

Town of Woodway

2005 Stormwater Comprehensive Plan

Acknowledgements

The development and preparation of the Town's new Stormwater Comprehensive Plan is the result of the combined efforts and ideas from the citizens and public officials and staff of Woodway. Thanks are given to all members who participated in its development.

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Executive Summary

Introduction

The Town of Woodway worked closely with its citizens, engineers, surveyors, and other staff to provide this Stormwater Comprehensive Plan (Plan). The Town and HDR worked closely to develop the purpose and scope for the Plan and HDR was authorized to prepare the Plan by the Town Council at the meeting on December 6, 2004. Formal authorization to perform the work was provided via Work Order dated December 10, 2004.

The Plan is to be used for identifying and planning for current and future stormwater needs. The Plan is divided into four chapters:

1. Existing Storm Drainage System Inventory
2. Storm Drainage System Analysis
3. Capital Improvements and Implementation Schedule
4. Financial Analysis and Utility Formation

This executive summary provides a brief overview of each chapter.

Existing Storm Drainage System Inventory

A detailed survey of most of the Town's storm drainage system was performed by INCA Engineers in coordination with the Public Works Department in early 2005. Woodway Highlands and Woodway Estates were not surveyed as part of this effort because stormwater system information for those areas was available from the original design plans. The survey documented the existing system, which is composed of storm sewer pipes, catch basins, manholes, ditches, and culverts. This system conveys stormwater from residential properties within the Town through a combination of ditches and pipes toward Puget Sound. In addition, stormwater is conveyed to Puget Sound via Deer Creek, Chevron Creek, or via one of the many private drainage systems located within the Town.

During the survey portion of the project, Woodway took advantage of the opportunity to establish the Town on the Washington State Plane Coordinates, NAD 83-91, and the NAVD 88 vertical datum. Horizontal and vertical control monuments throughout the town were established. This effort was coordinated with the Public Works Department and the control network and monumentation was recorded with the Snohomish County Assessor's office. Establishing control is important to the citizens and the Town because it provides a common datum for planning and constructing municipal and private development projects.

Interviews of former and current Town employees were conducted in January 2005. The interviews were used to gather historical information, gain knowledge of past and recent construction projects, and identify problem areas that contribute to today's stormwater concerns.

Citizens involvement in the development of this planning document is important to the Town. Citizens were informed and involved throughout the process via updates in the Town's newspaper, *The Whisper*, by a public questionnaire sent to every residence, and through Town meetings. Topics covered in the questionnaire included: areas of known flooding, erosion, and water quality problems; ranking of issues within the Town; and ways for residents to get involved in the Town's stormwater planning. Responses from the questionnaire were used to identify additional areas of concern and to refine previously identified problems. In addition to the questionnaire, citizens were given an opportunity to voice their thoughts to the Town staff and Council.

Through this process, 10 stormwater problems were identified. The 10 areas are listed below without reference to priority:

1. North Dogwood
2. South Dogwood
3. Twin Maples
4. Woodhaven Place
5. Chinook Road
6. Woodway Park Road
7. North Deer and Algonquin
8. Makah Road
9. Wachusett Road
10. 10724 226th Street SW

Storm Drainage System Analysis

During the process of identifying alternatives, low impact development considerations were reviewed for each alternative. Each alternative was analyzed to determine precipitation runoff and conveyance metrics for ditches, pipes, and inlets. A cost estimate was also prepared. Although a "no-action" alternative was considered, it was not accepted for any project because the problems are typically long-standing issues associated with flooding and/or erosion that need to be addressed. The problem areas and alternatives or phases are briefly described below.

North Dogwood

Public stormwater runoff is collected in a drainage system that flows through private property and discharges into a creek. Historically, the system was an open channel across private property, but was converted into a pipe system because of the owners desire to remove the open ditch. The pipe system is believed to be undersized. Damage has been reported on the property due to increased flows. Damage has also been reported downstream of the property due to the deposition of sediment and the erosion.

Three alternatives were identified:

1. Replace the existing pipe system with an appropriately sized pipe system
2. Convert the existing pipe system back into an open channel system
3. Convert the existing pipe system back into an open channel system and realign it along the property line

South Dogwood

Dogwood Place, south of Dogwood Lane, does not provide for collection of stormwater runoff at the low point in the road. Ponding of stormwater at this location is thought to increase saturation of the marine bluff close to where previous slide activity has occurred.

One alternative was identified for this project:

1. Construct catch basins at the low points in the road and connect them to the existing storm sewer system located west of the road on private property

Twin Maples

Existing infiltration dry wells within an estimated two-block area do not appear to adequately handle stormwater runoff. Stormwater from this neighborhood flows to the catch basin and associated conveyance system located in front of the residence at 11025 110th Place W. The existing system does not appear to have sufficient capacity for conveying these flows. The area floods during typical rain events and the residence has incurred damage due to flooding.

One alternative divided into two phases were identified for this project:

1. Improve the catch basin and downstream storm drain from 11025 110th Place W
2. Create a new storm drainage system within the Twin Maples neighborhood abandoning the infiltration system.

Woodhaven

The stormwater from Woodhaven Place drains west into an infiltration system installed in the early 1960s, which is aging and is not functioning properly. The infiltration system is located on an active and unstable bluff, which continues to erode and encroach upon private property and homes nearby.

Three alternatives were identified:

1. Divert the flows to 248th Street SW stormwater system
2. Divert the flows north to a new discharge location on the bluff
3. Pump the flows up Woodhaven Place to Woodway Park Road

Chinook Road

Residents along the west side of Chinook Road have voiced concerns about receiving increased stormwater runoff due to the recent development along the east side of the roadway. Their homes and driveways are situated below the elevation of the roadway.

Two alternatives were identified:

1. Construct a thickened edge of pavement and storm drainage system along the west side of Chinook Road
2. Construct a thickened edge of pavement and storm drainage system along the driveways located on the west side of Chinook Road

Woodway Park Road

Two outdated and undersized inlets that discharge onto private property are located on Woodway Park Road. The outlets clog frequently and this results in localized flooding of the roadway.

Two alternatives were identified:

1. Replace existing catch basins and connect to the existing drainage on the east side of Woodway Park Road
2. Replace existing catch basins and connect to the existing drainage system on Woodhaven Place

North Deer and Algonquin

Runoff from Algonquin Road and the adjacent hillside drains to a catch basin at the intersection of Algonquin Road and North Deer Drive. The runoff exceeds the capacity of the catch basin and deposits sediment from the erosion of the hillside on the road, creating safety concerns.

Two phases were identified:

1. Improve the catch basin and downstream pipe conveyance system
2. Construct a storm sewer system along Algonquin Road

Makah Road

The drainage from the creek discussed in the North Dogwood project has an outlet at Makah Road into an open catch basin with a rebar cage on top. The cage tends to plug with debris, subsequently causing localized flooding of Makah Road and private property.

Two alternatives were identified:

1. Replace the existing catch basin with an improved inlet and pipe conveyance system
2. Replace the existing rebar cage with a more efficient grate inlet and pipe conveyance system

Wachusett Road

Wachusett Road is quite steep and drains north to Deer Creek. The roadside stormwater collection and conveyances system performs poorly. Stormwater runoff is typically conveyed either along the edges of the road or sheet flows across the road. The runoff is a safety and erosion concern because of the adjacent hillside and increased water on the roadway surface.

Two phases were identified:

1. Create a storm sewer system along the east side of the road and place catch basins along the west side of the road
2. Construct a retaining wall on the west side of the road

10724 226th Street SW

Stormwater runoff from 226th Street SW drains down the driveway and into private property at this residence.

Two alternatives were identified:

1. Redirect flows entering the driveway toward the roadway
2. Construct a catch basin and pipe conveyance system on private property

Capital Improvements and Implementation Schedule

The Town and HDR collaborated to identify criteria for selecting alternatives and prioritizing the projects. The alternatives and project rankings were then used to develop a Capital Improvement Plan (CIP), a 6-year planning tool that the Town can use to address its future financial needs for improving the stormwater system. The CIP should be reviewed each year to reflect changing priorities and the potential impact of capital projects on operating budgets and scheduling, and for coordinating related projects.

The criteria used in the selection process were developed in a workshop attended by the Town and HDR staff. A numerical ranking of projects was not conducted; however, the following criteria were considered significant for evaluating and selecting each project's alternatives and priority. The criteria included:

- Ability to obtain permits
- Bluff stability/erosion issues
- Capital cost
- Legal liability
- Incorporated low impact development concepts
- Maintenance costs
- Number of properties benefited

- Property damage potential
- Public safety
- Potential success in addressing the problem

Costs and the incorporation of low impact development concepts were the key components in selecting alternatives. The key elements used for prioritizing the projects included: number of people benefited and the potential damage and liability if the project was not completed. The Town provided significant guidance in prioritizing the projects.

The priority of projects and the selected alternative or phase are as follows:

1. Twin Maples – Phase 1
2. Woodhaven – Alternative No. 1
3. North Deer and Algonquin – Phase 1
4. Woodway Park Road – Alternative No. 1
5. Makah Road – Alternative No. 1
6. Chinook Road – Alternative No. 1
7. North Dogwood – Alternative No. 3
8. Wachusett Road – Phase 1
9. Twin Maples – Phase 2
10. South Dogwood – Alternative No. 1
11. 10724 226th Street SW – Alternative No. 1
12. North Deer and Algonquin – Phase 2
13. Wachusett Road – Phase 2

Projects 1 through 11 are scheduled to be completed between 2006 and 2011. The second phases of North Deer and Algonquin (12) and Wachusett Road (13) will be completed in the next generation of the Capital Improvement Plan (CIP) between 2012 and 2026.

The Implementation Plan's proposed expenditures, based on the CIP schedule and 2005 dollars, are listed below.

Year	Estimated Expenditures
2006	\$150,545
2007	\$84,516
2008	\$89,535
2009	\$95,527
2010	\$198,241
2011	\$50,891
2012-2026	\$135,306

Financial Analysis and Utility Formation

As part of the comprehensive planning process, the Town wanted to identify various stormwater funding sources for both operations and capital. This included the option of establishing a stormwater utility. The financial plan provides the Town with information for determining the operating and capital expenditures required to meet stormwater needs over the next 6 years.

Stormwater operating expenses were identified and were categorized into three major subsections:

- Administration
- Maintenance
- Construction

The operating and capital costs for the utility were determined. Initially, a financial plan was developed that included outside funding sources for funding capital projects. These outside funding sources included low-interest loans. The Town expressed a policy intent to avoid debt financing of capital projects. Therefore, a second financial plan was developed. This plan, which is referred to as Option 1 within Chapter 4, requires more rate revenue to fund the capital projects. Option 2, the original financial plan, is also presented within Chapter 4.

Establishing a stormwater utility would generate funds for stormwater operations and a portion of capital expenses through development of a cost-based utility rate. There are numerous options in designing rates for a stormwater utility. Some of these include: flat monthly rate, tiered impervious rates, and impervious rates. The Town stated that they were interested in developing a rate that would serve for the entire planning period, through 2011.

Because the Town has impervious area available and this type of rate structure is most equitable, the Town directed that the impervious rate method be used when developing equitable rates. This applies a charge to the amount of impervious area per customer (or parcel). The Town's impervious area database includes information about all impervious areas, including roofs, driveways, patios, structures, etc. for each parcel. A rate of \$0.039 per square foot of impervious area was determined for Option 1 by dividing the total revenue

requirement by the total billable impervious area. This rate will fund the stormwater activities that the Town plans to undertake. These monies fund a majority of the capital needs identified within this Plan.

In addition, the financial plan was developed assuming that the Town would implement a utility connection charge. It was estimated that this type of fee could generate an average of \$3,300 annually. This revenue can be used only for growth-related portions of projects.

Finally, the Town has a number of reserves identified for capital projects. A small portion of the Town's Capital Facilities Reserve Fund would be used to fund capital in 2006, with the Town Council determining any future year use of reserves for stormwater capital projects. In addition, the funds set aside for stormwater capital within the Town's Capital Facilities Reserve will be expended each year on the identified projects. If the various funding assumptions described above do not come to fruition, the Town will need to find other funding sources, defer projects, or use rate adjustments in order to meet capital costs.

Chapter 1

Existing System

1.1 Introduction

To help develop the Stormwater Comprehensive Plan, the Town of Woodway inventoried and surveyed its entire storm drainage system. This was the first effort to describe the entire system as one entity; there was no previous inventory or survey of the entire stormwater system.

This chapter describes the existing system infrastructure, staff interviews, community involvement, the stormwater system survey, and known problem areas.

In addition to stormwater generated within Woodway, the Town receives stormwater runoff from the City of Edmonds to the east and north. The stormwater from Woodway generally flows toward Puget Sound via Deer Creek, Chevron Creek, or one of the many private drainage systems that are located within the Town.

The Town is served by a storm drainage system consisting of catch basins and manholes, storm sewer pipes, ditches and culverts, and ponds. The storm sewer pipes in the conveyance system range in diameter from 6 inches (typically for private storm drain systems) to 36 inches. A significant portion of the Town does not have subsurface collection and relies on ditches and culverts for stormwater conveyance.

The Town is characterized by residential development except in conservation areas. Recent redevelopment in the Town involved subdividing properties into smaller lots, a practice which is likely to continue in the future. As development has occurred, the stormwater conveyance system has advanced, but without comprehensive planning. Creating stormwater systems without planning for the future can lead to capacity problems, erosion, and other issues.

1.2 Existing System Infrastructure

The stormwater system in Woodway is divided into five major regions (see Figure 1-1): Woodway Highlands, North End, Woodway Commons, South End, and East End. These areas encompass regions or neighborhoods within the Town and do not necessarily correspond to the drainage basins within Woodway. The Town includes approximately 667 acres.

Woodway Highlands

Woodway Highlands, a 44-acre area located in the far southeast corner of Woodway, is the most recently developed area of the Town. It consists of 0.25- to 0.5-acre residential lots, a storm sewer system, and paved roads constructed solely for that development. The area

drains toward Timber Lane and directly discharges into Puget Sound on Chevron/Paramount property.

The Woodway Highlands storm sewer system consists of catch basins and storm sewers that range in diameter from 12 inches to 36 inches. Runoff is routed through a flow splitter and water quality vault located on 116th Avenue W. Discharge from the vault flows through facilities located in public right-of-way and private easements to an existing outfall on Chevron/Paramount property.

North End

The North End includes Woodway Estates, a 55-acre area developed in 1980. Woodway Estates consists of 1-acre and larger residential lots. Willow Creek cuts through the northeast corner of the area. Drainage is typically conveyed from the southwest to the northeast toward Willow Creek and into the City of Edmonds. Once outside the Town limits, Willow Creek discharges into Puget Sound.

The storm sewers along Chinook Road, Bella Coola Road, Nootka Road, and Makah Road connect at Makah Road and discharge into Willow Creek. The conveyance system consists of storm sewer pipes that range in diameter from 12 inches (the most typical) to 36 inches. A portion of Chinook Road north of Bella Coola Road does not contain storm sewer pipes. The drainage along that section of Chinook Road is conveyed via ditches and culverts to the north along the east side of the road into the City of Edmonds.

Woodway Commons

The 417-acre Woodway Commons area is located in Woodway's central section and represents the Town's largest surface area. The area consists of residential lots that vary in size from 1.5 to 10 acres. The main conveyance channel in Woodway Commons, and in the Town, is Deer Creek, which flows east to west and discharges into Puget Sound.

There are three drainage areas within the Woodway Commons area: Deer Creek, Willow Creek, and Puget Sound. The area south of Deer Creek drains from the south to the north and discharges into Deer Creek. The area north of Deer Creek drains in two separate directions: (a) the far north and northeast end (north of South Dogwood Lane) drain to the northeast into Willow Creek; Willow Creek then flows into the North End area; (b) the more southern portion of the area north of Deer Creek, and south of South Dogwood Lane, drains south into Deer Creek. Western portions of Woodway Commons drain off the bluff and toward Puget Sound.

The main thoroughfare through the Town is Woodway Park Road, which travels through the middle of Woodway Commons. The conveyance system for Woodway Park Road consists of storm sewers, drainage ditches, and culverts.

South End

The South End is located south of Woodway Commons and west of Woodway Highlands. Its southern boundary is adjacent to the City of Shoreline limits, and its western boundary is adjacent to Snohomish County (Chevron/Paramount property) and Puget Sound. The South End encompasses approximately 140 acres. Most of the area consists of residential lots

varying in size from 0.25 to 2 acres. The South End includes the Woodway Reserve, an undeveloped natural resources conservation area.

The South End typically drains east to west toward Puget Sound. The stormwater system consists of storm sewer pipes, ditches, and culverts along the roadways. Chevron Creek and Zeverbergen Creek also convey flows through the area. There are multiple outfalls within the South End that discharge to Chevron Creek, toward Puget Sound, and to the north into the Woodway Commons area.

East End

The East End, a small 11-acre area located on the easternmost extremity of the Town, is bordered by the City of Edmonds on three sides. The limits of the East End are 226th Street SW on the north, 106th Avenue West on the east, 228th Street SW on the south, all bordered by Edmonds; and North Deer Drive on the west, which is in Woodway. The area consists of residential lots.

The drainage is typically east to west toward Deer Creek, which is located directly south of the East End. There is no storm sewer along 226th Street SW or 106th Avenue W. The storm sewer along 228th Street SW is owned by the City of Edmonds. There is a storm sewer on North Deer Drive that conveys runoff south into Deer Creek, which is the ultimate discharge location for the East End.

1.3 Staff Interviews

To develop the existing system inventory, information was collected by interviewing current and previous Town staff. These interviews were useful for: (a) identifying problem areas, the projects that were completed during the Town's development and redevelopment, and time of construction; (b) filling in information gaps about the stormwater system; and (c) providing background information on the Town. This was the first attempt to collect comprehensive information about Woodway's stormwater system.

Two interviews were conducted to obtain historical information about the Town's stormwater system. The interviews were conducted January 11 and 13, 2005. The interviewees were:

- Joe Malinowsky, Public Works Director for Woodway between 1965 and 1982, who remains a Town resident and has sat on the Public Works Committee
- Mike Jahoula, the Town Engineer between 1982 and 1997

Meeting notes from the interviews are provided in Appendix A.

1.4 Community Involvement

Community involvement in the project was achieved in two ways: via a questionnaire and a public meeting. It was important to involve Woodway residents in the process of surveying the existing stormwater system and identifying problem areas, because the residents had firsthand accounts of problem areas and occurrence intervals.

The Town and HDR collaborated on a questionnaire that was sent to all residents. Topics covered in the questionnaire included: areas of known flooding, erosion, and water quality problems; rankings of issues within the Town; and ways for residents to get involved with Woodway's stormwater planning. Forty-two questionnaires were returned.

Another way for residents to provide input for the Stormwater Comprehensive Plan was through a public meeting, held as part of a Town Council meeting. The meeting gave residents an opportunity to voice their concerns and thoughts and to receive feedback from the Town staff and Council.

Input from the community confirmed the locations of the problem areas identified by the current and previous Town staff. Additional information collected as part of the community involvement process related to private drainage systems. The questionnaire and its results are included in Appendix B.

1.5 Stormwater System Survey

Woodway's stormwater system was surveyed as part of the project. Prior to this project, a comprehensive stormwater base map showing the locations of such features as storm sewer catch basins, pipes, and culverts did not exist. Exceptions to this were Woodway Highlands and Woodway Estates, where previous information was available. The storm sewer infrastructure information for Woodway Highlands and Woodway Estates was generated using plans that were created for developing those neighborhoods.

Inca Engineers Inc. performed the survey between January and March 2005. Inca Engineers defined horizontal and vertical controls throughout the Town, and created monumentation. This work established the Town on Washington State Plane Coordinates, NAD 83-91. The vertical datum for the Town is the NAVD 88 datum. By establishing a datum, the Town has the opportunity to tie into the infrastructure of other cities or the state.

The survey identified catch basins, manholes, culverts, ditches, and outfalls, and elevations associated with these features. The Town staff was instrumental in defining the full stormwater system by providing measure-down information for storm sewer structures and the storm sewer pipe network. They also provided assistance in identifying hard-to-locate structures. All of this information was compiled to create a stormwater system base map.

1.6 Areas of Known Flooding

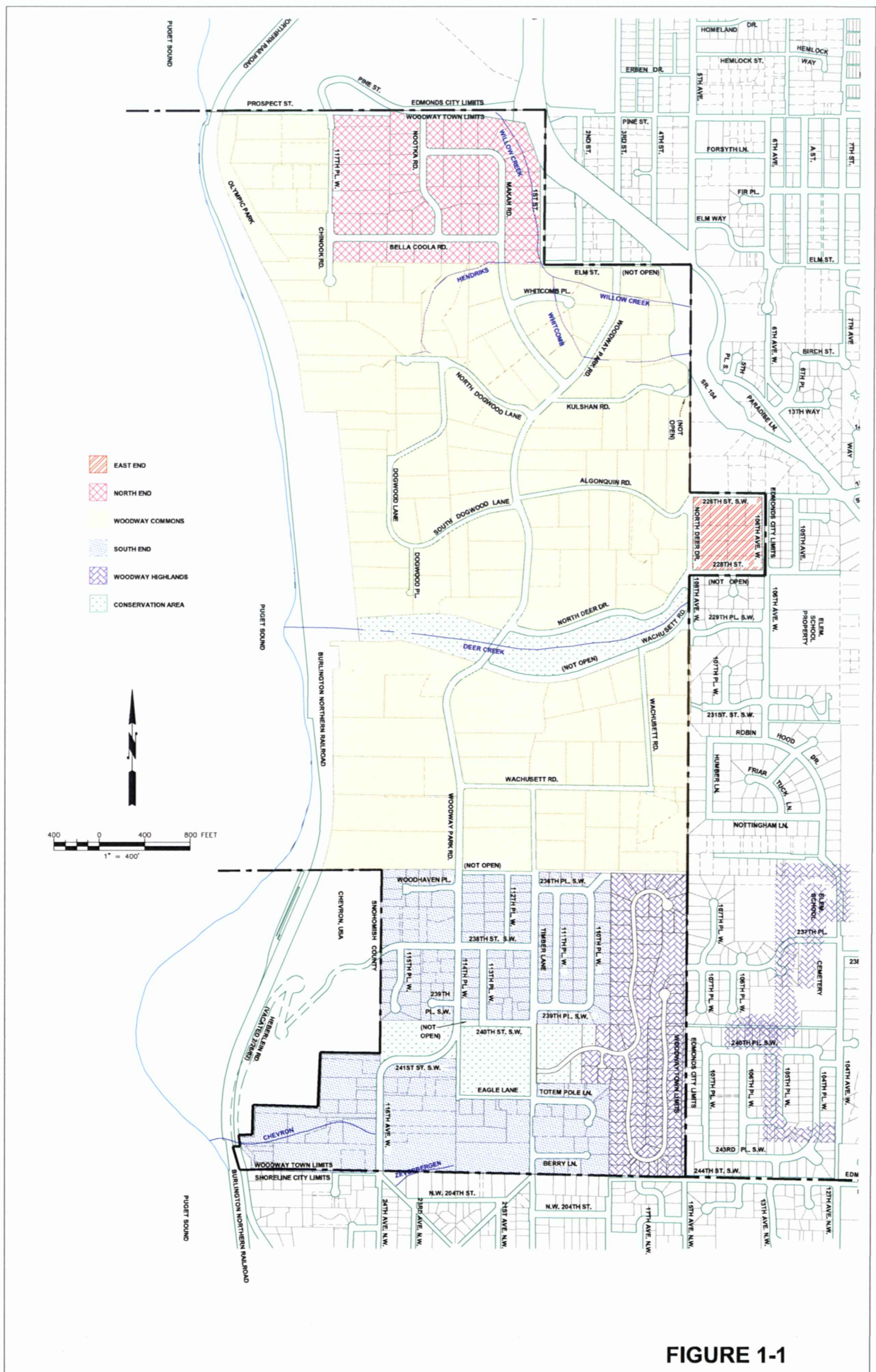
Woodway experiences flooding or other drainage-related problems in several areas throughout the Town. The known areas were identified by current Town staff, previous staff, and by residents.

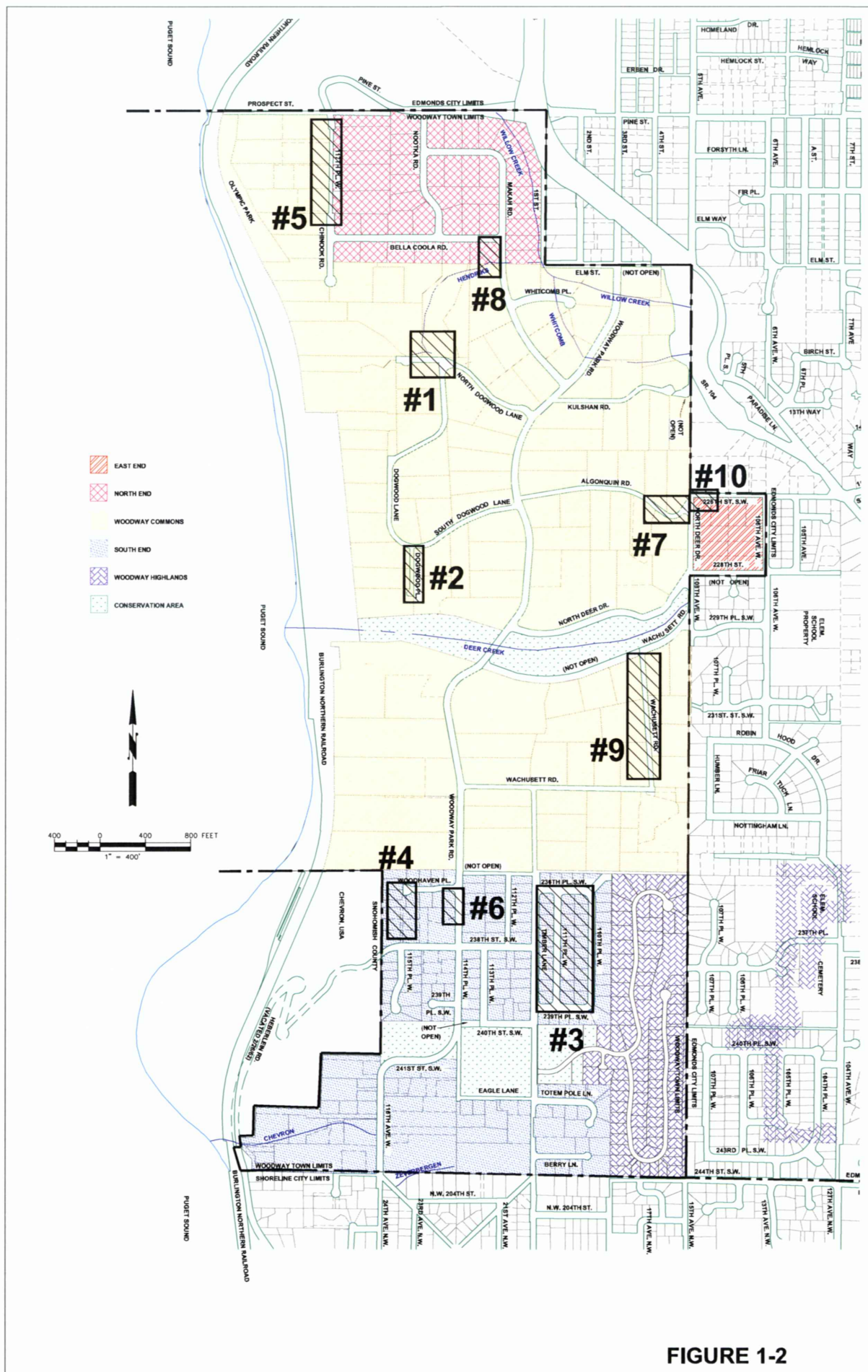
The ten areas with the most significant problems (refer to Figure 1-2) are:

1. North Dogwood
2. South Dogwood
3. Twin Maples
4. Woodhaven Place

5. Chinook Road
6. Woodway Park Road
7. North Deer and Algonquin
8. Makah Road
9. Wachusetts Road
10. 10724 226th Street SW

Identifying known problem areas is helpful in determining needed improvements for the stormwater system. The following chapters describe the analyses of these areas, and the development of the Capital Improvement Plan for the Town based on the 10 problem areas.





Chapter 2

Alternative Analysis

2.1 Introduction

Major objectives of Woodway's Stormwater Comprehensive Plan are to: (a) determine the 10 most significant problem areas within the Town, (b) identify alternatives for addressing these problem areas, and (c) develop a Capital Improvement Plan for the Town. With the assistance of current and previous Town staff and current residents, the Town identified problem areas where flooding and/or erosion problems typically occur. Note that while bluff stability is a concern, it represents a more complex problem than stormwater and should include geotechnical and hydrogeological evaluations, which are not addressed in the Stormwater Comprehensive Plan.

This chapter describes problem areas and alternatives, hydrologic analysis, and hydraulic analysis. It includes detailed project descriptions, discussion of the alternatives and analysis, probable opinion of project cost, a cost figure for each project area, and proposed alternatives.

2.2 Problem Areas and Alternatives

Prior to beginning development of the Stormwater Comprehensive Plan, the Town identified nine problem areas. The problems typically stemmed from flooding and erosion, caused by either lack of a defined stormwater system or an undersized system. As work progressed, a tenth problem area was identified.

Once problem areas were identified, a field visit was conducted to further understand the extent of the problems and alternatives to correct them. In most cases, two alternatives were evaluated for each project. In some instances, only one alternative was identified and no other alternatives were considered feasible. A "no-action" alternative was considered but not accepted for any project. A no-action alternative could lead to consequences such as property damage and/or safety hazards, and the problems are long-standing and need to be addressed. The problem areas and alternatives are briefly described below; more detailed information can be found in the project description sheets included at the end of this chapter.

North Dogwood

The North Dogwood project is located within the Woodway Commons area north of Deer Creek. The stormwater in this area currently flows to the north toward Willow Creek. The stormwater from North Dogwood Lane and a section of Dogwood Lane drains onto private property and into a 12-inch-diameter pipe. This drainage system then flows north and east through private property and into a creek, which continues to flow through the property to an outlet at Makah Road. Historically, the drainage system through the private property was an open channel system. It was converted into a pipe system. There is no known flooding on

the roadways; however, the drainage system through the private property may be undersized. Damage has been reported on the property due to flooding and downstream embankment erosion.

