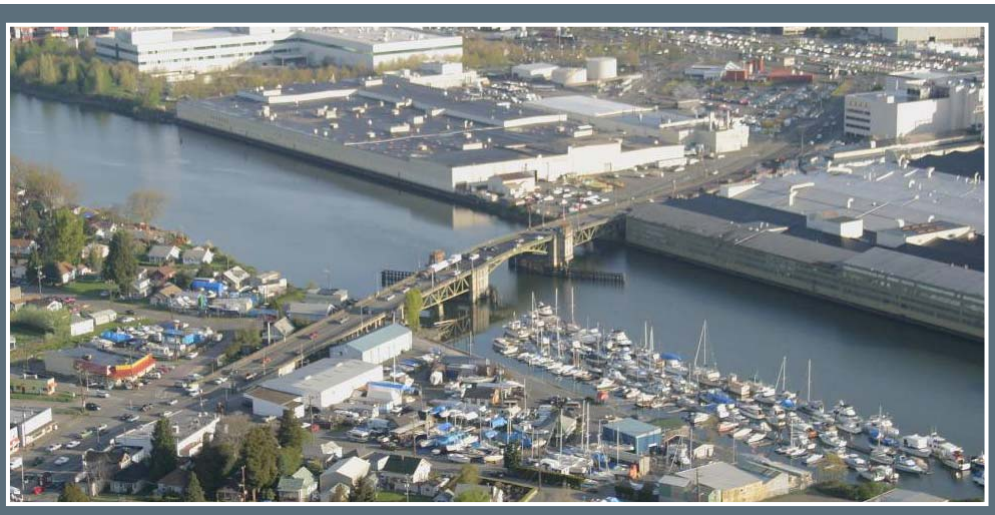

South Park Bridge Replacement

# STORMWATER POLLUTION PREVENTION PLAN

# TECHNICAL INFORMATION REPORT

November, 2009

PREPARED FOR:

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# 1 INTRODUCTION AND PROJECT OVERVIEW

The purpose of this report is to address the implementation of stormwater management activities prior to and during the construction phase of this project. This report is intended to provide project specific narrative for the intended methods to provide sediment and erosion control during construction. This report outlines a general approach and simplified order of work that may be followed or altered during construction. This project is being directed, administered, and funded by King County and has been designed according to the KCSWDM (2009) and Department of Ecology Stormwater Management Manual (SWMM 2007) criteria.

## 1.1 Project Description

This project proposes to construct a new bascule bridge because the existing bridge is structurally deficient and functionally obsolete. The project involves re-aligning the roadway, constructing a new bridge, removing the existing bridge, and restoring the areas around the old bridge. Additional work elements specific to temporary erosion and sediment control involve constructing the bridge piers with caissons to reduce in-water work impacts, installing sand blankets to prevent silt re-suspension during pile driving activities, using bubble curtains to reduce underwater sound/vibration impacts to biological organisms, and providing shoreline mitigation/restoration to improve shoreline habitat areas.

## 1.2 Project Location and Limits

The existing South Park Bridge No. 3179 is a 78-year old bridge built in 1931 and is located in an industrial area on the Duwamish Waterway, approximately 5 miles south of downtown Seattle, as shown in Figure 1. The project is located in Township 24N, Range 4E, Section 32 and encompasses the roadway corridor defined by 16$^{th}$ Avenue South (between East Marginal Way South and the South Park Bridge) and 14$^{th}$ Avenue South (between the bridge and South Cloverdale Street).

## 1.3 Project Areas and Impacts

The proposed and existing project limits are identical, however, the proposed area within the project limits is slightly different than the existing area because the new bridge is slightly larger than the old bridge causing additional area on and below the bridge structure. The project will reduce the amount of impervious area within the project limits and implement new permanent stormwater quality treatment facilities. Two low impact development rain gardens are proposed in the south basin and an underground water quality wet vault is designed for the north basin. Below is a table summarizing the basin areas and treatment goals:

**Table 1. Project Areas Summary**

| Description | South Basin (acres) | North Basin (acres) | Project Totals (acres) |
|---|---|---|---|
| Existing Basin Limits | 6.15 | 5.44 | 11.59 |
| Proposed Basin Limits | 6.37 | 5.62 | 11.99 |
| Existing Impervious Surface | 4.25 | 5.33 | 9.58 |
| Proposed Impervious Surface (New and Replaced) | 3.55 | 5.52 | 9.07 |
| Existing Pervious Surface | 1.90 | 0.11 | 2.01 |
| Proposed Pervious Surface | 2.82 | 0.10 | 2.92 |
| New Impervious Surface | 1.15 | 0.73 | 1.88 |
| Replaced Impervious Surface | 2.40 | 4.79 | 7.19 |
| Net Added Impervious Surface | -0.70 | 0.19 | -0.13 |
| Targeted Impervious Surface | 1.15 | 0.73 | 1.88 |
| Additional Treated Area [1] | 1.38 | 0 | 1.38 |
| Total Treated Area [2] | 2.53 | 0.73 | 3.26 |
| | | | |
| Total Area to be Disturbed | 6.37 | 5.62 | 11.99 |

[1] The Additional Treated Area is pollution generating impervious area diverted from the City of Seattle combined storm/sewer system to the new stormwater treatment rain gardens.

[2] The total treated area reported in this Table is the total targeted pollution generating impervious surface requiring treatment. All project stormwater is routed through the stormwater quality treatment facilities prior to discharge into the Duwamish Waterway.

**Table 2. Project Earthwork Summary**

| Description | Project Totals (C.Y.) |
|---|---|
| Approximate Cut Volumes | 65,000 |
| Approximate Fill Volumes | 76,000 |
| Contaminated Soil to be Treated | 22,300 |

