STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
For
TURTLE CREEK SOUTH, SECOND AND THIRD ADDITIONS

Date: February 2003
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STORMWATER FACILITIES
OPERATION AND MAINTENANCE MANUAL
for
TURTLE CREEK SOUTH, SECOND AND THIRD ADDITIONS

I. Purpose

This Operation and Maintenance Manual is intended to provide general guidelines for maintaining the stormwater facilities built in conjunction with Turtle Creek South, Second and Third Additions. The proper operation and maintenance of these facilities will be the responsibility of Turtle Creek South Home Owners Association. Implementation of these guidelines should help to insure that these facilities will continue to operate in the manner which they were designed as defined by the final approved plans of record on file at the Spokane County Division of Engineering and Roads.

The proper operation and maintenance of the stormwater facilities shall include insuring that the stormwater facilities are maintained in such a manner that the established construction specifications, approved plan configuration and design performance standards are maintained at a level that is at least equal to that which the design engineer approved for this project.

II. Description

The stormwater facilities installed with this project consist of three primary systems. The first system includes catch basins, conveyance pipes, curb inlets, and a treatment and detention pond and outlet structure. The second system includes a drainage ditch, ditch inlet, catch basin, manholes, conveyance pipes, and a treatment and detention pond with an outlet structure. The third system simply consists of a detention pond that does not release any water.

The first system collects and controls the stormwater runoff from the newly constructed public roads. The second system collects and controls stormwater runoff from the natural grade slopes to the south of the project site and from the west portion of 11th Court. The third system collects and detains stormwater generated from off-site areas located south of Crescent Drive.

A. Catch Basin, Manholes and Conveyance Pipes

In the first system, catch basins are provided at the low ends of 12th Court, Crescent Drive, 11th Court, and at the low point in 11th Avenue. Stormwater is collected by these catch basins and transported through the piping system, which consists of a combination of 12", 14", and 18" pipes and is comprised of two types of pipe (HDPE and DI). Stormwater is transported by this system to treatment and detention pond “F".
The second system provides a catch basin at the low point of the west portion of 11th Court. The catch basin drains into the 15" conveyance pipe that transports stormwater runoff collected at the ditch inlet from the natural grade hillside on the south side of the project, to the treatment and detention pond provided between the project site and the south side of Saltrese Creek. Manholes are provided as angle points along the conveyance pipe as required.

B. Treatment and Detention Ponds with Outlet Structure

Treatment of the stormwater is required in accordance with the Spokane County Aquifer Sensitive Area Ordinance. The treatment ponds are also utilized as detention ponds. Design methodology was based on minimizing the land area needed to store runoff volumes and using outlet structures to meter the flow to meet Spokane County requirements. A combination of these parameters resulted in the ponds that were constructed for this project.

III. Function

The stormwater facilities for Turtle Creek South, Second and Third Additions are generally very simple and should operate with very little attention. In most instances, a non-functioning system will be visually obvious and regular maintenance of the system will eliminate the occurrence of drainage problems. The following describes each component of the stormwater systems and the proper function of that component in the system.

A. Curb Inlet

The curb inlet provides an inlet to the catch basins and piping system for stormwater collected by the public road gutter system.

B. Catch Basin, Conveyance Pipes, and Manholes

The catch basin is provided to collect runoff from the road areas. The conveyance pipes are provided to route the runoff to the treatment and detention facility. The outlet pipe from the conveyance system has an erosion control feature (riprap) to protect the pond bottom. The manholes are provided for angle points in the piping system.

C. Treatment and Detention Pond with Outlet Structure

The treatment and detention pond accepts runoff from the conveyance pipes for treatment in accordance with the Aquifer Sensitive Area Ordinance and stores the flow until the outlet structure can meter the rate of stormwater outflow for disposal. The outlet area from the conveyance pipe, which is the inlet area to the pond, has been protected from erosion with the installation of riprap. The outlet structure located in the pond has been installed slightly above the pond bottom to allow for treatment of the stormwater, which will also help protect it from siltation. An exception to this is the 18" conveyance pipe
that enters Pond "F" at the pond bottom elevation. Normal operation of the pond will include some ponding, however runoff will be discharged by the outlet structures and disposed of by means of sheet flow down natural grade slopes.

Storage pond "E" is located south side of lots # 3,5, and 6 block 2 of Turtle Creek South 2ND Addition. This pond only collects off-site runoff south of the pond location. This pond has been designed to detain stormwater, so no outlet has been provided.

Treatment pond "F" is located along the north side of lots 1 through 6, block 4 of Turtle Creek South, Second Addition and lot 1, block 1 of Turtle Creek South, Third Addition. The runoff from the public road gutter system enters the pond through the system of catch basins and piping. Runoff exiting the treatment and detention pond flows into a system of four 12" culverts that transfer water under the maintenance road and into a 1-foot deep ditch graded level along the berm side. This ditch is designed to convert flow from point discharge to sheet discharge into Saltese Creek.

