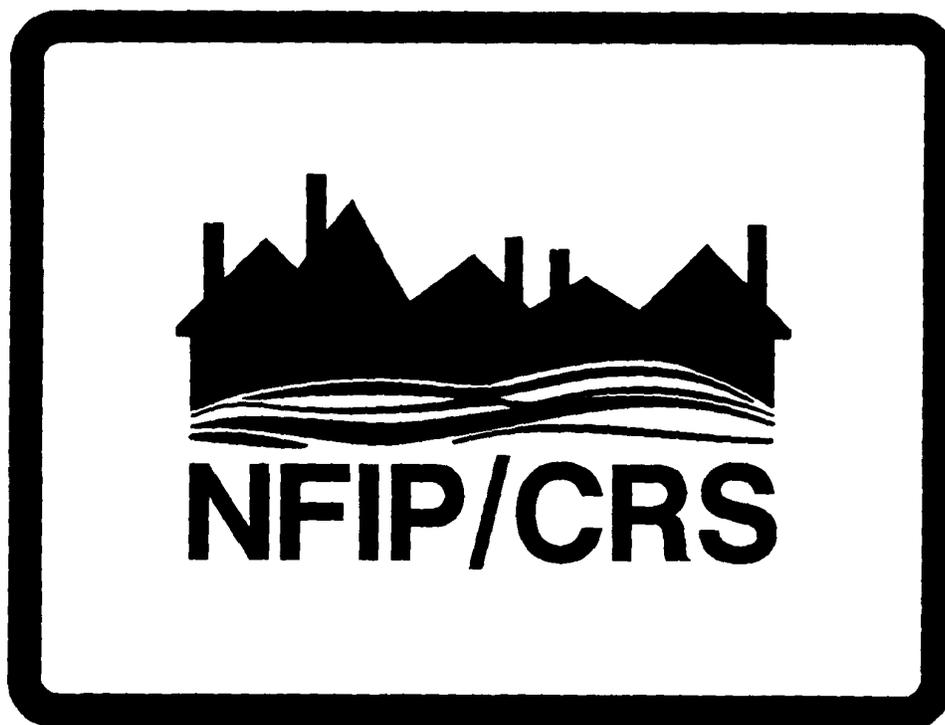


**National Flood Insurance Program
Community Rating System**



**CRS CREDIT FOR
DRAINAGE SYSTEM
MAINTENANCE**

January 1999

Note on this January 1999 Edition: This document was revised to reflect the following major changes in the 1999 *CRS Coordinator's Manual*:

- The credit criteria for channel and basin debris removal (CDR) was substantially revised. The total points remain the same, but credit is no longer based solely on the frequency of inspections.
- The example CDR procedures for Watertown were revised to maintain most of the example community's credit points under the new scoring.
- Excerpts from example drainage maintenance procedures published by the American Fisheries Society have been added.
- The credit for stream dumping regulations (SDR) is no longer tied to CDR and the frequency of inspection.

It should be noted that, in spite of these changes, most communities will still receive some credit with little or no change to their programs. The SDR examples in this publication are the same ones used in the 1995 and 1996 editions and the CDR example had only minor changes.

This document was prepared for the Community Rating Task Force by the Insurance Services Office, Inc., with support from French & Associates, Ltd., and the Association of State Floodplain Managers, Inc.

If a community is interested in applying for flood insurance premium credits through the Community Rating System (CRS), it should have the *CRS Application*. The *CRS Coordinator's Manual* provides a more detailed explanation of the credit criteria. These and other publications on the CRS are available at no cost from:

Flood Publications
NFIP/CRS
P.O. Box 501016
Indianapolis, IN 46250-1016
(317) 848-2898
Fax: (317) 848-3578

They can also be viewed and downloaded from FEMA's Website, www.fema.gov/nfip

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The cooperation provided by Arlington County, Virginia; Mandeville, Louisiana; Margate, Florida; South Holland, Illinois; the American Fisheries Society; and the Louisville and Jefferson County Metropolitan Sewer District is appreciated.

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CREDIT CRITERIA

In the 500 series of activities, the Community Rating System (CRS) provides credit for activities that prevent or reduce flood damage to existing development. Activities 520 (Acquisition and Relocation) and 530 (Retrofitting) credit actions taken on individual buildings to protect them from flooding.

Activity 540 (Drainage System Maintenance) provides credit for maintaining the local drainage system in order to prevent flooding that is caused by blockages or reduction in storage resulting from accumulations of debris. When human-made or natural debris is allowed to accumulate, it can create a dam in a channel or fill needed storage areas. Although a properly maintained channel can carry runoff from most small storms, a blocked or dammed channel can cause more frequent overbank flooding, unexpected erosion, and sedimentation.

Similarly, a lack of maintenance can result in detention or retention basins being filled with sediment or debris. If these basins are already full of sediment or debris, they cannot store water and flooding can result because the drainage system cannot do its job. Maintenance of these human-made facilities includes care for the outlets, pumps, wells, and other parts that are needed for the basins to work.

Many communities have programs and procedures for inspecting and clearing streams, ditches, and other channels; inspecting and cleaning retention or detention basins; cleaning storm sewers; stabilizing stream banks; dredging; and straightening channels. Only the first two of these activities are necessary for CRS credit, although additional credit is provided if the community's program includes permanent modifications of the drainage system.

This publication is provided to clarify what is needed for CRS credit and to offer examples of how local programs are scored. It should be used in conjunction with the *CRS Coordinator's Manual*, which can be ordered through the office listed on the inside front cover.

540 Drainage System Maintenance

This activity recognizes three elements of a community's drainage system maintenance program: maintenance of channels and storage basins, regulations that prohibit dumping in drainageways, and routine inspection and maintenance of coastal erosion protection facilities.

This section reviews the first two elements and explains the prerequisites for recognition by the CRS. Maintenance of coastal erosion protection includes dune or mangrove preservation, bluff stabilization, and beach nourishment programs. This third element is described in more detail in a separate publication, *CRS Commentary Supplement for Special Hazards Credit*. It can be ordered through the office listed on the inside front cover.

Maintaining channels and basins can be augmented by a program to limit the amount of runoff from new developments and one that controls erosion and sediment leaving construction sites. CRS Activity 450 (Stormwater Management) explains the credit points for regulating construction and other land alteration activities to minimize runoff and sediment-laden

stormwater. A comprehensive community drainage program should include elements from both Activities 540 (Drainage System Maintenance) and 450 (Stormwater Management).

Under the 1999 *CRS Coordinator's Manual* credit criteria for Activity 450, if the community wants credit for public maintenance of new stormwater management facilities, it must have procedures that meet the same requirements as the procedures for Activity 540 explained here. It is strongly recommended that these procedures be in the same document, especially because the two maintenance programs are most likely conducted by the same personnel.

Channel and Basin Debris Removal (CDR)

This element is known by its acronym, "CDR." CDR work can be limited to removal of log jams, trash, fallen trees, shopping carts, and similar debris that can dam a stream and cause flooding. It must also include inspection and maintenance of human-made storage basins, including their pumps, outfall pipes, and related facilities.

A community requesting credit for its program must submit documentation that explains how it operates. Section 544.a specifies five key items that need to be included:

1. Who is responsible
2. What part of the drainage system is covered
3. Inspection procedures
4. Maintenance procedures
5. Records

These five items are covered in more detail here.

1. Who is Responsible. Two jobs need to be performed: inspections and maintenance. The documentation submitted must identify what person or office is responsible for each. In most cases, the drainage system is inspected and maintained by the community's public works department or a similar agency. However, what counts for the CRS is not who does the work but whether it is being done.

The agency that administers the program does not have to be the community. Many communities are in flood control or drainage districts that perform both jobs. In other cases, a community employee will do the inspection and the community will contract with a private company to perform the maintenance.

In many communities, property owners' associations are responsible for maintenance of retention or detention basins on their property. The CRS can provide credit for this arrangement only if the community has an inspection program AND the authority to order the owner to perform needed maintenance. The CRS also recognizes programs that require the owner to submit periodic inspection reports signed by a licensed engineer.

In short, the community must show that the job will get done according to its inspection and maintenance schedule. No credit is provided for projects that are dependent on unsecured

outside funding, such as a special appropriation from the state legislature or approval of a Corps of Engineers' clearing and snagging project. Secured outside funding, such as projects financed by an annual state distribution of gasoline tax receipts, is acceptable.

2. Area Covered by the Program. Each community must define its own drainage system for this activity. This is best done on a map with a narrative that is included in the drainage system maintenance procedures submitted with the CRS application (see Section 544.a.2).

The community must be able to describe its "drainage system." For the purposes of this activity, a drainage system consists of all natural and human-made watercourses, conduits, and storage basins that must be maintained in order to prevent flood damage to buildings from smaller, more frequent storms. In some communities, this will include streets, roadside ditches, underground storm sewers, and inlets, as well as open channels and detention and retention basins.

Facilities covered. The determination of a community's drainage system is based on what facilities need to be maintained in order to prevent damage to buildings. In some communities, it will be open channels and ditches. In a flat community, especially one protected by a levee, maintaining storm sewers, sewer inlets, canals and pump stations may be vital to prevent flooding. In some areas of a community, roadside ditches are important conveyors of surface water and must be kept cleaned. In urbanizing watersheds, storage basins may be vital to preventing small storms from flooding buildings.

The drainage system must include watercourses identified on the community's Flood Insurance Rate Map (FIRM) AND watercourses not in the floodplain (in B, C, or X Zones). In fact, the CRS is particularly concerned with flood insurance claims paid on properties that are not in the floodplain. Most of these claims are due to inadequately sized or maintained drainage facilities in B, C, or X Zones.

The sites of flood insurance and disaster assistance claims should be considered by the community in determining the extent of the local drainage system that deserves regular maintenance. In communities with repetitive losses, the drainage system **MUST** cover those areas having repetitive loss properties where the cause of the losses was due to local drainage problems or smaller, more frequent storms.

Facilities not covered. Certain areas do NOT need to be included in the drainage system maintenance program. While the following parts of a drainage system should be maintained, they are not necessary for CRS credit:

1. Drainage facilities in undeveloped areas. For CRS credit, a community only needs to maintain those facilities where debris blockages would result in flooding of insurable buildings. Therefore, agricultural areas, parks, and areas with less than one building per acre do not need to be covered by the drainage maintenance program. Section 542, Impact Adjustment, explains how to exempt streams or ditches in rural areas, parks, or lands preserved as open space.

2. Swales and other grading techniques that direct water from a single private lot to the streets or drainage ditches.
3. Channels that will not inundate buildings during a flood, such as deeply incised ravines.
4. Natural storage areas. Lakes, ponds, marshes, and wetlands can usually absorb debris without significantly affecting their storage capacities. Because of their natural resource benefits, the CRS encourages communities to maintain their appearance and prevent dumping into them. The CRS does not advocate maintenance activities that disturb wetlands and other natural areas.
5. Irrigation canals. These do not need to be included unless they are specifically designed to be part of the community's drainage system or they intercept drainageways during high flows, either intentionally or accidentally.

Private property. In many areas of the country, property lines run to the middle of a stream or ditch. Often owners are legally responsible for maintenance of a channel on their property. This condition does not exempt the channel from the community's maintenance program. Obstructions and debris in such watercourses cause flooding.

A community must have the legal authority to inspect the channels and basins that it identifies as part of its drainage system. A community without the authority to enter properties to inspect all channels and basins may demonstrate that it has adequate visibility from public property to see them all. On the other hand, a program that only inspects bridges and culverts will not be recognized for credit.

A community must also have the authority to remove debris. This means that it is authorized either to enter the properties to perform maintenance or to order the owner to perform the maintenance. If there are areas where the community does not have these authorities, then it must modify its credit points to reflect how much of the drainage system it can inspect and maintain. This is discussed in Section 542, Impact Adjustment (page 11) and in the Watertown example (page 19).

It is important to note that this activity is verified in the field. An ISO/CRS Specialist will check a sample of stream segments and basins in the areas where the community states that it maintains them. If the field check shows that maintenance is not being performed according to the community's written procedures, the credit points will be adjusted. Citations issued to private property owners are not considered maintenance unless they are enforced and bring results.

The community's "drainage system" does not have to include facilities that only drain one lot. In order to draw the line between public and private maintenance responsibility, the community may exempt landscaping swales, low ground along property lines, or small drainageways from its program. However, facilities that are needed to drain several lots, such as a swale or ditch that runs through several private properties, must be considered part of the drainage system that needs to be inspected and maintained.

Altered watercourses. The CRS provides credit for activities that are “above and beyond” the minimum requirements of the National Flood Insurance Program (NFIP). If a stream is altered after the community’s Flood Insurance Rate Map is published, the NFIP requires the community to ensure that the channel’s carrying capacity is not adversely altered (44 *CFR* 60.3(b)(7)).

There is no CRS credit for maintaining such altered watercourses, because the maintenance is a minimum requirement of the NFIP. In fact, failure to maintain such watercourses may result in a FIRM revision.

3. Inspection Procedures. Inspection and maintenance requirements vary widely across the country. In areas with high rainfall, some communities may need to remove vegetation several times each year in order to ensure that its channels function properly. On the other hand, desert channels and debris basins may only need to be maintained after storms. This may vary highly within a community from year to year if there are no major storms one year and several the next. However, periodic INSPECTION of channels and basins in developed areas is needed in every community to prevent the accumulation of debris deposited by dumpers and careless people.

For the basic CRS credit, inspections must be conducted:

- At least once each year,
- After each storm that could adversely impact the drainage system, and
- In response to citizen’s complaints.

These should be considered minimums. Local conditions may well warrant more frequent regular inspections.

The CRS will not provide credit for a program that only makes inspections when a complaint is filed. While the program must respond to complaints, regular inspections are vital. Often complaints are filed after the problem causes a flood. The objective of drainage system maintenance is to prevent such problems. It should be noted that CRS Activity 330 (Outreach Projects) encourages communities to advise their residents on how to submit complaints, especially if they see illegal dumping (see Watertown example, page 34).

Problem sites. While annual inspection may be sufficient for many parts of the drainage system, some spots may need more frequent checks. Additional credit is provided if the community “identifies specific problem sites that are inspected and maintained differently or more frequently than other parts of the drainage system.”

