

CITY OF REDMOND REGIONAL STORMWATER FACILITIES PLAN

The City of Redmond is proceeding with a major new initiative to retrofit the most urbanized portions of the City to improve water quality in its streams and to conform to current regulatory standards for stormwater management. This new initiative includes:

1. guiding new development by updating stormwater code requirements to: meet Washington State Department of Ecology (Ecology) standards, promote low impact development, and be protective of the drinking water aquifer; and
2. implementing and executing capital improvement projects to construct regional stormwater facilities at strategic locations in the City to provide the greatest improvement to stormwater in the most economical manner.

The City intends to proceed with an aggressive schedule.

1.0 Alternative Approaches to Stormwater Management

The City has reviewed state and federal requirements for stormwater management, considered alternative approaches to meeting those requirements, and has selected an innovative, flexible, and proactive plan for action.

1.1 Required Stormwater Facilities

To meet federal Clean Water Act and Washington Department of Ecology requirements and to protect the environment, the City has adopted rules for management of stormwater flowing from new development and redevelopment project sites. These rules require implementation of flow control and water quality treatment of stormwater to protect streams and their inhabitants.

Flow control requirements in Redmond generally consist of:

- large stormwater detention ponds or vaults that cover about 10% of the newly developed or redeveloped area; or
- if a project is near Lake Sammamish or the Sammamish River, an oversized conveyance pipe to carry flows all the way to the receiving water; or
- if the soils are suitable and the site is not located within a groundwater protection area, a large infiltration pond or vault.

Water quality treatment systems in Redmond generally take up much less space than flow control facilities and often include:

- additional depth in stormwater detention ponds or vaults; or
- biofiltration swales; or
- constructed stormwater treatment wetlands; or
- sand filters or cartridge filters in stormwater treatment vaults; or
- a combination of two or more treatment methods.

These stormwater flow control and water quality facilities may be established: 1) on individual development sites; 2) as large regional facilities; or 3) sites may be developed to minimize the need for such facilities. Each approach has its advantages and disadvantages.

1.2 The Individual Site Approach

Using individual, on-site detention ponds or vaults for each development is the most common approach to stormwater management currently found in Redmond. Large residential plats typically use stormwater detention ponds. Commercial properties or properties with high property values, frequently opt to use stormwater detention vaults which are more expensive to construct, but may allow some beneficial uses such as parking or play areas on top.

The owner or developer finance the design and construction of individual facilities and, initially, is responsible for all operation and maintenance. In Redmond, facilities included as part of large residential plats are turned over to the City for maintenance. The owners of commercial development and small residential plats retain ownership and maintenance of their facilities. However, the City remains ultimately responsible for these activities if the owner fails to carry out the necessary operation and maintenance. Small, individual facilities located outside of stream buffers are preferable because they generally cause the least disturbance to the natural system. In watersheds that include many small streams, individual site facilities are needed to be most protective of the flow regime in each of the small streams.

There are disadvantages to individual site facilities. On-site facilities cost more per acre of development to construct and to maintain than regional facilities. Small facilities or underground vaults are more easily neglected because they are often out of sight and therefore out of mind. If neglected, a facility is less likely to achieve pollutant removal goals and may become an eyesore.

One major limitation to the individual site approach is that it is triggered only by new development and redevelopment. In other words, if a section of the City does not redevelop, that area will not be upgraded to meet current standards. As the City faces the need to address water quality on a regional scale, there is a need to find a way to accommodate the need to retrofit those areas. With the City's responsibilities at the regional level, a regional approach to stormwater management may be preferred.

1.3 The Regional Approach

In newly developing areas, properties prime for redevelopment, or in portions of the City that need to be retrofitted with stormwater facilities, local governments may choose to install strategically located regional facilities within the watershed. If a regional pond is selected, it is advisable to use on-site controls for any industrial

development within the regional pond drainage area. Regional facilities are not appropriate as in-stream facilities, but are appropriate for areas that are served by constructed stormwater conveyance systems (i.e. pipes and gutters).

Regional facilities are significantly more cost-effective because it is easier and less expensive to build a single large facility than several small ones. The City is able to allocate staff to maintain a few large facilities, rather than review, inspect, and enforce maintenance of multiple private facilities. This results in an increased assurance of continued effectiveness of the facility. Additionally the high visibility of large, regional ponds helps to ensure they are well maintained.

