL ON SHEET C.3.1
- PAVEMENT REMOVAL
- CONCRETE SIDEWALK REMOVAL
- TREE PROTECTION FENCING PER DETAIL ON SHEET C.3.1

DEMOLITION NOTES

1. INSTALL TEMPORARY CONSTRUCTION FENCE
2. INSTALL CATCH BASIN PROTECTION
3. SAWCUT
4. REMOVE & DISPOSE OF EXISTING CURB
5. REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT
6. REMOVE & DISPOSE OF EXISTING SIDEWALK TO NEAREST EXPANSION JOINT
7. REMOVE EX. WHEELSTOPS & RETURN TO OWNER
8. PROTECT EXISTING SIGN & POST
9. REMOVE & CAP EXISTING IRRIGATION LINES
10. CLEAR & REMOVE EXISTING SOD FOR BUILDING FOUNDATION, UTILITIES AND RAMPS
11. CONTRACTOR TO REMOVE & RE-INSTALL FENCE BEFORE AND AFTER MODULAR DELIVERY
12. PROTECT EXISTING CURB
13. PROTECT EXISTING SIDEWALK
14. PROTECT EXISTING IRRIGATION SYSTEM
15. PROTECT IN-PLACE EXISTING TREE & ROOT SYSTEM
16. PROTECT IN-PLACE EXISTING METAL BOLLARD/GATE
17. REMOVE EXISTING FENCE FOR BUILDING RAMP
18. REMOVE EXISTING GATE
19. TEMPORARILY REMOVE EXISTING WHEEL STOP & REINSTALL
20. PROTECT EXISTING IRRIGATION SYSTEMS WITHIN PLANTERS
21. CONTRACTOR TO REMOVE & RE-INSTALL FENCE IF NEEDED

CONSTRUCTION SEQUENCE

1. PLACE TEMPORARY CONSTRUCTION FENCE WHERE SHOWN ON PLAN. CONTRACTOR SHALL LOCATE AND PROTECT ALL EXISTING UTILITIES WITHIN WORK AREA.
2. IMPLEMENT TEMPORARY EROSION CONTROL MEASURES AS MAY BE REQUIRED IN ACCORDANCE TO CITY OF TUMWATER STORMWATER MANUAL.
3. REMOVE AND CAP ALL IRRIGATION LINES WITHIN THE WORK AREA. REMOVE SOD, AND PERFORM GRADING AND COMPACT BASE FOR GRAVEL BUILDING PAD.
4. TRENCH AND INSTALL PIPES AND CLEANOUTS FOR ROOF DRAIN. (TRENCHING AND PLACEMENT OF ELECTRICAL AND COMMUNICATION CONDUITS AND LEAD-INS BY OTHERS).
5. INSTALL FOOTING AND VAPOR BARRIER. INSTALL CRUSHED ROCK AS SHOWN ON SHEET C4.0 (DELIVERY, PLACEMENT, SETUP, AND RAMPS BY BUILDING CONTRACTOR/SUPPLIER).
6. INSTALL CONCRETE FOR WALKS, CLEAN-OUTS, AND MOW STRIP.
7. FINISH GRADE AND RESTORE SURROUNDING GRADES, LAWN AREAS, AND FENCING.

GENERAL NOTES

1. CONTRACTOR SHALL REMOVE AND HAUL OFF-SITE ALL SOD AND ORGANICS WITHIN THE CLEARING LIMITS AS NEEDED FOR CONSTRUCTION.
2. CONTRACTOR SHALL PROTECT EXISTING ASPHALT PAVING, CONCRETE SIDEWALK AND CURBS. ANY DAMAGE DURING CONSTRUCTION SHALL BE REPAIRED IN-KIND AT THE CONTRACTOR'S EXPENSE.

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Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

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TUMWATER SCHOOL DISTRICT

LINCS MODULAR BUILDING

DEMOLITION & TESC PLAN

ROSS D. JARVIS — STATE OF WASHINGTON — 43668 — REGISTERED PROFESSIONAL ENGINEER — 2-10-2023

JOB NUMBER:	C22278
DRAWING NAME:	C22-278-ER-01
DESIGNER:	REW
DRAFTING BY:	AJW
DATE:	FEBRUARY, 2023
SCALE:	AS NOTED
JURISDICTION:	TUMWATER, WA

C.3.0

SHEET 3 OF 9

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Construction\C22-278-ER-01.dwg Plotted: Feb 10, 2023 - 2:32pm

STANDARD EROSION CONTROL NOTES - CITY OF TUMWATER

SILT FENCES:
1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 12 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAIN\–FALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

INLET PROTECTION:
1. PLACE CONCRETE BLOCKS LENGTHWISE ON THEIR SIDES IN A SINGLE ROW AROUND THE PERIMETER OF THE INLET, SO THAT THE OPEN ENDS FACE OUTWARD, NOT UPWARD. THE ENDS OF ADJACENT BLOCKS SHALL ABUT. THE HEIGHT OF THE BARRIER CAN BE VARIED, DEPENDING ON DESIGN NEEDS, BY STACKING COMBINATIONS OF BLOCKS THAT ARE 4 INCHES, AND 12 INCHES WIDE. THE ROW OF BLOCKS SHALL BE AT LEAST 12 INCHES BUT NO GREATER THAN 24 INCHES HIGH.
2. PLACE WIRE MESH OVER THE OUTSIDE VERTICAL FACE (OPEN END) OF THE CONCRETE BLOCKS TO PREVENT STONE FROM BEING WASHED THROUGH THE BLOCKS. USE HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH ½ INCH OPENINGS.
3. PILE STONE AGAINST THE WIRE MESH TO THE TOP OF THE BLOCKS. USE ¾ TO 3 INCH GRAVEL.
4. PLACE WIRE MESH OVER THE DROP INLET SO THAT THE WIRE EXTENDS A MINIMUM OF 1 FT BEYOND EACH SIDE OF THE INLET STRUCTURE. USE HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH ½ INCH OPENINGS. IF MORE THAN ONE STRIP OF MESH IS NECESSARY, OVERLAP THE STRIPS. PLACE FILTER FABRIC OVER WIRE MESH.
5. PLACE ¾ INCH GRAVEL OVER THE WIRE MESH. THE DEPTH OF STONE SHALL BE AT LEAST 12 INCHES OVER THE ENTIRE INLET OPENING. EXTEND THE STONE BEYOND THE INLET OPENING AT LEAST 18 INCHES ON ALL SIDES.
6. IF THE STONE FILTER BECOMES CLOGGED WITH SEDIMENT, THE STONES MUST BE PULLED AWAY FROM THE INLET AND CLEANED OR REPLACED.

PIPE SLOPE DRAINS:
1. THE SOIL AROUND AND UNDER THE PIPE AND ENTRANCE SECTION SHALL BE THOROUGHLY COMPACTED.
2. THE FLARED INLET SECTION SHALL BE SECURELY CONNECTED TO THE SLOPE DRAIN WITH WATERTIGHT CONNECTING BANDS.
3. SLOPE DRAIN SECTIONS SHALL BE SECURELY FASTENED TOGETHER WITH WATERTIGHT FITTINGS, AND BE SECURELY ANCHORED INTO THE SOIL.
4. INTERCEPTOR DIKES SHALL BE USED TO DIRECT RUNOFF INTO A SLOPE DRAIN. THE HEIGHT OF THE DIKE SHALL BE AT LEAST 1" HIGHER OF ALL POINTS THEN THE TOP OF THE INLET PIPE.
5. THE AREA BELOW THE OUTLET MUST BE STABILIZED WITH A RIP RAP APRON (SEE CITY OF TUMWATER 2010 DRAINAGE & EROSION CONTROL DESIGN MANUAL FOR THE APPROPRIATE PROTECTION).

TEMPORARY DIKES AND SWALES:
1. SEED AND MULCH SHALL BE APPLIED WITHIN 5 DAYS OF DIKE CONSTRUCTION (SEE VEGETATION).
2. THE UPSLOPE SIDE OF THE DIKE SHALL PROVIDE POSITIVE DRAINAGE TO THE DIKE OUTLET.
3. NO EROSION SHALL OCCUR AT THE DIKE OUTLET. PROVIDE ENERGY DISSIPATION MEASURES AS NECESSARY.
4. SEDIMENT LADEN RUNOFF MUST BE RELEASED THROUGH A SEDIMENT TRAPPING FACILITY SUCH AS A POND, TRAP, OR SILT FENCE AS APPROPRIATE TO DRAINAGE AREA SIZE.

CHECK DAMS:
1. THE MAXIMUM SPACING BETWEEN THE DAMS SHALL BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM.
2. ROCK CHECK DAMS SHALL BE CONSTRUCTED OF 2 TO 4 INCH DIAMETER ROCK. THE ROCK MUST BE PLACED BY HAND OR MECHANICAL PLACEMENT (NO DUMPING OF ROCK TO FORM DAM) TO ACHIEVE COMPLETE COVERAGE OF THE DITCH OR SWALE AND TO INSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES.
3. LOG CHECK DAMS SHALL BE CONSTRUCTED OF 4 TO 6 INCH DIAMETER LOGS. THE LOGS SHALL BE EMBEDDED INTO THE SOIL AT LEAST 18 INCHES.
4. IN THE CASE OF GRASS LINED DITCHES AND SWALES, CHECK DAMS SHALL BE REMOVED WHEN THE GRASS HAS MATURED SUFFICIENTLY TO PROTECT THE DITCH OR SWALE. THE AREA BENEATH THE CHECK DAMS SHALL BE SEEDED AND MULCHED IMMEDIATELY AFTER DAM REMOVAL.
5. CHECK DAMS SHALL BE CHECKED FOR SEDIMENT ACCUMULATION AFTER EACH SIGNIFICANT RAINFALL. SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE HALF OF THE ORIGINAL DAM HEIGHT OR BEFORE.

PLASTIC COVERING:
1. PLASTIC SHEETING SHALL HAVE A MINIMUM THICKNESS OF 6 MILLS AND SHALL MEET THE REQUIREMENTS OF WSDOT STANDARD SPECIFICATIONS SECTION 9_14.5(3)
2. COVERING SHALL BE INSTALLED AND MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10–FOOT GRID SPACING IN ALL DIRECTIONS. ALL SEAMS SHALL BE TAPED OR WEIGHTED DOWN FULL LENGTH AND THERE SHALL BE AT LEAST A 12 INCH OVERLAP OF ALL SEAMS.
3. CLEAR PLASTIC COVERING SHALL BE INSTALLED IMMEDIATELY ON AREAS SEEDED BETWEEN OCTOBER 1 AND APRIL 30 AND REMAIN UNTIL VEGETATION IS FIRMLY ESTABLISHED.
4. WHEN THE COVERING IS USED ON UNSEEDED SLOPES, IT SHALL BE KEPT IN PLACE UNTIL THE NEXT SEEDING PERIOD.
5. PLASTIC COVERING SHEETS SHALL BE BURIED TWO FEET AT THE TOP OF SLOPES IN ORDER TO PREVENT SURFACE WATER FLOW BENEATH SHEETS.
6. PROPER MAINTENANCE INCLUDES REGULAR CHECKS FOR RIPS AND DISLODGED ENDS.

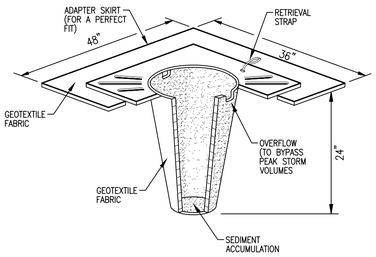
MULCHING:
1. MULCH MATERIALS USED SHALL BE HAY OR STRAW, AND SHALL BE APPLIED AT THE RATE OF 2 TONS PER ACRE.
2. MULCHES SHALL BE APPLIED IN ALL AREAS WITH EXPOSED SLOPES GREATER THAN 2:1.
3. MULCHING SHALL BE USED IMMEDIATELY AFTER SEEDING OR IN AREAS WHICH CANNOT BE SEEDED BECAUSE OF THE SEASON.
4. ALL AREAS NEEDING MULCH SHALL BE COVERED BY OCTOBER 1.

SEEDING:
1. SEED MIXTURE SHALL BE CHEWINGS FESCUE, AND SHALL BE APPLIED AT THE RATE OF 120 POUNDS PER ACRE.
2. SEED BEDS PLANTED BETWEEN MAY 1 AND SEPTEMBER 30 WILL REQUIRE IRRIGATION AND OTHER MAINTENANCE AS NECESSARY TO FOSTER AND PROTECT THE ROOT STRUCTURE.
3. FOR SEED BEDS PLANTED BETWEEN OCTOBER 1 AND APRIL 30, ARMORING OF THE SEED BED WILL BE NECESSARY. (E.G., GEOTEXTILES, JUTE MAT, CLEAR PLASTIC COVERING).
4. BEFORE SEEDING, INSTALL NEEDED SURFACE RUNOFF CONTROL MEASURES SUCH AS GRADIENT TERRACES, INTERCEPTOR DIKES, SWALES, LEVEL SPREADERS AND SEDIMENT BASINS.
5. THE SEEDBED SHALL BE FIRM WITH A FAIRLY FINE SURFACE, FOLLOWING SURFACE ROUGHENING. PERFORM ALL CULTURAL OPERATIONS ACROSS OR AT RIGHT ANGLES TO THE SLOPE.
6. FERTILIZERS ARE TO BE USED ACCORDING TO SUPPLIERS RECOMMENDATIONS. AMOUNTS USED SHOULD BE MINIMIZED, ESPECIALLY ADJACENT TO WATER BODIES AND WETLANDS.

STOCKPILES:
1. STOCKPILES SHALL BE STABILIZED (WITH PLASTIC COVERING OR OTHER APPROVED DEVICE) DAILY BETWEEN OCTOBER 1 AND APRIL 30.
2. IN ANY SEASON, SEDIMENT LEACHING FROM STOCK PILES MUST BE POSITIVELY PREVENTED.
3. TOPSOIL SHALL NOT BE PLACED WHILE IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBGRADE IS EXCESSIVELY WET, OR WHEN CONDITIONS EXIST THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING OR PROPOSED SODDING OR SEEDING.
4. PREVIOUSLY ESTABLISHED GRADES ON THE AREAS TO BE TOPSOILED SHALL BE MAINTAINED ACCORDING TO THE APPROVAL PLAN.

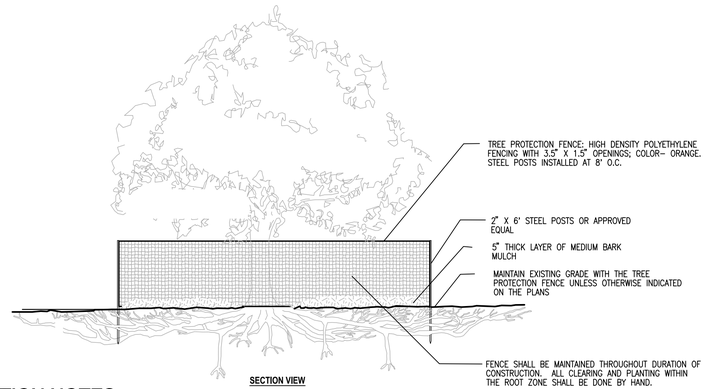
SOD PLACEMENT:
1. SOD SHALL BE MACHINE CUT AT A UNIFORM SOIL THICKNESS OF 3/4–INCH AT THE TIME OF CURING. MEASUREMENTS FOR THICKNESS SHALL EXCLUDE TOP GROWTH AND THATCH.
2. STANDARD SIZE SECTIONS OF SOD SHALL BE STRONG ENOUGH TO SUPPORT THEIR OWN WEIGHT AND RETAIN THEIR SIZE AND SHAPE WHEN SUSPENDED BY THE END OF A 3 FOOT SECTION.
3. SOD SHALL NOT BE HARVESTED OR TRANSPLANTED WHEN MOISTURE CONTENT (EXCESSIVELY DRY OR WET) MAY ADVERSELY AFFECT ITS SURVIVAL.
4. SOD SHALL BE HARVESTED, DELIVERED AND INSTALLED WITHIN A PERIOD OF 36 HOURS.

CONSTRUCTION ENTRANCES:
1. MATERIAL SHALL BE 4" TO 6" QUARRY SPALLS. (STANDARD SPECIFICATIONS).
2. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 100 FEET LONG. WIDTH SHALL BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED FOR SINGLE–FAMILY RESIDENTIAL AND SMALL COMMERCIAL SITES.
3. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
4. IF THE PAD DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH SILT FENCE.



STORM DRAIN INLET PROTECTION

NOT TO SCALE



SECTION VIEW

TREE PROTECTION NOTES

1. NO PRUNING SHALL BE PERFORMED EXCEPT BY APPROVED ARBORIST.
2. NO EQUIPMENT SHALL OPERATE INSIDE THE PROTECTIVE FENCING INCLUDING DURING FENCE INSTALLATION AND REMOVAL.
3. PLACING MATERIALS NEAR TREES: NO PERSON MAY CONDUCT ACTIVITY WITHIN THE ROOT PROTECTION AREA (RPA) OF ANY EXISTING TREE TO BE RETAINED, EXCEPT AS OTHERWISE NOTED (SEE LANDSCAPE AND IRRIGATION SPECIFICATIONS). THIS INCLUDES BUT IS NOT LIMITED TO PARKING EQUIPMENT, PLACING SOLVENTS, STORING BUILDING MATERIAL AND SOIL DEPOSITS, DUMPING CONCRETE WASH OUT AND LOCATING BURN HOLES.
4. PROTECTIVE BARRIER. BEFORE DEVELOPMENT, LAND CLEARING, FILLING OR ANY LAND ALTERATION, THE CONTRACTOR:
   A. SHALL FIELD VERIFY LOCATION, SIZE AND SPECIES TO DETERMINE RPA.
   B. SHALL ERECT TREE PROTECTION FENCING AROUND THE RPA OF THE TREE, AS DESCRIBED IN THE TEMPORARY TREE PROTECTION FENCE DETAIL. THE FENCING SHALL BE RETAINED THROUGHOUT CONSTRUCTION.
   C. SHALL PROHIBIT GRADING, TRENCHING, CUTTING, IMPERVIOUS SURFACING, OTHER CONSTRUCTION, COMPACTION OF EARTH, OR OTHER POTENTIALLY DAMAGING ACTIVITIES WITHIN THE RPA'S OF EXISTING TREES.
   D. SHALL ENSURE THAT ANY CLEARING OR LANDSCAPING DONE WITHIN THE DRIP LINE SHALL BE ACCOMPLISHED WITH HAND LABOR ONLY.
   E. SHALL ENSURE NO ROOTS GREATER THAN 2" SHALL BE CUT.
5. ATTACHMENTS TO TREES: DURING CONSTRUCTION, NO PERSON SHALL ATTACH ANY OBJECT TO ANY EXISTING TREE.
6. THE ROOT PROTECTION AREA (RPA) IS DEFINED AS THE AREA WITHIN THE DRIP LINE OF THE TREE TO BE RETAINED, UNLESS THE TREE IS AN OAK. THE RPA FOR OAK TREES EXTENDS TO ONE AND ONE–HALF TIMES THE RADIUS OF THE CANOPY.
7. RETURN ALL AREAS TO THEIR PRE–CONSTRUCTION STATE AFTER INSTALLATION IS COMPLETE.

TREE PROTECTION FENCE

DISCLAIMER

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UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

LDC
Surveying
Engineering
Planning
Woodinville
Olympia
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1411 State Avenue NE, #200
Olympia, WA 98506
T 425.806.1869
www.LDCorp.com
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TUMWATER SCHOOL DISTRICT

LINCS MODULAR BUILDING

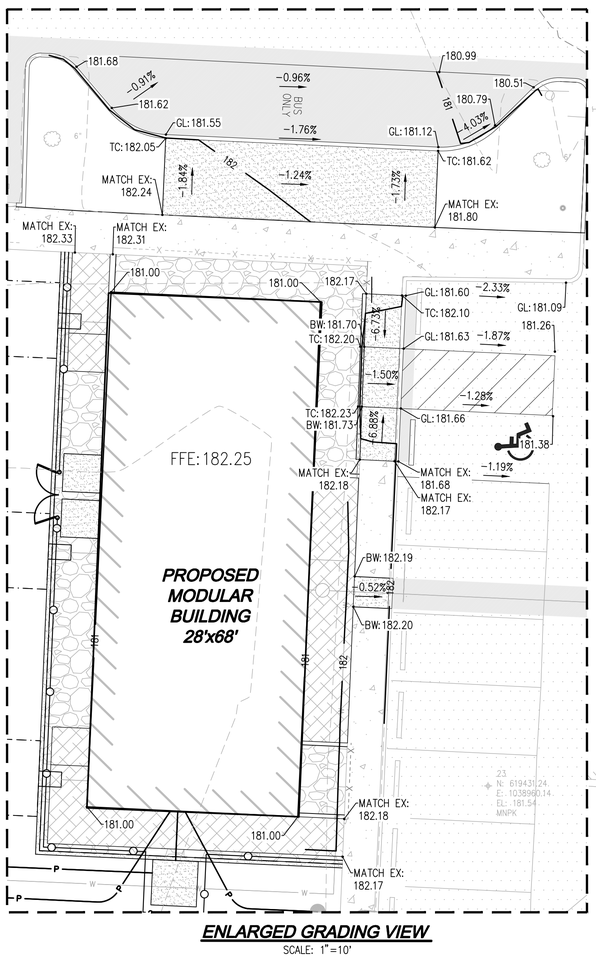
DEMO & TESC NOTES & DETAILS

ROSS D. JARVIS
STATE OF WASHINGTON
43668
REGISTERED
PROFESSIONAL ENGINEER
2-10-2023

JOB NUMBER:	C22278
DRAWING NAME:	C22-278-ER-DT
DESIGNER:	REW
DRAFTING BY:	AJW
DATE:	FEBRUARY, 2023
SCALE:	AS NOTED
JURISDICTION:	TUMWATER, WA

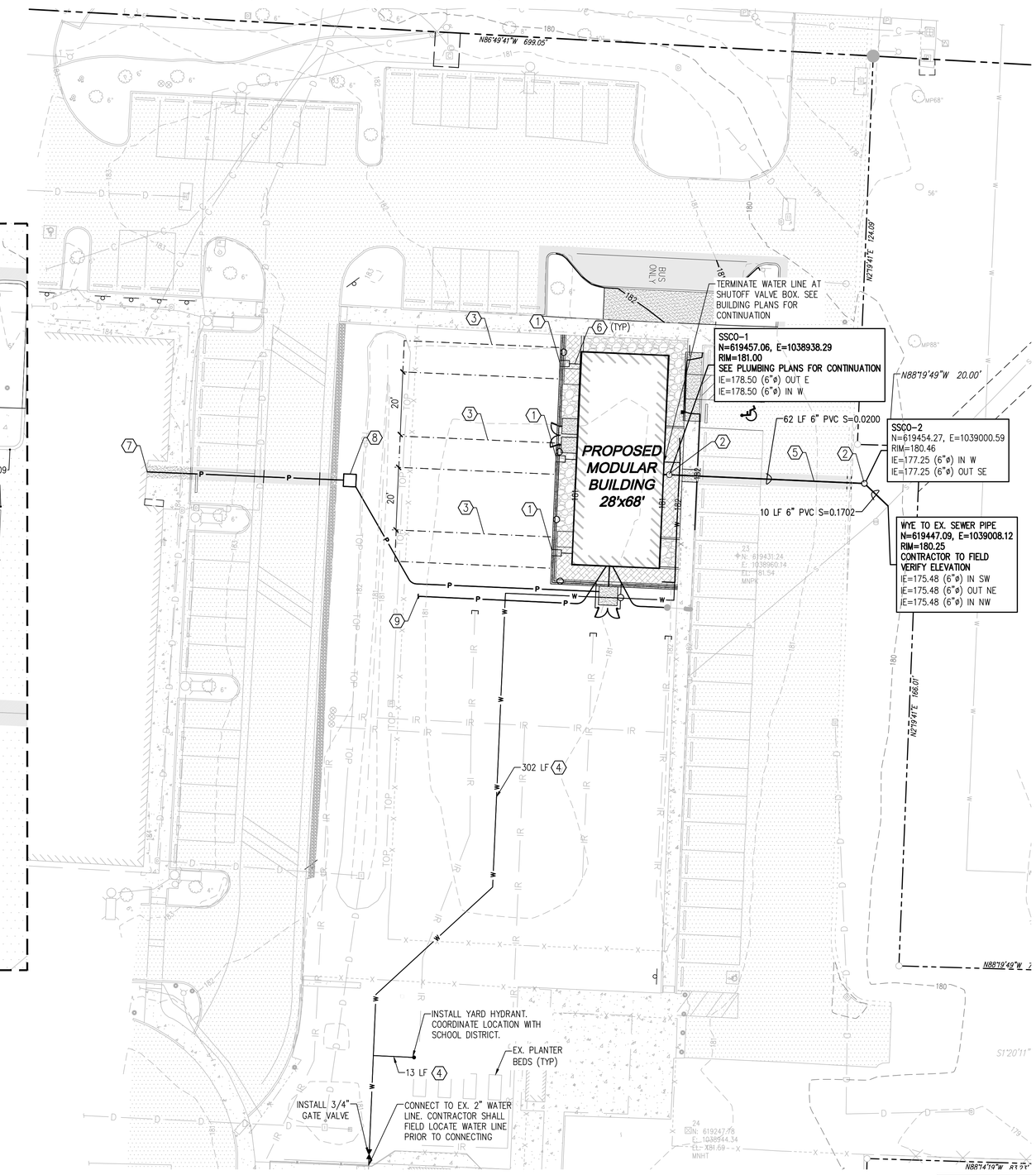
C.3.1

A PORTION OF SEC 34, TOWNSHIP 18, RANGE 2 WEST, W.M., THURSTON COUNTY, WASHINGTON



ENLARGED GRADING VIEW

SCALE: 1"=10'



SCALE: 1" = 20'

20' 0 20' 40'

LEGEND

- WATER SERVICE LINE
- SANITARY SEWER LINE
- SPLASH BLOCK PER DETAIL ON SHEET C.6.1
- SPLASH BLOCK FLOW PATH
- POWER / TELCOM LINE. SEE ELECTRICAL PLAN
- GATE VALVE
- 6" LATERAL SEWER CLEANOUT PER CITY OF TUMWATER STD DETAIL SS-11-A ON SHEET C.6.1
- XXX.XX SPOT ELEVATION
- X.XX% SLOPE ARROW
- EXISTING CONTOURS
- PROPOSED CONTOURS
- TC: XXX.XX TOP OF CURB
- GL: XXX.XX GUTTER LINE
- LP: XXX.XX BACK OF WALK

UTILITY NOTES

1. 2' x 3' CEMENT CONCRETE SPLASH BLOCK PER DETAIL ON SHEET C.6.1
2. 6" SEWER CLEANOUT PER CITY OF TUMWATER STD. DETAIL SS-11-A ON SHEET C.6.1
3. 10' x 50' VEGETATED FLOW PATH FOR SPLASH BLOCK
4. 1" CTS POLYETHYLENE WATER SERVICE
5. 6" PVC SDR 35 SEWER DRAIN AT 1.0% MIN SLOPE
6. ROOF DRAIN DOWNSPOUT TO SPLASH BLOCK.
7. PROPOSED CONNECTION TO POWER SUPPLY. COORDINATE CONNECTION WITH OWNER.
8. PROPOSED ELECTRICAL VAULT. SEE ELECTRICAL SITE PLAN BY OTHERS
9. CONNECTION TO EX. FACP. SEE ELECTRICAL SITE PLAN BY OTHERS

SEWER NOTE

1. INSTALL 6" SANITARY SEWER CLEANOUT PER CITY OF TUMWATER STANDARD PLANS SS-11-A, SEE DETAIL ON SHEET C.6.1. SEE BUILDING PLANS FOR CONTINUATION.

DISCLAIMER

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UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

LDC | Surveying Engineering Planning
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TUMWATER SCHOOL DISTRICT

LINCS MODULAR BUILDING

GRADING & UTILITY PLAN

ROSS D. JARVIS STATE OF WASHINGTON 43668 REGISTERED PROFESSIONAL ENGINEER 2-10-2023

JOB NUMBER:	C22278
DRAWING NAME:	C22-278-UT-01
DESIGNER:	REW
DRAFTING BY:	AJW
DATE:	FEBRUARY, 2023
SCALE:	AS NOTED
JURISDICTION:	TUMWATER, WA

C.6.0

SHEET 8 OF 9

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Construction\C22-278-UT-01.dwg Plotted: Feb 10, 2023 - 2:34pm

A PORTION OF SEC 34, TOWNSHIP 18, RANGE 2 WEST, W.M., THURSTON COUNTY, WASHINGTON

CITY OF TUMWATER GENERAL NOTES-STORMWATER

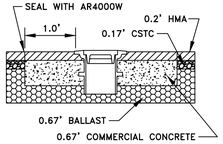
1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY/COUNTY STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA).
2. TEMPORARY EROSION/WATER POLLUTION MEASURES SHALL BE REQUIRED IN ACCORDANCE WITH SECTION 1-07.15 OF THE STANDARD SPECIFICATIONS AND THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL ("DRAINAGE MANUAL").
3. PROPONENT SHALL COMPLY WITH ALL OTHER PERMITS AND OTHER REQUIREMENTS OF THE GOVERNING AUTHORITY OR AGENCY.
4. A PRECONSTRUCTION MEETING SHALL BE HELD PRIOR TO THE START OF CONSTRUCTION OR STAKING OF THE SITE.
5. ALL STORM MAINS AND RETENTION/DETENTION AREAS SHALL BE STAKED FOR GRADE AND ALIGNMENT BY AN ENGINEERING OR SURVEY FIRM LICENSED TO PERFORM SUCH WORK.
6. STORM DRAIN PIPE SHALL BE AS SPECIFIED IN THE DRAINAGE MANUAL.
7. SPECIAL STRUCTURES, OIL/WATER SEPARATORS, AND OUTLET CONTROLS SHALL BE INSTALLED PER PLANS AND MANUFACTURERS RECOMMENDATIONS.
8. PROVIDE TRAFFIC CONTROL PLAN(S) AS REQUIRED IN ACCORDANCE WITH MUTCD.
9. CALL UNDERGROUND LOCATE LINE 1-800-424-5555 MINIMUM 48 HOURS PRIOR TO ANY EXCAVATIONS.
10. ALL SURVEYING AND STAKING SHALL BE PERFORMED BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK. THE ENGINEER OR SURVEYOR DIRECTING SUCH WORK SHALL BE LICENSED BY THE STATE OF WASHINGTON.
11. THE MINIMUM STAKING OF STORM SEWER SYSTEMS SHALL BE AS FOLLOWS:
    A. STAKE LOCATION OF ALL CATCH BASINS/MANHOLES AND OTHER FIXTURES FOR GRADE AND ALIGNMENT.
    B. STAKE LOCATION, SIZE, AND DEPTH OF RETENTION/DETENTION FACILITY.
    C. STAKE FINISHED GRADE OF ALL STORMWATER FEATURES, INCLUDING BUT NOT LIMITED TO CATCH BASIN/MANHOLE RIM ELEVATIONS, OVERFLOW STRUCTURES, WEIRS, AND INVERT ELEVATIONS OF ALL PIPES IN CATCH BASINS, MANHOLES, AND THOSE PIPES THAT DAYLIGHT.
12. PIPE MATERIALS USED FOR STORMWATER CONVEYANCE SHALL BE AS APPROVED BY THE JURISDICTION. PIPE SIZE, SLOPE, COVER, ETC., SHALL BE AS SPECIFIED IN THE DRAINAGE MANUAL.
13. ALL DRIVEWAY CULVERTS SHALL BE OF SUFFICIENT LENGTH TO PROVIDE A MINIMUM 3:1 SLOPE FROM THE EDGE OF THE DRIVEWAY TO THE BOTTOM OF THE DITCH. CULVERTS SHALL HAVE BEVELED AND SECTIONS TO MATCH THE SIDE SLOPE.
14. IF DRAINAGE OUTLETS (STUB-OUTS) ARE TO BE PROVIDED FOR EACH INDIVIDUAL LOT, THE STUB-OUTS SHALL CONFORM TO THE FOLLOWING:
    A. EACH OUTLET SHALL BE SUITABLY LOCATED AT THE LOWEST ELEVATION ON THE LOT, SO AS TO SERVICE ALL FUTURE ROOF DOWNSPOUTS AND FOOTING DRAINS, DRIVEWAYS, YARD DRAINS, AND ANY OTHER SURFACE OR SUBSURFACE DRAINS NECESSARY TO RENDER THE LOTS SUITABLE FOR THEIR INTENDED USE. EACH OUTLET SHALL HAVE FREE-FLOWING, POSITIVE DRAINAGE TO AN APPROVED STORM WATER CONVEYANCE SYSTEM OR TO AN APPROVED OUTFALL LOCATION.
    B. OUTLETS ON EACH LOT SHALL BE LOCATED WITH A FIVE-FOOT-HIGH, 2"x4" STAKE MARKED "STORM" OR "DRAIN." THE STUB-OUT SHALL VISIBLY EXTEND ABOVE SURFACE LEVEL AND BE SECURED TO THE STAKE.
    C. PIPE MATERIAL SHALL BE AS APPROVED BY THE JURISDICTION.
    D. DRAINAGE EASEMENTS ARE REQUIRED FOR DRAINAGE SYSTEMS DESIGNED TO CONVEY FLOWS THROUGH INDIVIDUAL LOTS.
    E. THE DEVELOPER AND/OR CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE LOCATIONS OF ALL STUB-OUT CONVEYANCE LINES WITH RESPECT TO THE UTILITIES (E.G., POWER, GAS, TELEPHONE, TELEVISION).
    F. ALL INDIVIDUAL STUB-OUTS SHALL BE PRIVATELY OWNED AND MAINTAINED BY THE LOT HOME OWNER.
15. THE STORM DRAINAGE SYSTEM SHALL BE CONSTRUCTED ACCORDING TO APPROVED PLANS ON FILE WITH THE JURISDICTION. ANY MATERIAL DEVIATION FROM THE APPROVED PLANS WILL REQUIRE WRITTEN APPROVAL FROM THE JURISDICTION.
16. A COPY OF THE APPROVED STORM WATER PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
17. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED OR SIMILARLY STABILIZED TO THE SATISFACTION OF THE JURISDICTION. FOR SITES WHERE GRASS HAS BEEN PLANTED THROUGH HYDROSEEDING, THE PERFORMANCE BOND WILL NOT BE RELEASED UNTIL THE GRASS HAS BEEN THOROUGHLY ESTABLISHED, UNLESS OTHERWISE APPROVED BY THE JURISDICTION.
18. ALL BUILDING DOWNSPOUTS ON COMMERCIAL SITES SHALL BE CONNECTED TO THE STORM DRAINAGE SYSTEM, UNLESS OTHERWISE APPROVED BY THE JURISDICTION.
19. ALL EROSION CONTROL AND STORMWATER FACILITIES SHALL BE REGULARLY INSPECTED AND MAINTAINED BY THE CONTRACTOR DURING THE CONSTRUCTION PHASE OF THE DEVELOPMENT PROJECT.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH, AND SAFETY OF THE PUBLIC, AND TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACT. ANY WORK WITHIN THE TRAVELED RIGHT-OF-WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE AT LEAST ONE FLAGGER FOR EACH LANE OF TRAFFIC AFFECTED. ALL SECTIONS OF THE CURRENT W.S.D.O.T. STANDARD SPECIFICATIONS FOR TRAFFIC CONTROL SHALL APPLY.
21. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN STREET USE AND OTHER RELATED OR REQUIRED PERMITS PRIOR TO ANY CONSTRUCTION ACTIVITY IN THE JURISDICTION'S RIGHT-OF-WAY. IT SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ALL REQUIRED PERMITS PRIOR TO ANY CONSTRUCTION.
22. NO FINAL CUT OR FILL SLOPE SHALL EXCEED TWO (2) HORIZONTAL TO ONE (1) VERTICAL WITHOUT STABILIZATION BY ROCKERY OR BY A STRUCTURAL RETAINING WALL.
23. THE PROJECT ENGINEER SHALL VERIFY THE LOCATIONS, WIDTHS, THICKNESSES, AND ELEVATIONS OF ALL EXISTING PAVEMENTS AND STRUCTURES, INCLUDING UTILITIES AND OTHER FRONTAGE IMPROVEMENTS, THAT ARE TO INTERFACE WITH NEW WORK, PROVIDE ALL TRIMMING, CUTTING, SAW CUTTING, GRADING, LEVELING, SLOPING, COATING, AND OTHER WORK, INCLUDING MATERIALS AS NECESSARY TO CAUSE THE INTERFACE WITH EXISTING WORKS TO BE PROPER, WITHOUT CONFLICT, ACCEPTABLE TO THE ENGINEER AND THE JURISDICTION, COMPLETE IN PLACE, AND READY TO USE.
24. COMPACTION OF ALL FILL AREAS SHALL BE PER CURRENT APWA SPECIFICATIONS. FILL SHALL BE PROVIDED IN 6" MAXIMUM LIFTS AND SHALL BE COMPACTED TO 95 PERCENT OF ITS MAXIMUM RELATIVE DENSITY.