For example, some areas may be more prone to vandalism or dumping or some culverts may catch debris more than others. Drainage maintenance procedures that recognize different needs for different parts of the drainage system receive more CRS credit.

4. Maintenance Procedures. Typical problems found in open channels include trash, shopping carts, tires, plastic containers, branches, and logjams. Typical storage basin problems that must be fixed include clogged inlets and outlets, basin sedimentation, and broken pumps. A regular maintenance program with inspections can prevent these items from becoming big

problems. When found early, they can often be removed or corrected with minimal equipment and expense.

The maintenance work for the basic CRS credit is normally carried out by a public works crew or contractor, usually without heavy equipment. The objective is to remove debris that has accumulated, such as shopping carts and log jams. For this CRS credit, the community's program must clearly describe what can and cannot be removed.

Stream classification. The community's drainage system maintenance program must identify what is considered a problem and what happens when a problem is found. This may require classifying streams and basins as natural and human-made and treating them differently. Debris like trash would be removed from both but the community would only mow and remove small trees from the human-made ditches. Figure 1 shows the main characteristics of natural and human-made ditches.

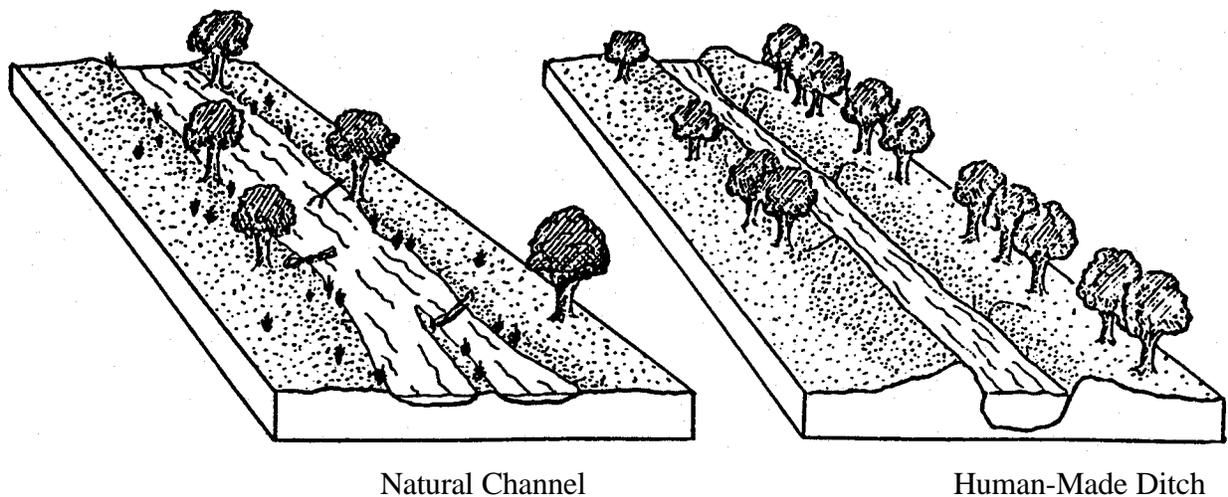


Figure 1. Natural and human-made ditches

Natural channels. The natural channel has a wider area in which to flow. Trees and small log or debris jams can be accommodated by minor diversions of flow without causing any problems. In fact, vegetation and minor obstructions that cause riffles and pools are desired in many natural streams because they improve habitat and water quality.

Human-made ditches. A human-made drainage ditch or canal is designed to use less area to carry more water. These channels need more attention because there is no room to carry overflows caused by blockages. They are not intended to have trees and other vegetation growing in them. In human-made ditches, too much vegetation is considered "debris." Therefore, if an inspection finds trees and brush growing in the channel, they have to be removed. Regular mowing and grubbing ensures that these channels do their job.

Maintenance of natural channels. The community's program should not treat natural and human-made ditches similarly. In natural streams, natural organic debris like branches should be left in the channel as long as it does not cause a flood problem. Such debris is part of the natural

system that provides a habitat for water-dependent life. Although debris that accumulates at a bridge can cause a major obstruction and should be removed, branches that fall in other locations that would not impact flooding could be left to help maintain the natural habitat.

Another problem in natural streams is that new vegetation grows close to the ground. It forms more resistance to flood flows than taller, more mature bushes and trees. If the vegetation is cut every year, the community may be preserving flood obstructions. On the other hand, allowing the vegetation to reach maturity may improve the channel's flood carrying capacity and provide for a better habitat.

In short, drainage system maintenance programs need to take into account the habitat and recreational as well as the flood control facets of the stream. The community with a multi-objective approach to its river corridors will best be able to handle the competing interests and get the best results from its stream maintenance efforts.

Bank erosion. Another kind of problem is bank erosion. This is more important where there are steeper banks, such as in a human-made ditch, and where houses or bridges are threatened by the erosion. Because bank erosion usually does not cause an obstruction to flood flows, CRS credits do not reflect local programs that deal with it. Similarly, bridge and culvert maintenance are only considered if their condition obstructs the flow of water.

Storage basins. Retention and detention basins are usually human-made. Normally, the owners of basins on private property have agreed to specific maintenance requirements. Typical problems are obstructions to inlets and outlets, sedimentation, and pump failure. As with bank stabilization, CRS credits are not adjusted if there are problems with appearance and aesthetics.

State permits. If the community has the right to enter all affected properties to perform maintenance, there should be no legal problems. In some cases, a state permit may be required. Usually a state permit is needed only for major projects, such as channel widening or bank stabilization. If a permit is needed for routine maintenance and debris removal, a general permit can often be obtained for a period of years and that specifies what work can be done. The community's program needs to identify the instances in which a state permit is needed.

Capital improvements. For the basic CRS credit, one-time-only projects like channel alterations are not needed. However, additional credit is provided if the community has an ongoing program, such as a capital improvements plan, to eliminate or correct problem sites or to construct "low maintenance" channels or other facilities. These could include:

- Reconstructing or enlarging bridge openings,
- Modifying a channel,
- Dredging or removing sedimentation,
- Placing rip-rap on banks,
- Reconstructing inlets and outlets,
- Installing grates to catch debris,
- Constructing new storage basins to reduce flows into channels,
- Replacing of pumps, or

- Planting willow shoots or installing other “soft” bank protection measures.

These items are not routine maintenance but they can reduce surface flooding and other damage caused by smaller, more frequent storms. They can also reduce a community’s overall maintenance effort by correcting known problem sites.

There is no credit for capital improvements if:

- The community does not have a written capital improvements or drainage system improvements plan, or
- The community does not budget money on an annual basis for drainage system improvement projects.

Infrequent capital expenditures are not credited. However, if the community has a master plan that shows that few or no capital improvements are needed, then a program that funds a project only every few years can be recognized.

5. Records. A maintenance program needs records. The ISO/CRS Specialist will verify the program by field checking both the channels and basins and the records that demonstrate periodic inspections and corrective actions taken. Other records that may be needed are citizen complaint forms and state permits. Examples of inspection and maintenance records are included on pages 31, 32 and 39.

Stream Dumping Regulations (SDR)

The second element in CRS recognition of drainage system maintenance credits regulations prohibiting the dumping of trash and debris in streams and storage basins. This element is known by its acronym, “SDR.”

Regulatory language. The community’s regulations must include the following items:

1. A prohibition against dumping any material in a channel or basin that could cause an obstruction to flows. The ordinance or law must specifically prohibit dumping in streams and ditches.

An ordinance that prohibits littering in public places or similar general nuisances is not acceptable. These types of ordinances focus on noxious materials, like garbage. Many non-noxious materials, such as logs, tree limbs, and grass clippings, can obstruct flows. Therefore, the ordinance must specifically address the problem of keeping channels clear of all materials, including brush, fill, and landscape waste, which are normally not covered in a littering ordinance. However, it does not need to include liquids.

2. Identification of an officer or office responsible for monitoring compliance and conducting enforcement actions. It must be clear that if a violation is found, the community or other enforcement agency will pursue it. It is not sufficient to rely on an ordinance that depends on a citizen to initiate a civil suit against a neighbor or other violator.

Usually the enforcing agency is the police department, environmental control officer, or the building or housing code department. In some states, a state law has qualified for SDR credit. However, those states have field enforcement officers who patrol the streams and have the authority to issue citations.

3. Provisions for penalties and abatement of violations. It must be clear that there is a penalty for violating the dumping regulations and that someone has the authority to order the obstruction removed.

These provisions do not have to be in the same ordinance. A photocopy of the appropriate sections of the ordinance(s) or law(s) must be attached to the submittal. Examples of ordinance or law language are included at the end of this publication. *NOTE: The example ordinance language provided in this publication is based on actual ordinances used by CRS communities. All ordinance language should be reviewed by legal counsel before adoption.*

Outreach project. The credit points for SDR are doubled if the community publicizes the regulatory requirements. This can be done by one of four kinds of outreach projects:

1. An outreach project to the community credited under OPC in Activity 330 (Outreach Projects),
2. An outreach project pursuant to the public information strategy (OPS) credited in Activity 330, provided the public information strategy document discusses publicizing drainage system maintenance,
3. An outreach project that advises all residents and businesses in the community about the regulations, but is not credited under Activity 330, or
4. Posting “no dumping in the stream” signs at key locations in the drainage system, such as frequent problem spots, schools, and public parks (see example of a sign that has been used by several CRS communities).



If alternatives 1—3 are used, the annual outreach project must cover the topic of drainage system maintenance. It must inform residents about the regulations and how to report violations. An example of such a project appears in Figure 330-1 of the *CRS Coordinator’s Manual* and in the examples in *CRS Credit for Outreach Projects* (which can be ordered through the office listed on the inside front cover). Watertown uses this approach, too (see page 34).

541 Credit Points

Three elements provide credit points under Activity 540. “CDR” is the variable for the element channel and basin debris removal. It provides up to 300 points, one of the largest credits in the CRS. “SDR” is the variable for the element stream dumping regulations, and provides up to 30

points. “EPM” is the variable for the element coastal erosion protection maintenance, which provides up to 50 points.

a. Channel and Basin Debris Removal (CDR)

The credit for CDR is provided only if the community can demonstrate that its program meets the five credit criteria points discussed on pages 2–8. The following credit points are provided based on the community’s program:

1. 200 points are provided for the basic program. The community’s drainage system maintenance program must include all of the following criteria:
 - (a) The entire drainage system is inspected at least once each year,
 - (b) An inspection is conducted after each storm that could adversely impact the drainage system,
 - (c) Inspections are conducted in response to citizens’ complaints, and
 - (d) Action is taken after an inspection identifies a need for maintenance or cleaning.

The community’s drainage system maintenance procedures (discussed in more detail in Section 544.a) must show how these four items are addressed. It is important to note that the points are not based on cost of the program, the source of funding, the amount of debris removed, and similar administrative issues. What counts is that the community inspects and maintains its drainage system, on a regular basis and when it is shown that maintenance is needed.

2. An additional 50 points is provided if the community’s program identifies specific problem sites that are inspected and maintained differently or more frequently than other parts of the drainage system. Problem sites can be channel constrictions, habitual debris catchers, undersized culverts, facilities near schools or other source of vandalism, etc. The procedures must list these sites (or show them on a map) and describe how they are treated differently, usually through more frequent inspections.
3. Another 50 points can be added to the basic program’s 200 points if the community has an ongoing program to eliminate or correct problem sites or otherwise reduce drainage problems or maintenance work. As discussed on page 7, funds must be spent annually on capital improvements or the community must have a master drainage improvement plan that shows that few or no capital improvements are needed.

The credit for CDR is the sum of these three items. CDR can = 200, 250, or 300, depending on the community’s program. The first item must be credited for any CDR credit (e.g., if the community does not have a regular maintenance program, there is no credit for a capital improvements program).

Verification visit. During the verification visit, the ISO/CRS Specialist will check the actual condition of the drainage system. The ISO/CRS Specialist will conduct a field survey to verify that the channels and basins are clear. A sample of five sites will be examined. If one or more is not maintained in accordance with the community's explanation of its program, the ISO/CRS Specialist will look at five more sites. Based on the review of the 10 sites, the value for CDR will be adjusted.

For example, if the survey finds three of the 10 sites to have debris or growth that should have been removed, then the value for CDR will be reduced by 30%. If more than five of the 10 sites have not been maintained, a third sample of five sites will be inspected. If the final result is that more than 50% of the sites have not been maintained, vCDR = 0 and the credit for CDR will be zeroed out ("vCDR" stands for the verified CDR score).

Many communities have different maintenance requirements for natural and human-made ditches. Normally more vegetation and trees are allowed in natural channels. It is important that the program explanation identify the channels and the maintenance procedures for each type. Otherwise, the ISO/CRS Specialist may survey a natural channel but assume that it should be maintained like a human-made one.

b. Stream Dumping Regulations (SDR)

If the community's regulations meets the three credit criteria specified under "regulatory language" on page 8, then it qualifies for SDR credit.

1. SDR = 15 points if the stream dumping regulations meet all three regulatory language criteria.
2. SDR = 30 points if the regulations meet the three criteria and the community publicizes the requirements. The publicity requirements are discussed under "outreach project" on page 9.

c. Coastal Erosion Protection Maintenance (EPM)

Credit for EPM is described in Section 540 in *CRS Commentary Supplement for Special Hazards Credit*. The credit calculations are recorded on a separate activity worksheet, AW-540SH. The credit points, cEPM, are transferred from AW-540SH to AW-540. The worksheet is in *CRS Commentary Supplement for Special Hazards Credit*, which can be ordered using the form in Appendix E of the *Coordinator's Manual* or through the office listed on the inside front cover.

542 Impact Adjustment

Most communities provide the same drainage maintenance service to all residents and therefore their programs cover the entire community. However, there may be cases in which a community can only inspect and maintain part of its drainage system. The impact adjustment modifies the credit points to reflect how much of the community's developed areas are covered by its drainage maintenance program.

To simplify the CRS application process, the impact adjustment is not included in the *CRS Application*. When the ISO/CRS Specialist conducts the verification visit, he or she will help determine the appropriate impact adjustment and will help with any needed calculations. The ISO/CRS Specialist completes activity worksheet AW-540 to determine the final or verified credit for this activity.