Through careful planning, combined with the City's water quality monitoring program, regional facility construction can be prioritized to focus efforts on the most impaired waters. Construction of regional facilities affords an opportunity to retrofit larger portions of the City that do not have stormwater controls meeting current standards. Finally, adequately planned and designed regional ponds not only provide benefits for stormwater treatment and flood prevention, but provide aesthetic benefits and natural wildlife habitat.

The main disadvantage to regional facilities is logistics. Locating and obtaining property for these large facilities is a challenge due to urban planning considerations and property costs. In most cases, the local government must provide capital construction funds for a regional facility, including the costs of land acquisition. However, if a downstream developer is the first to build, that person could be required to construct the facility and later be compensated by upstream developers for the capital construction costs and annual maintenance expenditures. Conversely, an upstream developer may have to establish temporary control structures if the regional facility is not in place before construction. One good approach is for the City to establish a funding source like bonds and use developer contributions to help to repay those bonds as new projects within the basin are developed.

1.3 The Low Impact Development Approach

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using small, site-based controls that are decentralized. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and treating stormwater in large, costly, end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, more cost-effective landscape features located at the lot level.

In rural settings, LID is the most preferred approach. In urban settings with high percentages of impervious surfaces, it can be challenging to design a site to infiltrate

stormwater. (i.e. if a site is 90% impervious, there remains only 10% of the site to use for infiltration of the runoff that concentrates from the impervious areas.)

With the right soil conditions, and development patterns, LID is an excellent approach. However, certain soil conditions can limit LID because LID is highly dependent upon infiltrating stormwater at the development site. In Redmond, there are two main concerns with the use of onsite infiltration for stormwater management:

1. Much of Redmond's soils are composed of glacial till, a material with a poor capacity for infiltration. Much of the till soils in Redmond lie on hillsides. When development projects include attempts to infiltrate stormwater into till soils on steep slopes, there is a high likelihood that the stormwater will become a problem for an existing downstream neighbor. Within Redmond's urban growth boundary, any new development will likely have a nearby downstream neighbor to impact.
2. On the valley floor of Redmond, the soils are ideal for infiltration. However, these soils are also the location of the City's drinking water aquifer. Therefore, much of the valley floor is protected by City ordinance and State law as a "wellhead protection zone". While infiltration of "clean" water from roofs and sidewalks is encouraged in wellhead protection zones, stormwater runoff from pollution generating surfaces like roads and parking lots is discouraged because of the potential for contamination of the groundwater resource.

1.4 The City of Redmond Proactive Approach

Consistent with the City's ethic and long term commitment to environmental protection, the City has taken the proactive approach of developing a Regional Stormwater Facilities Plan. This approach draws from the advantages of the individual approach, the regional approach, and the low impact development approach, in a manner that is integrated through: 1) revisions to its stormwater code that guides development; 2) careful management of operations and maintenance of existing facilities; and 3) a commitment to capital construction of new regional facilities.

As is typical of most jurisdictions, requirements to construct stormwater flow control or water quality facilities in Redmond are triggered when properties submit for permits to develop or redevelop property. Since most of Redmond was developed prior to implementation of current stormwater requirements; and due to the high cost of redevelopment; most areas of Redmond will not be required to meet current stormwater standards until the existing properties develop or redevelop. This could take several decades for substantial areas of the City to comply with new and future more rigid standards. Redmond is not satisfied with the length of time it will take to bring the City's stormwater conveyance and water quality facilities up to current codes or meet water quality objectives.

As a part of the City's commitment to stewardship of the streams within the City, the City has monitored water quality in stormwater and in the City's streams for more than ten years. In 2004, that data was analyzed and it was determined that several of the City's streams were impaired enough to be added to the State's 303D list. This listing requires a plan by the City to address the areas of concern. The primary pollutants of concern in Redmond's streams are: low dissolved oxygen, high temperature, and high fecal coliform. Additional monitoring has indicated high metals (copper, zinc, and lead) and hydrocarbons.