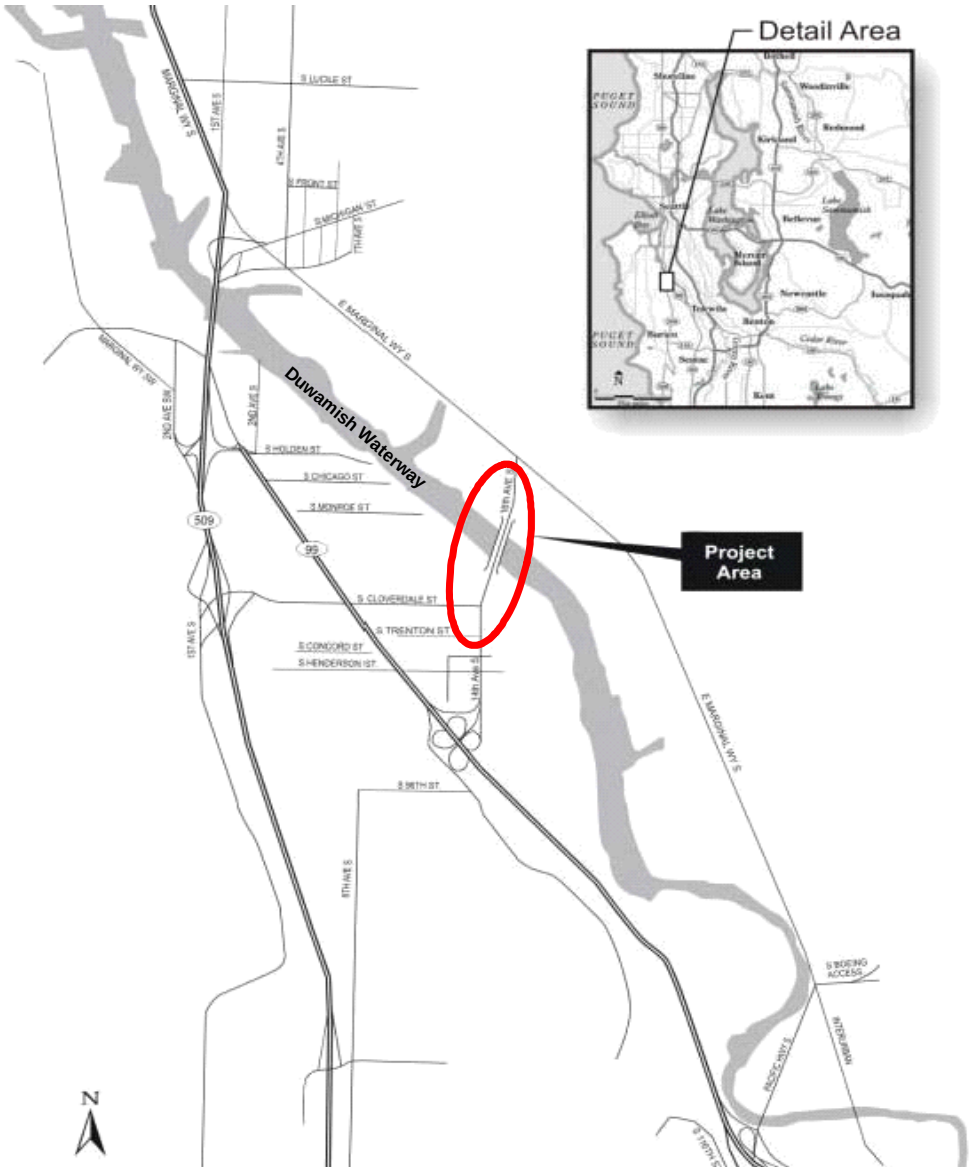



**Figure 1 – Site Location**

## 1.4 Existing Site Conditions

The project has been split into two basins, the North Basin (existing and proposed) as well as the South Basin (existing and proposed). Both north and south basins are considered part of one combined Threshold Discharge Area (TDA). Basin boundaries, areas, etc…can be found in the Hydraulics/Storm Drainage Design Technical Information Report.

### *1.4.1 Existing North Basin Conditions*

The existing North Basin (ENB) is bordered by East Marginal Way South, Boeing on the east and west, and the Duwamish Waterway to the south. The existing North Basin is commercial/industrial and primarily impervious paved asphalt and concrete surfaces for the roadway, parking lots, and sidewalks. The Boeing Plant 2 Stormwater Drainage System areas were determined by Ecology and Environmental Inc., 02-16-07 and can be found in Appendix B (Figure 15) of the Hydraulics/Storm Drainage Design Technical Information Report.

The ENB contains both private and public conveyance systems collecting onsite and offsite stormwater runoff into the Duwamish Waterway. The roadway runoff is collected into a conveyance system that discharges into the Duwamish Waterway through an existing 18-inch outfall pipe fitted with a tide-flap gate. Much of the Boeing offsite runoff is collected and conveyed in a private conveyance system that also connects to the public stormwater system and discharges through the same 18-inch diameter public outfall pipe. Boeing has additional private outfalls connecting directly to the Duwamish Waterway at various locations along the waterfront within the project limits.

The west side of the roadway has several large buildings and a large fenced parking lot. The Boeing Plant 2 is a historic and working aircraft manufacturing facility supported by two smaller buildings. The Boeing Pier (formerly Standard Oil) is located adjacent to the Duwamish Waterway and South Park Bridge. Boeing also has four large buildings on the east side of 16$^{th}$ Avenue South. A sidewalk, ramp access, and tunnel provide pedestrian access from the west to east side of the street mid-block between East Marginal Way South and the existing South Park Bridge Number 3179.

## 1.5 Existing South Basin Conditions

The Existing South Basin (ESB) limits are shown in Exhibit 2 of Appendix A. The limits extend from South Cloverdale Street north to the Duwamish Waterway and extend approximately 300-feet left and right of 14$^{th}$ Avenue South.

The ESB is a combination of mixed retail, residential, and commercial use with both impervious and pervious surfaces. The existing 14$^{th}$ Avenue South roadway is constructed of asphalt concrete pavement, cement concrete traffic curb and gutters, and cement concrete sidewalks between South Cloverdale Street and Dallas Avenue South. The 14$^{th}$ Avenue South roadway surface is an exposed brick roadway from Dallas Avenue South to the roadway terminus at the Duwamish Waterway. Small portions of the project have existing pervious grass “planter strips and/or exposed gravel surfaces.”

The ESB limits were established based on the proposed project limits, limits of construction activity for temporary erosion control, construction staging, and physical surface grading for drainage areas. The basin limits were established to account for onsite surface runoff as well as offsite drainage impacts within the project limits. For the ESB, offsite flows (roof top collection, driveways, alleys, etc…) drain into the existing onsite drainage system. The proposed design will continue to accept and preserve the offsite flow patterns. However, only onsite flows will be used to determine the design criteria for the water quality facility requirements/threshold treatment criteria. Both on and offsite flows will be added together to design and size the conveyance system, and conveyance for the water quality treatment facilities.

### *1.5.1 Existing North Basin Outfalls and Shoreline Conditions*

#### 1.5.1.1 List of Outfalls

The following is a list of existing outfalls labeled according to Boeing record documents on the north side of the waterway. The outfalls are labeled according to Boeing record documents according to outfall (OF) and lettered in order of sequence from downstream to upstream along the shoreline. See Exhibit 3 (Onsite Existing North Basin Exhibit) in Appendix A.

