Citizens Oversight Flooding Committee

Final Report

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City of North Royalton

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Executive Summary

The Citizens Flooding Oversight Committee was by the Mayor formed to prioritize flooding concerns on behalf of the citizens of the City of North Royalton. The Committee, assisted by consultants Stephen Hovancsek & Associates, Inc., were charged with identifying flooding sources, creating solutions for the flooding problems, investigating funding sources and identifying public education forums. The findings of the Committee are presented in this Report.

The conclusions of the report are as follows:

- The Committee has concluded that the recent occurrences of flooding during extreme storm events in the City were caused by a number of reasons including undersized, aging and deteriorated sanitary and storm drainage systems;
- The Committee is aware that statistically, the amount of rainfall has been increasing in our part of the United States;
- The Committee is aware that design standards, methods and techniques utilized in engineering are continuously changing and improving and those standards used previously may now be inadequate;
- The Committee recognizes the City of North Royalton Departments are understaffed;
- The Committee recognizes the City has been completing extensive cleaning and maintenance on the City's sewer infrastructure;
- The Committee recognizes the City has recently enacted legislation to promote positive drainage, alleviate erosion and sedimentation and protect the natural water-courses of the City;
- The Committee recommends certain financially feasible infrastructure projects can and should be completed by the City to alleviate flooding;
- The Committee wishes to inform the residents of the City of their responsibilities as homeowners and community members.

The recommendations are as follows:

- Construct a storm water management facility upstream of the Chesapeake Area;
- Reconstruct the storm sewer system in Cedar Estates;
- Reconstruct the Pamela Drive storm sewer system;
- Consult with a Hydro-geologist or other qualified professional to investigate subsurface hydrology near the Avalon Event Center Area;
- Construct a by-pass for the Biro Ditch;
- Create a maintenance schedule for roadside ditches and structures in the public right-of-way;
- Create a flow-monitoring program to identify sources of Inflow and Infiltration targeting problem areas;
- Ensure drainage facilities on private property are maintained as required by law;
- Encourage homeowner's to flood-proof their homes where applicable;
- Increase staffing of Departments to complete the recommendations.

INTRODUCTION

In recent years, the City of North Royalton has experienced heavy rains and floods on a number of occasions. In response to the flooding, the City of North Royalton has organized a Citizens Flooding Oversight Committee. The firm of Stephen Hovancsek & Associates, Inc. was retained by the committee and the City of North Royalton to facilitate and moderate the Citizens Flooding Oversight Committee. The committee operated for a period of six months meeting every two to four weeks. Meetings were held at the City Hall to discuss concerns of residents, disseminate information, and report on findings.

A roster of Committee Members is included in Appendix A. Agendas and Meeting Minutes are included with this report as Appendix B and C respectively.

The goals of the Citizens Flooding Oversight Committee were:

1) Prioritize flooding related concerns throughout the City on behalf of the residents.
2) Develop long-term and short-term plans that provide solutions to flooding concerns.
3) Develop cost estimates for the long-term and short-term plans.
4) Identify available funding mechanisms to ensure appropriate fiscal responsibility.
5) Identify public outreach strategies to educate, inform, and solicit support from the City residents.

The purpose of this report is to detail the findings of the committee that satisfy the stated goals.

GOALS

I. PRIORITIZE FLOODING RELATED CONCERNS

The residents of the City are affected by a number of flooding sources. Some residents have reported house flooding through windows and walls, others through back-ups of the sewers. Residents have reported yard flooding and street flooding as well as erosion of stream banks and ponding of water. As part of the prioritization, these sources needed to be identified.

The data obtained to identify sources and reasons for flooding in different areas of the City included:

a) An AutoCAD base map of the City including detention basin locations and sanitary sewer facilities from the Engineering Department;
b) Locations of flooding complaints from storms on May 10, 2003, May 20-22, 2004 and June 9, 2004;
c) Locations of flooding problems from Committee Members and Council Members;
d) Data received by the Mayor's office from residents;
e) Responses from a survey conducted in the North Royalton Recorder;
f) Federal Emergency Management Agency Flood Insurance Rate Maps and Flood Insurance Study;
g) Record plans for various improvements throughout the City;
h) Infiltration/Inflow Analysis for Sanitary Sewer District "B", Finkbeiner, Pettis & Strout, Limited, August 1990;
i) City of North Royalton, Ohio Dye Testing Results, Sanitary Sewer District 'A', Montgomery Watson, June 1998;
j) Smoke and Dye testing results completed by the City;
k) Age of Subdivisions;

and other miscellaneous data obtained from various sources over the course of the study period.

Data from these sources were plotted on the digital base map to create a Comprehensive Flooding Map for the City of North Royalton (see Appendix D). Locations of large concentrations of properties experiencing flooding on the Comprehensive Flooding Map were utilized to pinpoint areas of study. Data for properties experiencing flooding were also tabulated in spreadsheet form for use by the City (see Appendix E).

A majority of the properties experiencing flooding are located north of the Ohio Turnpike. Of 1,464 known instances of flooding, 1,194 (82%) occurred in the north section of the City. Although the southern section of the City experiences fewer instances of flooding, areas of localized yard, stream, and street flooding do exist. The southern section of the City is predominantly serviced by individual septic systems, which is likely the reason for fewer reported flooding instances. Flooding instances may have also gone unreported since some residents may have felt yard or street flooding was a temporary nuisance with no long-term effects or financial burden to them. Others are reluctant to report flooding fearing that such reports may affect their home resale potential.

Sources of Flooding

General Discussion

The Committee's greatest concern was basement flooding. Basement[1] flooding can cause structural damage as well as damage to its contents. Harmful dwelling conditions can also result from improperly cleaned basements. Generally, basement flooding is associated with the highest financial burden for the homeowner. Yard flooding and or street flooding, on the other hand, is typically viewed as a temporary nuisance with clean up usually amounting to yard debris and little or no cost to the property owner.

One of the reasons that basement flooding occurs, in the most simplistic terms, is that the sewer system becomes overloaded. Sanitary sewers are designed to convey raw sewage from homes

[1] For the sake of this report, the term "basement" shall mean the lowest floor of a structure including the first floor where basements are absent.

and businesses. The sanitary sewer design includes some capacity for infiltration. It cannot handle nor is it intended to convey large amounts of storm water. Storm water that enters the sanitary sewer directly through some connection is termed inflow. Storm water, and ground water that enters through pipe joints and manhole walls is termed infiltration.

Typically, the sanitary sewer is installed at a lower elevation than the storm sewer. Therefore, throughout the system, the storm sewer will usually cross over the sanitary sewer. Water will always seek the lowest level possible, and the depth of water depends on the volume generated and the head in the system. Under pressure from head in the system, water will be forced through any opening available, including deteriorated joints in pipe and brick walls of sewer structures. Water that exits a storm sewer pipe joint will find its way into the trench line of the sanitary sewer. As the stone in the trench becomes saturated, water will enter the sanitary sewer through the joints of the sanitary pipe. These joints, after many years, will no longer be watertight and will allow varying degrees of infiltration to occur. Older main line sewers will have as many as 50 joints in every 100 feet of line. Significant inflow sources may have originally began as small infiltrations that grew over time as joints opened and pipe bedding material was washed away to create void spaces around the pipe, especially in the heavy clay soils that predominate in the area.

Infiltration occurs in both the main sewers and the lateral connections. Typical construction methods include construction of the sanitary and storm service connections on private property in a common trench separate by as little as a few feet. Experts now believe infiltration in these lateral connections account for a large portion of "clean water" flow in sanitary sewers.

Additionally, there are many cases of cross connection, where the house footing drains, downspouts, and yard drains are connected to the sanitary sewer instead of the storm sewer. These are a major source of storm water that overloads the sanitary sewer. Today, such cross connections are strictly forbidden by law but 40 years ago, this was not the case.

Water that enters a basement does so by three ways:

1. Through the floor drain(s);
2. Through the walls and/or the footing drain sump;
3. Through other openings such as basement windows or doors.

The basement floor drain is typically the lowest point in a building sanitary sewer connection and will be the first place that a backup of the system is manifested. A back-up occurs because the sanitary main is overloaded and operating under so much head that water is forced up the connection; because the sanitary connection to the street is obstructed by roots and cannot flow freely into the main, which may otherwise be fully functioning; or because the connection pipe, usually 5 or 6 inches in diameter, is overloaded by water coming from the building itself, especially during a very intense rainstorm, if the building downspouts or other storm drains are directly connected to the sanitary lateral.

Water that enters the basement walls is not uncommon and is an indicator that the waterproofing on the exterior of the basement walls is no longer functioning. When such occurs only after an intense rainfall this indicates that either the storm sewer was overloaded and backed up into the storm connection, or that the building storm drainage system is partially blocked. In both cases, storm water under some amount of head is present against the building foundations because it could not freely drain into the storm sewer. This water will then enter through the block walls at mortar joints or where the floor slab meets the base of the wall. Some buildings have a sump pit located in the basement floor. The footing drains empty into this pit and are pumped out into the storm sewer by a small ¼ or 1/3 horsepower pump. During an intense rainfall, the storm connection may be so full of water that the pump cannot provide enough pressure to force the water into the storm connection. The pump may run continuously, but be unable to actually remove any water. The sump pit rapidly fills and overflows onto the basement floor.

Water that enters from window wells or cellar doors is due to grading around the building that allows surface drainage to flow against the structure and should be corrected by the homeowner.

Yard or street flooding can be caused by a number of reasons. Sewer systems are designed by employing standard methods of calculations. One such method is Technical Release 55.

Technical Release 55 (TR-55) first issued in 1975 with revisions in 1986 and update in 1999 by the United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division. TR-55 provides a simplified procedure to calculate storm water runoff, peak rate of discharge, hydrographs and storage volumes required for detention/retention basins and is dependent upon rainfall distribution, time parameters, soils and coverage of drainage area. Rainfall Distribution historically has been taken from Technical Paper No. 40 (T.P. 40), Rainfall Frequency Atlas of the United States, 1961. Climatic changes and increased rainfall led to research that produced a new set of standards; Rainfall Frequency Atlas of the Midwest, Bulletin 71 published in 1992 and authored by Huff & Angel.

Comparisons of the two sets of standards are as follows:

Comparison of 24 hour Duration Rainfall Values

Storm	**T.P. 40 (inches)**	**Bulletin 71 (inches)**
1-year	2.1	2.04
2-year	2.2	2.50
5-year	3.0	3.10
10-year	3.4	3.60
25-year	3.9	4.39
50-year	4.4	5.11
100-year	4.6	5.89

For one single family residential lot ½ acre in size:

Comparison of Volume of Runoff Using TR-55*

Storm	T.P. 40 (cf)	Bulletin 71 (cf)	% Difference
1-year	1,479	1,403	(5.4)
2-year	1,607	2,005	19.9
5-year	2,702	2,846	5.1
10-year	3,283	3,580	8.3
25-year	4,030	4,780	15.7
50-year	4,795	5,904	18.8
100-year	5,105	7,145	28.6

*Calculated with CN of 85 and Tc of 6 minutes for both T.P. 40 and Bulletin 71.

It is obvious from the above data that sewers designed using the historic standards may now not have sufficient capacity for current runoff predictions. The Huff & Angel data is becoming more accepted and used in current design. The City of North Royalton has incorporated the Huff & Angel data into the revised Chapter 1481 Storm Water Management as the required standard for all future development.

Yard and street flooding can also be caused by blockage of structures along open channels. Streams with consistent cross sections are much more efficient in conveying runoff. Vegetation and fallen timber as well as debris and sedimentation reduces the cross sectional area available for flow. The volume of water a channel or sewer can carry is directly dependent upon the cross section, slope, and the condition of the stream banks. Drainage systems can and do flush themselves however blockages still occur. Bottlenecks in a system increase the velocity and depth of flow through the system. Greater velocities increase the erosion of the banks, which in turn deposits sediment downstream. The morphology of streams is a natural process however sediment and erosion accelerate the changes.

Catch basins and inlets basins located adjacent to roadways have a tendency to collect sediment and leaves. Keeping the inlets to the storm sewer clean decreases the amount of time it takes for the runoff to enter the system and increases the efficiency of the system.

Basement Flooding in North Royalton

The Waster Water Department under the direction of Superintendent, Mr. Charles Johnson, has been vigorously cleaning and videotaping the sanitary sewer system since the recent flooding incidents. The department has, in one year's time, cleaned an astounding 40 miles of the City's sewer system. The department has also been identifying manholes that are located in low areas where storm water can pond. The lids of these manholes have been raised to eliminate storm water from entering. A listing of these manholes and sewers that have been cleaned through last year are included in Appendix F. The department is continuing to identify and repair problem manholes as the infrastructure is inspected. Additional sewers have also since been cleaned.

The Waste Water Department is hoping to implement an in-house flow-monitoring program in the near future. Flow monitoring is used to determine the hydraulic conditions of sanitary sewers under various conditions. Typically conducted over a 60-day period, temporary flow monitoring can be used to determine inflow/infiltration levels, calibrate dynamic hydraulic models, measure in-situ line capacity, and detect bottlenecks within the system. Flow monitoring will allow the Waster Water Department to direct further testing, cleaning and videotaping of sewers efficiently to determine causes of inflow and infiltration.

