Permanent Stormwater Control Facilities Operation and Maintenance (O&M) Manual

for:

JM Property Management, LLC

Located at:

1402 Third Street
Sedro-Woolley, Washington

Prepared for:

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Grantor – JM Property Management, LLC
Grantee – Sedro-Woolley Public
Parcel Number(s) – 130474, 113969, 75934, 130475
Assessor Number –
Sec/Twp/Rng – NE ¼, NW ¼, Section 25, Township 35N, Range 04E

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Operation and Maintenance Guidance

Description of Stormwater Facilities

Stormwater from the proposed project will be managed within onsite facilities. Stormwater runoff from building roofs will be infiltrated through bioretention cells. Stormwater runoff from pollution-generating surfaces, and adjacent impervious surfaces, will be infiltrated within permeable pavement.

Maintenance Responsibilities and Requirements

All on-site permanent stormwater facilities shall be maintained in perpetuity in a manner that allows them to function as originally designed. The owner of the property, association, or its designated representative, is solely responsible for the inspection, maintenance, repair and replacement of all permanent stormwater facilities located on site and any and all costs associated therewith. The City of Sedro-Woolley is under no obligation to maintain or repair permanent stormwater facilities located on this site.

The owner, association or its designated representative shall submit an annual operation and maintenance report for the permanent stormwater facilities to the City of Sedro-Woolley Public Works Department on or before March 31st of each year for the previous year's inspection and maintenance activities. The report shall include any remedial actions taken, how the actions were completed, who performed them, any problems encountered, and any required follow-up actions such as maintenance, repair or replacement. Annual report and other maintenance records shall be maintained on-site and available to the City upon request.

The City shall have the right to enter onto the property for inspection and compliance purposes. Should inspection reports (either by the property owner, association or by the City) indicate the permanent stormwater facilities are not being properly maintained or show signs of failure and the property owner has not remedied any maintenance standards exceedances, the City of Sedro-Woolley reserves the right but not the obligation to perform work that is necessary to maintain the permanent stormwater facilities that has not been performed by the property owner, and recover any and all costs so incurred by the City from the property owner. Failure to properly maintain the permanent stormwater facilities may also result in City levied fines in accordance with Sedro-Woolley Municipal Code Title 13, Chapter 13.40.

Maintenance Frequency

Stormwater facilities shall be inspected annually and cleared of debris, sediment and vegetation when they affect the functioning and/or design capacity of the facility.

Maintenance Equipment

- Shovels
- Pressure Washer

Maintenance Responsibilities

Facility	Responsibility
Onsite Storm Drains / Conveyance Systems	Property Owner
Bioretention Cells	Property Owner
Permeable Pavement	Property Owner
Open Space - Landscaping	Property Owner
Public Road and Inlets	City of Sedro-Woolley

The City may, at the City's exclusive discretion, unilaterally assume storm water facilities operations and maintenance responsibilities at the expense of the individual property owner if the City determines that the responsible entity is not inspecting, operating, maintaining, and/or repairing the stormwater facilities per this plan.

Operational Source Control BMPs

Operational Source Control BMPs are non-structural practices that prevent or reduce pollutants from entering stormwater. They include formation of a pollution prevention team, good housekeeping practices, preventive maintenance procedures, spill prevention and cleanup, employee training, inspections of pollution sources, and recordkeeping. The following BMPs must be implemented.

- Assign one or more individuals to be responsible for stormwater pollution control. The Property Owner shall appoint a person as Facility Manager that shall be responsible for

managing and implementing this plan for their portion of the open space and stormwater facilities. The Property Owner may hire a contractor to act as the Facility Manager.

- Promptly contain and cleanup solid and liquid pollutant leaks and spills including oils, solvents, fuels and dust. The Facility Manager will contact the regulatory agencies regarding spill response activities.
- Clean oils, debris, sludge, etc., from all systems regularly. All pavements and storm drain systems shall be inspected for these pollutants in accordance with the Maintenance Schedule.
- Inspect and clean treatment systems, conveyance systems, and catch basins as needed.
- Do not conduct outside spraying, grit blasting, or sanding activities.
- Train all employees in identifying pollutant sources and in understanding pollutant control measures, spill response procedures, and environmentally acceptable material handling practices. The Property Owner or manager shall provide employees with information regarding pollutant control measures and spill response procedures.
- Maintain a Maintenance Log (see Exhibit 1) and keep such record for twenty years per FMC 13.34.020. The log should include: scope of the inspection, the personnel conducting the inspection, the date of the inspection, major observations relating to the implementation of the maintenance plan, and actions taken to correct BMP inadequacies.
- Conduct inspections in accordance with the Operation and Maintenance Log no less than annually.

Structural Source Control BMPs

Structural Source Control BMPs are physical, structural, or mechanical devices or facilities that are intended to prevent pollutants from entering stormwater.

- Maintain the stormwater facilities as per the original design and in proper working order.
- Make changes to the system only when approved by a qualified individual.

Agency Notification Contact Reference List

Agency & Responsibility	Phone Contacts
Fire Department ▪ Fire Fighting ▪ Emergency medical response ▪ Community evaluation	911
Police Department ▪ Police authority	911
Hospital ▪ Emergency medical treatment	911
Washington State Department of Ecology Toxics Cleanup Program Reporting spills to soils	(360) 407-7170
National Response Center ▪ Reporting spills to water	(800) 424-8802
Washington State Emergency Management Division ▪ Reporting spills to water	(800) 258-5990
City of Sedro-Woolley • Public Works	(360) 855-0771

Operation and Maintenance Tasks

Permeable Pavement

Inspections

All permeable pavements should be inspected several times within the first few months after construction and twice annually thereafter. Inspections should be conducted after large storms to check for surface ponding that might indicate local or widespread clogging. If severe clogging occurs, the entire structure may have to be replaced.

Erosion and introduction of sediment from surrounding land uses should be strictly controlled. Surrounding landscape areas should be inspected regularly and possible sediment sources controlled immediately.

Maintenance

The permeable pavement surface should be vacuum swept one to two times per year, followed by high pressure jet hosing to keep the concrete pores open. Hand held pressure washers are effective for cleaning void spaces and appropriate for smaller areas such as sidewalks and permeable concrete parking islands.

Spot clogging of the permeable pavement layer can be relieved by drilling half-inch holes through the porous concrete layer every few feet. In cases where clogging occurs in a low spot in the pavement, it may be advisable to install a drop inlet to route water into the stone reservoir beneath the permeable concrete.

Potholes and cracks can be repaired using conventional, non-porous patching mixes as long as the cumulative area repaired does not exceed 10% of the parking lot area.

Utility cuts should be backfilled with the same aggregate base used under the base permeable paving to allow continued conveyance of stormwater through the base, and to prevent migration of fines from the standard base aggregate to the more open graded permeable base material.

Permeable Pavement

Component	Recommended Frequency a		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course				
Permeable Pavements, all	A, S		Runoff from adjacent pervious areas deposits soil, mulch or sediment on paving	• Clean deposited soil or other materials from permeable pavement or other adjacent surfacing • Check if surface elevation of planted area is too high, or slopes towards pavement, and can be regraded (prior to regrading, protect permeable pavement by covering with temporary plastic and secure covering in place) • Mulch and/or plant all exposed soils that may erode to pavement surface
Porous asphalt or pervious concrete		A or B	None (routine maintenance)	• Clean surface debris from pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: • Walk-behind vacuum (sidewalks) • High efficiency regenerative air or vacuum sweeper (roadways, parking lots) • ShopVac or brush brooms (small areas) • Hand held pressure washer or power washer with rotating brushes • Follow equipment manufacturer guidelines for when equipment is most effective for cleaning permeable pavement. Dry weather is more effective for some equipment.
	Ab		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. To clean clogged pavement surfaces, use one or combination of the following methods: • Combined pressure wash and vacuum system calibrated to not dislodge wearing course aggregate. • Hand held pressure washer or power washer with rotating brushes • Pure vacuum sweepers • Note: If the annual/biannual routine maintenance standard to clean the pavement surface is conducted using equipment from the list above, corrective maintenance may not be needed.
	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding then see above. • Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Pressure wash, vacuum sweep, or use a combination of the two for cleaning moss from pavement surface. May require stiff broom or power brush in areas of heavy moss.
	A		Major cracks or trip hazards and concrete spalling and raveling	• Fill potholes or small cracks with patching mixes • Large cracks and settlement may require cutting and replacing the pavement section. Replace in-kind where feasible. Replacing porous asphalt with conventional asphalt is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function. • Take appropriate precautions during pavement repair and replacement efforts to prevent clogging of adjacent porous materials

a) Frequency: A= Annually; B= Biannually (twice per year); S = Perform inspections after major storm events (24-hour storm event with a 10-year or greater recurrence interval).
b) Inspection should occur during storm event.

Permeable Pavement – Continued

Component	Recommended Frequency a		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Interlocking concrete paver blocks and aggregate pavers		A or B	None (routine maintenance)	• Clean pavement surface using one or a combination of the following methods: • Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Vacuum/sweep permeable paving installation using: • Walk-behind vacuum (sidewalks) • High efficiency regenerative air or vacuum sweeper (roadways, parking lots) • ShopVac or brush brooms (small areas) • Note: Vacuum settings may have to be adjusted to prevent excess uptake of aggregate from paver openings or joints. Vacuum surface openings in dry weather to remove dry, encrusted sediment.
	A b		Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)]	• Review the overall performance of the facility (note that small clogged areas may not reduce overall performance of facility) • Test the surface infiltration rate using ASTM C1701 as a corrective maintenance indicator. Perform one test per installation, up to 2,500 square feet. Perform an additional test for each additional 2,500 square feet up to 15,000 square feet total. Above 15,000 square feet, add one test for every 10,000 square feet. • If the results indicate an infiltration rate of 10 inches per hour or less, then perform corrective maintenance to restore permeability. • Clogging is usually an issue in the upper 2 to 3 centimeters of aggregate. Remove the upper layer of encrusted sediment, and fines, and/or vegetation from openings and joints between the pavers by mechanical means and/or suction equipment (e.g., pure vacuum sweeper). • Replace aggregate in paver cells, joints, or openings per manufacturer's recommendations
	A		Sediment present at the surface of the pavement	• Assess the overall performance of the pavement system during a rain event. If water runs off the pavement and/or there is ponding, then see above. • Determine source of sediment loading and evaluate whether or not the source can be reduced/eliminated. If the source cannot be addressed, consider increasing frequency of routine cleaning (e.g., twice per year instead of once per year).
	Summer		Moss growth inhibits infiltration or poses slip safety hazard	• Sidewalks: Use a stiff broom to remove moss in the summer when it is dry • Parking lots and roadways: Vacuum sweep or stiff broom/power brush for cleaning moss from pavement surface
	A		Paver block missing or damaged	• Remove individual damaged paver blocks by hand and replace or repair per manufacturer's recommendations
	A		Loss of aggregate material between	• Refill per manufacturer's recommendations for interlocking paver sections
	A		Settlement of surface	• May require resetting
Open-celled paving grid with gravel		A or B	None (routine maintenance)	• Remove sediment, debris, trash, vegetation, and other debris deposited onto pavement (rakes and leaf blowers can be used for removing leaves) • Follow equipment manufacturer guidelines for cleaning surface.
	A b		Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate)]	• Use vacuum truck to remove and replace top course aggregate • Replace aggregate in paving grid per manufacturer's recommendations
	A		Paving grid missing or damaged	• Remove pins, pry up grid segments, and replace gravel • Replace grid segments where three or more adjacent rings are broken or damaged • Follow manufacturer guidelines for repairing surface.
	A		Settlement of surface	• May require resetting

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Permeable Pavement – Continued				
Component	Recommended Frequency a		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Surface/Wearing Course (cont'd)				
Open-celled paving grid with gravel	A		Loss of aggregate material in paving grid	• Replenish aggregate material by spreading gravel with a rake (gravel level should be maintained at the same level as the plastic rings or no more than 1/4 inch above the top of rings). See manufacturer's recommendations.
		A	Weeds present	• Manually remove weeds • Presence of weeds may indicate that too many fines are present (refer to Actions Needed under "Aggregate is clogged" to address this issue)

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b) Inspection should occur during storm event.