If the community wants to modify its program to receive more CRS credit, it submits AW-540 with its modification. Because the community should be familiar with AW-540, a completed example is included on page 24.

Developed areas. Full CRS credit is provided if the community inspects and maintains all parts of the system in developed areas. There is no set definition of “developed portions of the community.” At a minimum it includes subdivisions with lots of 1 acre or smaller. It does not need to include farms, forests, parks, or preserves unless obstructions in those areas will result in flooding of built-up areas.

The community only needs to demonstrate that there are no buildings threatened in areas not covered. For example, full credit is provided to a county that maintains the drainage system in built-up areas, even though it does not look after every ditch in its rural areas or in parks or preserves.

Indian reservations, lands owned by the state or another community, and federal land, such as national parks and military reservations, are generally beyond a community’s jurisdiction. These may be excluded from the drainage system maintenance program. More guidance on excluding these types of properties can be found in Section 403 of the *Coordinator’s Manual*.

Partial coverage. There are cases where drainage maintenance programs do not cover all developed areas. For example, a community may not have the legal authority to send inspectors or maintenance crews onto some properties. Some communities are just starting formal maintenance programs and are phasing in streams for regular inspections after major obstructions have been removed or after rights-of-way have been obtained. In some areas, state or federal regulations may prevent disturbing the habitat of an endangered species.

If the community cannot provide inspections and maintenance in all developed areas, the CRS credit points must be adjusted to reflect the impact of the program. This adjustment is done by multiplying the credit points for CDR by the percentage of the community covered. This percentage is represented by “rCDR,” which stands for the ratio of the area covered. There are three options that can be used to calculate this impact adjustment.

a. Option 1

Option 1 is used if the community inspects and maintains all of its drainage system as described under “Area covered by the program” on page 3 within all developed areas of the community.

Under Option 1, $rCDR = 1.0$. This means that the score for CDR is multiplied by 1.0. Full credit is received for CDR because the program affects the entire community.

NOTE: If the community uses Option 1, its submittal must include an Impact Adjustment Map that shows all channels and other drainage facilities in its developed areas.

If the community's program does not cover all drainage facilities in its developed areas, then it cannot receive full credit for CDR. The impact adjustment reduces the credit by multiplying CDR by a value less than 1.0 using Option 2 or Option 3.

b. Option 2

Under Option 2, rCDR = 0.2. The community receives 20% of the credit for CDR. Option 2 is used if the community does not want to calculate the areas affected by its program under Option 3 or if Option 3 calculations result in rCDR less than 0.2.

c. Option 3

Under Option 3, the total area covered by the drainage maintenance program must be calculated and divided by the area of the developed portion of the community. The area affected by the program is represented by "aCDR" in the formula. The area of the developed portion of the community is shown as "aDC." The formula is simply:

$$\text{rCDR} = \frac{\text{aCDR}}{\text{aDC}}$$

NOTE: If the community uses Option 3, its submittal must include an Impact Adjustment Map that shows all channels and other drainage facilities in its developed areas and identifies those that are covered by the maintenance program.

The term "area" is used to be consistent with impact adjustments in other CRS activities. For this activity, the community will find it easier to base the impact adjustment on the lengths of the channels rather than on area measurements. The following procedure is recommended:

1. On the Impact Adjustment Map, identify and mark all channels and basins that the community determines to be its drainage system based on the criteria discussed under "Area covered by the program" on page 3. Only those in the developed portions of the community need to be shown.
2. Mark the channels and basins subject to the inspection and maintenance program.
3. Measure the total length of the streams and ditches in miles, feet, yards, or other linear measurement. Measure basin perimeters in the same units.
4. The area or length of all the channels and basins is aDC. The area or length of those subject to inspection and maintenance is aCDR. These values are entered in Section 542.c of AW-540 (see example on page 24).

5. Include the map with the submittal of a modification. Keep a copy of the map along with your notes on your calculations for the ISO/CRS Specialist's verification visit.

If rCDR is less than or equal to 0.2, then Option 2 should be used. This will provide more credit points if rCDR is less than 0.2 and will eliminate the need for an Impact Adjustment Map. During the verification visit, the ISO/CRS Specialist will check how the community calculated aCDR and aDC.

543 Credit Calculation

To determine the credit points for this activity, the value for CDR is multiplied by the impact adjustment ratio, rCDR. The product is called the credit for CDR or "cCDR:"

a. $cCDR = CDR \times rCDR$

The value for the channel and basin debris removal program (cCDR) is then added to the credit points for the community's stream dumping regulations (SDR) and its coastal erosion protection program (cEPM). The result is the credit for Activity 540, Drainage System Maintenance or "c540:"

b. $c540 = cCDR + SDR + cEPM$

The credit calculations are shown on activity worksheet AW-540. An example of a completed worksheet is on page 24 in this publication and in Figure 540-1 in the *Coordinator's Manual*.

544 Credit Documentation

For a community's first application for a CRS classification, worksheet page 41 of the *CRS Application* is submitted along with the documentation described below. A blank copy is found at the end of the *CRS Application*.

Subsequent requests for credit are called modifications. Modifications include the activity worksheet AW-540 along with the documentation described below. This worksheet is also used by the ISO/CRS Specialist to calculate the community's verified credit. A completed example is provided on page 24 of this document.

A community may also opt to use the *CRS Calculation Software*, which calculates the points and prints the worksheets. The *CRS Application*, the software, and the paper activity worksheets can be ordered using the form in Appendix E of the *Coordinator's Manual* or by contacting the office listed on the inside of the front cover of this publication.

Section 544 on the *CRS Application* worksheet page 41 and on AW-540 is a checklist for the documentation needed in addition to the worksheet. Up to five items must be included with the community's submittal depending on the credit applied for. These are explained in Sections 544.a through e, below. Records showing that the inspections and subsequent maintenance were

performed will be needed during the verification visit, as noted in Section 544.f. These six items are needed to confirm that the community's program meets the CRS credit criteria.

If the community wants credit for coastal erosion protection maintenance (EPM), then the submittal also needs AW-540SH and the appropriate documentation described in Section 540SH of *CRS Commentary Supplement for Special Hazards Credit*.

a. Program Explanation

To receive credit for this activity, the applicant must attach a summary description of the community's drainage system maintenance procedures to its worksheet. The document must cover the five key items discussed on pages 2–9:

1. Who is responsible. This may include agencies other than the community's public works department, such as a drainage district, state highway department, or property owners' association. The community is still responsible for providing the materials needed to verify the program.
2. A description of the area covered by the program and a description of the types of channels (e.g., natural or human-made). These descriptions are only needed for the developed portions of the community. If the community uses Options 1 or 3 to determine the impact adjustment, the description must include a map of all open channels and storage basins in the developed area and show which ones are subject to the maintenance program (see Section 544.e). The drainage maintenance staff must have access to the property to conduct inspections and to perform the maintenance unless the community has the legal authority to order the owners to correct the problems.

Inspection procedures. The document must show:

- When the entire drainage system is inspected,
- Where and how soon inspections are conducted after a major storm, and
- How soon inspections are conducted after citizens' complaints.

If the community wants the additional 50 points under Section 541.a.2 for inspecting and maintaining specific problem sites differently or more frequently than other parts of the drainage system, the sites and inspections procedures need to be included.

4. Maintenance procedures. The document must show how soon after an inspection an area must be cleared and what can and cannot be removed. The actions may be different for different channels. For example, the procedures may call for the public works department to remove downed trees and underbrush from human-made ditches but to leave them in parks or natural areas. Simply stating that "problems are corrected" or "debris is removed" is not an adequate description of what actions are to be taken for the different types of materials that may be found.
5. Records kept for the inspections and subsequent actions. Generally, a program has forms for citizen complaints and inspection records that identify where maintenance is needed and

forms, such as work orders or time sheets, that record when and how the maintenance was done.

Some communities may already have written procedures that include most or all of the five topics. In these cases, the community would only need to write a memo explaining the missing information.

In all cases, the topics must be highlighted or identified by notes made in the margins. Examples are included on pages 25–32 and 35–39.

b. Capital Improvements Program

If the community wants the 50 points additional credit under 541.a.3 for constructing permanent modifications to its drainage system, it must document that it has an ongoing program. One way to do this is to provide a copy of a page from the community's annual budget or capital improvements budget, provided they identify multi-year expenditures. There must be one or more line items that clearly show that the funds are budgeted for drainage system improvements rather than routine maintenance. An example of such a budget is included on page 53.

Normally, annual capital improvements expenditures are based on a long term plan. The community may have a copy of a drainage system improvements plan that describes the long term needs and estimates annual funding needs for the next several years. An example is provided on page 43 for the Town of Wethersfield, Connecticut.

Especially in small communities, drainage system improvements may not be needed every year. If the community has a written capital improvements or drainage system improvements plan that shows that few or no capital improvements are needed, then a program that funds a project only every few years can be recognized.

c. Stream Dumping Ordinance

If the community regulates dumping in open channels and basins and it wants credit under SDR, it must attach a copy of the appropriate pages of the ordinance or statute. A photocopy of the appropriate sections of the ordinance(s) or law(s) must be attached to the worksheet. The acronym "SDR" must be marked in the margin and where the three required items of regulatory language appear (see page 8) must be shown. Examples of stream dumping ordinances are included on pages 33, 55, 56 and 57.

It is not necessary to submit a certified copy of each ordinance. The Chief Executive Officer's certification of the community's entire submittal is considered to include a certification that the ordinance or statute has been enacted into law and is being enforced (see Section 212.a in the *Coordinator's Manual*).

d. Outreach Project

If the community is applying for the full 30 points for its stream dumping regulations (SDR), the submittal must include a copy of the annual outreach project that explains that there are regulations against dumping and how to report violations. This can be:

- A notation that one of the outreach projects submitted for Activity 330 (Outreach Projects) includes the drainage maintenance topic,
- A photocopy of a notice that is distributed to all residents of the community each year, or
- A photo or photocopy of a “no dumping” sign.

A copy of the outreach project is submitted each year with the community’s annual recertification. The recertification is due to FEMA by October 1. The ISO/CRS Specialist provides the forms with specific instructions.

e. Impact Adjustment Map

If the community determines the impact adjustment ratios using Options 1 or 3 (Sections 542.a and 542.c), then the submittal must include an Impact Adjustment Map. The map must show all channels and other drainage facilities in the developed portion of the community and identify which channels and facilities are covered by the channel and basin debris removal program.

If the community does not have a map, the ISO/CRS Specialist will calculate the credit points based on Option 2. An example map is on page 30.

A community may use Option 2 on its submittal and provide the Impact Adjustment Map for Option 3 credit during the verification visit.

f. Records

During the verification visit, the ISO/CRS Specialist will ask to see records that demonstrate that the inspections and maintenance were performed. Because the community’s credit is partially based on the frequency of inspections, there must be documentation that shows that the inspections were conducted on schedule and that needed maintenance was performed. These records can be in the form of inspection reports, memoranda on inspection findings, completed work orders, landfill receipts, time sheets, etc..

These records are not submitted with the application or modification. They are made available for review by the ISO/CRS Specialist during the verification visit. Examples of these records are included in the Watertown example (pages 31 and 32) and the Arlington County program explanation (page 39).

Each year copies of typical inspection and maintenance records for that year are submitted with the annual recertification. The recertification is due to FEMA by October 1. The ISO/CRS Specialist provides the forms with specific instructions.

545 For More Information

Communities can request help on this activity from the U.S. Natural Resources Conservation Service. Requests should be submitted to the local soil and water conservation district, which is usually located in the county seat. Urban communities may be within an urban drainage or sewer district that has drainage maintenance staff. Some state departments of natural resources or water resources also have drainage maintenance expertise.

Stream Obstruction Removal Guidelines, by C. McConnell, published in 1983 by The Wildlife Society and American Fisheries Society, provides simple and easy to understand guidelines for a channel maintenance program that has a minimal impact on habitat. Some excerpts from this publication appear on pages 40–42. It can be ordered for \$8 plus shipping from the American Fisheries Society, 5410 Grosvenor Lane, Bethesda, MD 20814.

EXAMPLE PROGRAM FOR WATERTOWN

Many communities have asked for examples of programs that would receive credit under Activity 540 (Drainage System Maintenance). Beginning on page 24 is an example of the documents submitted by the fictitious community of Watertown. The objective of the example is to illustrate the nature of the documentation that is required to be submitted for credit for Activity 540 and to give a sense of the level of detail that is needed.

540 Drainage System Maintenance

Watertown prepared a floodplain management plan after it was badly flooded in 1990. One of the plan's recommendations was to prepare a stream maintenance SOP (standard operating procedure). The SOP needed to be approved by the state's Department of Natural Resources to ensure that it met state regulations on channel work. A general state permit was issued allowing the city to conduct maintenance projects in accordance with the SOP.

The SOP, which appears on page 25, was prepared by the City and approved by the Department of Natural Resources. It is the basis of Watertown's drainage system maintenance program. The City's CRS Coordinator reviewed the SOP in 1994 with the Director of Public Works. A few revisions were made to ensure that CRS documentation requirements were included.

After the draft 1999 *CRS Coordinator's Manual* was published, the CRS Coordinator and the Director of Public Works met again. A few more changes were made to ensure that the SOP clearly met the latest CRS credit criteria. These changes are shown as shaded sections.

The margins are marked to show the five items that need to be documented:

1. Who is responsible: This is described in Section 2. Responsibilities. Overall responsibility has been given to the Director of the Department of Public Works. The Director of the Park Department is responsible for work on park property.
2. Area covered by the program: Watertown has one stream identified in its mapped Special Flood Hazard Area: Riley River. There are two creeks and four ditches outside the mapped floodplain. As listed in Section 3.a, Jurisdiction, the City is able to inspect and maintain those on public property and in the newer subdivisions where maintenance easements were required. There is also a retention basin in a new subdivision. The map on page 30 shows these drainage facilities.

The City is not able to maintain two stretches of channels on private property in the older part of town: Decker Ditch and Bayberry Ditch upstream of 13th Street. Maintenance along these streams is left up to the adjacent owners. The City does not inspect or maintain streams on federal property or in the Superior County Forest Preserve, north of Superior Boulevard.