In the last 15 years, the City has completed a number of dye or smoke testing. Smoke testing involves injecting a non-toxic vapor (smoke) into the manholes and following its path of travel in the mains and laterals. Colored dye is added to the storm drain water. Dyed water appearing in the sanitary sewer system indicates an existing connection between the sewer and storm drain system. Also, colored dye can be added to the sewer connection through an on-site fixture (toilet, sink, etc.) to help determine the approximate connection point to the City sewer system. The City has identified over 300 positive cross connections in areas where testing occurred. The

property owners may have corrected some of these connections since identification however; a majority is most likely still intact. Additional cross connections have not been identified in areas of the City that have not been tested. Calculations included as Appendix G indicate one cross connection from an 1,800 square foot building footprint during a 5- year storm event is equivalent to adding 64 sanitary connections to the sewer. An 8-inch sanitary sewer at the minimum design standards can generally service 300 homes. Five cross connections along one run of sewer would take up the entire capacity of the sanitary sewer for a 5-year storm event. The amount of storm runoff entering the sanitary sewers through cross connections is astounding. Mr. Johnson indicated cross connections as his greatest concern.

The drainage and sewer systems in a number of areas of the City have been investigated and/or analyzed for effects on basement flooding. Areas that were specifically studied include:

1) Chesapeake Area including Lynn, Hawley, Delsy and north portion of Gregory
2) Cedar Estates including Gabriella
3) Pamela and Parkdale
4) Thornhurst at Sprague
5) Avalon including Maple, Lisa and Villa Grande
6) Biro Ditch Area
7) Cady Road
8) State and Royalton
9) St. Thomas Woods
10) Royalton Heights
11) Edgerton and Bennett
12) Spyglass
13) Bunker/Dublin
14) Abbey and Sprague
15) Miscellaneous Localized Areas

1) Chesapeake Area

The Chesapeake drainage area consists of approximately 185 acres that drains to a culvert under York Road just north of Chesapeake Drive. Currently, three detention basins operate in this area east of York Road. The basins were constructed during different phases of construction of the Chesapeake subdivision. All three basins were analyzed for hydraulic efficiency. The upper basins in the newer sections of the subdivision appear to be designed according to City's regulations. The original basin at the corner of Potomac and Chesapeake however appears to allow frequent storm events (1 and 2-year) to pass through un-detained. A modification to the basin outlet structure can be installed to detain the more frequent storms (see **Photographs 1-4**).

The runoff from properties on the south side of Chesapeake is channelized into a 42" culvert at the rear of 9445 Chesapeake. This culvert receives approximately 125 acres of runoff. Maintenance of this channel and structure is paramount to the safety of the residents adjacent to it.

The Chesapeake area flows east to a culvert located on York Road. The water then continues east for a short distance in an open ditch before turning north under Delsy Drive through a culvert. The culvert opens up to a ditch again before turning east at the rear yards of properties on Delsy and Hawley. Observations of this open ditch indicate the need for maintenance of the ditch bottom and embankments (see **Photograph 5**). Heavy vegetation, debris and yard waste were observed along the length of the ditch, impeding the flow of water. Logjams were also observed causing the water to channelize into a smaller cross section undermining a portion of the banks. Cleaning and stabilizing the banks would be beneficial for hydraulic efficiency. The open ditch becomes enclosed at a culvert at 10089 Hawley at a 90-degree bend to the north (see **Photograph 6**). A ditch originating at the cul-de-sac on Delsy outlets at this culvert opening from the west (see **Photograph 7**). The culvert extends across the street, makes another 90-degree bend to the east in a junction chamber, runs east for a short distance, makes an additional 90-degree bend north, runs north for a small distance before opening up to ditch between 10105 and 10093 Lynn Drive (see

Photographs 8 and 9). At this opening, the rear yard drainage extending from York Road west enters the channel through a small pipe and swale at the rear of 10092 Hawley.

The open channel continues north to a culvert under Lynn Drive then further north to the rear line of properties on Lynn and Beachwood Drive where the channel make a 90-degree bend to the west. The culvert at Lynn was observed to have some accumulation of sediment, reducing the hydraulic capacity. The open channel continues west to a culvert at the southerly terminus of Wildwood Drive. The culvert and grates at Wildwood also were in need of cleaning. During a period of steady rain, the pond at the outlet of this channel was observed to be filled to capacity. The pond was enclosed by a fence installed perpendicular to the flow of the channel. The outlet of the pond was not visible. By the time the channel reaches the pond and ultimately Baldwin creek, an additional 86 acres of runoff area have been added to the Chesapeake area from Delsy, Hawley, Lynn, and Beachwood (see **Figure 1, Chesapeake Area Schematic**).

The bend at the entrance to the culvert on Hawley and the number of bends in this small section of culvert and open channel reduce the hydraulic capacity of the system. The open channels in the area appear to have sufficient capacity for the 100-year storm however the culverts do not have the capacity for a 10-year storm. The system however has been in place for a number of years and the area is built out. No vacant land is available in the immediate area to re-direct flow in a more efficient manner. Furthermore, the homes in the area are in close proximity to each other. Constructing culverts with the capacity required for 10-year storm events through this area would be extremely difficult.

A pair of 12-inch culvert pipes exists at10858 Gregory Lane. These culverts are also undersized. The rear yards of the properties on the east side of Gregory Lane had, at one time, definitive swales. Field observations revealed a number of these swales have been filled in; others are blocked with structures or landscaping. The rear yard swales on the west side of Gregory Lane are also in need of cleaning. The swale is filled in with yard waste, leaves and debris. Stagnant water was visible during a field visit.

The area also has a number of cross connections identified. Delsy in particular had more than 25% of the connections positively identified. An additional 19 cross connections that are tributary to the Gregory Lane sanitary sewer were also identified. Observation of the sanitary manhole at 10845 Gregory during a steady rain event indicated heavy Inflow/Infiltration (I/I) (see **Photograph 10**).

2) Cedar Estates

The Cedar Estates Subdivision is located downstream of approximately 360 acres divided into two watersheds stretching from Ridge Road west to York Road. The runoff from approximately 140 acres crosses York Road through a culvert. This culvert extends through the rear yards of properties on Elmwood Oval and Sassafras Circle before making a 90-degree bend to the north. The culvert continues north until it discharges into an open channel at the rear of 9600 Applewood Drive. The open channel flows north to the rear property corner of 9640 Applewood Drive where the runoff from the remaining 220 acres of drainage area joins the open channel. The channel then makes a 90-degree bend to the west along the rear line of properties on the north side of Applewood Drive (see **Photographs 11 and 12**). At the terminus of Wildwood Drive, the open channel enters into a culvert (see **Photograph 13**) that extends along the rear yards on Applewood for a few hundred feet before opening up again and discharging into Baldwin Creek. The storm sewer system for the subdivision connects to the culvert near Wildwood Drive (see **Figure 2, Cedar Estates Schematic**).

Hydraulic analysis of the storm sewer systems in the subdivision indicated a majority of the storm sewers in the subdivision do not have sufficient capacity for a 5-year storm event. Current City standards require the capacity to coincide with a 10-year storm event for a residential subdivision. Furthermore, the storm sewer system for the subdivision was connected to the culvert near Wildwood Drive at the flow line of the culvert pipe. During a 5-year storm event, the depth of water in the culvert pipe is approximately 3 feet therefore the 42” outlet pipe for the sewer system is 85% submerged.

Twenty-eight cross connections have been identified in this area. Gabriella had more than 25% of properties testing positively. Gabriella also appears to have a side-by-side sewer system; the sanitary and storm sewer were constructed in the same trench. As the system ages and the pipes deteriorate, storm water easily enters the sanitary through cracks and joints causing an overload of these types of systems.

Furthermore, the sanitary system in this subdivision is directly upstream from the Waste Water Treatment Plant B. If the treatment plant is overloaded, these residents are some of the first to feel the effect.

3) Pamela and Parkdale

Pamela Drive is located at the north border of the City and the City of Parma. The properties on the south side of Pamela are down slope of approximately 48 acres of drainage area. When the subdivision was constructed, a culvert pipe was installed at the rear of the southerly parcels to catch and convey the runoff from approximately 25 of these 48 acres (see **Photograph 14 and 15**). The pipe runs to the west and discharges into an open ditch before meeting up with the runoff from the remaining 23 acres. The flows merge and enter into a storm sewer (see **Photograph 16**) that discharges into the City of Parma sewer system (see **Figure 3, Pamela and Parkdale Sewers Schematic).**

The culvert pipe that runs along the rear of the southerly propertied cannot carry all of the runoff. Floodwaters overwhelm the inlet of the culvert pipe and flood the properties at 7387 and 7345. The floodwaters also flow across the street to properties at a lower elevation. The storm sewer on Pamela Drive itself is undersized for the current design standard. Evidence exists that indicates roadside ditches were once present on Pamela Drive. These ditches have since been filled or silted in. The Parkdale sewer outlet is also undersized. Approximately 30 acres of drainage area flows north to a ravine at the City Limit through a 24” pipe. Defined roadside ditches exist on Parkdale. Twenty-two of the homes on these two streets tested positive for cross connections.

4) Thornhurst at Sprague

Approximately 95 acres drain towards the culvert near Thornhurst Drive at West Sprague Road. The intersection is located at the bottom of a large hill. Runoff from the north side and south side of West Sprague flow through concrete channels and merge on the south side of West Sprague in front of 4473. The flow enters into a 36" culvert pipe that flows south along the side yard of this property. At the rear of 4473, the culvert opens up to a channel from a 90-degree bend to the west. The flow continues to west in the open channel, crosses Thornhurst in a culvert and then continues as an open channel to the City Limit and beyond to Big Creek (see **Figure 4, Thornhurst Schematic).**

Hydraulic analysis indicates the culvert along the side yard of 4473 is insufficient for the volume of runoff it is expected to convey.

5) Avalon Area

The Avalon Area consists of approximately 127 acres of drainage area including an area just south of Maple Lane and a portion of Lisa Lane. Approximately 8 acres south of Maple Lane drains to a culvert on Maple Lane. This existing 12" culvert does not have the capacity to convey the runoff from this area resulting in yard flooding for the residents in the vicinity. An additional 16 acres of runoff area merges with the flow from Maple to a storm sewer system on Lisa Lane. The water then discharges to the Class 3 wetlands behind Avalon Event Center.

In 2001, the Avalon Event Center was constructed at the corner of Wallings and State Roads. The Event Center is adjacent to and just north of the Class 3 wetlands. Construction of Avalon required the construction of a detention basin. The detention basin discharges into these wetlands (see **Photographs 17 and 18**). The wetlands outlet to the east along a channel located on vacant property. The channel continues east to a culvert in the rear yard of 11290 Villa Grande. The culvert continues east under Villa Grande where it discharges into an open channel behind 11292 Villa Grande continuing east to the City Limit and ultimately to Chippewa Creek (see **Figure 5, Avalon Area Schematic)**.

Residents in area and particularly at the north end of Villa Grande (see **Photographs 19 through 21**) have experienced an increase in surface flooding since the Event Center was constructed. After review of the topography of the area and the improvement plans for the Event Center, no correlation could be found for the increase in surface flooding and construction of the Event Center. File reviews for the construction of the subdivision however indicate shallow rock depth and high ground water in the area. Depth to water in this area is expected at 5 to 15 feet. This groundwater is in shale, which is encountered at 0 to 6 feet. The sustained pumping rate one could expect from a well in this area is 3 to 25 gallons per minute. The bedrock aquifer is overlain by sand and gravel with silt and clay. This would suggest a high recharge rate, and likely a high rate of discharge during times of high groundwater. This would explain the pumping from the ground during wet weather that residents have experienced and increase the amount of infiltration into the sanitary sewer.

6) Biro Ditch

The Biro Ditch was manmade to convey the runoff from approximately 230 acres on the north and south sides of Albion Road. Just west of Shaker Drive, the channel known locally as the Biro Ditch cross from the south side of Albion Road to the north through a culvert. The channel then turns towards the west beyond the structure at 10388 Albion Road and continues west to Gregory Lane. The channel crosses Gregory through a culvert (see **Photograph 22**) and continues west to northwest corner of 10760 Albion Road. At this point, the channel makes a 90-degree bend (see **Photograph 23**) and heads south again through another culvert on Albion Road. The channel continues south where it eventually drains into the east branch of the Rocky River (see **Figure 6, Biro Ditch Schematic)**.

The potential for blockage and flooding exists at every culvert. Three culverts are a part of this drainage course. The culvert particularly at Gregory Lane has, historically, needed regular maintenance. Loss of cross-sectional area of a culvert from sedimentation decreases the water carrying capacity of the pipe.