Bioretention Cells

Note that the inspection and routine maintenance frequencies listed below are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities"

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Facility Footprint				
Earth Side Slopes and Berms	B, S		Erosion (gullies/rills) greater than 2 inches dep around inlets, outlet, and alongside slopes	• Eliminate cause of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control matting) • For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made. • Properly designed, constructed and established facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems persist, the following should be reassessed: (1) flow volumes from contributing areas and bioretention facility sizing; (2) flow velocities and gradients within the facility; and (3) flow dissipation and erosion protection strategies at the facility inlet
	A		Erosion of sides causes slope to become hazard	Take actions to eliminate the hazard and stabilize slopes
	A, S		Settlement greater than 3 inches (relative to undisturbed sections of berm)	Restore to design height
	A, S		Downstream face of berm wet, seeps or leaks evident	Plug any holes and compact berm (may require consultation with engineer, particularly for larger berms)
	A		Any evidence of rodent holes or water piping in berm	• Eradicate rodents (see "Pest Control") • Fill holes and compact (may require consultation with engineer, particularly for larger berms)
Concrete sidewalls	A		Cracks or failure of concrete sidewalls	• Repair/seal cracks • Replace if repair is insufficient
Rockery sidewalls	A		Rockery side walls are insecure	Stabilize rockery sidewalls (may require consultation with engineer, particularly for walls 4 feet or greater in height)
Facility area		All maintenance visits (at least biannually)	Trash and debris are present	Clean out trash and debris
Facility bottom area	A, S		Accumulated sediment to extent that infiltration rate is reduced (see "Ponded water") or surface storage capacity significantly impacted	• Remove excess sediment • Replace any vegetation damaged or destroyed by sediment accumulation and removal • Mulch newly planted vegetation • Identify and control the sediment source (if feasible) • If accumulated sediment is recurrent, consider adding pre-settlement or installing berms to create a fore-bay at the inlet
		During/after fall leaf drop	Accumulated leaves in facility	
Low permeability check dams and weirs	A, S		Sediment, vegetation, or debris accumulated at or blocking (or having the potential to block) check dam, flow control weir or orifice	Clear the blockage
	A, S		Erosion and/or undercutting present	Repair and take preventative measures to prevent future erosion and/or undercutting
	A		Grade board or top of weir damaged or not level	Restore to level position

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Bioretention Cells – Continued

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Facility Footprint (Cont'd)				
Ponded Water	B, S		Excessive ponding water: Water overflow during storms smaller than the design event or ponded water remains in the basin 48 hours after the end of a storm.	Determine cause and resolve in the following order: 1. Confirm leaf or debris buildup in the bottom of the facility is not impeding infiltration. If necessary, remove leaf litter/debris. 2. Ensure that underdrain (if present) is not clogged. If necessary, clean underdrain. 3. Check for other water inputs (e.g. groundwater, illicit connections) 4. Verify that the facility is sized appropriately for the contributing area. Confirm that the contributing area has not increased. If steps #1-4 do not solve the problem, the bioretention soil is likely clogged by sediment accumulation at the surface or has become overly compacted. Dig a small hole to observe soil profile and identify compaction depth or clogging front to help determine the soil depth to be removed or otherwise rehabilitated (e.g. tilled). Consultation with an engineer is recommended.
Bioretention soil media	As needed		Bioretention soil media protection is needed when performing maintenance requiring entrance into the facility footprint	• Minimize all loading in the facility footprint (foot traffic and other loads) to the degree feasible in order to prevent compaction of bioretention soils • Never drive equipment or apply heavy loads in facility footprint • Because the risk of compaction is higher during saturated soil conditions, any type of loading in the cell (including foot traffic) should be minimized during wet conditions. • Consider measures to distribute loading if heavy foot traffic is required or equipment must be placed in facility. As an example, boards may be placed across soil to distribute loads and minimize compaction. • If compaction occurs, soil must be loosened or otherwise rehabilitated to original design state.
Inlets/Outlets/Pipes				
Splash block inlet	A		Water is not being directed properly to the facility and away from the inlet structure	Reconfigure/repair blocks to direct water to facility and away from structure
Curb cut inlet/outlet	M during the wet season and before severe storm is forecasted	Weekly during fall leaf drop	Accumulated leaves at curb cuts	Clear leaves (particularly important for key inlets and low points along long, linear facilities)
Pipe inlet/outlet	A		Pipe is damaged	Repair/replace
	W		Pipe is clogged	Remove roots or debris
	A, S		Sediment, debris, trash, or mulch reducing capacity of inlet/outlet	• Clear the blockage • Identify the source of the blockage and take actions to prevent future blockages
		Weekly during fall leaf drop	Accumulated leaves at inlets/outlets	Clear leaves (particularly important for key inlets and low points along long linear facilities)
		A	Maintain access for inspections	• Clear vegetation (transplant vegetation when possible) within 1 foot of inlets, maintain access pathways • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants
Erosion control at inlet	A		Concentrated flows are causing erosion	Maintain a cover of rock or cobbles or other erosion protection measure (e.g. matting) to protect the ground where concentrated water enters the facility (e.g. a pipe, curb, or swale)

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Bioretention Cells – Continued

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Inlets/Outlets/Pipes (cont'd)				
Trash rack	S		Trash or other debris present on trash rack	Remove/dispose
	A		Bar screen damaged or missing	Repair/replace
Overflow	A, S		Capacity reduced by sediment or debris	Remove sediment or debris/dispose
Underdrain pipe	Clean Pipe as needed	Clean orifice at least biannually	• Plant roots, sediment or debris reducing capacity of underdrain • Prolonged surface ponding (see "Ponded water")	• Jet clean or rotary/roots from underdrain(s) • If underdrains are equipped with a flow restrictor (e.g. orifice) to attenuate flow, the orifice must be cleaned regularly.
Vegetation				
Facility bottom area and upland slope vegetation	Fall and Spring		Vegetation survival rate falls below 75% within first two years of establishment (unless project O&M manual or record drawing stipulates more or less than 75% survival rate).	• Determine cause of poor vegetation growth and correct condition • Replant as necessary to obtain 75% survival rate or greater. Refer to original planting plan, or approved jurisdictional species list for appropriate plan replacements (See Appendix 3- Bioretention Plant List, in the LID Technical Guidance Manual for Puget Sound). • Confirm that plant selection is appropriate for site growing conditions • Consultation with a landscape architect recommended for removal, transplant, or substitution of plants
Vegetation (general)	As needed		Presence of diseased plants and plant material	• Remove any diseased plants or plant parts and dispose of in an approved location (e.g. commercial landfill) to avoid risk of spreading the disease to other plants • Disinfect gardening tools after pruning to prevent the spread of disease • See Pacific Northwest Plant Disease Management Handbook for information on disease recognition and for additional resources • Replant as necessary according to recommendations provided for "facility bottom area and upland slope vegetation".
Trees and shrubs		All pruning seasons (timing varies by species)	Pruning as needed	• Prune trees and shrubs in a manner appropriate for each species. Pruning should be performed by landscape professionals familiar with proper pruning techniques. • All pruning of mature trees should be performed by or under the direct guidance of an ISA certified arborist.
	A		Large trees and shrubs interfere with operation of the facility or access for maintenance	• Prune trees and shrubs using most current ANSI A300 standards and ISA BMP's. • Remove trees and shrubs, if necessary.
	Fall and Spring		Standing dead vegetation is present	• Remove standing dead vegetation • Replace dead vegetation within 30 days of reported dead and dying plants (as practical depending on weather/planting season) • If vegetation replacement is not feasible within 30 days, and absence of vegetation may result in erosion problems, temporary erosion control measures should be put in place immediately. • Determine cause of dead vegetation and address issue, if possible • If specific plants have a high mortality rate, assess the cause and replace with appropriate species. Consultation with a landscape architect is recommended.
	Fall and Spring		Planting beneath mature trees	• When working around and below mature trees, follow the most current ANSI A3000 standards and ISA BMPs to the extent practicable (e.g. take care to minimize any damage to tree roots and avoid compaction of soil). • Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases; such plantings should use mainly plants that come as bulbs, bare root or in 4-inch pots; plants should be in no large than 1-gallon containers

Bioretention Cells – Continued

Note that the inspection and routine maintenance frequencies listed below are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities"