In recognition of the need to improve water quality in the City's streams, the City of Redmond's Proactive Approach embraces a strategic combination of regional and low impact development approaches. By realizing the benefits gained in the regional approach and the performance achieved in LID, the City is able to proactively improve water quality and expedite compliance with state and federal stormwater initiatives. Also, as regulations change, the City will be poised to make a smooth transition to quickly upgrade its regional facilities to meet new standards. The City's two-tiered approach includes:

1. strengthening the City's stormwater code and development requirements, to require onsite retrofitting and encourage low impact development where appropriate; and
2. implementation of an aggressive capital improvement program to construct regional stormwater facilities that will retrofit key watersheds in the City and bring them up to current standards now.

2.0 STORMWATER CODE UPDATE

The City is in the process of revising its stormwater code requirements through an update to the City's Stormwater Technical Notebook (Stormwater Notebook). This update will include adoption of Ecology's 2005 Stormwater Management Manual for Western Washington (Ecology Manual). Since the Ecology Manual is a state-wide document, it is necessary to clarify some of its requirements for direct application within the City of Redmond. The Stormwater Notebook identifies City-specific adjustments to development and redevelopment requirements to meet all the City's long term goals for improvement to the environment. Several key areas are discussed below.

2.1 Redevelopment Retrofitting

The Ecology Manual requires redevelopment projects to provide stormwater controls for redeveloped areas. However, in recognition of the need to retrofit the City to meet current stormwater standards, the City requires additional retrofitting in two ways:

1. For redevelopment projects, stormwater facilities are required to be sized to provide flow control and treatment for the project area and an equal portion of the existing site (up to a maximum of twice the project area.) For road projects, this results in doubling the size of stormwater facilities, thereby retrofitting an equal portion of existing pavement.
2. For tenant improvement or other redevelopment projects that exceed the value of the existing site, the entire property is required to be retrofitted to meet current standards.

These two policies are key components of the City's approach to retrofitting the City to meet current standards, and are good examples of the City's progressive approach to improving stormwater quality.

2.2 Low Impact Development

The City's new Stormwater Notebook includes a new emphasis on low impact development. A new section is being added to identify and encourage the preferred ways of implementing low impact development in Redmond, and clarifying what is required for review of LID developments. This section was prepared by a consultant working under a Department of Ecology grant to promote LID.

The Stormwater Notebook also references the Puget Sound Action Team's Low Impact Development Technical Guidance Manual for Puget Sound, and includes additional maintenance requirements for LID facilities.

The Stormwater Notebook includes additional requirements for compost-amended soil. The City independently developed guidance for compost-amended soil that is now included in the Stormwater Notebook. This guidance is more specific and requires more of a developer investment than the guidance in the Ecology Manual. It has been demonstrated that the proper use of compost-amended soil greatly improves the infiltrating capacity of till soils and the capacity of those soils to hold water, thereby reducing stormwater runoff. They also are supportive of improved turf quality, resulting in a reduction in the use of fertilizers and pesticides by homeowners, thereby improving stormwater quality.

To provide an incentive for use of compost-amended soil, areas of compost-amended turf that have: slope lengths of at least 50 feet; and are made up of contiguous areas with a minimum area of 500 square feet; and are protected from vehicle traffic during construction; may be modeled as pasture for the purpose of sizing stormwater detention facilities.

2.3 Wellhead Protection Considerations

In 2003, the City adopted a wellhead protection ordinance, as mandated by the Washington State Department of Health. This ordinance includes a prohibition against

infiltration of unclean stormwater within wellhead protection zones. Contradictory to the wellhead protection requirements, the Ecology Manual requires infiltration of stormwater in outwash soils if direct discharge is not an option. However, the Ecology Manual includes a provision that if the groundwater is less than five feet deep, infiltration is not required. Instead, the soil is modeled as till for the purpose of sizing stormwater facilities. This common sense approach allows for a reasonable detention standard in outwash soils where infiltration is not an option.

As a protective measure for the City's shallow groundwater aquifer (less than five feet deep in many areas), on-site detention in Redmond's Wellhead Protection Zones 1, 2, and 3 shall be designed using the assumption that outwash soils are till. (In effect, the applicant shall assume the groundwater is too high to accommodate infiltration, so Ecology's alternative of modeling as till shall be used.)