3. Inspection procedures: Section 5. Identification of Problems notes that the City inspects all watercourses and basins at least twice a year. It also inspects known problem sites after storms and it responds to complaints.

4. Maintenance procedures: Section 6.a of Watertown’s SOP specifies four types of maintenance problems. Section 6.b explains what is done in response to each. The City’s program treats most of the watercourses as human-made ditches. Trash, vegetative growth, and obstructions must be removed within a designated time. The City only maintains the drainage system where it has authority. Elsewhere it is up to the owner.

Three areas are being kept close to their natural states: the Superior County Forest Preserve, Bayberry Ditch in and downstream of Alexander Park, and the channel through the Chestnut Creek Country Club. Channels in these three areas are treated as natural streams. While trash and obstructions are removed, vegetative growth is allowed.

5. Records: The City keeps a record of each inspection on the “Drainage Inspection Record” form found on page 31. If a routine inspection, post-storm inspection, or follow up to a citizen’s complaint find a problem, a “Drainage Problem Report” is filled out and forwarded to the appropriate office (see page 32).

541 Credit Points

a. Channel and Basin Debris Removal (CDR)

Because Watertown’s drainage system maintenance program meets the criteria for Activity 540, it qualifies for the basic 200 points of CDR credit under 541.a. Sections 5.b and 5.c of the SOP identify areas that are treated differently and inspected more frequently. These procedures qualify for the additional 50 points under 541.a.2.

While the city periodically builds channel improvement projects, it has no formal program or long range plan. It does not qualify for the additional 50 points for a capital improvements program under 541.a.3

$$\text{CDR} = 200 + 50 = 250$$

b. Stream Dumping Regulations (SDR)

Watertown receives credit for SDR for Ordinance #94-22. The city’s annual outreach project to the community (OPC) credited under Activity 330 publicizes this regulation, why it is important to keep the streams and basins clear, and how to report dumping violations and vandalism.

$$\text{SDR} = 30$$

c. Coastal Erosion Protection Maintenance (EPM)

Watertown is not a coastal community, so it does not apply for this credit.

542 Impact Adjustment

Watertown's channels and storage basins are shown on the drainage system map on page 29. The Department of Public Works has legal access along the Riley River, city streets, state and county roads, and on private property with drainage easements. The Park Department handles channels and basins on park property. These areas are listed in Section 3. Jurisdiction in the SOP.

If the City's program resulted in effective maintenance along all of these rivers, creeks, and ditches, it could use Option 1 for its impact adjustment. However, as noted on the map, there are some areas that are not covered:

1. There is no maintenance performed in the Superior County Forest Preserve, which owns the lands upstream of Superior Boulevard. The County does allow the City's Park Superintendent (or a trained designee) to inspect the culverts to determine if debris may threaten to cause water to go over Superior Boulevard. Otherwise, the Forest Preserve policy to not alter the accumulation of natural debris and growth in its channels.
2. There is no public maintenance on country club property along Chestnut Creek. However, as with the forest preserve, this area is undeveloped and does not need to be included in the City's program for full CRS credit.
3. Watertown does not inspect or maintain streams on federal prison property. But federal lands are not considered part of the regulatory floodplain (see Section 403 in the *Coordinator's Manual*), so they can be excluded from the City's drainage maintenance jurisdiction.
4. There are two channels in the older section of the City that are on private property: Decker Ditch and Bayberry Ditch upstream of Alexander Park (13th Street). On private property without easements, the City relies on property owners to remove trash, minor problems and obstructions. The City has found that many owners do not comply and the City Attorney has been unwilling or unable to order owners to do the work. Therefore, the City cannot claim that its program is effective in all developed portions of the community.

Less than 100% of the channels and basins in the developed parts of the community are covered by the maintenance program, so Watertown cannot use Option 1 for the impact adjustment. The City can choose between Options 2 and 3. Under Option 2, rCDR = 0.2. Under Option 3, the affected areas need to be measured. The affected channel lengths are displayed below (in feet).

<u>Stream</u>	<u>Undeveloped</u>	<u>Federal</u>	<u>Developed w/Access</u>	<u>Developed w/o Access</u>	<u>Total Developed</u>
Riley River		950	4,800		4,800
Chestnut Creek	2,300	1,300	650		650
Center Creek	500		6,500		6,500
North Ditch	500		1,500		1,500
Indian Estates basin			1,200		1,200
Decker Ditch				1,800	1,800
Bayberry Ditch			2,400	650	3,050
SR 153 ditch			<u>1,750</u>		<u>1,750</u>
	<u>3,300</u>	<u>2,250</u>	18,800	2,450	21,250

$$a\text{CDR} = 18,100 \quad a\text{DC} = 21,250 \quad r\text{CDR} = \frac{a\text{CDR}}{a\text{DC}} = \frac{18,800}{21,250} = 0.88$$

rCDR from Option 3 (0.88) is greater than rCDR from Option 2 (0.2), so Watertown uses Option 3 instead of Option 2.

543 Credit Calculation

- a. $c\text{CDR} = \text{CDR} \times r\text{CDR} = 250 \times 0.88 = 220$
- b. $c540 = c\text{CDR} + \text{SDR} + c\text{EPM} = 220 + 30 + 0 = 250$

These values are entered in activity worksheet AW-540 on page 24.

When the verification visit is conducted, the ISO/CRS Specialist will only visit those sites the Coordinator included under aCDR. As a result, the verification visit will probably find 100% of the sites checked in order and Watertown would receive a verified score of 250.

If Watertown did not exclude some areas from aCDR and used Option 1 for the impact adjustment, its applied score for CDR would be 250. However, the ISO/CRS Specialist’s sample might include sites where debris had not been removed. For example, if only seven of the 10 sites were well maintained, the City would have a verified score for CDR, vCDR of 175 (70% of 250, the credit calculated under Option 1).

If less than 50% of the sites checked were properly maintained, Watertown would lose all credit for this activity. It can be seen that a community should only claim credit for those areas where it is sure the channels and basins will be maintained.

544 Credit Documentation

a. Program Explanation

As noted in the discussion on pages 19–20, Watertown’s “Stream Maintenance SOP” on pages 25–32 provides adequate documentation for this requirement. The SOP was prepared in 1991. The City revised the SOP in 1994 and 1999 to update it and to ensure that it included some items needed for the CRS documentation. The CRS Coordinator has marked the margins to show where the five items are covered.

b. Capital Improvements Program

Watertown is not applying for credit for a capital or drainage improvement program, so there is no documentation included here. Examples of acceptable documentation for two other communities appears on pages 44–54.

c. Stream Dumping Ordinance

Watertown passed Ordinance #94-22 (page 33) to be sure it had the legal basis for the stream dumping regulations recognized by the CRS. It includes all three items needed:

1. A prohibition of dumping any material in a channel or basin that could cause an obstruction to flows (Section 1).
2. Identification of an officer or office responsible for enforcement and monitoring compliance (Chapter 12 is the responsibility of the Health Inspector).
3. Provision for penalties and abatement of violations (Sections 2–3).

d. Outreach Project

Watertown publicizes its stream dumping regulations in its annual outreach project to the community, a series of articles in the city's newsletter that is sent to all residents. A copy of the latest article is included with the submittal and appears on page 34.

e. Impact Adjustment Map

Because Watertown is using Option 3, the submittal must include the Impact Adjustment Map, a copy of which is on page 30. Watertown's CRS Coordinator must also keep the notes on how aCDR and aDC were calculated.

f. Records

The City's "Drainage Inspection Record" and "Drainage Problem Report" (pages 31–32) provide excellent records of problems that were identified and maintenance performed.

City of Watertown, ST

"Birthplace of Father Riley"

May 15, 1991

Revised: October 17, 1994

Revised: February 15, 1999

STREAM MAINTENANCE SOP

1. Objective: This Standard Operating Procedure (SOP) specifies responsibilities and procedures for inspecting and cleaning the rivers, creeks, ditches, and storage basins in the City of Watertown.
2. Responsibilities
 - a. The Director of the Department of Public Works is responsible for the administration of this SOP. He shall inspect the rivers, creeks, ditches, and retention basins and ensure that they are cleaned in accordance with this SOP.
 - b. The Director of the Park Department is responsible for maintenance of all drainage facilities on Park Department property.
 - c. The Superior County Forest Preserve District, the Chestnut Creek Country Club, and the Federal Prison are responsible for maintenance of all ditches and streams on their properties.
 - d. All work on state and county property and highway bridges shall be coordinated with the appropriate state and county offices.
 - e. Property owners are responsible for maintaining the ditches, streams, and retention basins on their properties. City personnel shall not enter onto private property unless an easement has been obtained or unless the problem is deemed an emergency and guidance has been provided by the City Attorney.
 - f. The Health Inspector is responsible for enforcing Ordinance #94-22, "An Ordinance Prohibiting Dumping and Depositing Material in the Rivers, Creeks, and Ditches of the City." (Added October 17, 1994)
3. Jurisdiction
 - a. This SOP covers the following rivers, creeks, and ditches. These are delineated on the attached City Drainage System Map. (Added October 17, 1994)
 - (1) Riley River from Chestnut Street west and south to the southern city limits.
 - (2) Chestnut Creek from Chestnut Street south to the Federal Prison grounds.
 - (3) Center Creek from Superior Boulevard south to the confluence with the Riley River.

1. Who is responsible

2. Area covered

2. Area covered

- (4) North Ditch from Superior Boulevard south to the confluence with Center Creek.
- (5) Bayberry Ditch from 13th Street east to the confluence with Center Creek.
- (6) Unnamed ditch that parallels State Route 153 (Cornhusker Street) from the eastern city limits west to the confluence with the Riley River.
- (7) All future drainage ways dedicated to the City in accordance with the City's subdivision ordinance.

b. This SOP covers the following retention basins:

- (1) Indian Estates retention basin and its outfall to Center Creek.
- (2) All future basins built and dedicated to the City in accordance with the City's subdivision ordinance.

4. Authority

- a. The Department of Public Works has the responsibility to inspect and maintain all rivers, creeks, ditches, and retention basins on City rights of way and where the owner has dedicated a drainage maintenance easement to the City.
- b. The Park Department has the responsibility to inspect and maintain all rivers, creeks, ditches, and retention basins on Park Department property.
- c. By State law (State Revised Statutes, Chapter 34, Para. 31-202), the City has the authority to inspect and maintain the channels and banks of all navigable streams within the corporate limits. This is the basis for the Department of Public Works' authority to enter on properties adjacent to Riley River.
- d. The Superior County Department of Roads and the State Department of Transportation have granted the Department of Public Works authority to enter on their lands to inspect channel and bridge conditions and report problems to them.
- e. This SOP has been approved by the Department of Natural Resources in accordance with General Permit #91-34, issued April 25, 1991.

5. Identification of Problems

- a. The Director of Public Works or his designee shall inspect all the watercourses and basins listed in Section 3 twice a year. One inspection will be run in February, before the Spring flood season. The other will be conducted in July, during the middle of the summer storm season.
- b. Each Monday morning, the Director of Public Works or his designee shall inspect the following locations where debris, dumped items and vandalism have been known to create problems:
 - (1) Cornhusker Street culvert over Center Creek.

3. Inspections

3. Inspections / Treating some areas different

- (2) The ditch along State Highway 153 upstream of Chestnut Street.
- (3) The Indian Estates retention basin inlets.
- (4) The Park Superintendent shall inspect Bayberry Ditch through Alexander Park. (Revised November 30,1998)
- c. Within 24 hours of a major storm, the Park Superintendent or his designee shall inspect the following “choke points” where debris has been known to accumulate during high flows from the unmaintained channels in the Forest Preserve:
 - (1) Superior Boulevard culvert over Center Creek.
 - (2) Superior Boulevard culvert over North Ditch
 - (3) Superior Boulevard culvert over Chestnut Creek (Revised November 30,1998)
- d. The Director of Public Works or his designee shall inspect all complaints submitted by residents, the Health Inspector, or other office. Such complaints shall be recorded on the City’s Citizen’s Complaint Form. The Director shall ensure that an inspection is conducted and the findings provided to the person submitting the complaint within one week. (Revised November 30,1998)
- e. The results of all inspections shall be noted on the City’s Drainage Inspection Record. Copies of the completed form shall be kept by the Public Works Department.
- f. If an inspection identifies a problem, the inspector shall describe it on the City’s Drainage Problem Report, a copy of which is attached.
 - (1) The top portion of the form shall be completed by whomever identifies the problem.
 - (2) The Director of Public Works shall complete the middle portion of the form and assign a work priority to the project. If the problem is in a channel or basin maintained by the Park Department or another agency, a copy shall be forwarded to them. A copy of all forms shall be kept by the Department’s Secretary to assist in tracking the response to the problem.
 - (3) The maintenance crew chief assigned the project shall complete the bottom portion of the form.
 - (4) When the form is completed, it shall be filed in the Public Works Department’s drainage files. If the problem was identified by someone outside the Department, a copy of the form shall be sent to the person or office who reported the problem.

5. Records

6. Maintenance:

- a. There are four types of maintenance problems:
 - (1) Trash: human-made objects, such as garbage, shopping carts, tires, lumber, furniture, and appliances. Animal carcasses are also included as trash.