CITY OF TUMWATER GENERAL NOTES-WATER

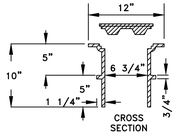
1. ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH CITY OF TUMWATER STANDARDS AND THE MOST CURRENT COPY OF THE WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION. IN CASES OF CONFLICT, THE MOST STRINGENT STANDARD SHALL APPLY.
2. THE CONTRACTOR SHALL BE IN COMPLIANCE WITH ALL SAFETY STANDARDS AND REQUIREMENTS AS SET FORTH BY OSHA, WISHA, AND THE WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE WSDOT/APWA STANDARD PLANS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (ALL APPLICABLE "K" PLANS) AND/OR THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC CONTROL PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
4. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF TUMWATER SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
5. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
6. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF TUMWATER CONSTRUCTION INSPECTORS PRIOR TO THE START OF CONSTRUCTION.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555, OR 811, A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF AN APPROVED SET OF PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
9. ALL SURVEYING AND STAKING SHALL BE PERFORMED PER THE CORRESPONDING CHAPTER OF THE CITY OF TUMWATER DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS.
10. TEMPORARY EROSION CONTROL/WATER POLLUTION MEASURES SHALL BE REQUIRED IN ACCORDANCE WITH WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION AND THE CITY OF TUMWATER DRAINAGE DESIGN AND EROSION CONTROL STANDARDS. AT NO TIME WILL SILTS AND DEBRIS BE ALLOWED TO DRAIN INTO AN EXISTING OR NEWLY INSTALLED FACILITY UNLESS SPECIAL PROVISIONS HAVE BEEN DESIGNED.
11. WATER MAINS EQUAL TO OR LESS THAN TEN INCHES IN DIAMETER SHALL BE AWWA C900 CLASS 200, SDR 14 OR DUCTILE IRON STANDARD PRESSURE RATING 350. WATER MAINS LARGER THAN 10 INCHES IN DIAMETER SHALL BE DUCTILE IRON STANDARD PRESSURE CLASS RATING 350.
12. GATE VALVES SHALL BE RESILIENT WEDGE, NRS (NON RISING STEM) WITH O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C 515 LATEST REVISION. VALVES SHALL BE MUELLER, M & H, KENNEDY, CLOW R/W, A.V.K. OR WATEROUS SERIES 2500.
13. EXISTING VALVES SHALL BE OPERATED BY CITY EMPLOYEES ONLY.
14. HYDRANTS SHALL BE THE DRY BARREL TYPE AND ONE OF THE FOLLOWING: WATEROUS, M & H, MUELLER, CLOW OR EJ (EAST JORDAN) WATERMASTER 5CD250. HYDRANTS SHALL BE BAGGED UNTIL SYSTEM IS APPROVED. ALL HYDRANTS SHALL BE POWDER COATED AND SHALL BE EQUIPPED WITH STORZ ADAPTERS.
15. THE CONTRACTOR SHALL INSTALL, CHLORINATE, AND FLUSH ALL WATER LINES. THE LINES SHALL BE CHLORINATED AND TESTED IN CONFORMANCE WITH THE ABOVE REFERENCED SPECIFICATION (SEE NOTE 1 ABOVE) AFTER FLUSHING THE CHLORINATED WATER FROM THE DISINFECTED LINES, THE CONTRACTOR SHALL MEASURE THE CHLORINE RESIDUAL TO VERIFY THAT FLUSHING IS COMPLETE. THIS SHALL BE COMPLETED PRIOR TO REQUESTING THE CITY FOR MICROBIOLOGICAL SAMPLES.
16. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE BACKING MARKED "WATER" WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. IN ADDITION TO TRACER TAPE, INSTALL DIRECT BURY, U.S.E. 12 GAUGE BLUE COATED COPPER WIRE, WRAPPED AROUND OR TAPED TO THE PIPE, AS SHOWN ON DETAIL. LOW VOLTAGE GREASE-TYPE SPLICE KITS SHALL BE USED ON TRACER WIRE. CONTINUITY TESTING OF THE WIRE WILL BE DONE BY THE CITY.
17. ALL SERVICE LINE LOCATIONS SHALL BE MARKED ON THE TOP OR FACE OF THE CURB WITH AN EMBOSSED "W" 3 INCHES HIGH AND ½ INCH INTO CONCRETE.
18. THE CITY WILL BE GIVEN 96 HOURS NOTICE PRIOR TO SCHEDULING A SHUTDOWN. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION", CONNECTION POINTS SHALL BE EXPOSED BY CONTRACTOR AND FITTINGS VERIFIED 96 HOURS PRIOR TO DISTRIBUTING SHUT-DOWN NOTICES.
19. SEPARATION BETWEEN WATER AND SEWER SHALL BE MAINTAINED PER DEPARTMENT OF ECOLOGY (DOE) STANDARDS.
20. A CONCRETE PAD SHALL BE INSTALLED AROUND ALL VALVE BOXES AND BLOW-OFFS.
21. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED TO CITY STANDARDS PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.
22. THE MINIMUM BURIAL DEPTH OF ALL WATER LINES SHALL BE 42 INCHES.
23. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND DEPTH OF THE EXISTING MAIN AND PROVIDE THE FITTINGS REQUIRED TO MAKE THE CONNECTION TO THE EXISTING MAIN.
24. AT THE CITY'S REQUEST THE CONTRACTOR SHALL INSTALL A TEMPORARY 2-INCH BRASS BLOW OFF FOR FLUSHING AND SAMPLING ON THE EXISTING AND/OR NEW WATER MAIN. THE BLOW OFF SHALL BE CONSTRUCTED WITH A STANDARD 2-INCH TAPPING SADDLE AND FORD BRASS CORPORATION STOP WITH 2-INCH BRASS PIPE EXTENDED UP TO FINISHED GRADE. WHEN FLUSHING AND SAMPLING ARE COMPLETED THE 2-INCH PIPE SHALL BE REMOVED. THE CORPORATION STOP SHALL BE SHUT OFF AND CAPPED TIGHT WITH THREADED BRASS CAP.
25. WHEN AN EXISTING CITY WATER MAIN IS TO BE ABANDONED IT SHALL BE THE DEVELOPER'S RESPONSIBILITY TO COORDINATE AND ABANDON THE EXISTING MAIN. IT SHALL ALSO BE THE DEVELOPER'S RESPONSIBILITY TO INSTALL AND TRANSFER EXISTING WATER SERVICES TO THE NEW MAIN. CITY CREWS WILL MAKE THE FINAL CONNECTION BETWEEN THE NEW METER AND THE OWNER'S PROPERTY.
26. ALL VALVE BOX, BLOW-OFF, AND MANHOLE LIDS SHALL BE CLEAN AND CLEAR OF ASPHALT OR CONCRETE BEFORE SCHEDULING A WALK THROUGH.
27. THE WATER MAIN, APPURTENANCES, AND SERVICE CONNECTIONS TO THE METER SETTER, SHALL BE TESTED IN SECTIONS OF CONVENIENT LENGTHS UNDER A HYDROSTATIC PRESSURE EQUAL TO 150 PSI IN EXCESS OF THAT UNDER WHICH IT WILL OPERATE. IN NO CASE SHALL THE TEST PRESSURE BE LESS THAN 225 PSI.
28. NO LOT LINE WATER MAINS ARE ALLOWED.

CITY OF TUMWATER GENERAL NOTES-SANITARY SEWER

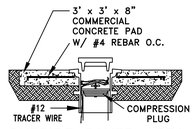
1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF TUMWATER STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA). IN CASES OF CONFLICT, THE MOST STRINGENT STANDARD SHALL APPLY.
2. ALL SAFETY STANDARDS AND REQUIREMENTS SHALL BE COMPLIED WITH AS SET FORTH BY OSHA, WISHA AND WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.
3. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF TUMWATER SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
4. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS
5. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF TUMWATER CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.
6. THE CITY OF TUMWATER CONSTRUCTION INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 48 HOURS IN ADVANCE OF A TAP CONNECTION TO AN EXISTING MAIN. CITY CREWS WILL PROVIDE THE TAPPING MACHINE AND WILL PERFORM THE TAP. NO MATERIALS ARE PROVIDED BY THE CITY AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONSTRUCT THE LATERAL/SIDE SEWER FROM THE MAIN TO THE STRUCTURE.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 OR 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.
8. GRAVITY SEWER MAIN SHALL BE PVC, ASTM D 3034 SDR 35 OR ASTM F 789 WITH JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477.
9. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM. MANHOLES SHALL BE TYPE 1-48" MANHOLE UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE.
10. MANHOLES SHALL BE FURNISHED WITH A METAL FRAME AND COVER AND SHALL BE FREE OF POROSITY, SHRINK CAVITIES, COLD SHUTS OR CRACKS, OR ANY SURFACE DEFECTS WHICH WOULD IMPAIR SERVICEABILITY. MANHOLE FRAME AND COVER UNITS SHALL BE FITTED TO ASSURE RATTLING NOISE FROM TRAFFIC IS PREVENTED. LOCK-TYPE COVERS SHALL BE REQUIRED IN ALL MULTI-FAMILY COMPLEXES, ON SCHOOL GROUNDS, ON MANHOLES CONTAINING ODOR CONTROL DEVICES OR AS DETERMINED BY THE CITY. THE MANHOLE OPENINGS SHALL BE CENTERED OVER THE OUTLET.
11. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A TAP TO AN EXISTING MAIN OR A WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRING LINE OF THE PIPE. WHEN A TAP IS USED TO CONNECT TO AN EXISTING SEWER MAIN, TELESCOPING FROM THE CLOSEST MANHOLE TO 15 FEET PAST THE TAP IS REQUIRED.
12. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES.
13. ALL PLASTIC PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE 12 INCHES TO 18 INCHES UNDER THE PROPOSED FINISHED SUBGRADE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING, MARKED "SEWER" WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. THE TAPE AND WIRE SHALL BE FURNISHED BY THE CONTRACTOR.
14. ALL SIDE SEWER LOCATIONS SHALL BE MARKED ON THE FACE OF THE CURB WITH AN EMBOSSED "S" 3 INCH HIGH AND ¼ INCH INTO CONCRETE.
15. BEDDING OF THE SEWER MAIN AND COMPACTION OF THE BACKFILL MATERIAL SHALL BE REQUIRED IN ACCORDANCE WITH THE ABOVE MENTIONED SPECIFICATIONS.
16. A 3' X 3' SQUARE X 8" THICK CONCRETE PAD WITH #4 REBAR SHALL BE INSTALLED AROUND ALL CLEANOUTS THAT ARE NOT IN A PAVEMENT AREA.
17. TEMPORARY STREET PATCHING SHALL BE ALLOWED AS APPROVED BY THE CITY ENGINEER. TEMPORARY STREET PATCHING SHALL BE PROVIDED BY PLACEMENT AND COMPACTION OF ONE INCH MINIMUM ASPHALT CONCRETE HOT MIX. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AS REQUIRED.
18. EROSION CONTROL MEASURES SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION AS PER THE APPROVED PLANS, SPECIFICATIONS AND CURRENT CITY DRAINAGE MANUAL.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, TRAFFIC CONTROL PLANS SHALL BE PREPARED AND SUBMITTED TO THE CITY FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
20. A COPY OF THE APPROVED PLANS SHALL BE ON THE CONSTRUCTION SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
21. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE PROJECT ENGINEER AND THE CITY OF TUMWATER.
22. ALL LINES SHALL BE HIGH VELOCITY CLEANED AND PRESSURE TESTED PRIOR TO PAVING IN CONFORMANCE WITH THE ABOVE REFERENCED SPECIFICATIONS. HYDRANT FLUSHING OF LINES IS NOT AN ACCEPTABLE CLEANING METHOD. TESTING OF THE SANITARY SEWER MAIN SHALL INCLUDE VIDEOTAPING OF THE MAIN BY THE CONTRACTOR. IMMEDIATELY, PRIOR TO THE VIDEOTAPING, ENOUGH WATER SHALL BE RUN DOWN THE LINE SO IT COMES OUT THE LOWER MANHOLE. A COPY OF THE VIDEO TAPE SHALL BE SUBMITTED TO THE CITY OF TUMWATER. ACCEPTANCE OF THE LINE WILL BE MADE AFTER THE TAPE HAS BEEN REVIEWED AND APPROVED BY THE CITY INSPECTOR AND THE OPERATIONS DIVISION. A VACUUM TEST OF ALL MANHOLES IN ACCORDANCE WITH TUMWATER STANDARD IS ALSO REQUIRED. TESTING SHALL TAKE PLACE AFTER ALL UNDERGROUND UTILITIES ARE INSTALLED AND COMPACTION OF THE ROADWAY SUBGRADE IS COMPLETED. AFTER THE PAVING AND RAISING OF MANHOLES ARE COMPLETE, THE DEVELOPER SHALL CLEAN AND VIDEOTAPE THE SEWER CONVEYANCE SYSTEM AGAIN AT THE DEVELOPER'S EXPENSE. THE METHOD OF CLEANING SHALL BE HIGH VELOCITY WATER PRESSURE CLEANING. ALL ROCKS AND DEBRIS SHALL BE REMOVED AND DISPOSED OF AT THE DEVELOPER'S EXPENSE. THE EXISTING SEWER SYSTEM SHALL BE PROTECTED DURING THE CLEANING OPERATION TO PREVENT ANY DEBRIS FROM ENTERING.
23. PRIOR TO BACKFILL, ALL MAINS AND APPURTENANCES SHALL BE INSPECTED AND APPROVED BY THE CITY OF TUMWATER CONSTRUCTION INSPECTOR. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES AS DETERMINED BY SUBSEQUENT TESTING AND INSPECTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CITY OF TUMWATER FOR THE REQUIRED INSPECTIONS.
24. ALL SANITARY SEWER MAINS SHALL BE PLACED IN PUBLIC RIGHT-OF-WAY OR IF IN EASEMENT AREAS, PROVIDE 12 FOOT WIDE PAVED (MINIMUM SIX INCH BALLAST, TWO INCH CRUSHED, TWO INCH ASPHALT) ACCESS TO ALL MANHOLES. NO LOT LINE SEWER MAINS WILL BE ALLOWED.
25. ALL MAINS WILL BE DEDICATED TO THE CITY FOR MAINTENANCE WITH APPROPRIATE BILLS-OF-SALE AND EASEMENTS.
26. WHEN USING STEEL PLATES OVER THE TRENCH, "STEEL PLATES AHEAD" SIGNS SHALL BE REQUIRED.
27. A MANDREL TEST IN ACCORDANCE WITH THE WSDOT/APWA STANDARD SPECIFICATIONS SHALL BE REQUIRED AS DIRECTED BY THE CITY.
28. ENCASEMENT MATERIAL SHALL INCLUDE ¼ INCH STEEL, OR DUCTILE IRON CLASS 52 PIPE. CONCRETE ENCASEMENT SHALL NOT BE ALLOWED.



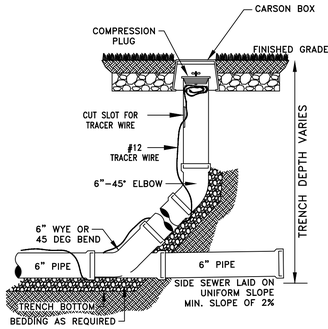
INSIDE PAVED ROADWAY



PVC LATERAL AND RAISER



OUTSIDE PAVED AREA
IN LANDSCAPED AREAS



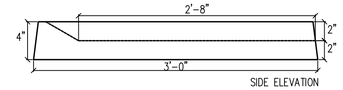
GENERAL NOTES:

1. ALL SEWER PIPE SHALL BE ASTM 3034 SDR 35.
2. LOCATED IN CENTER OF CUL-DE-SAC WHEN APPROPRIATE.

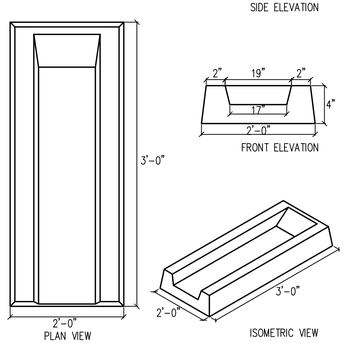
CITY OF TUMWATER, WASHINGTON
DEPT. OF PUBLIC WORKS

6" LATERIAL CLEANOUT
PVC

APPROVED / CITY ENGINEER				DWG. NO.
				SS-11-A
DES. PW	DWG. BY PW	CK'D BY MW	DATE NOV. 2014	NOT TO SCALE



SIDE ELEVATION



PLAN VIEW

FRONT ELEVATION

ISOMETRIC VIEW

SPLASH BLOCK DETAIL

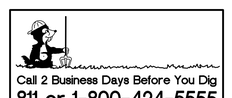
NOT TO SCALE

DISCLAIMER

TOPOGRAPHIC SURVEY INFORMATION CONTAINED ON THESE PLANS HAS BEEN PROVIDED BY MTN 2 COAST, LLC. LDC, INC. (LAND DEVELOPMENT CONSULTANTS, INC.) ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.



NO.	DATE	DESCRIPTION	BY

REVISIONS

LDC | Surveying Engineering Planning
Woodinville | Olympia | Kent
Olympia: 1411 State Ave. NE. #200, Olympia, WA 98506
T 425.806.1869 | www.LDCorp.com | F 425.482.2893

TUMWATER SCHOOL DISTRICT

LINCS MODULAR BUILDING

GRADING & UTILITY NOTES & DETAILS

JOB NUMBER:	C22278
DRAWING NAME:	C22-278-UT-02
DESIGNER:	REW
DRAFTING BY:	AJW
DATE:	FEBRUARY, 2023
SCALE:	AS NOTED
JURISDICTION:	TUMWATER, WA

C.6.1

SHEET 9 OF 9

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Construction\C22-278-UT-02.dwg Plotted: Feb 10, 2023 - 2:34pm

DRAINAGE CONTROL PLAN
ATTACHMENT 2
CONSTRUCTION SWPPP REPORT

Construction Stormwater Pollution Prevention Plan (SWPPP)

LINCS Modular Building
Binding Site Plan
Tumwater, Washington

LDC | Surveying Engineering Planning

February 2023

Construction SWPPP

Project Information

Project:	**LINCS Modular Building** **Binding Site Plan**
Site Address:	621 Linwood Avenue SW Tumwater, WA
Owner/Applicant:	**Tumwater School District** 621 Linwood Avenue SW Tacoma, WA 98512 Contact Name: Mel Murray

Reviewing Agency

Jurisdiction:	City of Tumwater

Project Representative

Prepared by:	**LDC, Inc.** 1411 State Ave. NE, Suite 200 Olympia, WA 98506 425.806.1869 ldccorp.com
Contact:	Ross Jarvis, PE RJarvis@ldccorp.com
Project Reference:	C22-278

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1. NARRATIVE

1.1 STORMWATER BMPS

The following explains and illustrates the measures to be taken on the site to control erosion and sedimentation problems. The SWPPP is a guideline to follow during construction to prevent erosion and sedimentation. Erosion control measures are not limited to those shown on the TESC plan and in this SWPPP. Measures shall be installed as necessary to meet the Department of Ecology's (DOE) and the City of Tumwater's guidelines for stormwater pollution prevention and the requirements of the DOE National Pollutant Discharge Elimination System (NPDES) permit as applicable. Further, the SWPPP shall be updated by the contractor as required by the requirements of the DOE NPDES permit.

Total Disturbed Area: 0.22 acres

Property Use: SFM: Single-Family Medium Density, GB: Greenbelt

Parcel Number: 09080004000

Section, Township, Range: Section 34, Township 18, Range 2W

1.1.1 *Element #1 –Mark Clearing Limits*

To protect adjacent properties and reduce the area of soil exposed, the limits of the construction will be clearly marked before land-disturbing activities begin. Where possible natural vegetation shall be preserved and the duff layer and native top soil shall remain in place. The following BMP(s) will be implemented where appropriate:

- BMP C101: Preserving Natural Vegetation and Topsoil
- BMP C103: High Visibility Fence
- BMP C233: Silt Fence

1.1.2 *Element #2 – Establish Construction Access*

Access points should be established to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site.

Construction access shall be off of Linwood Avenue SW. The contractor will utilize the existing entrance for construction and will repair any damaged areas in kind. Areas used throughout the parcel for construction storage and parking will be moved throughout the parcel depending on the location of the construction being conducted. It is important to note that the contractor shall not damage the existing site conditions that will remain throughout construction.

1.1.3 *Element #3 – Control Flow Rates*

Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site. The following BMPs are applicable for this project. If the following BMPs are not shown on the construction plan set, the Owner and the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs:

- BMP C235: Wattles

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements. Care will be taken throughout construction to protect the existing area from sediments, while protecting the hydrology as well. The contractor shall minimize the amount of exposed soils throughout the construction process.

1.1.4 *Element #4 – Install Sediment Controls*

Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal BMP. Silt fence barriers shall be installed in accordance with BMP C233. In addition, the following BMP's will be implemented where appropriate:

- BMP C233: Silt Fence

In addition, sediment will be removed from paved areas in and adjacent to work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize wash off of sediments from adjacent streets in runoff.

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMP's (e.g. infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMP's, such as those used for infiltration or biofiltration; however, those BMP's designed to remove solids by settling (wet ponds or detention ponds) can be used. When permanent stormwater BMP's will be used to control sediment discharge, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMP's. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized. Concentrated runoff is not anticipated for this project.

1.1.5 *Element #5 – Stabilize Soils*

All exposed and unworked soils shall be stabilized by application of effective BMP's, which protect the soil from the erosive forces of raindrop impact and flowing water and from wind erosion. From October 01 through April 30 of each calendar year, no soils shall remain exposed and unworked for more than two (2) days. From May 01 to September 30 of each calendar year, no soils shall remain exposed and unworked for more than seven (7) days. This condition applies to all on-site soils, whether at final grade or not. Additionally, except where approved

chemical treatment, full dispersion, or infiltration is practiced, clearing, grading, and other soil disturbing activities are prohibited between November 1 and February 28.

In areas where construction activities have temporarily or permanently ceased, seeding and mulching shall be used in accordance with BMP's C120 and C121. Dust control shall be used as needed to prevent wind transport of dust from disturbed soil surfaces and in accordance with BMP C140.

In general, cut slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C124: Sodding
- BMP C125: Topsoiling
- BMP C140: Dust Control
- BMP C202: Channel Lining

1.1.6 *Element #6 – Protect Slopes*

Slopes shall be constructed in a manner that will minimize erosion. This shall include, but is not limited to: placing excavated material on the uphill side of trenches, collecting drainage at the top of slopes, etc. Slopes will be stabilized as indicated in Element #5 above. In addition, the following BMP's will be implemented where appropriate:

- BMP C123: Plastic Covering
- BMP C130: Surface Roughening

1.1.7 *Element #7 – Protect Drain Inlets*

All storm drain inlets made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

- BMP C220: Storm Drain Inlet Protection

1.1.8 *Element #8 – Stabilize Channels and Outlets*

Channels are not expected to be present on the site during the project. The contractor will update this section of the SWPPP if conditions change.

1.1.9 *Element #9 – Control Pollutants*

All pollutants, including waste materials, that occur on-site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater. Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures. No pH-Modifying sources will be present on-site.

Three source control BMP's will apply to this project:

- A Spill Prevention Plan
- Maintenance of Storm Drainage Facilities
- Street Sweeping

In addition, the following BMP's shall be implemented where appropriate:

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage and Containment
- BMP C154: Concrete Washout Area

1.1.10 *Element #10 – Control Dewatering*

Clean, non-turbid de-watering water, as determined by the Certified Professional in Erosion and Sediment Control, can be discharged to systems tributary to state surface waters, provided the de-watering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.

Highly turbid or otherwise contaminated de-watering water, such as from equipment operation shall be handled separately from stormwater at the site. Some disposal options, depending on site constraints, may include: 1) transport off-site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters, 2) on-site treatment using chemical treatment or other suitable treatment technologies such as Baker tanks or approved equal, or 3) sanitary sewer discharge with local sewer purveyor's approval if there is no other option.

1.1.11 *Element #11 – Maintain BMP's*

All temporary and permanent erosion and sediment control BMP's shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance

and repair shall be conducted in accordance with each particular BMP's specifications. Visual monitoring of the BMP's will be conducted per the inspection schedule in Section 6.

All temporary erosion and sediment control BMP's shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMP's are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMP's or vegetation shall be permanently stabilized.

- BMP C150: Materials on Hand
- BMP C160: Certified Erosion and Sediment Control Lead

1.1.12 *Element #12 – Manage the Project*

Erosion and sediment control BMP's for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.

In addition, project management will incorporate the key components listed below:

Phasing

Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C162).

Inspection and Monitoring

All BMP's shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:

- Assess the site conditions and construction activities that could impact the quality of stormwater, and
- Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.

Whenever inspection and/or monitoring reveals that the BMP's identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMP's or design changes shall be implemented as soon as possible.

Maintaining an Updated SWPPP

This SWPPP shall be retained on-site or within reasonable access to the site.

The SWPPP shall be modified whenever there is a change in the construction activities that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMP's designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

1.1.13 *Element #13 – Protect Low Impact Development BMPs*

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. All maintenance and repairs shall be completed in accordance with the practices, procedures, and materials for each respective BMP. This project will construct Low Impact Development BMPs. The contractor shall refrain from compacting the existing soils surrounding the project site.

- BMP C233: Silt Fence

1.2 PROJECT DESCRIPTION

The project is located at 621 Linwood Avenue SW, Tumwater Washington. See Vicinity Map below.

Figure 1) Vicinity Map

The entire proposed project will disturb 0.22 acres of the 19.12 acres parcel. The proposed construction includes one portable building with associated utilities and accessibility ramps, a bus loading zone, and stormwater improvements. The Binding Site Plan includes the construction of the portable building and infiltration trench.

1.3 EXISTING SITE CONDITIONS

The subject site is +/- 19.15 acres in size. The sports field site is generally flat with a low spot towards the middle, slopes ranging from 0% to 2%, with an overall relief of approximately 2 ft.

1.4 ADJACENT AREAS

The proposed project is located near the intersection of S 6th Ave SW and Linwood Ave SW, just west of the North End Fire Station. The property is surrounded by residential lots to the west, south, and north.

1.5 CRITICAL AREAS

The project parcel is located within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate map (FIRM) Panel No. 53067C0168G. According to the FIRM Map the project

parcel is located within Zone X, which is determined to be an area of minimal flood hazard. See **Appendix 3** of the Drainage Report for the FIRM Map.

According to City of Tumwater GIS Maps, the project site is located within a Category I Critical Aquifer Recharge Area (CARA) and is not within a Wellhead Protection Area. There are no additional requirements or limitations for this project since the proposed infiltration facilities will not cause a violation of groundwater quality standards. See **Appendix 3** of the Drainage Report for the CARA and Wellhead Protection Areas maps.

1.6 SOIL

The final on-site geotechnical investigation by Landau Associates in December 2022 revealed a topsoil layer approximately 5 to 6 inches deep, followed by a medium dense fill comprised of crushed concrete, sand, and gravel with silt. The fill layer roughly extends from 0.8 to 3 ft below ground surface. The concrete debris ranged from 6 to 14 inches in diameter with some smaller 1-inch pieces mixed in. Recessional outwash, consisting of sand, silt, and gravel, was observed beneath the fill and extended approximately 9.0 ft below ground surface. No groundwater was observed during the geotechnical exploration. The preliminary investigation determined that the medium dense concrete fill material will provide suitable support for the portable building. The design infiltration rates were calculated using laboratory tests and the soil grain method in the City of Tumwater's 2022 DDECM. The infiltration rates of the native soils ranged from 3.3 to 6.2 in/hr and were determined to be appropriate for the design of small-scale facilities such as infiltration trenches. See Drainage Report **Attachment No. 3** for the full geotechnical report.

1.7 POTENTIAL EROSION

Potential on-site erosion control problems are not anticipated at this time. The Certified Professional in Erosion and Sediment Control will be on-site or on-call during construction activities to identify any erosion control problems. If there is a problem, the Certified Professional in Erosion and Sediment Control will promptly authorize the Contractor to initiate corrective measures.

1.8 CONSTRUCTION PHASING

The BMP implementation schedule will be driven by the construction schedule. The key milestones for each segment are as follows:

- **04/17/2023:** Mobilize equipment on-site
- **04/17/2023:** Mobilize and store all erosion and sediment control (ESC) and soil stabilization products (store Materials On Hand BMP C150)
- **04/17/2023:** Install ESC measures include stormwater management facility if applicable

- **04/17/2023:** Begin implementing soil stabilization and sediment control BMPs throughout the site for the duration of the wet season. Implement Element #12 BMPs and manage site to minimize soil disturbance.
- **04/24/2023:** Site inspections and monitoring conducted weekly and for applicable rain events as detailed in Section 1.13 of this SWPPP
- **04/24/2023:** Begin clearing and grubbing
- **07/01/2023:** Construction end, full site cleanup and restoration

1.9 CONSTRUCTION SCHEDULE

Estimated Construction Start Date: April 2023

Estimated Construction End Date: July 2023

1.10 FINANCIAL/OWNERSHIP RESPONSIBILITIES

Tumwater School District will be the owner of the site and will have full responsibility financially. If or when a new owner takes over the site, the new owner will have full financial responsibilities of the site.

1.11 ENGINEERING CALCULATIONS

All the engineering calculations are documented in the Drainage Report **Appendix 1** prepared by LDC, Inc.

1.12 POLLUTION PREVENTION TEAM

1.12.1 *Roles and Responsibilities*

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead – Primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Project Engineer – For projects with engineered structures only (sediment pond/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative.
- Emergency Owner Contact – Individual that is the site owner or representative of the site owner to contacted in the case of an emergency.

- Monitoring Personnel – Personnel responsible for conducting water quality monitoring; for most sites this person is also the CESCL.

1.12.2 *Team Members*

Title	Name (s)	Phone Number
Certified Erosion and Sedimentation Control Lead (CESCL)		
General Contractor		
Project Engineer	Ross Jarvis – LDC Inc	425.806.1869
Emergency Owner Contact		
Emergency Ecology Contact	Southwest Regional Office	360.407.6300
Non-Emergency Ecology Contact	Evan Wood	360.407.0246
Monitoring Personnel	See CESCL	

1.13 SITE INSPECTIONS AND MONITORING

Monitoring includes visual inspection, monitoring for water quality parameters of concern and documentation of the inspection and monitoring findings in a site logbook. A site logbook will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site logbook. This SWPPP may function as the site logbook if desired, or the forms may be separated and included in a separate site logbook. However, if separated, the site logbook must be maintained on site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

1.13.1 *Site Inspection*

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a CESCL per BMP C160. The name and contact information for the CESCL is provided in Section 1.12.2 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all potential stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen.

The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of the stormwater discharges. All maintenance and repairs will be documented in the site logbook or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

1.13.2 *Site Inspection Frequency*

Site inspected will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the site inspection frequency will be reduced to once every month.

1.13.3 *Site Inspection Documentation*

The site inspector will record each site inspection using the site log inspection forms provided in Appendix C. The site inspection log forms may be separated from this SWPPP document but will be maintained on site or within reasonable access to the site and be made available upon request to Ecology, the local jurisdiction and the Engineer.

1.14 STORMWATER QUALITY MONITORING

1.14.1 *Turbidity*

Turbidity sampling and monitoring will be conducted during the entire construction phase of the project. Samples will be collected weekly at the discharge point nearest the current phase of the project work. If there is no flow at the discharge point, the attempt to sample will be recorded in the site logbook and reported to Ecology in the monthly Discharge Monitoring Report (DMR) as "No Discharge". Samples will be analyzed for turbidity using the Hach 2100Q Turbidimeter.

The key benchmark turbidity value is 25 nephelometric turbidity units (NTU) for the downstream receiving water body. If the 25 NTU benchmark is exceeded in any sample collected, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.

2. Assess whether additional BMPs should be implemented, and document modified BMPs in the SWPPP as necessary.

3. Sample discharge daily util the discharge is 25 NTU or lower.

If the turbidity exceeds 250 NTU at any time, the following steps will be conducted:

1. Notify ecology by phone within 24 hours of analysis (see Section 1.12.2 of this SWPPP for contact information).

2. Continue sampling daily until the discharge is 25 NTU or lower. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration, and chemical

treatment within 24 hours, and implement those additional treatment BMPs as soon as possible, but within a minimum of 7 days.

3. Describe inspection results and remedial actions taken in the site logbook and in monthly discharge monitoring reports described in Section 1.15 of this SWPPP.