7) Cady Road

Approximately 390 acres of land drains towards the intersection of Cady and State Roads. A field visit of the area revealed roadside ditches that were silted or filled in. Other ditches were excavated with little or no slope causing water to pond. Catch basins installed along a small section of roadway were at grade instead of depressed to catch the runoff. Most of the runoff in this immediate area would end up bypassing these catch basins. The stream banks near the intersection of Cady and State are overgrown and need cleared. Cady Road is a County Road. An old County drainage structure exists near the intersection. The structure is beginning to deteriorate. If a County Road Improvement was to be constructed, the structure should be replaced (see **Figure 7, Cady Road Schematic)**.

8) State and Royalton

The runoff contributing to the stream near the intersection of State and Royalton Roads originates in the north, east and west. St. Thomas Woods Subdivision discharges to a rear yard swale on the properties along Padua Drive East. The drainage course merges with runoff from Royalwood Road from the west at a culvert under Royalwood Road. While the culvert under Royalwood is sufficient in capacity, erosion of the stream banks is evident at the outlet end of the culvert (see **Photograph 24**). Sections of the banks of the stream continuing south are overgrown. The drainage course continues south to Goodman Drive and through another culvert there. Again the culvert at Goodman has sufficient capacity however it appears the upstream end of the culvert was extended and no headwall was constructed. The entrance losses from this large corrugated metal pipe reduce the hydraulic capacity of the culvert.

A new home being constructed adjacent to the stream at the outlet of the culvert did not have any erosion control measures in place. Grass had not yet been established in the yard. This home however was under permit for construction prior to the EPA Phase II Storm Water Regulations that require erosion control were in effect.

Continuing south along the stream, a series of fences and homemade bridges have been constructed perpendicular to the flow path (see **Photograph 25**). Little or no headroom exists between the bottom of the fence or bridge and the water flowing in the stream that continues south. Just north of the Giant Eagle property, another homemade bridge has been constructed across the stream (see **Photograph 26**). Although there is sufficient clearance at this bridge, the stream has been bottlenecked into a small cross-section increasing the velocity just as the water approaches the twin culverts under the Giant Eagle parking lot indicated by the erosion of the gabion baskets at the inlet. Runoff from the east side of State Road merges with the twin culverts near the middle of the parking lot. The inverts of the twin culverts have an accumulation of sediment at the downstream end (see **Photograph 27**).

The banks downstream of the parking lot are overgrown and eroding. A section of the pavement on the Burger King site is undermined; a piece of curbing has fallen into the creek. Construction debris and concrete washout are evident along the embankments. The stream channel also meanders back and forth before entering into the large culvert on Royalton Road. The owners of Burger King are currently working with a consultant to submit plans to the Army Corps of Engineers to extend the existing gabion wall system along the stream bank on their property.

The stream just south of the culvert is grossly overgrown (see **Photograph 28**). Fallen timber and brush have overtaken the embankments. The stream continues south and eventually drains into the east branch of the Rocky River (see **Figure 8, State and Royalton Schematic)**.

Royalton Court Condominiums contributes to this drainage area. The property is subject to flooding from overland flow. A private Drainage Study was performed in late 2003 for this property that included recommendations to some of the problems in the area. The recommendations include a number of items that should be completed by the private property owner.

9) St. Thomas Woods

The subdivision named St. Thomas Woods was constructed in the 1960s. Predominant construction methods at the time included installing sanitary and storm sewers in the same trench. Infiltration from the storm into the sanitary can and does easily occur with this type of construction as the infrastructure ages. This subdivision was, in fact, constructed employing this method. The storm sewer system for this subdivision outlets into a drainage channel to the rear of the properties on the east side of Padua Drive East. In 1990, the City of North Royalton contracted with a firm to clean this drainage channel as it had become silted in. Flow capacity was reduced by sedimentation and overgrowth of the channel (see **Figure 9, St. Thomas Woods Schematic)**.

10) Royalton Heights

Royalton Heights Subdivision is located at the eastern edge of the City, just south of Wallings Road. The subdivision was constructed in a number of phases. Royalton Heights Subdivision included construction of Apollo, Titan, Mercury, Jupiter, Saturn and Athena Drives. The earlier phases of this subdivision did not require detention.

Saturn and Athena Drives were constructed perpendicular to a stream that flowed through the area. Culverts were constructed at the stream crossings. This stream continued to flow east into the City of Broadview Heights. The stream was channelized to make way for Sunset Oval. A detention basin was constructed as part of Phase 5 along side of the storm sewer outlet for Royalton Heights, Phases 1&3 (see **Figure 10, Royalton Heights Schematic)**.

The sanitary sewers for this area flow south by gravity to a pump station where the sewage is pumped uphill to an available gravity sewer.

Field observation on a day of heavy snowmelt at the detention basin at 12299 Apollo indicated the basin was not functioning properly. The basin was dry while the bypass for the inlet structure was flowing full as was the bypass channel. The channel behind the basin was also flowing at bank full conditions. The inlet structure consists of a 36-inch sewer entering

from the west and an 18-inch and 21-inch orifice exiting to the east through a 42-inch sewer. An 18-inch stub of pipe runs from the inlet structure to the detention basin at a 90-degree angle to the direction of flow. The designer's likely intent was to have the runoff from Phases 1 and 3 by-pass the basin with only the runoff from Phase 5 being diverted into the basin.

11) Edgerton and Bennett

The runoff from Lindberg Drive flows through an ephemeral stream beginning at 9581 Lindberg (see **Photograph 29**). The stream flows south to Edgerton Road along the east property line of 9670 Edgerton Road. Field visits and review of historic topographic maps indicate a low spot at the bottom of the cemetery hill fronting on Edgerton (see **Photograph 30**). The resident of this 9670 Edgerton indicated a 6"-8" sewer pipe runs from this low point at an angle to the west and in the front yard of 9682 Edgerton (see **Photograph 31**). Approximately 11 acres drains to the low point. This pipe is obviously under-sized which the property owner is aware of. Roadway runoff is collected in roadside ditches and merges with the flow from the culvert adding an additional 3 acres of runoff. The junction of the pipe and roadside ditches is filled with debris, rubble and yard waste. From this junction, flow is then directed across Edgerton through a culvert pipe that daylights in the side yard of 9675 Edgerton. A fence has been constructed perpendicular to the flow of this ditch. The water continues south through an open ditch across an overgrown vacant parcel (see **Photograph 32**). Two parallel 6" plastic pipes have been constructed from the vacant parcel to a headwall located at 16620 Bennett Road (see **Photographs 33 and 34**). A culvert pipe is located from the headwall to a catch basin across Bennett. The headwall was observed to be deteriorating with the first joint of pipe slightly offset from the line of the sewer. A portion of the lid of the catch basin has rusted through. Bricks from the crown of the sewer lay in the invert of the catch basin. The outlet for this catch basin is located in the rear yard of 16791 Bennett. Runoff from Bennett, an additional 5 acres, is collected in concrete gutters along the roadway and merges with the upstream drainage area at this catch basin (see **Figure 11, Edgerton and Bennett Schematic)**.

12) Spyglass Estates

Residents of the area have complained about erosion of yards along the creek that meanders through this development. Field observation revealed countless yard accessories such as swing sets and picnic tables located on the banks of the stream. Further downstream, new construction on Kingston Way was observed that did not include any erosion control measures (see **Figure 12, Spyglass Estates Schematic)**. A ditch and culvert pipe at the rear of the cul-de-sac properties was silted in and the houses were still under construction. Bare soil was piled along the banks of the stream. Vegetation was not yet established on the banks. The inlet of a culvert at the cul-de-sac of Kingston Way was already silted in causing the flow of water to meander from the flow path. Introduction of obtrusive elements along the banks of any stream, ditch or channel can greatly affect the dynamics of a hydraulic system. Permits for these homes were issued prior to the EPA Phase II Storm Water Regulations that require erosion control. After their construction began and after the regulations took effect, the grading plans for these lots were revised. Approved grading plans from the Engineer's office included requirements for erosion control measures.

13) Bunker/Dublin

The property at 4700 Bunker Road is located at the convergence of two major drainage courses in the northeast quadrant of the City. A 66-inch sewer runs along side the property and a 60-inch sewer runs along the rear of the property. The drainage area contributing to these sewers is in excess of 370 acres. The junction chamber for these two large sewers once included a grate on the outlet to keep children and animals out. Unfortunately, it also became clogged with debris washed downstream. The grate has since been removed and has alleviated some of the problems with this structure. The inlet end of the culvert also had a grate installed. This grate should be regularly cleaned to eliminate the possibility of yard flooding (see **Figure 13, Bunker/Dublin Schematic)**.

Review of the site plan for the property at 4700 Bunker revealed a storm connection directly into the 60-inch culvert at the rear of the property. The storm and sanitary sewers on Bunker in front of this property have been videotaped with inconclusive results. The home has a

check valve installed on the sanitary connection that has been successful in stopping basement backup. The sanitary sewer for this area flows to the Northeast Ohio Regional Sewer District's Southwesterly plant. The sewer in front on this home is part of a 10" trunk line.

14) Abbey and Sprague

The area of Abbey and Sprague is the juncture of approximately 1,476 acres or 2.3 square miles of drainage area. The Federal Emergency Management Agency has mapped the 100-year flood plain to include all of this intersection. The 100-year flood elevation at this intersection is 877 feet. Structures in the vicinity of the intersection are at elevations of approximately 875 feet. For the 100-year storm event, the first floors should be flooded by about 2 feet (see **Figure 14, Abbey and Sprague Schematic)**.

FEMA has scheduled the re-mapping of Cuyahoga County as part of its Map Modernization program however the contractor has not yet been approved to begin work. Preliminary maps are scheduled to be released to communities in 2006-2007. The re-mapping of the floodplain may affect this intersection dramatically.

15) Miscellaneous Localized Areas

Numerous localized flooding areas were reviewed and visited during the course of this study. Locations of these properties were determined by request of the property owner/owners, flooding complaints and areas of known problems.

3643 Royalton Road - the resident at this address indicated that water was coming over Royalton Road from the north. Sewer work since completed at Hunter's Creek has alleviated the problem.

5297 Royalton Road - Backup in June 2004 was the only time basement backup was experienced by this resident. The resident was concerned about the condition and size of sanitary sewer on Royalton Road.

5801 Royalton Road – Tenant reported debris washed down and blocked creek during June 2004 storm. The flooding that occurs was the only instance in 6 years. The tenant also complained about ponding in the parking lot. Field observation of the upslope property revealed the downspouts at 5895 Royalton Road were overflowing.

8377 Royalton Road – The resident indicated the creek overflowed for first time since moving to the property in 1990. The resident has not experienced any problems since the June 2004 storm. One concern the resident has was the maintenance of the detention basin at Dover Farms. Observation of the detention basin revealed some sediment buildup. A 3rd floor resident reported he had never observed the water higher than the weir opening on the outlet structure.

8395 Royalton Road – The bridge over the driveway was a recent construction and in good condition. The stream banks at the adjacent property, 8701, had a great deal of undermining occurring. The embankments are overgrown. The two properties upstream of 8701 had protected the banks with rocks and other materials. No erosion was evident there. The banks at 8701 had no protection. Downstream of these properties, a large trash grate was observed at a culvert at N. Akins Road at the outlet of stream (Royal Park Condos). The trash grate was collecting debris.

8700 and 8678 Boston Road – The erosion of the banks of the stream on private property was observed in the field. The stream alignment through the culvert on Boston Road flows toward the west bank causing erosion and undermining of the bank. Large debris was spotted just upstream of the property. The Cuyahoga County Engineer maintains the structure in the public right-of-way (see **Photographs 35 through 38**).

4665 Wiltshire Road – The resident had improvements completed to the service connection to remove root intrusion on private property. The resident also tries to keep the catch basin in the front yard cleared. This catch basin often fills with sediment from roadway. Adjacent

to this property, a barn was built at the property line with no gutters. The garage downspouts have been disconnected and allowed to splash onto the driveway. During rainfall, water rolls off of the buildings on the adjacent property and creates a "stream" of runoff that flows directly towards the residence. In the past, water entered the basement through the window well that filled from this "stream". The swale to the rear of this property is also overgrown. A homemade bridge spans the swale impeding the natural drainage course.

River Road – The intersection of River and State Roads was reported flooded in 2003. The intersection is located at the juncture of two drainage ways. The flooding of the street was caused by the blockage of a drainage structure.

II. LONG AND SHORT TERM SOLUTIONS AND COSTS

Because long-term solutions are very capital intensive, it will be many years before solutions to solve every flooding situation are constructed. Some short-term solutions are therefore worth considering. The solutions fall into two broad categories, those that the City can do within the public right-of-way, and those that should be done by the homeowner

A. City Solutions – Long and Short Term

The City has already taken many short-term steps to minimize flooding. Continuation of proactive practices and storm water management are essential. These short-term solutions often have little or no cost associated with them; they may be a continuation of existing practices, use of existing departments or administrative solutions.

i. New Regulations

The City Service Department should clear the sediment from the culverts and basins throughout the City in the dedicated right-of-way and easements on a regular basis. Grates on culverts and detention basin outlets should be checked periodically for buildup of debris, particularly after storm events when debris is likely to be washed downstream. Ordinance 04-221 passed by the City recently requires detention basins to be inspected annually by the owner and the

Engineering Department. Citations may be issued for any deficiencies found and 30 days provided to the owner to make the necessary repairs. The City may make the repairs after 30 days and assess the cost back to the property owner. As with any detention structure, maintenance is important for the structure to work affectively and efficiently. Residents should be encouraged to call into the Service Department if they see grates or inlets that appear to be blocked or clogged. Because the Service and Engineering Departments are understaffed, regular inspection and maintenance of public infrastructure is difficult. The City could consider hiring additional staff for these departments or an independent contractor to complete these tasks.