Three alternatives were identified for this project:

1. Replace the existing piped system with an appropriately sized pipe system
2. Convert the existing piped system back into an open channel system
3. Convert the existing piped system back into an open channel system, and realign system along property line

All of the alternatives would require evaluating the existing system through the property to determine its capacity. The limits of the work would include only the current length of the piped system; the remainder of the existing creek downstream through the property would remain untouched. For Alternatives 2 and 3, there would be a loss of developable land on the property if the existing stormwater system was converted back into an open channel system. Realigning an open channel system along the property line would have less impact on the private property land.

South Dogwood

The South Dogwood project area is located in the Woodway Commons area north of Deer Creek. The stormwater from the project area drains south toward Deer Creek. Dogwood Place, south of Dogwood Lane, does not have a storm sewer system on the road. The low spot on the roadway ponds, with no system to collect runoff. No damage to adjacent homes has been reported.

Only one alternative was identified for this project: to construct catch basins at the low point of Dogwood Place and connect them to the existing storm sewer located west of the road on private property. This existing storm sewer line discharges into Deer Creek. It is recommended that the condition of the existing storm sewer line be investigated as part of this project to determine the line's condition and capacity.

Twin Maples

The Twin Maples project area is located in the South End area. The stormwater from this neighborhood drains to the south toward the Woodway Reserve, a natural conservation area. Two blocks of the neighborhood, 110th Place W and 111th Place W, drain to a low spot located in front of the home at 11025 110th Place W. A catch basin is located in front of this home; however, the catch basin does not have sufficient inlet capacity, nor does the downstream storm sewer system. Dry wells are located on 110th Place W and 111th Place W. The neighborhood was constructed in the late 1950s and it is likely that the dry wells are failing due to their age. The area floods during typical rain events and the home has incurred damage due to flooding.

Two phases were identified for this project:

1. Improve the catch basin and downstream pipe from 11025 110th Place W
2. Create a new storm drainage network within the Twin Maples neighborhood

In Phase 1, the catch basin in front of 11025 110th Place W would be reconstructed to provide a more efficient collection system. The downstream storm drain pipes would be upsized to provide more capacity. The potential for converting the downstream pipe into an open ditch would be explored as part of the design phase of the project. Phase 2 would include developing a new storm sewer network throughout the neighborhood and eliminating the existing dry wells.

Woodhaven

Woodhaven is located within the South End area and was developed in the 1960s. Woodhaven Place is a side street west of Woodway Park Road. The stormwater from Woodhaven Place drains to the west toward the bluff. When the road and homes were constructed, stormwater was routed to an infiltration system located on the bluff. The infiltration system may not function as intended due to its age. No flooding has been reported in this area; however, the bluff is active and continues to erode and encroach upon homes. Additional saturation of the ground along the bluff may advance erosion and sloughing. An infiltration system project would be unable to obtain permits if it was proposed at the current time due to slope stability issues and the project's proximity to the bluff.

Three alternatives were identified:

1. Divert the flows to 238th Street SW
2. Divert the flows north to a new discharge location on the bluff
3. Pump the flows up Woodhaven Place to Woodway Park Road

Alternative 1 would involve construction of a new storm sewer line to the south and would connect into the existing storm sewer on 238th Street SW. The line would be constructed through Paramount property outside of the Town limits; therefore, an easement would be required. Alternative 2 would involve construction of a new storm sewer line to the north and would discharge at a new location along the bluff. A section of the pipe would be constructed through Paramount property; therefore, it would also require obtaining an easement. Alternative 3 would involve construction of a pump, and pumping the stormwater flows east up Woodhaven Place and discharging them into the system on Woodway Park Road. A force main would be constructed along Woodhaven Place and a new catch basin would be constructed at Woodway Park Road to connect to the force main.

Chinook Road

Chinook Road is located in the North End area. Chinook Road travels north to the Edmonds city limits. Along the northern section of the road, north of Bella Coola Road, the only stormwater conveyance system is a series of overgrown ditches along the east side, and culverts that are partially blocked with sediment. The stormwater in the area drains north into the City of Edmonds. Residents along the west side of Chinook Road have voiced concerns that they are receiving additional runoff due to the development on the east side of the road. Their homes and the majority of their properties are situated at an elevation lower than the roadway elevation. Residents have experienced flooding, but no damage has been reported.

Two alternatives were identified for this project:

1. Construct a thickened edge of pavement and storm drainage system along the west side of Chinook Road
2. Construct a limited thickened edge of pavement and storm drainage system along the west side of Chinook Road

Alternative 1 would include construction of a thickened edge of pavement along the west side of Chinook Road to divert runoff away from the driveways of homes. A new drainage system would be constructed to collect runoff and connect into the system on the east side of the road. Alternative 2 would include construction of a thickened edge of pavement only at the driveways along the west side of Chinook Road. A new drainage system would be constructed and would connect into the system on the east side of Chinook Road. The timing of the work associated with this project would be coordinated with the future road reconstruction project for Chinook Road.

Woodway Park Road

Woodway Park Road is located in the Woodway Commons area south of Deer Creek. The stormwater in this area drains north toward Deer Creek. There are two small inlets along the west side of Woodway Park Road south of Woodhaven Place; one is a 6-inch-diameter inlet and the other is a 12-inch-square inlet. Both inlets discharge west onto private property. The inlets are undersized and clog frequently. As a result, roadway floods are a safety hazard. No damage to adjacent properties has been reported, but the potential exists for damage to occur in the future.

Two alternatives were identified for this project:

1. Connect to the existing drainage on the east side of Woodway Park Road
2. Connect to the existing drainage system on Woodhaven Place

Both alternatives would involve replacing the inlets with catch basins. This would improve the inlet capacity and remove runoff from the road at a more rapid pace. Alternative 1 would require: (a) reconstructing the existing system on Woodway Park Road for approximately 800 feet due to the required elevation lowering of the system for connection, and (b) improving the capacity of the existing stormwater system. The existing system Alternative 2 would involve constructing additional storm sewer along Woodway Park Road and Woodhaven Place to connect to the existing storm sewer located along Woodhaven Place.

North Deer and Algonquin

The North Deer and Algonquin project area is located in the Woodway Commons area. The area is located north of Deer Creek and drains south into Deer Creek. Algonquin Road and the adjacent hill slope drain east to a catch basin located near the intersection of North Deer Drive. This runoff exceeds the capacity of the catch basin and deposits sediment in it from the erosion of the hill. Flooding has occurred, which creates a safety hazard. No damage has been reported.

Two phases were identified for this project:

1. Improve the existing catch basin and pipe
2. Construct a storm sewer system along Algonquin Road

In Phase 1, the existing catch basin would be replaced with a more efficient system; that is, one that increases the inlet capacity. The downstream pipe would be upsized for increased capacity all the way to its connection with the storm sewer system at North Deer Drive.

Phase 2 is a recommended second phase to the project. By constructing additional storm sewer along Algonquin Road, runoff would be collected before it reached the bottom of the hill, reducing the potential of overwhelming the catch basin located near North Deer Drive.

Makah Road

Makah Road is located in the Woodway Commons area. The stormwater from this area drains northeast toward Willow Creek. The drainage from the creek located and discussed in the North Dogwood project area has an outlet at Makah Road. It is collected into an open catch basin with a rebar cage on top. The cage tends to plug with large debris, causing subsequent flooding of Makah Road. This is a safety hazard, but no damage has been reported.

The two alternatives identified for this project are:

1. Replace existing catch basin with improved inlet
2. Replace existing rebar cage with more efficient grate

Both alternatives would include improving the detention area surrounding the existing catch basin and upsizing the current pipe outlet for additional capacity. Alternative 1 would involve constructing a culvert with wingwalls and headwall to collect water from the creek.

Alternative 2 would include constructing a new catch basin and more efficient grate, which would still provide safety and deter debris from entering the stormwater system.

Wachusett Road

Wachusett Road is located in the southern section of the Woodway Commons area. The stormwater drains north into Deer Creek. Along the west side of the roadway is a steep embankment, and homes are located along the east side. Wachusett Road is quite steep coming from the south, and no known stormwater system is located along the road. The runoff is causing erosion along the road, flooding at the bottom of the hill, and sheet flow across the road, creating a safety hazard. No flood damage has been reported. A storm sewer is located at the bottom of the hill, with an unknown pipe connection. The existing storm sewer along the east side of the road would need to be located as part of this project.

Two phases were identified for this project:

1. Create a storm sewer line along the east side of the road and place catch basins on west side of road
2. Construct a retaining wall on the west side of the road

The first phase of this project would consist of constructing: (a) a storm sewer system along the east side of the road to collect runoff before it reached the bottom of the hill, where it has a tendency to pond, and (b) catch basins along the east side of the road. Phase 2 would include constructing a retaining wall along the embankment on the east side of Wachusett Road to help prevent the continued erosion of the embankment onto the roadway, which is a maintenance and safety issue.

10724 226th Street SW

The home at 10724 226th Street SW is located in the East End area. The runoff from this area drains east into a storm sewer system on North Deer Drive, which drains south into Deer Creek. The driveway of this home is situated lower than the roadway elevation, and receives runoff from 226th Street SW. The home has experienced localized flooding, but no damage has been reported. No storm sewer is located along 226th Street SW.

The two alternatives identified for this project are:

1. Redirect flows from entering the driveway toward the roadway
2. Construct a catch basin on private property

Alternative 1 would create a thickened edge of pavement in front of the driveway to prevent runoff from entering the driveway and would direct runoff down 226th Street SW. The runoff would be collected by a newly constructed storm sewer line that would connect into the existing system on North Deer Drive. Alternative 2 would involve constructing a catch basin at the low spot on the driveway of the private property. A new storm sewer line would connect the catch basin to the existing system on North Deer Drive.

2.3 Hydrologic Analysis

A hydrologic analysis of the 10 problem areas was completed to determine peak flows generated by the sub-basins of the project areas. The peak flows were then used for the hydraulic analysis portion of the project discussed in Section 2.4.

A sub-basin is an area that drains to a single outlet and is separated from other sub-basins by a drainage divide. Five-foot mapping contours for the Town were developed from Light Detection and Radar (LIDAR) data. LIDAR uses the same principle as radar. The contours were used to delineate the drainage areas. These contours are appropriate for planning-level activities, but not for detailed design efforts. Sub-basins were delineated only for the 10 project areas.

The Rational Method was used to calculate peak flows. This method is one of the simplest rainfall runoff formulas, which assumes that a steady, uniform rainfall rate will produce maximum runoff when all parts of a basin contribute to outflow from the basin. The Rational Method uses basic information to compute flows. The formula for the Rational Method is:

$$Q=ciA$$

Q = peak flow (cubic feet per second)
c = runoff coefficient, variable with land use
i = rainfall intensity (in/hr)
A = area (acres)

The runoff coefficients are a function of land use, and incorporate the sub-basin losses. Rainfall intensities were calculated using parameters from the intensity-duration-frequency (IDF) curves. The rainfall intensity was further broken down and used total precipitation at the project site based on a given return frequency and the unit peak rainfall intensity factor. The total precipitation amounts were taken from the 24-hour-duration isopluvial maps developed by the Department of Ecology.

The 24-hour precipitation amounts per event were:

Recurrence Interval (years)	Volume (inches)
2	1.6
10	2.2
100	3.0

The hydrologic details of each project are shown on the individual project description sheets included at the end of this chapter.

2.4 Hydraulic Analysis

The results of the hydrologic analysis were used as inputs for the hydraulic analysis. The hydraulic analysis was used to size the proposed conveyance systems (either pipes or ditches).

FlowMaster® 2005 software was used to conduct the hydraulic analysis. This software, developed by Haestad Methods, aids in the design and analysis of pipes, ditches, open channels, weirs, and more. FlowMaster computes flows, water velocities, depths, and pressures based on several well known formulas. FlowMaster is not a comprehensive software package; for example, an entire storm sewer network would not be modeled using FlowMaster. Instead, the software evaluates individual sites and is therefore an appropriate software program for this analysis.

For analysis and design, FlowMaster requires input from design peak flows and other site constraints, such as slope of pipe. The results of the hydraulic analysis are shown in the FlowMaster summary reports included with the project description sheets at the end of this chapter.

2.5 Summary of Project Costs

A planning-level estimate of probable cost was developed for each alternative and phase of each project. This estimate includes construction, state sales tax, engineering, and legal

and administration costs. A 40-percent contingency was used for the estimate because the project is at the planning level and is subject to change once site investigation and design begins.

Easement costs were not included in the estimate of cost for each project per the Town's request. The Town's philosophy is to work with its residents in obtaining or negotiating easements. The project descriptions mention that easements would need to be acquired; however, no cost was associated with this. Easement costs would be negotiated between the Town and its property owners outside of this scope of work.

Table 2-1 is a summary of the project costs per phase and alternative, in 2005 dollars. More detailed cost estimates can be found in the project descriptions included in Appendix C.

Table 2-1. Summary of Project Costs

Project Name	Total Construction	Total Project Cost
Twin Maples		
Phase 1 - Catch basin system and pipes at south end	\$36,079	\$50,078
Phase 2 - System of catch basins & pipes throughout neighborhood	\$142,825	\$198,241
Woodhaven		
Alternative 1 - Extend storm drain to 238th Ave. SE in Snohomish County*	\$72,383	\$100,467
Alternative 2 - Extend storm drain to outfall on bluff	\$50,356	\$69,895
Alternative 3 - Pump station & discharge to Woodway Park Road	\$535,370	\$743,094
North Deer and Algonquin		
Phase 1 - Replace drain pipe and catch basin	\$19,943	\$27,681
Phase 2 - Extend storm drainage collection system to the West	\$20,004	\$27,765
Woodway Park Road		
Alternative 1 - Catch basin and pipes to Woodway Park Road*	\$40,947	\$56,835
Alternative 2 - Catch basins and pipes to Woodhaven	\$36,562	\$50,748
Makah Road		
Alternative 1 - Upsize pipe with catch basin inlet	\$38,199	\$53,020
Alternative 2 - Upsize pipe with headwall*	\$33,495	\$46,491
Chinook Road		
Alternative 1 - Full length thickened edge with catch basins*	\$31,011	\$43,044
Alternative 2 - Partial thickened edge asphalt with catch basins	\$17,561	\$24,375
North Dogwood		
Alternative 1 - Replace existing pipe	\$57,573	\$79,911
Alternative 2 - Replace pipe with open ditch on same alignment	\$27,133	\$37,661
Alternative 3 - Replace with open ditch on property boundary*	\$32,560	\$45,193
Wachusett Road		
Phase 1 - Catch basin and storm drain on west side of road	\$36,264	\$50,334
Phase 2 - Retaining wall on east side of road	\$77,540	\$107,625
South Dogwood		
Alternative 1 - Add catch basins to existing storm drain	\$19,657	\$27,284
Private Drive 10724 226th SW		
Alternative 1 - Thickened edge paving and catch basin on 226 th *	\$17,008	\$23,607
Alternative 2 - Catch basin and storm drain on private property	\$22,805	\$31,654
Total for Phase 1 and Selected Alternatives	\$339,347	\$471,014
Total for All Selected Alternatives and Phases	\$579,715	\$804,645

* Indicates selected alternative

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: North Dogwood

Location

Drainage system from North Dogwood Lane to Makah Road

Existing System and Site Conditions

Runoff from local area surrounding North Dogwood Lane and Dogwood Lane (Photo ND-1) drains onto the private property north of the intersection. The system originally consisted of an open channel and pond on the property, tying into the public system at Makah Road. The open channel was converted to a piped system in 2002. The current system needs to be evaluated to determine if its capacity is sufficient. It was installed without permit, nor inspection. It is suspected that old BNSF tile drains along Dogwood Lane may also contribute to localized flooding, according to the interviews with previous Town staff.

Goals

- Reduce localized flooding on private property by improving existing conveyance system
- Resolve proper access for maintenance

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.22
I	Rainfall Intensity (in/hr)	1.2
A	Area (acres)	34.4
Q	Peak Flow (cfs)	9.0

Alternatives Description

- Alternative No. 1 – Replace existing pipe system through private property
 - Provide appropriate sized system with 380 feet of 18” diameter pipe

- Provide easement for proposed pipe
- Alternative No. 2 – Convert the existing pipe system back into an open channel conveyance system
 - Convert approximately 330 feet of pipe back to an open channel
 - Upsize existing 15” diameter culvert to an 18” diameter culvert
- Alternative No. 3 – Convert the existing pipe system back into an open channel conveyance system and reroute along property line
 - Convert approximately 330 feet of pipe back to an open channel
 - Upsize existing 15” diameter culvert to an 18” diameter culvert

Discussion of Alternatives

Alternative No. 1 will reduce localized flooding on private property by installing an appropriately sized pipe system and discharging into the existing creek on the private property that eventually discharges at Makah Road.

Alternative No. 2 will reduce localized flooding on private property by converting the piped system back into an open channel system, installing an appropriately sized system and incorporating low impact development concepts. The remainder of the current creek will remain untouched. However, by converting back to an open channel system, there would be a loss of usable land on the private property.

Alternative No. 3 will also reduce localized flooding on private property by converting the piped system back into an open channel system, installing an appropriately sized system and incorporating low impact development concepts. The remainder of the current creek will remain untouched. By converting back to an open channel system and rerouting it to the property line, there will be some loss of usable land on the private property, and will require the clearing of existing trees.

A stormwater easement for the conveyance system through private property is necessary to comply with current Woodway Municipal Code (11.02.210). The proposed easement width is estimated to be a 25 feet.

The alternatives are depicted in the attached North Dogwood figure, Figure 2-1.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The North Dogwood area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

North Dogwood, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA	1	\$1,200.00	\$1,200.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	1500	\$0.15	\$225.00
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	400	\$0.10	\$40.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	380	\$25.00	\$9,500.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	380	\$60.00	\$22,800.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	1	\$2,200.00	\$2,200.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43	Drop Inlet Type 1 with Grate	EA	1	\$3,200.00	\$3,200.00
44					
45					
				Subtotal	\$39,165.00
				Mobilization	5%
				Construction Subtotal	\$41,123.25
				Contingency	40%
					\$16,449.30
				Construction Total	\$57,572.55
				State Sales Tax	8.80%
				Engineering Design	25%
				Legal/Administration	5%
					\$5,066.38
					\$14,393.14
					\$2,878.63
				Total Project Cost	\$79,910.70

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

North Dogwood, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA	1	\$1,200.00	\$1,200.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	500	\$0.15	\$75.00
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	330	\$0.10	\$33.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY	166	\$25.00	\$4,150.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	280	\$25.00	\$7,000.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	100	\$60.00	\$6,000.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$18,458.00
				Mobilization	5%
					\$922.90
				Construction Subtotal	\$19,380.90
				Contingency	40%
					\$7,752.36
				Construction Total	\$27,133.26
				State Sales Tax	8.80%
					\$2,387.73
				Engineering Design	25%
					\$6,783.32
				Legal/Administration	5%
					\$1,356.66
				Total Project Cost	\$37,660.96

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

North Dogwood, Alternative 3

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA	1	\$1,200.00	\$1,200.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF	1000	\$3.50	\$3,500.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	4330	\$0.15	\$649.50
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	500	\$0.10	\$50.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY	270	\$25.00	\$6,750.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	280	\$25.00	\$7,000.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	50	\$60.00	\$3,000.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$22,149.50
				Mobilization	5%
				Construction Subtotal	\$1,107.48
					\$23,256.98
				Contingency	40%
					\$9,302.79
				Construction Total	\$32,559.77
				State Sales Tax	8.80%
				Engineering Design	25%
				Legal/Administration	5%
					\$2,865.26
					\$8,139.94
					\$1,627.99
				Total Project Cost	\$45,192.95

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

North Dogwood



Photo ND-1. 12-inch CPEP with trash rack on private property



TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: South Dogwood

Location

Dogwood Place, south of South Dogwood Lane.

Existing System and Site Conditions

Ponding has occurred in the low spot along Dogwood Place (Photo SD-1). A deep existing 12" diameter drainage system is located west of the roadway, in private property, but no known conveyance system to collect runoff on Dogwood Place exists. The existing drainage system discharges into Deer Creek.

Goals

- Reduce localized flooding

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.22
I	Rainfall Intensity (in/hr)	1.4
A	Area (acres)	6.3
Q	Peak Flow (cfs)	2.0

Alternatives Description

- Alternative No. 1 – Install catch basins at the low point of Dogwood Place
 - Install 2 new catch basins and connect to the existing storm drain west of the roadway
 - Provide an easement for the existing storm drain

Discussion of Alternatives

There is only one alternative for this project. New catch basins and 12" diameter pipe will be installed and connected into the existing storm drain system west of Dogwood Place. They will collect the runoff at the low point, therefore, reducing localized flooding.

An easement for the conveyance system on private property will need to be acquired to meet Woodway Municipal Code (11.02.210).

The alternative is depicted in the attached South Dogwood figure, Figure 2-2.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The South Dogwood area can be most cost effectively improved via the above proposed plan improvements. The proposed system will reduce localized flooding by capturing the stormwater runoff along Dogwood Place and convey it to Deer Creek.

As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

The property owners should be contacted to see what storm sewer structures or connections are located on their properties. In addition, the existing storm sewer line should be televised to determine its condition.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

South Dogwood, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	95	\$0.15	\$14.25
7	Saw Asphalt Concrete Full Depth	LF	112	\$5.00	\$560.00
8	Asphalt Concrete Pavement Removal	SY	32	\$10.00	\$320.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	8	\$20.00	\$160.00
11	Asphalt Concrete Pavement, Class B	TN	6	\$58.00	\$348.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY	2	\$15.00	\$30.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF	285	\$4.00	\$1,140.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	75	\$35.00	\$2,625.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	4	\$1,200.00	\$4,800.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF	1125	\$3.00	\$3,375.00
43					
44					
45					
				Subtotal	\$13,372.25
				Mobilization	5%
				Construction Subtotal	\$14,040.86
				Contingency	40%
					\$5,616.35
				Construction Total	\$19,657.21
				State Sales Tax	8.80%
				Engineering Design	25%
				Legal/Administration	5%
					\$1,729.83
					\$4,914.30
					\$982.86
				Total Project Cost	\$27,284.20

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

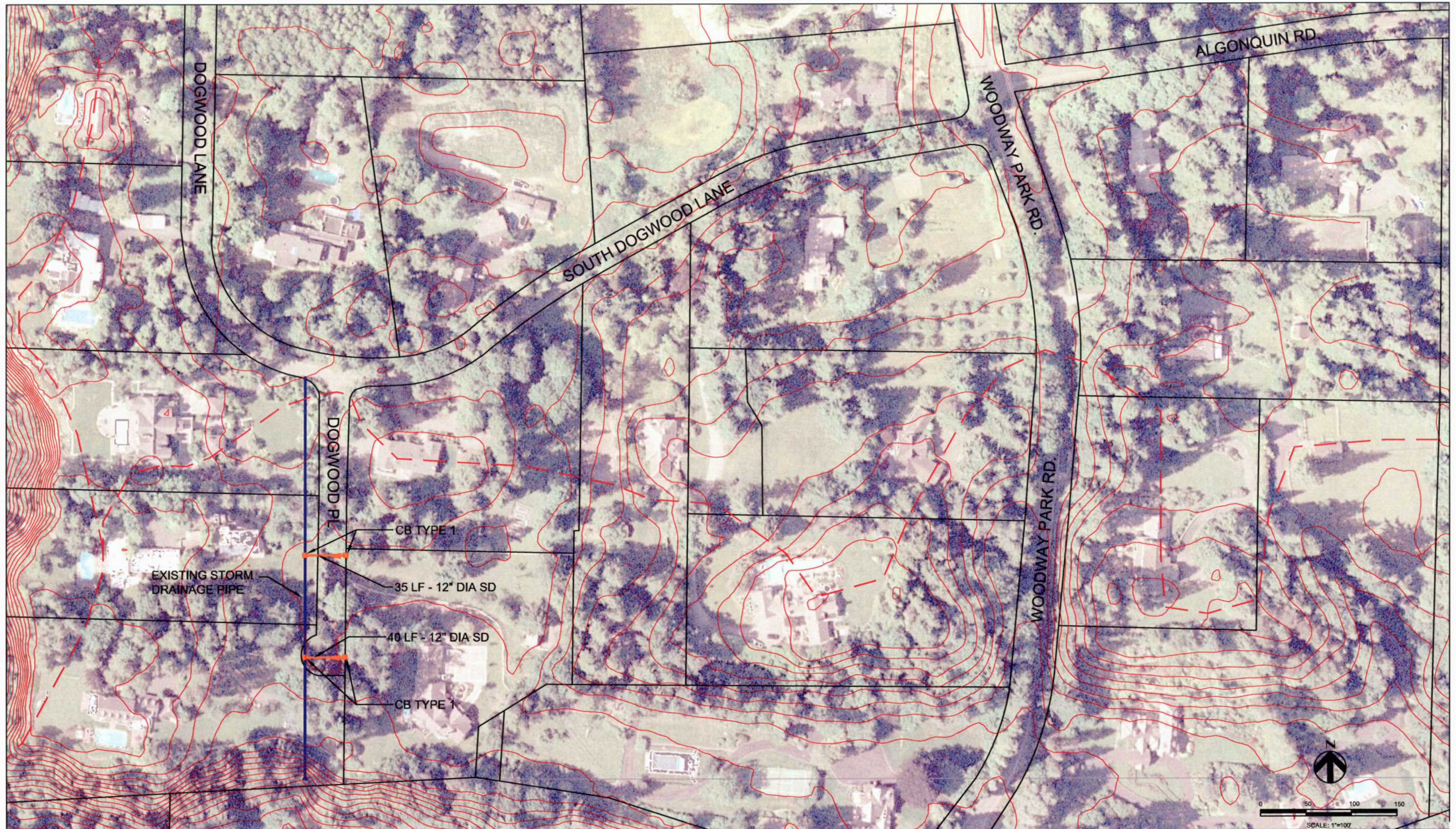
South Dogwood



Photo SD-1. Looking south along Dogwood Place



Photo SD-2. South end of Dogwood Place

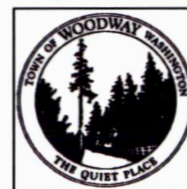


ALTERNATIVE 1

4- CB TYPE 1
75-LF 12" DIA SD
EASEMENT

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■ ■ ■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

SOUTH DOGWOOD

DATE
NOV 2005

FIGURE
FIG 2-2

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: Twin Maples

Location

In vicinity of 110th Place W and 239th Place SW.

Existing System and Site Conditions

Over a 15 acre area contributes to localized flooding in the vicinity of 11025 110th Place W, at the corner of 110th Place W and 239th Place SW. The neighborhood was developed in the late 1950's. An old catch basin (CB #21) (Photo TM-1) in the driveway appears to have sediment plugged pipes and limited sump. This catch basin flows south to a catch basin (CB #20) across 239th Place SW, and then ultimately outlets into a wooded area, Woodway Reserve, to the south where it likely infiltrates into the ground. The invert of the outlet of CB #20 is higher than the inlet of the pipe into CB #20, creating a backwater condition and local flooding. The outlet in the Woodway Reserve is the same elevation as the rim of CB #21. There is not an existing storm sewer network through Twin Maples. Dry wells are located on 111th Place W and 110th Place W. They do not appear to be collecting water, likely due to their age and that they are plugged, thus the runoff from the entire area eventually collects at CB #21. Many of the boulevards along 110th Place W (Photo TM-2) have been converted from grass areas to paved areas for parking.

Goals

- Reduce localized flooding at south end of Twin Maples
- Improve conveyance of existing system

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.48
I	Rainfall Intensity (in/hr)	1.2
A	Area (acres)	15.7
Q	Peak Flow (cfs)	8.9

Phases Description

- Phase No. 1 –Replace catch basin and pipe at south end of Twin Maples
 - Construct new drainage system from 11025 110th Place W to Woodway Reserve
 - Increase existing pipe from a 12-inch to an 18-inch pipe
 - Provide easement
- Phase No. 2 – Create a new gravity storm drainage network within Twin Maples
 - Connect existing drywells on 110th and 111th Place W to a new storm sewer system
 - Provide improved infiltration gallery in Woodway Reserve

Discussion of Phases

Phase No. 1 will reduce localized flooding during typical rainstorms by more efficiently conveying flows to the Woodway Reserve. The new system will remove barriers, such as the elevation differentials, within the existing system. The easement will make the existing storm drain a legal system and provide access for maintenance. This phase will reduce localized flooding at the south end of Twin Maples by improving the existing outlet from the neighborhood, however, it does not eliminate that the entire neighborhood drains to one location for collection.

Phase No. 2 is a second phase to accomplish the project goals and improve the drainage system through the Twin Maples neighborhood. The new system will capture runoff before it ponds in the low spot in front of 11025 110th Place W. By completing two phases for this project it will both reduce localized flooding and improve conveyance of the neighborhood, reduce the stress on the south end of Twin Maples.

A stormwater easement for the pipe from CB #20 is necessary to comply with current Woodway Municipal Code (11.02.210). The proposed easement width is estimated to be a total width of 20 feet.