1.14.2 *pH*

Sampling and monitoring of pH occurs if significant concrete work (> 1,000 cubic yards throughout the life of the project) or use of engineered soils (e.g., cement-treated base) is anticipated. No significant concrete work or engineered soils is planned for this project; therefore, no pH testing will be conducted.

1.15 RECORDKEEPING

1.15.1 *Site Logbook*

A site logbook will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form included in this SWPPP include the required information for the site logbook.

1.15.2 *Records Retention*

Records of all monitoring information (site logbook, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

1.15.3 *Access to Plans and Records*

All applicable documentation, including but not limited to the SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be provided to Ecology within 14 days of receipt of written request for the SWPPP from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with the general permit condition S5.G.

1.15.4 *Updating the SWPPP*

In accordance with conditions S3, S4.B, and S.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating of significantly minimizing pollutants in

stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

1.16 REPORTING

1.16.1 *Notification of Noncompliance*

If any of the terms and conditions of this permit is not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

1. Ecology will be immediately notified of the failure to comply.

2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and submitted to Ecology within five days of becoming aware of the violation.

3. A detailed report describing the noncompliance will be submitted to Ecology within five days, unless requested earlier by Ecology.

APPENDIX A
EROSION CONTROL AND GRADING PLANS

APPENDIX B
CONSTRUCTION BMPS

BMP C101: Preserving Natural Vegetation and Topsoil

Purpose

The purpose of preserving natural vegetation and topsoil is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20 to 30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

- Natural vegetation must be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by the city or other agencies during the development review and permitting process.

- All projects shall preserve native topsoil to the maximum extent practicable. Where applicable, soil preservation shall be performed in accordance with the postconstruction soil quality and depth BMP in Volume V.

Design and Installation Specifications

Where feasible, all sites shall retain and protect vegetation and soil from compaction by fencing and keeping materials storage and equipment off these areas during construction.

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. City ordinances to save natural vegetation and trees should be reviewed.

- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- **Construction Equipment:** This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.

- **Grade Changes**: Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

  Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots, it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- **Excavations:** Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them (except for drainfields/infiltration facilities, which would require tree removal). This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  - Cut as few roots as possible. When you must cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.

  - Backfill the trench as soon as possible.

  - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, dogwood, red alder, western hemlock, western red cedar, and Douglas-fir do not readily adjust to changes in environment, and special care should be taken to protect these trees.

- The windthrow hazard of Pacific silver fir and Pacific madrona is high, while that of western hemlock is moderate. The danger of windthrow increases where dense

stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.

- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.

- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western red cedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

- If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Delineation of an area to remain undisturbed or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-area buffers shall not be used as sediment treatment areas. These buffers shall remain completely undisturbed. The city may expand the buffer widths temporarily to allow the use of the expanded area for improved removal/filtration of sediment in any surface flow towards the buffer.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. High visibility fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the city or other state or federal permits or approvals.

Maintenance Standards

- Inspect the area frequently to make sure fencing or flagging remains in place and remains undisturbed. Replace all damaged fencing or flagging immediately.

BMP C103: High Visibility Fence

Purpose

Fencing is intended to:

- Restrict clearing to approved limits
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed
- Limit construction traffic to designated construction entrances, exits or internal roads
- Protect areas where marking with flagging/survey tape may not provide adequate protection

Conditions of Use

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

- High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least 4 feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every 6 inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 pounds per foot using the American Society for Testing and Materials (ASTM) D4595 testing method.
- If appropriate, install fabric silt fence in accordance with BMP C233 to act as high visibility fence. Except that the silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.
- Metal fences are the least preferred but might be appropriate to address security concerns. Metal fencing shall be designed and installed according to the manufacturer's specifications.

- Metal fences shall be at least 4 feet high and must be highly visible.
- Fences shall not be wired or stapled to trees.

Maintenance Standards

- If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils with a well-established vegetative cover. This is one of the most effective methods of reducing erosion.

Conditions of Use

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.
- The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.
- Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.
- Between October 1 and March 30 seeding requires a cover of mulch with straw or an erosion control blanket until 75 percent grass cover is established.
- Where the term "fully established" is used to describe vegetative cover or plantings, it shall be understood to mean that healthy vegetation covers 90 percent of exposed soil.
- Inspect all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching, for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) that will prevent erosion.

Design and Installation Specifications

- Seed retention/detention ponds as required.
- Install channels intended for vegetation before starting major earthwork, hydroseeded with a bonded fiber matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If

vegetated channels cannot be established by seed before water flow, install sod in the channel bottom—over hydromulch and erosion control blankets. Sod may be used for lining ditches to prevent erosion, but it will provide little water quality benefit during the wet season.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.

- The seedbed should be firm and rough. All soil shall be roughened no matter what the slope. If compaction is required for engineering purposes, slopes must be track walked before seeding. Backblading or smoothing of slopes greater than 4:1 is not allowed if they are to be seeded.

- New and more effective restoration-based landscape practices rely on deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical the subgrade should be initially ripped to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches the rototilling process should be done in multiple lifts, or the prepared soil system shall be prepared properly and then placed to achieve the specified depth.

- Organic matter is the most appropriate form of "fertilizer" because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form. A natural system typically releases 2 to 10 percent of its nutrients annually.

- In general, 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer can be used at a rate of 90 pounds per acre. Slow-release fertilizers shall be used because they are more efficient and have fewer environmental impacts. It is recommended that areas being seeded for final landscaping conduct soil tests to determine the exact type and quantity of fertilizer needed. This will prevent the over-application of fertilizer. If fertilizer is added to a hydromulch machine, it shall not be agitated for more than 20 minutes, since this can destroy the slow-release coating.

- There are numerous products available on the market that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal is a good source of long-term, slow-release, available nitrogen.

- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching, for specifications.

- On steep slopes, BFM or mechanically bonded fiber matrix (MBFM) products should be used. BFM/MBFM products are applied at a minimum rate of 3,000 pounds per acre of mulch with approximately 10 percent tackifier.

Application is made so that a minimum of 95 percent soil coverage is achieved. Numerous products are available commercially and should be installed per manufacturer's instructions. Most products require 24 to 36 hours to cure before a rainfall and cannot be installed on wet or saturated soils. Generally, these products come in 40 to 50 pound bags and include all necessary ingredients except for seed and fertilizer.

- In most cases, the shear strength of blankets is not a factor when used on slopes, only when used in channels. BFMs and MBFMs are good alternatives to blankets in most situations where vegetation establishment is the goal.

- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See also postconstruction soil quality and depth in Volume V, Chapter 6.

- When installing seed via hydroseeding operations, only about one-third of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.

- Enhance vegetation establishment by dividing the hydromulch operation into two phases:

    1. Phase 1 – Install all seed and fertilizer with 25 to 30 percent mulch and tackifier onto soil in the first lift;

    2. Phase 2 – Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:

    1. Installing the mulch, seed, fertilizer, and tackifier in one lift.

    2. Spread or blow straw over the top of the hydromulch at a rate of 800 to 1,000 pounds per acre.

    3. Hold straw in place with a standard tackifier.

  Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

    - Irrigation

    - Reapplication of mulch

    - Repair of failed slope surfaces

  This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM or MBFM (3,000 pounds per acre minimum).

- Seed may be installed by hand if:
  - Temporary and covered by straw, mulch, or topsoil.
  - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in the tables below include recommended mixes for both temporary and permanent seeding. These mixes, with the exception of the wetland mix and temporary erosion control mix, shall be applied at a rate of 80 to 100 seeds per square foot. Wet sites should apply 120 to 150 seeds per square foot. Local suppliers should be consulted for information on current pure live seed (PLS) rates and species specific seeds per pound to determine seed mix PLS pounds of seed per acre. The appropriate mix depends on a variety of factors, including exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the city may be used.
- Other mixes may be appropriate, depending on the soil type and hydrology of the area. Consult the local revegetation experts or the local conservation district for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the city may be used.

Table 3.2 presents the standard mix for those areas where a temporary or permanent vegetative cover is required. The mix assumes a desired 150 seeds per square foot and should be applied at approximately 37 pounds of pure live seed per acre.

Table 3.2. Temporary Erosion Control Seed Mix.

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
Spike bentgrass	*Agrostis exarata*	6	9	0.1
California brome	*Bromus carinatus*	15	23	9.8
Tufted hairgrass	*Deschampsia cespitosa*	15	23	0.4
Blue wildrye	*Elymus glaucus*	18	27	10.7
California oatgrass	*Danthonia californica*	18	27	5.6
Native red fescue	*Festuca rubra* var. *rubra*	18	27	2.4
Meadow barley	*Hordeum brachyantherum*	10	15	7.7
Total			**151**	**36.7**

Table 3.3 provides a recommended option for landscaping seed. It assumes a desired 100 seeds per square foot and should be applied at 18 pounds of pure live seed per acre.

Table 3.3. Landscaping Seed Mix.

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
Sideoats grama	*Bouteloua curtipendula*	20	30	6.8
California oatgrass	*Danthonia californica*	20	30	6.2
Native red fescue	*Festuca rubra* var. *rubra*	30	45	3.9
Prairie Junegrass	*Koeleria macrantha*	30	45	0.8
Total			**150**	**17.7**

The turf seed mix in Table 3.4 is for dry situations where there is little need for water. The advantage is that this mix requires very little maintenance.

Table 3.4. Low-Growing Turf Seed Mix.

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
Hard fescue	*Festuca brevipila*	25	20	1.5
Sheep fescue	*Festuca ovina*	30	24	1.5
Native red fescue	*Festuca rubra* var. *rubra*	25	20	1.7
Prairie Junegrass	*Koeleria macrantha*	20	16	0.3
Total			**80**	**5**

Table 3.5 presents a mix recommended for bioswales and other intermittently wet areas. The mix assumes a desired 150 seeds per square foot and approximately 29 pounds of pure live seed per acre. Sod shall generally not be used for bioswales because the seed mix is inappropriate for this application. Sod may be used for lining ditches to prevent erosion, but it will provide little water quality benefit during the wet season.

Table 3.5. Bioswale Seed Mix.

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
American sloughgrass	*Beckmannia syzigachne*	15	23	0.9
Tufted hairgrass	*Deschampsia cespitosa*	20	30	0.5
Blue wildrye	*Elymus glaucus*	18	27	10.7
Native red fescue	*Festuca rubra* var. *rubra*	20	30	2.6
Meadow barley	*Hordeum brachyantherum*	12	18	9.2
Northwestern mannagrass	*Glyceria occidentalis*	15	23	4.9
Total			**151**	**28.8**

The seed mix in Table 3.6. is a recommended low-growing, non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Other mixes may be appropriate, depending on the soil type and hydrology of the area. This mixture assumes a target goal of 150 seeds per square foot and should be applied at a rate of 36 pounds per acre. Consult terms of the HPA permit for seed mixes in wetlands.

Table 3.6. Low-Growing, Wet Area Seed Mix.*

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
California brome	*Bromus carinatus*	15	23	9.8
Columbia brome	*Bromus vulgaris*	18	27	8.1
Tufted hairgrass	*Deschampsia cespitosa*	15	23	0.4
California oatgrass	*Danthonia californica*	15	23	4.7
Native red fescue	*Festuca rubra* var. *rubra*	17	26	2.2
Western manna grass	*Glyceria occidentalis*	10	15	3.3
Meadow barley	*Hordeum brachyantherum*	10	15	7.7
Total			**152**	**36.2**

*Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix.

The meadow seed mix in Table 3.7 is recommended for areas that will be maintained infrequently or not at all and where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. This seed mix assumes a target goal of 120 seeds per square foot and an application rate of 25 pounds of pure live seed per acre.

Table 3.7. Meadow Seed Mix.

Common Name	Species	Percent Species Composition	Desired Seeds Per Square Foot	Pounds Pure Live Seed per Acre
Common yarrow	*Achillea millefolium*	4	5	0.1
Pearly everlasting	*Anaphalis margartacae*	1	1	0.0
California brome	*Bromus carinatus*	15	18	7.8
California oatgrass	*Danthonia californica*	15	18	3.7
Blue wildrye	*Elymus glaucus*	16	19	7.6
Idaho fescue	*Festuca idahoensis*	15	18	1.7
Native red fescue	*Festuca rubra* var. *rubra*	18	22	1.9
Sickle keeled lupine	*Lupinus albicaulis*	1	1	2.2
Fowl bluegrass	*Poa palustris*	15	18	0.4
Total			**120**	**25.4**

Maintenance Standards

- Reseed any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, an alternate method, such as sodding, mulching, or nets/blankets, shall be used. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the city when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.

- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Equivalent

Ecology has approved specific products as able to meet the requirements of BMP C120. However, the products did not pass through the TAPE process. The list of products is available on Ecology's web site at <www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>.

If a project wishes to use any of the "approved as equivalent" BMPs in the City of Tumwater, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch shall be used:

- On disturbed areas that require temporary stabilization, that are not covered with blankets, sod, or plastic covering.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year.
- Straw mulch must be refreshed frequently, and hydromulches per the manufacturer's recommendations.
- For seeded areas, mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40- to 50-pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table 3.8. Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95 percent covered (i.e., not visible under the mulch layer). Note: Thicknesses may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "compost" is selected, it must be a coarse compost that meets the following size gradations when tested in accordance with the U.S. Composting Council "Test Methods for the Examination of Compost and Composting" Test Method 02.02-B.

Table 3.8. Mulch Standards and Guidelines.

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	WSDOT Standard Specifications for Straw	2″ to 3″ thick	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high water elevation of surface waters (due to flotation).
Hydromulch – Short-Term	WSDOT Standard Specification for Short-Term Mulch	Approximately 1,500–2,000 lbs per acre: Apply per the manufacturer's recommendations	Applied with a hydromulcher, often combined with seed and fertilizer. Contains a tackifier and requires a typical cure time of 24–48 hours before rain. Soil must be completely and uniformly covered, without shadow areas where soil shows through. These mulches do not hold up to concentrated flows. Under normal conditions, will last 3–6 months.
Hydromulch – Moderate-Term	WSDOT Standard Specification for Moderate-Term Mulch	Approximately 3,000–4,000 lbs per acre: Apply per the manufacturer's recommendations	Applied with a hydromulcher, often combined with seed and fertilizer. Contains a tackifier and requires a typical cure time of 24–48 hours before rain. Soil must be completely and uniformly covered, without shadow areas where soil shows through. Moderate-Term Mulch needs to be applied in more than one layer with no more than 2,000 pounds per acre in any one layer. These mulches do not hold up to concentrated flows. Under normal circumstances, will last 6–12 months.
Hydromulch – Long-Term	WSDOT Standard Specification for Long-Term Mulch	Approximately 3,000–4,000 lbs per acre: Apply per the manufacturer's recommendations	Applied with a hydromulcher, often combined with seed and fertilizer. May only require 2–4 hours of cure time. Soil must be completely and uniformly covered, without shadow areas where soil shows through. Long-Term Mulch needs to be applied in more than one layer with no more than 2,000 pounds per acre in any one layer. These mulches do not hold up to concentrated flows. Under normal circumstances, will last 12–18 months.
Compost	WSDOT Standard Specification for Coarse Compost	2″ thick minimum	More effective control can be obtained by increasing thickness to 3 inches. Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125 or the postconstruction soil quality and depth BMP see Volume V, Chapter 6. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorous impaired water bodies.

Table 3.8 (continued). Mulch Standards and Guidelines.

Mulch Material	Quality Standards	Application Rates	Remarks
Chipped Site Vegetation	Average size should be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2″ thick minimum	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approximately 10 percent because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2″ thick minimum; approximately 100 tons per acre (approximately 800 lbs per cubic yard)	This material is often called “hog fuel” or “hogged fuel.” The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized). **Note: Wood based mulches may not be used for construction road stabilization where paved surfaces are to be constructed.**
Wood Strand Mulch or Wood Straw	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.	2″ thick minimum; approximately 100 tons per acre (approximately 800 lbs per cubic yard)	Cost-effective protection when applied with adequate thickness. A minimum of 95 percent of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between one-sixteenth and three-eighths inch. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT Standard Specification 9-14.4(4). **Note: Wood based mulches may not be used for construction road stabilization where paved surfaces are to be constructed.**

Coarse Compost

- Mulch may be applied at any time of the year and must be refreshed periodically
- Minimum Percent passing 3-inch sieve openings 100 percent
- Minimum Percent passing 1-inch sieve openings 90 percent
- Minimum Percent passing 0.75-inch sieve openings 70 percent
- Minimum Percent passing 0.25-inch sieve openings 40 percent.
- Mulch used within the ordinary high-water mark of surface waters must be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material.

Maintenance Standards

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term applications.
    - Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below. Due to rapid runoff caused by plastic covering, this method shall not be used upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    - Temporary ditch liner
    - Pond liner in temporary sediment pond
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored
    - Emergency slope protection during heavy rains
    - Temporary drainpipe (“elephant trunk”) used to direct water

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    - Run plastic up and down slope, not across slope, unless the slope length is less than 10 feet, and then it may be installed perpendicular to a slope.

  - Minimum of 8-inch overlap at seams.
  - On long or wide slopes, or slopes subject to wind, tape all seams.
  - Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath
  - Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place
  - Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil, which causes extreme erosion.
  - Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 6 mil.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Equivalent

Ecology has approved specific products as able to meet the requirements of BMP C123. However, the products did not pass through the TAPE process. The list of products is available on Ecology's web site at <www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>.

If a project wishes to use any of the "approved as equivalent" BMPs in the City of Tumwater, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

BMP C124: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, of uniform thickness (approximately 1 inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

- Shape and smooth the surface to final grade in accordance with the approved grading plan. The swale needs to be overexcavated 4 to 6 inches below design elevation to allow room for placing soil amendment and sod.
- Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than 10 percent or the permeability is less than 0.6 inch per hour. See < https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Waste-reduction-programs/Organic-materials/Managing-organics-compost > for further information.
- Fertilize according to the supplier's recommendations.
- Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
- Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
- Roll the sodded area and irrigate.
- When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to re-establish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.

BMP C125: Topsoiling/Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are integral components of providing permanent cover in areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding. Note that this BMP is functionally the same as the postconstruction soil quality and depth BMP (see Volume V, Chapter 6), which is required for all disturbed areas that will be developed as lawn or landscaped areas at the completed project site.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.

- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction **is not acceptable**. Preserve existing soil systems in undisturbed and uncompacted condition if functioning properly.

- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.

- Restore, to the maximum extent practicable, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native soil, incorporate amendments into on-site soil, or importing blended topsoil to meet this requirement.

- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.

- Beware of where the topsoil comes from, and what vegetation was on site before disturbance, invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.

- Topsoil from the site shall contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated to the site and will provide optimum conditions for establishing grasses. Commercially available mycorrhiza products shall be used when bringing in off-site topsoil.

Design and Installation Specifications

The following requirements must be met for disturbed areas requiring disruption and topsoiling, which will be developed as lawn or landscaped areas at project completion:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
    - A minimum organic content of 10 percent dry weight in planting beds, and 5 percent organic matter content in turf areas.
    - A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
    - A minimum depth of 8 inches. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
    - Scarify subsoils below the topsoil layer at least 4 inches with some incorporation of the upper material to avoid stratified layers, unless infeasible. Ripping or restructuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system. If blended topsoil is imported, then fines shall be limited to 25 percent passing through a U.S. #200 sieve.
    - Mulch planting beds with 2 inches of organic material.
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments.
    - When using the option of incorporating amendments to meet the organic content requirement, use compost that meets the composted material specification for bioretention (see Volume V, Chapter 9), with the exception that the compost may have up to 35 percent biosolids or manure.
    - Sections 3 through 7 of the document entitled Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13 in Ecology's Stormwater Management Manual for Western Washington provide useful guidance for implementing whichever option is chosen. The document includes guidance for preapproved default strategies and guidance for custom strategies. As of this printing the document can be found at: www.soilsforsalmon.org

- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.

- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.

- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to prevent a lack of bonding is to work the topsoil into the layer below for a depth of at least 4 inches below the topsoil layer.

- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and clay loam). Avoid areas of natural groundwater recharge.

- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.

- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.

- In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Stockpiled topsoil is to be reapplied to other portions of the site where feasible.

- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.

Stockpiling of topsoil shall occur in the following manner:

- Side slopes of the stockpile shall not exceed 2H:1V.

- Between October 1 and April 30:

    - An interceptor dike with gravel outlet and silt fence shall surround all topsoil.

  - Within 2 days, complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.

- Between May 1 and September 30:

  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.

  - Within 7 days, complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.

- When native topsoil is to be stockpiled and reused, the following shall apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:

  - Re-install topsoil within 4 to 6 weeks

  - Do not allow the saturation of topsoil with water

  - Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.

- Plant and mulch soil after installation.

- Leave plant debris or its equivalent on the soil surface to replenish organic matter.

- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 3.5 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each “step” catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs must be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.

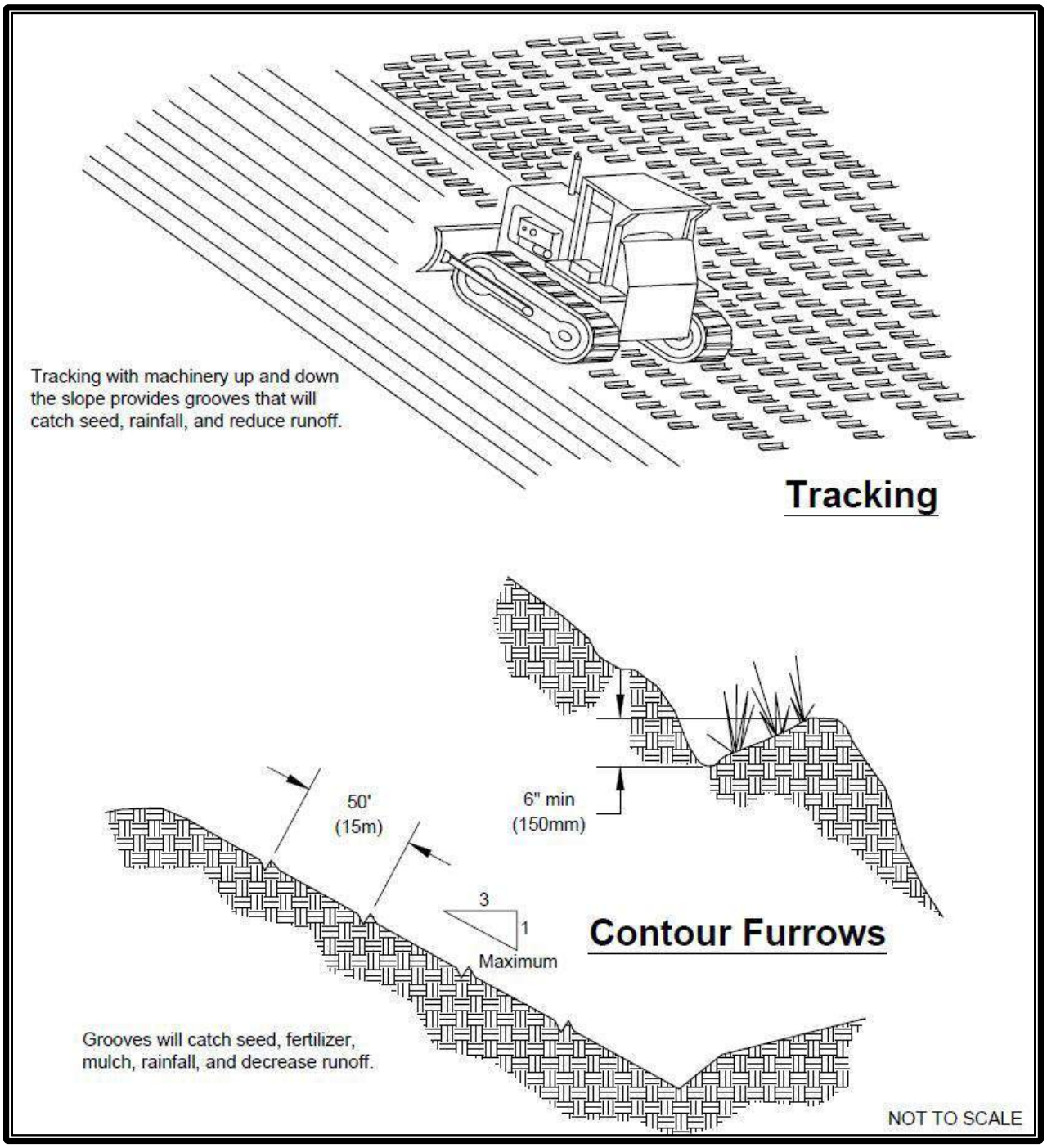

Figure 3.5. Surface Roughening by Tracking and Contour Furrows.

- Graded areas with slopes steeper than 3H:1V but less than 2H:1V shall be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.

- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are graded in this manner should be seeded as quickly as possible.

- Regular inspections should be made of the area. If rills appear, they should be regraded and reseeded immediately.

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

For use in areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts on roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.

- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.

- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.

- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).

- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.

- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Oil based products are prohibited from use as a dust suppressant. The city may approve other dust palliatives such as calcium chloride or PAM.

- PAM (BMP C126) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control. Use of PAM could be a cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 millimeter [mm]) to 10 to 20 percent.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Restrict use of paved roadways by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.
- Contact your Puget Sound Clean Air Agency <www.pscleanair.org> for guidance and training on other dust control measures. Compliance with Puget Sound Clean Air Agency guidance and BMPs constitutes compliance with this BMP.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose

Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy summer rains. Having these materials on site reduces the time needed to implement BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric, and steel "T" posts.

- Materials are stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A contractor or developer could keep a stockpile of materials that are available for use on several projects.

- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum that will cover numerous situations includes:

Material
Clear Plastic, 6 mil
Drainpipe, 6- or 8-inch diameter
Sandbags, filled
Straw Bales for mulching
Quarry Spalls
Washed Gravel
Geotextile Fabric
Catch Basin Inserts
Steel "T" Posts
Silt fence material
Straw Wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel "T" posts, and gravel must be kept covered and out of both sun and rain.

- Restock materials used as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Design and Installation Specifications

- Ensure that washout of concrete trucks, chutes, pumps, and internals is performed at an approved off-site location or in designated concrete washout areas, in accordance with BMP C154. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams—it is illegal and a violation of federal, state, and local regulations.
- Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas.
- Wash off hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels into formed areas only.
- Wash equipment difficult to move, such as concrete pavers in areas that do not directly drain to natural or constructed stormwater conveyances.

- Do not allow washdown from newly placed concrete areas or surfaces, such as concrete aggregate driveways, to drain directly to natural or constructed stormwater conveyances. Collect and dispose of all washdown in accordance with BMP C152.

- Contain washwater and leftover product in a lined container when no formed areas are available. Dispose of contained concrete in a manner that does not violate groundwater or surface water quality standards.

- Always use forms or solid barriers for concrete pours, such as pilings, within 15 feet of surface waters.

- Refer to BMPs C252 and C253 for pH adjustment requirements.

- Refer to the CSWGP for pH monitoring requirements if the project involves one of the following activities:

    - Significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete used over the life of a project)

    - The use of engineered soils amended with (but not limited to) portland cement-treated base, cement kiln dust or fly ash.

    - Discharging stormwater to segments of water bodies on the 303(d) list for high pH.

Maintenance Standards

Maintain any concrete washout facilities in accordance with BMP C154.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State or the city storm drain system is prohibited. Use this BMP to prevent process water and slurry from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. If the drainage pattern would allow flow from the location of the cutting to a catch basin, the catch basin shall be temporarily blocked.
- Dispose of collected slurry and cuttings in a manner that does not violate groundwater or surface water quality standards, such as at a Vactor decant facility that accepts this material.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Vacuum up all material and dispose of collected process water in a manner that does not violate groundwater or surface

water quality standards, such as at a Vactor decant facility that accepts this material.

- Handle and dispose cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and utilizing vacuum trucks.

BMP C153: Material Delivery, Storage and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on site, store materials in a designated area, and install secondary containment.

Conditions of Use

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (October 1 to April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and in secondary containment.

Material Storage Areas and Secondary Containment Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.

- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10 percent of the total enclosed container volume of all containers, or 110 percent of the capacity of the largest container within its boundary, whichever is greater.

- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.

- Provide sufficient separation between stored containers to allow for spill cleanup and emergency response access.

- During the wet weather season (October 1 to April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.

- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill cleanup material (spill kit).

- The spill kit shall include, at a minimum:

    - 1 water resistant nylon bag
    - 3 oil absorbent socks 3 inches by 4 feet
    - 2 oil absorbent socks 3 inches by 10 feet
    - 12 oil absorbent pads 17 inches by 19 inches
    - 1 pair splash resistant goggles
    - 3 pair nitrile gloves
    - 10 disposable bags with ties
    - Instructions

BMP C154: Concrete Washout Area

Purpose

This BMP applies to all projects that use concrete and conduct any form of on-site concrete washout. Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout off site, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or groundwater.

Auxiliary concrete truck components (e.g. chutes and hoses) and small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheel-barrows) may be washed into formed areas awaiting concrete pour.

Conditions of Use

Concrete washout area best management practices are implemented on construction projects where:

- Concrete is used as a construction material.
- It is not possible to dispose of all concrete wastewater and washout off site (ready-mix plant, etc.).
- Concrete trucks, pumpers, or other concrete coated equipment are washed on site.

Design and Installation Specifications

Implementation

The following steps are required to reduce stormwater pollution from concrete wastes:

- Perform washout of concrete trucks at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on site, except in designated concrete washout areas.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above grade or below grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are required.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for contractor's superintendent or CESCL to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

Contracts

- Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate washout area at least 50 feet from sensitive areas, storm drains, open ditches, or water bodies, including wetlands. See Figures 3.7 through 3.9.
- Allow convenient access for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access washout, prevent track-out with a pad of rock or quarry spalls (see BMP C105). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of facilities you install will depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, washouts must be placed in multiple locations for ease of use by concrete truck drivers.

On-Site Concrete Washout Facility, Transit Truck Washout Procedures

- Locate washout area at least 50 feet from sensitive areas, storm drains, open ditches, or water bodies, including wetlands. See Figures 3.7 through 3.9.
- Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations with a freeboard of 12 inches.
- Washout of concrete trucks shall be performed in designated areas only.

- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of off site.

- See maintenance standards below for concrete waste disposal requirements.

- Concrete Washout Facility:

    - Temporary concrete washout facilities either above or below grade) should be constructed as shown on the representative details below, with a recommended minimum length and minimum width of 10 feet. The quantity and volume must be sufficient to contain all liquid and concrete waste generated by washout operations.

    - Lath and flagging shall be commercial type.

    - Plastic lining material shall be a minimum of 10 mil polyethylene sheeting and must be free of holes, tears, or other defects that compromise the impermeability of the material.

    - Liner seams shall be installed in accordance with manufacturers' recommendations.

    - Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

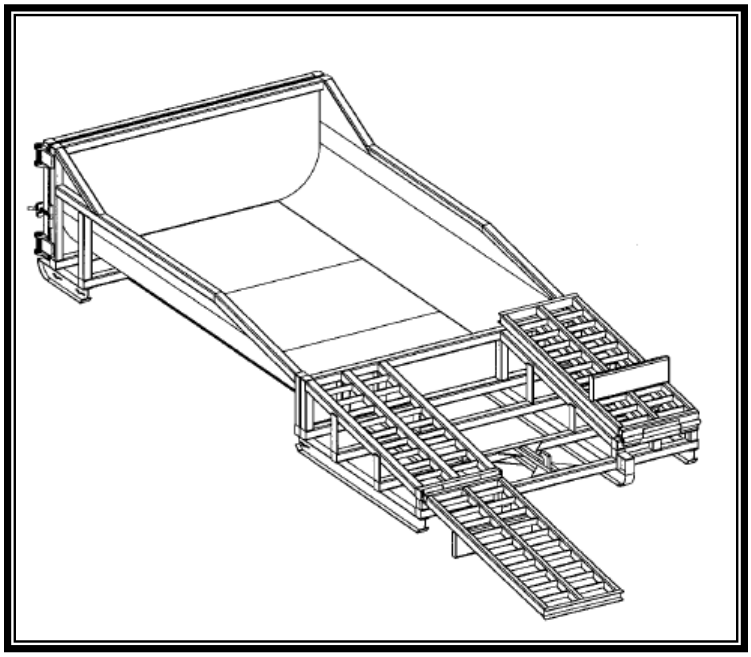

Figure 3.7. Prefabricated Concrete Washout Container with Ramp.

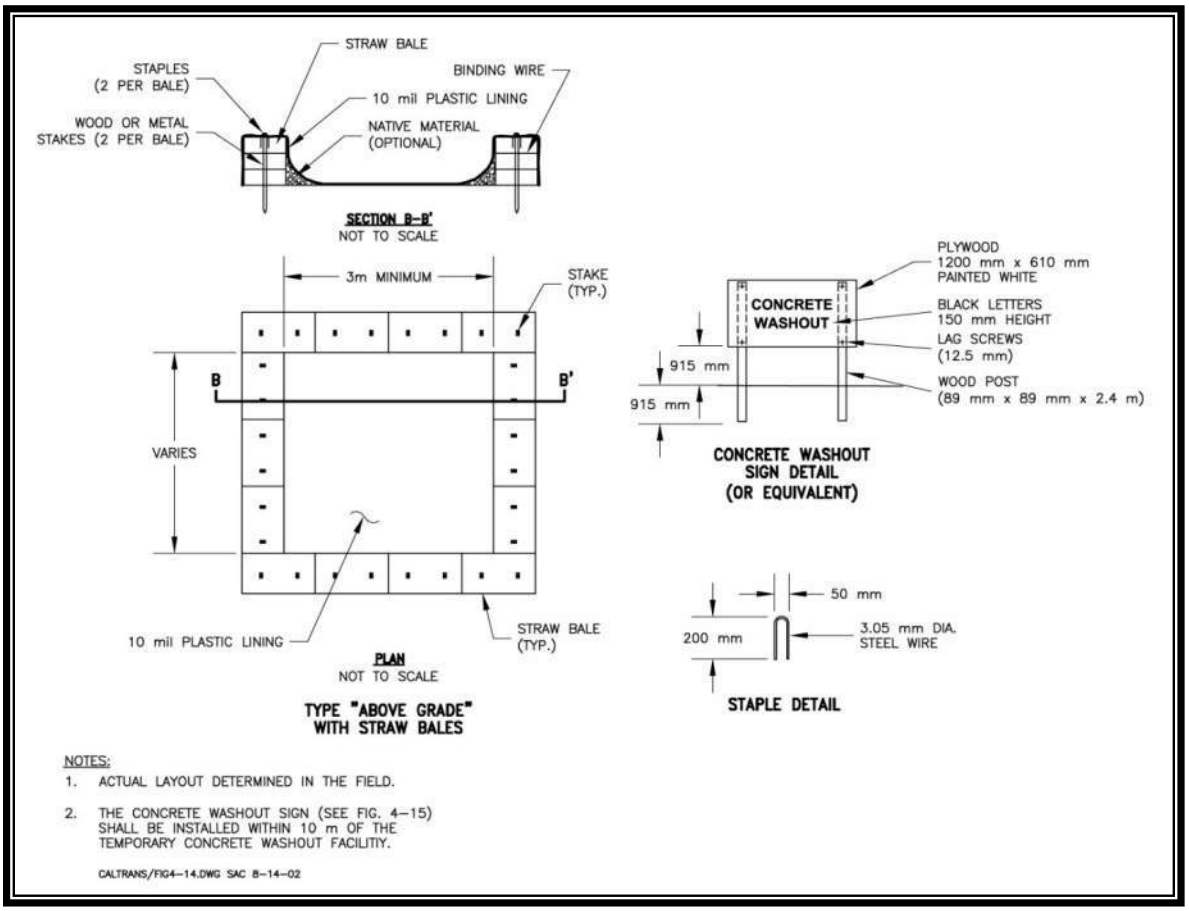

Figure 3.8. Concrete Washout Area A.