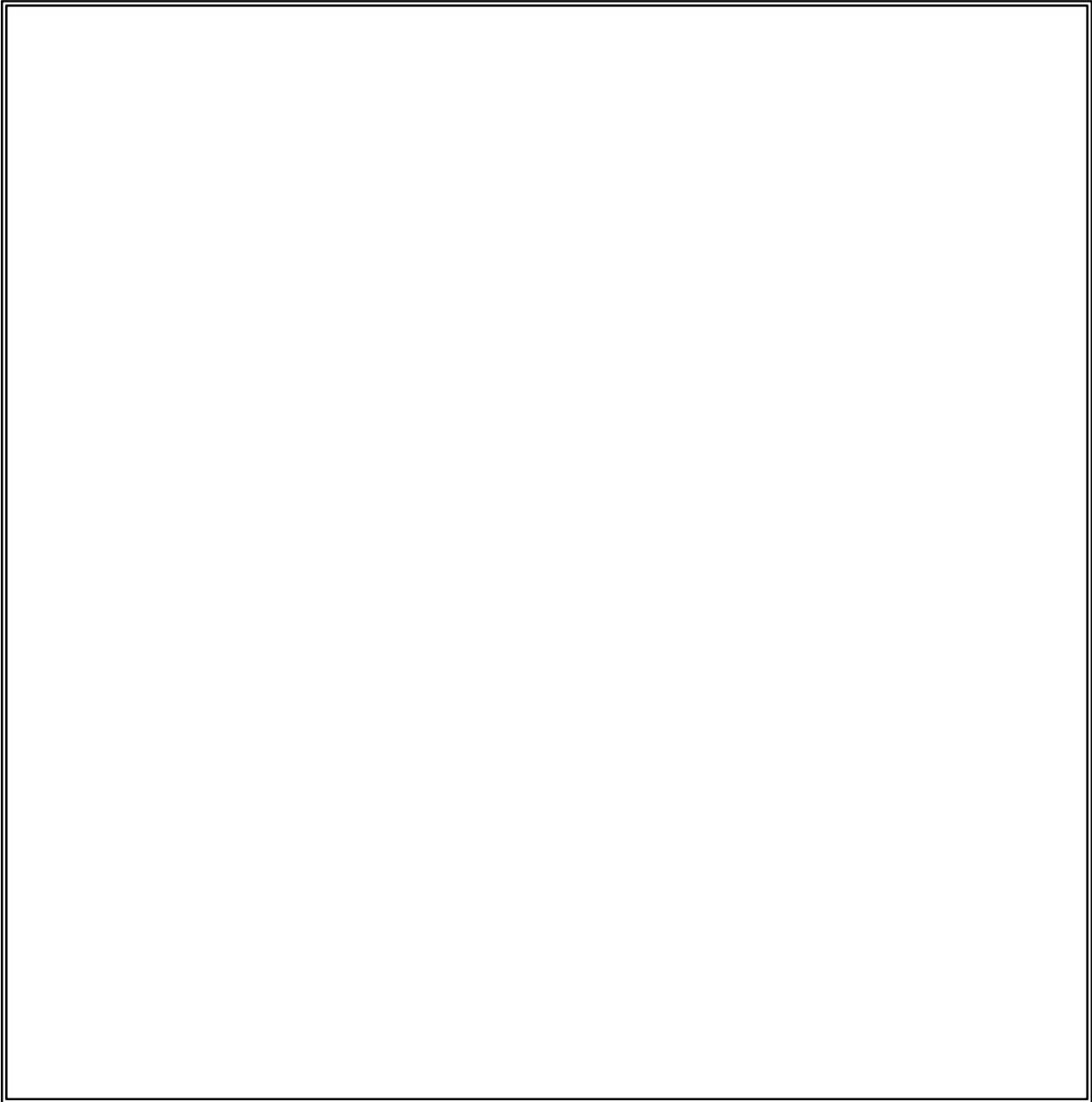
4. Maintenance procedures

- (2) Minor problem: vegetation growth, tree limbs, and other “naturally” occurring debris. Sedimentation in a retention basin is also included.
 - (3) Obstruction: fallen tree, culvert damage, log jam, large appliance or car body, etc., that, by itself, obstructs the flow of the ditch, stream, or river.
 - (4) Structural project: bridge or culvert replacement, bank stabilization, dredging, or other major project that requires a separate permit from the state Department of Natural Resources.
- b. Maintenance duties:
- (1) On public property: The Director of Public Works or the Director of Parks shall schedule a maintenance crew to remove trash and minor problems at the next convenient time. Obstructions shall be removed within two working days of being reported.
 - (2) Bayberry Ditch from Alexander Park to the confluence with Center Creek: This stream is being kept in close to a natural state. The Director of Parks shall ensure that trash and obstructions are removed within two working days. Vegetation and other naturally occurring minor problems shall not be removed unless they cause an obstruction.
 - (3) On state and county property and on private property with drainage maintenance easements: Trash, minor problems, and obstructions shall be reported to the owner. If the owner does not remove the problem within seven days, the Director of Public Works shall assume responsibility for the problem and treat the site as public property. If a pattern of trash or dumping is apparent, the City Attorney may take action to have the owner pay for the maintenance work in accordance with the terms of the easement.
 - (4) Chestnut Creek in Chestnut Creek Country Club: Upstream of Chestnut Street, the channel has been designed to allow for brush and trees to grow. Vegetation and other naturally occurring minor problems shall not be removed unless they cause an obstruction along this reach.
 - (5) Decker Ditch and Bayberry Ditch upstream of Alexander Park at 13th Street. These channels are on private property without drainage maintenance easements: Trash, minor problems, and obstructions shall be reported to the owner. If the owner does not remove the problem within seven days, the Director of Public Works shall consult with the City Attorney. The City may offer assistance to remove heavy appliances, log jams, etc. if the owner agrees to provide a drainage maintenance easement to the City. Otherwise, the City Attorney shall pursue legal action to have the owner abate the problem.
- c. Structural projects, including work in the waters of the Riley River, require budget approval by the City Council and a separate permit from the Department of Natural Resources. A drainage maintenance easement shall be obtained from all affected property

5. Records

owners. Structural projects shall be advertised for bid and scheduled in the same manner as other contracted public works projects.

- d. Upon completion of a maintenance project, the responsible crew chief shall complete the Drainage Problem Report and provide it to the Department of Public Work's Secretary for filing. The City Engineer and Director of the Department may periodically inspect projects and note their findings on the form.



City of Watertown Drainage System

Legend

- U U U Stream or ditch in undeveloped area
- P P P Stream or ditch on private property, not maintained
- PA Problem area
- CP Choke point
- Scale: 1" = 1,000 feet

5. Records

City of Watertown, ST

DRAINAGE INSPECTION RECORD

Date: _____ Inspector: _____

Type of inspection: Post-storm Routine

I have inspected the following surface drainage facilities and found them as noted. A Drainage Problem Report has been completed for all problems found and forwarded to the responsible party.

Problem areas

- | | | |
|--------------------------------------|-------------------------------------|----------------------------------------|
| Center Creek at Superior Boulevard | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| North Ditch at Superior Boulevard | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Chestnut Creek at Superior Boulevard | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Indian Estates Retention Basin | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Bayberry Ditch in Alexander Park | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Center Creek at Cornhusker | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| SR 153 Ditch | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |

Routine inspection

- | | | |
|------------------------------------------------|-------------------------------------|----------------------------------------|
| Center Creek, Superior to Benton | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Center Creek, Benton to Cornhusker | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Center Creek, Cornhusker to Riley River | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| North Ditch, Superior to Center Creek | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Bayberry Ditch, Alexander Park to Center Creek | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Chestnut Creek, Chestnut to Prison | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Riley River, Prison to Cornhusker | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Riley River, Cornhusker to Center Creek | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| Riley River, Center Creek to city limits | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| _____ | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |
| _____ | <input type="checkbox"/> No problem | <input type="checkbox"/> Problem found |

Signature: _____

5. Records

City of Watertown, ST

DRAINAGE PROBLEM REPORT

Date: _____ Inspector: _____

Type of inspection: Post-storm Complaint Routine

Location: (Identify stream or basin name, downstream and upstream streets or reference points, and location of problem. Provide sketch as needed.)

Type of problem: Trash Minor Obstruction Structural

Recommended maintenance: _____

Is equipment needed? ____ If so, list equipment needed: _____

Date: _____ Right of entry needed? ____

Work order description: _____

State permit needed? ____ Work order number: _____

Date: _____ Crew chief: _____

Maintenance performed: _____

Inspected by: _____

Use other side for additional recommendations for this site.

AN ORDINANCE PROHIBITING DUMPING AND DEPOSITING
MATERIAL IN THE RIVERS, CREEKS, AND DITCHES OF
THE CITY OF WATERTOWN.

WHEREAS, the City of Watertown has previously adopted an ordinance prohibiting the throwing of litter and other materials on streets, sidewalks, and other public places; and

WHEREAS, the City of Watertown wants to further prohibit littering or dumping of garbage, refuse, or other materials within its rivers, creeks, and ditches to further protect its drainage system.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF WATERTOWN, THAT:

Section 1: Chapter 12 - Health and Sanitation of the Watertown City Code is hereby amended by adding a new Section 12-10 to read as follows:

“Sec. 12-10. No person shall throw or place any refuse, paper, trash, glass, nails, tacks, wire, bottles, cans, grass clippings, brush, yard trash, concrete, earthen fill, garbage, containers, or litter or other debris in any ditch, stream, river, or retention basin that regularly or periodically carries surface water runoff. Any persons who deposits any of the above shall remove it or shall cause it to be removed therefrom immediately.”

Section 2: A violation of the foregoing shall be a second degree misdemeanor and punishable per the provisions of State Revised Statutes Ch. 47, para. 12-082 and 12-083.

Section 3: In the event that the City of Watertown deems it necessary to bring civil action to enforce the terms of this Ordinance, the violator shall be responsible for all court costs and attorney fees incurred by the City.

PASSED by the City Council of the City of Watertown, this 17th day of October, 19 94.

Ronnie Ivall
Clerk

APPROVED by me this 17th day of October, 19 94.

Richard O'Dell
Mayor

ATTESTED and FILED in my office this 17th day of October, 19 94.

Ronnie Ivall
Clerk

[Excerpts from the *Watertown Current*, the City’s newsletter that carries the outreach project to all properties in the community.]

Protect Yourself from Floods

“Water flows downhill.” This basic truth is the basis for the City’s drainage system. This system consists of storm sewers, channels, culverts and storage basins. All of these work to carry water away from buildings, like your house, that can be damaged if flooded.

However, water can’t flow if there is a dam in the way. Watertown’s drainage system can be blocked or altered when people dump in the channels, plug storm sewer inlets, or build improperly in the floodplain. Therefore, there are City regulations to prevent these problems.

Another problem arises from construction projects that alter the drainage pattern. Every lot was built so water would flow away from the building and along property lines to the street, storm sewer, or ditch. Fences, railroad ties, landscaping and regrading block this flow. So do construction projects in the ditches or the floodplain. All such projects require a permit from the City.

One property owner recently put a wall along the ditch behind his house without a permit. This was a violation of State law and the Watertown Municipal Code, Section 18-22. He was ordered to remove it and subsequently did, at his own expense. Don’t let this happen to you.

Here are some things to remember:

- ◆ Do not dump or throw anything into the ditches or basins. Dumping in our ditches and storage basins is a violation of the Watertown Municipal Code, Section 12-10.
- ◆ If you see dumping or debris in the ditches or basins, contact the City at 555-6666. The debris may increase flooding on your property.

- ◆ Every piece of trash can contribute to flooding. Even grass clippings and branches can accumulate and plug channels. If your property is next to a ditch or storage basin, please do your part and keep the banks clear of brush and debris.
- ◆ If you see building or filling without a City permit sign posted, contact the Building Department at 555-6666. The project may increase flooding on your property.
- ◆ Always check with the Building Department before you build on, alter, regrade, or fill on your property. A permit is needed to ensure that such projects do not cause problems on other properties.

New buildings in the floodplain must be protected from flood damage. Our building code requires that new residential buildings must be elevated one foot above the base flood level.

The ordinance also requires that all substantial improvements to a building be treated as a new building. A substantial improvement is when the value of an addition, alteration, repair or reconstruction project exceeds 50% of the value of the existing building. In the case of an addition, only the addition must be protected. In the case of an improvement to the original building, the entire building must be protected.

-- Continued on page 3. --

ARLINGTON COUNTY'S STREAM INSPECTION MANUAL

The following excerpt is from Arlington County, Virginia's, application for credit for Activity 540. It covers three of the five topics needed under Section 544.a, program explanation: who is responsible, maintenance procedures, and records. The streams inspection map should also be submitted with the application to clarify the area covered by the program. A separate memo or note can explain when inspections are conducted.

STREAM INSPECTION MANUAL

Arlington County Department of Public Works
Operations Division

} 1. Who is responsible

March 1986

General Instruction to Inspectors

The purpose of this manual is to provide a systematic and orderly inspection and record keeping process of stream conditions in Arlington County. It will acquaint the inspector with streambed characteristics and will instruct him or her how to evaluate conditions in the stream channel as well as along its banks.

A stream channel inspection checklist has been developed for use in the inspection process. This form allows the inspector to make a quick evaluation of the stretch and to note the location of items which require immediate attention.

} 5. Records

A Streams Inspection Map is available from the Surveys counter. It shows the location of streams in the County and denotes which are the responsibility of the Department of Public works for maintenance.

1. Completely read this manual.
2. Locate the stream segment on the map and in the field.
3. Determine the limits of the stretch to be inspected - from Point A to Point B. Choose landmarks, street crossings, etc. for easy recognition by any inspector or maintenance personnel. Describe location on form.
4. For consistency from one stream to the next, begin the inspection process at the highest point in the stream valley and follow the stream to its confluence with a larger stream.
5. If items are observed which pose an imminent danger to the public, these items should be reported immediately to the inspection supervisor for immediate action.
6. Some streams may not appear on the Streams Inspection Map. These may be on private property and inspection is done at the invitation or request of the property owner. In this case, the inspector should add this location to the Streams Inspection Map and note that it is on private property, for future reference.
7. The inspection of the Four Mile Run Flood Control Project will require that the inspector complete the regular inspection form as well as additional forms for the inspection of drainage structures and levees and floodwalls.

. . .

Streambed and Channel Stability Evaluation

Open Channel Inspection Procedure

3. & 4.
Inspection &
Maintenance
Procedures



In order to evaluate open channels it is necessary to become familiar with the components of the channel cross-section. See Figure 3.

Upper Bank - That portion of the cross-section from the break in the general slope of the surrounding land to the normal high water line. Vegetation is frequently found here.

Lower Banks - The sometimes submerged portion of the cross-section from normal high water to the water's edge during the summer low flow period.

Channel Bottom - The submerged portion of the cross-section which is totally an aquatic environment.