The alternatives are depicted in the attached Twin Maples figure, Figure 2-3.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Twin Maples area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Twin Maples, Phase 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	1360	\$0.15	\$204.00
7	Saw Asphalt Concrete Full Depth	LF	56	\$5.00	\$280.00
8	Asphalt Concrete Pavement Removal	SY	16	\$10.00	\$160.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	4	\$20.00	\$80.00
11	Asphalt Concrete Pavement, Class B	TN	3	\$58.00	\$174.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	455	\$0.10	\$45.50
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	300	\$60.00	\$18,000.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	1	\$1,200.00	\$1,200.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$24,543.50
</					

Notes:

- Pipe cost includes excavation, pipe, installation and trench material
- Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Twin Maples, Phase 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	6740	\$0.15	\$1,011.00
7	Saw Asphalt Concrete Full Depth	LF	484	\$5.00	\$2,420.00
8	Asphalt Concrete Pavement Removal	SY	368	\$10.00	\$3,680.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	91	\$20.00	\$1,820.00
11	Asphalt Concrete Pavement, Class B	TN	63	\$58.00	\$3,654.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	2250	\$0.10	\$225.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	2010	\$35.00	\$70,350.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	8	\$1,200.00	\$9,600.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$97,160.00
				Mobilization	5% \$4,858.00
				Construction Subtotal	\$102,018.00
				Contingency	40% \$40,807.20
				Construction Total	\$142,825.20
				State Sales Tax	8.80% \$12,568.62
				Engineering Design	25% \$35,706.30
				Legal/Administration	5% \$7,141.26
				Total Project Cost	\$198,241.38

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

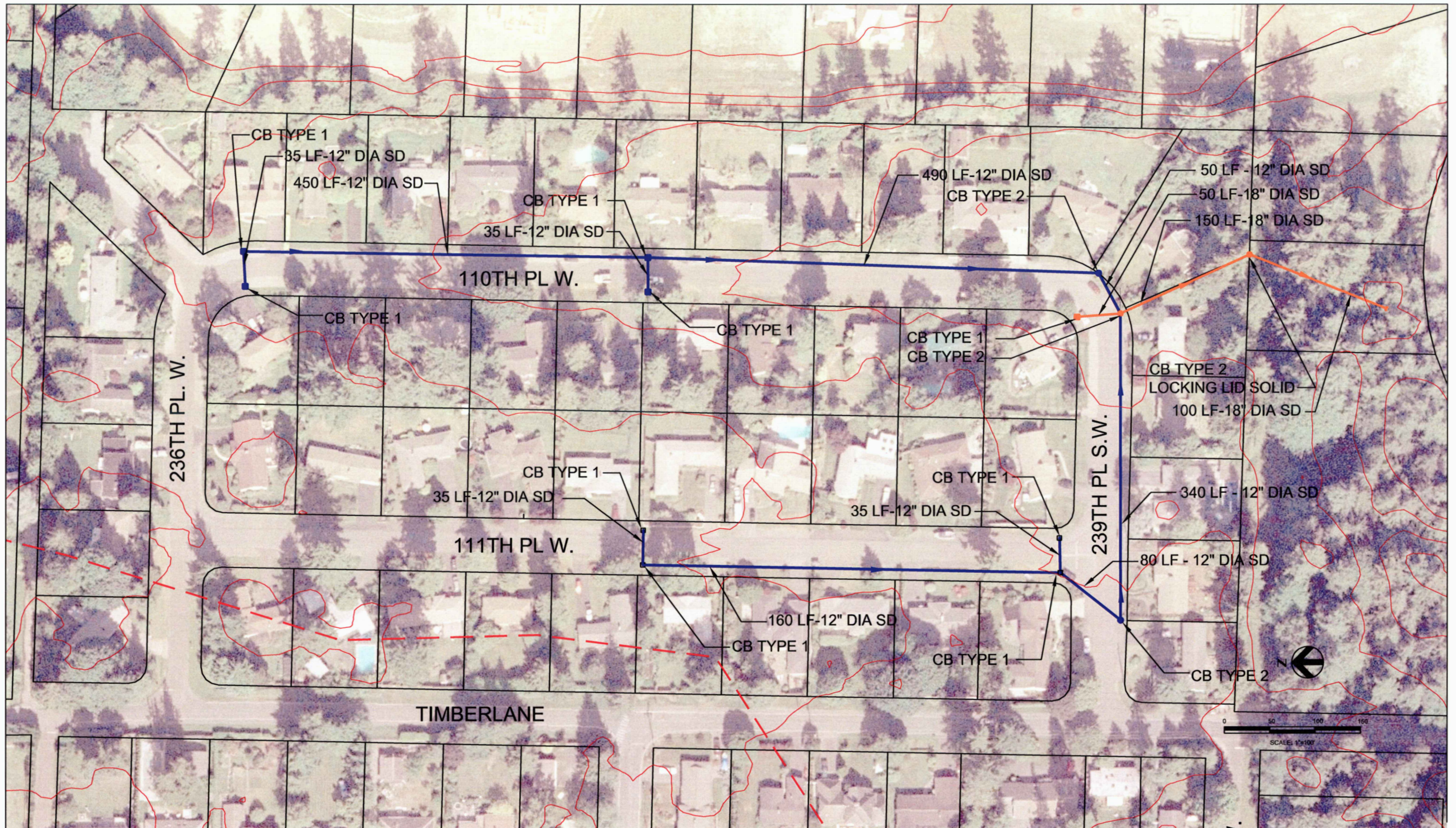
Twin Maples



Photo TM-1. Catch Basin #21 at 11025 239th Place SW



Photo TM-2. Looking north on 110th Place W.



PHASE I

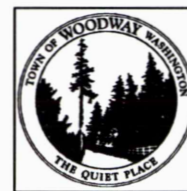
1- CB TYPE 1
2- CB TYPE 2
300 LF 18\" DIA PIPE

PHASE II

8- CB TYPE 1
2- CB TYPE 2
2010- LF 12\" DIA SD

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■ ■ ■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

TWIN MAPLES

DATE
NOV 2005
FIGURE
FIG 2-3

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: Woodhaven

Location

Along the bluff south of Woodhaven Place (236th Place)

Existing System and Site Conditions

Drainage from Woodhaven Place (Photo WH-1) and adjacent properties are routed to an infiltration system located west of 88 Woodhaven Place on the bluff. The bluff continues to erode, compromising the safety of the homes located on the bluff. A storm sewer system along Woodhaven Place conveys runoff to the infiltration system, which was constructed to the 1960's. Due to the age, the infiltration system is likely not functioning as originally intended. The infiltration system was constructed because the Developer was unable to obtain easements to construct a pipe system to Haberline or 238th Street SW. No flooding of Woodhaven Place has been identified. However, the development and infiltration system is adjacent to an active bluff, which is eroding. Additional saturation of the ground along the bluff may advance erosion and sloughing. If an infiltration system was proposed at this time, it would not be permitted due to a slope stability issue.

Goals

- Eliminate infiltration system on bluff to reduce the risk of sloughing

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.42
I	Rainfall Intensity (in/hr)	1.4
A	Area (acres)	2.2
Q	Peak Flow (cfs)	1.3

Alternatives Description

- Alternative No. 1 – Divert flows from Woodhaven Place south to 238th Street SW
 - Install new 12” diameter pipe from CB #153 off Woodhaven Place to existing storm drain system on 238th Street SW
 - Disconnect existing infiltration system
 - Provide easement for new pipe
- Alternative No. 2 – Divert the flows from Woodhaven Place to an outlet on the bluff
 - Install approximately 770 feet of new 12” diameter pipe north to a new discharge location on the bluff
 - Anchoring pipe on the bluff
 - Disconnect existing infiltration system
 - Provide easement for new pipe
- Alternative No. 3 – Pump flows to existing storm drain system on Woodway Park Road
 - Install pump station at west end of Woodhaven Place
 - Install approximately 425 feet of new 6” diameter forcemain
 - Construct new catch basin on Woodway Park Road and connect to existing drainage system on east side of road

Discussion of Alternatives

Alternative No. 1 will improve the drainage system by diverting flows that discharge to the infiltration system into a new 12” diameter pipe system. The new drainage system will connect into a reconstructed catch basin on the existing drainage system along the north side of 238th Street SW. A sanitary sewer line is located west of the Town’s limits, on Paramount property. The easement acquired for the sanitary sewer line does not include the provision for construction of a storm sewer line within the easement. Therefore, a stormwater easement for the pipe is necessary. The proposed easement width is estimated to be 20 feet wide. There is the potential for utility conflicts with side sewer connections to the sanitary sewer line. A downstream analysis of the drainage system along 238th Street SW will be needed to determine if it has capacity to handle additional flows. This analysis assumes that the existing drainage storm drain system has sufficient capacity. This alternative will eliminate the use of the existing infiltration system. The advantage of this alternative is that the flow will be taken into a storm sewer system, completely avoiding discharging over the bluff. However, to process to obtain easements to construct a pipe may be difficult and expensive.

Alternative No. 2 will improve the drainage system by diverting flows that discharge to the infiltration system to a new 12” diameter pipe system, and then to a new discharge location on the bluff. By routing the flows to this location, it will keep the discharge within the Town’s limits. A section of the pipe will go through Paramount’s property, therefore, a stormwater easement will

be necessary. The proposed easement width is estimated to be 20 feet wide. This alternative will eliminate the use of existing infiltration system. Obtaining easements for this alternative, over Alternative 1 may be easier. However, the discharge of the flows would still be over the bluff, which is a complicated situation with anchoring of the pipe and sloughing of the bluff.

Alternative No. 3 will improve the drainage system by diverting flows that discharge to the infiltration system, and pump them to Woodway Park Road. A catch basin and pump station will be installed at the west end of Woodhaven Place. A pump station will require operation and maintenance time and monies. New catch basins will be installed at the intersection of Woodhaven Place and Woodway Park Road, that will connect to the existing drainage system along the east side of Woodway Park Road. It is assumed no easement will be necessary for this alternative by keeping the location of the pipe within the road right-of-way.

The alternatives are depicted in the attached Woodhaven figures, Figure 2-4A, 2-4B and 2-4C.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Woodhaven area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Woodhaven, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing & Grubbing	SF	2300	\$0.15	\$345.00
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY	43	\$15.00	\$645.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 - 6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF	6900	\$4.00	\$27,600.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	460	\$35.00	\$16,100.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton	5	\$30.00	\$150.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$49,240.00
				Mobilization	5%
					\$2,462.00
				Construction Subtotal	\$51,702.00
				Contingency	40%
					\$20,680.80
				Construction Total	\$72,382.80
				State Sales Tax	8.80%
					\$6,369.69
				Engineering Design	25%
					\$18,095.70
				Legal/Administration	5%
					\$3,619.14
				Total Project Cost	\$100,467.33

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Woodhaven, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	3850	\$0.15	\$577.50
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	1285	\$0.10	\$128.50
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	40	\$25.00	\$1,000.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	770	\$35.00	\$26,950.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	1	\$1,200.00	\$1,200.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$34,256.00
				Mobilization	5%
					\$1,712.80
				Construction Subtotal	\$35,968.80
				Contingency	40%
					\$14,387.52
				Construction Total	\$50,356.32
				State Sales Tax	8.80%
					\$4,431.36
				Engineering Design	25%
					\$12,589.08
				Legal/Administration	5%
					\$2,517.82
				Total Project Cost	\$69,894.57

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Woodhaven, Alternative 3

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.
3. Pump station is based upon 1.9 cfs and 500 lf forcemain. No superstructure, duplex submersible wetwell, 14' deep, 10" wetwell, constant speed generation with sound attenuating enclosure. Site work \$75,000, wetwell \$25,000, mechanical

Woodhaven



Photo WH-1. Looking east along Woodhaven Place

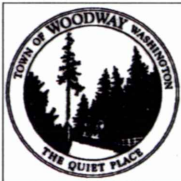


ALTERNATIVE 1

460 LF 12" DIA SD
2- CB TYPE 1
EASEMENT

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■■■



HDR

**TOWN OF WOODWAY
STORMWATER COMPREHENSIVE
PLAN**

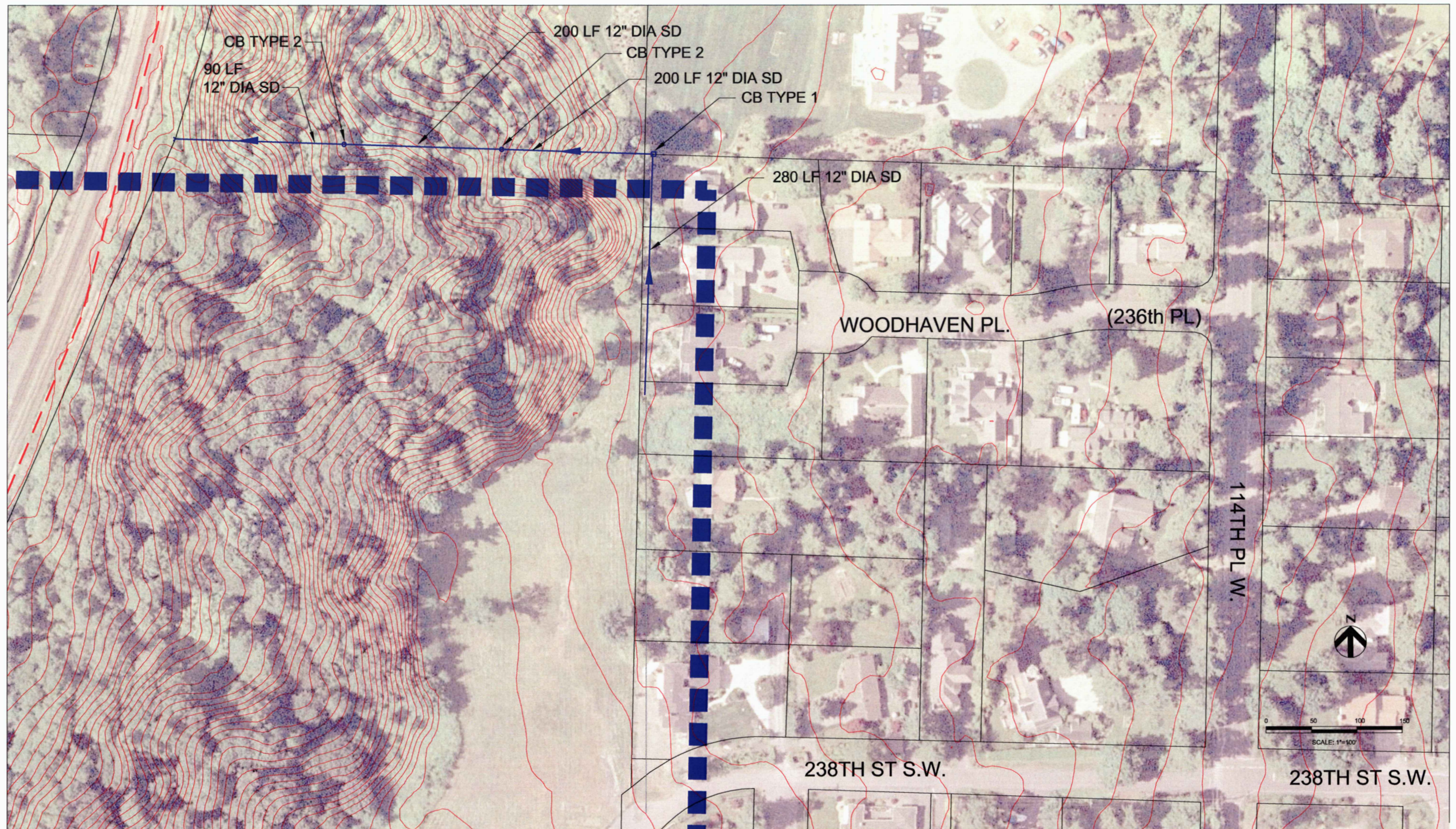
WOODHAVEN

DATE

NOV 2005

FIGURE

FIG 2-4A



ALTERNATIVE 2

770 LF-12" DIA SD
1 CB TYPE 1
2 CB TYPE 2

40 LF ABANDON PIPE
EASEMENT

LEGEND

CONTOURS ————
BASIN ————
PROPERTY LINE ————
TOWN LIMITS ■■■■

STORM DRAIN - SD
CATCH BASIN - CB



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

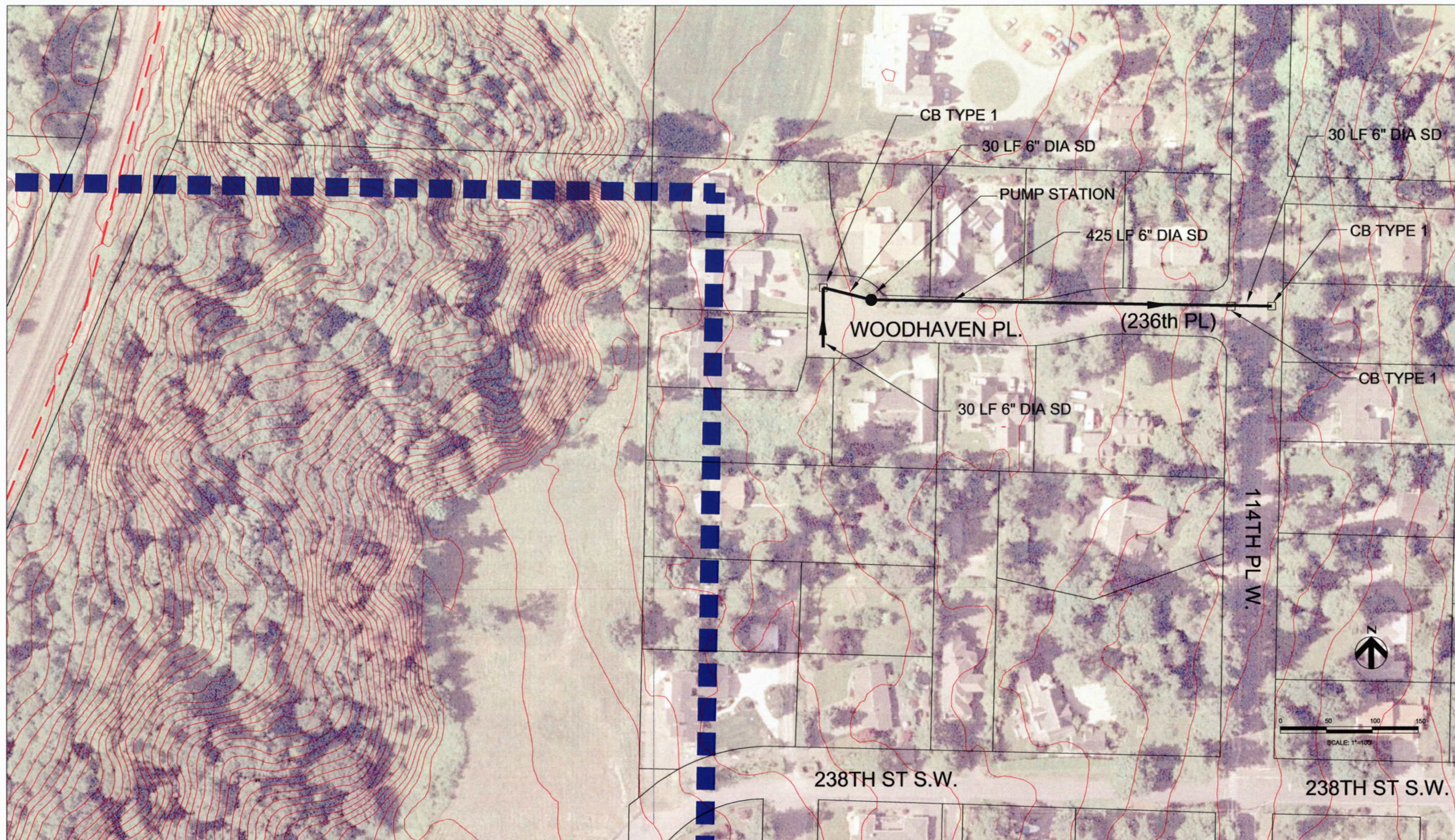
WOODHAVEN

DATE

NOV 2005

FIGURE

FIG 2-4B



ALTERNATIVE 3

515 LF-6" DIA SD
3 CB TYPE 1
1 PUMP STATION

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■■■■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

WOODHAVEN

DATE

NOV 2005

FIGURE

FIG 2-4C

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: Chinook Road

Location

Intersection of Chinook Road and Bella Coola Road extends north to the Town's city limits

Existing System and Site Conditions

The existing conveyance system along Chinook Road consists of swales and culverts along the east side of the roadway (Photo CH-1). A conveyance system on the west side of the roadway does not exist. The existing swale appears to be overgrown with vegetation and the culverts are partially blocked with sediment (Photo CH-2). Storm water is conveyed in the swale north into the City of Edmonds proposed Pine Street development. The homes of the residents along the west side of Chinook Road are situated at an elevation lower than the roadway and have voiced concerns of increased runoff into their properties. Development of new homes are occurring on the east side of the roadway. Frontage improvements associated with home improvements include approximately 350 feet of storm drain pipe and catch basins to drain plat.

Goals

- Reduce localized flooding at homes on the west side of Chinook Road.

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.48
I	Rainfall Intensity (in/hr)	1.8
A	Area (acres)	2.6
Q	Peak Flow (cfs)	2.3

Alternatives Description

- Alternative No. 1 – Construct storm drainage system along west side of Chinook Road
 - Construct 750 feet of thickened edge of pavement along west side of Chinook Road

- Install 12” diameter drainage system
- Alternative No. 2 – Construct system along driveways on the west side of Chinook Road
 - Construct thickened edge of pavement along driveway entrances on the west side of Chinook Road
 - Install 12” diameter drainage system

Discussion of Alternatives

Alternative No. 1 provides a thickened edge of pavement along the west side of Chinook Road to capture sheet flow across road and convey it to proposed catch basins along the west side of Chinook Road. These proposed catch basins will route flows to frontage improvement anticipated with development. This alternative will construct a new drainage system for the entire west side of Chinook Road.

Alternative No. 2 provides limited thickened edge of pavement at crossing of driveways to deter sheet flow from entering private property. Catch basins will be installed upgradient of the driveways to route flows to the east side system. This alternative will only construct a new drainage system near the driveways along the west side of Chinook Road.

The alternatives are depicted in the attached Chinook Road figures, Figure 2-5A and 2-5B.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Chinook Road area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Chinook Road, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing & Grubbing	SF	525	\$0.15	\$78.75
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY	167	\$75.00	\$12,525.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	175	\$0.10	\$17.50
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	105	\$35.00	\$3,675.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	4	\$1,200.00	\$4,800.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$21,096.25
				Mobilization	5%
				Construction Subtotal	\$22,151.06
				Contingency	40%
				Construction Total	\$31,011.49
				State Sales Tax	8.80%
				Engineering Design	25%
				Legal/Administration	5%
				Total Project Cost	\$43,043.94

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Chinook Road, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	525	\$0.15	\$78.75
7	Saw Asphalt Concrete Full Depth	LF		\$5.00	\$0.00
8	Asphalt Concrete Pavement Removal	SY		\$10.00	\$0.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN		\$20.00	\$0.00
11	Asphalt Concrete Pavement, Class B	TN		\$58.00	\$0.00
12	Asphalt Sidewalk, Thickened Edge	SY	45	\$75.00	\$3,375.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	175	\$0.10	\$17.50
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	105	\$35.00	\$3,675.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	4	\$1,200.00	\$4,800.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$11,946.25
	</				

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Chinook Road



Photo CH-1. Swale along east side of Chinook Road



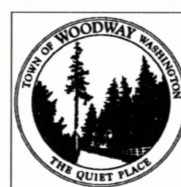
Photo CH-2. Culvert along east side of Chinook Road



ALTERNATIVE 1

750 LF - THICKENED EDGE
105 LF - 12" DIA SD
5 CB TYPE 1

LEGEND
 CONTOURS ———
 BASIN ———
 PROPERTY LINE ———
 TOWN LIMITS ■ ■ ■
 STORM DRAIN - SD ———
 CATCH BASIN - CB ———

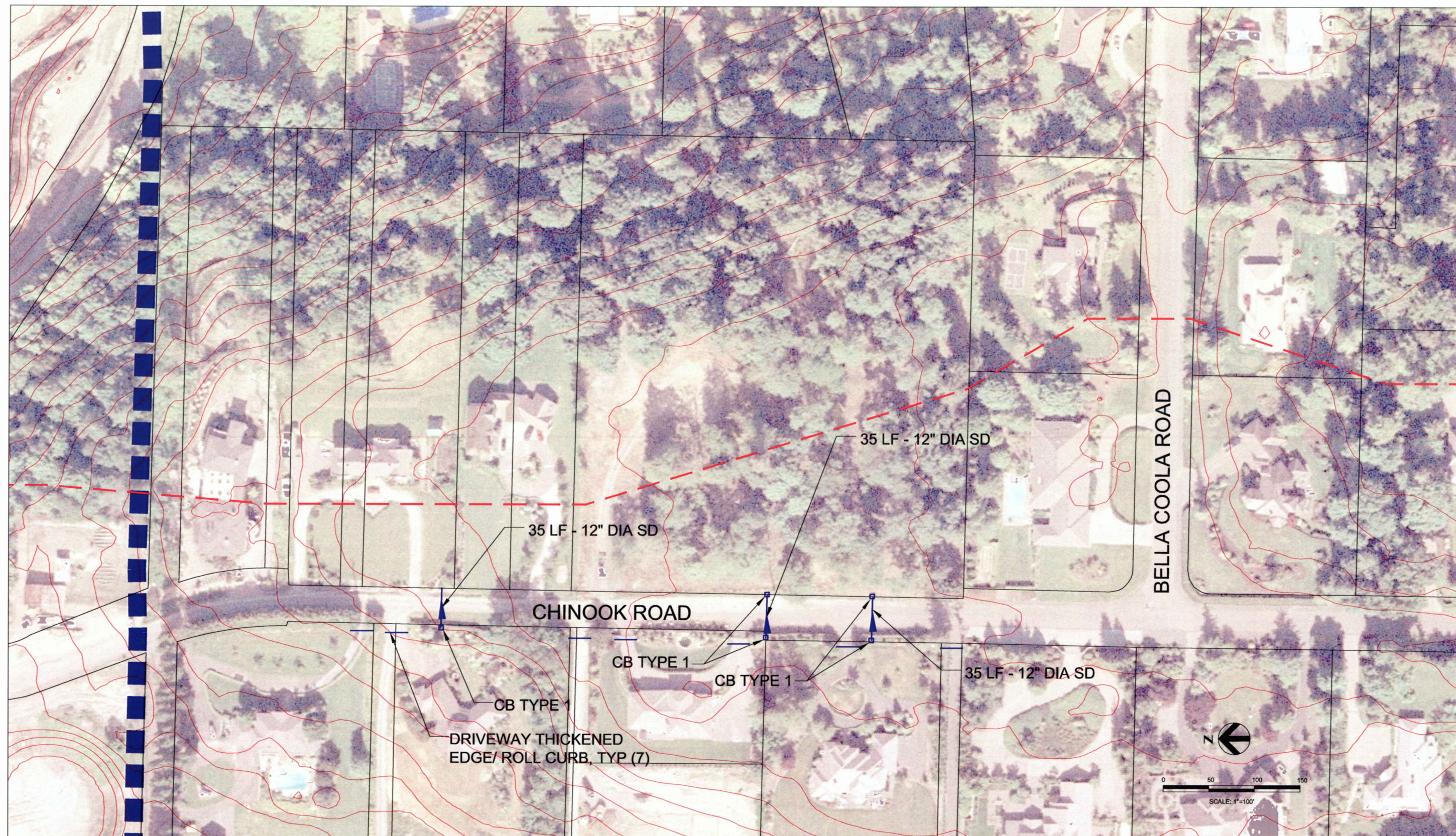


HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

CHINOOK ROAD

DATE
NOV 2005
FIGURE
FIG 2-5A

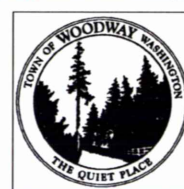


ALTERNATIVE 2

200 LF DRIVEWAYS THICKENED
EDGE/ ROLL CURB (25' EA)
5 CB TYPE 1
105 LF-12" DIA SD

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■ ■ ■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

CHINOOK ROAD

DATE

NOV 2005

FIGURE

FIG 2-5B

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: **Woodway Park Road**

Location

Woodway Park Road, between Woodhaven Place and 238th Street SW

Existing System and Site Conditions

A large area of Woodway Park Road (Photo WP-1) and adjacent properties drain to two small inlets on the west side of Woodway Park Road, that discharge onto private property, 23624 and 23700 Woodway Park Road . Inlet #81 is a 12' square grate with a 6" diameter pipe discharging to the west. Inlet #78 (Photo WP-2) is a 6" diameter inlet with a 6" diameter pipe discharging to the west onto private property. The inlets clog easily and cause flooding on the roadway, creating a hazard. The existing conveyance system along the east side of Woodway Park Road consists of a combination of storm sewer and open ditches. A conveyance system on the west side of the roadway does not exist.

Goals

- Reduce localized flooding
- Eliminate discharge from right-of-way onto private property

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.90
I	Rainfall Intensity (in/hr)	2.8
A	Area (acres)	0.3
Q	Peak Flow (cfs)	0.8

Alternatives Description

- Alternative No. 1 –Connect to the existing drainage system along east side of Woodway Park Road
 - Replace existing inlets with catch basins
 - Improve existing storm sewer system along east side of Woodway Park Road with a new 12' diameter system at lower invert elevation
 - Increase capacity of the existing open ditch sections with a new trapezoidal channel
- Alternative No. 2 –Connect to the existing drainage system on Woodhaven Place
 - Replace existing inlets with catch basins
 - Install new 12" diameter pipe system along west side of Woodway Park Road and Woodhaven Place

Discussion of Alternatives

Alternative No. 1 will reduce localized flooding by improving the capacity of the inlets along the west side of Woodway Park Road. The existing conveyance system along the east side of the road is situated at too high of an elevation for a connection of the proposed catch basins at #78 and #81. Therefore, this alternative will require reconstructing approximately 800 feet of the existing conveyance system (ditch and culverts) along the east side of Woodway Park Road. By diverting discharges from private property, it will remove the necessity for acquiring an easement for those discharges. This alternative will improve the inlet capacity of the current system, therefore reducing localized flooding on the roadway. However, it requires the reconstruction of the current system along the east side of Woodway Park Road.

Alternative No. 2 will also reduce localized flooding by improving capacity of the inlets along the west side of Woodway Park Road. Approximately 465' of 12" diameter pipe will be installed to connect to the existing drainage system on Woodhaven Place (CB #149). No modifications to the Woodhaven Place drainage system will be completed as part of this project. By diverting discharges from private property, it will remove the necessity for acquiring an easement for those discharges. This alternative will improve the inlet capacity of the current system, therefore, reducing localized flooding on the roadway. The affect of additional stormwater discharging to the current Woodhaven Place system will need to be evaluated.