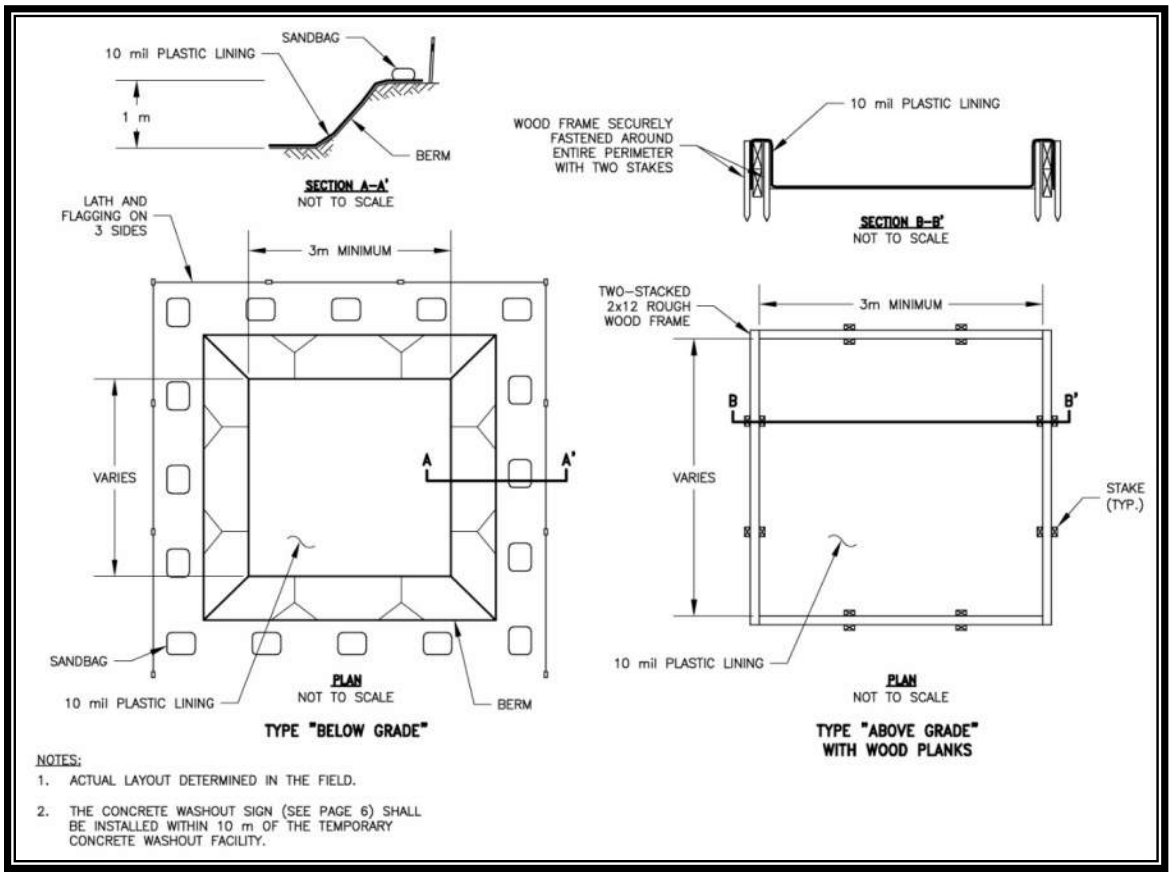

Figure 3.9. Concrete Washout Area B.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout BMPs are in place prior to the commencement of concrete work. This inspection shall be included in the SWPPP inspection checklist.
- During periods of concrete work, inspect daily to verify continued performance.
  - Check overall condition and performance
  - Check remaining capacity (percent full)
  - If using self-installed washout facilities, verify plastic liners are intact and sidewalls are not damaged
  - If using prefabricated containers, check for leaks.
- Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75 percent full or only 12 inches of freeboard remains, whichever occurs first.

- If the washout is nearing capacity, vacuum and dispose of the waste material in an approved manner.

    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground. Pump or vacuum the liquid or slurry out of the facility and dispose of it off site at a facility that accepts this material.

    - Do not use sanitary sewer without a permit that must be obtained from the LOTT Clean Water Alliance at 360-528-5708.

    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout facility prior to predicted wet weather to prevent accumulation and overflow of precipitation.

    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on site or hauled away for disposal or recycling.

- When you remove materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.

- Materials used to construct temporary concrete washout facilities shall be removed from the site of the work and disposed of or recycled.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, repaired, and stabilized to prevent erosion.

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project applicant designates at least one person as the responsible representative in charge of erosion and sediment control, and water quality protection. The designated person shall be the CESCL who is responsible for ensuring compliance with all local, state, and federal Construction SWPPP and water quality requirements.

Conditions of Use

A CESCL shall be made available on projects required to prepare a Construction SWPPP and that discharge stormwater to surface waters of the state. For projects that require a SWPPP Short Form, a CESCL is required during preparation of the document. Any modifications must be approved by the CESCL. Projects disturbing less than 1 acre and without potential to discharge stormwater off site may have a person without CESCL certification conduct inspections, though a CESCL is highly recommended. Ecology maintains a list of erosion and sediment control training and certification providers at: <www.ecy.wa.gov/programs/wq/stormwater/cescl.html>.

The CESCL shall:

- Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum training and certification requirements established by Ecology (see details below).

OR

- Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: <www.cpesc.net>.

Specifications

- Certification shall remain valid for 3 years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, or on call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, email address, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:

- Maintaining permit file on site at all times, which includes the Construction SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.
- Updating all project drawings and the Construction SWPPP with changes made.
- Completing any sampling requirements including reporting results using Web Discharge Monitoring Reports.
- Keeping daily logs, and inspection reports. Inspection reports must include:
    - Inspection date/time.
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
    - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
        - Locations of BMPs inspected
        - Locations of BMPs that need maintenance
        - Locations of BMPs that failed to operate as designed or intended
        - Locations of where additional or different BMPs are required
    - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
    - Any water quality monitoring performed during inspection.
    - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.

BMP C162: Scheduling

Purpose

Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of surface ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.

- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

3.2 Runoff Conveyance and Treatment BMPs

This section contains the standards and specifications for Runoff Conveyance and Treatment BMPs. Table 3.10 shows the relationship of the BMPs in Section 3.2 to the Construction SWPPP elements described in Section 2.3.3.

Effective implementation of source control measures in Section 3.1 throughout the construction site will reduce the generation of turbid water and may reduce the effort required to maintain treatment BMPs in this section.

Table 3.10. Runoff Conveyance and Treatment BMPs by SWPPP Element.

BMP or Element Name	Element #3 Control Flow Rates	Element #4 Install Sediment Controls	Element #6 Protect Slopes	Element #7 Protect Storm Drain Inlets	Element #8 Stabilize Channels and Outlets	Element #9 Control Pollutants	Element #10 Control Dewatering	Element #13 Protect Low Impact Development
BMP C200: Interceptor Dike and Swale			✓					✓
BMP C201: Grass-Lined Channels			✓					✓
BMP C202: Channel Lining					✓			
BMP C203: Water Bars	✓		✓				✓	
BMP C204: Pipe Slope Drains			✓					
BMP C205: Subsurface Drains			✓					
BMP C206: Level Spreader			✓				✓	
BMP C207: Check Dams	✓		✓		✓			✓
BMP C208: Triangular Silt Dike (TSD) (Geotextile Encased Check Dam)			✓					✓
BMP C209: Outlet Protection	✓				✓			
BMP C220: Storm Drain Inlet Protection				✓				
BMP C231: Brush Barrier		✓						✓
BMP C232: Gravel Filter Berm		✓						
BMP C233: Silt Fence		✓						✓
BMP C234: Vegetated Strip		✓						✓
BMP C235: Wattles	✓	✓						
BMP C236: Vegetated Filtration							✓	
BMP C240: Sediment Trap	✓	✓						
BMP C241: Temporary Sediment Pond	✓	✓						
BMP C250: Construction Stormwater Chemical Treatment		✓				✓		
BMP C251: Construction Stormwater Filtration		✓				✓		
BMP C252: High pH Neutralization Using CO_2						✓		
BMP C253: pH Control for High pH Water						✓		

BMP C202: Channel Lining

Purpose

To protect channels by providing a channel liner using either blankets or riprap.

Conditions of Use

Channel lining must be used when natural soils or vegetated stabilized soils in a channel are not adequate to prevent channel erosion.

- When a permanent ditch or pipe system is to be installed and a temporary measure is needed.

- In almost all cases, synthetic and organic coconut blankets are more effective than riprap for protecting channels from erosion. Blankets can be used with and without vegetation. Blanketed channels can be designed to handle any expected flow and longevity requirement. Some synthetic blankets have a predicted life span of 50 years or more, even in sunlight.

- Other reasons why blankets are better than rock include the availability of blankets over rock. In many areas of the state, rock is not easily obtainable or is very expensive to haul to a site. Blankets can be delivered anywhere. Rock requires the use of dump trucks to haul and heavy equipment to place. Blankets usually only require laborers with hand tools, and sometimes a backhoe.

- The Federal Highway Administration recommends not using flexible liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 pounds per square foot.

Design and Installation Specifications

See BMP C122 for information on blankets.

Since riprap is used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.

- Disturbance of areas where riprap is to be placed should be undertaken only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.

- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by children shall be

considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.

- Stone for riprap shall consist of field stone or quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended.

- A lining of engineering filter fabric (geotextile) shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.

- Filter fabric shall not be used on slopes greater than 1.5H:1V as slippage may occur. Use it in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

BMP C203: Water Bars

Purpose

A small ditch or ridge of material is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure 3.12.

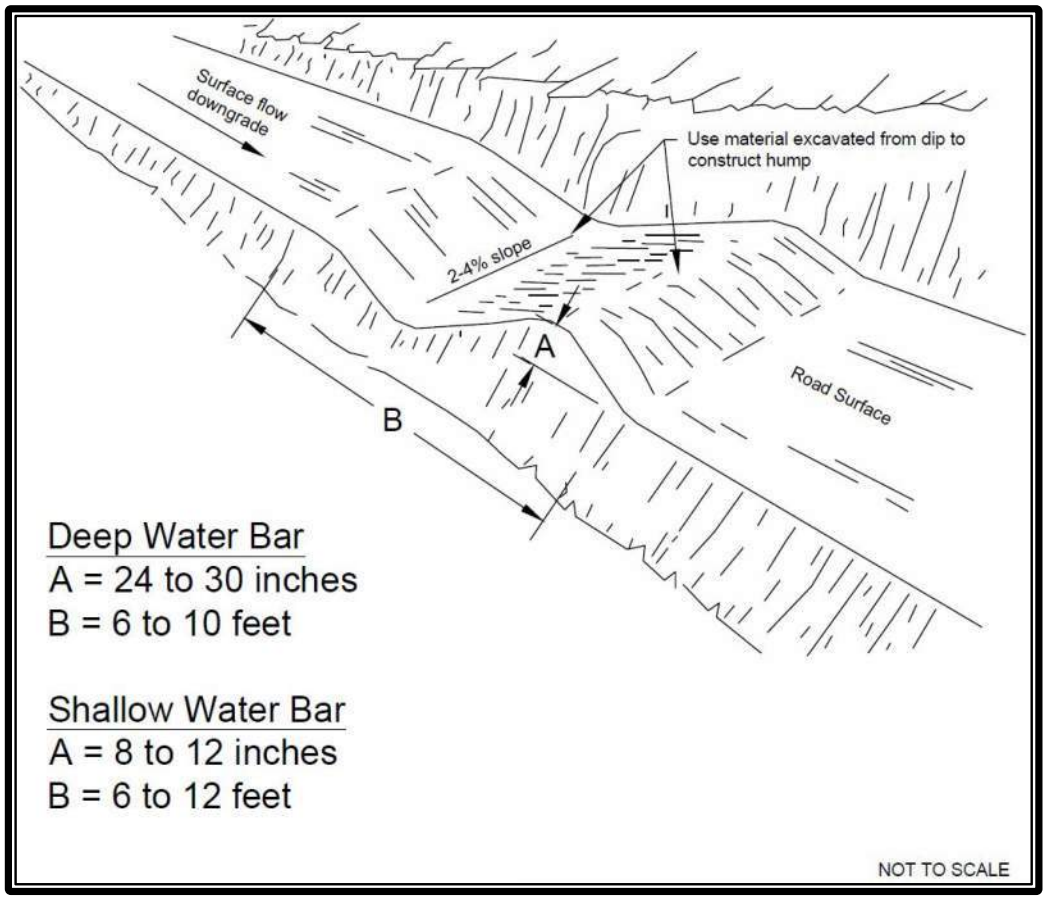

Figure 3.12. Water Bar.

Conditions of Use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long, narrow rights-of-way over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

- Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicular traffic is anticipated.

Design and Installation Specifications

- Height: 8-inch minimum measured from the channel bottom to the ridge top.
- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross.
- Base width of ridge: 6-inch minimum.
- Locate water bars to use natural drainage systems and to discharge into well vegetated stable areas.
- Guidelines for spacing:

Average Slope	Slope Percent	Spacing (feet)
> 20H:1V or flatter	<5%	125
(> 10 to 20) H:1V	5% to <10%	100
(> 5 to 10) H:1V	10% to <20%	75
(> 2.86 to 5) H:1V	20% to <35%	50
2.86 H:1V or steeper	≥35%	Use rock lined ditch

- Grade of water bar and angle: Select angle that results in ditch slope less than 2 percent.
- Install as soon as the clearing and grading is complete.
- Reconstruct/repair as soon as possible when disturbed by grading or excavation.
- Compact the ridge when installed.
- Stabilize, seed and mulch the portions that are not subject to traffic. Gravel the areas crossed by vehicles.

Maintenance Standards

- Periodically inspect right-of-way diversions for wear and after runoff events for erosion damage.
- Immediately remove sediment from the flow area and repair the dike when problems are identified.
- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary right-of-way diversion is permanently stabilized, remove the dikes and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

BMP C220: Storm Drain Inlet Protection

Purpose

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. If these BMPs are used on active roadways, projects shall install appropriate traffic control to ensure vehicle and pedestrian traffic is not exposed to the roadway obstructions. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap that is part of the SWPPP and will be cleaned after final stabilization.

Also use inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction can add significant amounts of sediment into the roof drain system. If possible delay installing lawn and yard drains until just before landscaping or cap these drains to prevent sediment from entering the system until completion of landscaping. Consider erosion protection methods around each finished lawn and yard drain until area is stabilized.

Table 3.11 lists several options for inlet protection. All the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to 1 acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 3.11. Storm Drain Inlet Protection.

Type of Inlet Protection	Emergency Overflow?	Applicable for Paved or Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows; easy to maintain; large area requirement: 30x30 feet per acre
Rock socks and gravel	Yes	Paved or Earthen	Applicable for heavy concentrated flows; will not pond
Gravel and wire drop inlet protection	No		Applicable for heavy concentrated flows; will pond; can withstand traffic
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation
Rock socks and gravel	Yes	Paved	Sturdy, but limited filtration
Culvert Inlet Protection			
Culvert inlet sediment trap			18-month expected life

Design and Installation Specifications

- **Excavated Drop Inlet Protection***:* An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.
    - Provide a depth 1 to 2 feet as measured from the crest of the inlet structure.
    - Slope sides of excavation no steeper than 2:1.
    - Minimum volume of excavation 35 cubic yards.
    - Shape basin to fit site with longest dimension oriented toward the longest inflow area.
    - Install provisions for draining to prevent standing water problems.
    - Clear the area of all debris.
    - Grade the approach to the inlet uniformly.
    - Drill weep holes into the side of the inlet.
    - Protect weep holes with screen wire and washed aggregate.
    - Seal weep holes when removing structure and stabilizing area.
    - It may be necessary to build a temporary dike to the down slope side of the structure to prevent bypass flow.

- **Rock Sock Drop Inlet Protection:** A barrier formed around the storm drain inlet with overlapping rock socks. See Figure 3.17.

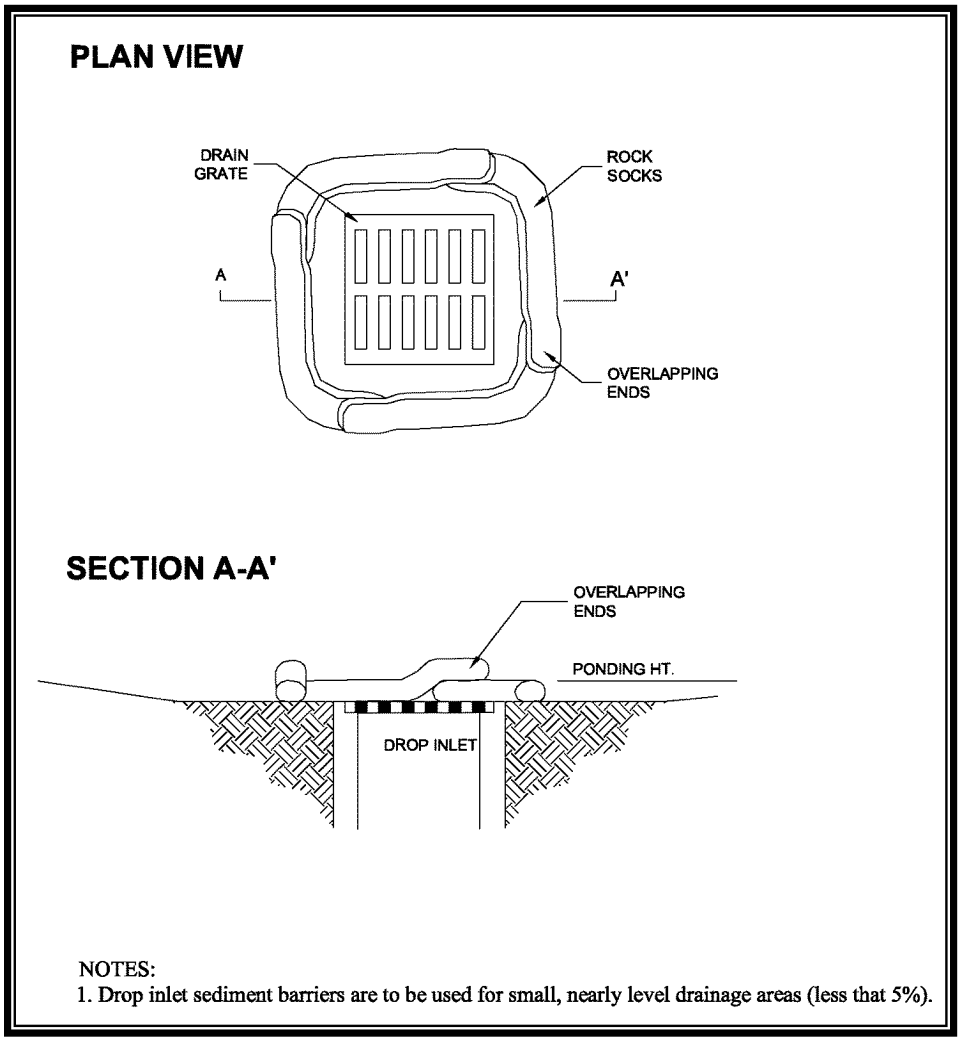

Figure 3.17. Rock Sock Drop Inlet Protection.

- Rock socks are bags made of burlap or geotextile fabric and are approximately 40 inches long and 6 inches in diameter. They are filled with 1/2-inch round rock to 24 inch length and a weight of 16 to 20 pounds.
- Use loosely woven material, such as burlap for filtration and a tight weave geotextile for diversion.
- Completely circle inlet with rock socks.
- Overlap ends to prevent gaps.
- Rock socks may be stacked if required, but should be replaced with gravel filled sandbags for large flows.

- **Gravel and Wire Mesh Filter:** A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.
    - Use a hardware cloth or comparable wire mesh with 1/2-inch openings
    - Use coarse aggregate
    - Provide a height 1 foot or more, 18 inches wider than inlet on all sides
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure
    - Overlap the strips if more than one strip of mesh is necessary
    - Place coarse aggregate over the wire mesh
    - Provide at least a 12-inch depth of gravel over the entire inlet opening and extend at least 18 inches on all sides.
- **Catch Basin Filters:** Use inserts designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. The combination of inlet protection and filters may provide flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way.
    - Provide 5 cubic feet of storage.
    - Requires dewatering provisions for sediment removed from the filter.
    - Provide a high-flow bypass that will not clog under normal use at a construction site.
    - Insert the catch basin filter in the catch basin just below the grating.
- **Curb Inlet Protection with Wooden Weir** – Barrier formed around a curb inlet with a wooden frame and gravel.
    - Wire mesh with 1/2-inch openings.
    - Extra strength filter cloth.
    - Construct a frame.
    - Attach the wire and filter fabric to the frame.
    - Pile coarse washed aggregate against wire/fabric.
    - Place weight on frame anchors.

- **Curb and Gutter Sediment Barrier:** Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 3.18.
    - Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
    - Construct a horseshoe shaped sedimentation trap on the outside of the berm sized to sediment trap standards for protecting a culvert inlet.

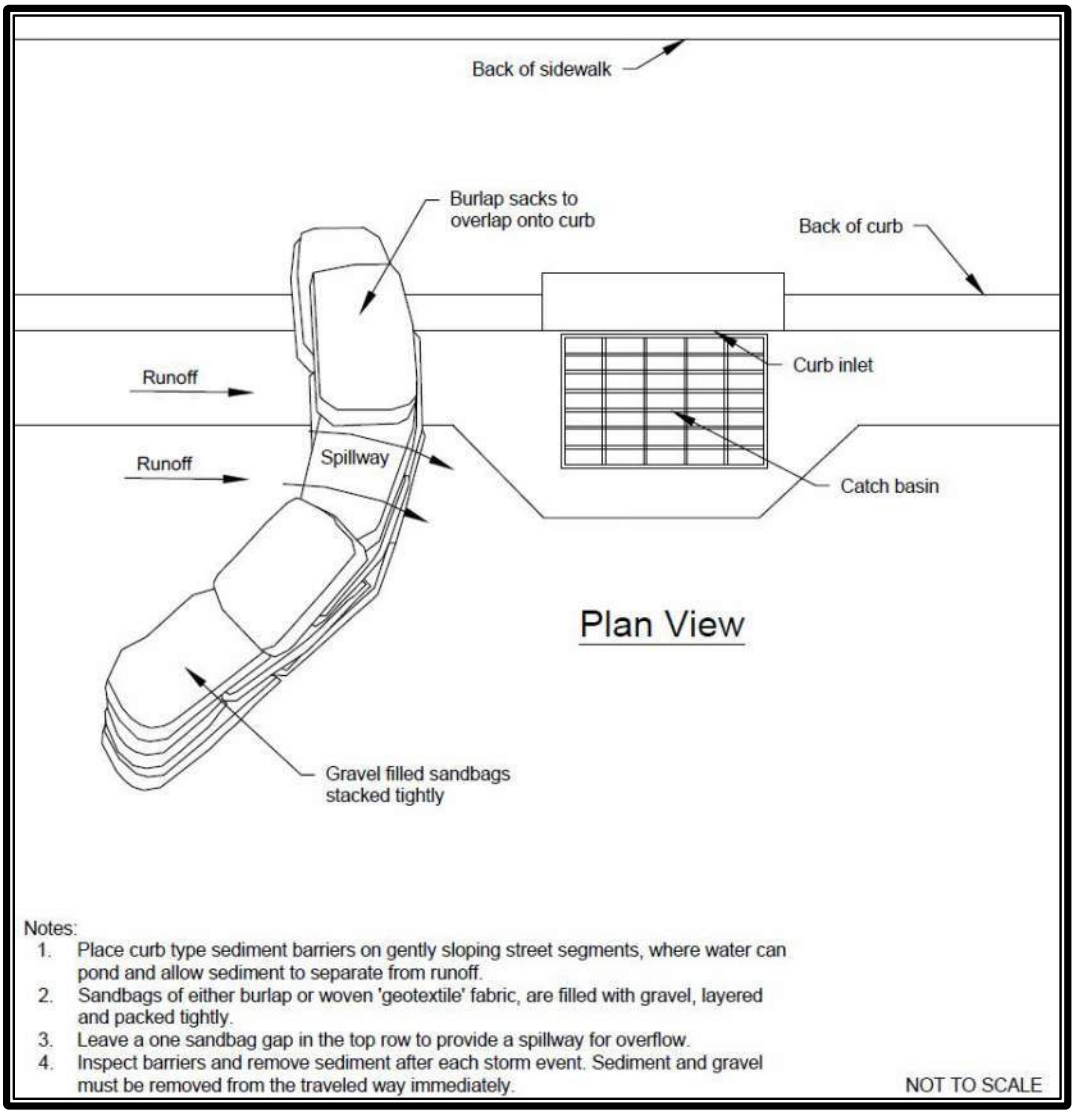

Figure 3.18. Curb and Gutter Barrier.

Maintenance Standards

- Inspect catch basin filters frequently, especially after storm events. Clean or replace clogged inserts. For systems with clogged stone filters pull away from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.

- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Approved as Equivalent

Ecology has approved specific products as able to meet the requirements of BMP C220. However, the products did not pass through the TAPE process. The list of products is available on Ecology's web site at <www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>.

If a project wishes to use any of the "approved as equivalent" BMPs in the City of Tumwater, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

BMP C233: Silt Fence

Purpose

Use of a silt reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 3.19 for details on silt fence construction.

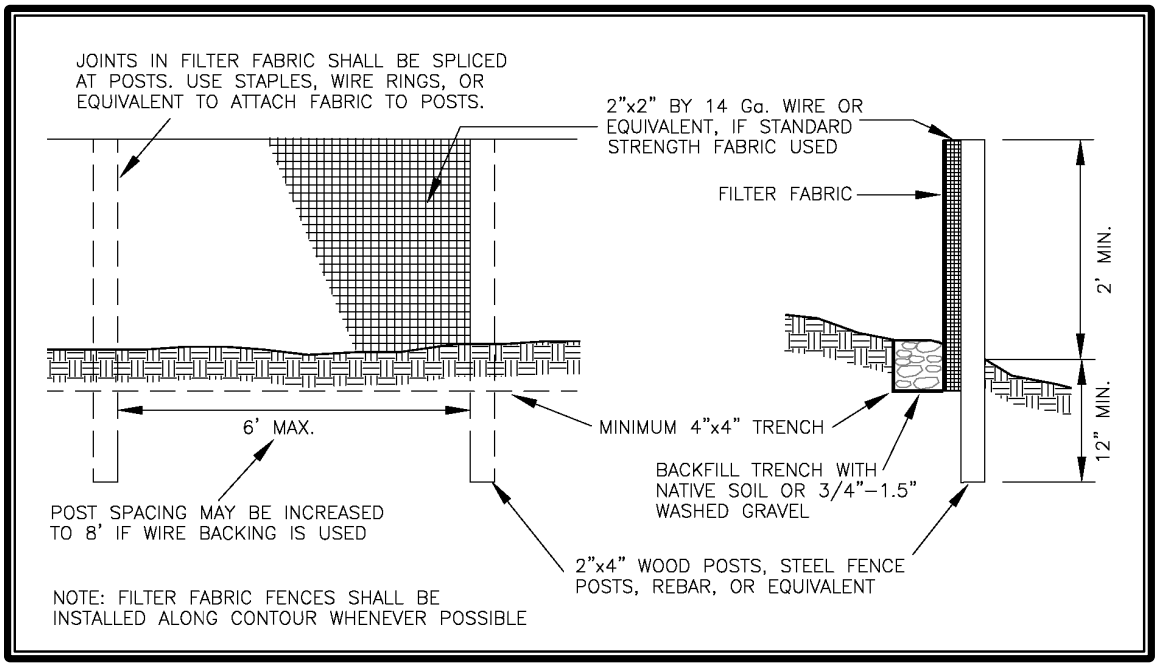

Figure 3.19. Silt Fence.

Conditions of Use

- Silt fence may be used downslope of all disturbed areas.
- Silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment pond.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Design and Installation Specifications

- Use in combination with sediment basins or other BMPs.
- Maximum slope steepness (normal [perpendicular] to fence line) 1H:1V.
- Maximum sheet or overland flowpath length to the fence of 100 feet.
- Do not allow flows greater than 0.5 cubic foot per second.
- The geotextile used shall meet the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table 3.12):

Table 3.12. Geotextile Minimum Standards.

Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for film wovens (U.S. #30 sieve). 0.30 mm maximum for all other geotextile types (U.S. #50 sieve). 0.15 mm minimum for all fabric types (U.S. #100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Standard strength fabrics must be supported with wire mesh, chicken wire, 2-inch by 2-inch wire, safety fence, or jute mesh to increase the strength of the fabric to the 180-pound minimum threshold. Silt fence materials are available that have synthetic mesh backing attached.
- Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- Include the following standard notes for silt fence on construction plans and specifications:
    - The contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
    - Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
    - The silt fence shall have a 2-foot minimum and 2.5-foot maximum height above the adjacent ground surface.
    - The filter fabric shall be sewn together at the point of manufacture to form filter fabric lengths as required. Locate all sewn seams at support posts.

Alternatively, two sections of silt fence can be overlapped, provided the contractor can demonstrate, to the satisfaction of the engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

- Attach the filter fabric on the upslope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the filter fabric to the posts in a manner that reduces the potential for tearing.

- Support the filter fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the upslope side of the posts with the filter fabric upslope of the mesh.

- Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 pounds grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the filter fabric it supports.

- Bury the bottom of the filter fabric 4 inches minimum below the ground surface. Backfill and tamp soil in place over the buried portion of the filter fabric, so that no flow can pass beneath the fence and scouring cannot occur. The wire or polymeric mesh shall extend into the ground 3 inches minimum.

- Drive or place the fence posts into the ground 18 inches minimum. A 12-inch minimum depth is allowed if topsoil or other soft subgrade soil is not present and 18 inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.

- Use wood, steel, or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of either:

  - Wood with dimensions of 2-inch by 2-inch minimum width and a 3-foot minimum length. Wood posts shall be free of defects such as knots, splits, or gouges.

  - No. 6 steel reinforcement bar or larger.

  - ASTM A 120 steel pipe with a minimum diameter of 1 inch.

  - U, T, L, or C shape steel posts with a minimum weight of 1.35 pounds per foot.

  - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.

- Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

- If the fence must cross contours, with the exception of the ends of the fence, gravel check dams shall be placed perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

  - Gravel check dams shall be approximately 1 foot deep at the back of the fence. Gravel check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.

  - Gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Gravel check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Silt fence installation using the slicing method specification details follow. See also Figure 3.20.

  - The base of both end posts must be at least 2 to 4 inches above the top of the filter fabric on the middle posts for ditch check dams to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.

  - Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the filter fabric, enabling posts to support the filter fabric from upstream water pressure.

  - Install posts with the nipples facing away from the filter fabric.

  - Attach the filter fabric to each post with three ties, all spaced within the top 8 inches of the filter fabric. Attach each tie diagonally 45 degrees through the filter fabric, with each puncture at least 1 inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.

  - Wrap approximately 6 inches of fabric around the end posts and secure with three ties.

  - No more than 24 inches of a 36-inch filter fabric is allowed above ground level, 12 inches must be buried.

  - Compact the soil immediately next to the filter fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

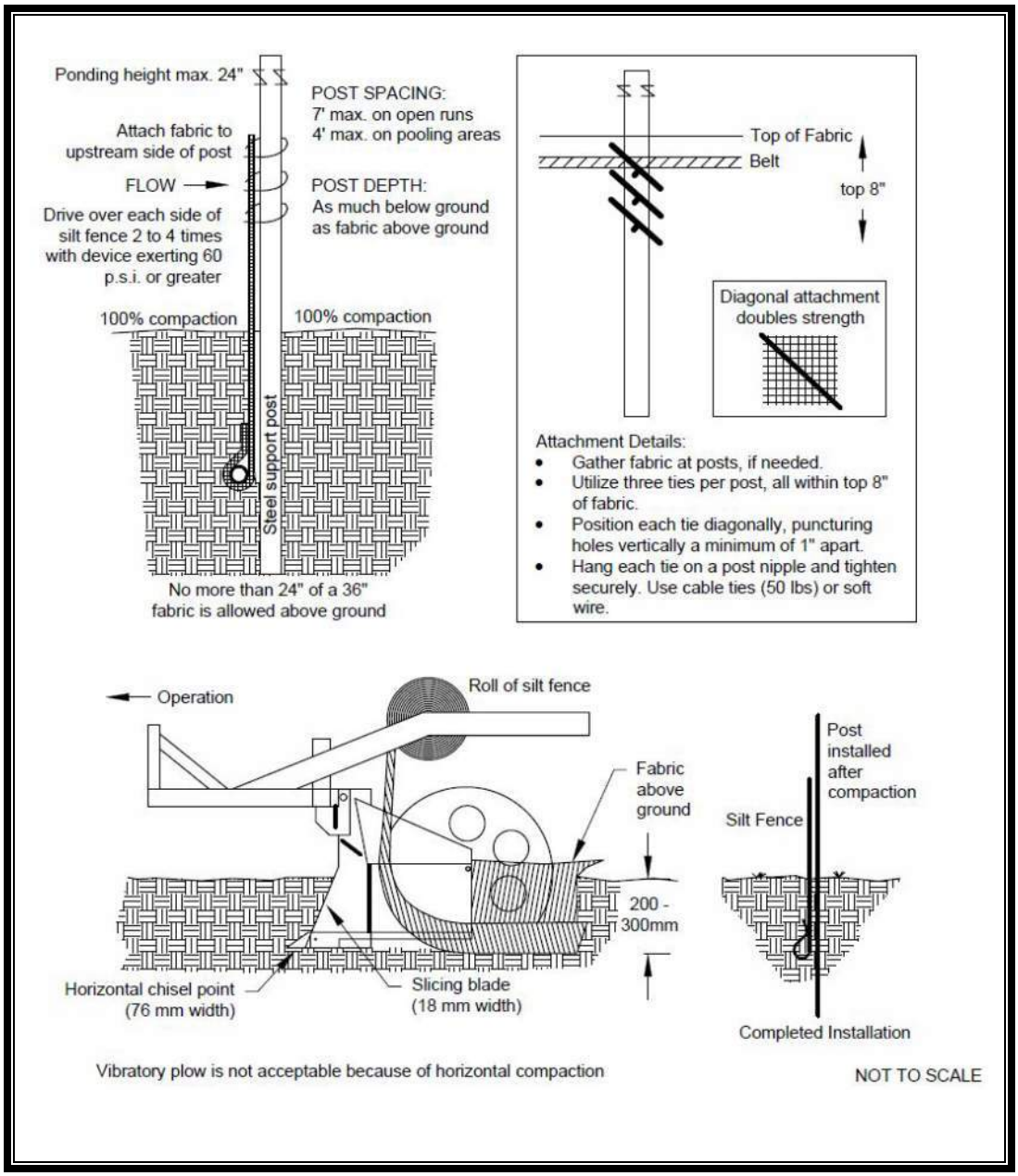

Figure 3.20. Silt Fence Installation by Slicing Method.

Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the fence to a sediment pond.
- Check the uphill side of the fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence or remove the trapped sediment.

- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.

- Replace filter fabric that has deteriorated due to ultraviolet breakdown.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. Wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 3.21 for typical construction details.

Conditions of Use

- Use wattles:
    - In disturbed areas that require immediate erosion protection.
    - On exposed soils during the period of short construction delays, or over winter months
    - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Typically, wattles are effective for one to two wet seasons.
- Prevent rilling beneath wattles by properly entrenching and abutting wattles together to prevent water from passing between them.

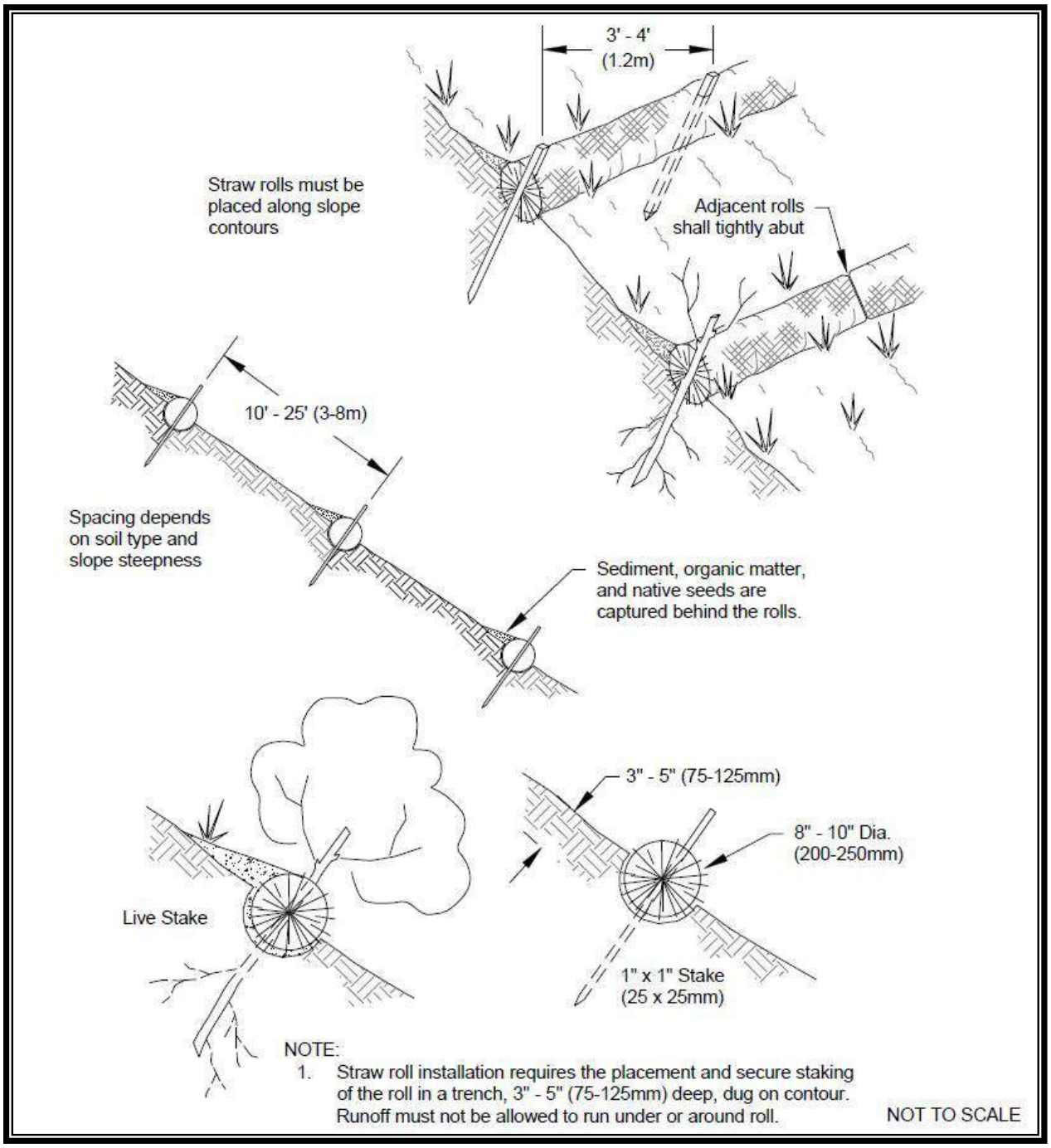

Figure 3.21. Straw Wattles.

Design Criteria

- Install wattles perpendicular to the flow direction and parallel to the slope contour.

- Narrow trenches shall be dug across the slope on contour to a depth of 3 to 5 inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches shall be dug to a depth of 5 to 7 inches, or one-half to two-thirds of the thickness of the wattle.

- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact using hand tamping or other methods.

- Construct trenches on contours at intervals of 10 to 25 feet apart depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.

- Install the wattles snugly into the trenches and abut tightly end to end. Do not overlap the ends.

- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.

- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.

- Wooden stakes should be approximately 0.75 by 0.75 by 24 inches minimum. Willow cuttings or 0.375-inch rebar can also be used for stakes. Note: rebar must be removed at end of project if used, while other fasteners maybe permitted to remain if all parts of the wattles are biodegradable and shown in plans for permanent erosion control.

- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.

- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Equivalent

Ecology has approved specific products as able to meet the requirements of BMP C235. However, the products did not pass through the TAPE process. The list of products is available on Ecology's web site at <www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>.

If a project wishes to use any of the "approved as equivalent" BMPs in the City of Tumwater, the project owner or representative must obtain approval for use of the BMP from the city on a case-by-case basis (i.e., for each project or site) before use.

APPENDIX C
SITE INSPECTION FORMS (AND SITE LOG)

Stormwater Maintenance Inspection Form

Neighborhood/HOA Name: _____

Closest Cross Street: _____

HOA Representative Name: _____

Email: _____

Inspection Date: _____

General Conditions	Not Present	Yes	No	Date maintenance complete
Is maintenance equipment able to access facility?	☐	☐	☐	
Do gates function properly and is the fence in good condition?	☐	☐	☐	
Is signage readable and in good condition?	☐	☐	☐	
Is sediment and vegetation maintained in ditches, swales and culverts?	☐	☐	☐	
Comments on work scheduled/completed:				

Catch Basins **number inspected**_____	Yes	No	Date maintenance complete
Are catch basin grates free of debris and accessible?	☐	☐	
Are catch basins free of structural damage?	☐	☐	
Is the sump < 1/3 full of sediment?	☐	☐	
Is the catch basin free of oil, paint, or garbage?	☐	☐	
Comments on work scheduled/completed:			

Wet Ponds **number inspected**_____	Yes	No	Date maintenance complete
Are rocks present at inlet to minimize erosion?	☐	☐	
Are inlets/outlets free of sediment and vegetation?	☐	☐	
Are banks stabilized and free from erosion?	☐	☐	
Do cattails cover less than 25% of the pond area?	☐	☐	
Is pond area clear of noxious or invasive vegetation? (see Thurston County Noxious Weed List)	☐	☐	
Are trees cleared from the bottom/slopes of the pond?	☐	☐	
Is all trash and yard waste removed from the pond area?	☐	☐	

Wet Ponds Continued	Not Present	Yes	No	Date maintenance complete
Is the level spreader free of sediment?	☐	☐	☐	
Comments on work scheduled/completed:				

Dry Ponds **number inspected_____**	Not Present	Yes	No	Date maintenance complete
Does pond completely drain within 72 hours after it rains?		☐	☐	
Are rocks present at inlet to minimize erosion?		☐	☐	
Are inlets/outlets free of sediment and vegetation?		☐	☐	
Are banks stabilized and free from erosion?		☐	☐	
Is pond area clear of noxious or invasive vegetation? (see Thurston County Noxious Weed List)		☐	☐	
Are trees cleared from the bottom/slopes of the pond?		☐	☐	
Is trash and yard waste removed from the pond area?		☐	☐	
Is the level spreader free of sediment?	☐	☐	☐	
Comments on work scheduled/completed:				

Infiltration Gallery, Filtered Vaults **number inspected _____**	Not Present	Yes	No	Date maintenance complete
Are manholes, observation ports and cleanout ports accessible?	☐	☐	☐	
Infiltration Gallery: Consult the City of Tumwater Water Resources Program or contractor for recommended maintenance.				
☐ City of Tumwater Consulted	☐ Contractor Consulted			
Filtered Vault: Consult the City of Tumwater Water Resources Program or contractor for recommended maintenance.				
☐ City of Tumwater Consulted	☐ Contractor Consulted			
Comments on work scheduled/completed:				

Low Impact Development Features	Not Present	Yes	No	Date maintenance complete
Permeable pavement	☐	☐	☐	
Rain gardens (healthy plants, no noxious/invasive/overgrown vegetation)?	☐	☐	☐	
Other:	☐	☐	☐	
Comments on work scheduled/completed:				

DRAINAGE CONTROL PLAN
ATTACHMENT 3
SOILS REPORT

December 19, 2022

Tumwater School District No. 33
621 Linwood Ave. SW
Tumwater, WA 98512-6847

Attn: Ms. Tanya Baker, Project Manager

Transmitted via email to: *tanya.baker@tumwater.k12.wa.us*

Re: Summary of Geotechnical Engineering Services
District Office Portable
Tumwater, Washington
Project No. 1467012.010.011

Dear Ms. Baker:

This letter summarizes the results of geotechnical engineering services provided by Landau Associates, Inc. (Landau) in support of the District Office Portable project, located at 621 Linwood Avenue Southwest in Tumwater, Washington (site; Figure 1). Geotechnical services were provided in accordance with the scope outlined in Landau's October 14, 2022 proposal.

Project Understanding

Tumwater School District No. 33 (District, project owner) plans to install a portable building east of the existing district office. The portable building will be supported on footings and stem walls. Landau provided geotechnical engineering services to support installation of the portable building.

Subsurface Conditions

On November 14, 2022, Landau's excavating subcontractor advanced three test pits (TP-1 through TP-3) 8.2 to 9.0 feet (ft) below ground surface (bgs). The approximate locations of the test pit excavations are shown on Figure 2.

Subsurface conditions were described using the soil classification system shown on Figure 3, in general accordance with ASTM International (ASTM) standard D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. Summary logs of the subsurface soil and groundwater conditions observed in the test pits are presented on Figures 4 through 6.

Soil samples were transported to Landau's geotechnical laboratory for further examination and testing. Natural moisture content determinations were performed on select soil samples in accordance with ASTM standard test method D2216-19, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. The natural moisture content is shown as "W = xx" (i.e., percentage of dry weight) in the "Test Data" column on Figures 4 through 6.

Grain size, or sieve, analyses were performed on select soil samples in accordance with ASTM standard test method D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis*. Samples selected for grain size analysis are designated with a "GS" on Figures 4 through 6. The results of the grain size analyses are presented on Figure 7.

Soil Conditions

Approximately 5 to 6 inches of topsoil was encountered at each exploration location. Fill was observed beneath the topsoil and extended 0.8 to 3 ft bgs. The fill was in a medium dense, moist condition and typically consisted of crushed concrete debris composed of sand and gravel with silt. The concrete debris ranged from 6 to 14 inches in diameter, with smaller pieces measuring less than 1 inch in diameter.

Recessional outwash was observed beneath the fill and extended approximately 9.0 ft bgs. The outwash was in a loose, moist condition and typically consisted of brown to gray sand with silt and sporadic gravel.

Groundwater Conditions

Groundwater was not observed in Landau's November 2022 explorations. The groundwater conditions reported herein are for the specific date and locations indicated and may not be representative of other locations and/or times. Site groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors.

Conclusions

Based on the results of Landau's geotechnical field investigation and laboratory testing, the medium dense crushed concrete debris will provide suitable support for the portable building, provided the following recommendations are incorporated into the project design.

Topsoil should be stripped to expose medium dense subgrade soil. Concrete debris larger than 4 inches in diameter should be removed and replaced with compacted structural fill. The exposed subgrade should be compacted to a firm, unyielding condition.

The lightly loaded portable building is anticipated to experience less than 1 inch of settlement if constructed as recommended herein. Similarly loaded foundation elements may experience ½ inch or less of differential settlement over 50-ft spans. Settlement is expected to occur as loads are applied during construction.

Pavement Design

Pavement sections should be constructed on a firm, unyielding subgrade that consists of medium dense crushed concrete debris or recessional outwash. Alternatively, pavement sections may be constructed on properly compacted structural fill that extends to such soils.

Landau used a 20-year design life, a reliability of 85 percent, an initial serviceability index of 4.5, and a terminal serviceability index of 2.5 to calculate pavement thickness. Design recommendations for flexible pavement sections are provided in Table 1.

Table 1. Recommended Asphalt Pavement Design Sections

Pavement Section Type[(a)]	ESALs	Asphalt Pavement Thickness (inches)	Crushed Surfacing Thickness (inches)
Parking lot	50,000	2.5	6

(a) Based on the assumption that pavement sections will be founded on a subbase consisting of medium dense crushed concrete debris or recessional outwash. Pavement sections also may be constructed on properly compacted structural fill that extends to such soils.
ESALs = equivalent single-axle loads

Base course material should be compacted to at least 95 percent of the maximum dry density, determined in accordance with ASTM standard test method D1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).* Compacted base course should meet the requirements for Crushed Surfacing Base Course in Section 9-03.9(3) of the Washington State Department of Transportation's 2023 *Standard Specifications for Road, Bridge, and Municipal Construction* (hereafter, *2023 WSDOT Standard Specifications*). To facilitate fine grading of the surface, the upper 2 inches of crushed surfacing could consist of crushed surfacing top course. Prevention of road-base saturation is essential for pavement durability; efforts should be made to limit the amount of water entering the base course.

Asphalt concrete should consist of Class B aggregate material or hot-mix asphalt, class ½-inch and PG58S-22 binder that conforms to the requirements in Section 5-04 of the *2023 WSDOT Standard Specifications.* The asphalt should be compacted to at least 91 percent of the Rice density.

Infiltration

Design infiltration rates were calculated using the results of Landau's geotechnical laboratory tests (Figure 7) and the soil grain size method in the City of Tumwater's 2022 *Drainage Design and Erosion Control Manual*. Correction factors were applied to account for plugging of soils (Fplugging = 0.7), the test method (Ftesting = 0.4), and the influence of facility geometry (Fgeometry= 0.9). Because hydrologic group A soils are mapped at the site (University of California Davis, accessed December 6, 2022), Landau used the simplified approach to calculate the design infiltration rates in Table 2. These rates are appropriate for design of small-scale or low-impact development facilities (e.g., trenches and bioswales); they are not suitable for larger stormwater systems (e.g., vaults and ponds).

Table 2. Design Factored Infiltration Rates

Material/Soil	Design Infiltration Rate (in/hr)
Crushed concrete fill	3.3
Native sand with silt	6.2

in/hr = inches per hour

Use of This Letter

Landau Associates has prepared this letter for the exclusive use of Tumwater School District No. 33 for specific application to the District Office Portable project in Tumwater, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that, within the limitations of scope, schedule, and budget, its services have been provided in a manner consistent with that level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality, under similar conditions as this project. Landau Associates makes no other warranty, either express or implied.

Closing

We trust that this letter provides you with the information needed to proceed with the project. If you have questions or comments, or if we can be of further service, please contact Lance Levine at 360.791.3178 or at llevine@landauinc.com.

LANDAU ASSOCIATES, INC.

Lance Levine, PE
Senior Engineer

12-19-2022

Steven R. Wright, PE
Principal

LGL/SRW/mcs
[\\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\R\DISTRICT OFFICE PORTABLE GEOTECHNICAL LETTER 12.19.2022.DOCX]

Attachments: Figure 1. Vicinity Map
Figure 2. Site and Exploration Location Plan
Figure 3. Soil Classification System and Key
Figures 4–6. Logs of Test Pits TP-1 through TP-3
Figure 7. Grain Size Distribution

References

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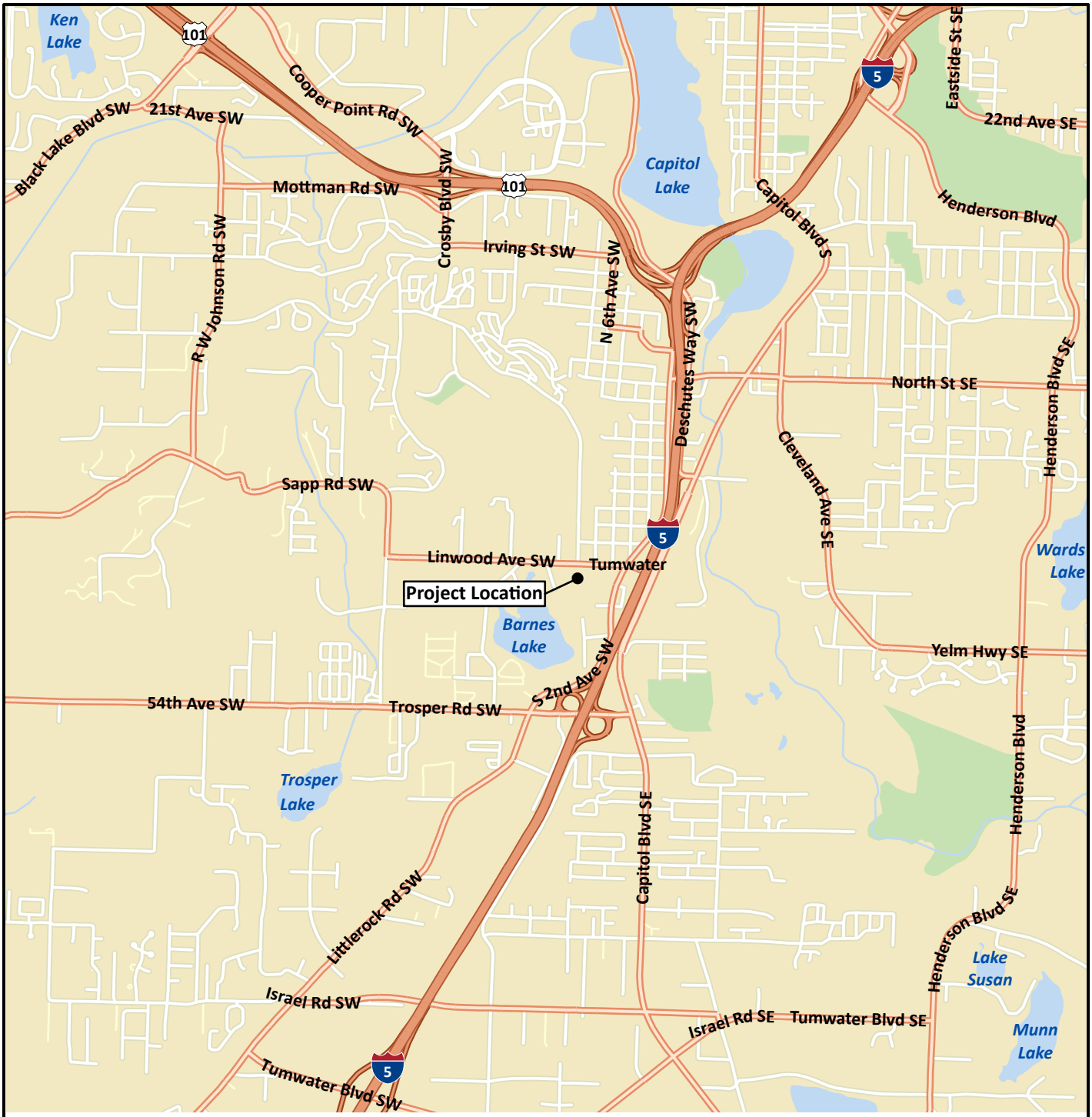

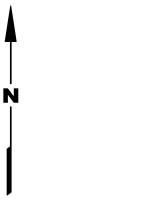

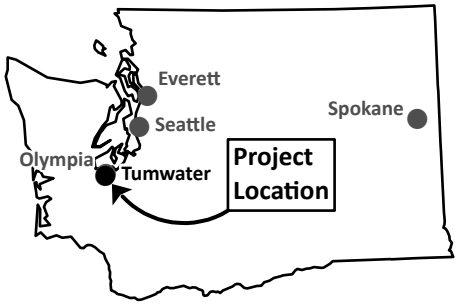

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District Office Portable Tumwater, Washington	**Vicinity Map**	Figure 1

Landau Associates | Y:\CAD\1467\012\1467012.010 Site Plan.dwg | 11/28/2022 10:13 AM | caduser

Legend

TP-1 Approximate Test Pit Location and Designation

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Google Maps 2022

0 75 150

Scale in Feet

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District Office Portable
Tumwater, Washington

Site and Exploration Location Plan

Figure
2

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

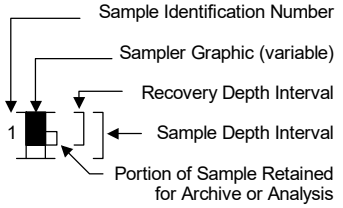
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE & METHOD

Graphic	Code	Description
☒	a	3.25-in OD, 2.42-in ID Split Spoon
⧓	b	2.00-in OD, 1.50-in ID Split Spoon
◧	c	Shelby Tube
◪	d	Grab Sample
◧	e	Single-Tube Core Barrel
◧	f	Double-Tube Core Barrel
☒	g	2.50-in OD, 2.00-in ID WSDOT
☒	h	3.00-in OD, 2.37-in ID Mod. Calif.
☒	i	Other - See text if applicable
	1	300-lb Hammer, 30-inch Drop
	2	140-lb Hammer, 30-inch Drop
	3	Pushed Sample
	4	Vibrocore (Rotosonic/Geoprobe)
	5	Other - See text if applicable
	6	Piston Extraction

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time after drilling/excavation/well

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Tumwater, Washington

Soil Classification System and Key

Figure 3

TP-1

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							5 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
		S-1	d	W = 11 GS		SP-SM	Brown and gray, very gravelly, fine to coarse SAND with silt and concrete debris up to 12 inches in diameter (medium dense, moist) **(FILL)**	
2		S-2	d			SP-SM	Brown, fine to medium SAND with silt (medium dense, moist) **(RECESSIONAL OUTWASH)**	
4							Grades to gray	
6		S-3	d					
8								
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 8.2 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1467012.01 12/5/22 \\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\T\1467012.010.GPJ SINGLE TEST PIT LOG

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Tumwater, Washington

Log of Test Pit TP-1

Figure 4

TP-2

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							5 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
						GP-GM	Brown and gray, very sandy, fine to coarse GRAVEL with silt, cobbles, and concrete debris up to 14 inches in diameter (medium dense, moist) **(FILL)**	
2		S-1	d	W = 10 GS				
						SP-SM	Brown, fine to medium SAND with silt (loose to medium dense, moist) **(RECESSIONAL OUTWASH)**	
4		S-2	d				Grades to gray and medium dense	
6								
		S-3	d					
8								
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 8.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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District Office Portable
Tumwater, Washington

Log of Test Pit TP-2

Figure 5

TP-3

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							6 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
		S-1	d			SP-SM	Brown and gray, gravelly, fine to coarse SAND with silt and concrete debris up to 6 inches in diameter (medium dense, moist) **(FILL)**	
						SP-SM	Brown, fine to medium SAND with silt (medium dense, moist) **(RECESSIONAL OUTWASH)**	
2		S-2	d	W = 12 GS				
4							Grades to gray	
6								
8		S-3	d				Grades to fine to coarse and with gravel	
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 9.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1467012.01 12/5/22 \\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\T\1467012.010.GPJ SINGLE TEST PIT LOG

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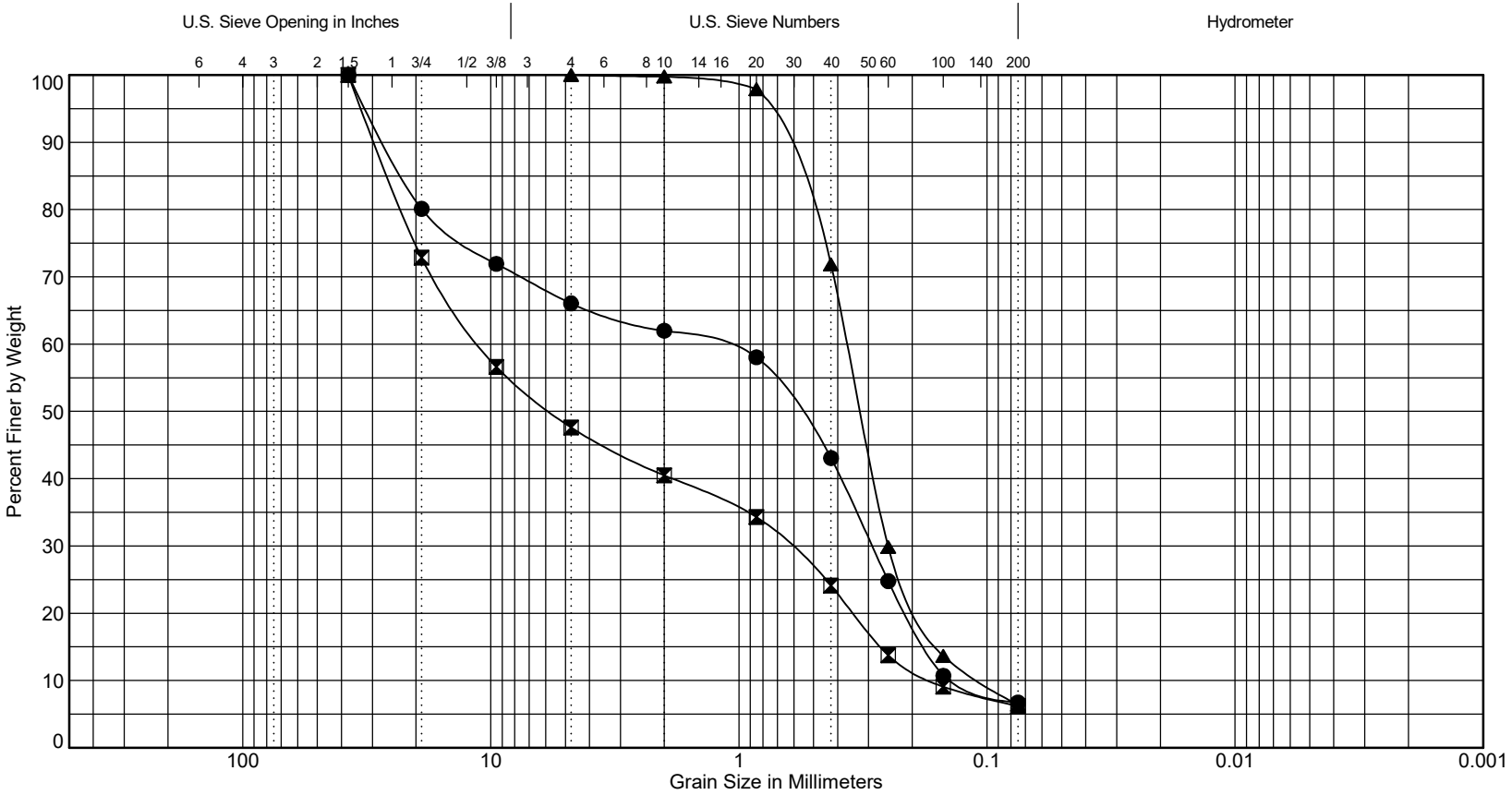
District Office Portable
Tumwater, Washington

Log of Test Pit TP-3

Figure 6



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP-1	S-1	1.3	11	Very gravelly, fine to coarse SAND with silt	SP-SM
⊠	TP-2	S-1	1.8	10	Very sandy, fine to coarse GRAVEL with silt	GP-GM
▲	TP-3	S-2	2.5	12	Fine to medium SAND with silt	SP-SM

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District Office Portable
Tumwater, Washington

Grain Size Distribution

Figure
7

DRAINAGE CONTROL PLAN
ATTACHMENT 4
MAINTENANCE AND SOURCE CONTROL MANUAL

Maintenance and Source Control Manual

LINCS Modular Building
Tumwater, WA

Parcel:
09080004000

Prepared By:
LDC, Inc.
1411 State Ave. NE Suite 200
Olympia, WA 98506
425.806.1869

LDC | Surveying Engineering Planning

February 2023

MAINTENANCE AND SOURCE CONTROL MANUAL
LINCS MODULAR BUILDING
621 LINWOOD AVENUE SW, TUMWATER, WA 98512
PARCEL NUMBER: 09080004000

SECTION 1: PROJECT DESCRIPTION

Description of Drainage System and Facilities serving the site:
The proposed improvements are included across 0.22 acres in one (1) stormwater basin. After construction, the stormwater runoff from the portion of the sports field that is converted to roof area will be tightlined to a downspout dispersion system sized to meet minimum requirement #5. Three splashblocks will convey the stormwater runoff from the roof and will disperse the runoff across three 50 ft long x 10 ft wide vegetated flow paths. The replaced sidewalk and parking areas will continue to utilize the existing facilities and therefore no adverse effects are anticipated at this time. In the event that the downspout dispersion system fails, the stormwater runoff will overtop the facility and flow into the adjacent biofiltration swale. The stormwater runoff that does not infiltrate within the biofiltration swale will be collected by a catch basin that conveys the stormwater runoff to an underground infiltration facility where the stormwater runoff will infiltrate as it does today. Typical maintenance of the stormwater system includes removing debris from catch basin grates and removing sediment from pipes and catch basins, and infiltration trench maintenance. The drawings of the stormwater facilities are found in **Attachment No. 1** of the Drainage Report. See **Appendix 3** of the Drainage Report for the Basin Map Exhibit.

SECTION 2: MAINTENANCE IMPORTANCE AND INTENT

Intent:
The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include:

- Maintain designed stormwater infiltration capacity
- Maintain ability to safely convey design stormwater flows
- Maintain ability to treat stormwater runoff quality
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems
- Clearly identify systems so they can be protected
- Keep maintenance costs low
- Prevent large-scale or expensive stormwater system failures
- Prevent water quality violations or damage to downstream properties

The intent of this section and manual is to pass on to the responsible party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

SECTION 3: RESPONSIBLE PARTIES

Owner Information:

The Tumwater School District will be responsible for maintaining the grounds and stormwater facilities on each respective lot. The stormwater facilities maintenance plan will be kept in a safe and well-known place and will be made available for inspection to the City upon request. See the general requirements below regarding frequency of inspections.

SECTION 4: FACILITIES REQUIRING MAINTENANCE

General Requirements:

1. Maintenance Required – all stormwater facilities shall be maintained in accordance with this maintenance program, the drainage report for the LINCS Modular Building project, and the most current version of the Thurston County Drainage Design and Erosion Control Manual and the City of Tumwater Drainage Manual.

2. Minimum Standards – the following are the minimum standards for the maintenance of this project's stormwater facilities.

a. Facilities shall be inspected annually and cleared of debris, sediment, and vegetation when they affect the functionality and/or design capacity of the facility.
b. Landscape and lawn/turf areas shall be inspected quarterly and mowed and replanted as necessary. Clippings are to be removed and properly disposed of.
c. Where lack of maintenance is causing or contributing to a water quality problem, immediate action shall be taken to correct the problem. Within one month, after initial recognition of the problem, a City of Tumwater inspector may revisit the facility to assure that the problem has been rectified at his or her convenience.

3. Disposal of Waste from Maintenance Activities – disposal of waste from maintenance activities shall be conducted in accordance with City of Tumwater's waste disposal standards.

4. Compliance – property owners are responsible for the maintenance, operation or repair of stormwater drainage systems, and project installed BMPs. Property owners shall maintain, operate, and repair these facilities in accordance with the requirements of this maintenance program, the drainage report, and the most current edition of the Thurston County Drainage Design and Erosion Control Manual and the City of Tumwater Drainage Manual.

Binding Site Plan Stormwater Structure Inventory:

- Splashblocks (3)

The Tumwater School District is responsible for the stormwater facilities and a pro-rated maintenance fee for the facilities constructed in the Binding Site Plan, listed above.

SECTION 5: MAINTENANCE INSTRUCTIONS

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the city, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the city.

Inspection Program:

1. Inspection – it will be the responsibility of the Owner to complete the necessary stormwater inspection tasks stated herein and prepare the inspection reports that will be submitted to the city of Tumwater. Inspection reports shall be submitted annually or at the City of Tumwater's request.

2. Records – the Owner shall keep records of the following;

a. As-built plans and locations of installed stormwater facilities.
b. Findings of fact from any exemption granted by the City of Tumwater.
c. Operation and maintenance requirements and records of inspection maintenance actions and frequencies
d. Declaration of Covenant associated with the maintenance and operation of stormwater facilities.
e. Any pertinent engineering reports.

It is important to keep the catch basins, Brentwood infiltration systems, and downspout dispersion systems free of debris and sediment, because if they get clogged the stormwater system will fail and will not meet water quality standards. Maintenance activities for the catch basins, Brentwood infiltration systems, downspout dispersion systems, and conveyance storm pipes include but are not limited to the actions listed below and the referenced checklists from the *2022 City of Tumwater Drainage Design and Erosion Control Manual.*

Log Sheet

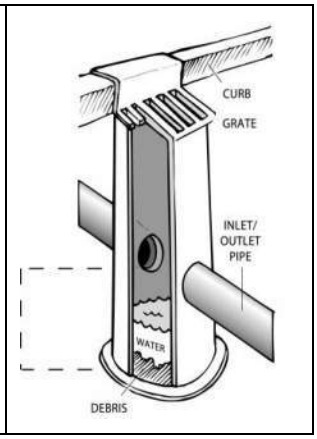
Use copies of this log sheet to keep track of when maintenance inspections occur and what items, if any, are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so others can easily access them.