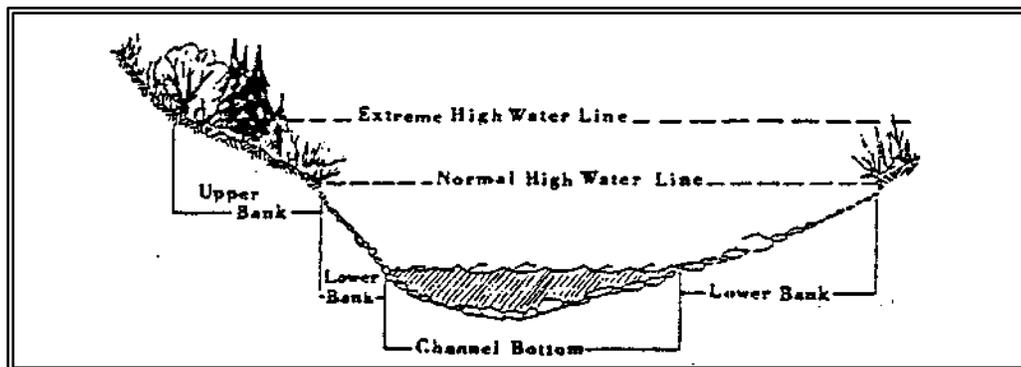


Figure 3. Channel cross-section.

Characteristics of the three main components of the stream cross-sections must be inspected to determine what maintenance procedures, if any, need be undertaken to keep the stream in a safe and functioning condition. The following characteristics, if applicable, should be inspected and an evaluation completed on the appropriate form, "Checksheet for Stream Channel Inspection."

I. Upper Channel Banks

- A. **Landform Slope:** The steepness of the land adjacent to the stream channel determines the extent and ease with which banks can be eroded and the volume of slough material which can enter the water. In general, the steeper the slope, the greater the potential volume of slough materials entering the stream. The inspector should note areas which may be easily eroded so that some protective measure may be recommended.
- B. **Debris Jam Potential:** Floatable objects are deposited on stream banks by man and natural processes. Tree limbs, trunks, twigs, and leaves reaching the channel form the bulk of the obstructions and flow deflectors. The inspector should look for evidence of debris carried by previous flow events and note objects or debris to be removed.
- C. **Vegetative Bank Protection:** The soil in banks is held in place largely by plant roots. Roots seldom extend far into the water table and near the shore they may be shallow-rooted.

Some species may be subject to effects of the wind and have the potential for being blown over and creating barriers to channel flow. Plants or trees which exhibit these characteristics should be noted on the check list for possible removal.

II. Lower Channel Banks

- A. Channel Capacity: The lower channel banks define the width of the stream. Channel width, depth, grade and roughness determine the volume of water which can be transmitted. Over time the channel capacity has adjusted to the size of the watershed and development events in the watershed. When capacity is exceeded (flooding), deposits of soil are found on banks and organic debris may be found hung up in the bank vegetation. An estimate should be made by the inspector to determine what the normal peak flows are and whether the present cross-section is adequate to handle the flows without bank deterioration
- B. Bank Rock Content: Examination of the materials which make up the channel bank will reveal the relative resistance to detachment by flow forces. Since vegetation is generally lacking, it is the size, volume and shape of the rock components which primarily determine the resistance to flow forces. In general, the larger and more abundant the bank rocks the better.

A "Good" condition would appear as a bank composed of mostly large (12") angular boulders.

A "Fair" condition would appear as a bank consisting of less than 50% rock by volume, and what rocks are present are 3"-6" diameters.

A "Poor" condition would be exemplified by mostly gravel of 1"-3" diameters.

Using these criteria, the inspector should rate this item as "Good," "Fair" or "Poor."

- C. Obstructions and Flow Deflectors: Objects within the stream channel like large rocks, embedded logs, bridge pilings, etc., change the direction of flow and sometimes the velocity as well. Obstructions may produce adverse stability effects when they increase the velocity and deflect the flow onto unstable or unprotected banks and across unstable bottom materials. On the other hand, they may produce favorable impacts when velocity is decreased by turbulence and pools are formed. The inspector should note obstructions and flow deflectors which may cause adverse stability effects on the stream channel and recommend their removal.
- D. Cutting: An early sign of stream degradation is a loss of aquatic vegetation by scouring or uprooting. Some channels are naturally devoid of aquatic plants. In this case the first stage of degradation would be an increase in the steepness of channel banks. Beginning near the top and later extending in serious cases to the total depth, the lower bank becomes a near vertical wall.

If plant roots bind the surface horizon of the adjacent upper banks into a cohesive mass, undercutting will follow. This process will continue until the weight of overhanging sod causes the sod to crack and slump into the channel. Cutting into the lower channel bank typically occurs at bends of streams where banks are unprotected. If this is observed in the stream, it should be noted so that bank protection measures can be implemented.

III. Channel Bottom

- A. Bottom Conditions: Water flows over the channel bottom nearly all of the time in perennial streams. It is therefore almost totally an aquatic environment composed of rocks of a variety of kinds, shapes and sizes. Plant and animal life may be present.

The shape of rocks may offer clues as to the stability of the stream. Rocks which are angular in shape tend to resist tumbling. They pack together well and orient themselves like shingles. In this form they are resistant to detachment by flow forces.

Rocks which appear rounded pack poorly and are easily detached and moved downstream. The inspector should rate this item as "Good" or "Fair" using the following criteria:

"Good"- Bottom appears stable with majority of channel rocks angular.

"Fair"- Bottom consists mostly of loose, rounded rocks which appear smooth or polished.

- B. Weed or Wild Growth in Channel: Weeds or other wild growth may limit channel flow capacity and should be removed.
- C. Trash Dumped in Channel: Trash dumped in the stream may limit channel capacity, cause obstructions to flow and pose health problems. It should be removed.

IV. Inspection of Improved Stream Channels

In some streams there have been improvements made which need to be inspected and maintenance procedures implemented if required. The following is a list of typical stream bed improvements which may be present in the particular stream being inspected.

- A. Gabions: Gabion baskets should be inspected for broken or deteriorated wires and repaired to keep rock in place.
- B. Retaining Walls: Retaining walls should be inspected for cracking and dislodgment of stone, if so constructed. Weep holes should be inspected for debris. Walls should be upright and show no sign of settling, instability, or undermining by stream flow forces.
- C. Rip Rap: If rip rap has been placed, check for dislodgment. If the rip rap has been grouted in place, check grout for deterioration and potential dislodgment of rip rap.
- D. Storm Sewer Structures: Check condition of storm sewer outlet structures for deterioration, sediment buildup and debris. Check endwalls for stability and deterioration and note an undermining of endwall and bank condition behind the endwall. Also note any scouring of the stream channel at outfall of pipe.

Inspection of storm sewer structures adjacent to the streambed should also be made at this time. Inspect the structure for condition of castings, concrete, sediment and debris buildup within the structure and drainage conditions around the structure which may inhibit proper functioning.

- E. Sanitary Sewer Structures: Sanitary Sewer mains or laterals frequently parallel or cross stream channels. Note any exposed mains and undermining of banks near the mains or manholes. Also check the condition of manhole structures for deterioration and check condition of castings for cracking or misalignment.
- F. Concrete Channel/Channel Bottom: Inspect the concrete channel for cracks and general deterioration. Note construction joints for adequacy and condition of filler materials. If weep holes are present, check for debris.
- G. Sacked Cement: Where sacked cement may have been placed, check for cracking and dislodgment.

ITEM	LOCATION OR LANDMARK	CONDITION
I. Upper Channel Banks A. Landform Slope B. Debris Jam Potential C. Vegetative Bank Protection		A. <input type="checkbox"/> Satisfactory <input type="checkbox"/> Erosion Potential <input type="checkbox"/> Eroding B. <input type="checkbox"/> No Debris <input type="checkbox"/> Remove Debris C. <input type="checkbox"/> Stable Vegetation <input type="checkbox"/> Eroding Bank Conditions <input type="checkbox"/> Remove Unstable Trees/Plants
II. Lower Channel Banks A. Channel Capacity B. Bank Rock Content C. Obstructions and Flow Deflectors D. Outting/Bank Erosion		A. <input type="checkbox"/> Adequate Capacity <input type="checkbox"/> Inadequate Capacity <input type="checkbox"/> Frequently Overflows Banks B. <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor C. <input type="checkbox"/> No Significant Obstructions <input type="checkbox"/> Remove Obstructions D. <input type="checkbox"/> No Outting <input type="checkbox"/> Outting/Slumping conditions
III. Channel Bottom A. Bottom condition B. Weed or Wild Growth in Channel C. Trash Dumped in Channel		A. <input type="checkbox"/> Good <input type="checkbox"/> Fair B. <input type="checkbox"/> No Weeds <input type="checkbox"/> Remove Weeds/Plant Growth C. <input type="checkbox"/> No Trash <input type="checkbox"/> Remove Trash
IV. Improvements in Stream Channels A. Gabions B. Retaining Walls C. Rip-Rap D. Storm Sewer Structures E. Sanitary Sewer Structures F. Concrete Channel/Channel Bottom G. Sacked Concrete H. Other (list)		A. <input type="checkbox"/> Good Condition <input type="checkbox"/> Needs Repair B. <input type="checkbox"/> Good Condition <input type="checkbox"/> Cracked Walls/Stone Dislodged <input type="checkbox"/> Clean Weepholes <input type="checkbox"/> Wall Unstable C. <input type="checkbox"/> Good Condition <input type="checkbox"/> Rip-Rap Dislodged/Missing D. <input type="checkbox"/> Good Condition <input type="checkbox"/> Structure Cracked <input type="checkbox"/> Sediment <input type="checkbox"/> Undermining Structure <input type="checkbox"/> scouring at Outfall E. <input type="checkbox"/> Good Condition <input type="checkbox"/> Structure Cracked <input type="checkbox"/> Exposed Main F. <input type="checkbox"/> Good Condition <input type="checkbox"/> Cracks, Deterioration G. <input type="checkbox"/> Good Condition <input type="checkbox"/> Cracks/Dislodgment

5. Records
(Also need record of maintenance action taken)

CHECKSHEET FOR STREAM CHANNEL INSPECTION
DEPARTMENT OF PUBLIC WORKS
ARLINGTON COUNTY, VA

NAME OF STREAM: _____
 LOCATION: _____
 FROM: _____ TO: _____
 INSPECTOR: _____ DATE: _____

Figure 4. Arlington County's checksheet for stream channel inspection.

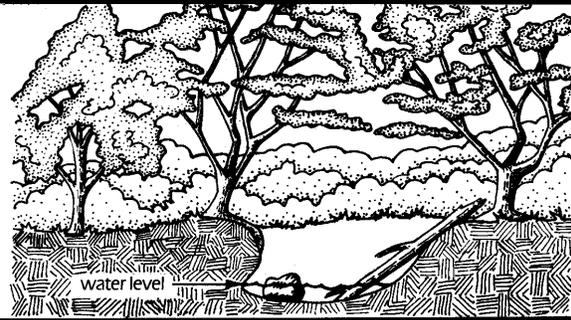
AMERICAN FISHERIES SOCIETY GUIDELINES

The next three pages are from pages 2, 3, and 6 of The Wildlife Society and American Fisheries Society's *Stream Obstruction Removal Guidelines*. See page 18 to order a complete copy.

Definition of Stream Obstruction Conditions

Condition One

These stream segments have acceptable flow and no work would be required. They may contain various amounts of instream debris and fine sediment, such as silt, sand, gravel, rubble, boulders, logs and brush. In certain situations flow may be impeded, but due to stream and land classification or adjacent land-use, this is not a problem.



Condition Two

These stream segments currently have no major flow impediments, but existing conditions are such that obstructions are likely to form in the near future, causing unacceptable problems. This condition is generally characterized by small accumulations of logs and/or other debris which occasionally span the entire stream width. Accumulations are isolated, not massive and do not presently cause upstream ponding damages.



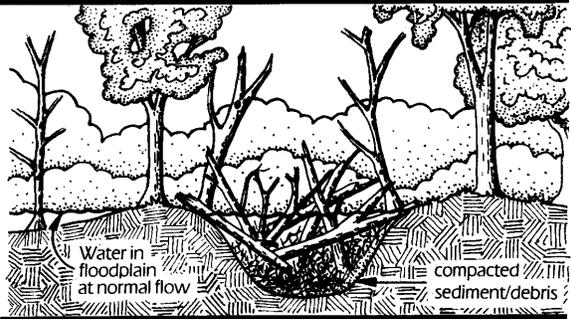
Condition Three

These stream segments have unacceptable flow problems. Obstructions are generally characterized by large accumulations of lodged trees, root wads, and/or other debris that frequently span the entire stream width. Although impeded, some flow moves through the obstruction. Large amounts of fine sediment have not covered or lodged in the obstruction.



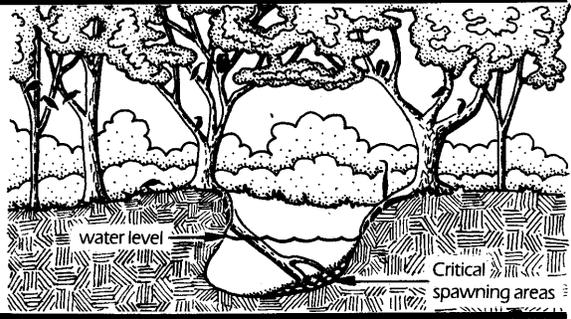
Condition Four

These stream segments are characterized by major blockages causing unacceptable flow problems. Obstructions consist of compacted debris and/or sediment that severely restricts flow.



Condition Five

These stream segments possess unique, sensitive, or especially valuable biotic resources and should be dealt with on a case-by-case basis. Examples include, but are not limited to: Areas harboring rare or endangered species, shellfish beds, fish spawning and rearing areas, and rookeries.



WETHERSFIELD WATERSHED MANAGEMENT STUDY

The Town of Wethersfield, Connecticut, experienced local flooding and drainage problems. It contracted with an engineering firm to study the problems and recommend solutions. The firm of Milone & MacBroom prepared the *Wethersfield Watershed Management Study* in 1995.

The following are some of the pages from that study. The table of contents shows how such a study can be organized and the Introduction explains how this one was conducted.

The last four pages of this section include the study's recommendations. Capital improvement projects are prioritized so they can be constructed over a number of years. They include a variety of channel improvements, such as culvert and headwall repairs, installing additional or larger culverts, sediment removal, sediment basins, channel widening and stream bank armoring. The study also recommends new detention basins to reduce the flows into the streams.