- 6-inch diameter CMP (Boeing OF-H, not found) serves only offsite stormwater runoff.
- 24-inch diameter CMP (Boeing OF-I, No. 4-125) serves only offsite stormwater runoff.
- 12-inch diameter pipe (Boeing, OF-J, not found) serves only offsite stormwater runoff
- 18-inch diameter SP (public outfall serving onsite stormwater runoff.. The pipe material is different between survey records and Boeing records and has been assumed to be concrete according to project survey records.
- 4-inch diameter SP (Boeing OF-K, surveyed as 6-inch diameter) serves only offsite stormwater runoff.
- 12-inch diameter SP (Boeing OF-L, abandon) flows are diverted to the public stormwater 18-inch diameter outfall.

The 18-inch diameter Boeing pipe that was not found is shown in the survey files and may be (most likely) the same pipe as the public outfall. Additionally, the 12-inch diameter outfall recorded in Boeing records may actually be the 18-inch diameter outfall.

#### 1.5.1.2 North Basin Public Outfall

The existing public outfall extends beyond a sheet pile wall and old Standard Oil dock system. The pipe extends out into the waterway and is supported on wooden “joists” between four wooden piles. The end of the pipe has an iron tide flap that does not close completely and may allow river/saltwater to enter the pipe. Access to the outfall is controlled with security and fencing from the land-side, so a close visual inspection of the pipe was not performed to determine the condition of the existing outfall.

#### 1.5.1.3 South Basin Public Outfall

Exhibit 2 in Appendix A of the Hydraulics/Storm Drainage Design Technical Information Report shows the south basin boundary, sub-basin areas, and basin discharge locations. The basin area is a combination of private and public land draining via surface runoff into private and public conveyance systems. The ESB has three discharge locations, the existing public 12-inch corrugated aluminum pipe outfall into the Duwamish Waterway, the combined storm/sewer system to the West Point Treatment Facility, and a 3-inch diameter iron pipe serving the private Marina parcels and draining into the Duwamish Waterway.

- Some of the south basin surface runoff is collected into a conveyance system and discharged into the Duwamish Waterway with the existing 12-inch diameter CMP public outfall. Appendix A contains exhibits illustrating limits, sizes, and flow patterns for the existing south basin conditions.

- The smaller 3-inch cast iron private outfall is located downstream of the public outfall and serves parcels operated and maintained by the Marina. Catch basins collect surface water runoff from the paved parcels and convey the water directly to the Duwamish Waterway without treatment. Down-turned elbows are used inside the catch basins to prevent oils from discharging through the outfall.

- The City of Seattle area within the south basin currently collects surface runoff and conveys flows through a combined storm/sewer system to the West Point Water Quality Treatment Facility.

### *1.5.2 Existing Bridge Conditions*

The existing bridge is approximately 1,045 feet long between abutments and the overall length of the project area is approximately 2,400 feet. The existing roadway consists of four 9.5-foot lanes and a total pavement width of approximately 38-feet not including sidewalks. The bridge is comprised of approach fills, abutment walls, approach spans supported on piers, bascule towers, and the bascule movable section over the Duwamish Waterway navigable channel.

### *1.5.3 Existing Jurisdictional Boundaries*

The project area is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits for both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Cloverdale Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

### *1.5.4 Existing Land Use and Zoning*

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company Plant 2 is located on the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land fronts 14th Avenue S. and the banks of river. Single family residences generally characterize the area south of the bridge.

### *1.5.5 Historic Site Development*

Between 1920 and 1930 a wooden swing bridge (14th Avenue South Bridge) structure was in service. During the early 1900's, the area shifted from mixed residential and farmlands to commercial and industrial uses. Between 1920 and 1935, a Standard Oil bulk fuel storage facility operated on a dock on the north shore. The north shore of the Duwamish Waterway became more industrialized during and following World War II. Commercial business activity in the project vicinity includes aviation manufacturing, oil transfer and storage, gasoline service stations, dry cleaners, boat storage yards, and light industrial warehouses.

## 1.6 Adjacent Areas

An upstream and downstream analysis, offsite analysis, zero-net rise study, and river scour study has been performed for this project and are included in the Storm Drainage Technical Information Report.

### *1.6.1 North Basin Adjacent Areas*

The existing drainage patterns within the ENB will be preserved as part of this project. The existing stormwater runoff from East Marginal Way north of the project limits is offsite roadway stormwater runoff and will be conveyed to the existing 18-inch public outfall for discharge into the Duwamish Waterway.

The Boeing parcels drain through a combination of private and public conveyance systems. The stormwater runoff draining through the private conveyance systems and private outfalls will be preserved. On the west side of the ENB, offsite flows do not enter the basin boundary as surface runoff. The flows are collected in a private conveyance system, treated for water quality in a private (Boeing) water quality treatment vault/oil water separator, and conveyed to the private 24-inch diameter outfall (OF-I, 4-125) into the Duwamish Waterway. On the east side of the ENB, Boeing offsite flows are conveyed to the existing public conveyance system and discharge into the Duwamish Waterway via the 18-inch diameter public outfall.

### *1.6.2 South Basin Adjacent Areas*

The existing City of Seattle combined storm/sewer system does not have sufficient capacity to convey large storm events and treat the events at the West Point water quality treatment facility. The project will provide relief to the combined storm/sewer system and adjacent offsite properties by redirecting runoff that currently discharges into the City of Seattle combined storm/sewer system into a water quality treatment facility for discharge into the Duwamish Waterway.

#### 1.6.2.1 Existing Marina and Shoreline

A private concrete boat launch ramp is located on the east side of the bridge and serves the Marina and Boat Service Business. The shoreline is a combination of dense grass, brush, rock, and mud, and sheet flows into the Duwamish Waterway. The existing catch basin serving the existing public 12-inch diameter corrugated aluminum metal pipe outfall is a brick and mortar catch basin that will be replaced.

The Marina has a storm drainage system including catch basins with down-turned elbows for oil containment. Based on a field visit, the marina did not seem to drain into the existing outfall or public combined storm/sewer system.

#### 1.6.2.2 Existing Retail, Residential, and Bridge

Residential lots within the project limits are generally lower than the existing roadway. Some of the private residential lots show signs of long term water drainage issues and resulting damage caused by constant water contact and poor drainage. During a field visit, December 31, 2008, several houses had rotting siding, corner posts, porches, and car garages caused by long term water damage. Some houses had visible downspouts connecting to footing drains that connect to the combined storm/sewer system or infiltration trenches. The existing brick roadway is higher than the properties adjacent to the roadway. In general, the water drains off of the brick roadway into the back of parcel 2185600080 and then under the existing bridge. Two catch basins drain the area under the bridge, but standing water near the abutment wall was observed. The natural drainage path has been considered and the sediment trap/sump should be located near the natural low spot to allow surface runoff to naturally collect site runoff under the bridge.