Location: _____	**Date Checked:**
Checked By: _____	_____
Name: _____	
Address: _____	**Phone:**
City: _____ **Zip:** _____	_____

Facility	Component Checked	Observations

Catch Basin:

An underground concrete box structure with a slotted metal grate on top that collects runoff water from the ground surface. Typically located within pavement in parking lots and in the street gutter, usually next to a curb. Grate on top lets water in and keeps larger debris out. Sediment settles in the sump in the bottom (below the pipe openings) and must be removed periodically. Catch basins have an outlet pipe between the grate and the sump, to let the cleaner water flow out to a storm pond or other location. Some catch basins have both inflow and outflow pipes, to convey collected runoff water through.



Actions to keep catch basins functioning:

- Remove litter, leaves, debris, and obstructions from catch basin grates.
- Hire a professional to remove sediment buildup from sump (if road is privately owned; catch basins in the public right-of-way are maintained by the city).

1r. Downspout, Sheet Flow, Concentrated Flow Dispersion

Dispersion BMP components vary depending on the type of BMP used, but can consistent of a gravel filled trench, splashblock, transition zone, vegetated flow path, berms, and/or slotted drains. Dispersion BMPs reduce peak flows by slowing stormwater runoff entering into the conveyance system, allowing for some infiltration, and providing some water quality benefits.

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Splashblock	Water Directed Toward Building	Water is being directed towards building structure.		Direct water away from building structure.	
	Water Causing Erosion	Water disrupts soil media.		Reconfigure/repair blocks and restore media.	
Transition Zone	Erosion	Adjacent soil erosion; uneven surface creating concentrated flow discharge; or less than 2 feet of width.		Address cause of erosion or scour.	
Dispersion Trench	Concentrated Flow	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” from edge of trench; intent is to prevent erosion damage).		Notch grade board or other distributor type and align to prevent erosion. Rebuild trench to standards, if necessary.	
Surface of Trench	Accumulated Debris	Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow from facility.		Remove and properly dispose of all trash and debris.	
	Vegetation Impeding Flow	Vegetation/moss present on drain rock surface impedes sheet flow from facility.		Maintain vegetation and treat moss with an all-natural, eco-friendly moss treatment.	
Pipe(s) to Trench	Accumulated Debris in Drains	Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc.		Remove trash or debris in roof drains, gutters, driveway drains, or area drains.	

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pipe(s) to Trench	Accumulated Debris in Inlet Pipe	Pipe from sump to trench or drywell has accumulated sediment or is plugged.		Remove trash or debris in inlet/outlet pipe screen or inlet/outlet pipe.	
	Damaged Pipes	Cracked, collapsed, broken, or misaligned drain pipes.		Repair cracks more than 0.25-inch wide at the joint of the inlet/outlet pipe.	
Sump	Accumulated Sediment	Sediment in the sump.		Remove sediment and dispose of properly. A contractor with vactor capabilities maybe needed.	
Access Lid	Hard to Open	Cannot be easily opened.		Clear lid of soil and debris. Use a blunt force object, such as a hammer, to loosen lid. Repair or replace access lid as needed.	
	Buried	Access lid is buried or unable to locate.		Use a metal detector in necessary to locate lid. Clear lid of soil and debris and ensure lid functions as designed (refer to record drawings for design intent).	
	Missing Cover	Cover missing.		Replace cover.	
Rock Pad	Inadequate Rock Cover	Only one layer of rock exists above native soil in area 6 square feet or larger, or any exposure of native soil.		Repair/replace rock pad to meet design standards.	
	Erosion	Soil erosion in or adjacent to rock pad.		Repair/replace rock pad to meet design standards.	
Dispersal Area	Erosion	Erosion (gullies/rills) greater than 2 inches deep in dispersal area.		Address cause of erosion or scour. Replace eroded media.	
	Accumulated Sediment	Accumulated sediment or debris to extent that blocks or channelizes flow path.		Remove and dispose of sediment or debris in dispersal area. Address sediment source (if feasible).	
Ponded Water	Ponded Water	Standing surface water in dispersion area remains for more than 3 days after the end of a storm event.		Address the cause of the standing water (e.g., grade depressions, compacted soil).	

Downspout, Sheet Flow, Concentrated Flow Dispersion					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Vegetation	Plant Survival	Dispersal area vegetation in establishment period (1 to 2 years, or additional 3rd year) during extreme dry weather).		Ensure vegetation is healthy and watered weekly during periods of no rain to ensure plant establishment.	
	Lack of Vegetation Allowing Erosion	Poor vegetation cover such that erosion is occurring.		Ensure vegetation is healthy and watered. Address cause of erosion or scour. Ensure plant species are appropriate for the soil and moisture conditions.	
	Vegetation Blocking Flow	Vegetation inhibits dispersed flow along flow path.		Ensure vegetation is trimmed, weeded, or replanted to restore dispersed flow path.	
	Presence of Poisonous and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to county personnel or the public (such as Scotch broom or blackberry vines, poison oak, tansy ragwort, stinging nettles, or devil's club). Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. *Complete eradication of noxious weeds may not be possible.*	
Pest Control	Mosquito Infestation	Standing water remains for more than three days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	
Rodents	Presence of Rodents	Rodent holes or mounds disturb dispersion flow paths.		Remove pests and return facility to original functionality. *Manage pests in compliance with adopted integrated pest management policies.* Repair dispersion flow path.	

1m. Bioretention Cells, Swales, and Planter Boxes

Bioretention areas are shallow stormwater systems with a designed soil mix and plants adapted to the local climate and soil moisture conditions. They are designed to mimic a forested condition by controlling stormwater through detention, infiltration, and evapotranspiration. Most routine maintenance procedures are typical landscape care activities.

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash	Trash and debris present.		Remove and properly dispose of all trash and debris.	
Concrete Sidewalls	Cracks or Failure in Concrete Planter Reservoir	Cracks wider than 0.5 inch or maintenance/inspection personnel determine that the planter is not structurally sound.		Repair or replace concrete.	
Rockery Sidewalls	Unstable Rockery	Rock walls are insecure.		Stabilize rockery sidewalls (may require consultation with professional engineer, particularly for walls 4 feet or greater in height).	
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (embankments, dikes, berms, and side slopes)	Erosion (gullies/rills) greater than 2 inches around inlets, outlet, and alongside slopes.		Eliminate the source of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control blanket). For deep channels or cuts (over 3 inches in ponding depth), deploy temporary erosion control measures until permanent repairs can be made.	
		Erosion of sides causes slope to become a hazard.		Eliminate the hazard and stabilize the slopes.	
		Settlement greater than 3 inches (relative to undisturbed sections of berm).		Restore the design height with additional mulch.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Earthen Side Slopes and Berms	Failure in Earthen Reservoir (embankments, dikes, berms, and side slopes) (continued)	Downstream face of berm or embankment wet, seeps or leaks evident.		Plug holes are compact berm. May require consultation with professional engineer, particularly for larger berms.	
		Any evidence of rodent holes or water piping around holes if facility acts as dam or berm.		Remove rodents (see "Pests: Insects/Rodents") and repair/compact berm.	
Ponding Area	Sediment or Debris Accumulation	Accumulation of sediment or debris to extent that infiltration rate is reduced (see "Ponded water") or surface storage capacity significantly impacted.		Clean sediment out to restore facility shape and depth. Replace damaged vegetation and mulched. Identify and control the source of sediment (if feasible).	
	Leaf Accumulation	Accumulated leaves in facility.		Remove leaves clogging outlet structure that impede water flow.	
	Basin Inlet via Surface Flow	Soil is exposed or signs of erosion are visible.		Control and repair sources of erosion.	
Curb Cut Inlet	Sediment or Debris Accumulation	Sediment, vegetation, or debris partially or fully blocking inlet structure.		Clear curb cut of debris. Identify source of the blockage and take action to prevent future blockages.	
Splashblock Inlet	Water Not Properly Directed to Facility	Water is not being directed properly to the facility and away from the inlet structure.		Reconfigure blocks to direct water to facility and away from structure.	
	Erosion	Water disrupts soil media.		Reconfigure/repair splashblock.	
Inlet/ Outlet Pipe	Damaged Pipe	Pipe is damaged.		Repair/replace pipe. Ensure no cracks more than 0.25 inch wide at the joint of inlet/outlet pipes exist.	
	Clogged Pipe	Pipe is clogged.		Clear pipe of roots or debris. Identify source of the blockage and take action to prevent future blockages.	
Inlets/ Outlet and Access Pathways	Blocked Access	Maintain access for inspections.		Clear vegetation within 1 foot of inlets and outlets. Maintain access pathways.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Ponding Area	Erosion	Water disrupts soil media.		Address cause of erosion or scour. Maintain a cover of rock or cobbles or other erosion protection measure (e.g., matting) to protect the ground where concentrated water enters or exits the facility (e.g., a pipe, curb cut, or swale).	
Trash Rack	Trash or Debris Accumulation	Trash or debris present on trash rack.		Clean and dispose trash.	
	Damaged Trash Rack	Bar screen damaged or missing.		Repair or replace barrier to design standards.	
Check Dams and Weirs	Sediment or Debris Accumulation	Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, weir, or orifice.		Clear blockage. Identify the source of the blockage and take actions to prevent future blockages.	
	Erosion	Erosion and/or undercutting is present.		Address the cause of erosion or undercutting. Repair check dam or weir.	
	Unlevel Top of Weir	Grade board or top of weir damaged or not level.		Restore weir to level position.	
Flow Spreader	Sediment Accumulation	Sediment blocks 35 percent or more of ports/notches or, sediment fills 35 percent or more of sediment trap.		Remove and dispose of sediment.	
	Damaged or Unlevel Grade Board/Baffle	Grade board/baffle damaged or not level.		Remove and reinstall board/baffle to level position.	
Overflow/ Emergency Spillway	Sediment or Debris Accumulation	Overflow spillway is partially or fully plugged with sediment or debris.		Remove sediment or debris in overflow.	
	Erosion	Native soil is exposed or other signs of erosion damage are present.		Repair erosion and stabilize surface of spillway.	
	Missing Spillway Armament	Spillway armament is missing.		Replace armament.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Underdrain	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain. Prolonged surface ponding (see "Bioretention Soil").		Remove sediment and debris from underdrains and orifices.	
Bioretention Soil	Ponded Water	Excessive ponding water: Water overflows during storms smaller than the design event or ponded water remains in the basin 48 hours or longer after the end of a storm.		Identify and address the cause of ponded water: 1. Remove leaf or debris buildup 2. Clear underdrain 3. Investigate other water inputs (e.g., groundwater, illicit connections) 4. Verify contributing area If steps #1–4 do not solve the problem, repair and replant imported bioretention soil.	
	Protection of Soil	Maintenance requiring entrance into the facility footprint.		Perform maintenance without compacting bioretention soil media.	
Vegetation	Bottom Swale and Upland Slope Vegetation	Less than 75 percent of swale bottom is covered with healthy/surviving vegetation.		Address cause of poor vegetation growth. Replant bioretention area as necessary to obtain 75 percent survival rate or greater. Ensure plant selection is appropriate for site growing conditions.	
Trees and Shrubs	Causing Problems for Operation of Facility	Large trees and shrubs interfere with operation of the basin or access for maintenance.		Trees and shrubs Prune or remove large trees and shrubs so they do not hinder facility performance or maintenance activities.	
	Dead Trees and Shrubs	Standing dead vegetation is present.		Ensure trees and shrubs do not hinder facility performance or maintenance activities. Remove dead vegetation and address cause of dead vegetation. Ensure specific plants with high mortality rate are replaced with more appropriate species.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Trees and Shrubs Adjacent to Vehicle Travel Areas (or areas where visibility needs to be maintained)	Safety Issues	Vegetation causes some visibility (line of sight) or driver safety issues.		Maintain appropriate height for sight clearance. Ensure regular pruning maintains visual sight lines for safety or clearance along a walk or drive. Remove or transplant tree or shrub if presenting a continual safety hazard.	
Emergent Vegetation	Conveyance Blocked	Vegetation compromises conveyance. Cattails cover more than 25% of the facility surface.		Clear conveyance of emergent plants. Consider replanting with plants that allow conveyance.	
Mulch	Lack of Mulch	Bare spots (without much cover) are present or mulch covers less than 2 inches.		Ensure facility has a maximum 3-inch layer of an appropriate type of mulch and mulch is kept away from woody stems.	
Vegetation	Accumulation of Clippings	Any grass or other vegetation clippings left in the facility.		Remove and properly dispose of clippings.	
	Weeds	Weeds are present (unless on edge and providing erosion control).		Ensure weed material is removed and disposed of. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Noxious Weeds	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to the public. Any evidence of noxious weeds as defined in the Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Eliminate danger of poisonous vegetation where maintenance personnel or the public might normally be. Completely remove invasive, noxious, or nonnative vegetation in accordance with applicable regulations. *(Coordinate with Thurston County Health Department.)* Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality. (Apply requirements of adopted integrated pest management policies for the use of herbicides.) *Complete eradication of noxious weeds may not be possible.*	
Excessive Vegetation	Adjacent Facilities Compromised	Low-lying vegetation growing beyond facility edge onto sidewalks, paths, or street edge poses pedestrian safety hazard or may clog adjacent permeable pavement surfaces due to associated leaf litter, mulch, and soil.		Trim groundcovers and shrubs at facility edge. Ensure excessive leaf litter is removed.	
	Causes Facility to Not Function Properly	Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety.		Ensure pruning and/or thinning vegetation maintains proper plant density and aesthetics. Remove or replace plants that are weak, broken, or not true to form in-kind. Ensure appropriate plants are present.	
Irrigation (if any)	Routine maintenance	Irrigation system present.		Refer to manufacturer's instructions for O&M.	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Plant Watering	Plant Establishment	Plant establishment period (1–3 years).		Water plants as necessary during periods of no rain to ensure plant establishment.	
Summer Watering (after establishment)	Drought Period	Longer term period (3+ years).		Water plants as necessary during drought conditions and water trees up to 5 years after planting.	
Spill Prevention and Response	Spill Prevention	Storage or use of potential contaminants in the vicinity of facility.		Implement spill prevention measures whenever handling or storing potential contaminants.	
	Spill Response	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.		Clean spills up as soon as possible to prevent contamination of stormwater. *(Coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.)*	
Safety	Safety (slopes)	Erosion of sides causes slope to exceed 1:3 or otherwise becomes a hazard.		Take actions to eliminate the hazard such as regrade the slope or vegetate to reduce erosion.	
	Safety (hydraulic structures)	Hydraulic structures (pipes, culverts, vaults, etc.) become a hazard to children playing in and around the facility.		Take actions to eliminate the hazard (such as cover and secure any openings).	
Aesthetics	Aesthetics	Damage/vandalism/debris accumulation.		Restore facility to original aesthetic conditions.	
	Edging	Grass is starting to encroach on swale.		Repair edging.	
Pest Control	Pests: Insects/ Rodents	Pest of concern is present and impacting facility function.		Remove pests and return facility to original functionality. *Manage pests in compliance with adopted integrated pest management policies.*	

Bioretention Cells, Swales, and Planter Boxes					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pest Control	Mosquitoes	Standing water remains in the basin for more than three days following storms.		Remove standing water if possible. For mosquito control, eliminate stagnant water or apply larvicide that contains Bti. *Apply insecticides in compliance with adopted integrated pest management policies.*	

1u. Fencing/Shrubbery Screen/Other Landscaping

Fencing, shrubbery screening, and landscaping provide flow control via interception, transpiration, and increased infiltration as well as slope protection. Most routine maintenance procedures are typical landscape care activities.

Fencing/Shrubbery Screen/Other Landscaping					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Missing or Broken Parts/Dead Shrubbery	Any defect in the fence or screen that permits easy entry to a facility.		Mend fence or replace shrubs to form a solid barrier to entry.	
	Erosion	Erosion has resulted in an opening under a fence that allows entry by people or pets.		Replace soil under the fence so that no opening exceeds 4 inches in height.	
	Unruly Vegetation	Shrubbery is growing out of control or is infested with weeds. See also Thurston County Noxious Weed List: https://www.co.thurston.wa.us/tcweeds/weed-list.htm		Maintain shrubbery and remove weeds with manual methods. Do not spray chemicals on vegetation without guidance or city approval. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.	
Fences	Damaged Parts	Posts out of plumb more than 6 inches.		Repair/replace posts so they are plumb to within 1.5 inches of plumb.	
		Top rails bent more than 6 inches.		Repair top rail so it is free of bends greater than 1 inch.	
		Missing or loose tension wire.		Ensure tension wire in place and holding fabric.	
		Missing or loose barbed wire that is sagging more than 2.5 inches between posts.		Stretch barbed wire in place with less than 0.75-inch sag between posts.	
		Extension arm missing, broken, or bent out of shape more than 1.5 inches.		Repair extension arm in place with no bends larger than 0.75 inch.	
		Part or parts that have a rusting or scaling condition that has affected structural adequacy.		Replace with structurally adequate posts or parts with a uniform protective coating.	

Fencing/Shrubbery Screen/Other Landscaping					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Fences	Openings in Fabric	Openings in fabric greater than 8-inch-diameter.		Repair fabric as needed.	

2b. Catch Basins

These structures are typically located in the streets. The City of Tumwater is responsible for routine maintenance of the pipes and structures in the public rights-of-way, while the property owner or homeowners' association is responsible for maintenance of pipes and catch basins in private areas and for keeping the grates clear of debris in all areas.

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Trash and Debris	Trash, leaves, or debris which is located immediately in front of the catch basin opening or is blocking inflow capacity of the basin by more than 10 percent.		Remove trash, leaves and debris located directly in front of catch basin or on grate.	
		Trash or debris (in basin) that exceeds 33 percent of the sump depth as measured from bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches of clearance from the debris surface to the invert of the lowest pipe.		Remove and properly dispose of all trash and debris. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	
		Trash or debris in any inlet or outlet pipe blocking more than 33 percent (one-third) of its height.		Remove and properly dispose of all trash and debris.	
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).		Remove dead animals, etc., present within the catch basin.	
	Sediment	Sediment (in basin) exceeds 33 percent of sump depth as measured from the bottom of basin to invert of lowest pipe into or out of basin, but in no case less than a minimum of 6 inches of clearance from the sediment surface to the invert of lowest pipe.		Remove and properly dispose of sediment in the catch basin. Refer to "Volume IV Appendix IV-C: Recommendations for Management of Street Wastes" for proper disposal of sediment from street runoff.	

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
General	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 0.25 inch (intent is to make sure no material is running into basin).		Patch or seal top slab as needed. Re-set grate frame as needed.	
	Structure Damage to Frame and/or Top Slab	Frame not sitting flush on top slab, i.e., separation of more than 0.75 inch of the frame from the top slab. Frame not securely attached.		Repair or re-set frame as needed.	
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person determines structure is unsound.		Replace or repair basin to design standard.	
		Grout fillet has separated or cracked wider than 0.5 inch and longer than 1 foot at the joint of any inlet/outlet pipe, or any evidence of soil entering basin.		Re-grout pipe and secure at basin wall.	
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.		Replace or repair basin to design standards.	
	Vegetation	Vegetation growing across and blocking more than 10 percent of the basin opening.		Remove vegetation blocking opening to basin.	
		Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.		Remove vegetation or root growth.	
	Contamination and Pollution	Presence of contaminants such as oil, gasoline, concrete slurries, paint, obnoxious color, odor, or sludge.		Locate the source of the pollution and remove contaminants or pollutants present. *Report and coordinate source control, removal, and/or cleanup with City of Tumwater Spill Reporting Hotline 360-754-4150, Moderate Risk Waste Program at Thurston County Environmental Health 360-754–4111, and/or Dept. of Ecology Spill Response 800-424-8802.*	

Catch Basins					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.		Ensure catch basin cover is in place and secured.	
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 0.5 inch of thread.		Repair/replace locking mechanism as needed.	
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)		Use blunt force with a hammer or similar tool to loosen lid.	
Ladder	Ladder Rungs Unsafe	Maintenance person judges that ladder is unsafe due to missing rungs, misalignment, rust, or cracks. Ladder must be fixed or secured immediately.		Repair or replace ladder to specifications. Ensure it is safe to use as determined by inspection personnel.	
Metal Grates	Grate Opening Unsafe	Grate with opening wider than 0.875 (7/8) inch.		Ensure grate opening meets design standards. Repair or replace grate as needed.	
	Trash and Debris	Trash and debris that is blocking more than 20 percent of grate surface inlet capacity.		Remove and properly dispose of all trash and debris.	
	Damaged or Missing	Grate missing or broken member(s) of the grate.		Repair or replace grate as needed. Ensure grate is in place and meets design standards.	

Group 3 – Miscellaneous Facilities and Features

3a. Conveyance Pipes, Culverts, Ditches, and Swales

These features contain and direct the flow of water from one location to another.

Conveyance Pipes, Culverts, Ditches, and Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Pipes	Sediment, Debris, and Vegetation	Accumulated sediment should not exceed 20 percent of the diameter of the pipe. Vegetation should not reduce free movement of water through pipes. Ensure that the protective coating is not damaged or rusted. Dents should not significantly impede flow. Pipe should not have major cracks or flaws allowing water to leak out.		Clean out pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe as needed.	
Open Ditches	Trash and Debris	There should not be any yard waste or litter in the ditch.		Remove and properly dispose of all trash and debris.	
	Sediment Buildup	Accumulated sediment should not exceed 20 percent of the depth of the ditch.		Clean out ditch of all sediment and debris. Refer to “Volume IV Appendix IV-C: Recommendations for Management of Street Wastes” for proper disposal of sediment from street runoff.	
Open Ditches and Swales	Overgrowth of Vegetation	Check for vegetation (e.g., weedy shrubs or saplings) that reduces the free movement of water through ditches or swales.		Clear blocking vegetation so that water moves freely through the ditches. Grassy vegetation should be maintained so it remains less than 12 inches high.	
	Erosion	Check around inlets and outlets for signs of erosion. Check slopes for signs of sloughing or settling. Action is needed where eroded damage is over 2 inches deep and where there is potential for continued erosion.		Eliminate causes of erosion. Stabilize slopes by using the appropriate erosion control procedure (e.g., compact the soil, plant grass, reinforce with rock).	

Conveyance Pipes, Culverts, Ditches, and Swales					
Drainage System Feature	**Problem or Defect**	**Conditions to Check For**	**Maintenance Required (Y/N)**	**What To Do for Desired Condition**	**Date Maintenance Completed**
Open Ditches and Swales	Missing Rocks	Native soil beneath the rock splash pad, check dam, or lining should not be visible.		Replace rocks to design standard.	
Swales	Vegetation	Grass cover is sparse and weedy, or areas are overgrown with woody vegetation.		Aerate soils and re-seed and mulch bare areas. Keep grass less than 12 inches high. Remove woody growth, re-contour and re-seed as necessary.	
	Homeowner Conversion	Swale has been filled in or blocked by shed, woodpile, shrubbery, etc.		Speak with the homeowner and request that the swale area be restored. Contact the city to report the problem if not rectified voluntarily.	
	Swale Does Not Drain	Water stands in the swale, or flow velocity is very slow. Stagnation occurs.		A survey may be needed to check grades. Grades should be in 1 to 5 percent range if possible. If grade is less than 1 percent, underdrains may need to be installed.	

SECTION 6: VEGETATION MAINTENANCE

Refer to the landscape plans for the planting schedule of the project site.

SECTION 7: POLLUTION SOURCE CONTROL MEASURES

1. Avoid the activity or reduce its occurrence:

If possible, avoid the activity or do it less frequently. Is there a substitute process or a different material available to get the job done? Can a larger run of a process be performed at one time, thus reducing the number of times per week or month it needs to be repeated? For instance, raw materials could be delivered close to the time of use instead of being stockpiled and exposed to the weather. Perhaps the site could avoid one solvent-washing step altogether. Apply lawn care chemicals following directions and only as needed. Many lawns are excessively fertilized. Do not apply herbicides right before it rains. Ecology or the Thurston County Department of Public Health and Social Services can provide pollution prevention assistance.

2. Move activities under shelter:

Sometimes it is fairly easy to move an activity indoors out of the weather. The benefits of this are twofold; preventing runoff contamination, and providing for easier, more controlled cleanup if a spill occurs. An example would be unloading and storing barrels of chemicals inside a garage area instead of doing it outside. Please be aware that moving storage areas indoors may require installation of fire suppression equipment or other building modifications as required by the International Building Code (IBC), the International Fire Code or local ordinances.

3. Clean up spills quickly:

Promptly contain and clean up solid and liquid pollutant leaks and spills on any exposed soil, vegetation, or paved area. Commercial spill kits are available, but readily available absorbents such as kitty litter also work well in many cases. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.

4. Use less material:

Don't buy or use more material than you really need. This not only helps keep potential disposal, storage, and pollution problems to a minimum, but will probably save money, too.

5. Use the least toxic materials available:

Investigate the use of materials that are less toxic than what is used now. Perhaps a caustic-type detergent or a solvent could be replaced with a more environmentally friendly product. Such a change might allow the site to discharge process water to the sanitary sewer instead of paying for expensive disposal (contact the City of Tumwater Wastewater Utility or the LOTT Clean Water Alliance to find out about allowable sanitary sewer discharges and pretreatment permits). Remember that even if using a biodegradable product, nothing but uncontaminated water is allowed to enter the stormwater drainage system.

6. Create and maintain vegetated areas near activity locations:

Vegetation of various kinds can help filter pollutants out of stormwater, so it is advisable to route stormwater through vegetated areas located near the activity. For instance, many parking lots contain grassy islands, typically formed in a "hump." By creating those islands as

depressions instead of humps, they can be used to treat runoff from the parking lot or roof. Also, don't forget the erosion control benefits of vegetation at a site.

7. Locate activities as far as possible from surface drainage paths:
Activities located as far as possible from known drainage paths, ditches, streams, other water bodies, and storm drains will be less likely to pollute, since it will take longer for material to reach the drainage feature. This gives more time to react to a spill, or if it is a "housekeeping" issue, may protect the local waters long enough for you to clean up the area around the activity. Don't forget that groundwater protection is important throughout the region, no matter where the activity is located, so the actions taken on your site on a day-to-day basis are always important, even in dry weather.

8. Maintain stormwater drainage systems
Pollutants can concentrate over time in storm drainage structures such as catch basins, ditches, and storm drains. When a large storm event occurs, it can mobilize these pollutants and carry them to receiving waters. Develop and implement maintenance practices, inspections, and schedules for treatment facilities (e.g., detention ponds, oil/water separators, vegetated swales). Clean oils, debris, sludge, etc., from all BMP systems regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems, to prevent the contamination of stormwater. Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas that are subjected to pollutant material leaks or spills. Also repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater. Requirements for cleaning stormwater facilities are discussed in Volume V of the *2022 City of Tumwater Drainage Design and Erosion Control Manual* as well as on the city website.

9. Reduce, reuse, and recycle as much as possible
Always look for ways to recycle instead of just disposing. This can save money as well as keep both hazardous and non-hazardous materials out of the landfills. Learn more about other businesses that have made process changes allowing recycling of chemicals by calling Ecology at 1-800-RECYCLE and requesting publications No. 92-45 and No. 90-22. Another unique recycling opportunity for businesses is available through the Industrial Materials Exchange. This free service acts as a waste or surplus "matchmaker," helping one company's waste become another company's asset. For instance, waste vegetable oil can become biofuel for another business. Call Industrial Materials Exchange at (206) 625-6232 to list potentially usable solid or chemical waste in their publication.

10. Be an advocate for stormwater pollution prevention
Help friends, neighbors, and business associates find ways to reduce stormwater pollution in their activities. Most people want clean water and do not pollute intentionally. Share your ideas and the BMPs in this chapter to get them thinking about how their everyday activities effect water quality.

11. Report problems
We all must do our part to protect water, fish, wildlife, and our own health by implementing proper BMPs, and reporting water quality problems that we observe. In the City of Tumwater, call the Department of Public Works at (360) 754-4140 to report dumping to sewers and to

report spills and other incidents involving storm drains or ditches. Also contact Ecology's Southwest Regional Office at (360) 706-4599.

12. Provide oversight and training
Assign one or more individuals at your place of business to be responsible for stormwater pollution control. Hold regular meetings to review the overall operation of BMPs. Establish responsibilities for inspections, operation and maintenance (O&M), documentation, and availability for emergency situations. Train all team members in the operation, maintenance, and inspection of BMPs and reporting procedures.

13. Dust control
Sweep paved material handling and storage areas regularly as needed, to collect and dispose of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water.

14. Eliminate illicit connections
An illicit connection is formally defined in the city's NPDES Municipal Stormwater Permit, but generally includes any connection to the city stormwater system that is not intended, permitted, or used for collecting and conveying stormwater. A common problem with the stormwater drainage system for most communities is the existence of illicit connections of wastewater to the storm drainage system. Wastewater other than stormwater runoff, such as wash water, must be discharged to a wastewater collection system, and may not be discharged to a storm drainage system (the storm drainage system does not drain to a wastewater treatment plant). Many businesses and residences have internal building drains, sump overflows, process wastewater discharges, and even sanitary sewer and septic system pipes that were connected to the nearby storm drainage system in the past as a matter of course. All businesses and residences must examine their plumbing systems to determine if illicit connections exist. Any time it is found that toilets, sinks, appliances, showers and bathtubs, floor drains, industrial process waters, and/or other indoor activities are connected to the stormwater drainage system, these connections must be immediately rerouted to the sanitary or septic system, holding tanks, or a process treatment system.

15. Dispose of waste properly
Every business and residence in the city must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally four options for disposal depending on the type of materials. These options include:

- Sanitary sewer and septic systems
- Recycling facilities
- Municipal solid waste disposal facilities
- Hazardous waste treatment, storage, and disposal facilities

DRAINAGE CONTROL PLAN
ATTACHMENT 5
ESTABLISHMENT OF MAINTENANCE COVENANT

AGREEMENT TO MAINTAIN
STORM WATER FACILITIES AND TO IMPLEMENT A
POLLUTION SOURCE CONTROL PLAN
BY AND BETWEEN THE CITY OF TUMWATER AND
TUMWATER SCHOOL DISTRICT NO. 33,
AND IT'S HEIRS, SUCCESSORS, OR ASSIGNS
(HEREINAFTER "OWNER")

The upkeep and maintenance of storm water facilities and the implementation of pollution source control best management practices (BMPs) are essential to the protection of water resources in the CITY OF TUMWATER. All property owners are expected to conduct business in a manner that promotes environmental protection. This Agreement contains specific provisions with respect to maintenance of storm water facilities and use of pollution source control BMPs. The authority to require maintenance and pollution source control is provided by Tumwater Municipal Code.

LEGAL DESCRIPTION:

PARCEL 1 OF SHORT SUBDIVISION NO. SS-7285, AS RECORDED JULY 19, 1993 UNDER AUDITOR'S FILE NO. 9307190251; TOGETHER WITH THAT PORTION OF VACATED L STREET AS VACATED BY INSTRUMENT RECORDED APRIL 14, 2004 UNDER AUDITOR'S FILE NO. 3632645; EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY STATUTORY WARRANTY DEED RECORDED MAY 20, 2009 UNDER AUDITOR'S FILE NO. 4083381.

IN THURSTON COUNTY, WASHINGTON

RECITALS:

WHEREAS, OWNER is the owner of certain real property in Thurston County, Washington, described as set forth in the legal description contained herein and referred to in this agreement as the "PROPERTY"; and

WHEREAS, in connection with the OWNER'S proposed development of the PROPERTY, the CITY OF TUMWATER has required and OWNER has agreed to construct storm water facilities and to implement a pollution source control plan. The storm water facilities and pollution source control plan were prepared by LDC, INC. for the OWNER'S PROPERTY and is on file with CITY OF TUMWATER; and

WHEREAS, OWNER has constructed improvements, including but not limited to, buildings, pavement, and storm water facilities on the PROPERTY, in order to further the goals of the CITY OF TUMWATER to ensure the protection and enhancement of Tumwater's water resources, CITY OF TUMWATER and OWNER hereby enter into this Agreement. The responsibilities of each party to this Agreement are identified below.

OWNER SHALL:

(1) Implement the storm water facility maintenance program located in the Stormwater Facilities Maintenance Guide of Volume V of the City's 2018 Drainage Design and Erosion Control Manual.

(2) Comply with Pollution Source Control Requirements located in Volume IV of the City's 2018 Drainage Design and Erosion Control Manual.

(3) Maintain a record (in the form of a log book) of steps taken to implement the programs referenced in (1) and (2) above. The log book shall be available for inspection by CITY OF TUMWATER at 621 LINWOOD AVENUE SW TUMWATER, WA 98512 during normal business hours. The log book shall catalog the action taken, who took it, when it was done, how it was done, and any problems encountered or follow-up actions recommended. Maintenance items ("problems") listed in Item (1) above shall be inspected as specified in the instructions or more frequently if necessary. OWNER is encouraged to photocopy the individual checklists in Item (2) above and use them to complete its monthly inspections. These completed checklists would then, in combination, comprise the log book.

(4) Submit an annual report to CITY OF TUMWATER regarding implementation of the programs referenced in (1) and (2) above. The report must be submitted on or before August 21st of each calendar year and shall contain, at a minimum, the following:

(a) Name, address, and telephone number of the business, the person, or the firm responsible for plan implementation, and the person completing the report.

(b) Time period covered by the report.

(c) A chronological summary of activities conducted to implement the programs referenced in (1) and (2) above. A photocopy of the applicable sections of the log book with any additional explanation needed shall normally suffice. For any activities conducted by paid parties not affiliated with OWNER, include a copy of the invoice for services.

(d) An outline of planned activities for the next year.

(5) Prevent any unauthorized modifications to the drainage system and prevent it from being dismantled, revised, altered or removed except as necessary for maintenance, repair or replacement. Any such actions will be covered under item (4) above and shall be approved by the CITY OF TUMWATER. Modifications to the storm water quantity control and storm water quality system must be approved in advance by CITY OF TUMWATER and may require the submittal of revised design drawings, supporting calculations, modifications to maintenance requirements, and applications for permits.

CITY OF TUMWATER WILL, AS RESOURCES ALLOW:

(1) Provide technical assistance to OWNER in support of its operation and maintenance activities conducted pursuant to its maintenance and source control

programs. Said assistance shall be provided upon request, as CITY OF TUMWATER time and resources permit and at no charge to OWNER.

(2) Review the annual report and conduct occasional site visits to discuss performance and problems with OWNER.

(3) Review this agreement with OWNER and modify it as necessary.

REMEDIES:

(1) If the CITY OF TUMWATER determines that maintenance or repair work is required to be done to the storm water facility existing on the OWNER'S PROPERTY, CITY OF TUMWATER shall give OWNER, and the person or agent in control of said PROPERTY if different, notice of the specific maintenance and/or repair required. CITY OF TUMWATER shall set a reasonable time in which such work is to be completed by the persons who were given notice. If the above required maintenance and/or repair is not completed within the time set by CITY OF TUMWATER, written notice will be sent to the persons who were given notice stating CITY OF TUMWATER'S intention to perform such maintenance and bill the OWNER for all incurred expenses. CITY OF TUMWATER may also adjust storm water utility charges if required maintenance is not performed.