2.4 Regional Facilities Plan

If new development or redevelopment projects are located within a basin that drains to an existing or proposed regional stormwater facility, that development may be allowed (or required) to contribute toward the cost of constructing that facility in lieu of building onsite improvements. If the regional facility project has been constructed or is on the City's Regional Facilities CIP List, then payment of the fee will be required and onsite improvements will not be required.

The City will begin the Regional Facilities Plan by constructing the first facility during the summer of 2007. This proposed facility will retrofit a 22-acre portion of the 500-acre City Center to meet current standards for new development. This 22-acre retrofit will be the "starting balance" for a stormwater facility accounting system. As each new development is constructed in the City Center without building on-site facilities, the 22-acre balance will be reduced accordingly. In this way, the City will maintain a higher level of water quality in the common receiving water, the Sammamish River, than if development had gone forward with a site-by-site approach to stormwater management. Before the stormwater facility balance is reduced to zero, the City will construct the next retrofit facility, thereby continuing to stay ahead of stormwater requirements and providing continued benefit to the receiving waters.

The City will manage its Regional Facilities Plan with certain conditions intended to protect local areas. Contribution in lieu of providing onsite flow control or water quality treatment is an option for new or redevelopment projects if the following conditions are met:

1. Allowing the contribution in lieu of providing onsite flow control or water quality shall not create an unsafe situation.
2. Appropriate onsite source control procedures are implemented.
3. The downstream system shall have adequate capacity to convey the undetained flow for the required maximum return period storm events without

causing or aggravating any downstream flow-related problems such as flooding or erosion.

4. Sites draining to infiltration systems in wellhead protection zones will have additional restrictions.
5. Some onsite treatment may be required if the regional facility doesn't meet all the requirements mandated for the development (i.e. if a development needs enhanced treatment and the regional facility only provides basic treatment, the regional facility may be the second part of a treatment train.)
6. A regional flow control project downstream of the project site with available capacity for new development shall be on the City's regional facility CIP list (as approved by the City Engineer).
7. The Natural Resources Division Manager or his/her designee approves the contribution in lieu of flow control as being consistent with the City's goals and objectives of the regional facilities program.

The amount of the contribution is proportionate to the amount of impervious area being added to the property. New impervious area that drains to the stormwater system is subject to a flow control fee. (This provides an incentive for infiltration of clean water from roofs and sidewalks.) New pollution generating impervious surfaces may not infiltrate, and are subject to a water quality fee. (This provides an incentive for site design that reduces the amount of pollution generating impervious surfaces.)

3.0 REGIONAL FACILITIES CAPITAL CONSTRUCTION PLAN

A major component of the City's initiative to rapidly improve the water quality of the streams in Redmond is construction of several key regional facilities. By moving forward with design and construction of these facilities, the City will make a very large investment in the health of its streams.

3.1 City Center

Redmond's City Center is made up of about 500 acres of commercial and residential development that drains to the Sammamish River. To retrofit this watershed, the City is planning construction of six regional facilities (see figure):

- Redmond Way Stormwater Trunk. Construct a new 6,000 lf direct discharge stormwater trunk from the east end of downtown Redmond to the River.
- Redmond Way Stormwater Treatment Facility. Construct a stormwater treatment wetland or cartridge filter system to provide enhanced treatment for the water quality storm.
- Leary Way Stormwater Treatment Wetland. Expand an existing bioswale into a stormwater treatment wetland to retrofit the subbasin for enhanced treatment.
- McRedmond Park filter vault. Construct a cartridge filter system to provide enhanced treatment for the water quality storm.
- Bear Creek filter vault. Construct a cartridge filter vault to treat and divert flow from a portion of the Redmond Way Stormwater Trunk into Bear Creek.

- 85th Street Water Quality. Construct a filter vault on the City campus to provide enhanced treatment for the water quality storm.

The City's initial push forward with the Regional Facilities Plan will be to finance these six projects, at an estimated \$40 million. The first project will be constructed in the summer of 2007 by borrowing from the Stormwater Utility's capital improvement fund.