## 1.7 Critical Areas

Portions of the site may contain contaminated soils or contaminated groundwater. The contaminated soils will be removed, stockpiled during testing, and transported to appropriate treatment/waste facilities. Any contaminated materials hauled and/or stored off-site must be stockpiled to contain sediment, pollution, and stormwater runoff according to appropriate best management practices.

Contaminated groundwater will need to be captured, and treated prior to discharge. Treated stormwater may be discharged into the Duwamish Waterway providing it meets or exceeds minimum pollutant loading thresholds and does not increase sediment loading in the waterway. Treated stormwater may also be discharged into the sewer system providing the contractor has the appropriate City permits for discharge.

## 1.8 Soils

The soils within the project limits have been investigated for strength, stability, quality of materials, suitability for the proposed improvements, and extent of contamination. A geotechnical report by Shannon and Wilson (2004) has been prepared documenting soils conditions and design criteria for the bridge, foundations, roadway, and other work elements associated with the project design.

### *1.8.1 Onsite Soil Conditions*

According to the National Resource Conservation Service historical data, the soils in the project vicinity are Vashon Till type material. Geotechnical investigations conducted by Shannon and Wilson and documented in the 2004 Geotechnical Report indicate that subsurface conditions under the project area consist of man-made fill and marsh deposits in the upper regions of the soils profile. This is underlain by loose to medium dense alluvial deposits consisting primarily of sand and very soft to medium stiff clayey and silty estuarine deposits. These normally consolidated non-glacial soils are underlain by over consolidated glacial soils (glaciomarine drift) that consist of stiff to hard, clayey silt to silty clay with some sand and gravel. The elevation (NAVD88) of the glacial soils ranges from approximately 95 feet under the proposed north bascule abutment to approximately 60 feet under the south bascule abutment. See Appendix F of the Hydraulics/Storm Drainage Design Technical Information Report for geotechnical borings and soils mapping.

### *1.8.2 Offsite Soil Conditions*

In the south basin, sewer service is a combination of septic and City combined storm/sewer system. A small portion of private residential home owners have septic systems. See Appendix F, Figure 15 of the Hydraulics/Storm Drainage Design Technical Information Report for the septic treatment areas.

### *1.8.3 Contaminated Soil Conditions*

A Focused Corrective Measure Study has been performed by Boeing (March, 2002) for the Southwest Bank Corrective Measure. The study was performed to determine the appropriate actions for the Southwest Bank Corrective Measure and determine the horizontal and vertical extent of soil that contained elevated levels of constituents of concern within the saturated zone (approximately 6-feet below ground surface). The soils above the saturated zone will also be managed for cleanup activities. Soil borings were performed, and groundwater sampling wells were installed and have been monitored for corrective action. Soils were tested and contamination parameters were identified for cadmium, copper, lead, and zinc. The stormwater and temporary erosion control measures have been designed to accommodate for contaminated soils, high ground water, dewatering, stockpiling, and transportation of materials. During construction, areas will be established to stockpile soil. The areas will be contained with berms, and all stockpiles will be covered with plastic. The soil will be tested and determined if it is clean or contaminated prior to transport and disposal. Contaminated soils will be transported to a facility capable of treating the contaminated soils. For additional site specific hazardous materials documentation refer to the South Park Bridge Project Hazardous Materials Technical Report (February 2004).

## 1.9 Potential Erosion Problems

The site is generally flat on both sides of the river. Much of the area is paved or will be stabilized. The shoreline will have rock stabilization, large woody debris, and vegetation for soil stabilization. The project is within the 10-year floodway and the upstream reach is controlled by the Howard Hanson Dam.

## 1.10 Construction Phasing

The in-water work window for the project is between August 1 and February 15. Construction and demolition activities are estimated to start in April 2010 and end in March 2013, taking a total of approximately 34 months. The general sequence of construction activities is outlined below.

1. Sensitive areas (streams, wetlands, and their buffers) located within the project limits will be delineated on the ground with high-visibility construction fencing.
2. Install appropriate temporary erosion and sediment control (TESC) measures in all work areas prior to the initiation of ground-disturbing construction activities, including construction of temporary sediment ponds.
3. A construction staging area from which to mobilize construction equipment to the project site will be established.
4. The soil supporting the existing bascule bridge piers will be compaction grouted in order to protect the existing bridge from damage during excavation and pile driving activities.
5. The existing timber fenders adjacent to the north and south main piers will be removed via barge-mounted equipment.
6. Two temporary work trestles will be constructed on the west side of the existing bridge. One work trestle will extend from the south shore and the other will extend from the north shore.
7. Two cofferdams will be constructed to enclose the new pier footings using either barge-mounted equipment or equipment deployed on the temporary work trestles.
8. The material within the cofferdam will be excavated up to six feet below the mud line, to the bottom of the concrete seal of the bascule pier footing.
9. Temporary steel piles will be installed within the cofferdams, and a temporary drill platform will be built above the cofferdam. A bubble curtain or cylinder system will be installed either around individual piles or around the inside perimeter of the cofferdam to minimize acoustic impacts to fish within the Duwamish Waterway.
10. The foundation supports for each main bascule pier will be constructed. Excavated material will be transferred to an acceptable disposal location that, if necessary, is approved to receive contaminated materials.
11. After the foundation seal concrete is formed and poured the cofferdam will be dewatered. All wastewater within the casing will be pumped out and treated by a sand media filter. Pier footings and bascule piers then will be constructed, including control towers.
12. The main pier cofferdams will be removed and properly disposed of.
13. Movable leaf trusses will be installed from barge-mounted cranes and/or work trestles, prestressed girders for the approach spans will be erected, and the concrete for the approach span decks and bascule span deck will be poured.
14. The temporary work trestles will be removed.
15. The western portion of the pier protection fenders for the new bridge will be installed.
16. New submarine cables for electrical power and control lines will be installed using directional boring construction from pits constructed on both sides of the shores.

17. The north and south bridge approaches will be constructed. This includes re-grading the intersection south of the bridge and completing roadway work to prepare for the bridge opening to vehicular traffic.
18. After the new movable bridge and approaches are constructed, traffic will be routed onto the new alignment. The existing bridge and approaches will be closed to prepare for demolition.
19. A second set of two temporary work trestles will be constructed on the eastern, upstream side of the existing bridge.
20. Temporary cofferdams will be installed around each existing bascule and intermediate pier. These cofferdams will isolate the in-water work areas for removal of existing bridge foundations.
21. Five existing piers and their foundations will be removed using equipment deployed from working trestles and barges. The existing bridge decking, superstructure, and approaches will also be removed.
22. Habitat quality of the shoreline under and adjacent to the new bridge will be enhanced, including removal of existing riprap, rocks, and debris. The shoreline will be stabilized with vegetation planting and native substrates, as well as large woody debris.