The alternatives are depicted in the attached Woodway Park Road figures, Figure 2-6A and 2-6B.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Woodway Park Road area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Woodway Park Road, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	1135	\$0.15	\$170.25
7	Saw Asphalt Concrete Full Depth	LF	386	\$5.00	\$1,930.00
8	Asphalt Concrete Pavement Removal	SY	110	\$10.00	\$1,100.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	27	\$20.00	\$540.00
11	Asphalt Concrete Pavement, Class B	TN	19	\$58.00	\$1,102.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	380	\$0.10	\$38.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY	43.0	\$25.00	\$1,075.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	420	\$35.00	\$14,700.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	6	\$1,200.00	\$7,200.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$27,855.25
				Mobilization	5%
					\$1,392.76
				Construction Subtotal	\$29,248.01
				Contingency	40%
					\$11,699.21
				Construction Total	\$40,947.22
				State Sales Tax	8.80%
					\$3,603.36
				Engineering Design	25%
					\$10,236.80
				Legal/Administration	5%
					\$2,047.36
				Total Project Cost	\$56,834.74

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Woodway Park Road, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost	
ROADWAY						
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00	
2	Street Cleaning	HR		\$95.00	\$0.00	
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00	
4	Inlet Protection	EA		\$150.00	\$0.00	
5	Triangular Silt Dike	LF		\$8.00	\$0.00	
6	Clearing &Grubbing	SF	1250	\$0.15	\$187.50	
7	Saw Asphalt Concrete Full Depth	LF	350	\$5.00	\$1,750.00	
8	Asphalt Concrete Pavement Removal	SY	120	\$10.00	\$1,200.00	
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00	
10	Crushed Surfacing Base Course	TN	30	\$20.00	\$600.00	
11	Asphalt Concrete Pavement, Class B	TN	21	\$58.00	\$1,218.00	
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00	
TRAFFIC CONTROL						
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00	
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00	
ROADSIDE DEVELOPMENT						
15	Topsoil (Class B)	CY		\$15.00	\$0.00	
16	Hydroseed	SY	417	\$0.10	\$41.70	
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00	
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00	
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00	
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00	
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00	
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00	
23	Mulch, 2" depth	CY		\$32.00	\$0.00	
24	Sodding	SF		\$4.00	\$0.00	
STORM DRAINAGE						
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00	
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00	
27	Remove Manhole	EA		\$550.00	\$0.00	
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00	
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00	
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	465	\$35.00	\$16,275.00	
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00	
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00	
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00	
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00	
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00	
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00	
37	Catch Basin, Type 1, 5 Foot Depth	EA	3	\$1,200.00	\$3,600.00	
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00	
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00	
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00	
41	Quarry Spalls	Ton		\$30.00	\$0.00	
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00	
43						
44						
45						
				Subtotal	\$24,872.20	
				Mobilization	5%	\$1,243.61
				Construction Subtotal		\$26,115.81
				Contingency	40%	\$10,446.32
				Construction Total		\$36,562.13
				State Sales Tax	8.80%	\$3,217.47
				Engineering Design	25%	\$9,140.53
				Legal/Administration	5%	\$1,828.11
				Total Project Cost		\$50,748.24

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

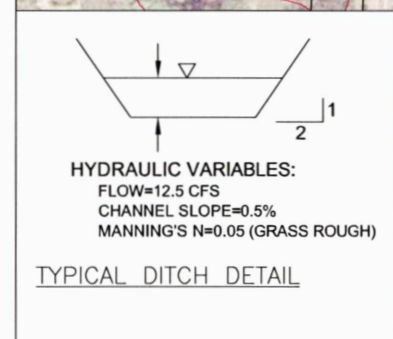
Woodway Park Road



Photo WP-1. Looking north along Woodway Park Road



Photo WP-2. Inlet #78 on Woodway Park Road

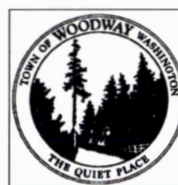


ALTERNATIVE 1

510 LF DITCH 420
 120 LF 12" DIA SD
 6-CB TYPE 1

LEGEND

CONTOURS ——— STORM DRAIN - SD
 BASIN - - - - - CATCH BASIN - CB
 PROPERTY LINE ———
 TOWN LIMITS ■ ■ ■



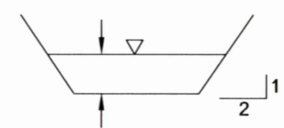
HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

WOODWAY PARK ROAD

DATE
 NOV 2005

FIGURE
 FIG 2-6A



HYDRAULIC VARIABLES:
 FLOW=12.5 CFS
 CHANNEL SLOPE=0.5%
 MANNING'S N=0.05 (GRASS ROUGH)

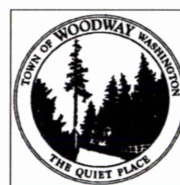
TYPICAL DITCH DETAIL

ALTERNATIVE 2

3- CB TYPE 1
 465 LF 12" DIA SD

LEGEND

- CONTOURS — STORM DRAIN - SD
- BASIN --- CATCH BASIN - CB
- PROPERTY LINE —
- TOWN LIMITS ■



HDR

**TOWN OF WOODWAY
 STORMWATER COMPREHENSIVE
 PLAN**

WOODWAY PARK ROAD

DATE
 NOV 2005

FIGURE
 FIG 2-6B

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: North Deer and Algonquin

Location

Algonquin Road, near the intersection of North Deer Drive

Existing System and Site Conditions

Approximately 300 feet of Algonquin Road drains east to a catch basin (CB #206) (Photo NDA-1) near the intersection with North Deer Drive, and the runoff exceeds the capacity of the catch basin. The existing pipe from the CB #206 sits at the very top of the structure (Photo NDA-2). The discharge pipe from CB #206 is a 6-inch diameter pipe, which connects to a catch basin across Algonquin Road (CB #207), and then to the existing drainage system along the west side of North Deer Drive. There is a steep slope on the north side of the roadway and no sidewalk. There is currently no storm sewer system along Algonquin Road, west of North Deer Drive. The runoff likely erodes the steep slope and deposits the sediment at the catch basin at the bottom of the hill.

Goals

- Reduce localized flooding
- Reduce sediment deposition

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.22
I	Rainfall Intensity (in/hr)	1.2
A	Area (acres)	16.5
Q	Peak Flow (cfs)	4.3

Phases Description

- Phase No. 1 – Replace existing catch basin and pipe

- Construct new catch basins at CB#206 and CB #207 with larger inlets
- Lower the invert elevation of the pipe and upsize the pipe from a 6" diameter to a 12" diameter
- Connect into existing storm sewer system on North Deer Drive
- Provide easement
- Phase No. 2 – Create a new storm drainage network west along Algonquin Road
 - Provide approximately 240 feet of 12" diameter storm sewer system to CB #206 along Algonquin Road with 3 additional CBs

Discussion of Phases

Alternative No. 1 will reduce localized flooding by improving the inlet efficiency and conveyance capacity of the existing drainage system. However, it will not reduce the amount of sediment deposition at the intersection of Algonquin Road and North Deer Drive. It will not eliminate that a section of Algonquin Road and the area to the north all collect at one location.

Phase No. 2 is recommended as the second phase to accomplish the project goals of reducing flooding and sediment deposition at CB #206. The new drainage system along Algonquin Road will capture runoff before it reaches CB #206. By collecting runoff along Algonquin Road it will also prevent eroding the embankment adjacent to the road. Thus satisfying the goals of the project.

A stormwater easement for the pipe connecting to North Deer Drive is necessary to comply with current Woodway Municipal Code (11.02.210). The proposed easement width is estimated to be a total width of 20 feet.

The alternatives are depicted in the attached North Deer and Algonquin figure, Figure 2-7.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The North Deer and Algonquin area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

North Deer and Algonquin, Phase 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	385	\$0.15	\$57.75
7	Saw Asphalt Concrete Full Depth	LF	56	\$5.00	\$280.00
8	Asphalt Concrete Pavement Removal	SY	16	\$10.00	\$160.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	4	\$20.00	\$80.00
11	Asphalt Concrete Pavement, Class B	TN	3	\$58.00	\$174.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY	8	\$15.00	\$120.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF	1155	\$4.00	\$4,620.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	105	\$35.00	\$3,675.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$13,566.75

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

North Deer and Algonquin, Phase 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	1200	\$0.15	\$180.00
7	Saw Asphalt Concrete Full Depth	LF	112	\$5.00	\$560.00
8	Asphalt Concrete Pavement Removal	SY	32	\$10.00	\$320.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	8	\$20.00	\$160.00
11	Asphalt Concrete Pavement, Class B	TN	6	\$58.00	\$348.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	400	\$0.10	\$40.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	240	\$35.00	\$8,400.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	3	\$1,200.00	\$3,600.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$13,608.00
				Mobilization	5%
					\$680.40
				Construction Subtotal	\$14,288.40
				Contingency	40%
					\$5,715.36
				Construction Total	\$20,003.76
				State Sales Tax	8.80%
					\$1,760.33
				Engineering Design	25%
					\$5,000.94
				Legal/Administration	5%
					\$1,000.19
				Total Project Cost	\$27,765.22

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

North Deer and Algonquin

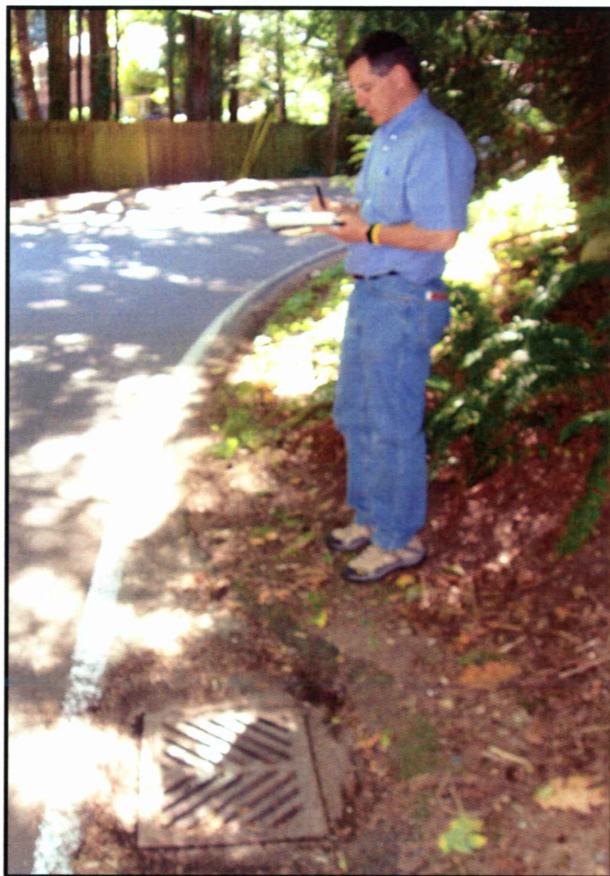
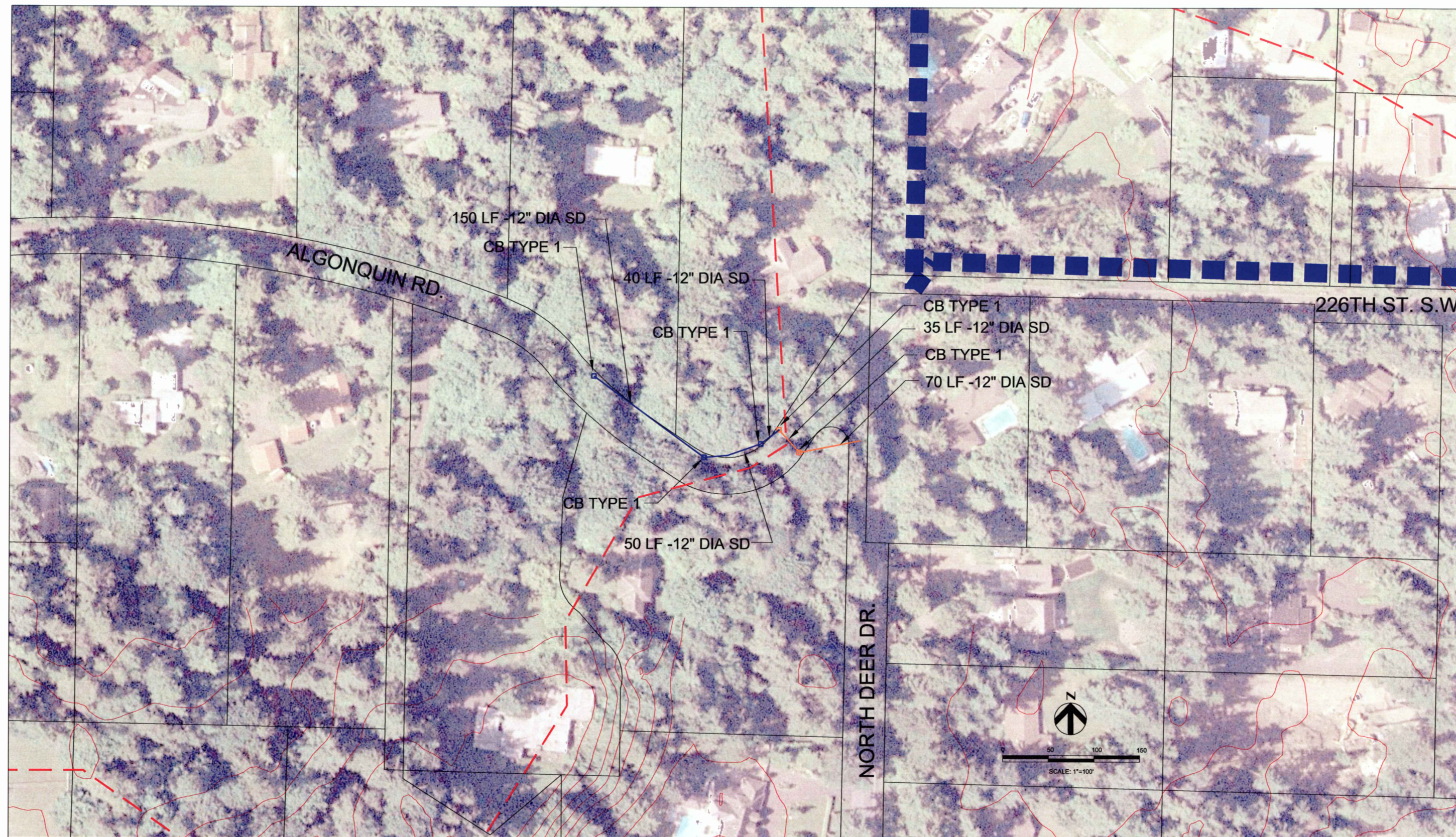


Photo NDA-1. Looking west on Algonquin Road



Photo NDA-2. Inside catch basin #206 at Algonquin Road and North Deer Drive



PHASE 1

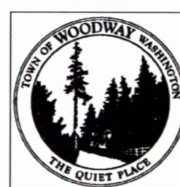
2 CB TYPE 1
105 LF-12" DIA SD
EASEMENT

PHASE 2

3 CB TYPE 1
240 LF-12" DIA SD

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■■■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

NORTH DEER AND ALGONQUIN

DATE

NOV 2005

FIGURE

FIG 2-7

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: **Makah Road**

Location

Creek from the Hendrick's property contributes to flooding and sheet flow across Makah Road, south of 11400 Bella Coola Road.

Existing System and Site Conditions

The creek from the Hendricks property (Photo MA-1) flows to an open catch basin with a rebar cage (Photo MA-2) placed on top, surrounded by a small depression area on a private property. The cage prevents large debris from entering the catch basin and provides a safety feature; however, the cage captures small debris, such as, leaves and sticks, which blocks the water from the creek from entering into the catch basin. The flow backs up in the creek and detention area, frequently flowing across Makah Road. The existing drainage system has an overflow system that conveys runoff east, across private property, to Willow Creek. Low flows are conveyed north down Makah road via the storm sewer system.

Goals

- Reduce frequent flooding of Makah Road
- Provide storm drain easement for overflow by-pass

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.20
I	Rainfall Intensity (in/hr)	1.2
A	Area (acres)	50.8
Q	Peak Flow (cfs)	12.1

The drainage area used in the analysis includes the upstream drainage basin.

Alternatives Description

- Alternative No. 1 – Replace existing catch basin with an improved inlet and larger culvert under Makah Road
 - Construct a headwall with wings around the culvert
 - Improve depression area surrounding culvert
 - Upsize the culvert from the existing 12-inch pipe to an 18-inch
 - Provide overflow easement
- Alternative No. 2 – Replace existing rebar gage with a more efficient grate
 - Construct new catch basin
 - Improve depression area surrounding catch basin
 - Upsize the pipe from the existing 12-inch pipe to an 18-inch pipe
 - Provide overflow easement

Discussion of Alternatives

Alternative No. 1 will reduce flooding of Makah Road by improving the inlet capacity and conveyance system. Headwall and wings will not block flows with small leaves and sticks. The inlet will also improve efficiency to convey flows from the creek. Existing 12" diameter along Makah Road, and 15" diameter pipe across Makah Road, will be increased to 18" diameter pipes. Alternative 1 will provide the greatest inlet capacity between the two alternatives. However, it will require additional land to construct the headwall and wings, over a typical catch basin.

Alternative No. 2 will also reduce flooding of Makah Road by improving the inlet capacity of the catch basin and conveyance system preventing flooding during typical rainstorms. Alternative 2 will have improved inlet capacity, but it is likely that it will be less than if the inlet was converted into a culvert, rather than a catch basin and grate. However, replacement of only the catch basin and grate will not require additional land to be used.

A stormwater easement for the high flow by-pass is necessary to comply with current Woodway Municipal Code (11.02.210). The proposed easement width is to be the channel width plus 15 feet, estimated to be a total width of 25 feet.

The alternatives are depicted in the attached Makah Road figure, Figure 2-8.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Makah Road area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Makah, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	990	\$0.15	\$148.50
7	Saw Asphalt Concrete Full Depth	LF	56	\$5.00	\$280.00
8	Asphalt Concrete Pavement Removal	SY	16	\$10.00	\$160.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	4	\$20.00	\$80.00
11	Asphalt Concrete Pavement, Class B	TN	3	\$58.00	\$174.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	330	\$0.10	\$33.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY	36	\$25.00	\$900.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	226	\$25.00	\$5,650.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	226	\$60.00	\$13,560.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43	Culvert Headwall and Wingwalls	EA	1	\$5,000.00	\$5,000.00
44					
45					
				Subtotal	\$25,985.50
				Mobilization	5%
					\$1,299.28
				Construction Subtotal	\$27,284.78
				Contingency	40%
					\$10,913.91
				Construction Total	\$38,198.69
				State Sales Tax	8.80%
					\$3,361.48
				Engineering Design	25%
					\$9,549.67
				Legal/Administration	5%
					\$1,909.93
				Total Project Cost	\$53,019.77

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Makah, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	990	\$0.15	\$148.50
7	Saw Asphalt Concrete Full Depth	LF	56	\$5.00	\$280.00
8	Asphalt Concrete Pavement Removal	SY	16	\$10.00	\$160.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	4	\$20.00	\$80.00
11	Asphalt Concrete Pavement, Class B	TN	3	\$58.00	\$174.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	330	\$0.10	\$33.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY	36	\$25.00	\$900.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF	226	\$25.00	\$5,650.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF		\$35.00	\$0.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF	226	\$60.00	\$13,560.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43	Grate Inlet Type 2	EA	1	\$1,800.00	\$1,800.00
44					
45					
				Subtotal	\$22,785.50
				Mobilization	5%
					\$1,139.28
				Construction Subtotal	\$23,924.78
				Contingency	40%
					\$9,569.91
				Construction Total	\$33,494.69
				State Sales Tax	8.80%
					\$2,947.53
				Engineering Design	25%
					\$8,373.67
				Legal/Administration	5%
					\$1,674.73
				Total Project Cost	\$46,490.62

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Makah Road

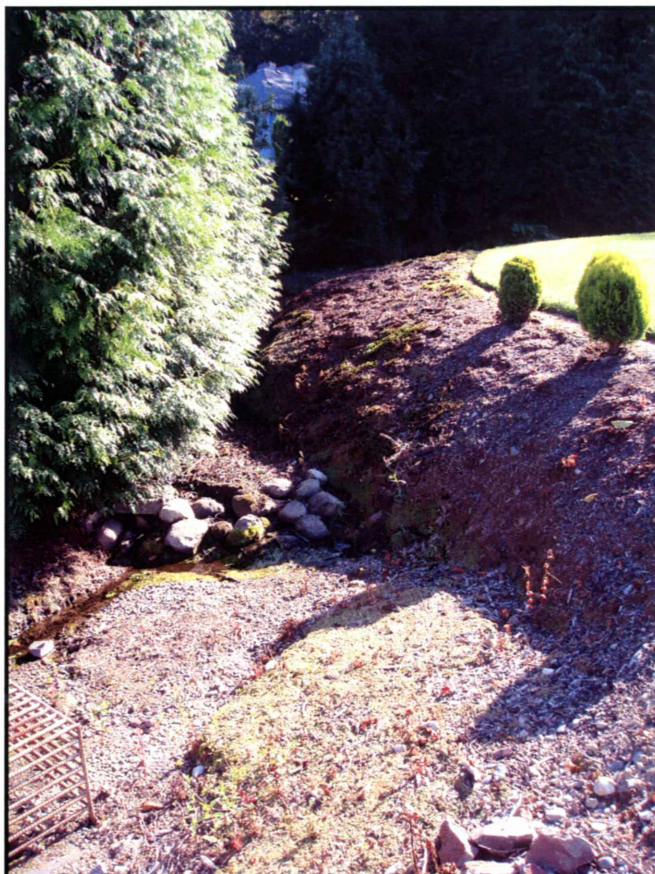
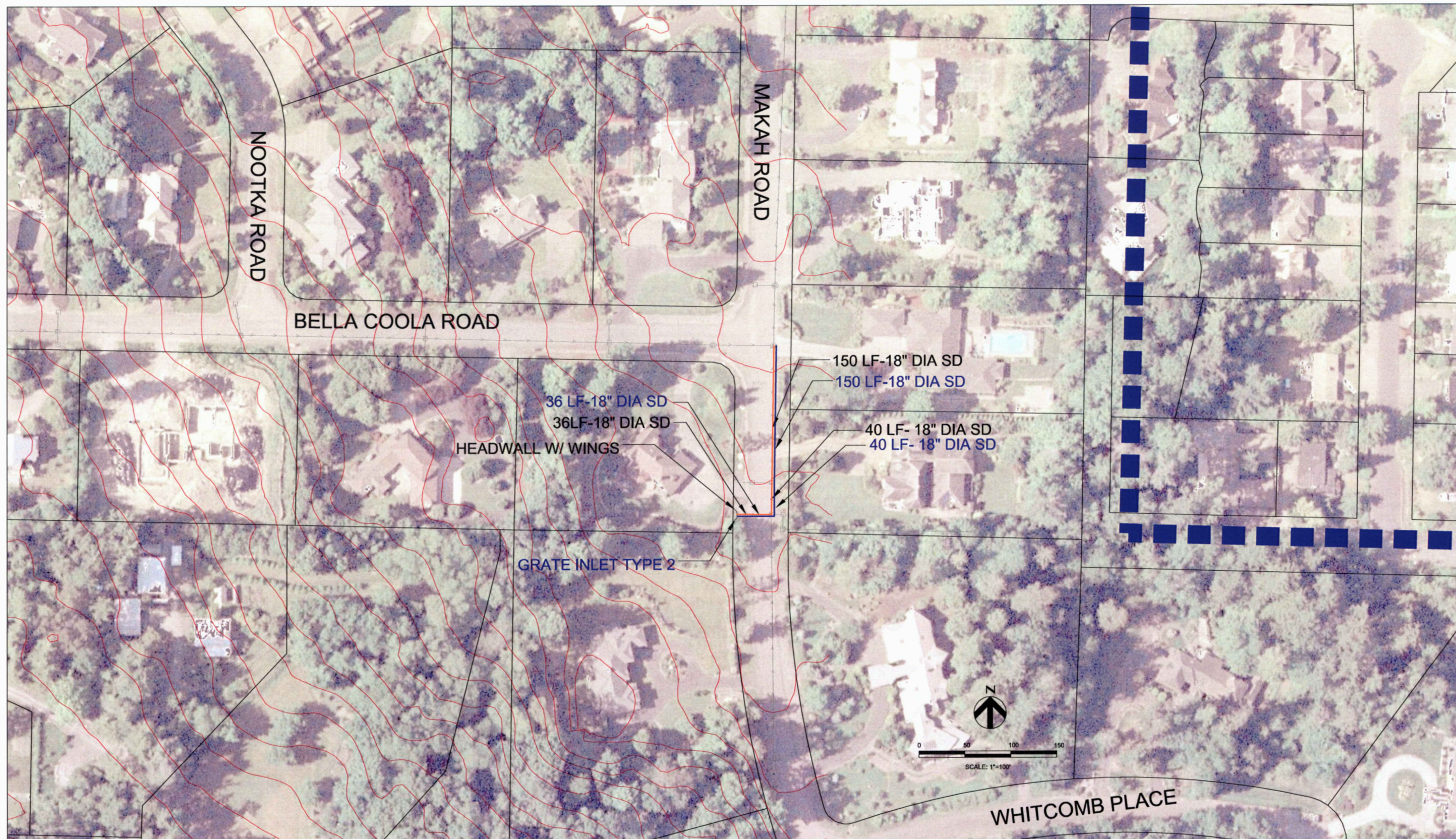


Photo MA-1. Looking west at the downstream end of the creek



Photo MA-2. Catch basin inlet at the downstream end of the creek



ALTERNATIVE 1

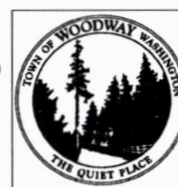
226 LF-18" DIA PIPE
HEADWALL WITH WINGS
226 LF REMOVE PIPE
EASEMENT

ALTERNATIVE 2

226 LF 18" DIA PIPE
GRATE INLET TYPE 2
226 LF REMOVE PIPE
EASEMENT

LEGEND

CONTOURS ——— STORM DRAIN - SD
BASIN - - - - - CATCH BASIN - CB
PROPERTY LINE ———
TOWN LIMITS ■■■



HDR

TOWN OF WOODWAY STORMWATER COMPREHENSIVE PLAN

MAKAH ROAD

DATE

NOV 2005

FIGURE

FIG 2-8

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: Wachusett Road

Location

Wachusett Road at intersection near Deer Creek.

Existing System and Site Conditions

Runoff along sides of the road (Photo WA-1) is conveyed in poorly defined conveyance swales and culverts. Runoff frequently sheet flows across the road (Photo WA-2) creating a hazard. Runoff also tends to convey sediment from the steep slope along the west edge of the road, which requires maintenance and removal of sediment deposits.

Goals

- Reduce localized flooding
- Reduce sheetflow across the roadway
- Protect embankment adjacent to roadway

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.32
I	Rainfall Intensity (in/hr)	1.0
A	Area (acres)	18.5
Q	Peak Flow (cfs)	6.1

Phases Description

- Phase No. 1 – Create a new storm sewer system along the east side of the road.
 - Provide 12” diameter pipe system along east side of Wachusett Road
 - Construct catch basins along west side of Wachusett Road

- Phase No. 2 – Construct retaining wall along the west side of the road

Discussion of Phases

Phase No. 1 will collect the runoff along the both sides of the road and reduce the flooding and sheet flow across Wachusett Road. By collecting the runoff along the sides of the road, there is less potential for erosion of the bottom of the embankment.

Phase No. 2 will help control the continued erosion of the slope, and prevent the sediment from eroding onto the road by constructing a retaining wall along the west side of the road.

The phases are depicted in the attached Wachusett Road figure, Figure 2-9.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The Wachusett Road area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted, which includes televising the existing pipe along the east side of the road to determine where it goes.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Wachusett, Phase 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing & Grubbing	SF	2325	\$0.15	\$348.75
7	Saw Asphalt Concrete Full Depth	LF	120	\$5.00	\$600.00
8	Asphalt Concrete Pavement Removal	SY	34	\$10.00	\$340.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	9	\$20.00	\$180.00
11	Asphalt Concrete Pavement, Class B	TN	6	\$58.00	\$348.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY	775	\$0.10	\$77.50
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 - 6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	525	\$35.00	\$18,375.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$24,669.25
				Mobilization	5%
					\$1,233.46
				Construction Subtotal	\$25,902.71
				Contingency	40%
					\$10,361.09
				Construction Total	\$36,263.80
				State Sales Tax	8.80%
					\$3,191.21
				Engineering Design	25%
					\$9,065.95
				Legal/Administration	5%
					\$1,813.19
				Total Project Cost	\$50,334.15

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Wachusett, Phase 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF		\$0.15	\$0.00
7	Saw Asphalt Concrete Full Depth	LF	112	\$5.00	\$560.00
8	Asphalt Concrete Pavement Removal	SY	32	\$10.00	\$320.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	8	\$20.00	\$160.00
11	Asphalt Concrete Pavement, Class B	TN	6	\$58.00	\$348.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	56	\$35.00	\$1,960.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA		\$1,200.00	\$0.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA	2	\$2,200.00	\$4,400.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43	Retaining Wall (Approx 300 lf by 6 foot wall height with 2 feet buried)	SF	1800	\$25.00	\$45,000.00
44					
45					
				Subtotal	\$52,748.00

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

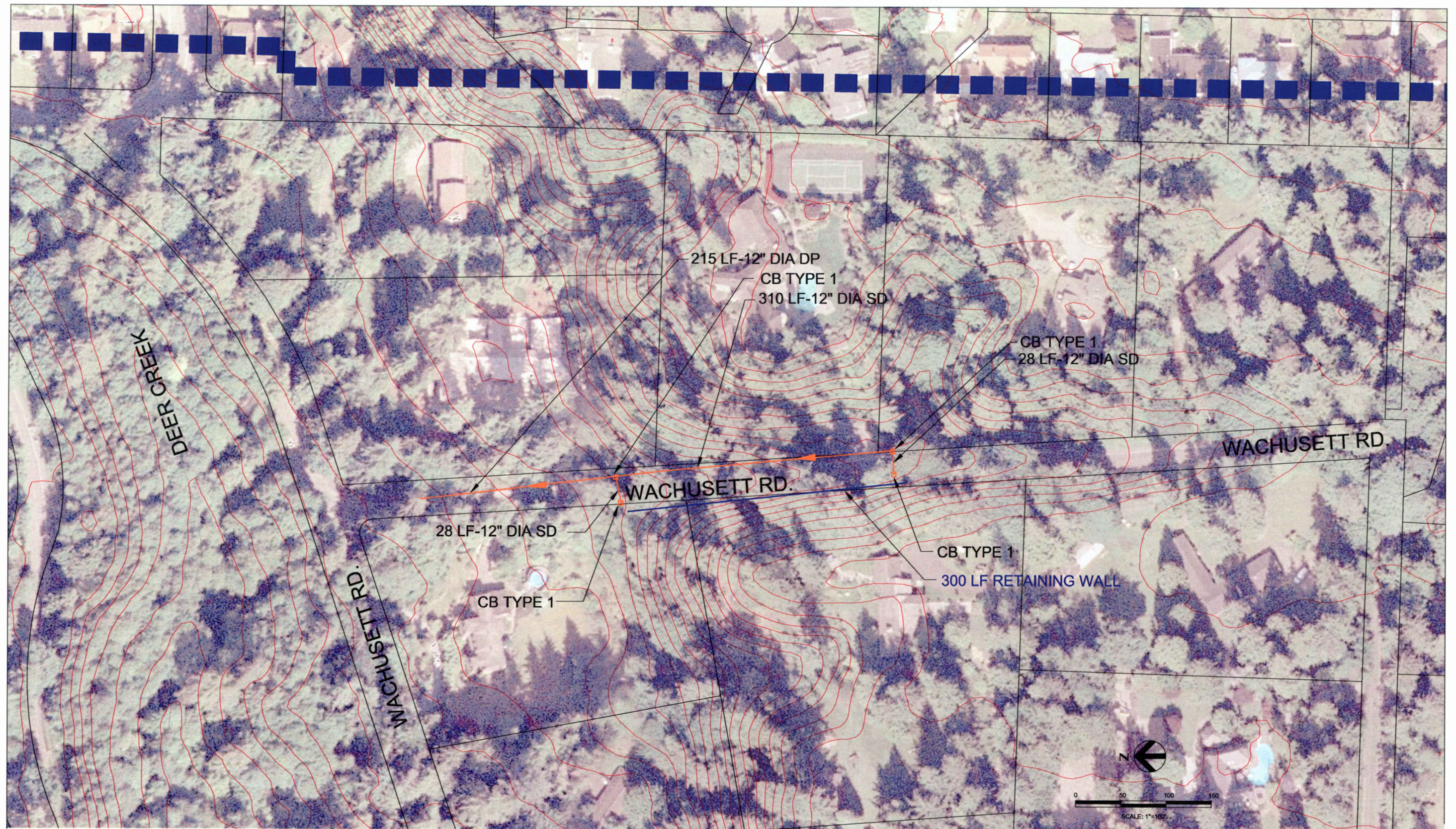
Wachusett Road



Photo WA-1. Looking south on Wachusett Road



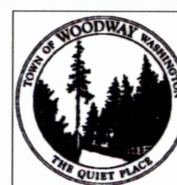
Photo WA-2. Looking north on Wachusett Road



PHASE 1	PHASE 2
70 LF THICKENED EDGE / ROLL CURB	300 LF RETAINING WALL
4 CB TYPE 1	
581 LF-12" DIA SD EASEMENT	

LEGEND

CONTOURS		STORM DRAIN - SD
BASIN		CATCH BASIN - CB
PROPERTY LINE		
TOWN LIMITS		



**TOWN OF WOODWAY
STORMWATER COMPREHENSIVE
PLAN**

WACHUSETT ROAD

DATE
NOV 2005

FIGURE
FIG 2-9

TOWN OF WOODWAY
STORMWATER COMPREHENSIVE PLAN
PROJECT DESCRIPTION

Project: 10724 226th Street SW

Location

10724 226th Street SW, at the intersection of 226th Street SW and North Deer Drive

Existing System and Site Conditions

The runoff coming west along 226th Street SW contributes to localized flooding in the driveway of 10724 226th Street SW, located at the intersection of 226th Street SW and North Deer Drive. The house is located on the south side of 226th Street SW and is situated lower than the elevation of the road. Currently there is no curb and gutter along the south side of the roadway and there is no drainage system (Photo 226-1). Runoff travels along the edge of the roadway. A low point in the driveway of 10724 226th Street SW floods, by runoff being conveyed down the driveway, and the depression does not have an outlet (Photo 226-2). There is a potential right-of-way issue to be sorted out at the intersection of 226th Street SW and North Deer Drive.