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Vegetation (cont'd)				
Trees and shrubs (cont'd)	Fall and Spring		Planting beneath trees	• When working around and below mature trees, follow the most current ANSI A300 standards and ISA BMPs to the extent practicable (e.g. take care to minimize any damage to tree roots and avoid compaction of soil). • Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases; such plantings should use mainly plants that come as bulbs, bare root or in 4-inch pots; plants should be in no larger than 1-gallon containers.
	Fall and Spring		Presence of or need for stakes and guys (tree growth, maturation, and support needs)	• Verify location of facility liners and underdrain (if any) prior to stake infiltration in order to prevent liner puncture or pipe damage • Monitor tree support systems: Repair and adjust as needed to provide support and prevent damage to tree. • Remove tree supports (stakes, guys, etc.) after one growing season or maximum of 1 year. • Backfill stake holes after removal.
Trees and shrubs adjacent to vehicle travel areas (or areas where visibility needs to be maintained)	A		Vegetation causes some visibility (line of sight) or driver safety issues	• Maintain appropriate height for sight clearance • When continued, regular pruning (more than one time/growing season) is required to maintain visual sight lines for safety or clearance along a walk or drive, consider relocating the plant to a more appropriate location. • Remove or transplant if continual safety hazard • Consultation with a landscape architect is recommended for removal, transplant, or substitution of plants
Flowering plants		A	Dead or spent flowers present	• Remove spent flowers (deadhead)
Perennials		Fall	Spent plants	• Cut back dying or dead and fallen foliage and stems
Emergent vegetation		Spring	Vegetation comprises conveyance	• Hand rake sedges and rushes with a small rake or fingers to remove dead foliage before new growth emerges in spring or earlier if the foliage is blocking water flow (sedges do not respond well to pruning)
Ornamental grasses (perennial)		Winter and Spring	Dead material from previous year's growing cycle or dead collapsed foliage	• Leave dry foliage for winter interest • Hand rake with a small rake or fingers to remove dead foliage back to within several inches from the soil before new growth emerges in spring or earlier if the foliage collapses and is blocking water flow
Ornamental grasses (evergreen)		Fall and Spring	Dead growth present in Spring	• Hand rake with a small rake or fingers to remove dead growth before new growth emerges in Spring • Clean, rake, and comb grasses when they become too tall • Cut back to ground or thin every 2-3 years as needed
Noxious weeds		M (March-October, preceding seed dispersal)	Listed noxious vegetation is present (refer to current county noxious weed list)	• By law, class A & B noxious weeds must be removed, bagged and disposed as garbage immediately • Reasonable attempts must be made to remove and dispose of class C noxious weeds • It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality; use of herbicides and pesticides may be prohibited in some jurisdictions • Apply mulch after weed removal (see "Mulch")

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Bioretention Cells – Continued

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Vegetation (cont'd)				
Weeds		M (March-October, preceding seed dispersal)	Weeds are present	• Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate • Follow IPM protocols for weed management (see "Additional Maintenance Resource" section for more information on IPM protocols)
Excessive Vegetation		Once in early to mid-May and once in early-to mid-September	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	• Edge or trim groundcovers and shrubs and facility edge • Avoid mechanical blade-type edger and do not use edge or trimmer within 2 feet of tree trunks • While some clippings can be left in the facility to replenish organic material in the soil, excessive leaf litter can cause surface soil clogging
	As needed		Excessive vegetation density inhibits stormwater flow beyond design ponding or becomes a hazard for pedestrian and vehicular circulation and safety	• Determine whether pruning or other routine maintenance is adequate to maintain proper plant density and aesthetics • Determine if planting type should be replaced to avoid ongoing maintenance issues (an aggressive grower under perfect growing conditions should be transplanted to a location where it will not impact flow) • Remove plants that are weak, broken or not true to form; replace in-kind • Thin grass or plants impacting facility function without leaving visual holes or bare soil areas • Consultation with a landscape architect is recommended for removal, transplant or substitution of plants
	As needed		Vegetation blocking curb cuts, causing excessive sediment build up and flow bypass	• Remove vegetation and sediment buildup
Mulch				
Mulch		Following weeding	Bare sports (without mulch cover) are present or mulch depth less than 2 inches	• Supplement mulch with hand tools to a depth of 2 to 3 inches • Replenish mulch per O&M manual. Often coarse compost is used in the bottom of the facility and arborist wood chips are used on side slopes and rim (above typical water levels) • Keep all mulch away from woody stems
Watering				
Irrigation system (if necessary)		Based on manufacturer's instructions	Irrigation system present	• Follow manufacturer's instructions for O&M
	As needed		Sprinklers or drip irrigation not directed/located to properly water plants	• Redirect sprinklers or move drip irrigation to desired areas

• Bioretention Cells – Continued				
Summer watering (first year)		Once every 1-2 weeks or as needed during prolonged dry periods	Trees, shrubs and groundcovers in first year of establishment period	• 10 to 15 gallons per tree • 3 to 5 gallons per shrub • 2 gallons water per square foot for groundcover areas • Water deeply, but infrequently, so that the top 6 to 12 inches of the root zone is moist • Use soaker hoses or spot water with a shower type wand when irrigation system is not present • Pulse water to enhance soil absorption, when feasible • Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by serval more passes. With this method, each pass increases soil absorption and allows more water to infiltrate prior to runoff • Add a tree bag or slow release water device (e.g. bucket with a perforated bottom) for water newly installed trees when irrigation system is not present

Bioretention Cells – Continued

Note that the inspection and routine maintenance frequencies listed below are recommended by Ecology. They do not supersede or replace the municipal stormwater permit requirements for inspection frequency required of municipal stormwater permittees for "stormwater treatment and flow control BMPs/facilities"

Maintenance Component	Recommended Frequency [A]		Condition when Maintenance is Needed (Standards)	Action Needed (Procedures)
	Inspection	Routine Maintenance		
Watering (cont'd)				
Summer watering (second and third years)		Once every 2-4 weeks or as needed during prolong dry periods	Trees, shrubs and groundcovers in second or third year of establishment period	• 10 to 15 gallons per tree • 3 to 5 gallons per shrub • Water deeply, but infrequently, so that the top 6 to 12 inches of the root is moist • Use soaker hoses or spot water with a shower type wand when irrigation system is not present • Pulse water to enhance soil absorption, when feasible • Pre-moisten soil to break surface tension of dry or hydrophobic soils/mulch, followed by several more passes. With this method, each pass increases soil absorption and allows more water to infiltrate prior to runoff
Summer watering (after establishment)		As needed	Established vegetation (after 3 years)	• Plants are typically selected to be drought tolerant and not require regular watering after establishment; however, trees may take up to 5 years to become fully established • Identify trigger mechanisms for drought-stress (e.g. leaf senescence, etc.) or different species and water immediately after initial signs of stress appear
Pest Control				
Mosquitos	B, S		Standing water remains for more than 3 days after the end of a storm	• Identify the cause of the standing water and take appropriate actions to address the problem (see "Ponded water") • To facilitate maintenance, manually remove standing water and direct to the storm drainage system (if runoff is from non-pollution-generating surfaces) or sanitary sewer system (if runoff is from pollution-generating surfaces) after getting approval from sanitary sewer authority. • Use of pesticides or Bacillus thuringiensis israelensis (Bti) may be considered only as a temporary measure while addressing the standing water cause.
Nuisance Animals	As needed		Nuisance animals causing erosion, damaging plants, or depositing large volumes of feces	• Reduce site conditions that attract nuisance species where possible (e.g. plant shrubs and tall grasses to reduce open areas for geese, etc.) • Place predator decoys • Follow IPM protocols for specific nuisance animal issues (see "Additional Maintenance Resources" section for more information on IPM protocols) • Remove pet waste regularly • For public and right-of-way sites consider adding garbage cans with a dog bags for picking up pet waste.
Insect Pests	Every site visit associated with vegetation management		Signs of pests, such as wilting leaves, chewed leaves and bark, spotting or other indicators	• Reduce hiding places for pests by removing diseased and dead plants • For infestation, follow IPM protocols (see "Additional Maintenance Resources" section for more information on IPM protocols)

[A] Frequency A = Annually; B = Biannually (twice per year); M= Monthly; W= At least one visit should occur during the wet seasons (for debris/clog related maintenance, this inspection/maintenance visit should occur in the early fall, after deciduous trees have lost their leaves); S= Perform inspection after major storm events (24-hour storm event with a 10-year or greater reoccurrence interval).

IPM - Integrated Pest Management

ISA - International Society of Arboriculture

Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash & Debris (Includes Sediment)	Trash or debris of more than 1/2 cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the basin by more than 10%	No Trash or debris located immediately in front of catch basin opening.
		Trash or debris (in the basin) that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume	No condition present which would attract or support the breeding of insects or rodents.
	Structure Damage to Frame and/or Top Slab	Corner of frame extends more than 3/4 inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (intent is to make sure all material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in Basin Walls/ Bottom	Cracks wider than 1/2 inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Cracks wider than 1/2 inch and longer than 1 foot at the joint of any inlet/ outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Sediment/ Misalignment	Basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.

Catch Basins (continued)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Fire Hazard	Presence of chemicals such as natural gas, oil and gasoline.	No flammable chemicals present.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Pollution	Nonflammable chemicals of more than 1/2 cubic foot per three feet of basin length.	No pollution present other than surface film.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by on maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying 80 lbs. of lift; intent is keep cover from sealing off access to maintenance.	Cover can be removed by one maintenance person.
Metal Grates (If Applicable)	General	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

Conveyance Systems

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & Debris	Accumulated sediment that exceeds 20% of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
	Vegetation	Vegetation that reduces free movement of water through pipes.	All vegetation removed so water flows freely through pipes.
	Damaged	Protective coating is damaged; rust is causing more than 50% deterioration to any part of pipe.	Pipe repaired or replaced.
		Any dent that decreases the cross section area of pipe by more than 20%.	Pipe repaired or replaced.
Open Ditches	Trash & Debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment	Accumulated sediment that exceeds 20 % of the design depth.	Ditch cleaned/ flushed of all sediment and debris so that it matches design.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion Damage to Slopes	See "Ponds" Standard	See "Ponds" Standard
	Rock Lining Out of Place or Missing (If Applicable).	Maintenance person can see native soil beneath the rock lining.	Replace rocks to design standards.
Catch Basins		See "Catch Basins: Standard	See "Catch Basins" Standard
Debris Barriers (e.g., Trash Rack)		See "Debris Barriers" Standard	See "Debris Barriers" Standard

Grounds

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Weeds (Nonpoisonous)	Weeds growing in more than 20% of the landscaped area (trees and shrubs only).	Weeds present in less than 5% of the landscaped area.
	Safety Hazard	Any presence of poison ivy or other poisonous vegetation.	No poisonous vegetation present in landscaped area.
	Trash or Litter	Paper, cans, bottles, totaling more than 1 cubic foot within a landscaped area (trees and shrubs only) of 1,000 square feet.	Area clear of litter.
Trees and Shrubs	Damaged	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trees and shrubs with less than 5% of total foliage with split or broken limbs.
		Trees or shrubs that have been blown down or knocked over.	Tree or shrub in place free of injury.
		Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Tree or shrub in place and adequately supported; remove any dead or diseased trees.

Disposal of Trash Debris and Sediment

Trash and Debris

Small amounts of trash and debris can be put into a solid waste container. Large amounts may require hiring a vendor to dispose of the material. If using a vendor, ensure that the vendor properly disposes of waste.