The City of North Royalton has also recently enacted a new Flood Damage Reduction Ordinance, 04-212 that exceeds the minimum standards set forth by the National Flood Insurance Program to manage the natural resources of the floodplain, adequately protect floodplain development from future flood damages, reduce adverse impacts of floodplain development, and meet or exceed the minimum federal requirements for community participation in the National Flood Insurance Program.

The City has also recently passed an Ordinance 05-14, increasing the fee to be collected for building permits for new construction. This fee will be collected into a separate account to be used for storm sewer improvements in the City.

In December of 1999, the US EPA expanded the National Pollutant Discharge Elimination System (NPDES) Storm Water Program by designating additional sources of storm water for regulation to protect water quality. All affected entities, including Municipalities unless exempt as specified by the program regulations, were required to obtain permit coverage by March 10, 2003. To obtain coverage, the regulated entities were required to provide a Storm Water Management Plan to the EPA. As part of this Management Plan, the City of North Royalton has adopted new regulations titled Controlling Construction Site Soil Erosion, Sediment, and Other Wastes and Storm Water Runoff (Chapter 1488), Controlling Post-Construction Water Quality Runoff, (Chapter 1490) and Controlling Riparian Setbacks and Wetlands Setbacks (Chapter 1492). Storm Water Pollution Prevention Plans, (SWP3), for any new construction site in excess

of 8,000 square feet are now required to control erosion and sedimentation not only during construction but also after construction for an indefinite period by these regulations. Riparian and wetlands setbacks are also a requirement now in the City of North Royalton. A number of communities in Northeast Ohio have yet to adopt similar ordinances. These regulations will help protect the drainage courses of the City. Copies of these ordinances can be found in Appendix H.

The City has entered into a Memorandum of Understanding with the Cuyahoga Soil and Water Conservation District (CSWCD) to perform site inspections for a fee, during construction, to verify compliance with regulations. The SWP3s, by City regulations, are also being reviewed by the CSWCD. The developer is paying fees for this review and inspections.

The enforcement of these and all similar ordinances are the key to their effectiveness. Some members of the Committee voiced concerns about the enforcement of the regulations of the City. Reportedly, citations have been issued with no further action taken. Violations and penalties are set forth in the regulations of the City. It will be up to the City to enforce the penalties when violations are discovered. The Building, Service and Engineering Departments are currently understaffed to provide the inspections that are required to determine compliance with regulations. Effective enforcement will require the hiring of additional personnel to perform inspections.

ii. Cross Connections and Sewer Inspection

The Waste Water, Engineering, and Building Departments should review the positive cross connection data to determine which homes should be disconnected. Mr. Johnson indicated in an interview that a part time cross connection investigator may be hired to verify and identify additional cross connections. The additional of this staff member would be extremely beneficial in aiding the understaffed Building Department. Reduction of inflow is paramount to reducing basement flooding for the City. The City should adopt a policy for cross connection elimination. Some communities utilize a point of sale inspection for transferring real estate. A dye test is required during the inspection. Cross connections discovered during the testing are required to

be corrected prior to transfer. Other communities, most recently the City of Strongsville, have required their residents to correct the cross connections in a certain period of time, usually 30 to 60 days. The City may consider setting up a no interest or low interest loan program to assist it's residents in making the necessary repairs. A small amount of grant money could be used to seed a revolving loan account. At an estimated $3,000 per connection, a small amount of money in the account could substantially reduce the inflow in just a few years. Priority should be placed on areas with known cross connections and concentrations of basement flooding.

The Waste Water Department should and has been identifying manholes with known inflow problems and is repairing them as necessary. As of March 15, 2005, the lids of 44 sanitary manholes were raised so that storm water could not enter. As additional manholes are located, the repairs are being made.

The City should and has been cleaning the sewers on a regular basis as well as performing a televised inspection of sanitary sewers in the City. Logs of the inspections are being kept and a cleaning schedule is being determined from these. Mr. Johnson's ultimate goal for the Department is to have a cleaning schedule in place that will allow for regular maintenance on most sewers with additional passes included for areas that are determined to require more frequent cleanings. The City could also offer a low cost service to homeowners to inspect and unblock both sanitary and storm service laterals.

The City recently revised Chapter 1481 Storm Water Management. The new requirements are much more detailed and consistent with or exceed current design standards. The requirements include the calculation of the hydraulic grade line, HGL, for all future storm sewer improvements. The hydraulic grade line is defined as "a line whose plotted ordinate position represents the sum of pressure head plus elevation head for the various positions along a given fluid flow path, such as along a pipeline or a ground water streamline". The HGL will be used by the City Engineer to determine if basement elevations and sewer elevations are set appropriately. In addition to the HGL calculation requirements, the revised regulations require culverts under all roadways to be designed for a 25-year storm event. The State standards for

culverts are the 10-year storm for roads with average daily traffic of less than 2000 and 25-year for average daily traffic over 2000. The requirements also include submittal of inlet spacing calculations to ensure catch basins are located properly along a roadway. The City should make certain these calculations are reviewed carefully and that the improvements are built as designed.

iii. National Flood Insurance Program

The City should consider participation in the Community Rating System (CRS) of the National Flood Insurance Program (NFIP). The Community Rating System was started in 1990 as a way to recognize and encourage communities to manage and regulate their floodplain above the minimum standards of the National Flood Insurance Program. The goals of the program are to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. Participation in the program by communities leads to discounted flood insurance premium rates based upon the number of activities a community completes.

There are 18 activities the community can participate with in four categories: Public Information, Mapping and Regulations, Flood Damage Reduction and Flood Preparedness. Points are assigned for each completed activity.

The Public Information Activities credit programs that advise people about flood hazard, flood insurance, and ways to reduce flood damage. They activities generally serve all members of the community.

The Mapping and Regulation Activities credit programs that map areas not shown on the Flood Insurance Rate Map, preserve open space, enforce higher regulatory standards, and manage storm water.

The Flood Damage Reduction Activities credit programs for comprehensive floodplain management plans, relocating or retrofitting flood prone structures and maintaining drainage systems.

The Flood Preparedness Activities credit flood warning, levee and dam safety programs. The State of Ohio's Dam Safety Program automatically qualifies each community in our State for this activity.

Communities are broken up into 10 classes dependent upon the number of activities that are completed and points awarded. Class 10 communities receive no discount in premiums. These communities typically are not active participants in the Community Rating System. The City of North Royalton is not listed in the latest published index of participating communities. The lower the Class number, the higher the premium deduction for residents living in a Special Flood Hazard Area. All other residents of a Class 9 or better community receive a 5% discount.

Initial application to the program takes some research and paperwork. A field visit is also made by Insurance Services Office, Inc. to verify the activities reported by the community. An annual re-certification application is also required but is much less time consuming.

The City of North Royalton should investigate the "Activities" the community already completes as part of its normal operations to determine if enough points are available to apply for Class 9 certification. A few inexpensive activities may also provide enough points if the City currently does not meet the requirements.

iv. Solutions for Specific Problem Areas

As a result of the analysis of various areas of the City, a number of viable solutions to the flooding problems have been determined. Cost estimates for each of these solutions can be found in Appendix I. These solutions are based upon record plans, fieldwork in certain areas and common engineering assumptions. Actual field measurements of the project areas will need to be completed to ensure the proposed projects are construct-able. Detailed plans will also need to be completed for proper construction. Costs for these two items as well as construction inspection services have been included in the cost estimates for budgetary purposes.

1) Chesapeake Area

Reconstruction of the infrastructure in the area would be financially prohibitive. Instead, to alleviate flooding problems in this area, a large detention basin is proposed. The basin would hold back a large volume of water reducing the flow in the drainage course. The basin could be located at the convergence of two streams on the rear vacant portions of propertied fronting on Albion Road. A portion of the rear of these properties is located in a ravine and is relatively un-build-able. Calculations indicate approximately 500,000 cubic feet of storage would be required. By constructing the basin, the flows through the remainder of the watershed would be reduced by as much as half. For the 100-year storm event the flow through the York Road culvert would be reduced from 186 c.f.s. to 99 c.f.s. The preliminary estimated cost for this improvement is approximately $280,000. The cost does not include the purchase of or easement on the property.

The property north of the proposed location can be developed into an extension of the Chesapeake subdivision. Financing for a portion of the detention basin could come from revenues from the sale of the portion of property not used for the basin if the City were to purchase it. Assessments to residents downstream that benefit from the basin can also be used to finance the construction of the basin.

In addition, the culverts on the north end of Gregory should be replaced with a 19" x 30"single elliptical pipe. The cost to replace this culvert would be approximately $51,000. This price includes the replacement of the twin pipes on private property. Replacement of the culvert in the public right-of-way would not alleviate the surface-flooding problem. Residents should be encouraged to re-establish and maintain the rear yard swales on both the east and west sides of Gregory to promote positive drainage.

2) Cedar Estates

Since a majority of the storm sewer system in Cedar Estates does not have sufficient capacity, hydraulic analysis including the calculation of the hydraulic grade line, HGL, was completed to correctly size the sewers throughout the subdivision for a 10-year storm event. Possible solutions were then developed assuming the sewer system is

replaced. The construction cost to replace the sewer system is estimated at $1.7 million. The estimate was determined assuming the sewer can be constructed in an unpaved area. If construction of the sewers is limited to the roadway area, this cost will increase dramatically.

Construction of a detention basin in conjunction with the replacement of the sewer system is one solution. The detention basin could be constructed upstream of the convergence of the two open channels at the north east corner of the subdivision. The basin would had an estimated volume of 1,250,000 cubic feet of storage and would reduce the amount of flow through the northern channel by approximately 50%. For the 100-year storm event, the volumetric flow rate would be reduced from 416 c.f.s. to 190 c.f.s. The reduction in flow would reduce the depth of water and HGL in the culvert near Applewood where the sewer system for the subdivision is connected. The construction cost for the detention basin is estimated at $415,000. This cost does not include obtaining the property for the basin.

The storm sewers in the subdivision can be replaced without the construction of the detention basin however the sewer sizes will increase to have the same effect as the construction of the detention basin. Estimated cost for this second solution; sewer replacement without the construction of the basin, is approximately $2.0 million. Again, the cost is based upon constructing the sewer in an unpaved area.

The construction cost for the two proposed solutions are about the same. Removing the culvert at Applewood that flows west was also considered however the decrease in depth of flow was not significant enough to merit its removal.

3) Pamela and Parkdale

Two solutions are proposed for this area. The first would be the construction of the improvements as proposed by Dalia Consultants in 1991. Cost for this improvement is estimated at $617,000. The improvements include the construction of basins at the rear

of the properties where a large amount of runoff concentrates. The improvements also include the reconstruction of the outlet to the ravine at the north end of Parkdale. Currently, a majority of flow from Pamela Drive outlets to a sewer in the City of Parma. By relocating the outlet to the ravine, the City of North Royalton will have control over the condition and maintenance of the pipe. The outlet has been sized to accommodate the contributing drainage area on Parkdale. The re-establishment of the roadside swales on Pamela Drive is also part of this project.

Alternatively, a detention basin could be constructed to the rear of 7251-7345 Pamela Drive. Construction cost for this basin is approximately $250,000 but does not include the cost for obtaining the property or easement for the basin.

The City should carefully consider the initial construction cost versus the maintenance cost of both improvements. The storm sewer will have a useful life of approximately 50 years. Although the sewer is designed to flush itself, maintenance of the manholes and inlet basins will be required periodically. The detention basin will require annual inspection and maintenance to assure it is in good working order. The construction of the detention basin does not include removing the outlet of the sewer system from another municipality. Should the existing outlet remain, the capacity of the sewer is somewhat at the mercy of the City of Parma.

4) Thornhurst at Sprague

Because a majority of the drainage area originates in the City of Parma and because the cause of flooding is directly associated with a culvert on private property, there is little the City can do to eliminate the flooding at this intersection. Residents with historical knowledge of the area reported that flooding began after the 36” culvert pipe was installed. The resident can choose to remove or replace the culvert pipe along the side yard.

5) Avalon Area

The existing culvert under Maple Lane near 4851 Maple is not sufficient for the drainage area. This culvert should be replaced to allow runoff to flow through to the storm sewer system on Lisa Drive. Construction cost for this improvement is estimated at approximately $25,000. The project would include re-establishing the side yard swales on private property. A savings of approximately $3,800 would result if the residents were required to repair the swales themselves.