Goals

- Reduce localized flooding at 10724 226th Street SW.

Hydrologic Analysis

The 100-year peak flow was calculated using the Rational Method. The parameters used for the analysis are shown in the following table:

C	Runoff coefficient	0.35
I	Rainfall Intensity (in/hr)	1.8
A	Area (acres)	2.0
Q	Peak Flow (cfs)	1.3

Alternatives Description

- Alternative No. 1 – Redirect flows from entering into the driveway to the roadway
 - Create a thickened edge of pavement between the road and driveway

- Construct a new 12" diameter drainage system from 10724 226th Street SW to existing drainage system on North Deer Drive
- Alternative No. 2 –Catch basin on private property
 - Construct catch basin at low point in the driveway
 - Connect the catch basin to existing drainage system on North Deer Drive with a 12" diameter pipe
 - Provide easement

Discussion of Alternatives

Alternative No. 1 will reduce localized flooding of the private property by redirecting runoff from entering the driveway by the creation of a thickened edge of pavement, and collecting the flows in a new drainage system along 226th Street SW. There is a potential easement to be acquired dependent on the outcome of the right-of-way issue at the intersection of 226th Street SW and North Deer Drive. The proposed easement would be necessary to meet Woodway Municipal Code (11.02.210).

Alternative No. 2 will also reduce localized flooding by collecting the runoff at the low spot on the property at 10724 226th Street SW. Runoff would still be conveyed onto the property from the road. An easement would be required to connect the catch basin to the drainage system on North Deer Drive per Woodway Municipal Code (11.02.210). The proposed easement width is estimated to be 20 feet wide. This alternative would involve constructing a public system on private property.

The alternatives are depicted in the attached 10724 226th Street SW figure, Figure 2-10.

Cost Items and Quantities

Construction line items and quantities are listed in the attached construction cost estimate table. Quantities were calculated based on the information obtained during HDR during field visits, and survey mapping of the infrastructure. Given the extent of survey, geotechnical, hydrologic, and hydraulic information available at this time, a 40 percent contingency has been applied.

Conclusions and Recommendations

The 226th Street SW area can be most cost effectively improved via the above proposed plan improvements. As part of Advanced Engineering and Design, we recommend that a detailed site survey, geotechnical analysis and hydrologic/hydraulic analyses be conducted.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Private Driveway 10724 226th St SW, Alternative 1

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing & Grubbing	SF		\$0.15	\$0.00
7	Saw Asphalt Concrete Full Depth	LF	250	\$5.00	\$1,250.00
8	Asphalt Concrete Pavement Removal	SY	110	\$10.00	\$1,100.00
9	Cement Concrete Pavement Removal	SY	69	\$20.00	\$1,388.89
10	Crushed Surfacing Base Course	TN	18	\$20.00	\$360.00
11	Asphalt Concrete Pavement, Class B	TN	12	\$58.00	\$696.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY		\$15.00	\$0.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF		\$4.00	\$0.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	125	\$35.00	\$4,375.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	2	\$1,200.00	\$2,400.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$11,569.89
				Mobilization	5%
					\$578.49
				Construction Subtotal	\$12,148.38
				Contingency	40%
					\$4,859.35
				Construction Total	\$17,007.74
				State Sales Tax	8.80%
					\$1,496.68
				Engineering Design	25%
					\$4,251.93
				Legal/Administration	5%
					\$850.39
				Total Project Cost	\$23,606.74

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

Town of Woodway
Stormwater Comprehensive Plan
Feasibility Level Opinion of Probable Cost

Private Driveway 10724 226th St SW, Alternative 2

Bid Item	Bid Description	Unit	Qty	Unit Price	Total cost
ROADWAY					
1	ESC Construction Entrance	EA		\$1,200.00	\$0.00
2	Street Cleaning	HR		\$95.00	\$0.00
3	Fence, Temporary Silt Containment	LF		\$3.50	\$0.00
4	Inlet Protection	EA		\$150.00	\$0.00
5	Triangular Silt Dike	LF		\$8.00	\$0.00
6	Clearing &Grubbing	SF	625	\$0.15	\$93.75
7	Saw Asphalt Concrete Full Depth	LF	150	\$5.00	\$750.00
8	Asphalt Concrete Pavement Removal	SY	42	\$10.00	\$420.00
9	Cement Concrete Pavement Removal	SY		\$20.00	\$0.00
10	Crushed Surfacing Base Course	TN	15	\$20.00	\$300.00
11	Asphalt Concrete Pavement, Class B	TN	15	\$58.00	\$870.00
12	Asphalt Sidewalk, Thickened Edge	SY		\$75.00	\$0.00
TRAFFIC CONTROL					
13	Traffic Control Labor, Flagging	HR		\$45.00	\$0.00
14	Relocate Sign, Traffic	EA		\$100.00	\$0.00
ROADSIDE DEVELOPMENT					
15	Topsoil (Class B)	CY	12	\$15.00	\$180.00
16	Hydroseed	SY		\$0.10	\$0.00
17	Shrub, Evergreen, 8' ht.	EA		\$180.00	\$0.00
18	Shrub, Evergreen, 1 Gal.	EA		\$15.00	\$0.00
19	Shrub, Deciduous, 1 Gal.	EA		\$10.00	\$0.00
20	Tree, Conifer (6 - 8' ht.)	EA		\$200.00	\$0.00
21	Tree, Deciduous (5 -6' ht, multistem)	EA		\$75.00	\$0.00
22	Ditch Excavation Including Haul	CY		\$25.00	\$0.00
23	Mulch, 2" depth	CY		\$32.00	\$0.00
24	Sodding	SF	1875	\$4.00	\$7,500.00
STORM DRAINAGE					
25	Remove/Abandon Existing Storm Drain Pipe	LF		\$25.00	\$0.00
26	Remove Inlet or Catch Basin	EA		\$200.00	\$0.00
27	Remove Manhole	EA		\$550.00	\$0.00
28	Remove Tree (12" DBH)	EA		\$500.00	\$0.00
29	Storm Drainage Pipe, 6-inch Diameter ADS HPDE	LF		\$30.00	\$0.00
30	Storm Drainage Pipe, 12-inch Diameter ADS HPDE	LF	120	\$35.00	\$4,200.00
31	Storm Drainage Pipe, 18-inch Diameter ADS HPDE	LF		\$60.00	\$0.00
32	Storm Drainage Pipe, 24-inch Diameter ADS HPDE	LF		\$85.00	\$0.00
33	Storm Drainage Pipe, 30-inch Diameter ADS HPDE	LF		\$130.00	\$0.00
34	Manhole, 48-inch, 8 Foot Depth	EA		\$2,400.00	\$0.00
35	Manhole, 54-inch, 8 Foot Depth	EA		\$2,650.00	\$0.00
36	Manhole, 60-inch, 8 Foot Depth	EA		\$3,510.00	\$0.00
37	Catch Basin, Type 1, 5 Foot Depth	EA	1	\$1,200.00	\$1,200.00
38	Catch Basin, Type 2, 48-inch, 5 Foot Depth	EA		\$2,200.00	\$0.00
39	Catch Basin, Type 2, 60-inch, 5 Foot Depth	EA		\$4,200.00	\$0.00
40	Temporary Stormwater Bypass	LS		\$2,000.00	\$0.00
41	Quarry Spalls	Ton		\$30.00	\$0.00
42	Shoring or Extra Excavation Trench	SF		\$3.00	\$0.00
43					
44					
45					
				Subtotal	\$15,513.75
				Mobilization	5%
					\$775.69
				Construction Subtotal	\$16,289.44
				Contingency	40%
					\$6,515.78
				Construction Total	\$22,805.21
				State Sales Tax	8.80%
					\$2,006.86
				Engineering Design	25%
					\$5,701.30
				Legal/Administration	5%
					\$1,140.26
				Total Project Cost	\$31,653.63

Notes:

1. Pipe cost includes excavation, pipe, installation and trench material
2. Catch basin and manhole costs includes excavation, material, installation and backfill.

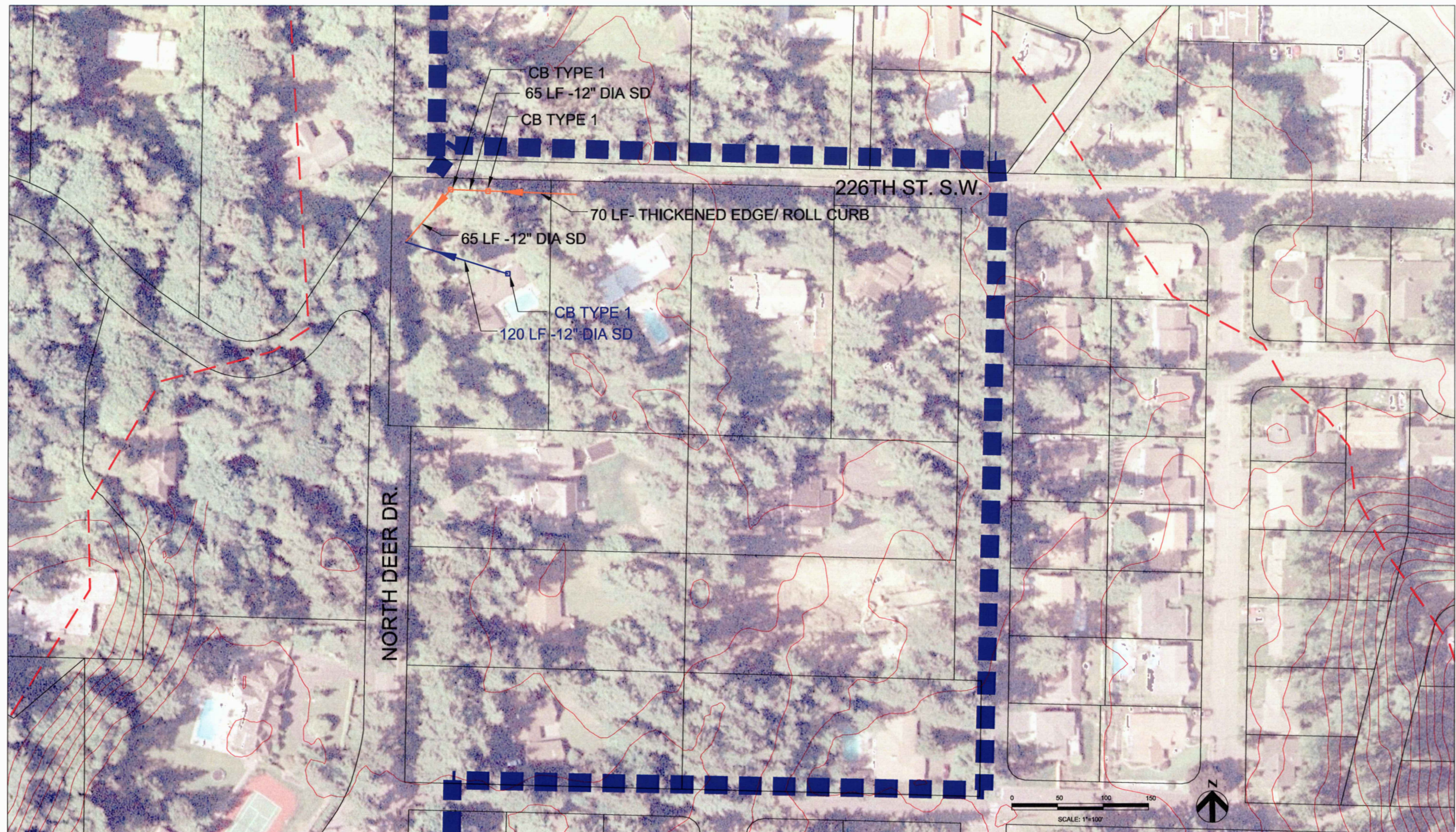
10724 226th Street SW



Photo 226-1. Looking west on 226th Street SW



Photo 226-2. Looking onto 10724 226th Street SW

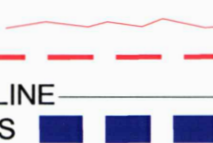


ALTERNATIVE 1
 70 LF THICKENED EDGE
 / ROLL CURB
 2 CB TYPE 1
 130 LF-12" DIA SD
 EASEMENT

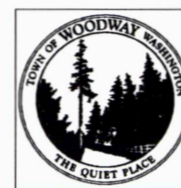
ALTERNATIVE 2
 1 CB TYPE 1
 120 LF-12" DIA SD
 EASEMENT

LEGEND

CONTOURS
 BASIN
 PROPERTY LINE
 TOWN LIMITS



STORM DRAIN - SD
 CATCH BASIN - CB



HDR

**TOWN OF WOODWAY
 STORMWATER COMPREHENSIVE
 PLAN**

226TH STREET

DATE
 NOV 2005
 FIGURE
 FIG 2-10

Chapter 3

Capital Improvements and Implementation Schedule

3.1 Introduction

This chapter describes the methodology and criteria used for selecting alternatives and prioritizing projects, the Capital Improvement Plan (CIP), and the 6-year schedule and beyond for the second phases of projects.

HDR and the Town of Woodway collaborated to identify criteria for selecting the alternatives and prioritizing projects. The results of selecting the alternatives and prioritizing the 10 project areas were used to develop the CIP. In essence, the CIP is a long-range financial planning tool that the Town can use to address its future needs in improving the stormwater system. Through the CIP, the Town schedules stormwater system improvements over time and in so doing, is able to prepare and implement a financial plan to afford them. The CIP should be reviewed each year to reflect changing priorities and the potential impact of capital projects on operating budgets and scheduling, and for coordinating related projects.

3.2 Development of Recommended Capital Improvement Plan

A CIP provides a way for the Town to prioritize projects and budget for these projects on an annual basis. (See Chapter 2 for a discussion of the 10 projects and proposed alternatives or phases.) The CIP lists the improvements necessary to reduce impacts of existing drainage problems and to improve the current stormwater system. Project costs are based on existing site conditions, and are expressed in 2005 dollars. Project costs may need to be adjusted based on inflation and further investigation of problems.

3.2.1 Criteria

The criteria used to select the alternatives and prioritize the projects are listed below. All criteria are deemed important, and they are listed in no particular order. These criteria were developed in workshop setting attended by the town staff including the Town Engineer, Director of Public Works, the Town Administrator and the Mayor.

- Ability to obtain easements
- Ability to obtain permits
- Bluff stability/erosion issues
- Capital Cost

- Legal liability
- Low impact development concepts incorporated
- Maintenance costs
- Number of properties benefited
- Property damage potential
- Public Safety
- Potential success in addressing the problem

3.2.2 Recommended Alternatives

The Town decided not to weight or score the criteria because they are all considered important. The alternatives were assessed by reviewing how they met the criteria. Capital cost, property damage potential and potential to solve the problem were deemed the most important criteria supporting selection of alternatives. The selected alternatives are described below. All the alternatives adequately address the problems identified in the project areas for the lowest possible cost.

North Dogwood

Alternative No. 3 is the recommended alternative; it includes converting the existing piped system into an open channel system and realigning it along the property line. Realigning the system maximizes the amount of developable land for the property owner. This alternative reduces damage potential on the property, which contains the channel and downstream properties, and incorporates low impact development methodologies. This project will require that a private easement be established to allow the town to access for maintenance.

South Dogwood

Only one alternative was identified for South Dogwood: to construct catch basins at the low point along Dogwood Place and connect the catch basins to the existing storm sewer system located west of the roadway. The alternative addresses the identified problem, and by reducing flooding on the roadway, it decreases property damage potential, the Town's legal liability, and safety issues.

Twin Maples

Twin Maples is a two-phase project: (1) improve the catch basin and downstream pipe from 11025 110th Place West, and (2) create a new storm drainage network within the Twin Maples neighborhood. It is recommended that both these phases be completed within the 6-year CIP schedule due to the severity of the problem. The project will reduce the property damage potential, legal liability, and safety issues caused by flooding of the roadway. To incorporate low impact development methodology, it is recommended that during the design process, an alternative be investigated to create a ditch downstream rather than a pipe.

Woodhaven

Alternative No. 1 is recommended; it diverts flow away from the bluff and south to 238th Street SW. This alternative reduces bluff stability/erosion impacts, property damage potential, legal liability, and safety issues caused by saturation of the bluff. It is a cost effective alternative that minimizes maintenance. A downstream analysis of the existing storm sewer system on 238th Street SW needs to be completed as part of the design process. Downstream analysis may identify downstream problems outside of the town that will need to be addressed.

Chinook Road

Alternative No. 1 is recommended; it involves constructing a thickened edge of pavement and new storm sewer system along the west side of Chinook Road. The recommended alternative reduces property damage and the Town's legal liability by decreasing the potential for flooding of private property. This project should be coordinated with the future road reconstruction work proposed for Chinook Road. This alternative helps reduce costs and reduces impacts to residents.

Woodway Park Road

Alternative No. 1 is recommended; it connects the new catch basins to the existing storm sewer system along the east side of Woodway Park Road. The alternative reduces safety concerns and legal liability by decreasing flooding of the roadway, and incorporates low impact development methodologies. The existing ditch along Woodway Park Road needs improvement, and this alternative allows the Town to meet that need by improving the existing ditch. This project benefits motorists on Woodway Park Road, which is the major thoroughfare through Woodway.

North Deer and Algonquin

North Deer and Algonquin is a phased project consisting of: (1) improving the existing catch basin and pipe, and (2) constructing a storm sewer system along Algonquin Road. The project will reduce flooding of the roadway, improving safety, decrease the Town's legal liability, and lessen erosion issues along the embankment of north of Algonquin Road. The embankment should be re-vegetated in the second phase of the project. This project benefits a large number of residents because it is located at one of the main entrances to the Town.

Makah Road

Alternative No. 2 is the recommended alternative for Makah Road. This alternative improves the inlet by replacing a culvert with wingwalls and a headwall. It also improves the detention area surrounding the existing catch basin and upsizes the current pipe outlet, thus adding additional capacity. The alternative improves safety by reducing flooding of the roadway and decreases the potential to damage property, thus lessening the Town's legal liability. This alternative benefits most residents who travel into the Woodway estates development.

Wachusett Road

Wachusett Road is a phased project. The phases consist of: (1) creating a storm sewer line along the east side of the road and placing catch basins on the west side of road, and (2) constructing a retaining wall on the west side of the road. This project improves safety by reducing flooding and sheet flow across Wachusett Road, thus decreasing potential property damage and the Town's legal liability. Constructing a retaining wall would reduce erosion problems along the embankment on the road and improve safety. This project benefits all who travel on Wachusett Road.

It is recommended that additional exploratory work be accomplished to determine the extent of the existing drainage system prior to design.

10724 226th Street SW

Alternative No. 1 is the preferred alternative; it redirects flows from entering the private driveway by constructing a thickened edge of pavement along 226th Street SW. The runoff is collected by proposed catch basins and routed into the existing storm sewer system on North Deer Drive. This reduces the Town's legal liability by eliminating public flow onto private property. This project impacts only one private property.

In general, it is recommended that any exploratory work to investigate how the existing system functions should be completed prior to developing the design of the recommended alternatives.

3.2.3 Prioritizing Projects

The priority of projects, including future phases, was based on applying the criteria to each project. Important factors applied to the ranking of projects were: number of people or properties benefited, potential for property damage and safety.

The priority of projects is proposed as follows:

1. Twin Maples – Phase 1
2. Woodhaven – Alternative No. 1
3. North Deer and Algonquin – Phase 1
4. Woodway Park Road – Alternative No. 1
5. Makah Road – Alternative No. 2
6. Chinook Road – Alternative No. 1
7. North Dogwood – Alternative No. 3
8. Wachusett Road – Phase 1
9. Twin Maples – Phase 2
10. South Dogwood – Alternative No. 1
11. 10724 226th Street SW – Alternative No. 1
12. North Deer and Algonquin – Phase 2

13. Wachusett Road – Phase 2

Figure 3-1 displays the projects in order of priority.

3.3 Schedule and Implementation Plan

The CIP schedule spans a 6-year period. The second phases of the projects will typically be completed over a 7- to 20-year period, except for Twin Maples, which is a higher priority than the second phases of other projects. Table 3-1 shows the CIP schedule. The proposed schedule is based on a balance of priority and cash flow.

Table 3-1. Capital Improvement Plan Schedule

	2006	2007	2008	2009	2010	2011	2012-2026
Twin Maples – Phase 1	X						
Woodhaven	X						
North Deer and Algonquin – Phase 1		X					
Woodway Park Road		X					
Makah Road			X				
Chinook Road			X				
North Dogwood				X			
Wachusett Road – Phase 1				X			
Twin Maples – Phase 2					X	X	
South Dogwood						X	
10724 226th Street SW						X	
North Deer and Algonquin – Phase 2							X
Wachusett Road – Phase 2							X

The schedule is a suggested course of action for budgeting and planning to accomplish the goals of this plan. It should be reviewed each year to revisit the proposed improvements and to determine if additional projects have surfaced within the Town, or if storm events have rearranged the priority of the projects.

The Implementation Plan's proposed expenditures, based on the CIP schedule, are listed in Table 3-2. The second phase of the Twin Maples project costs will be split between 2010 and 2011, with eighty percent being paid for in 2010 and the remaining twenty percent being paid for in 2011.

Table 3-2. Implementation Plan

Year	Estimated Expenditures
2006	\$150,545
2007	\$84,516
2008	\$89,535
2009	\$95,527
2010	\$158,593
2011	\$90,539
2012-2026	\$135,390

The Implementation Plan lists current planning-level estimates of expenditures, presented in 2005 dollars. Inflation and necessary exploratory work will increase expenditures. The estimated expenditures do not reflect any costs associated with easements. The Town's philosophy is to work with residents on any easements required to complete a project. The Implementation Plan should be reviewed each year to revisit the proposed improvements and the Town's budget.

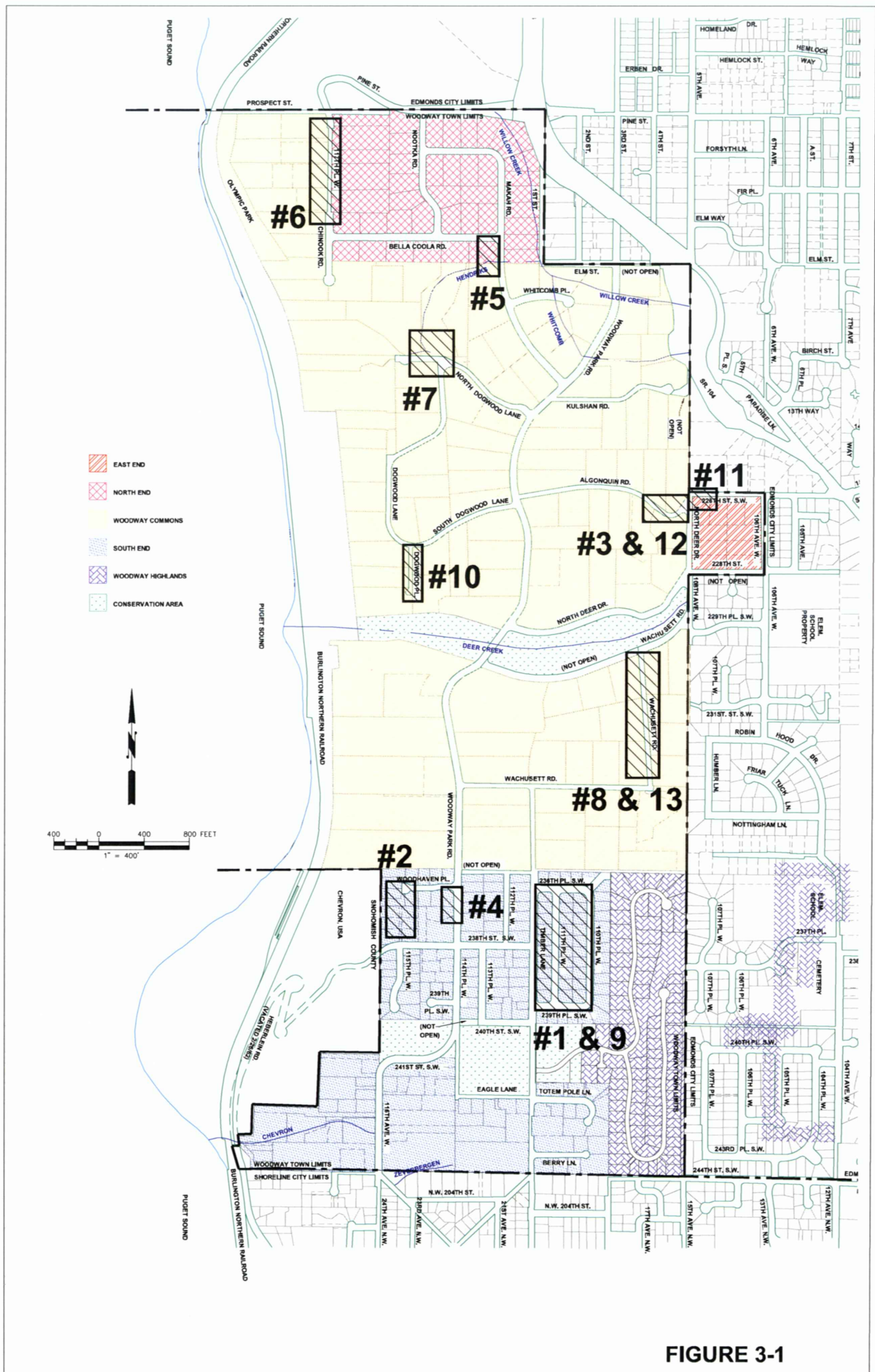


FIGURE 3-1

Chapter 4

Financial Analysis and Utility Formation

4.1 Introduction

As part of its comprehensive planning process, the Town of Woodway requested that HDR identify various stormwater funding sources for both operations and capital. This included the option of establishing a stormwater utility. A 6-year financial plan was developed for stormwater activities and the projected capital improvements described in Chapter 3.

This chapter describes the methodology used to establish the financial plan, presents various funding options, and provides stormwater rate options, should the Town decide to establish a utility for funding stormwater activities.

The financial plan begins by identifying the costs associated with operating, maintenance, and administrative stormwater related activities. Next, the capital costs described in the previous chapter are allocated to the year of design and construction. The next step includes identifying the maximum amount of capital funding sources outside of rate revenue in order to minimize the impact on rates that capital projects typically have. When the total revenue needed each year is known from the financial plan, (the annual revenue requirement) this amount is divided by the total available billing units to determine the rate needed to cover all identified costs. This is the methodology followed to develop the Town's financial plan. Each step is described in more detail in the following sections.

Following submittal of the draft Stormwater Comprehensive Plan, Town staff discussed the appropriateness of some of the recommendations and funding sources within the draft plan's financial section. Subsequently, several adjustments to the financial plan were requested. In particular, the outside capital funding sources were significantly reduced. These changes are reflected in the first sections within this chapter as Option 1 costs. Option 1 is referred to as the "Rates and Reserves" option. The sections following this discussion present the initial financial plan that was developed for the Town, or option 2. Option 2 is referred to as "Additional Capital Funding Sources". By providing both financial plans to the Town, the Town's Council has a range of options and information to use in developing their decisions regarding funding of stormwater related activities within the Town.

4.2 Development of the Financial Plan/Revenue Requirements

The intent of the financial plan is to provide the Town with information for determining the operating and capital expenditures required to meet stormwater needs over the next 6 years. In developing the financial plans, fund balance and reserve levels were also analyzed. The financial plans review the projected potential revenue sources and stormwater expenses from 2006 through 2011.

The Town has had a ten-year financial forecasting model for several years. The Town's 2006 budget from the forecasting model (dated April 2005), was used as the basis for the

determining the stormwater system's anticipated operating expenses. These expenses were used to determine the level of rates necessary to fund ongoing operations and maintenance, and to fund the prioritized capital projects identified within this report. Revenues and expenses were escalated for future years by estimating inflation and growth, as described below.

4.2.1 Identification of Stormwater Operating Expenses

A review of the Town's street budget was conducted. The street budget currently contains stormwater related expenses. In addition, the Public Works staff members tracked their stormwater activities for a period of 4 months, from January to April 2005. These data were used to estimate annual stormwater maintenance activities and expenses.

