

*Exhibit C: Routine Maintenance & Repair Activities*

To simplify the maintenance process, seven primary routine maintenance and repair activities have been identified and are described in this document. These seven activities are:

1. Sediment and Debris Removal
2. Vactoring and Jetting
3. Vegetation Control
4. Anchoring Large Woody Debris (LWD)/Habitat Restoration
5. Beaver Dam Maintenance
6. Mechanical Improvements and Repairs/Replacements
7. Safety Improvements
8. Monitoring Equipment Installation, Repair/Replacement

Within these maintenance activities specific BMP's are identified to accomplish the task with minimal impacts on the surrounding environment. The methods and associated BMP's are listed and explained within Exhibit E: Maintenance & Repair Methods.

**1. Sediment and Debris Removal**

- Sediment and Debris Removal consists of the removal of excess sediment and vegetative matter which compromises the performance of the facility. This work is often demand work (e.g., as a result of storm events, requirements in the City's municipal separate storm sewer system NPDES permit, or beaver activity) and not on a regular schedule. The goal of sediment and debris removal is to maintain the capacity or function of the facility by removing excess sediments and returning the facility to its original design capacity or to provide continuous flow through to reduce flood risk. The work may be accomplished by hand or by utilizing either vactor trucks or heavy equipment such as excavators and backhoes. Pumps and in-creek/pond water-tight structures or silt fence may be employed for isolation and dewatering of the work area if needed. Environmental buckets or other erosion and sediment control BMPs may be employed to prevent discharge of fill or deleterious materials downstream. Fish exclusion measures and other protection measures may also be employed. It is required most commonly in:
  - Catch basin and stormwater structures to maintain their capacity and function.
  - Conveyance facilities to maintain their capacity:
    - Piped stormwater infrastructure.
    - Culvert and ditch systems.
    - Instream infrastructure may require sediment/debris removal near or in water at culvert inflows/outfalls and trash racks.
  - Stormwater Facilities to maintain their capacity and treatment:
    - Treatment Ponds
    - Detention Ponds
    - Engineered Wetlands
- BMPs for Sediment and Debris Removal:
  - Delineation of Work Areas
  - Temporary Bypass of Stream Flow
  - Vactoring and Jetting
  - Excavating and use of environmental buckets
  - Bank/Retaining Wall Stabilization
  - Habitat Addition or Maintenance

- Site Restoration/Landscaping
- Temporary Erosion Control
- Temporary Dewatering

**2. Vactoring and Jetting**

- Vactoring and Jetting consists of the removal of excess sediment and vegetative matter which compromises the ditch and culvert or pipe facility. This work is often scheduled work and is required on a consistent basis. The goal of vactoring and jetting is to remove excess material to reduce flooding impacts and maintain capacity. It is accomplished utilizing a combination vactor truck. It is required most commonly in:
  - Pipe and Culvert systems
  - Ditches
- BMPs for Vactoring and Jetting:
  - Delineation of Work Areas
  - Temporary Bypass of Stream Flow
  - Vactoring and Jetting
  - Excavating and use of environmental buckets
  - Bank/Retaining Wall Stabilization
  - Habitat Addition or Maintenance
  - Site Restoration/Landscaping

**3. Vegetation Control**

- Vegetation control consists of the removal of excess or obstructing vegetation from a facility and its appurtenances such as ponds, trash racks, ditches, inside of and around structures, pipes and culverts. The goal is to maintain accessibility and capacity of the facility and all appurtenances. This involves cutting back live vegetation or removing and replacing trees. This work is often scheduled work and is required on a consistent basis. It is accomplished utilizing a variety of hand tools including rakes, weed eaters and machetes. It is required most commonly in:
  - Ditches
  - Culvert inflows and outflows
  - Ponds
  - Maintenance Hole Lids/Access Hatches
- BMPs for Controlling Vegetation:
  - Delineation of Work Areas
  - Temporary Bypass of Stream Flow
  - Habitat Addition or Maintenance
  - Site Restoration/Landscaping