(2) If at any time CITY OF TUMWATER determines that the existing system creates any imminent threat to public health, welfare or water quality CITY OF TUMWATER may take immediate measures to remedy said threat. No notice to the persons listed in Remedies (1), above, shall be required under such circumstances. All other responsibilities shall remain in effect.

(3) OWNER grants unrestricted authority to CITY OF TUMWATER for access to any and all storm water system features for the purpose of routine inspections and/or performing maintenance, repair and/or retrofit as may become necessary under Remedies (1) and/or (2).

(4) OWNER shall assume all responsibility for the cost of any maintenance and for repairs to the storm water facility. Such responsibility shall include reimbursement to CITY OF TUMWATER within 30 days of the receipt of the invoice for any such work performed. Overdue payments will require payment of interest at the current legal rate for liquidated judgments. If legal action ensues, any costs or fees incurred by CITY OF TUMWATER will be borne by the OWNER.

(5) OWNER hereby grants to the CITY OF TUMWATER a lien against the above-described PROPERTY in an amount equal to the cost incurred by CITY OF TUMWATER to perform the maintenance or repair work described herein, including interest and fees described in Remedies (4), above.

This Agreement is intended to protect the value and desirability of the real PROPERTY described above and to benefit all the citizens of the CITY OF TUMWATER. It shall run with the land, and touch and concern the land, and be binding on all parties having or acquiring from OWNER or their successors any right, title, or interest in the PROPERTY or any part thereof, as well as their title, or interest in the PROPERTY or any part thereof, as well as their heirs, successors, and assigns. They shall inure to the benefit of each present or future successor in interest of said PROPERTY or any part thereof, or interest therein, and to the benefit of all citizens of the CITY OF TUMWATER.

Dated at _____, Washington, this _____ day of _____, 20___.

OWNER:

_____
Signature
Name: _____
Title:_____
Address:_____

[Choose notary block – corporate or individual – delete the other – KEEP NOTARY BLOCK ON SAME PAGE AS SIGNATURE]

State of Washington)
)ss
County of _____)

I certify that I know or have satisfactory evidence that _____is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____of _____ _____to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated:_____

_____
(Signature)
Notary Public in and for the State of Washington.
My appointment expires _____.

(Seal or Stamp)

State of Washington)
)ss
County of _____)

I certify that I know or have satisfactory evidence that _____is the person who appeared before me, and said person acknowledged that (he/she) signed this

instrument and acknowledged it to be (his/her) free and voluntary act for the uses and purposes mentioned in the instrument.

Dated:_____

_____
(Signature)
Notary Public in and for the State of Washington.
My appointment expires _____.

(Seal or Stamp)

CITY OF TUMWATER:

APPROVED as to form only:

_____
City Attorney

ACCEPTED BY:

_____
Water Resources & Sustainability Director

APPENDIX 1
DESIGN CALCULATIONS

LDC | Surveying Engineering Planning

Calculations:

Roof area = 1,904 SF ---> Round up to 2,000 SF

Maximum roof area drainage per splash block = 700 SF

Minimum required splash blocks = 3

Per the 2022 DDECM:

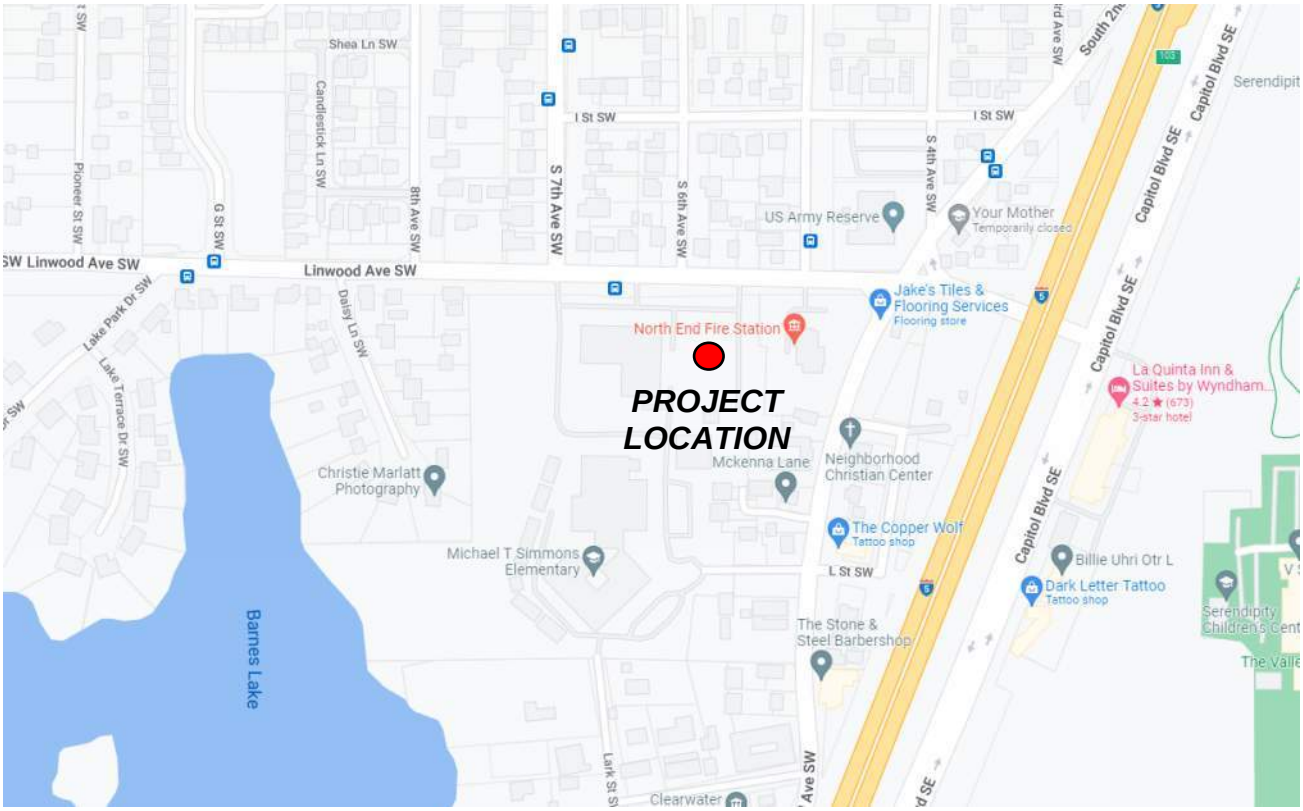
Splash block dimensions: 2' wide x 3' long x 6" deep

Vegetated flow path dimensions: 10' wide x 50' long w/ 20' spacing

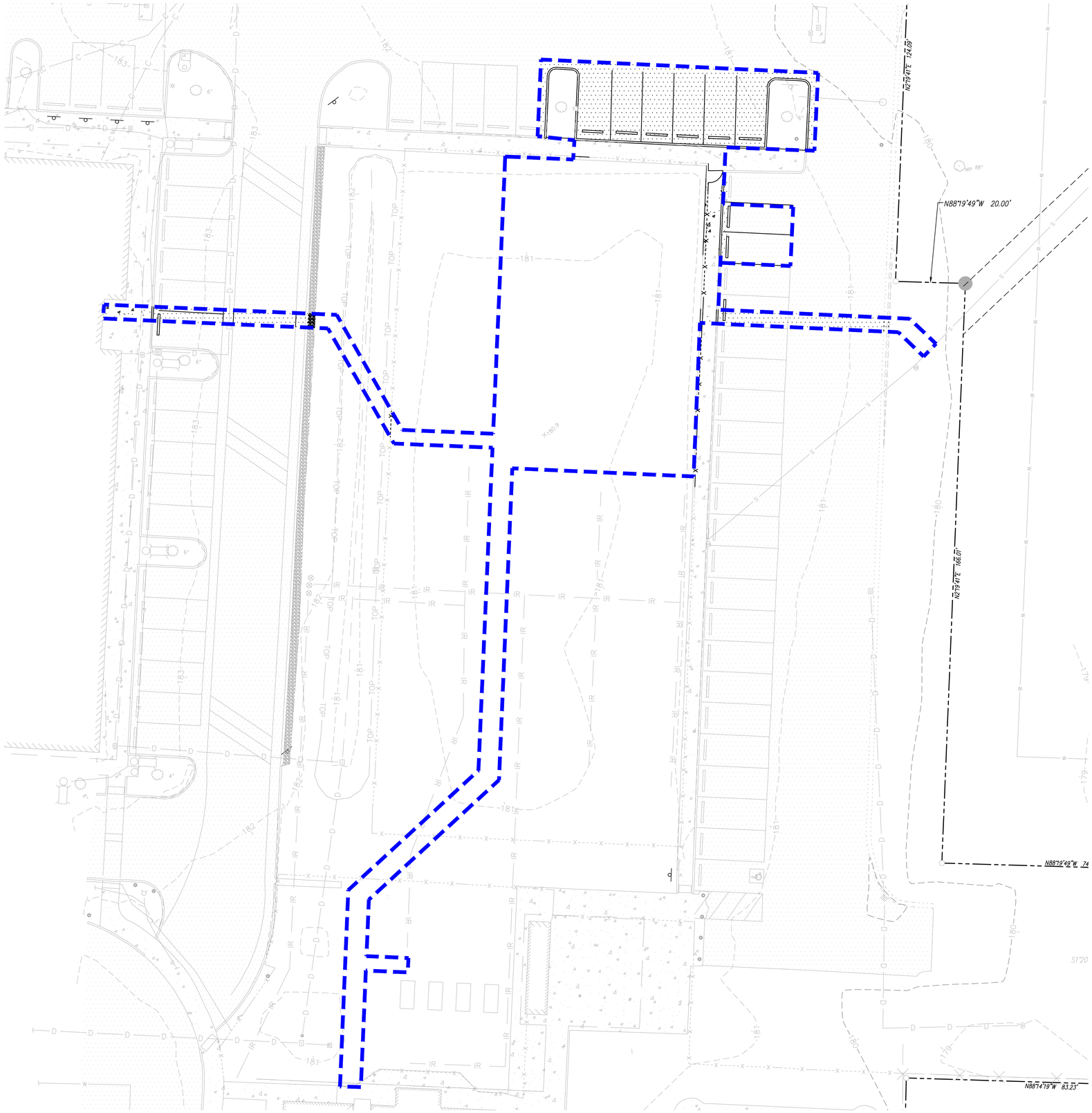
APPENDIX 2
SOIL MANAGEMENT PLAN

APPENDIX 3

SUPPLEMENTAL REPORTS AND INFORMATION



1411 State Avenue NE, Suite 200 • Olympia, WA 98506 • ph: 425.806.1869 • fx: 425.482.2893 • www.LDCcorp.com



EXISTING PROJECT SITE AREAS:

IMPERVIOUS:	***0.06 ACRES***
PERVIOUS:	***0.16 ACRES***
TOTAL:	***0.22 ACRES***

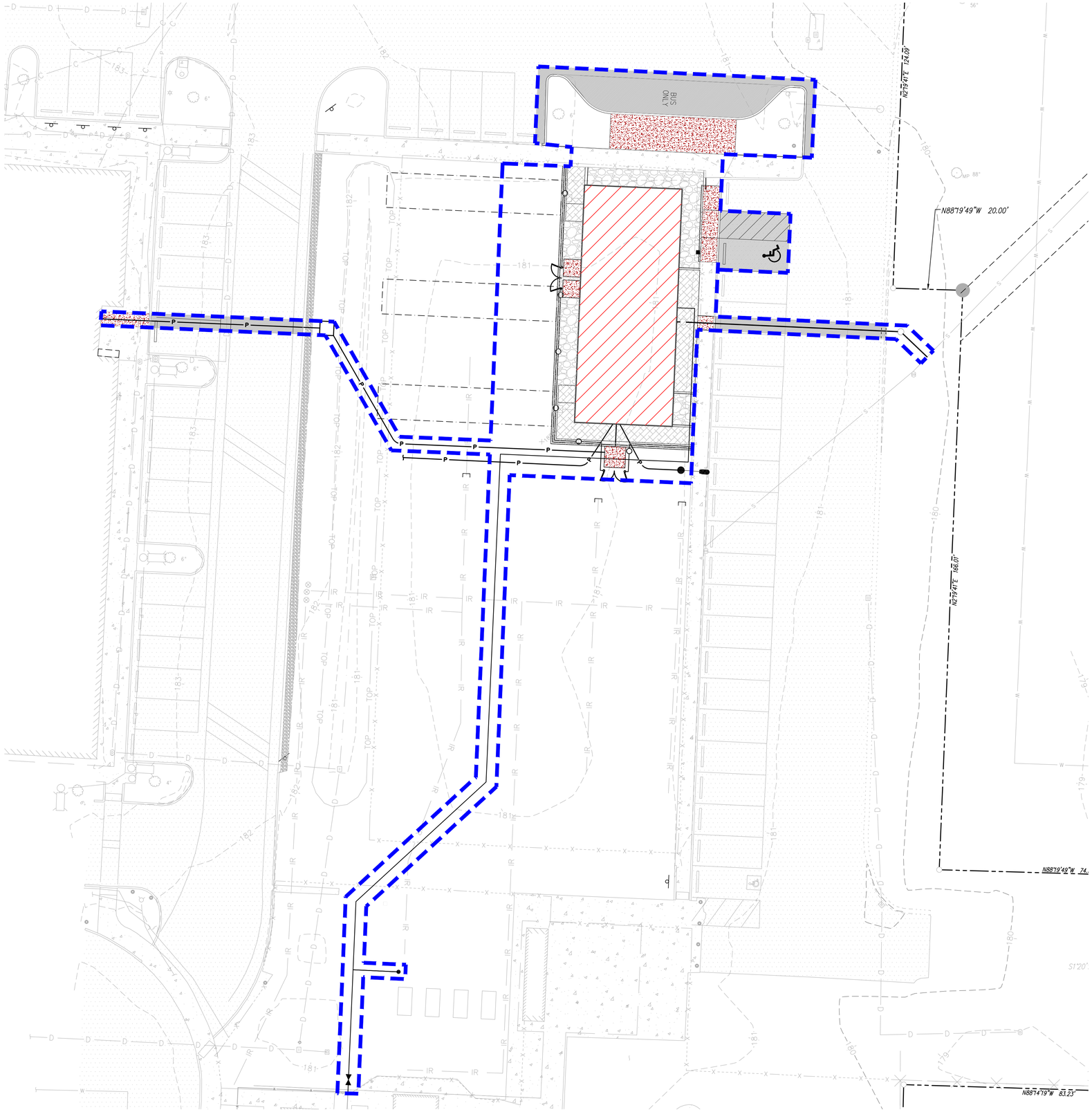
TUMWATER SCHOOL DISTRICT
LINCS MODULAR BUILDING
EXISTING CONDITIONS MAP

LDC | Surveying Engineering Planning

Woodinville Olympia Kent
1411 State Avenue NE, #200
Olympia, WA 98506
T 425.806.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 12-22-22

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Exhibits\2022-1219 Stormwater\C22-278 Ex.Conditions Map.dwg Plotted: Feb 10, 2023 - 2:33pm



PROPOSED PROJECT SITE AREAS:

ROOF:	***0.05 ACRES***
SIDEWALK:	***0.02 ACRES***
ASPHALT:	***0.03 ACRES***
METAL:	***0.01 ACRES***
GRAVEL:	***0.01 ACRES***
PERVIOUS:	***0.10 ACRES***
TOTAL:	***0.22 ACRES***

TUMWATER SCHOOL DISTRICT
LINCS MODULAR BUILDING
PROPOSED CONDITIONS MAP

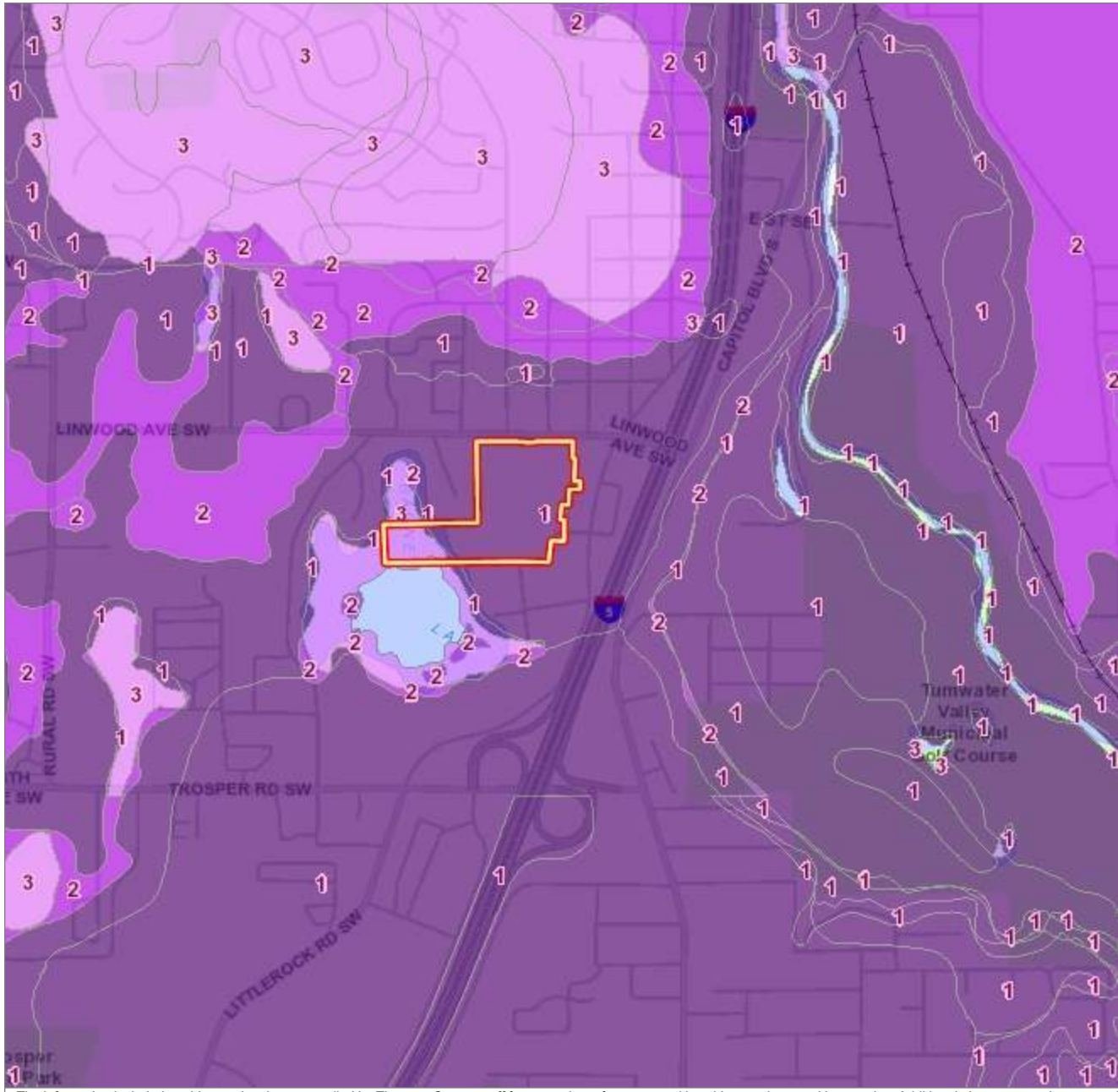
LDC | Surveying Engineering Planning

Woodinville Olympia Kent
1411 State Avenue NE, #200
Olympia, WA 98506
T 425.806.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 12-22-22

Drawing: P:\Civil\2022\C22-278 LINCS Modular Building\Drawings\Exhibits\2022-1219 Stormwater\C22-278 Pr.Conditions Map.dwg Plotted: Feb 10, 2023 - 2:32pm

Critical Aquifer Recharge Area



Legend

- Critical Aquifer Recharge Areas
  - 1
  - 2
  - 3
- Parcel Boundaries
- Roads - Major (Large Scale)
  - <all other values>
  - I 5 ACCESS; US 101 ACCESS; US 101 SB OFF RAMP
  - I 5; US 101
- Roads (Large Scale)
- Railroads
- County Border
- Olympia Municipal Airport
- Water Bodies (River - Small Scale)
- Water Bodies (Other)
- Parks
- Cities
- Capital Forest
- County Background
- Roads - Major
  - <all other values>
  - I 5 ACCESS; US 101 ACCESS; US 101 SB OFF RAMP
  - I 5; US 101
- Roads
- Railroads
- County Border

Scale 1: 21,476

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Feet

Map Created Using GeoData Public Website

Published: 12/12/2022

Note:

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County GeoData Center

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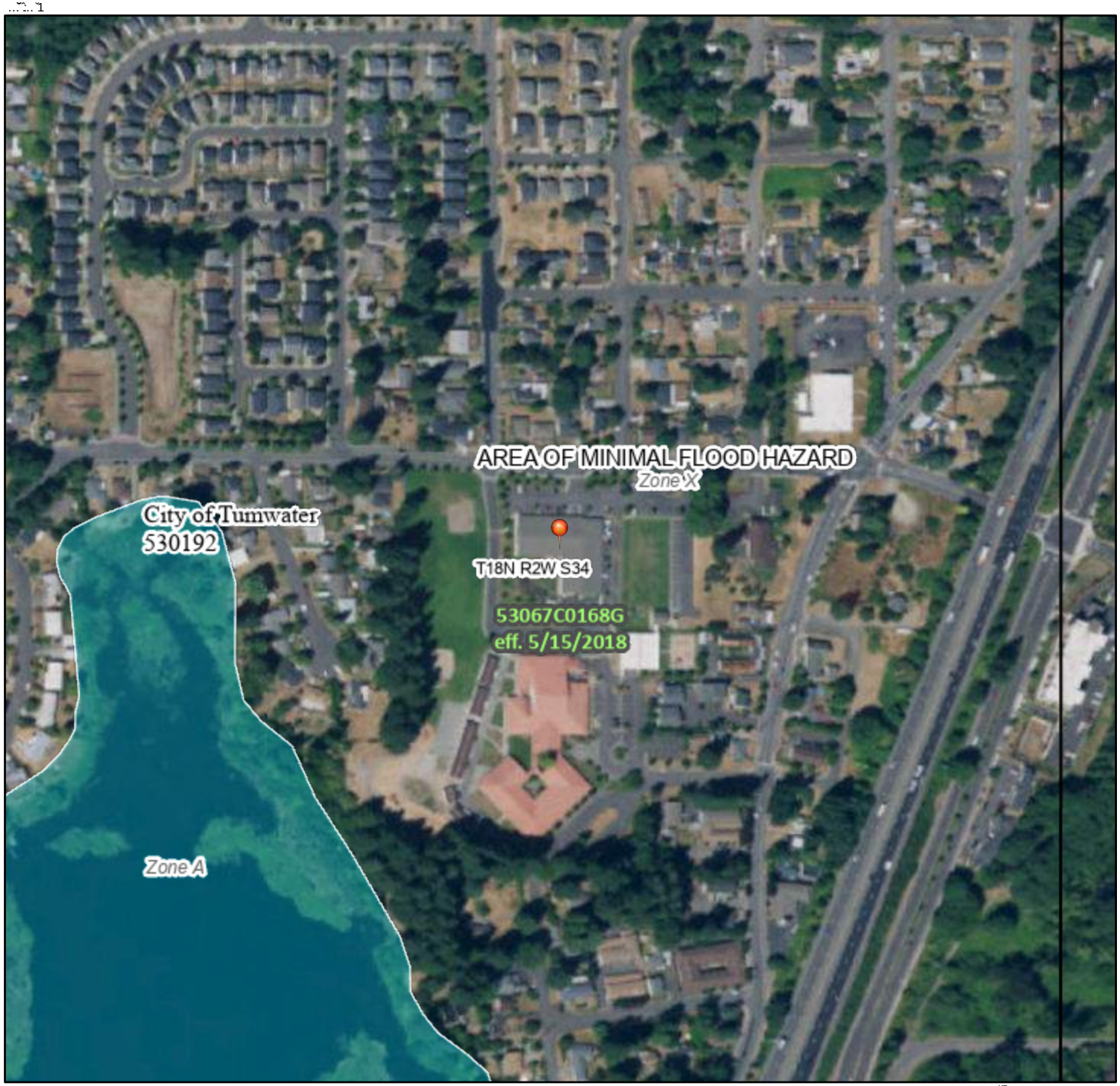

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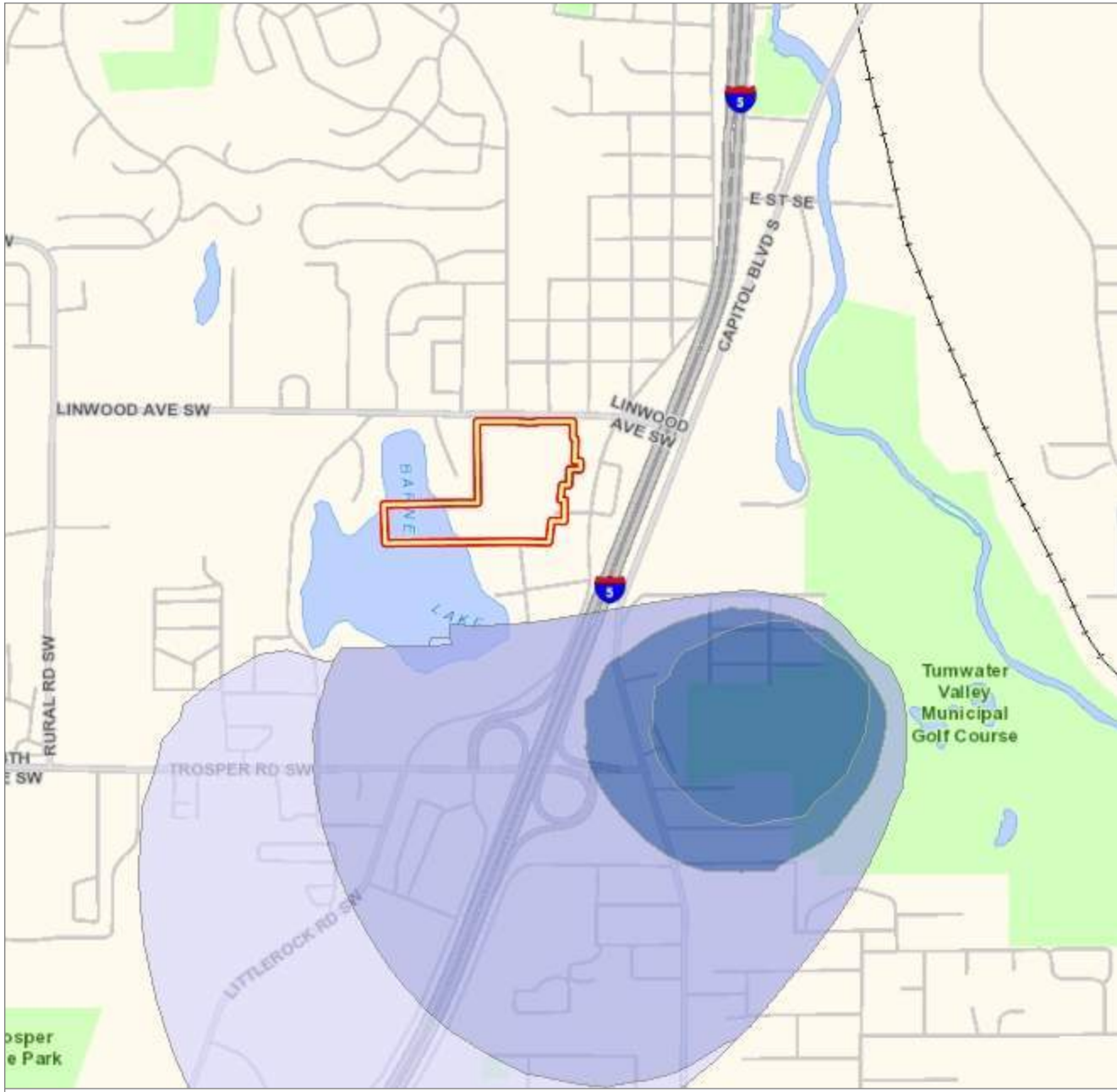
Wellhead Protection Area Map



Legend

- Wellhead Protection Areas
  - 6 Month
  - 1 Year
  - 2 Year
  - 3 Year
  - 5 Year
  - 10 Year
- Parcel Boundaries
- Roads - Major (Large Scale)
  - <all other values>
  - I 5 ACCESS; US 101 ACCESS; US 101 SB OFF RAMP
  - I 5; US 101
- Roads (Large Scale)
- Railroads
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- Olympia Municipal Airport
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- County Background
- Roads - Major
  - <all other values>
  - I 5 ACCESS; US 101 ACCESS; US 101 SB OFF RAMP
  - I 5; US 101
- Roads

Scale 1: 21,476

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Feet

Map Created Using GeoData Public Website

Published: 12/12/2022

Note:

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County GeoData Center

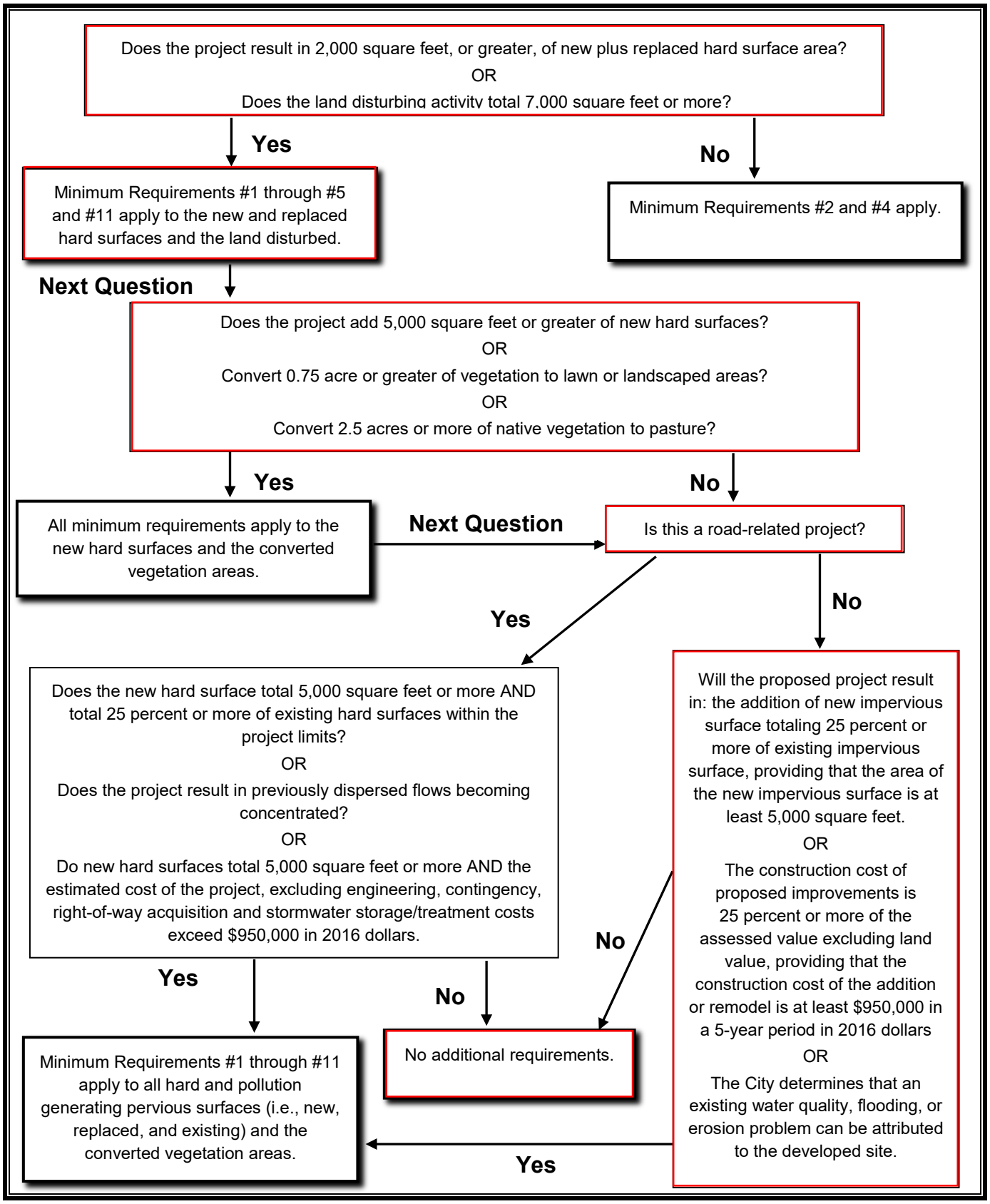


Figure 2.2. Flow Chart for Determining Requirements for Redevelopment.

December 19, 2022

Tumwater School District No. 33
621 Linwood Ave. SW
Tumwater, WA 98512-6847

Attn: Ms. Tanya Baker, Project Manager

Transmitted via email to: *tanya.baker@tumwater.k12.wa.us*

Re: Summary of Geotechnical Engineering Services
District Office Portable
Tumwater, Washington
Project No. 1467012.010.011

Dear Ms. Baker:

This letter summarizes the results of geotechnical engineering services provided by Landau Associates, Inc. (Landau) in support of the District Office Portable project, located at 621 Linwood Avenue Southwest in Tumwater, Washington (site; Figure 1). Geotechnical services were provided in accordance with the scope outlined in Landau's October 14, 2022 proposal.

Project Understanding

Tumwater School District No. 33 (District, project owner) plans to install a portable building east of the existing district office. The portable building will be supported on footings and stem walls. Landau provided geotechnical engineering services to support installation of the portable building.

Subsurface Conditions

On November 14, 2022, Landau's excavating subcontractor advanced three test pits (TP-1 through TP-3) 8.2 to 9.0 feet (ft) below ground surface (bgs). The approximate locations of the test pit excavations are shown on Figure 2.

Subsurface conditions were described using the soil classification system shown on Figure 3, in general accordance with ASTM International (ASTM) standard D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. Summary logs of the subsurface soil and groundwater conditions observed in the test pits are presented on Figures 4 through 6.

Soil samples were transported to Landau's geotechnical laboratory for further examination and testing. Natural moisture content determinations were performed on select soil samples in accordance with ASTM standard test method D2216-19, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. The natural moisture content is shown as "W = xx" (i.e., percentage of dry weight) in the "Test Data" column on Figures 4 through 6.

Grain size, or sieve, analyses were performed on select soil samples in accordance with ASTM standard test method D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis*. Samples selected for grain size analysis are designated with a "GS" on Figures 4 through 6. The results of the grain size analyses are presented on Figure 7.