3.2 Overlake

Redmond's Overlake neighborhood includes a 150-acre area of commercial development that drains into Bellevue. The City has identified two preferred locations for large regional stormwater ponds that would provide stormwater treatment and detention before the stormwater leaves Redmond's City limits and flows into Bellevue.

It should be noted that Redmond represents a very small portion (1.4%) of the 10,870 acre Kelsey Creek basin. The City of Bellevue provides primary stewardship for this basin. All of Redmond's contribution to the basin flows into Bellevue's municipal stormwater conveyance system, which has discharges to waters of the state that are regulated by the Washington State Department of Ecology. As a good neighbor, the City is committed to meeting City of Bellevue standards for detention and water quality. As an environmental steward, Redmond is committed to bringing the entire watershed up to current standards. To meet these two goals, projects within this watershed will have two options. The first option will be to design the project to meet all the standard requirements of the Stormwater Technical Notebook. The second option will be to design the project to meet City of Bellevue standards for detention and water quality and to make a proportionate contribution toward construction of the City's proposed regional facilities. With this approach, stormwater will be managed to meet or exceed the requirements of the primary basin steward (Bellevue) while using developer contributions to take steps to retrofit the watershed to meet current City of Redmond standards.

3.3 City-Wide

With completion of the key regional facilities described above, the City will continue its efforts in other portions of the City. Initial estimates have identified new proposed facilities at a cost of about \$60 million to complete.

3.4 Council Support

City staff presented the Regional Facilities Plan to the Redmond City Council's Planning & Public Works Committee. The committee endorsed the Regional Facilities Plan and the full Council has embraced the philosophy and is supportive of the concept. Council is now considering the final terms for financing the plan.

3.5 Financing

The cost for the City Center facilities is estimated at \$40 million. The City will obtain bonds in that amount to fund the program. The bonds will be repaid from the City's Stormwater Utility Fund and also from developer contributions as part of the "fee in lieu of" program. Once formal approval of the financial plan is achieved, the City will leverage existing balances in the Stormwater Utility's Capital Improvement Fund to begin design and construction of the proposed facilities.

4.0 REGIONAL STORMWATER FACILITIES PLAN – IMPLEMENTATION SCHEDULE

In the interest of quickly advancing this proactive approach to stormwater management, the City has an aggressive schedule for updating its stormwater code and implementing its Regional Facilities Capital Construction Plan.

Jan-Sep 2006	Update Stormwater Notebook	Identify proposed regional facilities
Sep 2006	Complete internal review of Stormwater Notebook	Reach out to Ecology for feedback about the Regional Facilities Plan
Oct 2006	Share draft Stormwater Notebook with the public. City approval of Stormwater Notebook	Seek Council approval for funding of Regional Facilities Plan
Nov 2006	Publish Stormwater Notebook	Develop accounting protocols for Regional Facilities Plan
Jan 2007	Stormwater Notebook becomes effective	Begin design of City Center regional facilities
Jul 2007	Obtain \$40 million bonds to fund Regional Facilities Plan. Award construction contract for first facility for summer construction	
Future	Construction of facilities in City Center, Overlake, and beyond	