Temporary erosion and sediment controls will be installed in accordance with the 2005 King County Surface Water Design Manual (KCSWDM) prior to beginning ground disturbing activities. The ESC strategy for this project includes:

- Marking clearing limits
- Protecting existing and constructed storm drain inlets from sediment with catch basin inserts
- Installing temporary stabilized construction accesses, and designated equipment cleaning areas
- Protecting adjacent properties and the Duwamish Waterway from sediment transport using temporary silt fence
- Protecting the river from sediment by routing construction runoff to sediment traps and sand media filters
- Covering disturbed areas with non-erodible material as soon as practical
- Controlling dust by watering construction areas as needed
- Protecting the Duwamish Waterway from construction debris by providing a containment system
- Compliance with all KCSWDM (2005) ESC requirements (see ESC notes and details in Appendix A of this report)

Erosion control features will remain in place until permanent vegetation is sufficiently established. Earthwork should occur in the dry season as much as possible and in-water work will be completed within the fish window specified by the Department of Fish and Wildlife. However, if construction occurs during the wet season, temporary cover measures for exposed slopes will be necessary. This will consist of mulching on shallower slopes, and erosion control blanket or plastic sheeting on steeper slopes. Erosion control blanket and permanent erosion control seeding will be established on all 2:1 fill slopes regardless of the season. See Appendix A for the Temporary Erosion Control plans, notes, and details.

## 1.11 Financial/Ownership Responsibilities

The project is a public improvement project within King County and City of Seattle right-of-way. The project is lead by King County and bonding worksheets usually prepared for private developer projects have not been developed.

# 2 EROSION AND SEDIMENT CONTROL MINIMUM REQUIREMENTS AND NARRATIVE

The 12 TESC elements are described below. Common design and procedural BMPs are described for each element, followed by a list of applicable BMPs.

## 2.1 TESC Element 1: Mark Clearing Limits

Prior to land-clearing activities, mark all clearing limits shown on the plan in the field with high-visibility fences to protect sensitive areas and their buffers (including vegetation to preserve), as well as adjacent properties. Retain duff layer, native topsoil, and existing vegetation in an undisturbed state to the maximum extent practicable.

PHYSICAL BMPS

- High visibility fence will be used to delineate the construction zones and prevent construction impacts outside of the project limits. This is intended to preserve natural vegetation outside of the construction project limits.
- There are not any wetlands or streams with buffer zones on this project. Work in the river and shoreline shall be protected/contained/controlled with appropriate BMPs to prevent sediment suspension and transport in the river.

## 2.2 TESC Element 2: Establish Construction Access

Access points shall be stabilized with a construction access comprised of a quarry spalls pad, crushed rock, or equivalent BMP, per Standard Specification 8-01.3(7) and the Standard Plans. Install stabilized construction access points prior to grading operations. Access points and haul routes are reduced to the fewest number possible for this project. The construction entrances shall be sloped downward into the site to reduce track-out of sediments onto the roadway. If sediment is tracked off-site, roads are to be cleaned thoroughly at the end of the day or more frequently if necessary. Sediment shall be removed from roads by shoveling or sweeping, and removed sediment should be transported to a controlled disposal area. If the stabilized construction entrance is not effective in preventing sediment from being tracked onto roads, a tire wash must

be used and the wash-water must be discharged to a separate on-site treatment system, such as closed-loop recirculation or land application, or discharged to a sanitary sewer (if allowed by individual permit). Street washing is only allowed after sediment is removed from the street. If streets are washed with water, wash-water must be treated prior to discharge.

PHYSICAL BMPS

- Stabilized construction entrances will be used for both the north and south basins
- Construction road stabilization will be necessary for this project. Much of the existing surfaces are paved. The construction sequence shall be performed to keep as much of the "yard" and working areas with existing pavement in-tact during construction so the contractor is utilizing the paved stabilized surfaces.
- Street cleaning will be performed daily or more frequently as necessary.
- Tire wash may be necessary and shall be used if the construction entrance is not sufficient.

## 2.3 TESC Element 3: Control Flow Rates

Protect downstream properties and waterways from erosion by preventing increases in the volume, velocity, and peak flow rates for stormwater runoff from the site during construction. Install sediment control facilities to provide flow control as early in the construction process as feasible and protect infiltration facilities from siltation during the construction phase. Also install the permanent bypass interceptor line to bypass East Marginal Way and Boeing runoff around the site.

PHYSICAL BMPS

- Temporary sediment vault
- Sediment trap/sump with pumps, and baker tanks.
- Check Dams

## 2.4 TESC Element 4: Install Sediment Controls

Install sediment control BMPs prior to soil-disturbing activities. Prior to leaving a construction site or discharging to an infiltration facility, concentrated stormwater runoff from disturbed areas must pass through sediment ponds or traps. Sheet flow runoff must pass through sediment control BMPs specifically designed to remove sediment from sheet flows such as filter berms, vegetated filter strips, or silt fencing. Because maintaining sheet flows greatly reduces the potential for erosion, runoff should be maintained and treated as sheet flow whenever possible.

The underground wet vault will be built during the initial phases of the project. The vault may be used as a temporary sediment trap during construction. After earthwork activities have been completed, and the finished grading is permanently stabilized, the vault shall be pumped dry, cleaned, and put on-line as a water quality treatment wet vault with discharge into the Duwamish Waterway. A Chitosan Enhanced Sand Filter and additional portable tanks may be used in conjunction with the vault for water quality treatment, storage, and flow control.

Due to construction phasing, the last item of work involves removing the existing bridge, abutments, and constructing the rain gardens. The rain gardens will function as infiltration facilities and should not be used for sediment trapping or flow control storage during construction. Temporary sumps, sediment traps, and baker tanks will be required for the south side of the project. A chitosan enhanced sand filtration system may be necessary to treat stormwater runoff prior to discharge

Non-stormwater (dewatering, line flushing) discharges must also be controlled to protect downstream properties. When non-stormwater discharges are routed through separate storm sewer systems, the flow rate must be controlled to minimize scouring and flushing of sediment trapped in the system.

PHYSICAL BMPS
- Silt fence
- Wattle
- Temporary sediment pond or trap
- Straw bale barrier
- Street cleaning
- Surface roughening
- Level spreader
- Inlet protection
- Outlet protection
- Preserving natural vegetation
- Portable storage water tanks
- Stormwater chemical treatment (Chitosan Enhanced Sand Filter System)
- Filter berm (gravel, wood chip, or compost)
- Construction stormwater filtration

Note: All TESC plans, including stormwater chemical treatment, whether originally planned or added after construction begins, must notify and be approved by King County/City of Seattle water quality programs.