**4. Anchoring LWM/Habitat Restoration**

- Anchoring LWM/Habitat Restoration consists of anchoring existing woody material from previously constructed habitat improvement projects to prevent the migration and blockage of infrastructure. It also applies to naturally occurring LWM that may need to be redistributed and anchored to restore the conveyance capacity of the stormwater facility or may be deemed necessary and beneficial for habitat within the stormwater facility. This work is often demand work (storm event driven) and not on a regular schedule. The goal of anchoring LWM and habitat restoration is to maintain stormwater facility capacity and function, replace and improved damaged habitat to benefit fish and wildlife. It is required most commonly in:

- Ditches
- Habitat projects where woody debris has destabilized and needs to be anchored such as engineered wetland areas or creeks
- Trash racks
- Ponds
  
- BMPs for Anchoring LWM/Habitat Restoration
  - Delineation of Work Areas
  - Temporary Bypass of Stream Flow
  - Bank/Retaining Wall Stabilization
  - Habitat Addition or Maintenance
  - Site Restoration/Landscaping

**5. Beaver Dam Management**

**a. Beaver Dam Maintenance**

Beaver dam maintenance consists of the complete or partial removal or manipulation of dams in areas where flooding and property damage might otherwise result. SPU coordinates with WDFW on beaver dam maintenance. There are three scenarios where beaver dam maintenance may occur:

- New dams (less than 1 year old) constructed in areas where there is limited habitat value and flooding will occur.
- Old dams that need to be manipulated for fish passage.
- Old dams that need to be manipulated for flood control.

**b. Beaver Exclusion Devices**

Beaver exclusion devices design and construction: Design, install, and maintain guards, grates, grills, fences, and other beaver exclusion devices to provide unimpeded fish passage and to prevent beavers from plugging a culvert or other water crossing structures such as low bridge crossings.

This work is not conducted on a regular schedule. It is accomplished utilizing hand tools such as pry bars, shovels and rakes.

- BMPs for Beaver Dam Management:
  - Delineation of Work Areas
  - Habitat Addition or Maintenance
  - Site Restoration/Landscaping

**6. Mechanical Improvements and Repairs/Replacements**

- Mechanical improvements refer to adding new gates, valves, trash racks, access hatches and their components when necessary to maintain functionality of the structure and facility. Mechanical repairs/replacements refer to maintaining structural components such as slide or sluice gates, orifice plates, hinges, trash racks, valves, etc. The goal of this activity is to maintain the operability and function of the structural components of drainage system facilities. This work is often conducted on-demand and not on a regular schedule. It is required most commonly in:
  - Flow Control Structures
  - Culverts or pipes fitted with trash racks or gates
  - Diversion Structures
  - Overflow Maintenance Holes fitted with debris cages

- BMPs for Mechanical Repairs:
  - Delineation of work areas
  - Temporary Bypass of Stream Flow (if needed)
  - Site Restoration/Landscaping (if needed)

**7. Safety Improvements**

- Safety Improvements refer to improving safe accessibility for crew and emergency response at stormwater facilities. For example, steep slopes may be furnished with a stairwell and platform for safer access to a structure. Fencing and security improvements fall under this activity. Improvements to access roads and boat ramps also fall under this activity. The goal of this activity is to maintain the safety and accessibility of stormwater facilities. This work is often demand work and not on a regular schedule.
- BMPs for Safety Improvements:
  - Delineation of work areas
  - Temporary Bypass of Stream Flow
  - Bank/Retaining Wall Stabilization
  - Habitat Addition or Maintenance
  - Site Restoration/Landscaping

**8. Monitoring Equipment Installation, Repair/Replacement**

- Monitoring equipment installation refers to installing monitors and associated equipment in creeks, ponds, pipes and structures. Monitoring equipment repair/replacement refers to the maintenance of existing monitoring equipment at various locations. The goal of this activity is to track level, flow, sediment, and water quality data in an effort to better understand and evaluate our drainage sites and facilities.
- BMPs for Safety Improvements:
  - Delineation of work areas
  - Temporary Bypass of Stream Flow (if needed)
  - Site Restoration/Landscaping