Using the 2006 street budget as a starting point, expenses were categorized into three major subsections:

- Administration
- Maintenance
- Construction

In reviewing the street fund budget, items that are solely for the purpose of stormwater, such as catch basin cleaning, were included in their entirety. Catch basin cleaning is budgeted at \$5,600 for 2006. Other expense items, such as small tools and minor equipment, clothing allowance, travel and training, telephone, supplies, etc. were included at 15 percent of the 2006 street fund budget line items. This level of effort for stormwater was arrived at through discussions with the Town's Mayor, Public Works Director and Administrative Project Manager.

Based on the hours staff allocated to stormwater maintenance activities for January through April, "wet" and "dry" month activities were determined. The activities were similar (street sweeping and trimming ditch vegetation) on a monthly basis, with the exception that in the wet months, there was also storm response activity. Additional costs, such as those for equipment, were determined from the expense tracking provided by staff members. Equipment costs were developed from data in the Town's budget forecasting model. "Wet" quarters totaled approximately \$1,200 while "dry" quarters' expenses totaled approximately \$800. Together this totals about \$4,000 in labor, equipment and miscellaneous expenses for stormwater related work. The direct stormwater estimated operating and maintenance (O&M) expenses in 2006 are projected to total approximately \$15,600, including all of the expenses described above.

Overhead and indirect costs associated with indirect internal services provided to stormwater activities also needed to be included. The direct stormwater estimated O&M expenses in 2006 equate to approximately 2 percent of the current expense fund (general fund) and the street fund budget, less the stormwater related expenses. Therefore, 2 percent of related general governmental expenses (payroll, accounting, engineering, planning) were allocated to the administrative expenses of the stormwater system. These indirect administrative service expenses average \$6,100 annually through 2011. The direct and indirect expenses together total an estimate of \$21,700 for operations, maintenance and administration in 2006.

Annual escalation factors were applied to the 2006 estimated costs to develop projected costs. Escalation factors range from employee health benefits at an annual increase of 15 percent, to miscellaneous items, materials, and supplies at 2 percent. Labor was escalated at 3 percent per year. Detailed escalation factors are provided in Appendix C, accompanied by a copy of the financial plan. The only other program cost increase through this projected time period will take place in 2010 when the Town will have the responsibility to maintain 70 catch basins and a stormwater vault from the Woodway Highlands. This is anticipated to increase the line item used to pay Snohomish County for these services by \$1,400. The information regarding this increased cost came about after the rate model and draft financial sections were completed. Therefore, these costs are only included in the new financial plan, Option 1, developed for the Town. For Option 2, this increase in O&M expenses could result in roughly a 2.3% rate adjustment. The Town will determine if there is a need for an adjustment sometime in 2009. No other cost increases, above the 2006 figures, were assumed as part of the projected costs. O&M expenses ranged from \$21,700 in 2006 to \$26,000 in 2011 for the Town's Option 1 financial plan.

4.2.2 Tax and Transfer Payments

Should the Town establish a stormwater utility, it will be required to pay state and town tax obligations in the form of excise taxes. The state public utility tax for stormwater utilities is 1.5 percent of gross stormwater utility rate revenues. For 2006 these tax payments average approximately \$1,840 in the Option 1 plan and average \$670 annually in the Option 2 financial plan. The difference is due to larger rate revenues derived in the Option 1 plan. Projected taxes for the period assume constant tax rates over time. Additionally, the Town may choose to implement a utility tax once the utility is established.

There are no known transfer payments for the stormwater utility at this time, aside from the indirect cost allocations previously discussed.

4.2.3 Capital Improvement Funding

The capital costs presented in Table 3-2 were allocated to the various years projected for construction. The project costs provided in Chapter 3 are in 2005 dollars. Those costs were increased for inflation to the projected year of construction, assuming a 3-percent inflationary increase in each year. The Town's projects are primarily replacement projects, or projects that address existing flooding problems. Table 4-1 presents the capital improvement projects in their projected year of construction. This is the area where the two financial plans diverge. The remainder of the text in this section will describe the revised financial plan, Option 1 funding assumptions, based on the Town's revised input. For purposes of clarity, Option 1 is referred to as the Rates and Reserves option because those are the primary sources of funding the Town chooses to use for capital projects. The Town has a long standing policy of trying to pay for large items without incurring debt, or use the pay as go approach.

The Option 2 funding plan, which was presented in the Town's Draft Comprehensive Stormwater Plan, is presented beginning with Section 4.5 as an alternative scenario, where consideration to additional funding sources was given in order to minimize the impact on rates from capital projects. However, those additional funding sources include low-interest loans and debt service.

Table 4-1. Capital Improvement Funding Plan for Option 1

Capital Projects	2006	2007	2008	2009	2010	2011
Mower replacement portion	\$2,000	\$0	\$0	\$0	\$0	\$0
Twin Maples, Phase 1	51,580	0	0	0	0	0
Woodhaven, Alt. 3	103,248	0	0	0	0	0
North Deer & Alogonquin, Phase 1	0	29,367	0	0	0	0
Woodway Park Road, Alt. 1	0	60,296	0	0	0	0
Makah Alternative 2	0	0	49,322	0	0	0
Chinook Rd. Alt. 1	0	0	47,035	0	0	0
North Dogwood, Alt. 3	0	0	0	50,865	0	0
Washusett, Phase 1	0	0	0	56,651	0	0
Twin Maples, Phase 2	0	0	0	0	183,853	47,342
South Dogwood - Alt. 1	0	0	0	0	0	32,579
Private Drive 10724 226th SW	0	0	0	0	0	28,188
Other	0	0	0	0	0	0
To Cash Reserve	0	0	0	0	0	0
Total Capital Outlays	\$156,829	\$89,663	\$96,358	\$107,516	\$183,853	\$108,109
Less: Other Funding Sources						
General Fund	\$0	\$0	\$0	\$0	\$0	\$0
Utility Reserve	0	0	0	0	0	0
Capital Facilities Reserve	50,000	0	0	0	0	0
PWTF Loans	0	0	0	0	0	0
Bonding (Revenue)	0	0	0	0	0	0
Stormwater Connection Charges	0	3,216	3,216	3,313	3,409	3,506
Stormwater Capital Reserve	30,909	10,927	11,255	11,593	11,941	12,299
Total Other Funding Sources	\$80,909	\$14,143	\$14,471	\$14,906	\$15,350	\$15,805
Total Capital From Rates Expense	\$75,920	\$75,520	\$81,886	\$92,611	\$168,502	\$92,304

The Town has planned for capital needs by programming funds in a reserve called the Capital Facilities Reserve Fund within the Town's financial forecasting model. In fact, the Town's elected officials have set aside a portion of these funds specifically for stormwater projects. As can be seen in Table 4-1, the funding sources for the projects include \$50,000 from the capital facilities reserve fund in 2006 for the Twin Maples project. In the last line of Table 4-1, the funding of capital from rates fluctuates with each year, depending on the total capital projects planned within that year. The funding of capital from rates has a direct impact on the level of rates. If the Town commits to using reserve for projects in future years, this will aid in reducing the level of rates needed.

For future projects, the specifics of capital funding sources will be determined by the Town on a project by project basis as the projects are implemented. This may include use of reserves, general fund, or deferring projects when these other sources are not available. Otherwise, as noted in Option 2 below, there may be the possibility of considering outside funding sources.

An important aspect in developing the capital portion of the financial plan is to include a funding component for renewal and replacement projects. The minimum funding level used within the industry¹ for this type of capital is annual depreciation expense. Depreciation is used as a benchmark for funding capital projects to reflect the value of the depreciated facilities. This is a measure the Town should target and determine once the utility is established.

¹ The American Water Works Association, which addresses water, wastewater and stormwater rate related issues along with all engineering and regulatory issues related to these utilities, has established many industry standards through publication of the M1 through M26 Rate-setting manuals to assist professionals in the field in following uniform and generally accepted rate setting principles and methodologies when determining cost-based, equitable rates and charges for utility services.

As described above, capital funding from rates for projects fluctuates each year, with depending on the capital expenses of that year. The average level of capital funding from rates in Option 1 is 80 percent of the average annual capital expenditures, or an average of \$98,000. This is a healthy level for funding of renewals and replacements.

4.2.4 Debt Service for Option 1

There is currently one outstanding debt obligation for the Town's stormwater system: a PWTF loan to pay for the planning effort involved in developing this plan. The repayment of the loan totals \$17,000 per year for 6 years. Funds were set aside in the utility reserve fund for these repayments. Therefore, this expense does not come from rate revenue and does not impact proposed rate calculations. The final payment for this planning loan is 2011. Therefore, just outside the planning horizon for this financial plan, the revenue and expense for this loan will no longer appear within the Town's financial forecasting model for stormwater activities. No other debt obligations are included in the Option 1 financial plan.

4.3 Summary of the Financial Plan for Option 1 – Rates and Reserves

Table 4-2 provides a summary of expenses for the proposed stormwater utility, as developed in the revised financial plan, Option 1 – Rates and Reserves. This is an abbreviated summary of the detailed analysis, which is provided in Appendix C, as Option 1.

Table 4-2. Projected Stormwater Utility Expenses, 2006 through 2011 – Option 1: Rates and Reserves

	2006	2007	2008	2009	2010	2011
SOURCES OF REVENUE						
Projected Rate Revenues	\$122,371	\$122,983	\$123,597	\$124,215	\$124,836	\$125,461
Miscellaneous Revenues (Utility Reserve)	17,250	17,253	17,255	17,258	17,020	17,050
TOTAL REVENUE SOURCES	\$139,621	\$140,235	\$140,852	\$141,473	\$141,856	\$142,511
EXPENSES						
O&M EXPENSE						
Operating and Maintenance	\$15,620	\$16,080	\$16,567	\$17,082	\$19,029	\$19,639
Administrative Allocation	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377
TOTAL O&M EXPENSE	\$21,699	\$21,971	\$22,575	\$23,211	\$25,280	\$26,016
TOTAL TAX EXPENSE	\$1,836	\$1,845	\$1,854	\$1,863	\$1,873	\$1,882
TOTAL CIP FROM RATES EXPENSE	\$75,920	\$75,520	\$81,886	\$92,611	\$168,502	\$92,304
DEBT SERVICE EXPENSE	\$17,000	\$17,000	\$17,000	\$17,000	\$17,000	\$17,000
FUNDING OPERATING RESERVE	\$380	\$380	\$380	\$380	\$380	\$380
TOTAL EXPENSES	\$116,834	\$116,715	\$123,695	\$135,064	\$213,034	\$137,581
Balance/(Deficiency)	\$22,787	\$23,520	\$17,157	\$6,409	(\$71,178)	\$4,930

At the Town's request, this financial plan assumes a rate that is set for the entire planning period, through 2011. Rate revenue is explained in the following section. Again, it should be noted that the \$17,000 per year in miscellaneous revenue pays for the planning loan payments of \$17,000 per year through 2011. At that time the loan will be paid in full. The

expense and revenue are shown in the financial plan simply to show the entire financial picture of stormwater management in one place.

Table 4-2 summarizes all stormwater O&M and capital expenses that were previously described. The operations and maintenance expense includes the estimated labor and equipment expense based on the actual work tracked in the first 4 months of 2005. It also includes the Snohomish County costs for cleaning catch basins and the 15 percent of other street fund line items for work related to storm drainage work. These costs range from \$15,600 in 2006 to \$18,200 in 2011. The administrative allocation expense includes the 2% of costs allocated due to internal service to the stormwater utility from other areas in the Town's government. The taxes show the 1.5% excise tax that is due to the state.

The next portion of Table 4-2 addresses capital costs. The rate funded portion of the capital plan, as presented in Table 4-1 is shown. Finally, the total debt expense is displayed. This includes the debt payments described above. The total revenue requirements add all the projected utility expenses together. When the expenses are subtracted from the available revenue sources, the net balance or deficiency of funds is derived.

For most years of the planning period, there is a balance. In years when the balance exists, those funds are added to the stormwater utility O&M reserve. In 2010 when there is a large deficit, due to greater capital costs, those reserve funds from the previous years cover the deficit.

It is important to note that the financial plan presented in this section is predicated upon an assumed level of growth of the system (1 percent per year). Should this growth increase, slow down, or not occur, the level of rates may be impacted.

4.3.1 Utility Reserves

A key indicator of financial health and viability is a utility's reserve levels. There are two reserves essential for prudent management of a financially stable utility. One is an operating reserve, the other is a capital reserve. A reasonable reserve balance for an operating reserve for a utility that is receiving rate revenue once every 6 months would range between 90 days and 180 days. For the Town, the minimum target balance suggested is 120 days. This equates to approximately \$5,100 in the first half of the review period, and increases to \$6,500 by 2011 for Option 1. With the projected stormwater rate, the Town is projected to be slightly deficient in 2010 and 2011 in meeting this reserve level. This is due to the additional cost of O&M on Woodway Highlands facilities in those years.

A capital reserve is important in minimizing the fluctuations that capital projects place on a utility. The Town has established reserve funds for capital needs. Because the utility is not yet established, the capital reserve has been established at \$10,000 per year, escalating at 3% per year. Within the capital portion of the plan, these funds were applied each year to capital expenses. As the utility matures, it will be important to establish a separate stormwater utility capital reserve, along with a target a minimum balance. The industry² recommended level for utility capital reserves is the average annual capital expenditure from the 6-year capital improvement plan (CIP). This level of reserve provides a buffer for years

² The American Water Works Association, which addresses water, wastewater and stormwater rate related issues along with all engineering and regulatory issues related to these utilities, has established many industry standards through publication of the M1 through M26 Rate-setting manuals to assist professionals in the field in following uniform and generally accepted rate setting principles and methodologies when determining cost-based, equitable rates and charges for utility services.

when there are more than the average capital expenses, and helps avoid the peaks and valleys of rate-funded capital. In years when capital expenses are lower than available funding, the reserve should be replenished and developed to a level close to \$120,000. In Option 1, the Town is deficient in meeting these recommended reserve levels through the planning period, ranging from \$60,000 to \$120,000 deficient.

4.4 Review of Rate Alternatives

Of the possible funding sources for operating and capital expenses, utility rates are the most obvious. A variety of options are available for designing appropriate stormwater rates. These options are described below.

4.4.1 Rate Design Options

There are numerous options to consider when developing rates for stormwater utilities. Given limited staff time and resources, keeping the rate easy to administer and understand is key, along with adequately funding all stormwater activities.

Flat Monthly Rate

The simplest approach to developing rates is to divide the total revenue requirement by the total number of customers and calculate a flat monthly or annual charge. While there are obvious administrative advantages to this type of charge, it is not as equitable as other rate designs.

Many larger utilities conduct a comprehensive rate study to determine allocation of costs to the various customer classes. Because the Town's customer base is single-family residential, that customer class was the focus of the rate analysis. The most common rate option implemented by larger utilities is a flat monthly charge for single-family residential customers. This charge is based on a calculated average impervious area, or an equivalent residential unit (ERU). This unit is then applied to other non-residential customers as well to determine the number of ERUs on their property. While this approach works for most large utilities that also have a major commercial base, it may not be appropriate for Woodway. The flat monthly rate also does not generate adequate revenue for capital projects over time.

Tiered Impervious Rates

For implementing rates, many stormwater utilities around Puget Sound have established tiers based on impervious impacts. This was done primarily in the early 1990s when stormwater utilities were fairly new and specific impervious data were not as readily available, especially for commercial customer classes. There are variations on these types of rates that can be used to develop a more sophisticated rate that applies runoff coefficients for various types of land use. These rate structures generally have larger billing system requirements, including more setup and monitoring. This is not a necessary approach for Woodway, because the customer base is almost uniformly single-family residential.

Another variation on this type of rate can include dividing the service area into distinct drainage basins and allocating costs to those who benefit from the services. Again, this

requires a more extensive and comprehensive rate study and analysis. It also is not necessary when there is essentially one uniform customer class.

Impervious Rates

Rates that are based on impervious area to some degree are more equitable and cost-based. Customers have varying levels of impervious area, and thus varying impacts on the system. Should a large residential property with 20,000-square-feet of tennis court, swimming pool, and other impervious areas pay the same as a small residential lot with 5,500-square-feet of roof, driveway, and walkway impervious areas? It would not be equitable, and would penalize the smaller lot customers. Additionally, rates based on impervious surfaces also provide modest incentives for property owners to reduce planned or existing impervious surfaces. Flat rates do not.

Because the Town has invested time and resources into gathering information about the impervious area by parcel number, the data is available to develop rates based on impervious area per customer (or parcel). For the Option 1 financial plan, a rate of \$0.039 per square foot was determined by dividing the annual net revenue requirements by the total billable impervious square feet. The annual rates were averaged to determine a rate that would provide adequate revenue for operations and capital throughout the planning period, through 2011, as requested by the Town.

A 5,500-square-foot lot with an average of 40-percent impervious area will result in an annual bill of \$85.55. For a larger property with numerous impervious areas (10,800 square feet) the annual bill will be \$420.00 per year, or \$35.00 per month. There is a total of 3,137,800 square feet of impervious area in the Town's database. These are billable impervious square feet including impervious areas of individual properties such as structures (homes and ancillary buildings), driveways and other impervious surfaces. Other impervious areas include items such as patios, tennis courts and swimming pools. The total billable impervious area times the Option 1 rate of \$0.039 per square foot of impervious area will generate an estimated \$122,000 in revenue in 2006 and grow to \$125,000 by 2011, due to growth.

4.4.2 Rate Credits

Some communities adopt credit systems to reduce rates for developers and customers who construct public facilities that meet current stormwater regulations. (Credits for private facilities are inappropriate.) Town staff considered recommending a rate credit system, particularly to recognize the substantial investment in public stormwater facilities by the developers and customers in the Woodway Highlands subdivision.

Two arguments against adopting a rate credit system were presented:

- Every subdivision has met or will be required to meet requirements that are current when the subdivision is filed. Creating rate credits would provide a variable patchwork of credits that would be confusing and inequitable.
- The Town is required to maintain the entire public system in perpetuity for the benefit of everyone. Rate credits would provide discounts to selected property owners. Any credit given to some customers must be made up by other customers. All residents should pay their fair share of community-wide maintenance costs.

4.4.3 Implementation of Impervious Rates

The Town directed HDR to develop a rate that will be adequate for the entire planning period. For Option 1, the rate determined to fund operations and capital for the 2006 to 2011 time period is \$0.039 per square foot.

There is an additional amount of impervious area within the Town's database that is not associated with parcel numbers. This amount totals 235,000 of additional impervious square feet. These areas were listed as driveways within the database. Once the Town has determined the parcel number for these areas, they will produce an additional \$9,000 per year. This revenue was not included in the financial plan as it is assumed that this effort will take some time to research and correct.

As part of this analysis it was also assumed that the Town will contract with the County to administer the billing through existing property tax administration. The Town should perform some auditing of tax receipts to verify that properties along Town boundaries are receipted to Woodway so that the stormwater revenue will be received. By contracting with the County, the Town avoids the need to start an entirely new billing system, saves on postage costs, and reduces the number of customer service calls related to monthly bills, etc. One potential disadvantage to using the property tax bills for assessing stormwater fees is that any properties within the Town's boundaries that are exempt from property taxes will not receive the stormwater bill. However, the Town has determined that there are not many tax exempt properties within the Town's limits. The Town needs to provide the billing information to the County by November of the year before the rates will be implemented. The County requires that time in order to program the fees onto the property tax records and statements.

4.4.4 Summary of Option 1 Financial Plan and Rates

The previous sections described the projected revenues, expenses and rates, as determined for the revised financial plan developed for the Town, Option 1. The projected rate of \$0.039 per impervious square foot will generate adequate revenue for the Town to fund the capital projects primarily through rates and reserves. To the degree that the Town Council allocates reserves or other Town resources to funding the stormwater capital projects, the rate can be reduced.

The first financial plan developed for the Town did look at other funding sources for the projected capital projects as a way of moderating the rate impacts caused by capital improvements. This financial plan was presented within the Town's Draft Comprehensive Stormwater Plan, and is presented below as Option 2 – Additional Capital Funding Sources. This alternative plan provides the Town Council with additional information for consideration as they determine what rate level to implement in order to fund stormwater activities and capital projects.

Because the O&M expenses are the same for both options, except as noted within the tax discussion in Section 4.2.2, Option 2's discussion begins with the capital projects and evaluation of additional capital funding sources.

4.5 Option 2 – Evaluation of Additional Capital Funding

Table 4-3 presents the same capital improvement projects expenses as presented for Option 1 in Table 4-1. However, there were additional outside funding sources assumed for the capital projects in developing the Option 2 financial plan. These are presented and discussed below.

Table 4-3. Capital Improvement Funding Plan for Option 2

Capital Projects	2006	2007	2008	2009	2010	2011
Mower replacement portion	\$2,000	\$0	\$0	\$0	\$0	\$0
Twin Maples, Phase 1	51,580	0	0	0	0	0
Woodhaven, Alt. 3	103,248	0	0	0	0	0
North Deer & Alogonquin, Phase 1	0	29,367	0	0	0	0
Woodway Park Road, Alt. 1	0	60,296	0	0	0	0
Makah Alternative 2	0	0	49,322	0	0	0
Chinook Rd. Alt. 1	0	0	47,035	0	0	0
North Dogwood, Alt. 3	0	0	0	50,865	0	0
Washusett, Phase 1	0	0	0	56,651	0	0
Twin Maples, Phase 2	0	0	0	0	183,853	47,342
South Dogwood - Alt. 1	0	0	0	0	0	32,579
Private Drive 10724 226th SW	0	0	0	0	0	28,188
Other	0	0	0	0	0	0
To Cash Reserve	0	0	0	0	0	0
Total Capital Outlays	\$156,829	\$89,663	\$96,358	\$107,516	\$183,853	\$108,109
Less: Other Funding Sources						
General Fund	\$0	\$0	\$0	\$0	\$0	\$0
Utility Reserve	0	0	0	0	0	0
Capital Facilities Reserve	50,000	51,489	82,989	93,263	46,901	96,337
PWTF Loans	85,000	25,000	0	0	125,000	0
Bonding (Revenue)	0	0	0	0	0	0
Stormwater Connection Charges	0	3,216	3,216	3,313	3,409	3,506
Stormwater Capital Reserve	12,000	0	0	0	0	0
Total Other Funding Sources	\$147,000	\$79,705	\$86,205	\$96,576	\$175,310	\$99,843
Total Capital From Rates Expense	\$9,829	\$9,958	\$10,153	\$10,940	\$8,543	\$8,266

As noted above, the Town has planned for capital needs by programming funds in a reserve called the Capital Facilities Reserve Fund within the forecasting model. In fact, the Town's elected officials have set aside a portion of these funds specifically for stormwater projects. As can be seen in Table 4-3, the assumed funding sources for the projects include a total of \$420,000 from the capital facilities reserve fund; and \$235,000 in Public Works Trust Fund (PWTF) loans. As described below, these funding sources must be confirmed, or adjusted, as necessary. The Town has indicated that the reserve funding is allocated on an annual basis, based on the highest priorities facing the Town. If the capital facilities reserve funds that have been assumed above are not available, the assumption is that the general funds will continue to fund larger capital projects such as those listed in Table 4-1. Otherwise, projects will need to be deferred or other outside funding sources will need to be identified, such as various borrowing options as described below.

When developing utility financial plans, a prudent first step is to determine if there are outside funding sources available to fund capital costs. Outside funding sources help to reduce the dollar for dollar impact of financing capital projects from rates. Other financing options also help to levelize the variations that occur with CIPs, where each year there can be a different amount of expenditure required. Debt financing has the advantage of spreading the impact over future years, where new customers coming into the system will also help repay these costs.

PWTF low-interest loans are an attractive way to debt finance projects with the least impact to customers over the years. The following projects may be eligible for PWTF loans based on project descriptions in the draft comprehensive plan:

- Woodhaven
- Woodway Park Road
- Twin Maples, Phase 2

These projects appear to have a replacement component, which is the intent of the PWTF program. PWTF loans are attractive because they are available at an interest rate of 0.5 percent if 15 percent of the project cost is matched, or 2.0 percent if 5 percent is matched. The assumptions within the financial plan were that the Town will match 30 percent or more, thus achieving the lowest interest rate. These loans are described in more detail below. However, if the Town is not successful in obtaining a loan, funding from the general fund, capital facilities reserves, or bond funding will be necessary. If bond funding is used, increased rates will be necessary to cover the higher interest rate, higher debt service, and to meet debt service coverage requirements.

As noted in the Option 1 discussion, another important aspect in developing the capital portion of the financial plan is to include a component for renewal and replacement projects. The minimum funding level used within the industry for this type of capital is annual depreciation expense. This can be identified by the Town once the utility has been established.

For Option2, the capital funding from rates was balanced in order for the overall test period stormwater rate to be reasonable. In the latter years of the review period, less funding of capital projects is provided through rates as the debt service increases along with increasing inflationary pressures. Therefore, by 2010 the Town should increase funding of capital from rates by \$2,500, and by \$3,000 in 2011. These additional funding amounts will require an additional 5-percent increase of the projected beginning rate level. One option is to implement rate adjustments of approximately 2.0 percent per year beginning in 2009 to generate additional capital funding from rates. This approach would level out the adjustments, and keep the adjustments closer to cost-of-living adjustment levels.

If the Town later determines that capital improvement projects other than those listed in Chapter 3 are required, or if the funding options change substantially from those outlined in the financial plan, the Town may need to consider finding other funding sources, including additional debt and rate adjustments to meet debt payments. Other possible funding sources are further described below.

4.5.1.1 External Sources of Funds for Capital Projects

The Town has the ability to apply for grant and low-interest loan funds that are available to public entities for stormwater system projects. Table 4-4 provides a summary of the contacts for various funding agencies. These sources rarely provide full funding for a construction project. The Town will need to supplement these funds with other funding sources to ensure implementation of the recommended capital improvement projects.

Table 4-4. Funding Agency Contacts, Town of Woodway

Program	Address	Phone	FAX	Internet
Centennial Clean Water Fund	Department of Ecology P.O. Box 47600 Olympia, WA 98504-7600	(360) 407-6566	(360) 407-6426	www.ecy.wa.gov
Public Works Trust Fund	Public Works Board P.O. Box 48319 Olympia, WA 98504-8319	(360) 586-7186	(360) 664-3029	www.pwb.wa.gov
Infrastructure Database (over 200 funding programs)	Infrastructure Assistance Coordinating Council (IACC)	(360) 725-5002		www.infrafunding.wa.gov

Department of Ecology

The Centennial Clean Water Fund (CCWF) is available to local governments and tribes for measures that prevent and control water pollution. Both grants and loans are available on a yearly funding cycle.

CCWF is the largest state grant program for water projects. It provides grants for planning, design, and construction of facilities and other activities related to water quality. In 1996 CCWF changed its application process and eligibility criteria. The primary focus of the program is pollution prevention and funding projects with a quantifiable water quality benefit. Interest rates are 0.5 percent for loans with durations up to 5 years, while those with durations over 5 years but less than 20 years have a 1.5-percent rate. Grant funding of 50 to 75 percent of a project is available depending on the type of project. These grants are highly competitive. The evaluation criteria must be considered in determining if a project would score highly enough to be successful.

Funding from this program is not available to provide excess capacity; the funding must be used to meet existing residential needs.

Public Works Trust Fund

The PWTF loan program was set up by the Legislature to assist cities, towns, counties, or special districts with funding for different types of public works projects. Projects can include streets, roads, drainage systems, water systems, and sanitary sewer systems. For stormwater utilities, the allocated funds are for replacing and/or repairing systems that serve an existing population. Funds are not allocated for installing new systems.

The loans are issued at up to a 2-percent interest rate for a maximum term of 20 years for applications requesting 95 percent project funding. The interest rate decreases to 0.5 percent when municipalities provide at least 15 percent of the project funding. Debt service coverage is not imposed on the PWTF loan.

Infrastructure Assistance Coordinating Council

Funding for various aspects of stormwater utility capital projects is available from numerous other programs. The Infrastructure Assistance Coordinating Council (Council) provides resources and conferences on available funding sources. This Council is comprised of federal, state and local organizations whose function is to provide funding for infrastructure repair and development. The purpose of the Council is to assist local governments in coordinating funding efforts for infrastructure improvements. This is an important resource, as the Council is aware of any new funding opportunities that arise.

While the above list of possible grant and loan opportunities for the Town is not exhaustive, it does highlight the most probable outside funding sources available to the Town for its stormwater capital improvement needs, excluding revenue bonds.

Other funding sources available to offset capital costs include contributions received from new stormwater connections, existing reserves, and new revenue bond proceeds.

4.5.1.2 Internal Sources of Funds

The previous section discussed external sources of funds. The Town can also consider adjustments to existing service fees for plan review and inspection. Currently these funds go directly to consultants providing these services. The Town should review these fees at least once every 3 to 5 years to ensure that the fees are cost-based and that they provide full cost recovery.

To maximize a growth-related revenue source, connection charges to the utility should be developed while the Town is still experiencing and projecting growth. As shown in Tables 4-1 and 4-3, the capital funding plans assumed that a connection fee will be developed and implemented by 2007. The fees assumed a charge of approximately \$680 and about five new connections per year (at 1 percent growth). These fees are authorized by specific legislative authority and follow a prescriptive process in determining the exact fee. The Town will need to follow this prescriptive process before implementing a fee.

4.5.2 Debt Service for Option 2

There is currently the one outstanding debt obligation for the Town's stormwater system as noted in the Option 1 discussion; a PWTF loan to pay for the planning effort involved in developing this plan. The repayment of the loan totals \$17,000 per year for 6 years.

For Option 2, the Town will require additional loans in the future to meet the capital needs identified earlier in this plan. As described above, it is projected that this need will be covered through PWTF loans. If the Town is unsuccessful in obtaining these low-interest loans, either general fund, reserve funding, or a bond issue would be needed.

The combined debt service on the existing and future projected debt averages approximately \$25,000 between 2006 and 2011.

Meeting debt service coverage requirements would be necessary if the Town issues a revenue bond, rather than receiving a PWTF loan. Debt service coverage is a financial measurement of an entity's ability to repay debt. A debt service coverage ratio compares net income before debt service payments to the total debt service on revenue bonds. An

industry target ratio for debt service coverage ranges from 1.30 to 1.50. However, these targets are specified within each bond covenant. Revenue bond funding might not be a practical funding alternative given the small size of the issue. If outside funding is needed, other funding sources for short-term financing may be more appropriate, such as a line of credit or bank loan.