This study may look similar to a stormwater management plan (SMP) that can be credited under CRS Activity 450 (Stormwater Management). However, by itself it would not receive SMP credit because it is a purely structural solution to local flooding. There is no mention of regulatory standards that would manage the increase in runoff from future development and redevelopment.

If future watershed development is not subject to stormwater management constraints, the benefits of the capital improvements will diminish over time. There should also be a review of the impact of the increased flows enabled by the projects on the recipient body of water, in this case the Connecticut River. It is therefore recommended that communities base their capital improvements on comprehensive stormwater management plans that account for future development as well as current problems and look at the entire watershed.

It should be noted that the following pages are taken from a plan prepared by an outside consultant. To receive the 50 points credit under Section 541.a.3 for a capital improvements program, the ISO/CRS Specialist will need to verify implementation by reviewing the budgets for several years or contracts to construct the recommended projects. The ISO/CRS Specialist could also field verify the program by visiting completed construction sites.

WETHERSFIELD WATERSHED MANAGEMENT STUDY

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I. INTRODUCTION

A. Purpose

This project was initiated by the Town of Wethersfield in January 1992 to evaluate chronic drainage and flooding problems. The State of Connecticut Department of Environmental Protection assisted in funding of the project.

The scope of this project includes analyzing the hydrology, hydraulics, and ecology of the Town's primary watercourses, and an inventory of storm drains, culverts, bridges, and dams. It focuses upon the runoff from local rainfall and excludes flood hazards related to the Connecticut River.

The primary goal of this study is to provide guidance on how to reduce the impact of urbanization on the riverine system, to determine the adequacy of the existing drainage facilities, and to provide recommendations for improving existing problem areas.

This study has been prepared to serve as a planning tool for the management of watersheds, watercourses, floodplains, and stormwater runoff in the Town of Wethersfield. It recognizes that stormwater runoff is a valuable resource; however, excessive runoff may lead to flooding, destruction of property, damage to roads and utilities, and personal harm. Stormwater runoff provides man with many beneficial functions such as water supply, groundwater recharge, support of aquatic and terrestrial ecosystems, wastewater assimilation and dilution, and recreation. Although this report is primarily concerned with surface runoff, it also addresses the relationship of runoff to wetlands and groundwater recharge.

The three major drainage basins in Wethersfield (Beaver Brook, Folly Brook, and Goff Brook), including its tributaries (Fairlane Brook, Two Stone Brook, and Collier Brook), have reaches with alluvial channels in many areas. Alluvial channels are sensitive to changes in flow rates or sediment loads. Increases in runoff rates or sediment loads to alluvial streams may cause significant environmental and channel stability problems. The potential increases in peak rates of runoff that occur with conventional uncontrolled development would create additional flooding, exceeding the capacity of many drainage facilities and significantly altering the alluvial stream channels.

The Watershed Management Program presented in this report will help mitigate many drainage problems. The management program defines those portions of the watershed which are most sensitive to development, presents general criteria for storm drainage facilities in each part of the drainage basins, and defines areas that have existing or potential flood detention capability.

A primary product of the study is the creation of mathematical computer models for the hydrology of the major watersheds. They can be used to compute the runoff impact of land use changes anywhere in the drainage basin and allow one to simulate various stormwater management alternatives.

B. Procedures

The general procedures used in the preparation of this study included an investigation of townwide characteristics (topography, soils, geology, climate, water quality, stream and wetland ecology, flood problems, land use, infrastructure, drainage basins) followed by the establishment of specific criteria for the technical analysis used in the study.

This work included field inspections and inventories of existing facilities, watercourses and wetlands, hydrologic analysis of runoff rates and problem areas, and preparation of storm drainage management recommendations. A detailed hydraulic evaluation, including floodwater profiles, was then conducted on the streams including a hydraulic analysis of road culverts on the major streams.

Studies of this nature often investigate increases in runoff from future development as projected by a Town's plan of development or zoning map. However, since much of Wethersfield is developed to its maximum potential under current zoning laws, the runoff analysis was performed for maximum development under current land use and zoning regulations. Any future developments should follow good stormwater management practices to ensure that there is no increase in runoff to downstream areas.

C. Summary

General recommendations have been made in this report to improve the stream's water quality, reduce flooding, improve storm drainage systems, remove excess sediment, and make specific channel improvements. To implement these general improvements, detailed designs and permits will be required.

XI. PROJECT PRIORITY RANKING

The priority list in Table 10- 1 was prepared by the Town of Wethersfield to rank the drainage problems and recommendations according to the topics shown at the top of each of the columns. A group of projects has already been approved by the Wethersfield Town Council for the first phase of work and are noted with an asterisk. In addition to the Priority List, Table 10- 1 the projects have been grouped for construction purposes. These groupings were based on their priority, location, watershed and hydraulic sequence. The hydraulic sequence of the projects must be taken into account in performing these projects since some projects may have a significant impact on flows and velocities in the stream.

A. Folly Brook - Project Sequence

The proposed project sequence for projects along Folly Brook is 57, 58, 59, and 11. For project descriptions please refer to the previous section. Project #10, the construction of a storm sewer system in the Cumberland Avenue area near Folly Brook, is part of the first phase of projects approved by the Wethersfield Town Council. Constructing this project prior to the other proposed project along Folly Brook will not have a negative impact on flood flows since the stormwater runoff currently flows along the street gutters and then directly into the brook. The storm sewers will alleviate the excessive water on the pavement and convey the stormwater runoff below ground. The discharge from this proposed street drainage system will enter the brook prior to the peak flows from the upstream watershed that is controlled by a large, natural stormwater storage area, therefore, Project #10 should not cause any adverse affect on flood flows in Folly Brook.

Projects 57, 58, 9, and 59 are improvements to the existing channel, culvert headwalls, and undersized street drainage discharging to the brook. These projects are not dependent on each other or any other projects along the stream. Project #11 is the construction of sediment basins at the storm sewer outfalls entering the large wetlands at Wintergreen Woods and will not be dependent on other projects in the watershed.

B. Beaver Brook - Project Sequence

Most of the Beaver Brook projects are minor consisting of sediment removal and headwall and endwall repair except for #22, the installation of an additional culvert under Route 3, and #23, the installation of twin 60" RCP culverts through the embankment crossing Beaver Brook east of Morrison Road. The proposed project sequence begins with the most downstream project and works upstream. This is the normal sequence for a stream improvements project. However, the minor projects can be performed at any time. The interdependent projects are #22 and #23. Project #22, the installation of an additional 60" RCP cross culvert under Route 3, Maple Street, should be accomplished prior to #23, the installation of twin 60" RCP through the embankment east of Morrison Road. This embankment impounds a large quantity of stormwater similar to a detention pond. The installation of culverts through this embankment may increase the magnitude and frequency of flood flows downstream. Therefore, Project #23 should be the last project constructed on Beaver Brook. The remainder of the projects along Beaver Brook (#'s 7, 24, 25, 26, 27, 28, and 29) can be performed any time.

**TABLE 10-1
FLOOD & DRAINAGE PROJECTS - PRIORITY LIST**

PROJECT ID NO.	# HOMES BENEFIT 1 (<5) 2 (5-15) 3 (>15)	PERMIT SENSITV 1 (long) 2 3 (easy)	ENVIR SENSITV 1(very sen) 2 3 (none)	EASE DESIGN 1 (Diff) 2 3 (easy)	EASE CONSTR. 1 (diff) 2 3	COST 1 (diff) 2 3 (cheap)	PUBLIC INPUT (1 pt)	CUM POINTS	RANKING
									* Phase 1
									**Det. Ponds
10	3	3	3	3	3	2	1	18	1*
19	1	3	3	3	3	2	1	16	2
57	1	3	3	3	3	3		16	3
27	1	3	3	3	3	3		16	4
25	1	3	3	3	3	3		16	5
12	2	3	3	3	2	3	1	16	6
13	1	3	3	3	3	2	1	16	7
14	1	3	3	3	3	2	1	16	8*
38	3	2	2	3	2	2	1	15	9
8	1	3	3	3	3	2	1	15	10*
<hr/>									
51	1	3	2	3	3	3		15	11
9	3	2	3	3	2	2		15	12
39	2	2	2	3	3	3		15	13
1	2	3	3	2	1	3	1	15	14*
29	1	3	3	3	3	2		15	15
28	1	3	3	3	3	2		15	16
45	2	3	3	3	2	2		15	17
49	2	2	2	3	3	3		15	18
5	3	3	2	2	2	2		14	19*
21	3	2	2	3	2	2		14	20
<hr/>									
56	3	2	2	3	2	2		14	21
3	2	3	3	2	1	2	1	14	22**
6	1	2	2	3	3	3		14	23
23	3	2	2	3	2	2		14	24
22	3	1	2	3	2	2	1	14	25
55	3	2	2	3	2	2		14	26
18	1	2	2	3	2	2	1	13	27
54	3	2	2	2	2	2		13	28
20	1	2	2	3	2	2	1	13	29*
50	3	2	2	3	1	2		13	30
<hr/>									
53	2	2	2	3	2	2		13	31
36	3	2	2	3	2	1		13	32
59	3	2	2	2	2	2		13	33
48	1	2	2	3	2	2	1	13	34
35	3	2	2	3	2	1		13	35
30	3	2	2	2	1	2		12	36
33	3	1	1	2	2	2	1	12	37
42	2	2	2	3	1	2		12	38
43	2	2	2	3	1	2		12	39
16									
<hr/>									
34	2	2	2	2	1	2	1	12	41
37	3	2	2	2	2	1		12	42
15	1	2	2	3	2	2		12	43*
52	2	1	2	3	2	2		12	44
32	3	1	1	2	2	2		11	45
26	3	1	1	2	2	2		11	46
40	1	2	1	2	2	3		11	47
47	1	2	2	2	2	2		11	48
4	2	1	2	2	2	2		11	49
7	1	1	2	3	2	2		11	50
<hr/>									
60	3	1	1	2	2	2		11	51
44	2	1	1	3	1	2		10	52
11	3	1	1	1	1	2	1	10	53
17	3	1	1	2	1	1	1	10	54*
24	2	1	1	2	2	2		10	55
41	2	1	1	2	2	2		10	56
46	2	1	1	2	2	2		10	57
2	3	1	2	2	1	1		10	58
58	3	1	1	2	2	1		10	59
31	3	1	1	2	1	1		9	60

* Project identification number refers to the previous list of flooding and drainage problems and recommended solutions.

C. Goff Brook - Project Sequence

The project sequence for Goff Brook includes Collier Brook, Two Stone Brook, Fairlane Brook and other smaller unnamed tributaries. The most significant project that will reduce peak flood flows in Goff Brook and Fairlane Brook is Project #60, the construction of five detention basins along the abandoned Route 291 corridor. These detention ponds are located in the south end of Wethersfield and the north end of Rocky Hill.

The sequencing of the projects for Goff Brook will begin downstream and work upstream. The projects in the lower reach of Goff Brook between Route 91 and Bell Pond Dam are 39, 6, 30, 40, 31, and 41 (see the previous section for detailed project descriptions). These projects consist of removing debris from the channels, increasing culvert capacity, and making repairs to Bell Pond Dam. Projects in the middle reach of Goff Brook between Mill Woods Park and Murphy Pond are 4, 32, 33, 2, 42, and 20. These projects consist of storm drainage improvements, improvements to Bell Pond Dam and Murphy Pond Dam, increasing the culvert capacity at Griswold Road, and providing stream bank protection in the specified areas. Projects in the upper reach of Goff Brook between Murphy Pond and the 1860 Reservoir are 34, 13, 35, 36, 46, 44, 37, 45, 12, and 38. These projects consist of increasing the culvert's flow capacity, removal of sediment build-up, channel widening, stream bank armoring, and off-channel storm drainage improvements.

The sequence of projects on Fairlane Brook is 51, 54, 1, 53, 52, 3 and, 50. These projects consist of increasing culvert capacity, removal of sediment, and off-channel storm sewer improvements. The extent of improvements along Fairlane Brook will be greatly reduced as shown in the recommendations if the upstream detention basin is constructed.

The sequencing of construction projects for Two Stone Brook is 47, 18, 14, 48, and 15. These projects consist of increasing culvert capacity of several culverts, modifying Jensens Pond Dam, and making off-channel storm drainage improvements.

The projects on Collier Brook should be sequenced as follows: 17 and 19 on the east branch and 8, 49, and 21 on the west branch.

The project construction sequence outlined above is a general sequence to follow when prioritizing the construction of the projects. However, most of the off-stream storm drainage improvements will have minor impact on the stream's flood flows and can be performed out of sequence. The channel improvements, such as widening, debris and sediment removal, and the culvert improvements should generally begin downstream and work upstream since the improvements may affect the downstream flood flows.

MSD CAPITAL BUDGET

The next two pages are taken from the annual budget of the Louisville and Jefferson County, Kentucky, Metropolitan Sewer District (MSD). Along with wastewater collection and treatment duties, the MSD is responsible for drainage system maintenance throughout the county.

On the next page is page four of the 1999 budget's summary. Note how there is a separate Maintenance Division budget line item for stormwater projects.

On page 54 is a page from the Construction and Acquisition Fund's Long-Term Capital Budget Plan. It lists numerous drainage improvement projects and shows the projected budget needs over future fiscal years.

This capital budget is an example of the documentation that shows that a community has an ongoing program to eliminate or correct drainage problems.