The Avalon Event Center detention basin is in need of repair. Silt and denuded areas were observed in the field however the basin is private property and cannot be repaired by the City until a violation notice and ample time has been given the property owner. Costs for the repair and cleaning of the basin are minor.

No reason was found to explain the constantly wet yards on the north end of Villa Grande. Historical cross connection testing of the area was inconclusive. Evidence does point to a high water table and reported spring in the area. Sandstone outcroppings are visible in a number of yards in the Villa Grande subdivision. A transition in the geologic formations of the area is evident at the stream that flows from the Event Center to Villa Grande. The City or property owners could consult with a hydro-geologist to further investigate the geology and water table of the area. A geologic study of the area may result in an explanation of excess infiltration into the sanitary sewer as well as determine a source for the excess surface water in Villa Grande.

6) Biro Ditch

An existing ditch flows from the north west corner of Cinnamon Lakes to the Biro Ditch. Enlarging this channel and extending it to the 90-degree bend at 10231 Albion would split the drainage area. The northern drainage area would continue to flow through the existing culverts first at Gregory and then at Albion. The southern drainage area would flow through a more direct route to the west where it would meet up with the Biro Ditch

again. The flow through the culverts under Albion and Gregory would have to convey less than 50% of what they are passing today. Construction of this ditch would cost approximately $100,000 and would require an easement through private property.

7) Cady Road

The concerns on Cady Road are predominantly related to surface flooding. The City should re-establish roadside ditches that have been silted in. Annual inspections of these swales to determine maintenance requirements should be performed not only on Cady but also other streets were roadside ditches exist. An estimated cost for cleaning and digging roadside ditches is approximated at $8-$9 per linear foot of ditching including seeding of the disturbed area.

The catch basins that were installed at grade should be lowered to allow for capture of runoff instead of bypassing the grates. Adjusting these basins to the correct elevation should cost between $250-$400 per catch basin.

8) State and Royalton

The culverts along the stream from Royalwood to Royalton have been reviewed. All appear to have sufficient capacity. The stream banks are in need of repair in some areas and maintenance in others. `The stream however flows on private properties and therefore is the responsibility of the property owner. Homemade bridges and fences that impede the flow of the stream should be removed. Property owners that fail to remove these structures should be cited unless they can produce proof that the structures would not hinder flow. Property owners should be required to clear overgrowth of the banks and remove logjams.

A headwall should be constructed at the inlet of the Goodman culvert to reduce the entrance losses. Entrance losses depend on the geometry of the inlet. The coefficient, K, for culvert calculations reduces from 0.9 with no headwall to 0.5 with a headwall. The smaller the losses in the culvert, the more efficient water can pass through it.

9) St. Thomas Woods

St. Thomas Woods should continue to be monitored carefully for inflow and infiltrations with flow meters because of the side-by-side sewer construction that exists. A detailed videotaping of the sanitary sewer should be performed to evaluate the integrity of the pipe and joints. In-situ lining of the sanitary may be an option for this subdivision should problems be discovered with the main line.

During in-situ lining, a resin-saturated bladder is inserted into the sewer. Hot water or steam is introduced into the pipe after both ends are sealed. The water forces the bladder to expand and the heat causes the resin to stick to the walls of the existing sewer. After a short curing period, the water is released and a cutter is sent through the pipe to open up the service laterals. The work is completed with only a few trucks and a crew. No excavation takes place and residents are without service for only a short period of time. A preliminary cost for in-situ lining is approximately $40 per linear foot including cleaning and televising prior to lining. This cost is only for the main sewer line and does not include lining of service laterals.

Investigation and replacement, where necessary, of the service laterals should also be considered by the private property owners.

Additionally, the drainage course to the rear of the properties on the east side of Padua Drive East should be kept cleared. This drainage course is the outlet for the storm sewer system of the subdivision.

10) Royalton Heights

The inlet diversion structure at this detention basin controls the flow out of the sewer system and into the detention pond or outlet channel. When designing a detention pond, typically the outlet structure is the control for flow. Backup at the inlet will cause backup of the storm sewer system. Backup of an outlet will cause backup into the basin and

possibly flow over the emergency overflow weir but not the sewer. Although the inlet diversion structure has sufficient capacity to pass all storms through the 100-year event, the hydraulic grade line is forced so high that the storm sewer system in the subdivision operates under pressure.

Ideally, the inlet and outlet structures should be replaced to allow all of the flow into the basin with control at the outlet structure. The volume of the pond would need to be increased to accommodate the increased flow however there is no available area to enlarge the basin. A possible solution to minimize the problem would be to replace the orifice plate in the structure and lower the inlet into the pond. The orifice plate should be modified to allow flow into the basin first with by-pass orifices at higher elevations. The top of the plate should also be lowered to lower the HGL. The outlet structure would also need modification to maintain the allowable flow out of the basin. The cost to replace the diversion plate, outlet structure and make modifications to the basin is estimated at $10,000. The homeowner's association owns the detention basin. The association should contract with a professional engineer to re-design the basin.

The sanitary sewer located in an easement through the detention basin should be carefully videotaped by the City to verify the integrity of the pipe and joints. Repairs should be made immediately should any deficiencies be found.

11) Edgerton and Bennett

A new sewer system can be constructed from the low point at 9670 Edgerton Road to the headwall at 16620 Bennett Road. It should be noted however that a majority of this system would be located on private property. A preliminary cost to construct this system is estimated at $190,000. This cost includes replacement of the headwall at 16620 with an inlet structure, the culvert pipe under Bennett and the outlet pipe. Should this proposed storm sewer system not be constructed, the headwall at 16620 Bennett should be repaired and the culvert pipe under Bennett Road should be replaced. The cost estimated for repairing just the public infrastructure is $26,000. Making the repairs in the

public right-of-way however will not eliminate the potential for flooding. The condition of the outlet pipe from the catch basin at 16701 Bennett is not known, as it exists on private property. A videotaping of the sewer can reveal problems that may be causing the backup of the structures in the public right-of-way.

12) Spyglass Estates

All of the reported flooding incidents that took place in Spyglass Estates were for yard flooding and erosion that occurred on private property. The City's regulations prohibit the diverting of watercourses. During field visits, many diversions were witnessed on the banks of the stream that meanders through the subdivision. Diversions located on private property near the normal water elevation should be removed. Residents can also install rock channel protection to reduce erosion of the stream banks.

The City has recently adopted regulations requiring erosion control for any excavation. Many areas of new construction did not have erosion control measures installed including homes on Kingston Way in this subdivision. Inspections are necessary for all building construction. The City Inspectors that perform these functions should also be observing if silt fence or other control measures have been installed. Deficiencies should be reported to the Engineering Department or Building Commissioner for enforcement.

13) Bunker/Dublin

The videotaping of the sewers has been inconclusive. Some improvements have already been completed and the resident has reported some relief. If the storm lateral truly is connected to the large culvert pipe to the rear of the property, the resident could consider, with approval from the Engineering Department, day-lighting the lateral in the rear yard and allowing the discharge to flow overland instead of into the culvert. This home already has a sump pump installed.

The City should begin a flow-monitoring program in this area to determine the extent of I/I into the sanitary as soon as possible. Dye and smoke testing should also be used to identify and eliminate cross connections.

14) Abbey and Sprague

The residents near this intersection will be affected by a number of improvements that have been proposed throughout this study. As previously stated, the properties here are located in a designated 100-year floodplain. Downstream improvements would have to be completed to lower the 100-year flood elevation enough to remove the structures from the floodplain. Unfortunately, the City of North Royalton does not have jurisdiction of the downstream area.

A possible solution for the extensive flooding area would be for the City to acquire the properties nearest the culvert and transform the area into a park. The residents can utilize the park during dry weather and as an extension of the floodplain during wet weather. FEMA has grants available for such projects. Cost for acquisition is highly variable and are dependent on the current market. A professional appraiser should be employed to determine the value of the properties. The City is currently in the process of obtaining funding to begin acquisitions of some of the affected properties.

15) Miscellaneous Areas

The miscellaneous areas that were observed often suffered from yard or street flooding. The problems in most areas were intermittent or a single occurrence. The storm that occurred in June 2004 was a large storm. Flooding was extensive all over the area. The City of North Royalton was not alone. Areas that usually do not suffer from flooding, did. A maintenance schedule for cleaning storm water structures is paramount to alleviating surface flooding. Structures should be inspected at the very least, after every large storm event to ensure clear outlets. A large portion of these flooding incidents may have been avoided if the City's regulations were vigorously enforced and owners maintained the drainage courses through their properties. Regular maintenance of

drainage structures by their owners can alleviate the need for future large-scale rehabilitation or restoration projects.

The property owners at 8678 and 8700 Boston Road should consider a restoration project. The banks of the stream here are eroding at an alarming rate. The construction of gabion baskets or use of bioengineering methods would be extremely beneficial to these property owners. A detail of a typical section for gabion basket installation is included as Figure 15. Cost for this type of installation is estimated at $450 per foot of 6-foot high walls. A preliminary cost for a 170-foot section in this area is approximated at $77,000. The City may assist the property owners in applying for available grants to complete the repairs.

Bioengineering solutions to stream stabilization utilize live plants. Their roots are used to stabilize and secure soils, making them resistant to erosion and scour. Rock weirs, root wads, pool sections and live branch sections are constructed to protect the stream banks and decrease the velocity of the water. Costs associated with bioengineering are site specific and dependent upon design and therefore cannot be determined without a detailed site study. An estimated cost derived from previous projects was approximately $830 per linear foot of stream. A professional engineer that specializes in bioengineering should be consulted for this type of project.

Short Term Homeowner Solutions

There are a number of things that a homeowner can do to "flood-proof" a home or building. In order of ease and effectiveness, these are as follows:

1) Ensure that sanitary laterals are clean and free of blockage;
2) Ensure that storm sewer laterals are clean and free of blockage;
3) Disconnect downspouts upon approval of the Building and Engineering Departments;
4) Direct sump pumps to discharge outside of the building envelope with approval from the Building and Engineering Departments;

5) Install floor drain stacks;

It should be obvious that not every one of these solutions is appropriate for every case. Each instance of flooding is somewhat unique and one of the greatest unknowns is typically the condition and arrangement of underground piping on private property.

The first two items should be done on a semi-annual basis as part of normal maintenance by the homeowner. Cost for cleaning is relatively small and dependent upon the contractor and can range from $250 to $500.

The disconnection of downspouts should be permitted only upon the approval of the Engineering Department. This will help to relieve the footing drains in those cases where water is entering basement walls. The disconnected downspouts must be directed well away from the building foundation and the foundations of neighboring structures. The use of rain barrels with roll-up "elephant trunk" discharge lines or pop-up drainage emitters could be considered in such cases. Costs for rain barrels are approximately $135 each. Pop-up drainage emitters are approximately $15 each plus the cost for piping to the location of discharge.

Where there are existing sump pumps for footing drains the discharge from the pump can be directed to a splash pad at grade on the exterior of the building. A more powerful pump may be required in some cases.

Where the chronic basement flooding occurs through the floor drain, but to a depth of less than 12 inches, a floor drain stack should be considered. This consists of a threaded, Schedule 40 PVC or black iron pipe installed on a water tight, threaded access plug or cap. This plug or cap would be located on every floor drain. Depending on the existing conditions, the floor drain may have to be reconstructed in part to install a threaded adapter. Utility sinks, washing machines, air conditioning condensate and dehumidifier discharge lines should be plumbed into this stack. A threaded adapter will allow the plug and stack to be removed occasionally so that spills or floor wash water can be drained. Costs associated with this improvement are dependent upon the

number of floor drains and plumbing involved. A rough estimated cost would be approximately $550 per floor drain.

Materials to complete most of these improvements can be found at home improvement, plumbing supply, bulk landscape supply and garden supply stores as well as on the Internet.

Diagrams of some of these flood-proofing methods can be found in Appendix J.

In addition to flood-proofing the home, residents have a responsibility to maintain drainage courses on private property dictated by City Ordinance 05-24. The City cannot expend tax dollars to maintain or replace infrastructure outside of the public right-of-way or easements. This often leads to the misconception that roadside ditches are not the responsibility of a property owner. Just as a property owner is required to mow the lawn and or take care of the sidewalk in the public right-of-way, the responsibility for the ditch is also theirs. Ditches should not be filled in without a permit from the Building Department. To do so would be in violation of City code 1022.05. Ditches should also not become a place to dump yard waste and leaves.

A main line of the underground storm sewer system located in the right-of-way is not the property owner's responsibility even if located in the tree lawn however; the service lateral to that main line is the responsibility of the owner. In any case, property owners should do their part to keep inlets to the storm sewers clean for the sake of all adjacent property owners.

A collection of pertinent Homeowner's Responsibilities can be found in Appendix K. Additionally, information regarding the responsibilities of property owners versus local governments in the maintenance of channels, streams and rivers is located in Appendix L. The Pennsylvania Department of Environmental protection has prepared a publication titled "We All Live Downstream, A Homeowners Guide" full of ideas and methods homeowners can use to reduce erosion, promote positive drainage and protect drainage ways. The brochure can be found online at *http://www.dep.state.pa.us/dep/deputate/enved/EnviroEd/Can_Do/cover.htm* and covers topics including soils, drainage, reducing erosion, landscaping, lawn care and a list of

ornamental waterside plants. Although the publication was written for the residents of Pennsylvania, the general ideas can be utilized in Northeast Ohio.