Sediment

1. Clean sediment may be used as landscape material or sent to yard waste recyclers.
2. Sediment that does not appear to be heavily contaminated with oil or grease can be double bagged and put into a solid waste container. Material that appears to be heavily contaminated must be disposed of by a qualified vendor.

Annual Stormwater Maintenance Log

Component	Comments/Defects/Action Taken	Action By	Action Date

Inspection Conducted By: _____

Date of Inspection: _____

Additional Comments: _____

PERMANENT STORMWATER FACILITY ANNUAL REPORTING FORM

City of Sedro-Woolley
Public Works Department
RE: Permanent Stormwater Facilities – Annual Reporting
325 Metcalf Street, Sedro-Woolley, WA 98284
Phone: 360-855-0771

This form must be completed and the certification signed by the Owner, its administrator, executor, successor, heir or assign. One signed copy of the completed Annual Report, including attachments, shall be submitted to the Public Works Department by March 31st for the year prior.

GENERAL INFORMATION		
Owner Name (☐ check if new):	**Reporting Period:** Jan. 1st to Dec 31st * Reports for each year are due to the City by Mar. 31st of the following year.	
Facility Address:		
Contact Person (☐ check if new) **Name:** **Phone Number(☐ check if new):** **Mailing Address (☐ check if new):**		
Have there been any major changes to or maintenance on the BMPs?	☐YES	☐NO
Does the BMP have any major deficiencies?	☐YES	☐NO
Do you have an updated Inspection and Maintenance Plan?	☐YES	☐NO

"I certify that to the best of my knowledge and belief the maintenance and inspection of the permanent BMPs is being implemented in accordance to the Stormwater Facility Operation and Maintenance Plan for this property or that a notice of any deficiencies has been provided."

Signature _____ Date _____

ATTACHMENTS:
Inspection Log/Certification

[Attach additional information as needed. Remedial actions taken, how they were completed, and who performed them. Deficiencies to the BMPs, or problems encountered.]

Construction Plans

1402 THIRD STREET: CIVIL IMPROVEMENTS

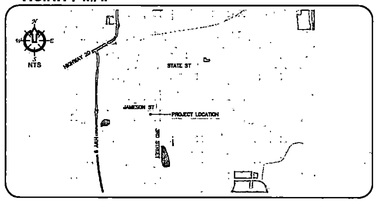
A PORTION OF NE 1/4 , NW 1/4, SECTION 25, TOWNSHIP 35 NORTH, RANGE 4 EAST, W.M.
SKAGIT COUNTY, WASHINGTON

LEGEND

- FOUND BRASS MON
- FOUND ALUMINUM CAP MON
- FOUND CONC MON
- FOUND SQARE CONC MON
- FOUND REBAR AND CAP
- SET 1/2" REBAR W/ PLASTIC CAP
- FOUND IRON PIPE
- FOUND HUB AND TACK
- FOUND PK NAIL
- FOUND PK NAIL AND TAG/SHINER
- FOUND RR SPIKE
- EXISTING STORM DRAIN CATCH BASIN (TYPE I)
- EXISTING STORM DRAIN CATCH BASIN (TYPE 2)
- EXISTING STORM DRAIN MANHOLE (TYPE 2) (SOLID LID)
- EXISTING STORM DRAIN AREA DRAIN
- EXISTING STORM DRAIN CLEANOUT
- EXISTING STORM DRAIN SERVICE
- PROPOSED RAINLEADER/DOWNSPOUT
- PROPOSED AREA DRAIN
- PROPOSED STORM DRAIN SERVICE
- PROPOSED STORM DRAIN CLEANOUT
- PROPOSED STORM DRAIN CATCH BASIN
- PROPOSED STORM DRAIN MANHOLE (TYPE 2)
- EXISTING SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER CLEANOUT
- EXISTING SANITARY SEWER SERVICE
- PROPOSED SANITARY SEWER SERVICE
- PROPOSED SEWER CLEANOUT
- PROPOSED SEWER MANHOLE
- EXISTING WATER SERVICE CONNECT
- EXISTING FIRE STAND PIPE
- EXISTING WATER BLOW-OFF VALVE
- EXISTING WATER METER BOX
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- EXISTING WATER VALVE BOXES
- PROPOSED WATER SERVICE CONNECT
- PROPOSED WATER METER BOX
- PROPOSED WATER VALVE
- PROPOSED WATER BLOW-OFF
- PROPOSED FIRE HYDRANT
- PROPOSED FIRE DEPARTMENT CONNECTION
- PROPOSED POST INDICATOR VALVE
- PROPOSED WATER BEND
- PROPOSED THRUST BLOCK
- PROPOSED TEE OR CROSS
- EXISTING POWER/AND OR UTILITY POLE
- EXISTING POWER/AND OR UTILITY POLE
- EXISTING GUY POLE
- EXISTING GUY WIRE
- EXISTING POWER METER/STRUCTURE
- EXISTING POWER VAULT
- EXISTING POWER JBOX/HANDHOLD
- EXISTING LIGHT POLE
- PROPOSED LIGHT POLE
- EXISTING UTILITY POLE
- EXISTING TV BOX
- EXISTING TELEPHONE PEDESTAL
- EXISTING TELEPHONE MANHOLE
- EXISTING MAIL BOX
- EXISTING SIGN
- PROPOSED SIGN
- EXISTING FLAG POLE
- EXISTING LANDSCAPING
- EXISTING GAS METER
- PROPOSED FLOW DIRECTION ARROW
- ADA PARKING SPACE
- PAVEMENT MARKINGS
- DETAIL CALLOUT

- EXISTING OVERHEAD ELECTRIC LINES
- EXISTING FIBER OPTIC LINE
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD PHONE
- EXISTING UNDERGROUND PHONE
- EXISTING OVERHEAD UTILITES (UNKNOWN)
- EXISTING UNDERGROUND TV CABLE
- EXISTING GAS MAIN
- PROPOSED GAS LINE
- EXISTING WATER LINE
- EXISTING FIRE MAIN
- PROPOSED WATER LINE
- PROPOSED IRRIGATION LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SEWER FORCE MAIN
- PROPOSED SANITARY SEWER LINE
- PROPOSED SANITARY SEWER FORCE LINE
- EXISTING FLOW LINE & DIRECTION
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE (SOLID WALL)
- PROPOSED STORM DRAIN LINE (PERFORATED)
- PROPOSED FOUNDATION DRAIN
- PROPOSED ROOF DRAIN
- EXISTING CHAIN LINK FENCE
- PROPOSED CHAIN LINK FENCE
- EXISTING BARBED WIRE FENCE
- PROPOSED BARBED WIRE FENCE
- EXISTING FENCE TYPE
- EXISTING FENCE TYPE
- EXISTING CONC. FENCE OR RET. WALL
- EXISTING STONE WALL
- EXISTING ORDINARY HIGH WATER LINE
- EXISTING TOP OF BANK
- EXISTING TOE OF BANK
- PROPOSED TOP OF BANK
- PROPOSED TOE OF BANK
- EXISTING CONTOUR (INDEX)
- EXISTING CONTOUR (NORMAL)
- PROPOSED CONTOUR (INDEX)
- PROPOSED CONTOUR (NORMAL)
- PROPOSED DAYLIGHT FILL LINE
- PROPOSED DAYLIGHT CUT LINE
- EXISTING SPOT ELEV @ TOP OF PAVEMENT
- EXISTING SPOT ELEV @ EDGE OF PAVEMENT
- EXISTING SPOT ELEV @ EDGE OF CONC WALK
- EXISTING SPOT ELEV @ TOP OF GROUND
- EXISTING SPOT ELEV @ EDGE OF GRAVEL
- EXISTING SPOT ELEV @ FACE OF CURB
- EXISTING SPOT ELEV @ TOP BACK OF SIDEWALK
- EXISTING SPOT ELEV @ TOP OF CONC WALK OR WALL
- TS 17.20 = PROPOSED SPOT ELEV @ TOP OF SIDEWALK
- TP 17.20 = PROPOSED SPOT ELEV @ TOP OF PAVEMENT
- TC 17.20 = PROPOSED SPOT ELEV @ TOP OF CURB
- FG 17.20 = PROPOSED SPOT ELEV @ TOP OF FINISHED GRADE
- PROPOSED ASPHALT PAVEMENT
- PROPOSED PAVEMENT REPAIR
- PROPOSED CONCRETE
- PROPOSED PERMEABLE CONCRETE

VICINITY MAP



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FAX: (360) 424-8784
demers@skagitpud.com

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BURLINGTON, WA 98233
TEL: (360) 766-5628
MOB: (425) 324-0223
CONTACT: mike.judy@pse.com

UTILITY LOCATE
PHONE: 811

CITY OF SEDRO-WOOLLEY

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FAX: (360) 855-1733
JOHN COLEMAN, PLANNING DIRECTOR
jcoleman@ci.sedro-woolley.wa.us

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kwynn@sedro-woolley.gov

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ASSISTANT FIRE CHIEF JERRY GARDENER
(360) 855-2252
jgardener@sedro-woolley.gov

ABBREVIATIONS

1'/1"	ONE FOOT/ONE INCH
AD	ABSOLUTE VALUE OF THE ALGEBRAIC GRADE DIFFERENCE
AF#	AUDITORS FILE NUMBER
ASPH	ASPHALT
BLDG	BUILDING
BVCS	BEGINNING OF VERTICAL CURVE STATION
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
C	COMPACT PARKING STALL
CB	CATCH BASIN
CDF	CONTROLLED DENSITY FILL
CJ	CONTROL JOINT
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CNTRL	CONTROL
CO	CLEANOUT
COR	CORNER
CPLG	COUPLING
CPP	CORRUGATED POLYETHYLENE PIPE
CONC	CONCRETE
CULV	CULVERT
Ø	DIAMETER
DEMO	DEMOLITION
DF	DRAINFIELD
DI	DUCTILE IRON
EA	EACH
EL/ELEV	ELEVATION
EP/EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EVCS	END OF VERTICAL CURVE STATION
EVCE	END OF VERTICAL CURVE ELEVATION
EX/EXIST	EXISTING
EXP	EXPANSION JOINT/COLD JOINT
FFE	FINISH FLOOR ELEVATION
FG	FINISH GRADE
FM	FORCE MAIN
FND	FOUND
GAL	GALLON
GUTT	GUTTER
HE	HEARING EXAMINER
HB	HOSE BIB
HDPE	HIGH DENSITY POLYETHYLENE PIPE
INV	INVERT
IE	INVERT ELEVATION
IRRIG	IRRIGATION
K	LENGTH OF VERTICAL CURVE PER PERCENT GRADE DIFFERENCE
LF	LINEAR FOOT
MAX	MAXIMUM
MIN	MINIMUM
MON	MONUMENT
No./#	NUMBER
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE
PCL	PARCEL
PERF	PERFORATED
PI	POINT OF INTERSECTION
POB	POINT OF BEGINNING
PP	POWER POLE/UTILITY POLE
PROP	PROPERTY
PT/P.O.T.	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INFLECTION
R	RADIUS
R/C	REBAR WITH CAP
RIM	RIM
RCP	REINFORCED CONCRETE PIPE
RET	RETAINING
ROW	RIGHT OF WAY
RPP	REDUCED PRESSURE PRINCIPAL
RR	RAILROAD
SD	STORM DRAIN
SDCB	STORM DRAIN CATCH BASIN
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
ST	STREET
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TEL/TELE	TELEPHONE
TP	TOP OF PAVEMENT
TS	TOP OF SIDEWALK
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
VC	VERTICAL CURVE