Soil Conditions

Approximately 5 to 6 inches of topsoil was encountered at each exploration location. Fill was observed beneath the topsoil and extended 0.8 to 3 ft bgs. The fill was in a medium dense, moist condition and typically consisted of crushed concrete debris composed of sand and gravel with silt. The concrete debris ranged from 6 to 14 inches in diameter, with smaller pieces measuring less than 1 inch in diameter.

Recessional outwash was observed beneath the fill and extended approximately 9.0 ft bgs. The outwash was in a loose, moist condition and typically consisted of brown to gray sand with silt and sporadic gravel.

Groundwater Conditions

Groundwater was not observed in Landau's November 2022 explorations. The groundwater conditions reported herein are for the specific date and locations indicated and may not be representative of other locations and/or times. Site groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors.

Conclusions

Based on the results of Landau's geotechnical field investigation and laboratory testing, the medium dense crushed concrete debris will provide suitable support for the portable building, provided the following recommendations are incorporated into the project design.

Topsoil should be stripped to expose medium dense subgrade soil. Concrete debris larger than 4 inches in diameter should be removed and replaced with compacted structural fill. The exposed subgrade should be compacted to a firm, unyielding condition.

The lightly loaded portable building is anticipated to experience less than 1 inch of settlement if constructed as recommended herein. Similarly loaded foundation elements may experience ½ inch or less of differential settlement over 50-ft spans. Settlement is expected to occur as loads are applied during construction.

Pavement Design

Pavement sections should be constructed on a firm, unyielding subgrade that consists of medium dense crushed concrete debris or recessional outwash. Alternatively, pavement sections may be constructed on properly compacted structural fill that extends to such soils.

Landau used a 20-year design life, a reliability of 85 percent, an initial serviceability index of 4.5, and a terminal serviceability index of 2.5 to calculate pavement thickness. Design recommendations for flexible pavement sections are provided in Table 1.

Table 1. Recommended Asphalt Pavement Design Sections

Pavement Section Type[(a)]	ESALs	Asphalt Pavement Thickness (inches)	Crushed Surfacing Thickness (inches)
Parking lot	50,000	2.5	6

(a) Based on the assumption that pavement sections will be founded on a subbase consisting of medium dense crushed concrete debris or recessional outwash. Pavement sections also may be constructed on properly compacted structural fill that extends to such soils.
ESALs = equivalent single-axle loads

Base course material should be compacted to at least 95 percent of the maximum dry density, determined in accordance with ASTM standard test method D1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).* Compacted base course should meet the requirements for Crushed Surfacing Base Course in Section 9-03.9(3) of the Washington State Department of Transportation's 2023 *Standard Specifications for Road, Bridge, and Municipal Construction* (hereafter, *2023 WSDOT Standard Specifications*). To facilitate fine grading of the surface, the upper 2 inches of crushed surfacing could consist of crushed surfacing top course. Prevention of road-base saturation is essential for pavement durability; efforts should be made to limit the amount of water entering the base course.

Asphalt concrete should consist of Class B aggregate material or hot-mix asphalt, class ½-inch and PG58S-22 binder that conforms to the requirements in Section 5-04 of the *2023 WSDOT Standard Specifications.* The asphalt should be compacted to at least 91 percent of the Rice density.

Infiltration

Design infiltration rates were calculated using the results of Landau's geotechnical laboratory tests (Figure 7) and the soil grain size method in the City of Tumwater's 2022 *Drainage Design and Erosion Control Manual*. Correction factors were applied to account for plugging of soils (Fplugging = 0.7), the test method (Ftesting = 0.4), and the influence of facility geometry (Fgeometry= 0.9). Because hydrologic group A soils are mapped at the site (University of California Davis, accessed December 6, 2022), Landau used the simplified approach to calculate the design infiltration rates in Table 2. These rates are appropriate for design of small-scale or low-impact development facilities (e.g., trenches and bioswales); they are not suitable for larger stormwater systems (e.g., vaults and ponds).

Table 2. Design Factored Infiltration Rates

Material/Soil	Design Infiltration Rate (in/hr)
Crushed concrete fill	3.3
Native sand with silt	6.2

in/hr = inches per hour

Use of This Letter

Landau Associates has prepared this letter for the exclusive use of Tumwater School District No. 33 for specific application to the District Office Portable project in Tumwater, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that, within the limitations of scope, schedule, and budget, its services have been provided in a manner consistent with that level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality, under similar conditions as this project. Landau Associates makes no other warranty, either express or implied.

Closing

We trust that this letter provides you with the information needed to proceed with the project. If you have questions or comments, or if we can be of further service, please contact Lance Levine at 360.791.3178 or at llevine@landauinc.com.

LANDAU ASSOCIATES, INC.

Lance Levine, PE
Senior Engineer

12-19-2022

Steven R. Wright, PE
Principal

LGL/SRW/mcs
[\\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\R\DISTRICT OFFICE PORTABLE GEOTECHNICAL LETTER 12.19.2022.DOCX]

Attachments: Figure 1. Vicinity Map
Figure 2. Site and Exploration Location Plan
Figure 3. Soil Classification System and Key
Figures 4–6. Logs of Test Pits TP-1 through TP-3
Figure 7. Grain Size Distribution

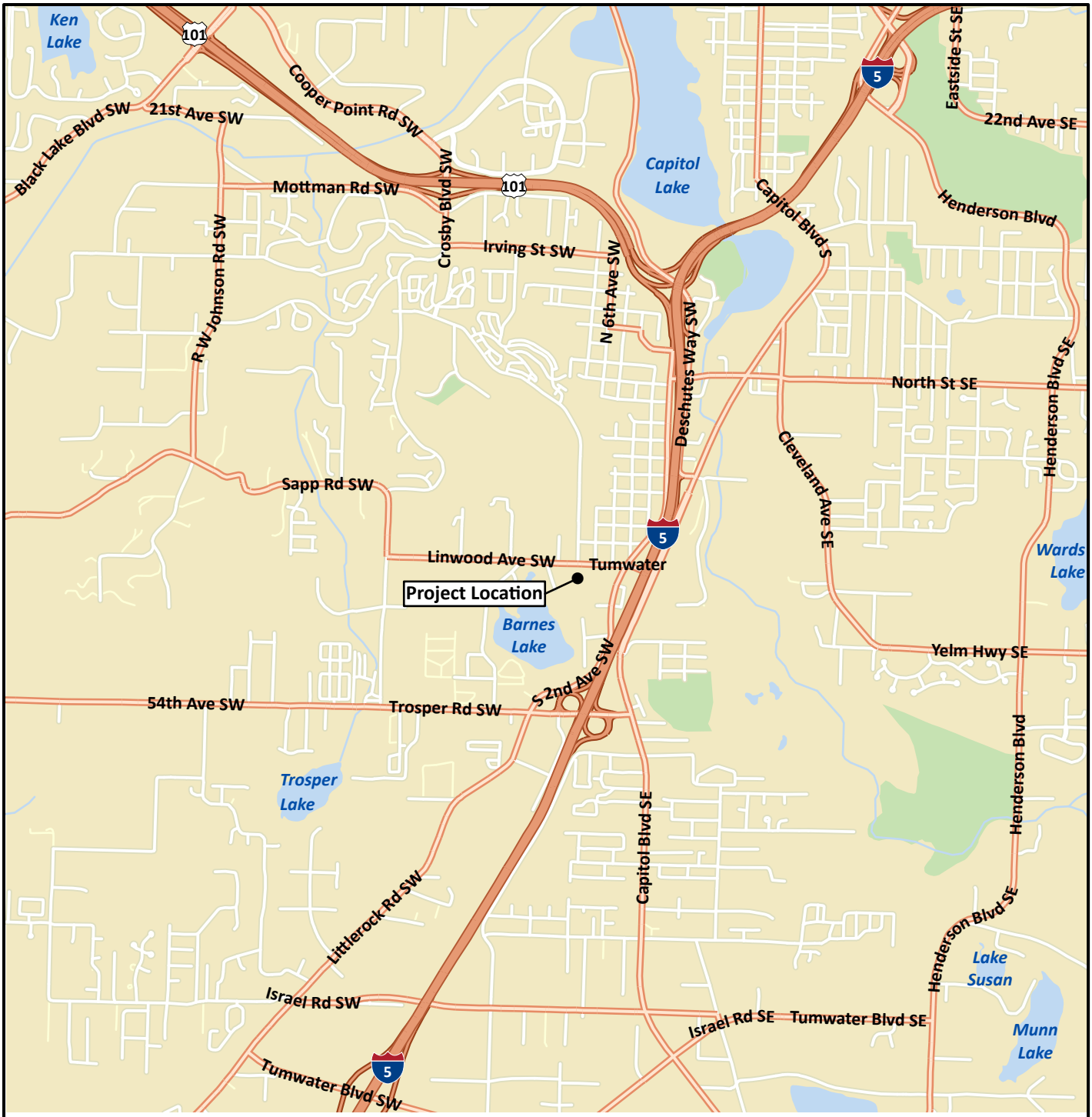
References

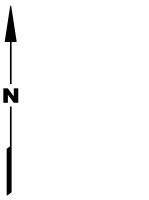
ASTM. 2017. Annual Book of ASTM Standards. In: *Soil and Rock(I).* West Conshohocken, PA: ASTM International.

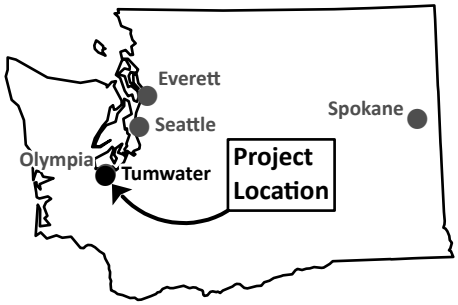
City of Tumwater. 2022. *Drainage Design and Erosion Control Manual*. July.

University of California Davis. "Soil Survey Website." Accessed December 6, 2022. Available online at: https://casoilresource.lawr.ucdavis.edu/gmap/.

WSDOT. 2022. *M41-10: Standard Specifications for Road, Bridge, and Municipal Construction.* 2023 Edition. Washington State Department of Transportation. September 14.







Data Source: Esri.

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LANDAU ASSOCIATES

District Office Portable Tumwater, Washington	**Vicinity Map**	Figure 1

Landau Associates | Y:\CAD\1467\012\1467012.010 Site Plan.dwg | 11/28/2022 10:13 AM | caduser

Legend

TP-1 Approximate Test Pit Location and Designation

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Google Maps 2022

0 75 150

Scale in Feet

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Site and Exploration Location Plan

Figure
2

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

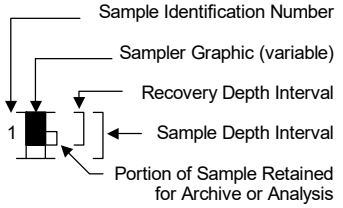
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE & METHOD

Graphic	Code	Description
☒	a	3.25-in OD, 2.42-in ID Split Spoon
⧓	b	2.00-in OD, 1.50-in ID Split Spoon
◧	c	Shelby Tube
◪	d	Grab Sample
◧	e	Single-Tube Core Barrel
◧	f	Double-Tube Core Barrel
☒	g	2.50-in OD, 2.00-in ID WSDOT
☒	h	3.00-in OD, 2.37-in ID Mod. Calif.
☒	i	Other - See text if applicable
	1	300-lb Hammer, 30-inch Drop
	2	140-lb Hammer, 30-inch Drop
	3	Pushed Sample
	4	Vibrocore (Rotosonic/Geoprobe)
	5	Other - See text if applicable
	6	Piston Extraction

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time after drilling/excavation/well

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Soil Classification System and Key

Figure 3

TP-1

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							5 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
		S-1	d	W = 11 GS		SP-SM	Brown and gray, very gravelly, fine to coarse SAND with silt and concrete debris up to 12 inches in diameter (medium dense, moist) **(FILL)**	
2		S-2	d			SP-SM	Brown, fine to medium SAND with silt (medium dense, moist) **(RECESSIONAL OUTWASH)**	
4							Grades to gray	
6		S-3	d					
8								
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 8.2 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1467012.01 12/5/22 \\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\T\1467012.010.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Log of Test Pit TP-1

Figure 4

TP-2

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							5 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
						GP-GM	Brown and gray, very sandy, fine to coarse GRAVEL with silt, cobbles, and concrete debris up to 14 inches in diameter (medium dense, moist) **(FILL)**	
2		S-1	d	W = 10 GS				
						SP-SM	Brown, fine to medium SAND with silt (loose to medium dense, moist) **(RECESSIONAL OUTWASH)**	
4		S-2	d				Grades to gray and medium dense	
6								
		S-3	d					
8								
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 8.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1467012.01 12/5/22 \\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\T\1467012.010.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Log of Test Pit TP-2

Figure 5

TP-3

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Measured Excavated By: Howards Const. & Excvtg. Logged By: LGL	
0							6 inches of sod and topsoil (loose, moist) **(TOPSOIL)**	Groundwater not encountered.
		S-1	d			SP-SM	Brown and gray, gravelly, fine to coarse SAND with silt and concrete debris up to 6 inches in diameter (medium dense, moist) **(FILL)**	
						SP-SM	Brown, fine to medium SAND with silt (medium dense, moist) **(RECESSIONAL OUTWASH)**	
2		S-2	d	W = 12 GS				
4							Grades to gray	
6								
8		S-3	d				Grades to fine to coarse and with gravel	
10								
12								

Test Pit Completed 11/14/22
Total Depth of Test Pit = 9.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

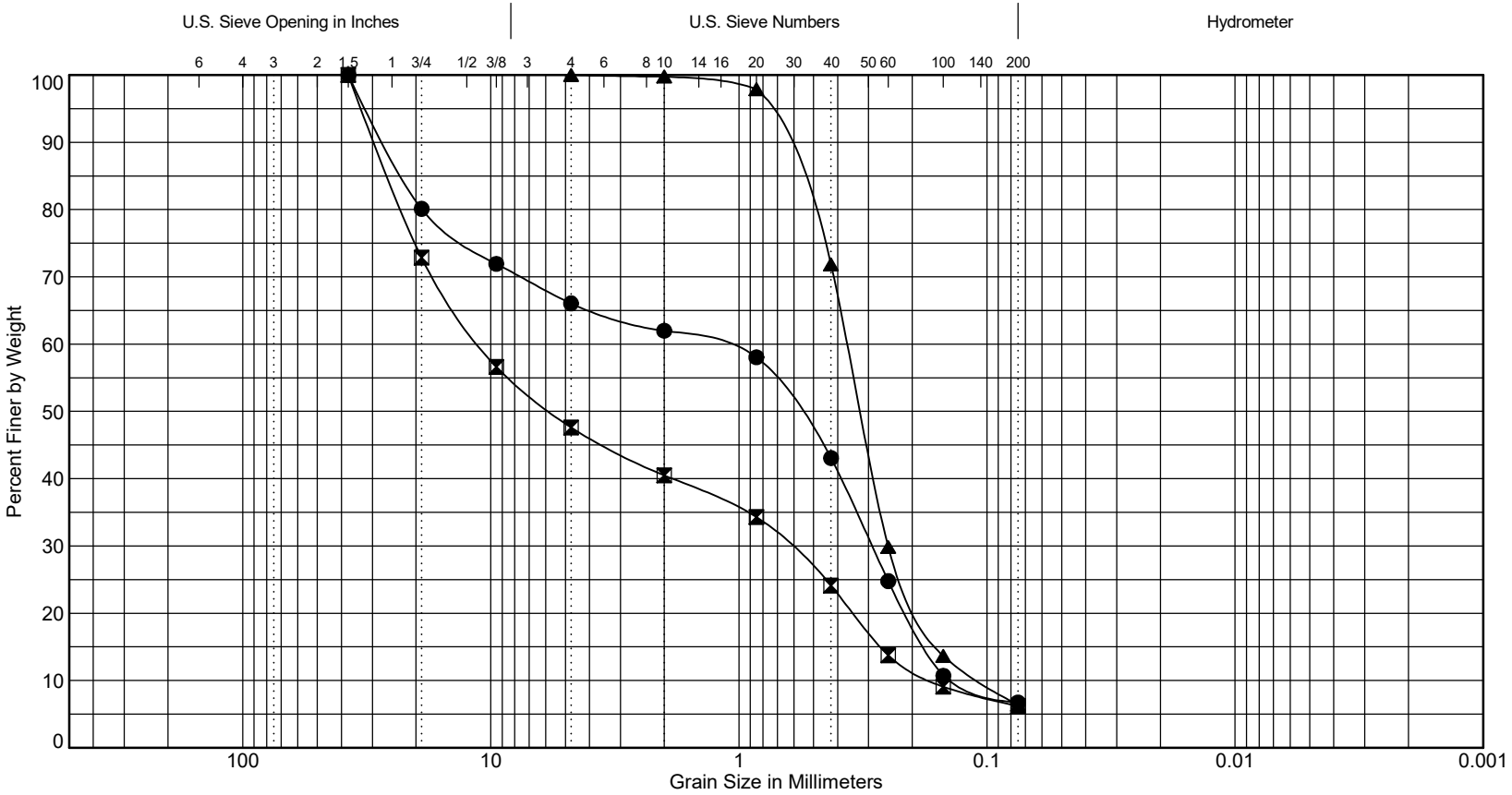
1467012.01 12/5/22 \\OLYMPIA1\PROJECTS\1467\012.010 DISTRICT OFFICE PORTABLE\T\1467012.010.GPJ SINGLE TEST PIT LOG

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Log of Test Pit TP-3

Figure 6



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP-1	S-1	1.3	11	Very gravelly, fine to coarse SAND with silt	SP-SM
⊠	TP-2	S-1	1.8	10	Very sandy, fine to coarse GRAVEL with silt	GP-GM
▲	TP-3	S-2	2.5	12	Fine to medium SAND with silt	SP-SM

LANDAU ASSOCIATES

District Office Portable
Tumwater, Washington

Grain Size Distribution

Figure
7

February 7, 2023

City of Tumwater
Trip Generation Assessment

The intent of this assessment is to provide the City of Tumwater with a trip generation summary and site characteristics for the proposed project herein referred to as LINCS Portable. A project description is provided below.

PROJECT DESCRIPTION

- LINCS Portable proposes for the construction of a 1,904 square foot modular portable (built off-site) located at 621 Linwood Avenue SW (Tumwater School District building). The portable would provide service for 18–21-year-old life skills students in their transition from high school to work. The current on-site LINCS program serves 8 students and 3 staff members. The portable addition would be designed to accommodate 16 students and 5 staff members.

- The LINCS Portable addition is proposed on tax parcel #: 09080004000 which is comprised of 19.15-acres.

- Site ingress/egress is to remain via three access points all extending south from Linwood Avenue SW (one gated).

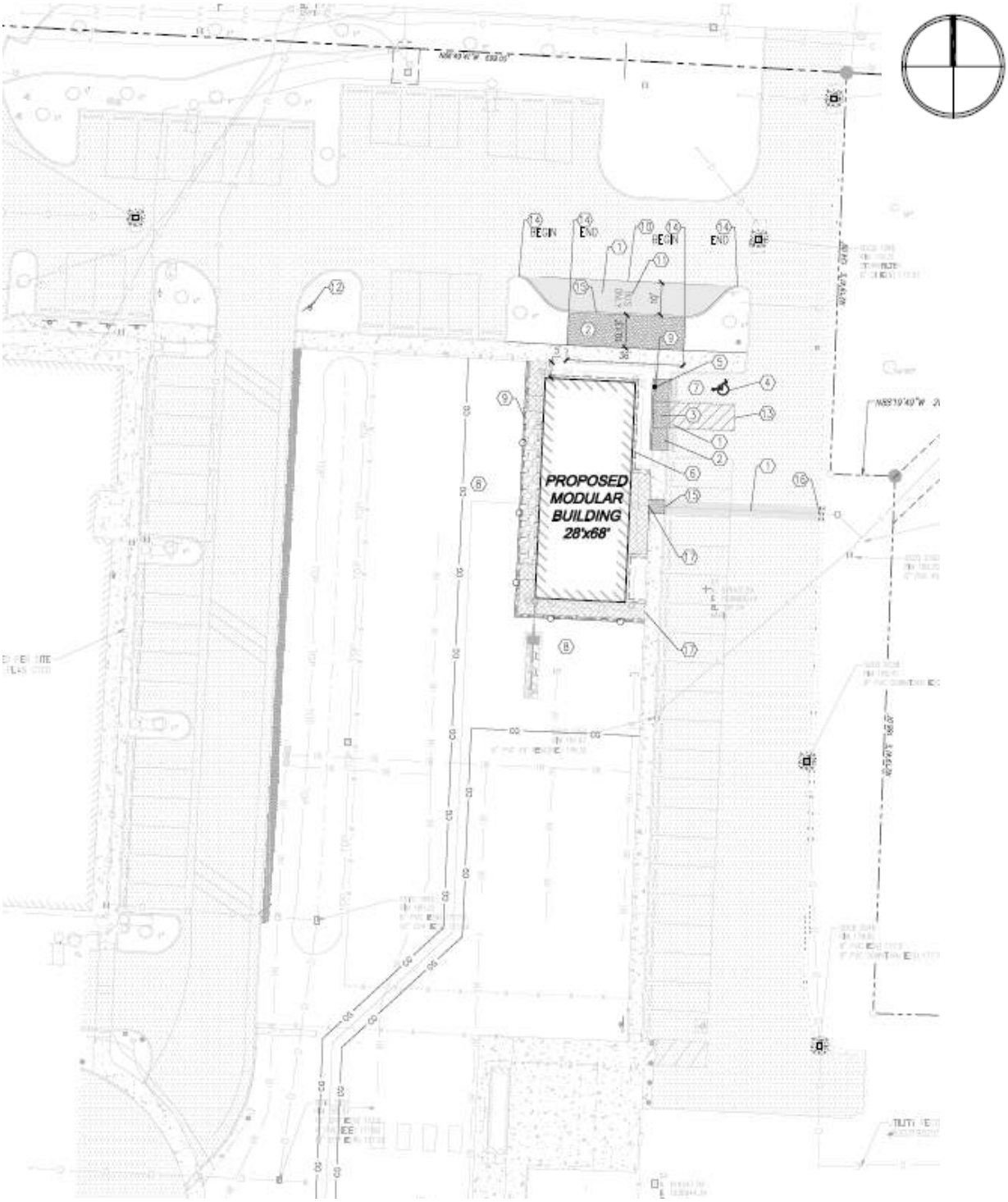
- In conversation with the director of facilities, currently 7 of the 8 students ride a Tumwater School District bus (87.5%), and one student utilizes parent pick-up and drop-off (12.5%). No students would be using a personal vehicle to arrive or depart (students typically don't possess driver licenses). The same transport ratio is expected for the increased student capacity.

- The LINCS school hours would be from 8:00 AM – 1:30 PM and office hours from 7:00 AM – 3:00 PM. No new trips are anticipated between the 4:00-6:00 PM peak period.

- A vicinity map of the surrounding roadway network is provided on the following page with the subject parcel outlined in red. A conceptual site plan is presented on the following page.

Figure 1: Vicinity Map

Figure 2: Site Plan



Illustrated above is the proposed 1,904 square foot LINCS modular portable. A full-sized site plan is available in the appendix.

TRIP GENERATION

Trip Generation is usually estimated by the Institute of Transportation Engineers (ITE) publication, *Trip Generation Manual,* 11th Edition. As this project has a specific use and a known number of students and staff, a custom trip generation has been prepared. As stated previously, 5 staff members and 16 students are anticipated to attend the LINCS Portable project daily. It should be noted that LINCS is presently offered on-site with 3 staff members and 8 students. The proposed portable is intended to allow for an increased capacity and enhance the programs offerings. Therefore, trip generation would be a function of new capacity added to the site (2 staff and 8 students).

The analysis will only account for the AM peak hour as all students and/or staff would be released before the start of the PM peak hour (4:00 PM). In preliminary conversations with the director of facilities, it was stated that currently 7 of the 8 students utilize the provided bus service (87.5%). The same ratio would be expected for the potential 8 student increase resulting in 1 additional parent-student pick-up and drop-off. Remaining students would arrive and depart via the existing busing service.

AM peak hour traffic can therefore be estimated by the following:

AM Peak Hour Traffic

Staff Trips (two new to the site) …..……..……. 2 trips (2 inbound / 0 outbound)
Bus Trips (0 net new bus trips) …...…….……0 trips (0 inbound / 0 outbound)
Student Trips (one net new parent pick-up/drop-off) ….....…....……...2 trips (1 inbound / 1 outbound)

Table 1: Project Trip Generation

Use	Net New	AM Peak-Hour Trips		
		In	Out	Total
LINCS Portable	2 Staff + 8 Students	3	1	**4**

Based on provided data from the school district, the proposed project is estimated to generate approximately 4 trips (3 inbound / 1 outbound) occurring in the AM peak hour 0 trips occurring in the PM peak hour (LINCS school hours are from 8:00 AM – 1:30 PM and office/staff hours are from 7:00 AM – 3:00 PM).

TRIP ASSIGNMENT AND DISTRIBUTION

Travel assignments have been established based on TAZ 965 distribution map provided by TPRC. Figure 3 shows the AM peak hour trip distribution for the estimated project trips proximate to the subject site. Figure 4 illustrates the trip assignments scaled out to the Tumwater Boulevard /I-5 interchange.

It was found that zero trips would traverse the critical Tumwater Boulevard/I-5 interchange given the subject site's vicinity to other freeway access opportunities (Trosper Road SW).

SUMMARY

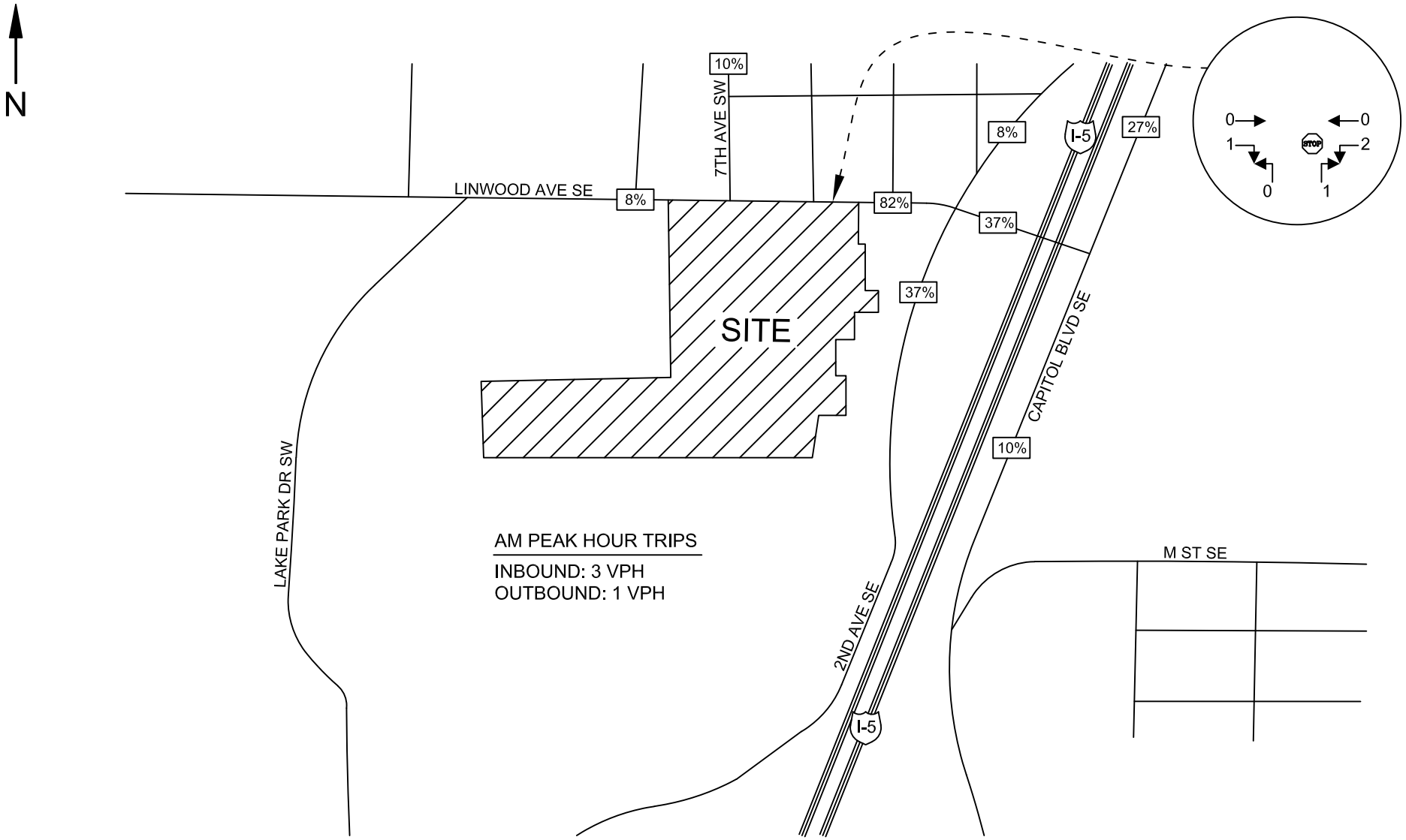
LINCS Portable proposes for the addition of a 1,904 square foot modular portable located at the Tumwater School District site (621 Linwood Avenue SW). The subject site is situated on 19.15-acres on a single tax parcel. The LINCS school hours would be from 8:00 AM – 1:30 PM and the office/staff hours would be from 7:00 AM – 3:00 PM adding no PM peak hour trips to the city's system.

Based on information provided by the school district and accounting for the net increase in students and staff, new activity to and from the subject site are estimated with 4 trips (3 inbound / 1 outbound). Figures 3 and 4 illustrate the trip distribution and assignment. No trips were identified traveling through the Tumwater Boulevard/I-5 interchange.

Please feel free to contact me should you require further information.

Aaron Van Aken, P.E. PTOE

02/07/2023



HEATH & ASSOCIATES

TRANSPORTATION PLANNING & ENGINEERING

LINCS PORTABLE

AM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT

FIGURE 3

HEATH & ASSOCIATES

TRANSPORTATION PLANNING & ENGINEERING

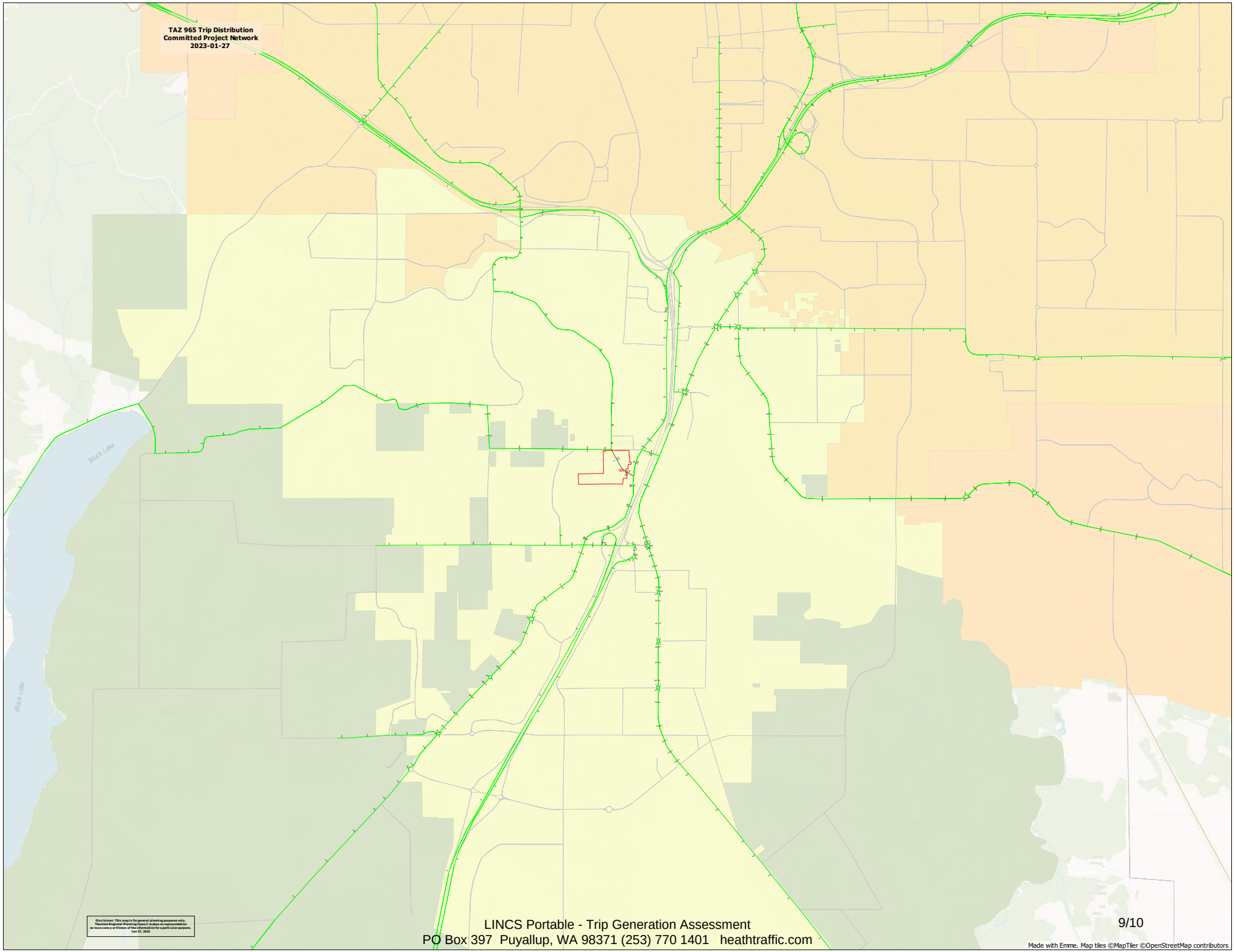
LINCS PORTABLE

TUMWATER BLVD/I-5 INTERCHANGE - AM TRIP DISTRIBUTION
FIGURE 4

LINCS PORTABLE

TRIP GENERATION
ASSESSMENT

APPENDIX



LINCS Portable - Trip Generation Assessment

PO Box 397 Puyallup, WA 98371 (253) 770 1401 heathtraffic.com

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555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4140
Fax: 360-754-4142

Memo

To: Tami Merriman, Permit Manager
Alex Baruch, Associate Planner

From: Mary Heather Ames, Transportation Manager

Date: March 22, 2023

Re: Transportation Concurrency – LINCS Modular Building Transportation Concurrency

Based on the Trip Generation Report prepared for the LINCS Modular Building project, dated October 5, 2022 and the City of Tumwater Capital Facilities Plan, the City finds that the LINCS Modular Building project is concurrent in regards to Transportation conditioned as follows:

1. Shall pay Transportation Impact Fees per the Fee Resolution current at time of permit application.