4.6 Summary of the Option 2 Financial Plan

Table 4-5 provides a summary of expenses for the Option 2 financial plan of the proposed stormwater utility. This is an abbreviated summary of the detailed analysis for Option 2, which is provided in Appendix C.

Table 4-5. Projected Option 2 Stormwater Utility Expenses, 2006 through 2011

	2006	2007	2008	2009	2010	2011
SOURCES OF REVENUE						
Projected Rate Revenues	\$43,754	\$44,192	\$44,634	\$45,080	\$45,531	\$45,986
Miscellaneous Revenues (Utility Reserve)	17,250	17,255	17,263	17,271	17,279	17,287
TOTAL SOURCES OF REVENUE	\$61,004	\$61,447	\$61,896	\$62,351	\$62,810	\$63,273
O&M EXPENSE						
Operating and Maintenance	\$15,620	\$16,080	\$16,567	\$17,082	\$17,629	\$18,211
Administrative Allocation	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377
TOTAL O&M EXPENSE	\$21,699	\$21,971	\$22,575	\$23,211	\$23,880	\$24,588
TOTAL TAX EXPENSE	\$656	\$663	\$670	\$676	\$683	\$690
TOTAL CIP FROM RATES EXPENSE	\$9,829	\$9,958	\$10,153	\$10,940	\$8,543	\$8,266
DEBT SERVICE EXPENSE	\$21,477	\$22,793	\$22,793	\$22,793	\$29,377	\$29,377
TOTAL EXPENSES (REVENUE REQUIREMEN	\$53,661	\$55,385	\$56,191	\$57,621	\$62,482	\$62,920
Balance/(Deficiency) Before Added Taxes	\$7,344	\$6,061	\$5,706	\$4,730	\$327	\$353

This financial plan assumes a certain level of rate revenue, which is explained at the end of this chapter. There is also \$17,000 per year in miscellaneous revenue that transfers from the utility reserve fund to pay the PWTF planning loan for 6-years

Table 4-5 summarizes the expenses that were previously described in the O&M sections for Option 1.

The next portion of Table 4-5 addresses capital costs. The total capital plan is summarized, less the other funding sources. The balance is the capital portion that is funded from rates. Finally, the total debt expense is displayed. This includes the debt payments described in Section 4.5.2. The total revenue requirements add all the projected utility expenses together. When the expenses are subtracted from the available revenue sources, the net balance or deficiency of funds is derived.

It is important to note that the financial plan presented in this section is predicated upon an assumed level of growth of the system (1 percent per year). Should this growth increase, slow down, or not occur, the level of rate adjustment required will be impacted.

The Town desired to adopt a rate that would fund these stormwater management services for the planning period, without the need to adjust rates. This causes there to be a balance in

revenue in the beginning of the planning period. This balance is added into the operating reserve to build toward the minimum target. In the latter years there is only a slight balance.

In Option 2, the utility is better able to achieve the minimum target balances of the operating and capital reserves. The target balances between both reserves are deficient through the review period by \$100,000 in 2006 and reduce to a deficiency of \$30,000 below the minimum targets by 2011. Therefore, the utility's stability increases as more years of revenue generation occur.

4.7 Review of Rates for Option 2

The same rate options as described for Option 1 are available. Since the Town invested time and resources into gathering information about the impervious area by parcel number, the data is available to develop rates based on impervious area per customer (or parcel). A rate of \$0.014 per square foot of impervious area was determined by dividing the net revenue requirements by the total billable impervious square feet.

A 5,500-square-foot lot with an average of 40-percent impervious area will result in an annual bill of \$30.80. For a larger property with numerous impervious areas (10,800 square feet) the annual bill will be \$151.20 per year. There is a total of 3,137,800 square feet of impervious area in the Town's database. These are billable impervious square feet including impervious areas of individual properties such as structures (homes and ancillary buildings), driveways and other impervious surfaces. Other impervious areas include items such as patios, tennis courts and swimming pools. The total billable impervious area times the rate of \$0.014 per square foot of impervious will generate an estimated \$43,900 in revenue in 2006 and increase to \$46,000 by 2011, due to growth.

4.8 Summary of the Town's Financial Plan Options

For funding the stormwater activities that the Town plans to undertake, implementing a cost-based and equitable rate is a reasonable approach. Options 1 and 2 give the Town's Council a rate range of \$0.014 per square foot of impervious area for Option 2 to \$0.039 for Option 1. Option 1 allows the Town to continue to fund capital projects without incurring debt, while creating higher rates for customers. Option 2 assumes a modest amount of debt in order to accomplish the capital improvements with less impact on rates. Both options were based on accounting data provided by the Town and were developed using generally accepted accounting and rate-setting principles. Once the rate and utility connection charges are implemented, these funds and other outside sources should adequately fund the operations, maintenance, and capital projects outlined in this comprehensive stormwater plan. The details of both options are contained in Appendix C.

Memo

To: Stormwater Planning Committee
From: Randall Burns
Date: August 23, 2005
Re: 1/11/05 meeting with Joe Malinowski

Present: Joe Malinowski, Beth Peterson (HDR), Randall Burns (Town of Woodway)

The meeting began at 1:00 PM at the office of HDR.

The purpose of the meeting was to learn about the Town's historic stormwater problems. Joe Malinowski is a long-time resident of Woodway and both as an employee of the Town and as a private contractor is familiar with many of the problems and solutions regarding stormwater runoff.

A lot of the drains were constructed in Town in the late 1950's, especially along Woodway Park Road. Joe remembers when there were very deep ditches along Woodway Park Road recalling that a lot of underground streams, springs and aquifers are in the area. To relieve the stormwater flows, he installed french drains and connected the ditch to Whitcomb Creek. He discussed the installation of a storm water system that carries water from 23300 Woodway Park Rd. down the bluff and through a culvert under the railroad tracks.

Joe discussed Great Northern Railroads installation of 4" drain tile in the Dogwood neighborhood to prevent damage to their tracks. He described an 18" concrete pipe that drained Dogwood Place to Deer Creek. One year over a foot of water backed up on Dogwood Place, when the water released there was considerable washout. He also describes his construction of a pond, in 1952, on the north side of the intersection of Dogwood Way and North Dogwood Lane. The storm system was modified with a baffle that diverts water west down the road away from the pond.

Conditions of the vacant property located on the east side of 116th at the town's limit were described as being very wet. Joe detailed the function a bypass in the catch basin located at this property that facilitates the diversion of the stormwater away from fish ponds on private property to facilitate cleaning.

Joe concluded that he felt that there were not a lot of problems with the drainage system throughout the Town.

Memo

To: Stormwater Planning Committee
From: Randall Burns
Date: August 23, 2005
Re: 1/13/05 meeting with Mike Jauhola

Present: Mike Jauhola (Roth Hill), Beth Peterson (HDR), Randall Burns (Town of Woodway)

The meeting began at 10:00 AM in the Woodway Town Hall Council Chamber.

The purpose of the meeting was to learn about the Town's historic stormwater problems. Mike Jauhola was the Town of Woodway's Engineer for approximately 20 years ending in 1998. Projects reviewed by Gray and Osborne include the Woodway Park Estates, King County Metro Sewer Forced Main, LID 90-1, Dogwood Sewer, including the design of the storm drain system on North Deer Drive, 116th, and numerous other projects.

Dogwood Lane and Dogwood Place have had problems for many years. Mike recalls seeing plans from the 1920's and 1930's when the railroad belonged to Great Northern showing perforated drains that drained the Dogwood Area to prevent slides on the tracks below the marine bluff. Gray & Osborne completed plans for a deeper drainage system that would create positive drainage of the area but funding was not available to complete the project. Some improvements were made by constructing the drainage ditch in the right of way adjacent 22438 Dogwood Ln.

In the Twin Maples area, there is localized flooding, made more serious because the area has a high ground water table and is served by on-site sewage disposal (septic) systems. In the area of Woodhaven and 238th, the infiltration systems are suspect. This is a cause for concern because of the proximity to the bluff and the potential for erosion problems.

Mike also recalled that when Olympic View Water and Sewer District upgraded their treatment plant, that they installed some improvements to the stormwater drainage system. Additional storm drain work was conducted by Olympic View Water and Sewer District for watershed protection purposes.



THE TOWN OF WOODWAY PUBLIC WORKS DEPARTMENT

-Memorandum-

To:	Honorable Mayor and Council Members
From:	Randall Burns, Director of Public Works
Subject:	Stormwater Questionnaire Response
Date:	February 17, 2005

Please find the attached summary of the responses we received from the residents of the town. We sent out 420 questionnaires and received 42 responses. Considering peoples' daily schedules this 10% does not seem too bad. Fortunately a fair amount of good information was gathered. Aside from the identification of specific problem areas, the identification of water quality as the priority issue gives good direction for our future efforts. It was also very pleasing to find that 6 individuals would be interested in being involved with our stormwater program.

In the attached you will find the actual questions followed by the tabulated results. I also included the specific comments received. As may be obvious from a few of the critical responses, all the comments have been included as submitted. In the cases where the respondent did not include information I identified the response as "Null" this is most notable on question number six.

A. Specific Problems

1. Does your neighborhood experience flooding problems?

9 - Yes

33 - No

If yes, where and what type of solutions are needed?

- ❖ 112th has had a long-standing problem with rainwater run-off particularly on the west side where residential damage has occurred. 112th needs to be repaved in such a manner that water will flow in a north south direction to the present stormwater system.
- ❖ Toward the end of Chinook Rd., the ditch seems to fill up quickly by the Greenberg and Widing residences
- ❖ We understand that a French drain at the west edge of 88 Woodhaven Pl. overflows. Is it a part of the storm drain that occurs at the S.W. end of the cul-de-sac?
- ❖ Common areas in Woodway Highlands are very soggy. Soil drainage is very poor.
- ❖ (no)But the street gutter on the West side going south of 112th & 238th St. Most of this water is run off from the street itself.
- ❖ Only when drain is plugged.
- ❖ Water runs down our street when it rains hard and onto our driveway. There have been occasions when the water overflows into our yard and then continues down a side embankment.
- ❖ Through yard @ 23624 Woodway Park Road. Divert water on Woodway Park Road.
- ❖ Unknown, But my home has. Water does not drain across the right of way to the sewer on the adjacent property. Install a drain in the right of way. Provide a conduit for stormwater from my property to sewer.
- ❖ August 22nd we had a major flood that flooded the entire basement, bedroom, etc. because the town's storm drain in our driveway backed up because it didn't flow correctly. (Suggestions) pump the drain and an updated drain field because the drain will not hold the entire amount of rain water. We have 2 sump pumps that couldn't handle the amount of water from the overflow of torrential downpour from the Town's drain.
- ❖ 23728 110th Pl W (Twin Maples) Street drain backs up during heavy rain.

2. Does your neighborhood experience erosion problems?

5 - Yes

37 - No

If yes, where and what type of solutions are needed?

- ❖ We understand that the bank below 55 and 66 Woodhaven Pl. experiences erosion.
- ❖ another drain installed
- ❖ The bluff. Work with railroad.
- ❖ On parking strip/town right of way S. side of 238th @ intersection of 113th Pl. W. from first driveway E. of the intersection. Surface water eroded right of way material into open end of drainage pipe under 113th Pl. W. Increased surface flow seemed to start with building Highlands, although it's blocks away. Know of no other changes upgrade of this location. Solution unknown.
- ❖ The ridge above Twin Maples in the Highlands

3. Are you aware of any locations where water quality is or seems to be impaired?

1 - Yes

41 - No

If yes, where and what type of solutions are needed?

- ❖ End of N. Dogwood lane. Drain pipes are plugged under road.

4. Have you observed flooding or drainage problems in the Town?

11 - Yes

31 - No

If yes, please note location on the enclosed map.

- ❖ Corner of Timber and Berry Lanes,
- ❖ Just at the North end of Chinook Rd. I also see a lot of water draining down on 21800 Makah coming off the driveway and draining north down the sidewalk.
- ❖ We see water flow across Woodway Park Road into the back yard of the S.E. lot on Woodhaven Pl. Don't know how much of it affects the lot.
- ❖ 1. E. side of Woodway Park Rd. just N. of 238th. 2. Storm drain in front of 23812 114th Ave. W. can not receive road water runoff as a curb along the edge of the road prevents water from draining into the storm drain W. of the driveway. 3. Same as 2. above
- ❖ Several in Woodway Estates
- ❖ Not in the southern portion.
- ❖ End of N. Dogwood Lane
- ❖ I have heard of some drainage problems to the east of us on 110th.
- ❖ On my property and Woodhaven Pl.
- ❖ In Twin Maples

5. Have you observed fish in streams in the Town area? If so, where and when have you observed them? If you know the species, what species have you seen?

B. Values

6. What should be the Town's stormwater management priorities? Please rank with 1 as the highest and 5 as the lowest.

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Null</u>
Flood control	16	7	5	4	5	5
Protect water quality	25	3	5	2	3	4
Erosion control	12	10	9	3	4	4
Restore fish habitat	5	5	12	9	3	8
Sediment control at construction sites	8	9	9	5	6	5
Restoration of riparian/streambank habitat	3	7	9	8	8	7
Other <u>(one commented see below)</u>	2	1	0	0	0	39
"Control traffic and speeders"						

7. How important is promoting the use of measures that use innovative methods to reduce the negative impacts of stormwater runoff?

10 - Very Important

14 - Important

10 - Not Very Important

8 - Null

C. Involvement

8. Would you consider changing some of your daily activities to improve water quality if provided information about how to do so?

31 - Yes

11 - No

If yes, what activities would you be willing to adapt?

- ❖ Don't know what activities might be involved other than (reduced) lawn watering. Any household chores that we might do in an environmentally better way, we would try to implement e.g laundry etc.

- ❖ What are you proposing and does it make sense?
- ❖ Need more info to answer.
- ❖ Not sure. Would have to look at the information.
- ❖ We'd consider changing the times we have peak water usage.
- ❖ Grounds watering, car washing, driveway/patio cleaning etc. What else is there?
- ❖ Just let us know.
- ❖ Minimize water usage associated with washing personal vehicle
- ❖ Organic lawn care, environmentally friendly laundry/dishwashing products
- ❖ Not aware of any daily activities that degrade water quality
- ❖ When car washing on driveway or when fertilizing lawn. On street side of 238th.
- ❖ Don't know.
- ❖ Adapt household water waste i.e. washing (cleaning) water disposal or other household possibilities
- ❖ I would consider anything
- ❖ I would consider changing some daily activities, however I don't know what would be the changes that must be made.
- ❖ Just give us Information
- ❖ ? (Several applicants answered with this simple yet descriptive punctuation mark).

9. Would you be willing to get involved in a citizen based group to assist in developing a Stormwater Management Plan and assist in organizing community activities?

6 - Yes

36 - No

D. Miscellaneous

10. Do you have, or are you aware of, any drainage-related reports or other data that may be useful to the Town study?

2 - Yes

40 - No

If yes, please provide a brief description of these reports and data and the name and telephone number of a person to contact for additional information.

- ❖ Contact Mike Jaholla at Gray & Osborne (former Town Engineer fired by Drummond). He is a font of info on Town history.

11. Other Comments:

- ❖ Woodway Park Road is full of springs. I have a spring by my farm and in my front driveway. My neighbor has a spring at the front of their driveway. I think it would be difficult to control all the springs we have in the park.
- ❖ See Joe Malinowski for help.
- ❖ Isn't there information on the Deer Creek habitat situation regarding flooding?
- ❖ This is a waste of money.
- ❖ Control speeds in Woodway. This (negative impacts of stormwater runoff) is the least of our problems. We don't see stormwater management as a priority for Woodway. We don't see this as a major issue that the town should be spending time with. Please work on traffic issues.
- ❖ Surface water from Chinook drains onto the driveway to my neighbors and also onto my driveway. Because of poor drainage, a lot of this water either puddles and creates mud holes or floods my driveway and erodes it. (the mud holes are at the neighbor's) On the North side of my driveway is an open drain pipe installed by the previous owner. When there is heavy rain. This creates a lot of drainage that is going into Herm Behla's yard. In the past, the bank has slipped onto the railroad

tracks – perhaps this undrained water has something to do with it? We do have a French drain surrounding Pt. Edwards Place property, but it is not designed for or sufficient enough to provide for the neighborhood. In the past our pasture has flooded to the south, but this has been greatly helped by the installation of retention tanks of the recently constructed home on that driveway / property.

- ❖ Randy is aware of our flood damage. We have to have sand bags in front of our garage door now because we are in constant fear of another flood when it rains. Please do something! The storm water drainage is 50 yrs old and needs to be updated. All the water converges into the storm drain in our driveway from 239th Pl. SW and 110th St. There is no where for it to drain. More drains need to be put in.
- ❖ Twin Maples is in the first steps of getting sewer signatures- maybe sewer and storm water projects are or could be worked together.

TOWN COUNCIL MINUTES

February 22, 2005

CALL TO ORDER, FLAG SALUTE, ROLL CALL

The second Council meeting for the month of February was called to order by Mayor Nichols at 7:00 p.m. at Woodway Town Hall. Councilmembers present were Robert Schillberg, Kent Saltonstall, Peter Block, and Kerin Steele. Councilmember Steve Abel had an excused absence. Administrative Projects Manager Jack Collins, Public Works Director Randall Burns, Town Arborist Elizabeth Walker, and Clerk-Treasurer Lorraine Taylor were also present. Other guests included Port of Edmonds Commissioner Fred Gouge.

APPROVAL OF MINUTES: The following changes were made to the February 7, 2005 minutes:

- Page 3, last paragraph, revise to read, "Councilmember Block voiced several concerns including the possibility of this creating a hardship on a property owner and the selection of an arbitrary percentage. ~~and the vagueness of variance criteria.~~
- Page 4, first paragraph, revise to read, "He also pointed out the differences between the effects of setbacks on large lots versus small lots and the arbitrary limitation on possibility of a property owner seeking a variance to avoid a natural circumstance."

Councilmember Steele moved to approve the minutes of the February 7, 2005 Council meeting as amended. *Councilmember Saltonstall* seconded the motion. Motion carried unanimously.

APPROVAL OF VOUCHERS: *Councilmember Block* moved to approve Claims Warrants #4432 through #4559 for the total amount of \$13,235.76. *Councilmember Steele* seconded the motion. Motion carried unanimously.

AUDIENCE COMMENTS: None

COUNCIL REPORTS: *Councilmember Schillberg* reported on the Snohomish County Solid Waste Advisory Committee, advising a permanent director has not yet been selected.

Councilmember Steele identified proposed legislation described in the AWC bulletin that may warrant Town comment, 1) a proposed bill to clarify that cities are not required to have a minimum residential density of four dwelling units per acre to be in compliance with the GMA, 2) a bill regarding Best Available Science, and 3) HB1458 and SB5431, bills attempting to get the State more involved in ensuring septic and other onsite sewage facilities are monitored and fixed so as not to adversely impact marine water quality.

Mayor Nichols referred to the State of the Cities report prepared by AWC, advising she planned to email Senator Fairley to encourage her to support increasing the size of communities who can apply for the Road Preservation Funds Program. Another bill would allow cities that have not experienced a great deal of growth to extend the update of their Comprehensive Plan from five years to ten years.

Councilmember Block reported the recent Sound Transit meeting was not well attended by local elected officials but there were a number of city staff members present. He explained the purpose of the meeting was to discuss the upcoming revision of Sound Transit's 1996 Comprehensive Plan and gather input from affected communities. He advised three more meetings were scheduled in the next three months and Sound Transit's primary interest was service enhancements.

The Council discussed dates for March meetings due to Councilmembers' absences and Planner Bill Trimm's unavailability on March 7. A workshop with Mr. Trimm regarding the Comprehensive Plan was tentatively scheduled for March 1 or 2, 5:00 – 6:30. Councilmember Block requested an excused absence from the March 7 meeting and Councilmember Saltonstall requested an excused absence from the March 21 meeting.

Councilmember Saltonstall reported an oil spill from a Rabanco truck on Dogwood Lane. He was unable to reach Rabanco Manager Gary Trunkhill on his cell phone and requested staff email him requesting that he contact Councilmember Saltonstall.

Councilmember Saltonstall reported the Parks Committee held its first meeting and toured the Conservation areas. At Councilmember Saltonstall's request, Public Works Director Randall Burns reported on the removal of hazard trees from the wetland area in response to a resident's concern with three dead alder trees on Parcel I. He explained the trees were removed completely and not left at the 30-foot animal habitat height due to safety issues cited by the contractor.

MAYOR REPORT: Mayor Nichols advised a letter and fact sheet regarding coyotes has been prepared for distribution to all Town residents. The letter advised residents the Council would be discussing a policy regarding local government's role and invited them to provide comment at the March Council meetings. The letter also advised residents to contact Ralph Olsen with any reports of aggressive coyote behavior. She summarized a letter from Kevin Christiansen, US Department of Agriculture, following his evaluation of coyotes in Town, recommends monitoring the situation and contacting him with any consistent reporting of aggressive behavior.

Mayor Nichols reported on staff's efforts to correct the color of advisory and speed limit signs in Town. She reported Chief Hansen is working on securing the services of a motorcycle officer. With regard to the Town's commitment to install trees as a buffer to the area in the Reserve used for storage of materials, she reported Public Works has planted several 6-foot cypress trees.

Mayor Nichols reported Ross Wood, Triad, relayed Edmonds' interest in keeping Pine Street closed between Nootka and Chinook until next December due to construction. Recalling that most residents of Woodway Estates preferred full closure of Chinook, and based on an informal survey of several residents of the estates, she concluded that closure would be acceptable. She would request Mr. Wood communicate to the Woodway Estates residents regarding extending the closure.

STORMWATER SURVEY SUMMARY

Mayor Nichols explained information regarding the Stormwater Comprehensive Plan and a survey had been provided to Town residents. She summarized staff was aware of most of the issues that residents identified via the survey, no problems areas were uncovered. Public

Works Director Randall Burns briefly reviewed the tabulated results of the survey. Discussion followed regarding the need to educate the public, plans for an article in the *Woodway Whisper* regarding stormwater issues, respondents' interest in educational materials and a suggestion to highlight water quality at the 2005 Community Fair.

Administrative Project Manager Jack Collins provided a report regarding the creation of a Stormwater Utility. To avoid confusing the issue of fees with the creation of the Stormwater Utility Fund, he recommended the Council create the Stormwater Utility when the planning phase is complete. Mayor Nichols advised the Stormwater Comprehensive Plan would include assistance with establishing rates, etc.

Councilmembers expressed support for the concept of establishing a Stormwater Utility Fund and requested staff provide further information regarding the fund.

PUBLIC HEARING – Establishing a Limit for Yard Setbacks: Ordinance No. 05-450

At 8:12 p.m., Mayor Nichols opened the public hearing on an amendment to Title 14.50 limiting variances to the required setback for a front, side or rear yard to no more than 10% of each yard setback.

Jon Fleming, 21635 Chinook Road, inquired how the 10% limit was determined and although he understood the intent, questioned how the proposed amendment would address the issue. He commented there were instances where variances made common sense, pointing out on the largest lots where the setback is 100 feet, 10% would allow a 10-foot variance; on the smallest lots where the setback is 10-feet, it would allow a 1-foot variance. He suggested a committee to consider variances or a sliding scale depending on lot size. He concluded the proposed amendment was a band-aid rather than a long term solution.

Hearing no further public comment, Mayor Nichols closed the public hearing at 8:15 p.m. She explained in discussions with the Hearing Examiner regarding variances and how to maintain the setbacks and distance between properties, the Hearing Examiner emphasized the need for clear direction regarding what was important to the community. The recommendation from the Town Planner and Town Attorney was to establish a number or a percentage.

Councilmember Block expressed his opposition to the ordinance, citing the arbitrary percentage and greater impact on smaller lots. Councilmember Schillberg pointed out potential conflicts between Title 14.50 and the Tree Ordinance. Discussion followed regarding applying the 10% limitation only to R-87 and R-43 zoned lots, the 10% limitation might not preserve the Town's character when applied to smaller lots, past interpretations of variance criteria by the Hearing Examiner.

ACTION: *Councilmember Steele* moved for approval of Ordinance No. 05-450 amending Title 14.50 of the Woodway Municipal Code limiting variances to the required setback for a front, side or rear yard to no more than 10% of each yard setback, as amended (revising the first sentence in Section 14.50.015 to read, "In order to maintain the character of land and uses prescribed in each of the Town's R-87 and R-43 zoning districts, requests to vary the required setback for a front, side or rear yard shall not exceed ten percent of each yard setback that is set forth in Title 14." and adding "as well as meeting all the other criteria for a variance" to the last sentence in Section 14.50.015.) *Councilmember Schillberg* seconded the motion. Motion carried unanimously.

Councilmembers agreed to consider conflicts between Title 14.50 and the Tree Ordinance upon completing their review of revisions to the Tree Ordinance.

DRAFT TREE ORDINANCE AMENDMENTS

Mayor Nichols briefly reviewed revisions made as a result of the Council's previous discussion. The Council continued their review of the proposed revisions to the Tree Ordinance.

Discussion centered on the interface between the Tree Ordinance and various limitations for setbacks.

Discussion included options with regard to appeals, 1) a reduced fee for a "paper" appeal, 2) the appeal fee being the actual cost of the Hearing Examiner with the Town covering the first \$100, 3) the loser paying the appeal fee, and 4) \$300 appeal fee plus 50% of the actual cost of the Hearing Examiner. Suggested changes to the ordinance included clarifying review criteria for appeals regarding feasible and prudent location alternatives and establishing a \$300 appeal fee plus 50% of the actual cost of the Hearing Examiner regardless of outcome.

Mayor Nichols advised staff would make the revisions to the Tree Ordinance and a public hearing would be scheduled for March 7 with final adoption of the revised Tree Ordinance scheduled for late March or early April.

STRATEGY FOR OPTION LOT PURCHASE

Mayor Nichols explained by the end of August, the Town must make a decision with regard to the option lot purchase. She reviewed options developed by Mr. Collins for acquiring the lots, explaining the Town has sufficient funds to purchase one lot, purchasing the second lot would require additional funds. She described potential funding sources including a \$15,000 grant from Starbucks, unexpended IAC funds, Councilmatic bonds and/or a bank loan.

Discussion followed regarding Councilmembers' preference with regarding to purchasing the lots, funding options, and a suggestion to contact Woodway Highlands regarding purchasing the lot. Mayor Nichols agreed to have staff develop a funding scenario and prepare a letter to Woodway Highlands residents inquiring about their interest in purchasing a lot and describing the importance of the lot to the trail system.

ORDINANCE NO. 05-451 – 2004 Budget Amendment

Mayor Nichols explained this ordinance was a housekeeping requirement by State law any time a municipality expends more funds than it budgeted. The Town experienced more activity in the building department in 2004 than anticipated which resulted in additional revenues and expenses. She summarized the additional \$65,000 in revenue would be placed in the Capital Reserve Fund.

ACTION: *Councilmember Schillberg* moved for approval of Ordinance No. 05-451, 2004 Budget Amendment. *Councilmember Steele* seconded the motion. Motion carried unanimously.

RESOLUTION NO. 05-287 – Confirming Representatives to SnoCom & SERS Board

Mayor Nichols advised Councilmember Saltonstall is the representative to SnoCom and the SERS Board and the alternate is Councilmember Schillberg.

ACTION: *Councilmember Steele* moved for approval of Resolution No. 05-287, confirming representatives to SnoCom and SERS Board. *Councilmember Block* seconded the motion. Motion carried (3-0-1), Councilmember Saltonstall abstained.

AUDIENCE COMMENTS: None

GENERAL COUNCIL DISCUSSION – Council Choice of Topics

A brief discussion occurred with Port Commissioner Fred Gouge regarding the Port's stormwater drainage. He advised the City of Edmonds calculates its stormwater charge based on the amount of impervious surface.

ADJOURNMENT OF PUBLIC MEETING: *Councilmember Saltonstall* moved to adjourn the meeting. *Councilmember Block* seconded the motion. Motion carried unanimously. The meeting was adjourned at 9:42 p.m.

Respectfully Submitted,

Lorraine Taylor, Town Clerk-Treasurer

APPROVED BY THE TOWN COUNCIL

Carla A. Nichols, Mayor

(These minutes accurately reflect what was said at the Council Meeting. Publication does not vouch for the veracity of these statements.)