SHEET INDEX

CITY OF SEDRO-WOOLLEY APPROVED PLANS

PERMIT # #2023-088
ADDRESS 1402 THIRD STREET
APPROVAL DATE ______

APPROVED FOR CONSTRUCTION

Signature ______ Sedro-Woolley Public Works Dept. ______ Date
Signature ______ Sedro-Woolley Planning Dept. ______ Date
Signature ______ Sedro-Woolley Fire Dept. ______ Date

THIS PLAN SHEET IS APPROVED FOR CONSTRUCTION IN ACCORDANCE WITH THE CITY OF SEDRO-WOOLLEY ORDINANCES AND POLICIES. THIS PLAN SHEET DOES NOT IMPLY OR CONVEY PERMISSION TO CONSTRUCT ANY ITEM UNLESS ACCOMPANIED BY AN APPROVED PERMIT COVERING THE WORK. ALL PERMITS MUST BE ON CITY APPROVED FORM REVIEWED FOR COMPLIANCE TO CITY CODES. ACTUAL CONFORMANCE OF THE DESIGN WITH APPLICABLE LAWS IS THE SOLE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE NAME AND STAMP APPEAR ON THIS SHEET. ACQUIRING, COMPLYING WITH AND PROVIDING MITIGATION FOR ALL FEDERAL, STATE, COUNTY AND LOCAL LAWS, PERMITS AND MANDATES, INCLUDING BUT NOT LIMITED TO THE ENDANGERED SPECIES ACT, FEDERAL WETLAND PERMIT, STATE DEPARTMENT OF FISHERIES HYDRAULICS PERMIT, FEDERAL FLOOD PLAIN PERMITS, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS IS THE RESPONSIBILITY OF THE DEVELOPER, LANDOWNER, AND THEIR ENGINEER. THE ISSUANCE OF THIS PLAN SHALL NOT BE CONSTRUED AS PROOF OF COMPLIANCE WITH APPLICABLE LAWS AND PERMIT REQUIREMENTS.

Signature ______ Sedro-Woolley Public Works Dept. ______ Date

This approval will expire in one year from the date noted above

JOB ID# CP16453
P.U.D NO. 1 OF SKAGIT COUNTY
ENGINEERING DEPARTMENT APPROVAL

This plan has been reviewed and accepted by District staff for compliance with District Standards and resolutions only. The project design and/or engineering were not analyzed and the District does not make any certifications or representations as to the completeness or accuracy of the information presented.

District Engineering Manager ______ Date ______

FREELAND & ASSOCIATES

CLIENT: JM PROPERTY MANAGEMENT

CALL BEFORE YOU DIG FOR BURIED UTILITY LOCATIONS 1-800-424-5555

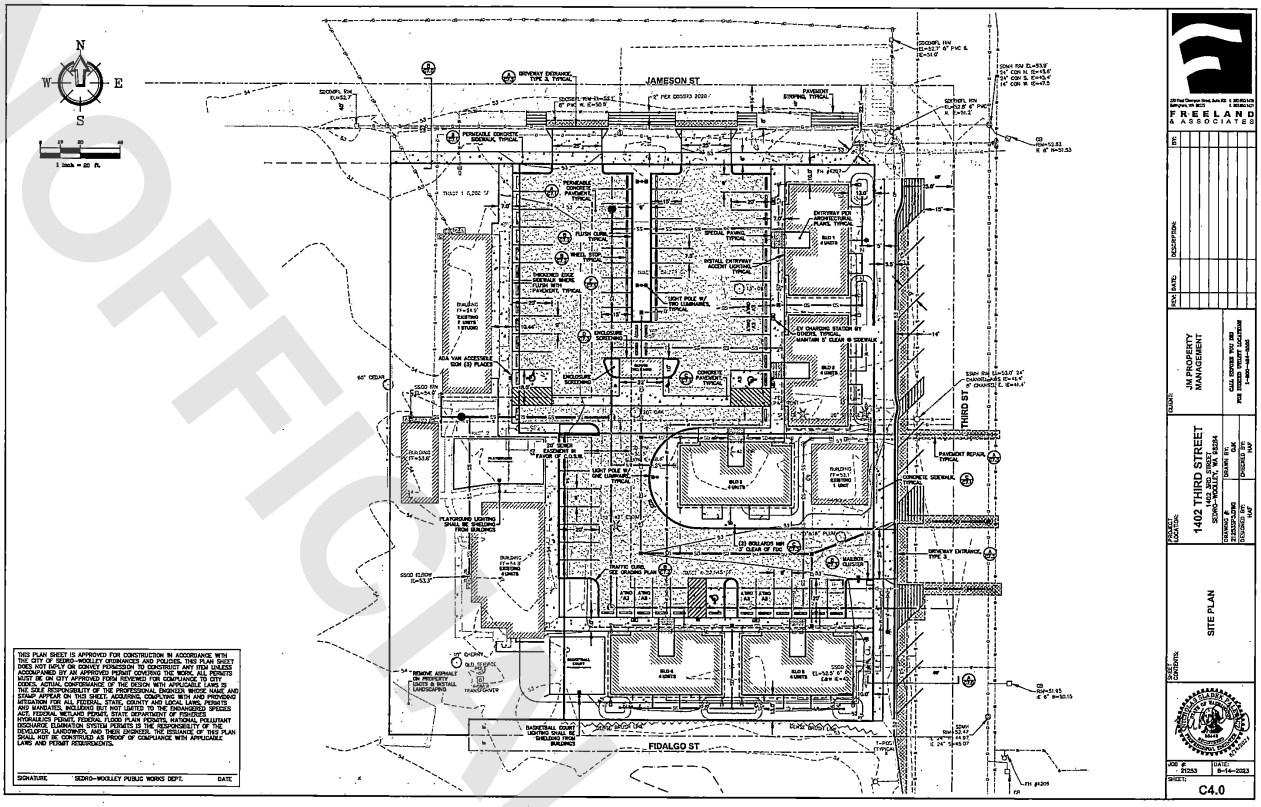
PROJECT LOCATION: 1402 THIRD STREET
1402 3RD STREET
SEDRO-WOOLLEY, WA 98284

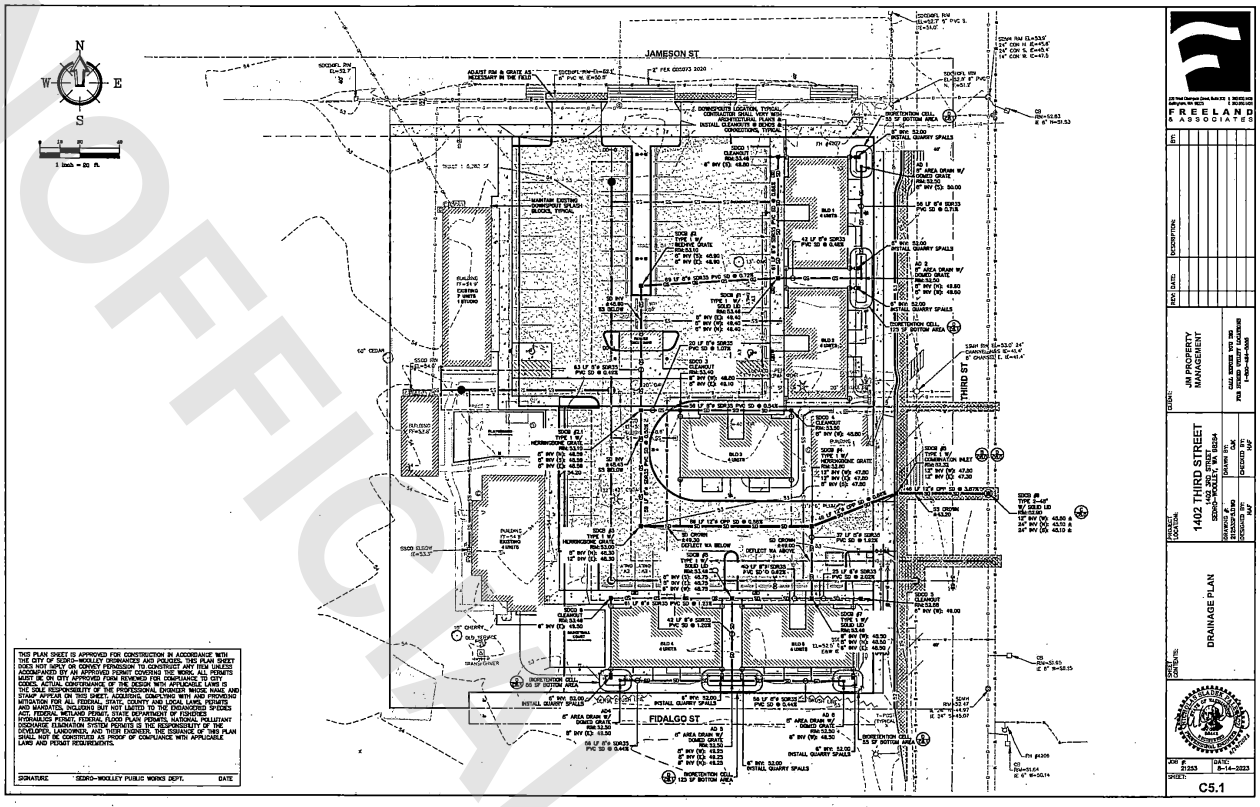
DRAWING #: 21253SP5.DWG
DRAWN BY: GJK
DESIGNED BY: HAF
CHECKED BY: HAF

SHEET CONTENTS: COVER SHEET

NICHOLAS SLADEK PALEWICZ
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
8/14/2023