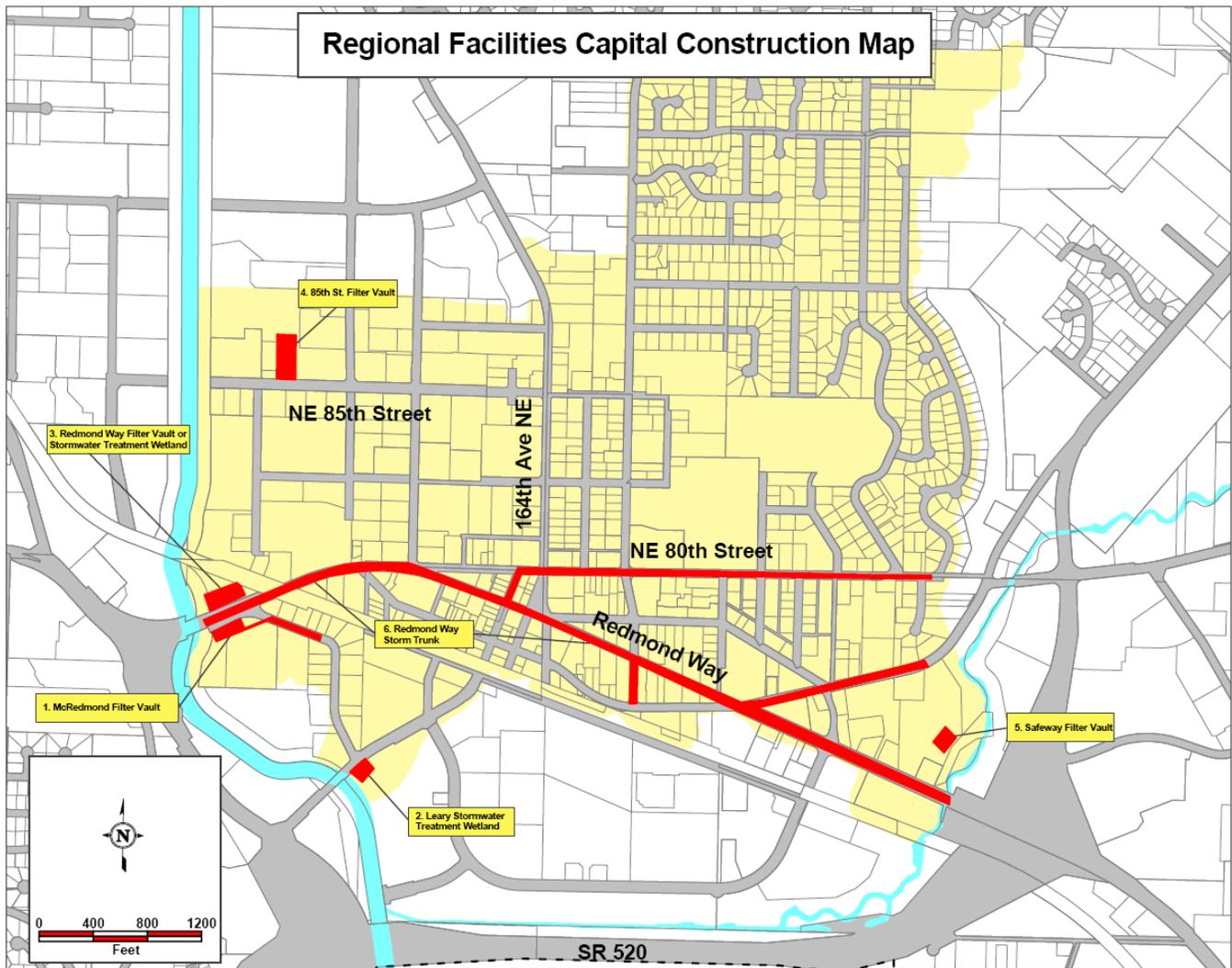


Figure: Regional Facilities Capital Construction Map

Notes:

- Each facility is designed to provide enhanced treatment for its associated drainage area. All new development located within the highlighted area will contribute toward the cost of construction of these six regional facilities. Facilities will be sized to treat the water quality design storm.
- For the filter vaults, it is hoped that the Aquaswirl / Aquafilter vault system will be approved for enhanced treatment. If this doesn't work out, the City will proceed with a wetvault / StormFilter vault alternative.
- The six regional facilities will be:
 1. McRedmond Filter Vault: enhanced treatment of 22 Acres of commercial downtown. \$1.6M.
 2. Leary Stormwater Treatment Wetland: enhanced treatment of 16 Acres of commercial downtown. \$500K
 3. Redmond Way Filter Vault: enhanced treatment of 209 Acres of commercial downtown and residential neighborhoods draining through the new Redmond Way Storm Trunk. \$4.6M. A stormwater treatment wetland option is under consideration pending property issues.
 4. 85th Street Filter Vault: enhanced treatment of 230 Acres of commercial downtown, multifamily, and residential neighborhoods. \$7.6M.
 5. Safeway Filter Vault: enhanced treatment of the water quality storm from 15 Acres or residential and commercial areas. The water quality storm will be treated and discharged to Bear Creek. Higher flows of untreated stormwater will go to the Redmond Way Storm Trunk. \$712K
 6. Redmond Way Storm Trunk: New storm trunk sized to convey 100-year storm to the river. \$22.5M.