**TOWN OF WOODWAY - OPTION 1
STORMWATER FINANCIAL PLAN
SUMMARY OF REVENUE REQUIREMENTS**

	2006	2007	2008	2009	2010	2011
SOURCES OF REVENUE						
Projected Rate Revenues	\$122,371	\$122,983	\$123,597	\$124,215	\$124,836	\$125,461
Miscellaneous Revenues (Utility Reserve)	17,250	17,253	17,255	17,258	17,020	17,050
TOTAL REVENUE SOURCES	\$139,621	\$140,235	\$140,852	\$141,473	\$141,856	\$142,511
O&M EXPENSE						
Operating and Maintenance	\$15,620	\$16,080	\$16,567	\$17,082	\$19,029	\$19,639
Administrative Allocation	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377
TOTAL O&M EXPENSE	\$21,699	\$21,971	\$22,575	\$23,211	\$25,280	\$26,016
TOTAL TAX EXPENSE	\$1,836	\$1,845	\$1,854	\$1,863	\$1,873	\$1,882
TOTAL CIP FROM RATES EXPENSE	\$75,920	\$75,520	\$81,886	\$92,611	\$168,502	\$92,304
DEBT SERVICE EXPENSE	\$17,000	\$17,000	\$17,000	\$17,000	\$17,000	\$17,000
FUNDING OPERATING RESERVE	\$380	\$380	\$380	\$380	\$380	\$380
TOTAL EXPENSES (REVENUE REQUIREMENTS)	\$116,834	\$116,715	\$123,695	\$135,064	\$213,034	\$137,581
Balance/(Deficiency)	\$22,787	\$23,520	\$17,157	\$6,409	(\$71,178)	\$4,930
PROPOSED RATE ADJUSTMENT	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cash Reserves						
Beginning Balance	\$0	\$23,166	\$47,066	\$64,603	\$71,392	\$593
Plus: Additions	23,166	23,900	17,537	6,789	(70,798)	5,309
Less: Uses	0	0	0	0	0	0
Ending Balance	\$23,166	\$47,066	\$64,603	\$71,392	\$593	\$5,903
Target Minimum Balance of 120 Days of O&M:	\$5,135	\$5,287	\$5,447	\$5,616	\$6,256	\$6,457
Capital Reserve						
Beginning Balance	\$30,909	\$0	\$0	\$0	\$0	\$0
Plus: Additions	0	10,927	11,255	11,593	11,941	12,299
Less: Uses	30,909	10,927	11,255	11,593	11,941	12,299
Ending Balance Capital Reserve	\$0	\$0	\$0	\$0	\$0	\$0
Target Minimum Balance: Average 6-Year CIP:	\$123,721					\$123,721
Notes:						
O&M items from Street Fund are allocated 15% to stormwater.						
Total Reserve Balances	\$23,166	\$47,066	\$64,603	\$71,392	\$593	\$5,903
Total Target Reserve Balances	\$128,856	\$129,008	\$129,168	\$129,337	\$129,977	\$130,178
Balance/(Deficiency) in Reserve Levels	(\$105,690)	(\$81,942)	(\$64,565)	(\$57,945)	(\$129,384)	(\$124,275)

Town of Woodway - Option 1
Stormwater Financial Plan
Exhibit 1

ESCALATION FACTORS	Budget	Projected					Notes
	2006	2007	2008	2009	2010	2011	
Revenues:							
Rate Revenues/Growth	Estimate	1%	1%	1%	1%	1%	
Miscellaneous Revenues	Estimate	1%	1%	1%	1%	1%	
Investment Interest Rate	Estimate	2%	3%	3%	3%	3%	
Expenses:							
Labor	Estimate	3%	3%	3%	3%	3%	
Benefits	Estimate	15%	15%	15%	15%	15%	
Materials & Supplies	Estimate	2%	2%	2%	2%	2%	
Equipment	Estimate	3%	3%	3%	3%	3%	
Miscellaneous	Estimate	2%	2%	2%	2%	2%	
New PWTF/CCWF Loans:							
Term in Years	20	20	20	20	20	20	
Rate	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	
Revenue Bond							
Term in Years	20	20	20	20	20	20	
Rate		5.5%	6.0%	6.0%	6.0%	6.0%	

Town of Woodway - Option 1
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

	Estimate	Projected					
	2006	2007	2008	2009	2010	2011	Notes:
SOURCES OF REVENUE							
Rate Revenues							
Residential	\$122,371	\$122,983	\$123,597	\$124,215	\$124,836	\$125,461	As Rate Revenue
	0	0	0	0	0	0	As Rate Revenue
Total Rate Revenues	\$122,371	\$122,983	\$123,597	\$124,215	\$124,836	\$125,461	
Miscellaneous Revenues							
General Fund	\$0	\$0	\$0	\$0	\$0	\$0	One-time; Input
Permit Fees	0	0	0	0	0	0	As Other Revenues
Interfund Loan(s)/Utility Reserve	17,000	17,000	17,000	17,000	17,000	17,000	Flat, Per 2005 Budget
Other	0	0	0	0	0	0	As Other Revenues
Investment Interest	250	253	255	258	20	50	@ 2% of reserve
Total Miscellaneous Revenue	\$17,250	\$17,253	\$17,255	\$17,258	\$17,020	\$17,050	
Total Sources of Revenue	\$139,621	\$140,235	\$140,852	\$141,473	\$141,856	\$142,511	
EXPENSES - Stormwater							
Allocations to Administration							
Budgeting, Accounting Services	\$1,822	\$1,859	\$1,896	\$1,934	\$1,973	\$2,012	@ 2%; As Misc
Legal Services (ordinance review)	500	200	204	208	212	216	@ 2%; As Misc
Other General Gov't Services	2,553	2,604	2,656	2,710	2,764	2,819	@ 2%; As Misc
Engineering Services	816	832	849	866	883	901	@ 2%; As Misc
Planning Services	200	204	208	212	216	221	@ 2%; As Misc
Miscellaneous Tranfers	188	191	195	199	203	207	@ 2%; As Misc
Total Administrative Allocations	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377	

Town of Woodway - Option 1
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

Page 2 of 4

		Estimate	Projected					
		2006	2007	2008	2009	2010	2011	Notes:
Maintenance and Construction Expenses								
Regular Pay		\$2,359	\$2,430	\$2,503	\$2,578	\$2,655	\$2,735	City Tracking; As Labor
Employment Benefits		782	899	1,034	1,189	1,367	1,573	33% of salary; As Benefits
Salaries and Benefits		\$3,141	\$3,329	\$3,537	\$3,767	\$4,023	\$4,308	
<u>Maintenance</u>								
30.20	Clothing Allowance	\$77	\$78	\$80	\$81	\$83	\$84	As Supplies
30.40	Small Tool and Minor Equipment	153	156	159	162	166	169	As Supplies
30.40	Street Maintenance Engineering	612	630	649	669	689	709	As Labor
30.40	NGPA Preserve Maintenance	918	936	955	974	994	1,014	@ 30%; As Misc
40.50	Storm Drng: Prof. Srvs/Catch Basin Clean	5,600	5,712	5,826	5,943	7,462	7,611	As Misc; Increase \$1,400 in 2010
	Equipment	326	336	346	357	367	378	As Equipment
70.50	Roadside (refresh gravel)	1,071	1,092	1,114	1,137	1,159	1,182	As Supplies
90.30	Machinery Fuel and Oil	306	315	325	334	344	355	As Equipment
90.40	Administration	75	77	78	80	81	83	As Misc
90.40	Travel	46	47	48	49	50	51	As Misc
90.40	Rentals	250	258	265	273	281	290	As Equipment
90.50	Machine Maintenance and Repair	383	394	406	418	431	443	As Equipment
90.50	Miscellaneous	122	125	127	130	132	135	As Misc
Maintenance Subtotal		\$9,939	\$10,156	\$10,379	\$10,606	\$12,239	\$12,505	
<u>Construction</u>								
10.40	Telephone	\$306	\$312	\$318	\$325	\$331	\$338	As Misc
30.30	Office Supplies	46	47	48	49	50	51	As Supplies
30.50	Liability Insurance	1,362	1,389	1,417	1,445	1,474	1,503	As Misc
30.50	Property/Vehicle Insurance	260	268	276	284	293	302	As Equipment
47.00	Electricity	107	109	111	114	116	118	As Misc
60.40	Training	306	312	318	325	331	338	As Misc
38.50	Vehicle Maintenance & Repair	153	158	162	167	172	177	As Equipment
Construction Subtotal		\$2,540	\$2,595	\$2,651	\$2,708	\$2,767	\$2,827	
Total Maintenance & Construction Exp.		\$15,620	\$16,080	\$16,567	\$17,082	\$19,029	\$19,639	
Taxes								
State Taxes		\$1,836	\$1,845	\$1,854	\$1,863	\$1,873	\$1,882	Budget;1.5% of rate rev
Transfer to Street Fund		0	0	0	0	0	0	As Equipment
Other Transfers		0	0	0	0	0	0	
Total Tax Expenses		\$1,836	\$1,845	\$1,854	\$1,863	\$1,873	\$1,882	

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[illegible]

	Estimate 2006	2007	2008	Projected			Notes:
	2009	2010	2011				
TOTAL EXPENSES (REVENUE REQUIREMENTS)	\$116,834	\$116,715	\$123,695	\$135,064	\$213,034	\$137,581	
Balance/(Deficiency) of Funds	\$22,787	\$23,520	\$17,157	\$6,409	(\$71,178)	\$4,930	
Proposed Rate Adjustment	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cash Reserves							
Beginning Balance	\$0	\$23,166	\$47,066	\$64,603	\$71,392	\$593	
Plus: Additions	23,166	23,900	17,537	6,789	(70,798)	5,309	
Less: Uses	0	0	0	0	0	0	Input
Ending Balance	\$23,166	\$47,066	\$64,603	\$71,392	\$593	\$5,903	
Target Minimum Balance of 120 Days of O&M:	\$5,135	\$5,287	\$5,447	\$5,616	\$6,256	\$6,457	
Capital Reserves							
Beginning Balance	\$30,909	\$0	\$0	\$0	\$0	\$0	
Plus: Additions	0	10,927	11,255	11,593	11,941	12,299	Per Town Forecasting Model
Less: Uses	30,909	10,927	11,255	11,593	11,941	12,299	Input
Ending Balance	\$0	\$0	\$0	\$0	\$0	\$0	
Target Minimum Balance: Average 6-Year CIP:	\$123,721					\$123,721	
Notes:							
O&M items from Street Fund are allocated 15% to stormwater.							
Total Reserve Balances	\$23,166	\$47,066	\$64,603	\$71,392	\$593	\$5,903	
Total Target Reserve Balances	\$128,856	\$129,008	\$129,168	\$129,337	\$129,977	\$130,178	
Balance/(Deficiency) in Reserve Levels	(\$105,690)	(\$81,942)	(\$64,565)	(\$57,945)	(\$129,384)	(\$124,275)	

Town of Woodway
Stormwater Financial Plan
Exhibit 3
Labor Cost Estimates

Budget Item/Street Fund	Budget/ Estimate	Percent
2005 Labor budget	\$109,222	
2005 Benefit budget	36,195	33%
3 employees; Cost per employee	36,407	
Hourly rate per employee	17.50	
Total employee hourly rates	52.51	
2 at \$15/hr	30.00	
1 supervisor	\$22.51	

Personnel	w/ Benefits	Actual Hourly
Maintenance Worker I	\$18.60	\$14.00
Maintenance Lead	28.70	21.53
Supervisor	32.70	24.55

**Town of Woodway
Stormwater Financial Plan
Exhibit 4
Equipment Cost Estimates**

Equipment Item	2002 Value	Useful Life	Depreciation	Replacement Cost	Total Cost	Utilization Rate	Hours Used	Cost Per Hour
1995 GMC Dump Truck	\$16,000	25	609	\$17,449	1,307	50%	1,040	\$1.30
2003 Ford Ranger Pick-up	19,720	15	1,181	21,430	2,610	80%	1,664	1.60
1997 Kubota commercial mower	12,000	7	1,671	12,510	3,459	60%	1,248	2.80
1995 Kubota Tractor	16,000	15	1,047	17,388	2,206	50%	1,040	2.10
Street Sweeper	16,000	25	1,047	17,388	1,742	50%	1,040	1.70

Notes: Assume 3% inflation.

Town of Woodway
Stormwater Financial Plan
Exhibit 5
Stormwater Activity Estimates

Item Number (Access Table)	1	2	3	4	5	6	7	8	9	10	11	12					
Hours Per Activity	8	8	4	3	2	2	1	2	7	6	7	6		56	Rainy	Dry	Per City
	January	February	February	February	February	February	February	February	February	March	April	April	Total	Quarter	Quarter	Notes	Annual
Labor	\$112	\$112	\$56	\$42	\$39	\$39	\$14	\$39	\$98	\$84	\$98	\$84		\$634	\$546	Per City	
Benefits (33% 2005 Fund 102)	37	37	19	14	13	13	5	13	32	28	32	28		210	181	Per Ratio in Street Fund 2005 Budget	
Equipment	13	13	7	5	3	3	2	3	12	17	12	17		77	86	Exhibit 4	
Rental Equipment		125												125	0	Per City	
Other							150							150	0	Estimated	
Total	\$162	\$287	\$81	\$61	\$55	\$55	\$170	\$55	\$142	\$129	\$142	\$129	\$1,467	\$1,196	\$813		\$4,018

Town of Woodway - Option 1
Stormwater Financial Plan
Exhibit 6 - Rate and Revenue Projections

	2006	2007	2008	2009	2010	2011	6-year Avg.
Impervious ares (square feet)	3,137,709	3,153,398	3,169,165	3,185,010	3,200,935	3,216,940	
Revenue Req. (less PWTF planning loan)	\$99,834	\$99,715	\$106,695	\$118,064	\$196,034	\$120,581	
Rate - \$/sq. ft.	\$0.032	\$0.032	\$0.034	\$0.037	\$0.061	\$0.037	\$0.039
	2006	2007	2008	2009	2010	2011	Total
Rate Revenue	\$122,371	\$122,983	\$123,597	\$124,215	\$124,836	\$125,461	
Balance/(Deficiency)	22,537	23,267	16,902	6,151	(71,198)	4,880	2,539

Town of Woodway - Option 1

Stormwater Financial Plan

Exhibit 7 - Projected Annual Bills with Monthly Equivalents

Total Lot Size	Percent Impervious	Square Ft. Impervious	Annual Bill	Equivalent Monthly Bill	Difference from Oct. '05	
					Monthly	Annually
2 Acres	14%	12,197	\$473.44	\$39.45	\$25.22	\$302.68
2 Acres	27%	23,522	913.06	76.09	48.89	586.66
2/3 Acre	22%	6,389	248.00	20.67	13.07	156.80
1/2 Acre	36%	7,841	304.35	25.36	15.87	190.47
1/3 Acre	24%	3,485	135.27	11.27	8.02	96.27
1/3 Acre	33%	4,792	185.99	15.50	11.00	131.99
1/3 Acre	47%	6,824	264.90	22.08	14.81	177.66

Option 2 – Additional Capital Funding

**TOWN OF WOODWAY
STORMWATER FINANCIAL PLAN
SUMMARY OF REVENUE REQUIREMENTS**

	2006	2007	2008	2009	2010	2011
SOURCES OF REVENUE						
Projected Rate Revenues	\$43,754	\$44,192	\$44,634	\$45,080	\$45,531	\$45,986
Miscellaneous Revenues (Utility Reserve)	17,250	17,255	17,263	17,271	17,279	17,287
TOTAL SOURCES OF REVENUE	\$61,004	\$61,447	\$61,896	\$62,351	\$62,810	\$63,273
O&M EXPENSE						
Operating and Maintenance	\$15,620	\$16,080	\$16,567	\$17,082	\$17,629	\$18,211
Administrative Allocation	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377
TOTAL O&M EXPENSE	\$21,699	\$21,971	\$22,575	\$23,211	\$23,880	\$24,588
TOTAL TAX EXPENSE	\$656	\$663	\$670	\$676	\$683	\$690
TOTAL CIP FROM RATES EXPENSE	\$9,829	\$9,958	\$10,153	\$10,940	\$8,543	\$8,266
DEBT SERVICE EXPENSE	\$21,477	\$22,793	\$22,793	\$22,793	\$29,377	\$29,377
TOTAL EXPENSES (REVENUE REQUIREMENT)	\$53,661	\$55,385	\$56,191	\$57,621	\$62,482	\$62,920
Balance/(Deficiency) Before Added Taxes	\$7,344	\$6,061	\$5,706	\$4,730	\$327	\$353
PROPOSED RATE ADJUSTMENT	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cash Reserves						
Beginning Balance	\$0	\$7,344	\$13,405	\$19,111	\$23,841	\$24,168
Plus: Additions	7,344	6,061	5,706	4,730	327	353
Less: Uses	0	0	0	0	0	0
Ending Balance	\$7,344	\$13,405	\$19,111	\$23,841	\$24,168	\$24,521
Target Minimum Balance of 120 Days of O&M:	\$5,135	\$5,287	\$5,447	\$5,616	\$5,796	\$5,987
Capital Reserve						
Beginning Balance	\$30,909	\$18,909	\$29,836	\$41,091	\$52,684	\$64,625
Plus: Additions	0	10,927	11,255	11,593	11,941	12,299
Less: Uses	12,000	0	0	0	0	0
Ending Balance Capital Reserve	\$18,909	\$29,836	\$41,091	\$52,684	\$64,625	\$76,924
Target Minimum Balance: Average 6-Year CIP:	\$123,721					\$123,721
Notes:						
O&M items from Street Fund are allocated 15% to stormwater.						
Total Reserve Balances	\$26,253	\$43,241	\$60,202	\$76,525	\$88,793	\$101,445
Total Target Reserve Balances	\$128,856	\$129,008	\$129,168	\$129,337	\$129,517	\$129,708
Balance/(Deficiency) in Reserve Levels	(\$102,604)	(\$85,767)	(\$68,966)	(\$52,812)	(\$40,724)	(\$28,263)

**Town of Woodway
Stormwater Financial Plan
Exhibit 1**

ESCALATION FACTORS	Budget	Projected					Notes
	2006	2007	2008	2009	2010	2011	
Revenues:							
Rate Revenues/Growth	Estimate	1%	1%	1%	1%	1%	
Miscellaneous Revenues	Estimate	1%	1%	1%	1%	1%	
Investment Interest Rate	Estimate	2%	3%	3%	3%	3%	
Expenses:							
Labor	Estimate	3%	3%	3%	3%	3%	
Benefits	Estimate	15%	15%	15%	15%	15%	
Materials & Supplies	Estimate	2%	2%	2%	2%	2%	
Equipment	Estimate	3%	3%	3%	3%	3%	
Miscellaneous	Estimate	2%	2%	2%	2%	2%	
New PWTF/CCWF Loans:							
Term in Years	20	20	20	20	20	20	
Rate	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	
Revenue Bond							
Term in Years	20	20	20	20	20	20	
Rate		5.5%	6.0%	6.0%	6.0%	6.0%	

Town of Woodway
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

Page 1 of 4

	Estimate 2006	2007	2008	Projected			Notes:
	2009	2010	2011				
SOURCES OF REVENUE							
<i>Rate Revenues</i>							
Residential	\$43,754	\$44,192	\$44,634	\$45,080	\$45,531	\$45,986	As Rate Revenue
	0	0	0	0	0	0	As Rate Revenue
Total Rate Revenues	\$43,754	\$44,192	\$44,634	\$45,080	\$45,531	\$45,986	
<i>Miscellaneous Revenues</i>							
Dept. of Ecology	\$0	\$0	\$0	\$0	\$0	\$0	
General Fund	0	0	0	0	0	0	
Permit Fees	0	0	0	0	0	0	As Other Revenues
Interfund Loan(s)/Utility Reserve	17,000	17,000	17,000	17,000	17,000	17,000	Flat, Per 2005 Budget
Other	0	0	0	0	0	0	As Other Revenues
Investment Interest	250	255	263	271	279	287	@ 2% of reserves
Total Miscellaneous Revenue	\$17,250	\$17,255	\$17,263	\$17,271	\$17,279	\$17,287	
Total Sources of Revenue	\$61,004	\$61,447	\$61,896	\$62,351	\$62,810	\$63,273	
EXPENSES - Stormwater							
<i>Allocations to Administration</i>							
Budgeting, Accounting Services	\$1,822	\$1,859	\$1,896	\$1,934	\$1,973	\$2,012	@ 2%; As Misc
Legal Services (ordinance review)	500	200	204	208	212	216	@ 2%; As Misc
Other General Gov't Services	2,553	2,604	2,656	2,710	2,764	2,819	@ 2%; As Misc
Engineering Services	816	832	849	866	883	901	@ 2%; As Misc
Planning Services	200	204	208	212	216	221	@ 2%; As Misc
Miscellaneous Tranfers	188	191	195	199	203	207	@ 2%; As Misc
Total Administrative Allocations	\$6,079	\$5,891	\$6,009	\$6,129	\$6,252	\$6,377	

Town of Woodway
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

		Estimate	Projected				Notes:	
		2006	2007	2008	2009	2010		2011
Maintenance and Construction Expenses								
	Regular Pay	\$2,359	\$2,430	\$2,503	\$2,578	\$2,655	\$2,735	City Tracking; As Labor
	Employment Benefits	782	899	1,034	1,189	1,367	1,573	33% of salary; As Benefits
	Salaries and Benefits	\$3,141	\$3,329	\$3,537	\$3,767	\$4,023	\$4,308	
<u>Maintenance</u>								
30.20	Clothing Allowance	\$77	\$78	\$80	\$81	\$83	\$84	As Supplies
30.40	Small Tool and Minor Equipment	153	156	159	162	166	169	As Supplies
30.40	Street Maintenance Engineering	612	630	649	669	689	709	As Labor
30.40	NGPA Preserve Maintenance	918	936	955	974	994	1,014	@ 30%; As Misc
40.50	Storm Dmg: Prof. Srvs/Catch Basin Clean	5,600	5,712	5,826	5,943	6,062	6,183	As Misc
	Equipment	326	336	346	357	367	378	As Equipment
70.50	Roadside (refresh gravel)	1,071	1,092	1,114	1,137	1,159	1,182	As Supplies
90.30	Machinery Fuel and Oil	306	315	325	334	344	355	As Equipment
90.40	Administration	75	77	78	80	81	83	As Misc
90.40	Travel	46	47	48	49	50	51	As Misc
90.40	Rentals	250	258	265	273	281	290	As Equipment
90.50	Machine Maintenance and Repair	383	394	406	418	431	443	As Equipment
90.50	Miscellaneous	122	125	127	130	132	135	As Misc
	Maintenance Subtotal	\$9,939	\$10,156	\$10,379	\$10,606	\$10,839	\$11,077	
<u>Construction</u>								
10.40	Telephone	\$306	\$312	\$318	\$325	\$331	\$338	As Misc
30.30	Office Supplies	46	47	48	49	50	51	As Supplies
30.50	Liability Insurance	1,362	1,389	1,417	1,445	1,474	1,503	As Misc
30.50	Property/Vehicle Insurance	260	268	276	284	293	302	As Equipment
47.00	Electricity	107	109	111	114	116	118	As Misc
60.40	Training	306	312	318	325	331	338	As Misc
38.50	Vehicle Maintenance & Repair	153	158	162	167	172	177	As Equipment
	Construction Subtotal	\$2,540	\$2,595	\$2,651	\$2,708	\$2,767	\$2,827	
Total Maintenance & Construction Exp.		\$15,620	\$16,080	\$16,567	\$17,082	\$17,629	\$18,211	
Taxes								
	State Taxes	\$656	\$663	\$670	\$676	\$683	\$690	Budget; 1.5% of rate rev
	Transfer to Street Fund	0	0	0	0	0	0	As Equipment
	Other Transfers	0	0	0	0	0	0	
Total Tax Expense		\$656	\$663	\$670	\$676	\$683	\$690	

Town of Woodway
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

	Estimate 2006	2007	2008	Projected			Notes:
				2009	2010	2011	
Capital Projects							Total
Mower replacement portion	\$2,000	\$0	\$0	\$0	\$0	\$0	Storm. Comp Plan
Twin Maples, Phase 1	51,580	0	0	0	0	0	Storm. Comp Plan
Woodhaven, Alt. 3	103,248	0	0	0	0	0	Storm. Comp Plan
North Deer & Alogonquin, Phase 1	0	29,367	0	0	0	0	Storm. Comp Plan
Woodway Park Road, Alt. 1	0	60,296	0	0	0	0	Storm. Comp Plan
Makah Alternative 2	0	0	49,322	0	0	0	Storm. Comp Plan
Chinook Rd. Alt. 1	0	0	47,035	0	0	0	Storm. Comp Plan
North Dogwood, Alt. 3	0	0	0	50,865	0	0	Storm. Comp Plan
Washusett, Phase 1	0	0	0	56,651	0	0	Storm. Comp Plan
Twin Maples, Phase 2	0	0	0	0	183,853	47,342	Storm. Comp Plan
South Dogwood - Alt. 1	0	0	0	0	0	32,579	Storm. Comp Plan
Private Drive 10724 226th SW	0	0	0	0	0	28,188	Storm. Comp Plan
Other	0	0	0	0	0	0	Storm. Comp Plan
To Cash Reserve	0	0	0	0	0	0	Estimated
Total Capital Outlays	\$156,829	\$89,663	\$96,358	\$107,516	\$183,853	\$108,109	
Less: Other Funding Sources							
General Fund	\$0	\$0	\$0	\$0	\$0	\$0	Input;Esc as Growth
Utility Reserve	0	0	0	0	0	0	Input
Capital Facilities Reserve	50,000	51,489	82,989	93,263	46,901	96,337	Input
PWTF Loans	85,000	25,000	0	0	125,000	0	Input
Bonding (Revenue)	0	0	0	0	0	0	Input
Stormwater Connection Charges	0	3,216	3,216	3,313	3,409	3,506	Est. @ 1% Grwth.
Stormwater Capital Reserve	12,000	0	0	0	0	0	Input
Total Other Funding Sources	\$147,000	\$79,705	\$86,205	\$96,576	\$175,310	\$99,843	
Total Capital From Rates Expense	\$9,829	\$9,958	\$10,153	\$10,940	\$8,543	\$8,266	Should Move toward Deprec. Exp.
Debt Service							
Interfund Loan	\$0	\$0	\$0	\$0	\$0	\$0	
PWTF Loan repayment (Planning loan)	17,000	17,000	17,000	17,000	17,000	17,000	@ 0% for 6 years
New PWTF (P+I)	4,477	5,793	5,793	5,793	12,377	12,377	@ 0.5% for 20 years
New Revenue Bonds (P+I & issuance)	0	0	0	0	0	0	@ 6.0% for 20 years
Total Debt Service Expense	\$21,477	\$22,793	\$22,793	\$22,793	\$29,377	\$29,377	

Town of Woodway
Stormwater Financial Plan
Exhibit 2
Sources & Applications of Funds

Page 4 of 4

	Estimate 2006	2007	2008	Projected			Notes:
	2009	2010	2011				
TOTAL EXPENSES (REVENUE REQUIREMEN	\$53,661	\$55,385	\$56,191	\$57,621	\$62,482	\$62,920	
Balance/(Deficiency) of Funds	\$7,344	\$6,061	\$5,706	\$4,730	\$327	\$353	
Plus: Additional Taxes w/ Rate Increase	\$0	\$0	\$0	\$0	\$0	\$0	
Net Balance/(Deficiency) of Funds	\$7,344	\$6,061	\$5,706	\$4,730	\$327	\$353	
Proposed Rate Adjustment	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cash Reserves							
Beginning Balance	\$0	\$7,344	\$13,405	\$19,111	\$23,841	\$24,168	
Plus: Additions	7,344	6,061	5,706	4,730	327	353	
Less: Uses	0	0	0	0	0	0	Input
Ending Balance	\$7,344	\$13,405	\$19,111	\$23,841	\$24,168	\$24,521	
Target Minimum Balance of 120 Days of O&M:	\$5,135	\$5,287	\$5,447	\$5,616	\$5,796	\$5,987	
Capital Reserves							
Beginning Balance	\$30,909	\$18,909	\$29,836	\$41,091	\$52,684	\$64,625	
Plus: Additions		10,927	11,255	11,593	11,941	12,299	Per Town Forecasting Model
Less: Uses	12,000	0	0	0	0	0	Input
Ending Balance	\$18,909	\$29,836	\$41,091	\$52,684	\$64,625	\$76,924	
Target Minimum Balance: Average 6-Year CIP:	\$123,721					\$123,721	
Notes:							
O&M items from Street Fund are allocated 15% to stormwater.							
Total Reserve Balances	\$26,253	\$43,241	\$60,202	\$76,525	\$88,793	\$101,445	
Total Target Reserve Balances	\$128,856	\$129,008	\$129,168	\$129,337	\$129,517	\$129,708	
Balance/(Deficiency) in Reserve Levels	(\$102,604)	(\$85,767)	(\$68,966)	(\$52,812)	(\$40,724)	(\$28,263)	

Town of Woodway
Stormwater Financial Plan
Exhibit 3
Labor Cost Estimates

Budget Item/Street Fund	Budget/ Estimate	Percent
2005 Labor budget	\$109,222	
2005 Benefit budget	36,195	33%
3 employees; Cost per employee	36,407	
Hourly rate per employee	17.50	
Total employee hourly rates	52.51	
2 at \$15/hr	30.00	
1 supervisor	\$22.51	

Personnel	w/ Benefits	Actual Hourly
Maintenance Worker I	\$18.60	\$14.00
Maintenance Lead	28.70	21.53
Supervisor	32.70	24.55

**Town of Woodway
Stormwater Financial Plan
Exhibit 4
Equipment Cost Estimates**

Equipment Item	2002 Value	Useful Life	Depreciation	Replacement Cost	Total Cost	Utilization Rate	Hours Used	Cost Per Hour
1995 GMC Dump Truck	\$16,000	25	609	\$17,449	1,307	50%	1,040	\$1.30
2003 Ford Ranger Pick-up	19,720	15	1,181	21,430	2,610	80%	1,664	1.60
1997 Kubota commercial mower	12,000	7	1,671	12,510	3,459	60%	1,248	2.80
1995 Kubota Tractor	16,000	15	1,047	17,388	2,206	50%	1,040	2.10
Street Sweeper	16,000	25	1,047	17,388	1,742	50%	1,040	1.70

Notes: Assume 3% inflation.

Town of Woodway
Stormwater Financial Plan
Exhibit 5
Stormwater Activity Estimates

Item Number (Access Table)	1	2	3	4	5	6	7	8	9	10	11	12					
Hours Per Activity	8	8	4	3	2	2	1	2	7	6	7	6	56	Rainy	Dry	Per City	Annual
	January	February	February	February	February	February	February	February	February	March	April	April	Total	Quarter	Quarter	Notes	Cost
Labor	\$112	\$112	\$56	\$42	\$39	\$39	\$14	\$39	\$98	\$84	\$98	\$84		\$634	\$546	Per City	
Benefits (33% 2005 Fund 102)	37	37	19	14	13	13	5	13	32	28	32	28		210	181	Per Ratio in Street Fund 2005 Budget	
Equipment	13	13	7	5	3	3	2	3	12	17	12	17			77	86	Exhibit 4
Rental Equipment		125												125	0	Per City	
Other							150							150	0	Estimated	
Total	\$162	\$287	\$81	\$61	\$55	\$55	\$170	\$55	\$142	\$129	\$142	\$129	\$1,467	\$1,196	\$813		\$4,018

Town of Woodway
Stormwater Financial Plan
Exhibit 6 - Revenue Projections

Flat fee per parcel

Type of Rate	Housing Units ¹	Flat Rate Per month	Total Revenue
Residential	384	\$9.50	43,754
Buildout	84	\$9.00	9,018
	<u>467</u>		<u>52,772</u>

1) 2004 Comp Plan page 10 Table 2-3, for additional housing unit capacity.

Flat Fee by Land Use Category

Land Use Category	Category Description	Units	Cost Per Month	Annual Revenue
R-87, R-43	1 per 2 acres	186	6.00	13,392
R-14.5	2/acre	96	11.10	12,787
UR	3/acre	93	16.10	17,962
		<u>375</u>		<u>44,141</u>

Impervious Area Fee

	Total Impervious Area	Total Program Cost 2006	Cost Per Square Foot Impervious	Avg. Imprv Area 7,606
Total Less "Drives"	3,798,251	\$40,621	0.011	\$6.78
Total Less Drives and Doubles	3,137,709	\$40,621	0.013	\$8.21
Total with Drives Less Doubles	3,372,534	\$40,621	0.012	\$7.63
		2008		
** Total Less Drives and Doubles	3,137,709	43,754	0.014	\$8.84
** Total with Drives Less Doubles	3,372,534	43,754	0.013	\$8.22

** Using the Total without driveways is recommended, until such time as the Town can identify the parcel numbers associated with those driveways.
This total program cost does not include the \$17,000 PWTF loan repayment, which is funded from the capital utility reserves.