Long Term Homeowner Solutions

Some long-term and more costly solutions the homeowner can complete include:

1) Installing sump pumps where appropriate;
2) Eliminating cross connections;
3) Installing a backwater or backflow valve;
4) Installing overhead plumbing;

Where footing drains are known to be connected to the sanitary sewer, or where a floor drain is known to be connected to the storm sewer, an appropriate sump pump should be installed. Both connections are in violation of the Plumbing Code. In the first case the footing drains must be disconnected from the sanitary lateral and directed into a sump pit. This pit could be located in the basement floor, or outside of the structure. The discharge should be directed into a known storm sewer outlet or onto a splash pad.

In the second case the floor drains, and any other wastewater source, should be disconnected from the storm sewer connection (and the footing drains as well) and directed into a sump pit in the basement floor. The discharge should be directed into the sanitary sewer lateral. Wherever sump pumps are installed, a check valve on the discharge line is required. Costs to install an interior sump pump are estimated at $1,700.

A water-powered backup pump can also easily be installed that requires no electricity to run and come in residential and commercial sizes. Costs range from $200 to $400 for residential units and $400 to $800 for commercial units. They can also be purchased on the Internet.

Where other cross connections are known or discovered, they must be eliminated. The U.S. EPA has forbidden any clean water connection to the sanitary sewer, and any wastewater connection to the storm sewer is in violation of the Plumbing Code.

Where chronic basement flooding occurs to depth of more than 12 inches a backwater (also known as backflow, back flap) valve should be considered. This consists of a plastic or metallic valve assembly installed on the sanitary sewer connection at the point where a single connection leaves the building. It can be installed in a separate access pit outside of the structure, or in a pit inside the structure, but as close as possible to the basement wall where the pipe exits. If there is more than one connection to the main sewer then a valve would be needed on each.

The backflow valve has an internal flap or other device that closes when the pressure on the street side of the connection is greater than the house side of the connection, and thereby prevents the ingress of water from the sanitary from flowing into the basement. The valve must be accessible for periodic maintenance and cleaning to ensure that it does not clog when needed. Costs associated for an internal installation is estimated at $1,300. An exterior installation is estimates at $3,200.

A more expensive, but also more foolproof remedy, is to install overhead plumbing. Unless the building was previously served by a septic tank, the existing wastewater plumbing is collected into one or more lines that converge under the basement floor and exist the building below the wall footing. In an overhead system, all waste pipes on the basement level would be plugged outside of the building and abandoned. Where the plug is installed on the sanitary connection a cut-off wall of clay should be placed around the abandoned line and the storm sewer lateral connection for the full width of the trench, to grade. This will prevent water in the saturated main sewer common trench from migrating up the lateral trench.

The waste piping from the upper floors would be connected into a new line that would exit through the basement wall about 4 to 5 feet above the basement floor or higher, as long as at least 30 inches of cover is maintained over the line outside of the building. Any waste plumbing

on the basement level such as floor drains, toilets, sinks, condensate lines, etc. would have to be pumped up into the new overhead line. The new line would be connected to the existing lateral connection just outside of the right-of-way, with a new test tee. The footing drains should be directed into sump pump, with a discharge to a splash block. Costs associated with overhead plumbing are estimated at $11,000.

Any modification to the plumbing system described above will require a building permit and inspection by the Building Department and should be completed by someone specifically skilled in plumbing. A list of contractors licensed to work in the City can be obtained from the Building Department.

Diagrams of some of these flood-proofing methods can also be found in Appendix J.

III. FUNDING MECHANISMS

Below is a list of funding sources available. In addition to these, the City can use assessments as a means to finance improvements. Costs for improvements are allocated to residents based upon benefit. Assessments can be paid for immediately or included on property taxes over a specified period of time.

The City could also create a Storm Water Utility with collections dedicated to a storm sewer improvement fund. The fund would be used specifically for storm sewer improvements. Any building permit for new structures in the City is already subject to a fee for such a fund.

LOCAL

CUYAHOGA COUNTY

The County offers low and no interest loans for home repairs to low and moderate income homeowners. Details are available from the County Department of Development at 216-443-7260 and at www.cuyahogacounty.us/resource.

CUYAHOGA COUNTY DEPARTMENT OF DEVELOPMENT

Community Block Grant funds are available for financing storm and sanitary sewer upgrades as well as other capital improvements in designated areas.

SOIL AND WATER CONSERVATION PROGRAM

Purpose: To plan and carry out a national natural resource conservation program and to provide leadership in the conservation and use of the nation's soil, water and related resources.

Assistance provided: Technical soil and water conservation resource assistance is provided to state and local governments. Advisory and counseling services are provided to the general public in order to promote total resource planning and management, improve water quality and natural resources, and reduce point and non-point source pollution.

Eligible: State and local governments, the general public and territories.

Contact: County offices of the USDA's Natural Resource Conservation Service.

STATE

OHIO PUBLIC WORKS ISSUE 2 FUNDS

Application Schedule: Applications are due at the end of September.

Preliminary rankings are completed by mid-December.

Recommendations are sent to Columbus by the end of March.

Agreements for funded projects are effective on July 1.

Funding Available: Grants up to 90% of rehabilitation cost, 50% of new/expansion improvement costs, 0% interest loans for up to 20 years.

Projects funded: Issue 2 eligible projects include bridges and culverts, roads, solid waste disposal facilities, storm water and sanitary collection, storage and treatment facilities, water supply and distribution systems, wastewater treatment systems.

Basis of funding: Points system based on various criteria including infrastructure needs of the district, infrastructure age, infrastructure condition, project preventative maintenance, health and safety needs, other project funding, subdivision financial participation, community and

economic development, access to funds, overall economic health, ability/effort to finance and other project factors.

Administered: District One Public Works Integrating Committee (Cuyahoga County) though the Cuyahoga County Planning Commission for the State of Ohio. The committee consists of seven members including a private sector member and two local Mayors.

Website: http://www.planning.co.cuyahoga.oh.us/dopwic

2005 Funding	State Capital Improvement Program (Issue 2)	$12,709,000
Available:	Local Transportation Improvement Program	$ 7,858,000
	Revolving Loan Program	$ 2,236,000
	Total	**$22,803,000**

Funding Year 2005 preliminary ranking was released in mid-December. Results are available at the website.

OHIO DEPARTMENT OF NATURAL RESOURCES FUNDING

NON-POINT SOURCE POLLUTION (NPS) EDUCATION GRANTS

Eligible: SWCDs and, through them, schools and other local organizations.

Specifications: Two types of grants are available; Personnel grants through which SWCDs can hire or retain NPS education specialists to develop education programs targeting schools and general public audiences or Watershed Awareness to Watershed Action (WAWA) mini-grants for projects such as educator workshops, student field days, water festivals, storm drain stenciling, landowner and developer seminars, and other watershed awareness initiatives.

Schedule: Oct. 15, Dec. 15, March 15

Contact: Jeanne Russell, 614-265-6682

WATERSHED COORDINATORS

Eligible: Non-profit organizations, local and regional units of governments.

Organizations can request a six-year declining grant to employ a watershed coordinator to work on watershed planning and implementation to control non-point source pollution.

Grant covers salary and fringe benefits for the coordinator, 100 percent (up to $40,000) in year one and declining to 50 percent in year six.

Schedule: June 15 each year.

Application: http://www.dnr/state.oh.us/odnt/soil+water/downloads.htm

Contact: Rosida Porter, 614-265-6647

OHIO EPA FUNDING

The **Ohio Environmental Education Fund** (OEEF) began the **Mini Grant Program**, in 1999. Mini grants are available for projects requesting a minimum of $500 and a maximum of $5,000, with a project period up to 12 months. The program addresses proposals requesting funding for specific classroom and workshop projects, conference speakers, and other items/activities that are eligible under the General Grant Program. Application forms, reviews, and reporting requirements are streamlined, compared to the General Grant Program.

Phone: 614/644-2873

Fax: 614/728-1275

E-mail: OEEF@epa.state.oh.us

Web: www.epa.state.oh.us

The **Water Pollution Control Loan Fund** (WPCLF), jointly administered by the Ohio EPA and the Ohio Water Development Authority can be used for sanitary sewers and in some cases storm sewers The program provides below market interest rate loan for non point source water pollution control activities and municipal wastewater treatment improvements. The loan term is typically 20 years with some short-term loans available for specific projects or tasks.

OHIO WATER DEVELOPMENT AUTHORITY FUNDING

The Authority has a loan program that may finance design and construction of both storm and sanitary sewer improvements. Loan rates are as follows:

LOAN TYPE	RATE
OWDA Market Rate Program	4.99%
Rural Development Loan Program	3.27%
Community Assistance	2.00%
Water Pollution Control Loan Fund	3.25%

1. Short Term Loan	3.20%
2. Hardship Loan (varies)	1.00%
3. Small Systems Construction Loan	2.75%
* 4. Standard Rate Construction Loan	3.25%

Drinking Water Assistance Fund

1. Short Term Loan	3.20%
2. Small System Construction Loan	2.75%
3. Standard Rate Construction Loan	3.25%
4. Small Systems with Economic Points	2.00%

For the Period 4/1/2005 to 6/30/2005

Contacts: Steve Grossman, Executive Director 614-466-5822 (main)
614-728-9112(fax) or 614 644-9964 (fax)
Sue Farmer, Chief Loan Officer
Ken Heigel, PE, Chief Engineer

FEDERAL

U.S. ARMY CORP OF ENGINEERS OUTREACH PROGRAM

Section 205 funding Flood Control

Provides local protection from flooding by construction of improvements of flood control works such as levees, channels, and dams.

Cost shared with Community 65/35

Section 208 Funding Snagging & Clearing

Snagging and Clearing for Flood Control

Cost shared with Community 65/35

Section 14 Grant Emergency Stream bank Protection

A general authority to carry out stream bank protection of a publicly used facility, i.e. bridge, road, school, hospital, utility line.

Cost shared with Community 65/35

Section 594 Funding Environmental Infrastructure for Ohio

Corp provides design and construction assistance for water-related environmental infrastructure and resource protection and development for wastewater treatment and related facilities; combined sewer overflow, water supply, storage, treatment and related facilities; mine drainage; environmental restoration (brownfields); surface water resource protection and development.

Cost shared with Community 75/25

Section 319(h) Grants

The Clean Water Act requires the EPA to award section 319(h) grants to the state non-point source agency, designated by the governor, to implement its approved Non-point Source Management Program to help achieve and maintain beneficial uses of water, such as swimming or fishing. EPA-approved state Non-point Source Management Programs provide the framework for determining which activities are eligible for funding under section 319(h).

Projects: Implementing ground water protection activities, funding urban storm water runoff activities if that meet certain criteria, funding abandoned mine land reclamation projects designed to protect water quality if those activities meet certain criteria, implementing lake protection and restoration activities except for in-lake work such as aquatic macrophyte harvesting or dredging unless the sources of pollution have been addressed sufficiently to ensure that the pollution being remediated will not reoccur.

Ohio 319 grant program implementation funding is now focused on:

- Watersheds where NPS significantly contributes to the water quality impairment and/or threats; and

- Projects in the watersheds that implement specific action items from TMDL Reports at step 8 or above and/or the state endorsed components of comprehensive watershed action plans.

As of February 2005, 15 Ohio TMDL Reports have been approved by USEPA, 1 TMDL Report is awaiting USEPA approval, 2 TMDL Reports are undergoing public review in Ohio, 17 TMDLs are in progress and 43 watershed action plans are at different stages of completion. The objective of the TMDL and watershed action planning projects is to meet water quality standards through the establishment and implementation of a science-based, locally-led and sustainable strategy for: a) restoring impaired sub-basins within a watershed and/or, b) preserving existing water quality in sub-basins currently meeting standards.

Cost shared with Community 60/40

FOREST SERVICE STEWARDSHIP INCENTIVE PROGRAM

Purpose: To encourage private landowners to manage their forestland in ways that improves water quality, including tree planting and the implementation of best management practices for stream crossings and streamside management.

Assistance provided: direct payments, technical/engineering support, and education not to exceed 75% of the total cost with a maximum of $10,000 per applicant per fiscal year.

Eligible: Non-industrial private landowners.

Contact: State forestry agency and state forester.

WATERSHED PROTECTION AND FLOOD PREVENTION (SMALL WATERSHED PROGRAM)

Purpose: To provide technical and financial assistance to state agencies and units of local government in planning and carrying out works of improvement to protect, develop and utilize the land and water resources in small watersheds, including total resource management and planning to improve water quality and solve problems caused by flooding erosion and sediment damage, conservation, development, utilization and disposal of water.