## 2.5 TESC Element 5: Stabilize Soils

Stabilize all exposed and un-worked soils by applying effective BMPs that protect the soil from wind, raindrops, and flowing water. Selected soil stabilization measures must be appropriate for the volume of flow, time of year, site conditions, estimated duration of use, and the water quality impacts that stabilization agents may have on downstream waters or groundwater.

Soil stockpiles are especially vulnerable to slumping when saturated and must be stabilized and protected with sediment-trapping measures. Plastic may be necessary on silty stockpiles, as it is the only BMP that can prevent soil saturation. Stockpiles should be located away from storm drain inlets, waterways, and drainage channels where possible.

In western Washington, cover exposed soil that is not being worked-whether final grade or not-within the following time limits, using approved soil cover practices:

| | |
|---|---|
| October 1 through April 30 | 2 days maximum |
| May 1 through September 30 | 7 days maximum |

Expose no more soil than can be covered within the above time limits. Construction activities should never expose more erodible earth than amounts shown below.

| | |
|---|---|
| October 1 through April 30 | 5 acres |
| May 1 through September 30 | 17 acres |

PHYSICAL BMPS

- Preserving vegetation
- Temporary mulching
- Placing erosion control blanket and plastic covering
- Seeding and planting
- Gravel base
- Sodding
- Check dam**
- Wattle**
- Surface roughening***
- Stabilized construction entrance
- Construction road stabilization
- Dust control BMPs
- Soil binding using polyacrylamide*

* While polyacrylamide alone does help stabilize soils, using it in conjunction with mulch provides more protection for disturbed soil. (Contractor may request)

** Check dams and wattles alone do not stabilize soils. These BMPs should be used in conjunction with other soil stabilization BMPs.

*** Surface roughening alone does not provide soil stabilization. Another BMP should be used in conjunction with surface roughening to protect the soil from raindrop impacts. It must be performed prior to seeding, per the Standard Specifications.

A percolation test has been performed for the soils within the rain garden areas to determine if the soils percolate well and if a construction geotextile for separation is warranted to prevent treated runoff from infiltrating and spreading contamination plumes toward the river. The test results report between 0.4 and 1.3 inches per hour infiltration rates of the existing soils. The long term infiltration rates are anticipated to be between 0.1 and 0.3 inches per hour (assuming a value of 4 for the factor of safety). These infiltration rates are well below the thresholds that would require installation of a liner, but the liner is proposed as a conservative judgment for addressing potential contamination issues.

## 2.6 TESC Element 6: Protect Slopes

Construct cut-and-fill slopes in a manner that will minimize erosion by (1) reducing continuous length and steepness, and (3) roughening slope surfaces, considering soil type and its potential for erosion (such as track walking). In addition, all soil must be protected from concentrated flows through temporary conveyances such as diversions and pipe slope drains.

To capture sediment and runoff when cutting trenches, place excavated soil on the uphill side of the trench (when consistent with safety and space considerations). Contaminated groundwater shall be pumped from the trenches and contained for testing and treatment prior to discharge.

PHYSICAL BMPS
- Channel lining (riprap, grass)
- Temporary pipe slope drain
- Interceptor dike and swale
- Gradient terraces
- Placing erosion control blanket
- wattles

## 2.7 TESC Element 7: Protect Drain Inlets

Protect all operable storm drain inlets from sediment with approved inlet BMPs.

PHYSICAL BMPS
- Inlet protection (above/below grate and grate covers)
- Check dam

## 2.8 TESC Element 8: Stabilize Channels and Outlets

Check dams should be placed at regular intervals (see the Standard Plans) within constructed channels that are cut down a slope.All temporary conveyance channels should be designed, constructed, and stabilized to prevent erosion. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

PHYSICAL BMPS
- Channel lining (riprap, grass)
- Check dam
- Temporary seeding and planting
- Erosion control blanket
- Sodding
- Outlet/outfall protection

## 2.9 TESC Element 9: Control Pollutants

All pollutants, including construction materials, waste materials, and demolition debris, must be handled and disposed of in a manner that does not cause contamination of stormwater. Wood debris may be chopped and spread on-site. Application of fertilizers and other chemicals should be conducted in a manner and at application rates that will not result in loss of chemicals to stormwater runoff. Manufacturers' label requirements for application rates and procedures must be followed.

Methods for controlling pollutants that can be considered hazardous materials, such as hydrocarbons and pH-modifying substances, must be described in the contractor's SPCC plan. The plan must be prepared to meet Standard Specification 1.07.15(1) and the Washington State Department of Ecology's (Ecology's) standards. Stormwater or groundwater that has come into

contact with curing concrete must be sampled to ensure water quality standards are not violated. (See water quality monitoring protocols in Section 6-8 for sampling information). Process water (for example, concrete washout, slurry water, and hydrodemolition) must be contained and cannot be discharged to waters of the state. Contaminated groundwater shall be pumped from the trenches and contained for testing and treatment prior to discharge.

## 2.10 TESC Element 10: Control Dewatering

When groundwater is encountered in an excavation or other area, control , treat, and discharge it as described in Standard Specification 8-01.3(1)C. Contaminated groundwater shall be pumped from the trenches and contained for testing and treatment prior to discharge.

## 2.11 TESC Element 11: Maintain BMPs

A Certified Erosion and Sediment Control Lead (CESCL) shall inspect BMPs per Standard Specification 8-01.3(1)B to ensure they perform their intended function properly until the Project Engineer determines that final stabilization is achieved. Final stabilization means completion of all soil-disturbing activities and establishment of a permanent vegetative cover or permanent stabilization measures (such as riprap) to prevent erosion. Temporary BMPs shall be removed within 30 days after final stabilization is achieved.

Maintain BMPs in accordance with Standard Specification 8-01.3(15). When the depth of accumulated sediment and debris reaches approximately one-third the height of the device, the contractor must remove the deposits. BMP implementation and maintenance should be documented in the Site Log Book. Clean sediments may be stabilized on-site if the Project Engineer approves.

## 2.12 TESC Element 12: Manage the Project

Apply the following actions on all projects:

(1) Preserve vegetation and minimize disturbance and compaction of native soil, except as needed for building purposes.

(2) Phase development projects to minimize the amount of soil exposed at any one time and prevent the transport of sediment from the site during construction.

(3) Time sediment control BMP installation in accordance with TESC Element 4.

(4) To minimize erosion, follow soil cover timing requirements and exposure limits in TESC Element 5 and Standard Specification 8-01.3(1). Projects that infiltrate all runoff are exempt from the above restrictions. Individual contract Special Provisions and Project Engineer directives may be more stringent, based on specific location characteristics or changing site and weather conditions.