Treatment and detention pond "G" is located along the north side of lots 8 and 9, block 1 of Turtle Creek South, Third Addition. The catch basin collects runoff from the west portion of 11th Court. The conveyance pipes collect and control stormwater runoff from the natural grade hillside ditch on the south side of Turtle Creek South, Third Addition enters the pond through a 15" pipe. The pipe from the conveyance system has an erosion control feature (riprap) to protect the bottom of the pond. Runoff exiting the treatment and detention pond flows into Saltese Creek through a weir on the north side of the pond. The manholes serve as angle points for the piping system.

IV. Responsibility to Maintain

Turtle Creek South Home Owners Association will be responsible for the proper operation and maintenance of the stormwater facilities described in this manual. Those systems include catch basins, inlets, conveyance pipes, the treatment and detention pond and the outlet structure. Turtle Creek South Home Owners Association shall follow the methods described in this manual.

V. Maintenance

The following information provides a maintenance description for each of the stormwater elements included in this project. Turtle Creek South Home Owners Association is responsible to provide the maintenance described on the schedule noted within each element.

A. General

The following stormwater facilities shall be visually inspected following a significant rainfall or snowmelt event.

1. Inspect all catch basins, pipe inlets and pond outlet structures making sure that they are clear of debris and obstructions.
B. Curb Inlet

Curb inlets must be maintained free of debris and vegetation to ensure proper stormwater flow to the treatment and detention pond.

C. Catch Basins and Manholes including the Outlet Control Structure

The catch basins and manholes should have the grates removed at least twice a year, once in the spring (April) and once in the fall (October) to insure that they are free from dirt and silt and to insure that they are operating properly. Should excessive silt or dirt be discovered in any catch basin or manhole, it must be cleaned out by means of a vector truck.

D. Treatment and Detention Pond

Periodic maintenance of the pond should be done to insure it is functioning properly. The following items should be noted:

1. The rip raps pads, located at the pipe outflow area, should be secure in the areas defined by the plans and should be free from debris. The edges of the rip rap pads should be checked for scouring of the dirt around the pad. Any scouring or gouging of the dirt needs to be repaired and sodded or seeded to insure proper vegetative growth.

2. The bottom of the pond needs to be free from debris and sediment deposition.

3. The outlet pipe needs to be located slightly above the pond bottom elevation to safeguard against siltation. Any siltation building up near the pipe should be removed and the area should be reseeded. Any debris or weeds plugging the pipe needs to be removed.

4. The treatment and detention pond shall be seeded with the following dryland seed mix:

   10% Elka Perennial Rye
   20% Durar Hard Fescue
   45% Covar Sheep / Fescue
   15% Reubens Canadian Bluegrass

   Provide mixture composed of grass seed and fertilizer in percentages as follows:
Grass Seed: 90 lbs. per acre  
Fertilizer: 16-16-16 timed release  
Composition, 300 lbs. per acre.

E. High Density Polyethylene Pipe (HDPE) & Ductile Iron Pipe (DI)

The HDPE and DI pipes should be checked periodically for obstructions at each end and twice a year the pipe should be visually inspected to insure that there is not mid-pipe blockage. Should a mid-pipe blockage be observed, it should be removed immediately. In the event that any of the pipes were to fail by being crushed, they must be replaced with the same type and size pipe as soon as the failure is discovered.

VI. Summary

By understanding the stormwater system as described herein and properly maintaining the components, the homeowners of Turtle Creek South, Second and Third Additions will have a long lasting and effective stormwater facility.
CALCULATIONS FOR ANNUAL OPERATIONS AND MAINTENANCE COST AND REPLACEMENT COSTS PER LOT

ANNUAL OPERATION & MAINTENANCE COSTS (O&M) = $400
PRESENT VALUE OF DRAINAGE SYSTEM (PV) = $38,000

ASSUME 50% REPLACEMENT IN 20 YEARS (PV/2) = $19,000

\[
FV = \frac{PV}{2} (F/P, 4\%, n=20) \times \\
FV = 19,000 (2.1911) \times \\
(FV) = 41,630
\]

ANNUAL SET ASIDE FOR FUTURE REPLACEMENT
(ASSUME) CONSERVATIVE INVESTMENT = 6%

\[
A = FV (A/F, 6\%, n=20) \times \\
A = 41,630 (0.0272) \times \\
(A) = 1,132
\]

TOTAL ANNUAL CHARGE = (O&M) + (A)
= 400 + 1132
= $1,532

ANNUAL CHARGE PER LOT = (TAC) / (#LOTS)
= 1532 / 65

\[
\text{ANNUAL CHARGE PER LOT} = $23.57
\]

* See attached interest tables.
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