Assistance provided: Studies, monitoring, loans, cost-share grants, and technical assistance are provided for the installation of land treatment measures. Grants cannot exceed $100,000 per

applicant for the life of the program. Generally, technical assistance (advisory and counseling services) for all types of measures is provided without cost.
Eligible: Any state agency, county or group of counties, municipality, town or township, soil and water conservation district. Watershed cannot exceed 250,000 acres in size. Watershed must be recommended by governor or governor's representative for planning assistance.
Contact: U.S. Department of Agriculture, Natural Resources Conservation Service, Director, Watersheds and Wetlands Division, P.O. Box 2890, Washington D.C. 20013, Tel. (202) 720-3534, Fax: (202) 720-2143.

WETLANDS RESERVE PROGRAM

Purpose: To protect and restore wetlands through acquisition of easements and provision of technical/engineering and restoration cost-share assistance.
Assistance provided: Direct payments at fair market values for permanent easements and 30-year easements. Payments for restoration costs of 100 percent for permanent easements and 50 to 75-percent for 30-year easements. Technical/engineering support is also provided.
Eligible: Non-federal landowners with restorable wetlands.
Contact: U.S. Department of Agriculture, Natural Resources Conservation Service, Wetlands Scientist, Watershed and Wetlands Division, Washington D.C. 20013, Tel. (202) 690-0848, Fax (202) 720-2143.

BUREAU OF RECLAMATION CONSTRUCTION PROGRAM

Purpose: To provide funding and assistance in the implementation of structural and operational measures to improve water management.
Assistance provided: Grants, studies, technical/engineering support, and research. Reimbursements and repayment arrangements are determined on case-by-case basis.
Eligible: State, local and tribal governments. Congressional authority and appropriations must be secured.
Contact: Bureau of Reclamation, Director, Technical Service Center, D-8000, Denver Federal Center, Denver, Colorado 80225, Tel (303) 236-6985, ext. 366.

STATE REVOLVING FUNDS CAPITALIZATION GRANTS

Purpose: To provide a long term source of financing to states for the construction of wastewater treatment facilities and the implementation of other water quality management activities.

Assistance provided: Grants to states, territories, and District of Columbia. Loans to local communities, inter-municipal and interstate agencies, and Indian tribes.

Eligible: same as above.

Contact: State Revolving Fund Coordinator, Environmental Protection Agency

WATER QUALITY GRANTS

Purpose: To stimulate the creation of unique and new approaches to meeting storm water, combined sewer outflows, sludge and pretreatment requirements as well as enhancing state capabilities.

Assistance provided: Grants. A state match is encouraged.

Eligible: State water pollution control agencies, interstate agencies and local public agencies, Indian tribes and nonprofit institutions. No eligibility requirements specified by statute.

Contact: Water Quality Cooperative Agreement contacts, Environmental Protection Agency, Office of Water, 401 M Street, S.W., Washington D.C., 20460 Tel (202) 260-9539 or 5807, Fax (202) 260-1156.

EPA Regional Office V
77 West Jackson Boulevard
Chicago, Il 60604-3507

FEMA FLOOD MITIGATION ASSISTANCE

Purpose: There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and

Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures.
Eligible: Community/Watershed groups, local government, State/Territorial Agencies, Tribal agencies.
Communities must participate in the National Flood Insurance Program.
Assistance provided: 75% of total project cost.
Contact: Regional FEMA office, 536 South Clark St., Chicago, IL 60605, (312) 408-5500, http://www.fema.gov/fima/fma.shtm
Applications are due July 15, 2005 for FY 2005

Additional information is available from *A State and Local Government Guide to Environmental Program Funding Alternatives* at http://www.epa.gov/owow/nps/MMGI/funding.html and from *Water Quality, A Catalog of Related Federal Programs*, United State General Accounting Office, Report to Congressional Committees, June 1996.

IV. PUBLIC OUTREACH STRATEGIES

The City and its residents working together can alleviate many of the flooding problems in the community. The City can construct the improvements listed in this report, the citizens need to take up their responsibility for maintenance on private property. Often the residents don't know what their responsibility is. Public education projects will inform the residents of these responsibilities.

The Committee agrees that public education is key to alleviate flooding. Some methods for outreach the committee discussed include:

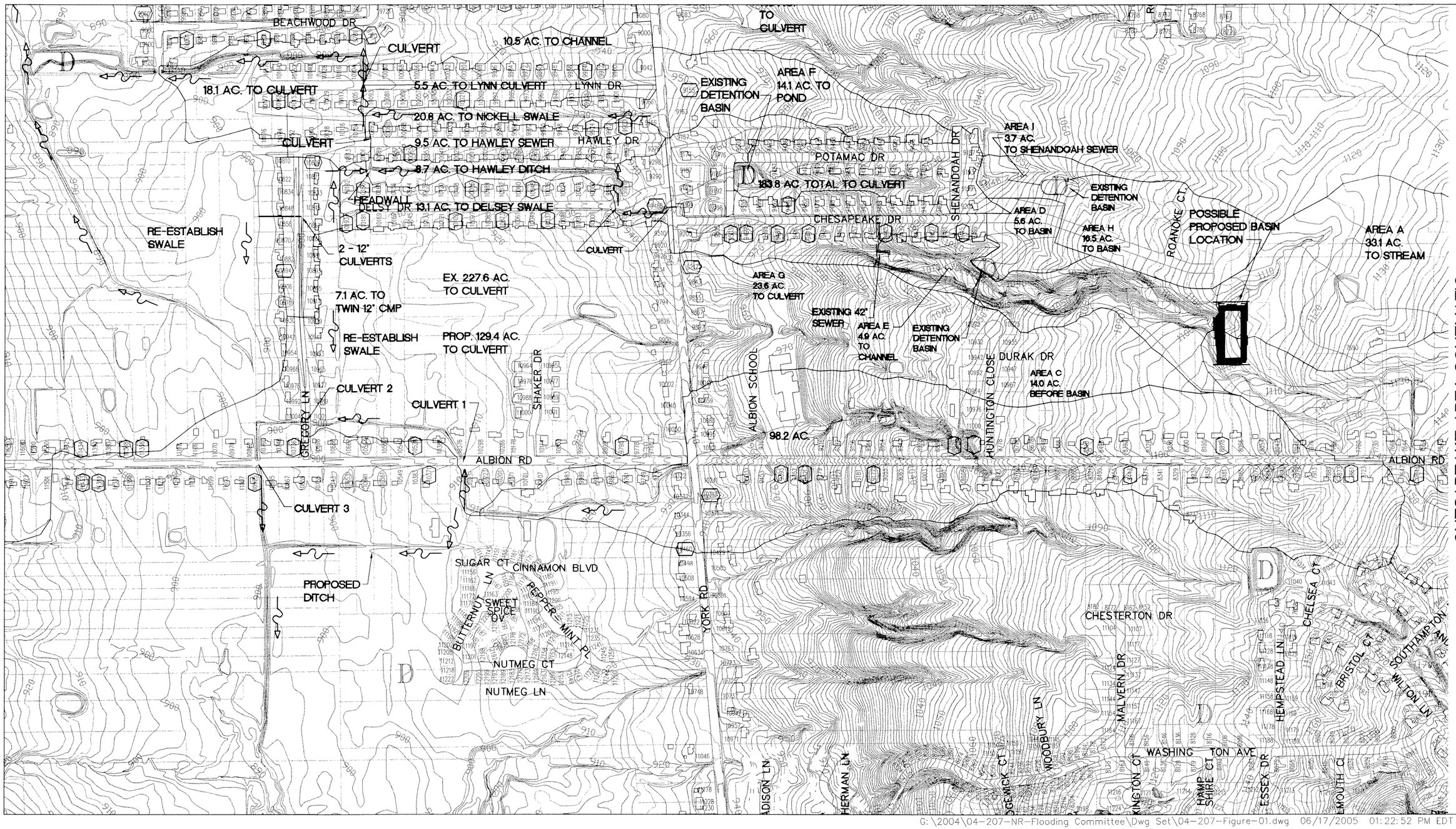
- preparing a publication and mass mailing to all addresses in the City. While this is likely the most expensive outreach project, information can be disseminated to every person in the community.

- contacting and requesting the local newspaper to include information regarding responsibilities and resources.
- utilizing the resources of the Public Involvement Public Education (PIPE) committee that was formed at part of the City's Storm Water Management Plan in response to the EPA Phase II regulation. The PIPE committee will likely host meetings, prepare or obtain publications, display information at community events and send mailings. Although the PIPE committee concentrates primarily on storm water quality issues, some of the same concepts apply to storm water management. Publications dealing with management can be made available at PIPE committee events.
- utilizing the community library for a display about storm water management and a clearinghouse for storm water management publications such as *Flood proofing Non-residential Structures*, *Flood Emergency and Residential Repair Handbook* and *Retrofitting Flood-prone Residential Structures* from FEMA
- asking local civic organizations and churches to distribute publications to their members or distribute publications to one neighborhood at a time
- asking the local school board to distribute publications to the students in conjunction with stream stewardship education
- utilizing the City's web site by providing a link to specific information for flooding issues and resources

There are a number of publications already available that the City can use for its Public Education. The EPA has a series of free publications that can be customized for the City's use at http://cfpub.epa.gov/npdes/stormwatermonth.cfm. FEMA also has a number of publications available at http://www.fema.gov/library/prepandprev.shtm, in particular, ***Avoiding Flood Damage:*** *A Checklist for Homeowners.*

A sample of preprinted material can be found in Appendix M.

Figures



NORTH

SCALE IN FEET (HORIZONTAL)

STATE OF OHIO ANDREW W. BLACKLEY III NO. 49487 PROFESSIONAL ENGINEER

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5			
4			
3			
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REVISIONS

CHESAPEAKE AREA SCHEMATIC

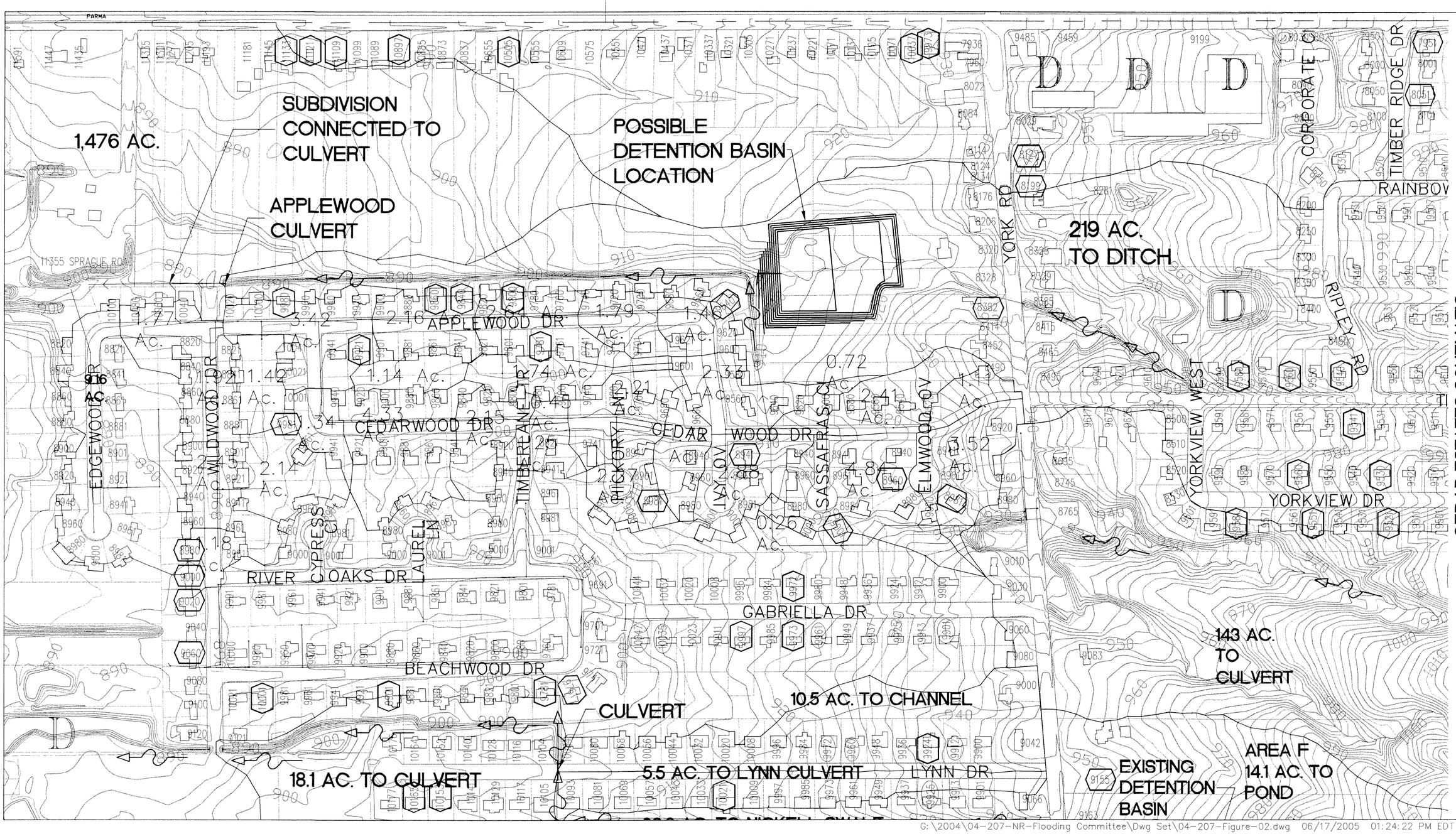
STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05