(5) The work of utility contractors and subcontractors is coordinated to meet requirements of both the TESC and SPCC plans.

(6) All BMPs are inspected, monitored, and maintained in accordance with TESC Element 11. Sampling will be conducted to ensure compliance (see Section 6-4 for details).

(7) The certified Erosion Control Lead is on-site or on-call at all times.

(8) The TESC and SPCC plans are kept on-site or within reasonable access to the site. Due to the unpredictable nature of weather and construction conditions, the TESC plan is a flexible document that should be modified whenever field conditions change. Whenever inspections and/or monitoring reveal that the BMPs identified in the TESC plan are inadequate due to the actual discharge of or potential to discharge pollutants, the plan must be modified (as appropriate) as soon as possible but within 7 days. Fully implement and maintain BMPs as soon as possible but within 10 days. Most of these updates can be drawn onto the plans sheets. The plan must also be update whenever there are changes in the project design or in construction methods that could affect the potential for erosion or spills.

# 3 CSWPPP ANALYSIS AND DESIGN

The construction stormwater pollution prevention plan (CSWPPP) is applicable to the proposed construction activities and the time of year construction is to take place. The CSWPPP design and analysis is based on guidelines and criteria established in the Biological Assessment (March 2009). Runoff flow calculations for sizing erosion control features are included in Section 3.2.

## 3.1 ESC Plan Analysis and Design (Part A)

Construction activities that could contribute pollutants to surface stormwater are:

- Demolition and removal
- Construction
- Clearing and grading
- Filling
- Excavation
- Compaction

The BMPs selected to address the pollution generated from the construction activities listed are:

Clearing Limits: The clearing limits will be delineated with high visibility fence, silt fence and/or metal fence.

Cover Measures: All earth work areas not covered by quarry spalls will be stabilized with a 2" layer of straw mulch. Cut and fill slopes will be covered with erosion control blanket over a layer of compost. Surface roughening and temporary seeding will be used to stabilize exposed soils.

Wattles will be installed in the earth work area to reduce flow velocity, spread the flow width, and capture sediment.

The project is partially located within an area of the Duwamish Waterway that has been designated as a superfund site. It is likely that soil removed from excavations for the new bridge piers and foundations will be contaminated. All excavated soil will be stockpiled onsite or on lined barges and tested to determine if it is contaminated. All stockpiles will be covered with plastic sheeting while the testing is conducted to stabilize the soil and to prevent leaching and spread of any contaminated materials that may be present in the stockpile. If a stockpile is found to contain hazardous material, it will be sent to a facility for special treatment and disposal.

Perimeter Protection: Silt fence will be placed downhill from the construction activities and along the river. Check dams (triangular silt dikes) will be placed in existing and temporary ditches.

Traffic Area Stabilization: Four stabilized construction entrances will be installed to stabilize the accesses into the construction site. A construction entrance will be installed at Dallas Avenue and at Orr Street to provide access to the work area on the south side of the South Park Bridge. Two entrances will be installed on the east and west sides of 16th Avenue South to provide access to the work area on the north side of the bridge. A wheel wash system may be necessary and may be installed at each of the onstruction entrances.

Sediment Retention: Collected surface water will be routed to temporary holding ponds or sumps at the low points under the new bridge. One sump will be constructed within each of the two work areas north and south of the Duwamish River. The runoff will be pumped from the sumps and treated with chitosan enhanced sand media filters and chemical treatment before being discharged to the Duwamish River. Supplemental storage of runoff and dewatering will be provided with Baker tanks as necessary. See Section 3.2 for the sediment pond sizing calculations. Catch basin inlet protection and block and gravel curb inlet protection will be used to minimize sediment deposits and dispersion in the drainage system.

Surface Water Collection: Interceptor ditches will be installed within the work area to convey runoff from disturbed areas to the sumps and sand media filter systems.

Dewatering Control and In-water Work:

Temporary sediment control sheeting will be installed to isolate the in-water construction of the new bridge pier foundations and the demolition of the existing bridge pier foundations from the Duwamish Waterway. All wastewater and process water within the cofferdams will be pumped out and treated by the sand media filters. All excavated soil and demolition debris will be removed from the cofferdams and either placed in trucks or on barges and hauled offsite for proper disposal. Spill aprons or containment tarps will be installed under excavation equipment to reduce the risk of material entering the Duwamish Waterway.

If ground water is encountered in other excavations, it will be routed to sediment traps and treated for sediment removal.

River sediments within the project limits may be contaminated with hazardous materials from adjacent superfund sites. A sand drainage blanket consisting of sandy gravel will be placed on

the riverbed within the limits of the in-water work to minimize the re-suspension of potentially contaminated sediments as a result of work activities.

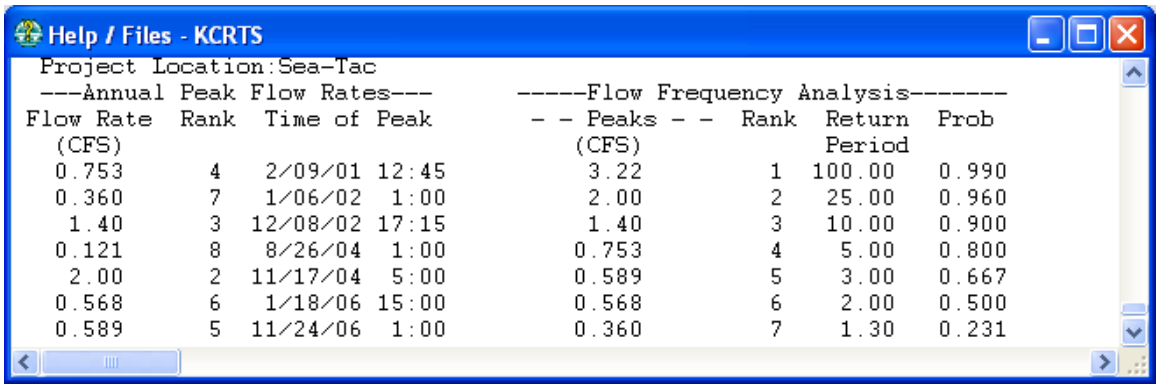
Dust Control: Dry exposed soil surfaces will be wetted to prevent wind erosion and dust.

## 3.2 SWPPS Plan Design (Part B)

**Temporary Sediment Pond Design, South Side**
Assumptions and data entry:

Project location is SeaTac
3.55 acres impervious area
2.82 acres pervious till grass
Total tributary area is 6.37 acres
15-minute time step
A sediment pond shall be used where the contributing drainage area is 3 acres or more.
The proposed South Basin erosion control flows assume the entire basin is cleared and grubbed.