JOB #: 21253
DATE: 8-14-2023
SHEET: C1.0





GENERAL NOTES

1. ALL DEPTHS REPRESENT COMPACTED DEPTHS.
2. CONTROL JOINTS (TOOLED) SHALL BE 10' O.C. MAXIMUM. CONTROL JOINTS SHALL BE 1/4 DEPTH OF SLAB. ALL CONSTRUCTION JOINTS SHALL BE DOWELED.
3. AFTER GRADING, THE EXISTING SUBGRADE SHALL NOT BE COMPACTED OR SUBJECTED TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC.
4. IMMEDIATELY BEFORE BASE AGGREGATE AND CONCRETE PLACEMENT, REMOVE ANY ACCUMULATION OF FINE MATERIAL FROM EROSION WITH LIGHT EQUIPMENT AND SCARIFY SOIL TO A MINIMUM DEPTH OF 5 INCHES.
5. EROSION AND INTRODUCTION OF SEDIMENT SHALL BE STRICTLY CONTROLLED DURING AND AFTER CONSTRUCTION TO PREVENT CLOGGING OF THE VOID SPACES IN THE BASE MATERIAL AND PERMEABLE SURFACE.
6. BALLAST SECTION SHALL BE A BLEND OF CLEAN, CRUSHED, ANGULAR, WASHED ROCK WITH NO FINES RANGING FROM 2" TO 12" IN GENERAL SIZE.
7. A QUALIFIED GEOTECHNICAL PROFESSIONAL MUST BE PRESENT DURING THE EXCAVATION AND CLEANOUT OF THE PERMEABLE CONCRETE TO ENSURE THAT THE LONG TERM INFILTRATION RATES, SOIL CONDITIONS, TREATMENT LAYERS, AND INFILTRATION CHARACTERISTICS MEET THE APPROVED DESIGN. THIS PROCESS SHALL BE ACCOMPLISHED BY PROVIDING THE CITY A MEMORANDUM, SIGNED AND SEALED BY THE PROJECT GEOTECHNICAL ENGINEER OR GEOLOGIST STATING THE FOUND GEOLOGICAL CONDITIONS MATCH THE APPROVED DESIGN.

GEOTEXTILE LAYER MAY BE OMITTED IF APPROVED BY PROJECT GEOTECHNICAL ENGINEER

6" PERMEABLE PAVEMENT WITH 2" PEA GRAVEL AGGREGATE

6" BALLAST

NATIVE SOIL OVEREXCAVATED TO MEAN SURFACE ALLUVIUM SOILS, COMPACTED PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATIONS

(A) PERMEABLE CONCRETE PAVEMENT
NTS

GENERAL NOTES

1. ALL DEPTHS REPRESENT COMPACTED DEPTHS.
2. CONTROL JOINTS (TOOLED) SHALL BE 10' O.C. MAXIMUM. CONTROL JOINTS SHALL BE 1/4 DEPTH OF SLAB. ALL CONSTRUCTION JOINTS SHALL BE DOWELED.
3. AFTER GRADING, THE EXISTING SUBGRADE SHALL NOT BE COMPACTED OR SUBJECTED TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC.
4. IMMEDIATELY BEFORE BASE AGGREGATE AND CONCRETE PLACEMENT, REMOVE ANY ACCUMULATION OF FINE MATERIAL FROM EROSION WITH LIGHT EQUIPMENT AND SCARIFY SOIL TO A MINIMUM DEPTH OF 5 INCHES.
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6. BALLAST SECTION SHALL BE A BLEND OF CLEAN, CRUSHED, ANGULAR, WASHED ROCK WITH NO FINES RANGING FROM 2" TO 12" IN GENERAL SIZE.
7. A QUALIFIED GEOTECHNICAL PROFESSIONAL MUST BE PRESENT DURING THE EXCAVATION AND CLEANOUT OF THE PERMEABLE CONCRETE TO ENSURE THAT THE LONG TERM INFILTRATION RATES, SOIL CONDITIONS, TREATMENT LAYERS, AND INFILTRATION CHARACTERISTICS MEET THE APPROVED DESIGN. THIS PROCESS SHALL BE ACCOMPLISHED BY PROVIDING THE CITY A MEMORANDUM, SIGNED AND SEALED BY THE PROJECT GEOTECHNICAL ENGINEER OR GEOLOGIST STATING THE FOUND GEOLOGICAL CONDITIONS MATCH THE APPROVED DESIGN.

4" PERMEABLE PAVEMENT WITH 2" PEA GRAVEL AGGREGATE

2" BALLAST

EXISTING NATIVE SUBGRADE, OVEREXCAVATED TO MEAN SURFACE ALLUVIUM SOILS

(B) PERMEABLE CONCRETE SIDEWALK
NTS

NOTES

1. ALL DEPTHS REPRESENT COMPACTED DEPTHS.
2. REMOVE ALL TOPSOIL AND UNSUITABLE NATIVE SOIL FROM THE ROAD AND SLOPE PRISM.
3. IF FILL REQUIRED EXTEND GRAVEL BASE TO UNYIELDING NATIVE SUBGRADE. PLACE GRAVEL BASE IN 12" MAX LIFTS AND COMPACT LIFT TO 95% MAX. DENSITY.
4. CONTROL JOINTS SHALL BE A DEPTH OF SLAB. ALL CONSTRUCTION JOINT SHALL BE DOWELED.

6" PORTLAND CEMENT CONCRETE WITH #3@18 MESH REINFORCEMENT AND PSI FLEX STRENGTH @ 14 DAYS, 3,600 PSI COMPRESSIVE STRENGTH @ 28 DAYS, CONTROL JOINTS (TOP, ON SUBGRADE) @ 10' O.C.

8" GRAVEL BORROW COMPACTED TO 95% MAX DENSITY, MODIFIED PROCTOR

EXISTING SUBGRADE OR STRUCTURAL FILL COMPACTED TO 95% MAX DENSITY

(C) CONCRETE PAVEMENT
NTS

NOTES
ALL DEPTHS REPRESENT COMPACTED THICKNESSES.

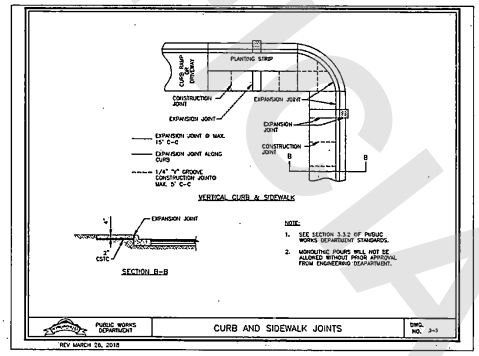
3" HOT MIX ASPHALT (HMA), CLASS B*, PG 64-22

3" CRUSHED SURFACING TOP COURSE PER WSDOT 9-03.9(3)

12" GRAVEL BORROW COMPACTED TO 95% MAX DENSITY, MODIFIED PROCTOR

EXISTING SUBGRADE OR STRUCTURAL FILL COMPACTED TO 95% MAX DENSITY

(D) ASPHALT PAVEMENT
NTS



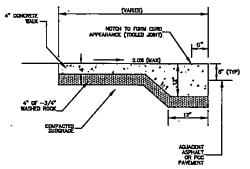
NOTE:
1. SEE SECTION 3.3.2 OF PUBLIC WORKS DEPARTMENT STANDARDS.
2. MONOLITHIC POURS WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL FROM ENGINEERING DEPARTMENT.

PUBLIC WORKS DEPARTMENT | CURB AND SIDEWALK JOINTS | DWG. NO. 3-3

REV MARCH 28, 2018

(E) CURB AND SIDEWALK JOINTS

NOTES
1. EDGE DOES NOT NEED TO BE THICKENED IN AREAS WHERE ADJACENT TO PLANTING/LANDSCAPE AREAS OR BUILDING FOUNDATION.
2. TOOLED JOINTS SPACED TO MATCH SIDEWALK WIDTH — EXPANSION JOINTS SPACED 100' MAX. IN WHERE WALK JOINS DRIVEWAY OR CURB.
3. NOTCH TO FORM CURB APPEARANCE IS NOT REQUIRED WHEN SIDEWALK IS ADJACENT TO LANDSCAPING.



(F) THICKENED EDGE SIDEWALK

THIS PLAN SHEET IS APPROVED FOR CONSTRUCTION IN ACCORDANCE WITH THE CITY OF SEDRO-WOOLLEY ORDINANCES AND POLICIES. THIS PLAN SHEET DOES NOT SUPPLY OR CONVEY PERMISSION TO CONSTRUCT ANY ITEM UNLESS ACCOMPANIED BY AN APPROVED PERMIT COVERING THE WORK. ALL PERMITS MUST BE OBTAINED FROM REVIEWED FOR COMPLIANCE TO CITY STANDARDS PRIOR TO THE START OF CONSTRUCTION. IT IS THE SOLE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE SEAL AND STAMP APPEAR ON THIS SHEET, ASSURING COMPLYING WITH AND PROVIDING NOTIFICATION FOR ALL FEDERAL, STATE, COUNTY AND LOCAL LAWS, PERMITS AND MANDATES, INCLUDING BUT NOT LIMITED TO THE ENDANGERED SPECIES ACT, FEDERAL WETLAND PERMIT, STATE DEPARTMENT OF FISHERIES HYDRAULIC PROJECT APPROVAL, AND NPDES STORMWATER POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS. IT IS THE RESPONSIBILITY OF THE DEVELOPER, LANDOWNER, AND THEIR ENGINEER, THE ISSUANCE OF THIS PLAN SHALL NOT BE CONSTRUED AS PROOF OF COMPLIANCE WITH APPLICABLE LAWS AND PERMIT REQUIREMENTS.

SIGNATURE | SEDRO-WOOLLEY PUBLIC WORKS DEPT. | DATE

FREELAND & ASSOCIATES

BY	DESCRIPTION	APP'D	DATE

CLIENT: JM PROPERTY MANAGEMENT

CALL BEFORE YOU DIG 811 OR 1-800-424-5555

PROJECT LOCATION: 1402 THIRD STREET SEDRO-WOOLLEY, WA 98284

DRAWN BY: AM
CHECKED BY: AMP
DRAWING # SEDRO-WOOLLEY
DESIGNED BY: AMP

SHEET TITLE: SITE & PAVING DETAILS

JOB #: 23253
DATE: 8-14-2023
SHEET: C7.1

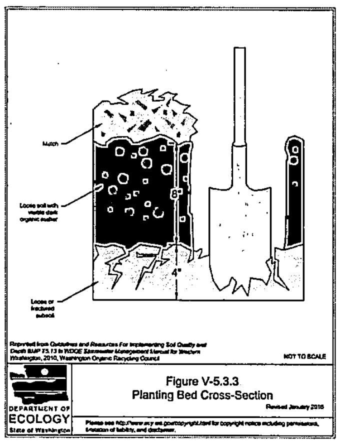


Figure V-5.3.3
Planting Bed Cross-Section

Ⓐ SOIL AMENDMENTS - BMP T5.12

GENERAL NOTES

ESTABLISHING A MINIMUM SOIL QUALITY AND DEPTH IS NOT THE SAME AS PRESERVATION OF NATURALLY OCCURRING SOIL AND VEGETATION. HOWEVER, ESTABLISHING A MINIMUM SOIL QUALITY AND DEPTH WILL PROVIDE IMPROVED ON-SITE MANAGEMENT OF STORMWATER FLOW AND WATER QUALITY. SOIL ORGANIC MATTER CAN BE ATTAINED THROUGH NUMEROUS MATERIALS SUCH AS COMPOST, COMPOSTED WOODY MATERIAL, BIOSOLIDS, AND FOREST PRODUCT RESIDUALS. IT IS IMPORTANT THAT THE MATERIALS USED TO MEET THE SOIL QUALITY AND DEPTH BMP BE APPROPRIATE AND BENEFICIAL TO THE PLANT COVER TO BE ESTABLISHED. LIKEWISE, IT IS IMPORTANT THAT IMPORTED TOPSOILS IMPROVE SOIL CONDITIONS AND DO NOT HAVE AN EXCESSIVE PERCENT OF CLAY FINES. THIS BMP CAN BE CONSIDERED INFEASIBLE ON TILL SOIL SLOPES GREATER THAN 33 PERCENT.