Summary of Appropriations by Department
Revenue Fund
Fiscal Year Ending June 30, 1999

	Actual Expenses <u>1996-97</u>	Approved Budget <u>1997-98</u>	Projected Expenses <u>1997-98</u>	Approved Budget <u>1998-99</u>
<u>Maintenance Division:</u>				
Support. Services	2,201,000	2,340,100	2,268,400	2,377,500
Sewer Const. and Repair	5,576,300	5,303,600	5,441,200	5,542,800
Stormwater Const. and Repair	5,020,100	5,086,300	4,678,800	4,836,300
Floodwall Maintenance	<u>1,158,500</u>	<u>326,900</u>	<u>158,600</u>	<u>240,000</u>
	13,955,900	13,056,900	12,547,000	12,996,600
<u>Operations Division:</u>				
Operations Administrative Office	330,600	327,000	343,400	349,800
<i>Morris Forman Plant:</i>				
MFWTP Administrative Office	202,700	216,100	201,400	203,000
NTWTP Operations	10,524,400	10,613,000	10,561,800	10,363,900
MFWTP Maintenance	3,053,200	2,927,100	3,023,200	3,198,700
Material Services	1,080,100	288,700	255,000	275,900
Laboratory Service	1,188,800	1,255,700	1,227,300	1,213,700
MFWTP Instrumentation	<u>999,800</u>	<u>1,131,100</u>	<u>1,153,900</u>	<u>1,115,300</u>
	17,049,000	16,431,700	16,422,600	16,370,500
<i>Urban Area:</i>				
Urban Area Administrative Office	191,800	185,600	211,000	211,600
Hite Creek Treatment Plant	438,200	416,600	569,400	580,200
West County Treatment Plant	1,402,500	1,230,600	1,670,600	1,565,200
Small Treatment Plants	1,713,700	1,613,800	1,699,000	1,710,300
Pumping and Lift Stations	2,131,900	1,924,900	2,227,500	2,311,600
Floodwall Pumping and Gates	760,600	533,600	516,500	520,100
Urban Area Maintenance	2,451,500	2,300,900	2,527,600	2,520,700
Jeffersontown Treatment Plant	494,300	565,000	498,900	532,000
Cedar Creek Treatment Plant	<u>255,100</u>	<u>336,500</u>	<u>313,000</u>	<u>314,100</u>
	9,839,600	9,107,500	10,233,500	10,265,800
	<u>27,219,200</u>	<u>25,866,200</u>	<u>26,999,500</u>	<u>26,986,100</u>
<u>Information Technology Division</u>				
Systems Planning Administrative Office	685,200	287,000	663,100	666,300
Lou./Jeff Co. Info. Consortium	1,015,100	1,216,400	1,050,900	1,679,300
Information Services	2,427,400	2,610,000	2,512,500	2,565,500
Engineering Records		566,000	117,900	
GIS Services & Records				421,300
Process Mapping & Information				179,100
	<u>4,127,700</u>	<u>4,679,400</u>	<u>4,344,400</u>	<u>511,500</u>
Insurance & Reserves	3,045,800	3,100,300	2,405,300	2,778,400
Gross Expenses	<u>70,713,000</u>	<u>70,822,000</u>	<u>72,827,100</u>	<u>70,490,100</u>
Recoveries	<u>(10,368,000)</u>	<u>12,305,000)</u>	<u>(11,828,900)</u>	<u>(8,801,100)</u>
Net Expenses	<u>\$ 60,345,000</u>	<u>\$ 58,517,000</u>	<u>\$ 60,998,200</u>	<u>\$ 61,689,000</u>

**LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT
LONG-TERM CAPITAL BUDGET PLAN
FOR FISCAL YEAR ENDING JUNE 30, 1999**

WATER-SHED/ BID	PROJECT NAME	FY 1998		FY 1999		PROJECT TO DATE EXPEND-ITURE	FY1998 Y-T-D EXPEND-ITURE	REMAIN-ING FY 1998 PROJECTED	FY 1999 PRO-JECTED	FY2000 PRO-JECTED	FY2001 PRO-JECTED	FY 2002 PRO-JECTED	FY 2003 PRO-JECTED	THERE-AFTER
		ORIGINAL PROJECT BUDGET	APPROVED PROJECT BUDGET	PROPOSED AMEND-MENTS	REVISED PROJECT BUDGET									
0990540	1536 GLEN ROCK ROAD FLOODPROOFING	23		18	18				18					
0981690	BENOCH AVENUE DRAINAGE IMPROVEMENT	143		143	143			6	137					
0981920	NEIGHBORHOOD 16 DRAINAGE IMPROVEMENTS	975		975	975				60				305	
0991830	NEIGHBORHOOD 17 DRAINAGE IMPROVEMENTS	2,527		2,527	2,527				30	234	305	305	747	
0981940	NEIGHBORHOOD 18 DRAINAGE IMPROVEMENTS	1,610		1,610	1,610				30		529	529	522	
0981850	NEIGHBORHOOD 19 DRAINAGE IMPROVEMENTS	1,319		1,319	1,319				30		464	414	410	
0981960	NEIGHBORHOOD 20 DRAINAGE IMPROVEMENTS	1,774		1,774	1,774				30	143	536	536	529	
0981870	NEIGHBORHOOD 22 DRAINAGE IMPROVEMENTS	1,203		1,203	1,203				210		333	333	328	
0982160	DEVONSHIRE DRIVE DRAINAGE IMPROVEMENT	186		186	186			6	180					
0982170	MADRONE AVENUE DRAINAGE IMPROVEMENT	49		49	49			1	48					
0983010	JAMAICA DRIVE FLOODPROOFING	50		50	50				8					
MILL CREEK DRAINAGE SUBTOTAL:		13,661	4,597	10,077	14,675	1,117	518	340	2,226	2,198	3,077	2,875	2,841	
SERVICE AREA #1 TOTAL:		105,609	132,662	18,881	151,543	23,499	13,049	8,265	18,136	29,375	30,255	11,436	13,291	17,286
<u>SERVICE AREA # 2</u>														
MIDDLE FORK/DRAINAGE														
0931490	COLONEL ANDERSON PKWY DRAINAGE IMPROVEMENT	250	338	(7)	331	64	0	30	238					
0932230	SADDLEHORN DRAINAGE IMPROVEMENT (MINI)	50	52		52	13			39					
0932430	WATTERSON TRAIL/MIDDLETOWN DRAINAGE IMP.	500	517	47	564	314	121	123	127					
0960910	CHEROKEE PARK DR. IMP. (MINI)	30	34		34	7			28					
0961320	BENJAMIN LANE DR. IMP. (MINI)	116	116	37	153			33	120					
0961340	HUNTINGTON ROAD (900) DR. IMP. (MINI)	50	50	38	88			2	86					
0961370	LEYTON/LYNDALE LEVEE DR. We (MINI)	140	140	(20)	120	8	8	8	104					
0961320	MIDDLEFORK WATERSHED FLOODPROOFING PHASE 1	250	250		250			1	68	63	117			
0961530	WOODBOURNE/SILS AVE. (ALLEY) DR. 00. (MINI)	40	40	68	108			5	103					
0982230	GRAND VISTA PLACEDRAINAGE IMPROVEMENT	2,253		2,253	2,253								336	1,917
0982240	HURSTBOURNE CREEK STUDY DRAINAGE IMP	979		979	979				180	89	326	384		
0982260	HENINGWAY ROAD DRAINAGE IMPROVEMENT (MINI)	119		119	119								25	94
0982330	MIDLANE TERRACE PROJECT 03 DRAINAGE IMP. (MINI)	62		62	62							16	12	34
0982360	NOTTINGHAM PKWY/HURSTWOOD CT DRAINAGE IMP	1,843		1,843	1,843							324	1,519	
0982420	RUGBY PLACE (906) DRAINAGE IMPROVEMENT	322		322	322								101	221
0982460	WEHAM WAY/SUNDERLAND ROAD DRAINAGE IMP.	173		173	173								57	116
0982570	FAIRLAND AVENUE DRAINAGE IMPROVEMENT	1,146		1,146	1,146								331	815
0982670	ABERDEEN NAS CAPITAL PROJ #1 DRAINAGE IMP	266		266	266							83	18	164
MIDDLE FORK DRAINAGE SUBTOTAL		8,588	1,537	7,326	8,863	406	129	202	1,093	152	444	483	1,204	4,879
MUDDY FORK/DRAINAGE														
0920210	EVERGREEN RD. ROADWAY & DRAINAGE IMP	127	128		128	20		108						
0931340	BLACKBURN/FENLEY DRAINAGE IMPROVEMENT	600	649	(32)	617	155		6	461					
0992210	GREEN MEADOW COURT/KNLOCH ROAD DRAINAGE IMP.	2,439		2,439	2,439									2,439
0932290	INDIANOLA SUBDIVISION DRAINAGE IMP AREA 1,	105		105	105								38	67
0982300	INDIANOLA SUBDIVISION DRAINAGE IMP. AREA 9	253		253	253								80	173
0912610	CORONA COURT (1102) DRAINAGE IMPROVEMENT	610		610	610								216	394
MUDDY FORK DRAINAGE SUBTOTAL		4,133	777	3,374	4,150	175	6	108						
SOUTH FORK DRAINAGE														
0931270	BUECHEL TERRACE DRAINAGE IMPROVEMENT	609	673	611	283	242	4		40	1,001				
0931290	BELMAR DRIVE (1475) DRAINAGE IMPROVEMENT	125	49	13	61.	48	4	14						

STREAM DUMPING ORDINANCES

This section includes three ordinances that were submitted by communities for CRS credit for SDR, stream dumping regulations, under Activity 540. Each has been given full credit because they include the three items noted in Section 544.b:

1. A prohibition of dumping ANY material in a channel or basin that could cause an obstruction to flows.
2. Identification of an officer or office responsible for enforcement and monitoring compliance.
3. Provisions for penalties and abatement of violations.

In many cases, items 2 and 3 appear elsewhere in an ordinance or municipal code book. For example, the sections in Mandeville’s and Margate’s ordinances on stream dumping do not have an office or officer identified. In these situations, the community identifies the office or officer or the penalty clause on the activity worksheet or in the margin of the ordinance.

NOTE: The example ordinance language provided in this publication is based on actual ordinances used by CRS communities. All ordinance language should be carefully reviewed by legal counsel before adoption.

An ordinance is much more effective if people know about it. As a prerequisite for the full 30 points credit for SDR, the community must conduct an outreach project that notes that there are regulations against dumping and how to report violations. Watertown’s newsletter article is shown on page 34.

The South Holland ordinance on page 57 was distributed to all participants at a floodproofing open house the Village held for floodplain residents. By itself, this does not meet the publicity requirement for CRS credit. To receive credit for its stream dumping regulations, South Holland would have to distribute the flyer to all residents or addresses in the community. In fact, South Holland also discussed the ordinance in its quarterly Village newsletter, its OPC project. The more publicity, the better.

Mandeville, Louisiana

Sec. 9-49. Obstruction of public drains prohibited.

No person, firm corporation or other legal entity shall place or cause to be placed in any public subsurface drain, swale drainage ditch, or other drainage way any material of any form, type or nature the placement of which would alter, impede, block or otherwise detrimentally affect the rate of flow of water through said drainage way.

Whoever is found guilty of violating the provisions of this section shall be deemed guilty of a misdemeanor punishable as provided in section 1-9 for violations of the provisions of this Code of Ordinances. (Ord. No. 85-16, 5-23-85)

- 1. Prohibition against dumping
- 3. Penalty

2. Note--the Police Department enforces this ordinance

Margate, Florida

Sec. 10-12. Littering.

No
Dumping

(a) *Depositing of litter prohibited.* It shall be unlawful for any person, firm or corporation, in person or by his agent, employee or servant, to cast, throw, sweep, sift or deposit in any manner in or upon any public way or street or other public place in the city or any river, canal, public water, drain, sewer or receiving basin within the jurisdiction of the city, any kind of dirt, rubbish, waste article, thing or substance whatsoever, whether liquid or solid. Nor shall any person, firm or corporation, cast, throw, sweep, sift or deposit any of the aforementioned items anywhere within the jurisdiction of the city in such manner that it may be carried or deposited in whole or in part, by the action of the sun, wind or rain into any of the aforementioned places.

Provided that this section shall not apply to the deposit of material under a permit authorized by any ordinance of the city; or to goods, wares or merchandise deposited upon any public way or other public place temporarily in the necessary course of trade; and removed therefrom within ten (10) hours after being so deposited; or to articles or things deposited in or conducted into the city sewer system through lawful drains in accordance with the ordinances of the city relating thereto.

Provided, further, that this section shall not apply to the deposit of material or other trash placed for normal residential trash pickup and removal within seventy-two (72) hours after being so deposited.

(b) *Vehicles to be covered.* It shall be unlawful for any person, firm or corporation, in person or by his or its agent, employee or servant, to use any vehicle to haul any kind of dirt, rubbish, waste articles or things or substance, whether liquid or solid, unless such vehicle is covered to prevent any part of its load from spilling or dropping at all times while such vehicle is in motion on any street or alley in the municipality; except that while such vehicle is on State Road 441, it shall be covered at all times except while actually being loaded or unloaded. Provided, however, that the requirements herein for covering such vehicles shall not apply to vehicles carrying brush cuttings, tree trimmings, branches, logs and similar waste material, or fill or sand if such matter is securely lashed or loaded on such vehicle to prevent spilling or dropping as aforesaid.

Penalty

(c) *Penalty.* Any person, firm or corporation violating any of the provisions of this section shall be punished as provided by Section 1-8 of this Code; and a separate offense shall be deemed committed on each day during or on which a violation occurs or continues. (Ord. No. 80-26, § 1, 4-9-80)

Section 10-1 states that enforcement is the responsibility of the Building Inspector

South Holland, Illinois

NOTICE TO RESIDENTS

Please be advised of the passage of a new ordinance.

SECTION 14-51 Regulation

The deliberate or unintentional disposal of grass clippings, brush, fill, trash, debris, obstructions or unwanted materials into the storm sewers or within or along banks of man-made or natural water courses or in adjacent floodplain areas which may wash into streams and sewers is unlawful.

SECTION 14-52 Powers and Authority of Inspectors

The Code Enforcement Officer and other duly authorized employees of the Village of South Holland shall be permitted to enter upon all properties for the purpose of inspection, observation and measurement, in accordance with the provision of this ordinance.

SECTION 14-53 Penalties

a. Any person found to be violating the provision of this ordinance shall be served by the Village of South Holland with written notice stating the nature of the violation and providing 10 days for the satisfactory correction thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations.

b. Any person who shall continue any violation beyond the time limit provided for in Section 14-54 shall be guilty of a misdemeanor, and upon conviction thereof shall be fined in an amount not exceeding \$500.00 dollars for each violation. Each day shall count as a separate offense.

c. A substitution may be made for hours of Community Service in lieu of a cash fine, if the service is devoted to remediation of the impact of dumping in the conveyance system.

1. No Dumping
2. Officer
3. Penalties

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