Step 1: Obtain the discharge from the hydrologic calculations of the 15-minute peak flow for the 2-year runoff event ($Q_{2\text{-}15min}$) using KCRTS.




$Q_{2\text{-}15min}$ = 0.568 cfs

Step 2: Determine the Pond geometry. Determine the required surface area at the top of the pond with the equation:

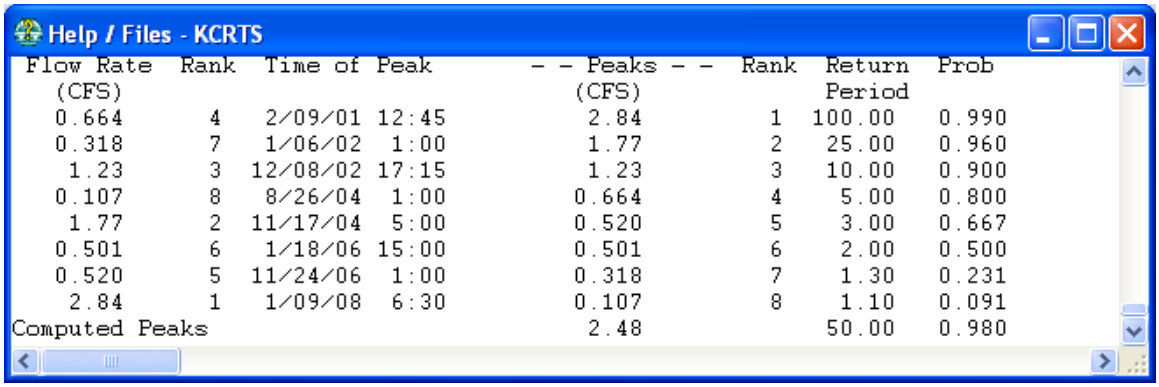
SA = 2 x $Q_{2\text{-}15min}$/0.00096
SA = 2 x 0.568 cfs/0.00096 ft/s
**SA = 1183 SF**

There is enough space available to grade a pond/trap of this size but Baker Tanks will be necessary for containment and treatment of contaminated water.

**Temporary Sediment Pond Design, North Side**
Assumptions and data entry:

Project location is SeaTac
0.0 acres impervious area
5.62 acres pervious till grass (all asphalt is removed at once)
Total tributary area is 5.62 acres
15-minute time step
A sediment pond shall be used where the contributing drainage area is 3 acres or more. The proposed North Basin erosion control flows assume the entire north basin is cleared for construction.

Step 1: Obtain the discharge from the hydrologic calculations of the 15-minute peak flow for the 2-year runoff event ($Q_{2\text{-}15min}$) using KCRTS.




| Flow Rate (CFS) | Rank | Time of Peak | – – Peaks – – (CFS) | Rank | Return Period | Prob |
|---|---|---|---|---|---|---|
| 0.664 | 4 | 2/09/01 12:45 | 2.84 | 1 | 100.00 | 0.990 |
| 0.318 | 7 | 1/06/02 1:00 | 1.77 | 2 | 25.00 | 0.960 |
| 1.23 | 3 | 12/08/02 17:15 | 1.23 | 3 | 10.00 | 0.900 |
| 0.107 | 8 | 8/26/04 1:00 | 0.664 | 4 | 5.00 | 0.800 |
| 1.77 | 2 | 11/17/04 5:00 | 0.520 | 5 | 3.00 | 0.667 |
| 0.501 | 6 | 1/18/06 15:00 | 0.501 | 6 | 2.00 | 0.500 |
| 0.520 | 5 | 11/24/06 1:00 | 0.318 | 7 | 1.30 | 0.231 |
| 2.84 | 1 | 1/09/08 6:30 | 0.107 | 8 | 1.10 | 0.091 |
| Computed Peaks | | | 2.48 | | 50.00 | 0.980 |

$Q_{2\text{-}15min}$ = 0.501 cfs

Step 2: Determine the Pond geometry. Determine the required surface area at the top of the riser pipe with the equation:

SA = 2 x $Q_{2\text{-}15min}$/0.00096
SA = 2 x 0.501 cfs/0.00096 ft/s
**SA = 1044 SF**

A water quality wet vault will be constructed to provide water quality treatment to the north basin runoff once the project is completed. This vault will be installed as a first order of work to allow the vault to be used as a sediment pond to contain construction runoff. The vault is not large enough to contain all of the runoff from the 2-year design flow, and Baker tanks will be required to provide supplemental storage.

## 3.3 Spill Prevention Control and Countermeasures (SPCC) Requirements

The Contractor shall develop a Spill Prevention, Control and Countermeasures (SPCC) Plan per the amendment to the WSDOT Standard Specifications §1-07.15(1).

This plan is for control of pollutants on construction sites that have the potential to harm human health or the environment, (RCW 70.105, Hazard Waste Cleanup-Model Toxics Control Act). The plan shall address sources of pollutants, critical receptors, spill prevention and containment, spill response, and reporting requirements. This plan is expected to address comprehensive control of pollutants that include, but are not limited to, management of fuels, oils, solvents, and chemicals used in operations and maintenance, solid waste decomposition products determined by Department of Ecology to present a hazard, and maintenance and management of contaminated soils and water encountered or generated on the construction site.

The Contractor shall make available at the construction site an individual designated as the SPCC Lead that is knowledgeable in hazardous waste recognition, and spill control and response. The SPCC Lead is the person responsible for developing and implementing the SPCC Plan. In the event of a hazardous material spill, the SPCC Lead is the designated person to respond and alert the appropriate authorities. At a minimum this individual will have training or experience in the following:

1. Knowledge of basic hazard and risk assessment techniques
2. Knowledge of the proper selection and use of personal protective equipment
3. An understanding of basic hazardous materials terms.
4. Ability to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personnel protective equipment available.
5. Knowledge of how to implement decontamination procedures.
6. An understanding of relevant standard operating procedures and termination procedures contained in the SPCC.

The Contractor shall take measures to prevent solid wastes from becoming a source of pollutants to stormwater or decomposition products from entering waters of the state. The Contractor should use best available practices to contain, segregate, store, and dispose of solid wastes consistent with state and local statutes and ordinances controlling solid waste disposal.

# 4 DESIGN REFERENCES

King County Surface Water Design Manual, 2005

King County Road Design and Construction Standards, 2007

Dept. Of Ecology Stormwater Management Manual for Western Washington, 2005

# APPENDIX A

| | |
|---|---|
| Erosion Control Structure Notes | 2 Pages |
| Erosion Control General Notes | 3 Pages |
| Temporary Erosion Control Plans | 12 Pages |
| Temporary Erosion Control Details | 3 Pages |
| CWSPPP Worksheet Forms | 7 Pages |