DESIGN GUIDELINES

SOIL RETENTION: RETAIN, IN AN UNDISTURBED STATE, THE DUFF LAYER AND NATIVE TOPSOIL TO THE MAXIMUM EXTENT PRACTICABLE. 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, TO BE REAPPLIED TO OTHER PORTIONS OF THE SITE WHERE FEASIBLE.

SOIL QUALITY: ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE THE FOLLOWING:

1. A TOPSOIL LAYER WITH A MINIMUM ORGANIC MATTER CONTENT OF 10% DRY WEIGHT IN PLANTING BEDS, AND 5% ORGANIC MATTER CONTENT IN TURF AREAS, AND A PH FROM 6.0 TO 8.0 OR MATCHING THE PH OF THE UNDISTURBED SOIL. THE TOPSOIL LAYER SHALL HAVE A MINIMUM DEPTH OF EIGHT INCHES EXCEPT WHERE TREE ROOTS LIMIT THE DEPTH OF INCORPORATION OF AMENDMENTS NEEDED TO MEET THE CRITERIA. SUBSOILS BELOW THE TOPSOIL LAYER SHOULD BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
2. MULCH PLANTING BEDS WITH 2 INCHES OF ORGANIC MATERIAL.
3. USE COMPOST AND OTHER MATERIALS THAT MEET THESE ORGANIC CONTENT REQUIREMENTS:
   a. THE ORGANIC CONTENT FOR "PRE-APPROVED" AMENDMENT RATES CAN BE MET ONLY USING COMPOST MEETING THE COMPOST SPECIFICATION FOR BIORETENTION (BMP T7.30), WITH THE EXCEPTION THAT THE COMPOST MAY HAVE UP TO 35% BIOSOLIDS OR MANURE. THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 40% TO 65%, AND A CARBON TO NITROGEN RATION BELOW 25:1. THE CARBON TO NITROGEN RATION MAY BE AS HIGH 35:1 FOR PLANTINGS COMPOSED ENTIRELY OF PLANTS NATIVE TO THE PUGET SOUND LOWLANDS REGION.
   b. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS MEETING (A.) ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATIO REQUIREMENTS, AND MEETING THE CONTAMINANT STANDARDS OF GRADE A COMPOST.

THE RESULTING SOIL SHOULD BE CONDUCIVE TO THE TYPE OF VEGETATION TO BE ESTABLISHED.

IMPLEMENTATION OPTIONS: THE SOIL QUALITY DESIGN GUIDELINES LISTED ABOVE CAN BE MET BY USING ONE OF THE METHODS LISTED BELOW:

1. LEAVE UNDISTURBED NATIVE VEGETATION AND SOIL, AND PROTECT FROM COMPACTION DURING CONSTRUCTION.
2. AMEND EXISTING SITE TOPSOIL OR SUBSOIL EITHER AT DEFAULT "PRE-APPROVED" RATES, OR AT CUSTOM CALCULATED RATES BASED ON TESTS OF THE SOIL AND AMENDMENT.
3. STOCKPILE EXISTING TOPSOIL DURING GRADING, AND REPLACE IT PRIOR TO PLANTING. DO NOT SIEVE STOCKPILE SOIL. ORGANIC DEBRIS AND ROCKS PROVIDE HIGH QUALITY SOIL STRUCTURE. STOCKPILED TOPSOIL MUST ALSO BE AMENDED IF NEEDED TO MEET [illegible] REQUIREMENTS, EITHER AT A DEFAULT "PRE-APPROVED" RATE [illegible]
4. IMPORT TOPSOIL MIX OF SUFFICIENT ORGANIC CONTENT AND D[illegible]

MORE THAN ONE METHOD MAY BE USED ON DIFFERENT PORT[illegible] ALREADY MEETS THE DEPTH AND ORGANIC MATTER QUALITY S[illegible] DOES NOT NEED TO BE AMENDED.

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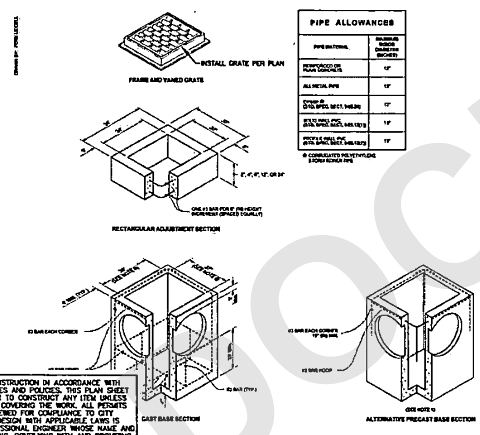
SIGNATURE: SEDRO-WOOLLEY PUBLIC WORKS DEPT. DATE

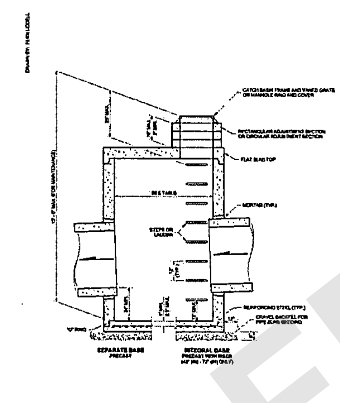


PIPE ALLOWANCES	
PIPE MATERIAL	[illegible]
[illegible] CONCRETE	12"
ALL METAL PIPE	15"
[illegible]	12"
[illegible] WALL PVC	15"
[illegible] WALL PVC	15"

CORRUGATED POLYETHYLENE STORM SEWER PIPE

CATCH BASIN TYPE 1
STANDARD PLAN B-5.20-03

Ⓑ CATCH BASIN TYPE 1



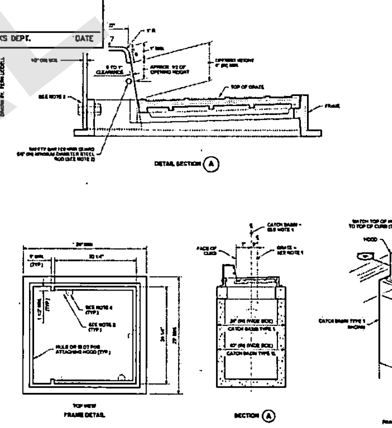
CATCH BASIN DIMENSIONS				
CATCH BASIN DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
54"	4.5"	8"	42"	8"
60"	5"	8"	48"	8"
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	8"	12"	84"	12"
120"	10"	12"	96"	12"
144"	12"	12"	108"	12"

PIPE ALLOWANCES					
CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER				
	CONCRETE	ALL METAL	CPSSP (1) PP (4)	SOLID WALL PVC (2)	PROFILE WALL PVC (3)
48"	24"	30"	24"	30"	30"
54"	30"	36"	30"	36"	36"
60"	36"	42"	36"	42"	42"
72"	42"	54"	42"	48"	48"
84"	54"	60"	54"	48"	48"
96"	60"	72"	60"	48"	48"
120"	66"	84"	60"	48"	48"
144"	78"	90"	60"	48"	48"

(1) Corrugated Polyethylene Storm Sewer Pipe (See Standard Specification Section 9-05.20)
(2) (See Standard Specification Section 9-05.12(1))
(3) (See Standard Specification Section 9-05.12(2))
(4) Polypropylene Pipe (See Standard Specification Section 9-05.24)

CATCH BASIN TYPE 2
STANDARD PLAN B-10.20-02

Ⓒ CATCH BASIN TYPE 2



COMBINATION INLET
STANDARD PLAN B-25.20-02

Ⓓ COMBINATION INLET

FREELAND & ASSOCIATES	
CLIENT:	JM PROPERTY MANAGEMENT
PROJECT LOCATION:	1402 THIRD STREET, 1402 3RD STREET, SEDRO-WOOLLEY, WA 98284
DRAWING #:	21253SPS.DWG
DRAWN BY:	GJK
DESIGNED BY:	HAF
CHECKED BY:	HAF
SHEET CONTENTS:	DRAINAGE DETAILS
JOB #:	21253
DATE:	8-14-2023
SHEET:	C8.0

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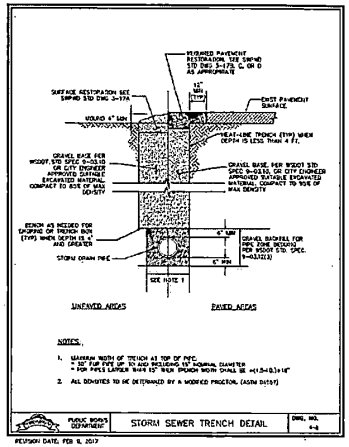
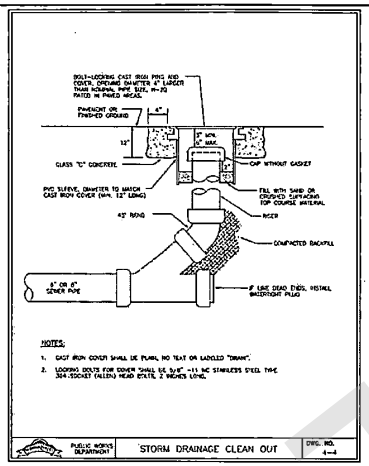


Ⓐ STORM SEWER TRENCH



Ⓑ STORM DRAINAGE CLEAN OUT

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SIGNATURE SEDRO-WOOLLEY PUBLIC WORKS DEPT. DATE

BIORETENTION CONSTRUCTION SPECS

INSTALLATION SPECIFICATIONS

1. BIORETENTION AREAS SHALL REMAIN FREE OF ALL CONSTRUCTION MATERIALS (CONCRETE SLURRY, GYPSUM BOARD, PLYWOOD, NAILS, SCREWS, ETC.)
2. PREVENT OVER COMPACTION OF SUBGRADE SOIL. THIS IS CRITICAL FOR PERFORMANCE OF THE FACILITY.
3. NO EXCAVATION, SOIL PLACEMENT, OR SOIL AMENDMENT SHALL TAKE PLACE DURING WET OR SATURATED CONDITIONS. SEE SOIL PLACEMENT NOTE FOR ADDITIONAL INFORMATION.
4. OPERATE EQUIPMENT ADJACENT TO, NOT IN, THE FACILITY.
5. IF MACHINERY MUST OPERATE IN THE FACILITY, USE LIGHT WEIGHT, LOW GROUND CONTACT PRESSURE EQUIPMENT.
6. EXCAVATE BIORETENTION FACILITY WITH TOOTHED BUCKET. SCARIFY SUBGRADE TO FRACTURE SOIL AND TILL IN SOIL AT INTERFACE. SCARIFICATION DEPTH TO BE A MINIMUM OF FOUR INCHES.

MULCH/ORGANIC LAYER SPECIFICATIONS

1. 2–3 INCH LAYER OF SHREDDED WOOD MULCH (COARSE PARTICLE SIZE – 3"–4" LENGTH) IS REQUIRED (NOD FUEL IS ACCEPTABLE).
2. MULCH SHALL BE SPREAD BY HAND-TOOLS ONLY (NO HEAVY EQUIPMENT IS TO BE USED WITHIN THE BIORETENTION IN ORDER TO AVOID COMPACTION).
3. THE MULCH MATERIAL PROVIDES FOR THE DECOMPOSITION OF ORGANIC MATERIAL, AND ALSO PLAYS AN IMPORTANT ROLE IN THE REMOVAL OF METALS. SHREDDED HARDWOOD MULCH ALLOWS FOR MAXIMUM SURFACE AREA FOR BINDING AND RESISTS FLOTATION/WASHOUT.
4. EACH SPRING, THE BIORETENTION SHALL BE RE-MULCHED WITH 2–3 INCHES OF HARDWOOD MULCH.

BIORETENTION SOIL MIX (BSM) SOIL SPECIFICATIONS

MINERAL AGGREGATE

PERCENT FINER A RANGE OF 2 TO 4 PERCENT PASSING THE #200 SIEVE IS IDEAL AND FINES SHOULD NOT BE ABOVE 5 PERCENT FOR A PROPER FUNCTIONING SPECIFICATION ACCORDING TO ASTM D422.

AGGREGATE GRADATION

THE AGGREGATE PORTION OF THE BSM SHOULD BE WELL-GRADED, ACCORDING TO ASTM D 2487-98 (CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (UNIFIED SOIL CLASSIFICATION SYSTEM)), WELL-GRADED SAND SHOULD HAVE THE FOLLOWING GRADATION COEFFICIENTS:

- COEFFICIENT OF UNIFORMITY (CU = D60/D10) EQUAL TO OR GREATER THAN 4, AND
- COEFFICIENT OF CURVE (CC = (D30)2/D60 X D10) GREATER THAN OR EQUAL TO 1 AND LESS THAN OR EQUAL TO 3.

TABLE BELOW PROVIDES A GRADATION GUIDELINE FOR THE AGGREGATE COMPONENT OF A BIORETENTION SOIL MIX SPECIFICATION IN WESTERN WASHINGTON (HERRERA, ROBERTSON, 2007). THE SAND GRADATION BELOW IS OFTEN SUPPLIED AS A WELLGRADED UTILITY OR SCREENED. WITH COMPOST THIS BLEND PROVIDES ENOUGH FINES FOR ADEQUATE WATER RETENTION, HYDRAULIC CONDUCTIVITY WITHIN RECOMMENDED RANGE (SEE BELOW), POLLUTANT REMOVAL CAPABILITY, AND PLANT GROWTH CHARACTERISTICS FOR MEETING DESIGN GUIDELINES AND OBJECTIVES.

MINERAL AGGREGATE GRADATION	
U.S. SIEVE NUMBER	PERCENT PASSING
3/8	100
4	95–100
10	75–90
40	25–40
100	4–10
200	2–5

WHERE EXISTING SOILS MEET THE ABOVE AGGREGATE GRADATION, THOSE SOILS MAY BE AMENDED RATHER THAN IMPORTING MINERAL AGGREGATE.

COMPOST TO AGGREGATE RATIO, ORGANIC MATTER CONTENT, CATION EXCHANGE CAPACITY

- COMPOST TO AGGREGATE RATIO: 60–65 PERCENT MINERAL AGGREGATE, 35 – 40 PERCENT COMPOST.
- ORGANIC MATTER CONTENT: 8 – 8 PERCENT BY WEIGHT.
- CATION EXCHANGE CAPACITY (CEC) MUST BE > 8 MILLIEQUIVALENTS/100 G DRY SOIL. NOTE: SOIL MIXES MEETING THE ABOVE SPECIFICATIONS DO NOT HAVE TO BE TESTED FOR CEC. THEY WILL READILY MEET THE MINIMUM CEC.

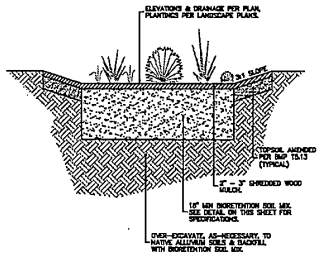
COMPOST

TO ENSURE THAT THE BSM WILL SUPPORT HEALTHY PLANT GROWTH AND ROOT DEVELOPMENT, CONTRIBUTE TO INFILTRATION OF POLLUTANTS, AND NOT RESTRICT INFILTRATION WHEN USED IN THE PROPORTIONS CITED HEREIN, THE FOLLOWING COMPOST STANDARDS ARE REQUIRED.

- MEETS THE DEFINITION OF "COMPOSTED MATERIALS" IN WAC 173-350-220 (INCLUDING CONTAMINANT LEVELS AND OTHER STANDARDS). AVAILABLE ONLINE AT HTTP://APPLETS.NWLOOP/PROGRAMS/SWA/ORGANICS/EQR.HTML
- PRODUCED AT A COMPOSTING FACILITY PERMITTED BY THE WA DEPARTMENT OF ECOLOGY, A CURRENT LIST OF PERMITTED FACILITIES IS AVAILABLE AT HTTP://APPLETS.NWLOOP/PROGRAMS/SWA/COMPOST/
- THE COMPOST PRODUCT MUST ORIGINATE A MINIMUM OF 65 PERCENT BY VOLUME FROM RECYCLED PLANT WASTE AS DEFINED IN WAC 173-350-100 AS "TYPE I FEEDSTOCKS." A MAXIMUM OF 35 PERCENT BY VOLUME OF OTHER APPROVED ORGANIC WASTE AS DEFINED IN WAC 173-350-100 AS "TYPE II", INCLUDING POSTCONSUMER FOOD WASTE, BUT NOT INCLUDING BIOSOLIDS, MAY BE SUBSTITUTED FOR RECYCLED PLANT WASTE. TYPE II AND IV FEEDSTOCKS SHALL NOT BE USED FOR THE COMPOST BOUND INTO BIORETENTION FACILITIES OR BIORETENTIONS.
- STABLE (LOW OXYGEN USE AND CO2 GENERATION) AND MATURE (CAPABLE OF SUPPORTING PLANT GROWTH) BY TESTS SHOWN BELOW. THIS IS CRITICAL TO PLANT SUCCESS IN A BIORETENTION SOIL MIXES.
- MOISTURE CONTENT RANGED NO VISIBLE FREE WATER OR DUST PRODUCED WHEN HANDLING THE MATERIAL.
- TESTED IN ACCORDANCE WITH THE U.S. COMPOSTING COUNCIL "TESTING METHODS FOR THE EXAMINATION OF COMPOST AND COMPOSTING" (TMECC), AS ESTABLISHED IN THE COMPOSTING COUNCIL'S "SEAL OF TESTING ASSURANCE" (STA) PROGRAM. MOST WASHINGTON COMPOST FACILITIES NOW USE THESE TESTS.
- SCREENED TO THE SIZE GRADATIONS FOR FINE COMPOST UNDER TMECC TEST METHOD 02.02-B (GRADATIONS ARE SHOWN IN THE SPECIFICATION IN AN APPENDIX OF THE LOW IMPACT DEVELOPMENT TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND)

PH BETWEEN 6.0 AND 8.5 (TMECC 04.11-A). IF THE PH FALLS OUTSIDE OF THE ACCEPTABLE RANGE, IT MAY BE MODIFIED WITH LIME TO INCREASE THE PH OR IRON SULFATE PLUS SULFUR TO LOWER THE PH. THE LIME OR IRON SULFATE MUST BE MIXED UNIFORMLY INTO THE SOIL PRIOR TO USE IN THE BIORETENTION AREA.

- MANUFACTURED INERT CONTENT LESS THAN 1% BY WEIGHT (TMECC 03.08-A)
- MINIMUM ORGANIC MATTER CONTENT OF 40% (TMECC 05.07-A)
- SOLUBLE SALT CONTENT LESS THAN 4.0 MMHOS/CM (TMECC 04.10-A)
- MATURITY GREATER THAN 80% (TMECC 05.05-A "GERMINATION AND VIGOR")
- STABILITY OF 7 OR BELOW (TMECC 05.08-B "CARBON DIOXIDE EVOLUTION RATE")
- CARBON TO NITROGEN RATIO (TMECC 04.01 "TOTAL CARBON" AND 04.02D "TOTAL KJELDAHL NITROGEN") OF LESS THAN 25:1. THE C:N RATIO MAY BE UP TO 35:1 FOR PLANTINGS COMPOSED ENTIRELY OF PUGET SOUND LOWLAND NATIVE SPECIES AND UP TO 40:1 FOR COARSE COMPOST TO BE USED AS A SURFACE MULCH (NOT IN A SOIL MIX).



Ⓓ BIORETENTION CELL SECTION

FREELAND & ASSOCIATES

CLIENT: JN PROPERTY MANAGEMENT

PROJECT LOCATION: 1402 THIRD STREET SEDRO-WOOLLEY, WA 98284

DRAWING #: 21253DPLDWG | DRAWN BY: CJK | CHECKED BY: MJF | DESIGNED BY: MJF

SHEET CONTENTS: DRAINAGE DETAILS

JOB #: 21253 | DATE: 5-14-2023

SHEET: C8.1

NO.	DATE	DESCRIPTION	BY

CALL BEFORE YOU DIG 811 OR 1-800-424-5555