04-207

FIGURE 01



CEDAR ESTATES SCHEMATIC

REVISIONS

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STATE OF OHIO — ANDREW K. BLACKLEY III — 49497 — REGISTERED PROFESSIONAL ENGINEER

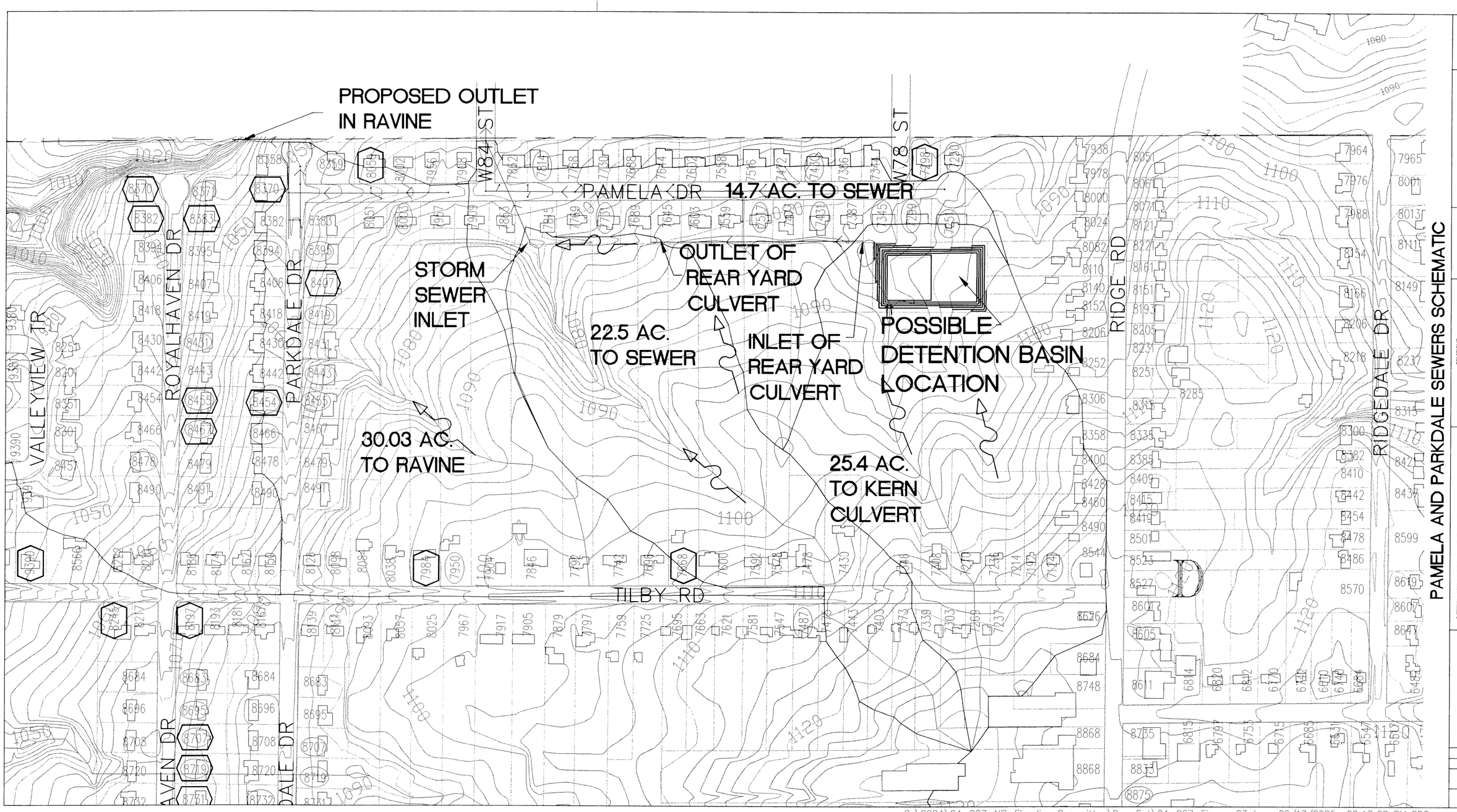
STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05

04-207

FIGURE 02



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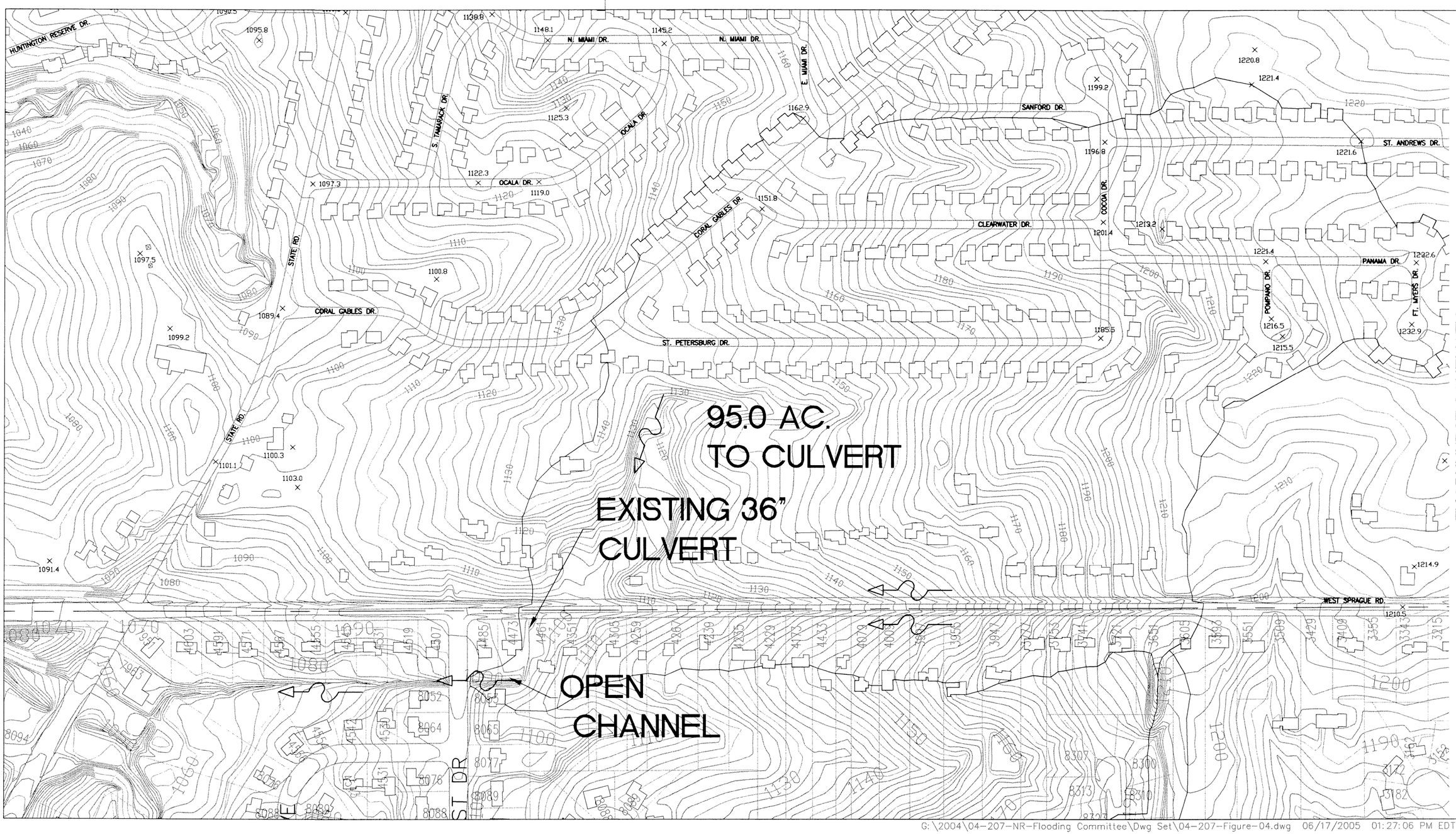

THORNHURST SCHEMATIC

NORTH

SCALE IN FEET (HORIZONTAL)
250 0 250 500

STATE OF OHIO
ANDREW K. BLACKLEY III
NO. 49457
REGISTERED
PROFESSIONAL ENGINEER

REVISIONS

No.	DESCRIPTION	DATE	BY
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STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
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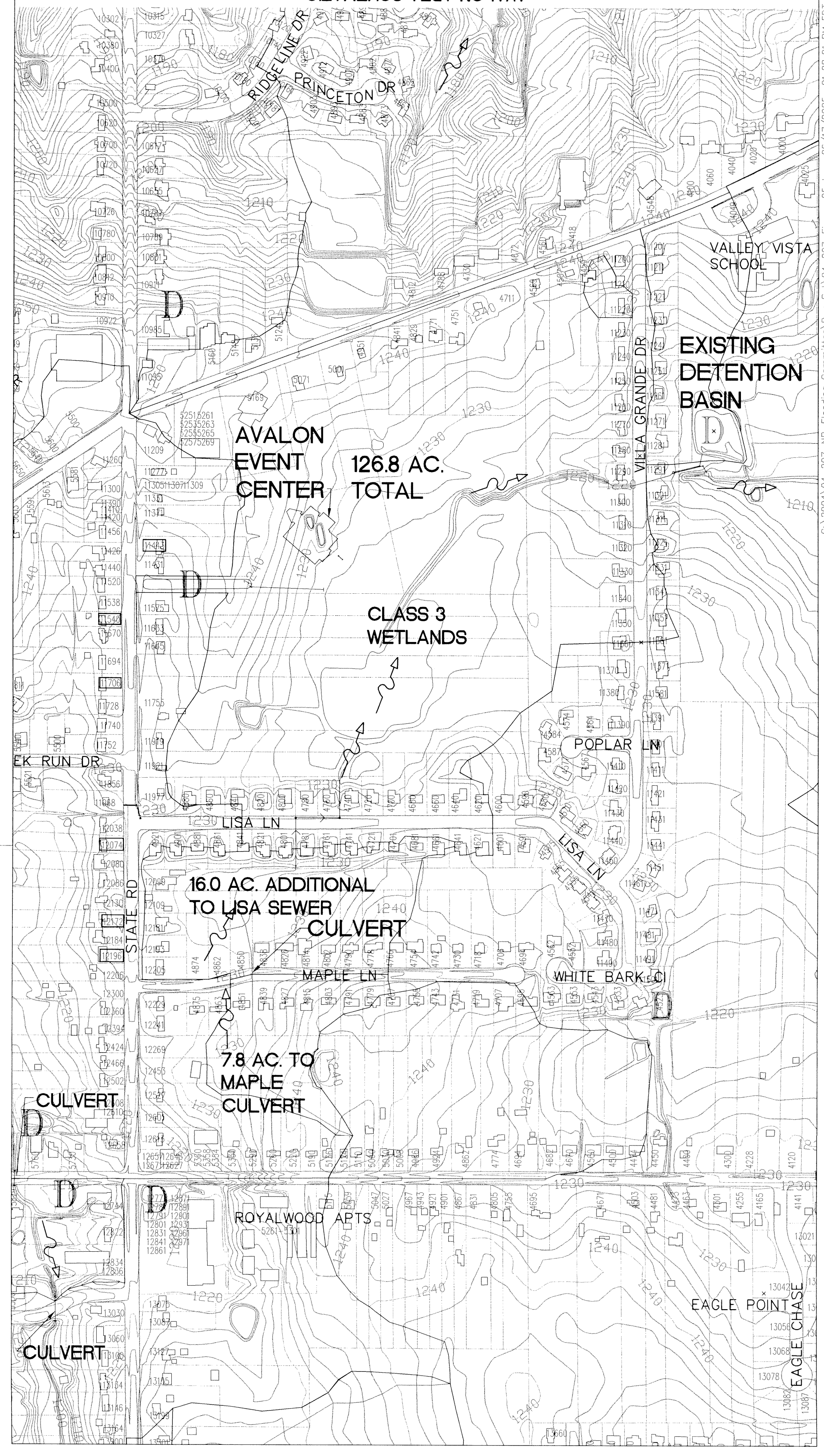
POSITIVE
CROSS
CONNECTIONS

06-15-05
04-207

FIGURE 04

AVALON AREA SCHEMATIC



POSITIVE CROSS CONNECTIONS

06-15-05
04-207
FIGURE 05

STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

No.	DESCRIPTION	DATE	BY
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REVISIONS

STATE OF OHIO ANDREW K. BLACKLEY III 49497 PROFESSIONAL ENGINEER

SCALE IN FEET (HORIZONTAL)
350 0 350 700

NORTH

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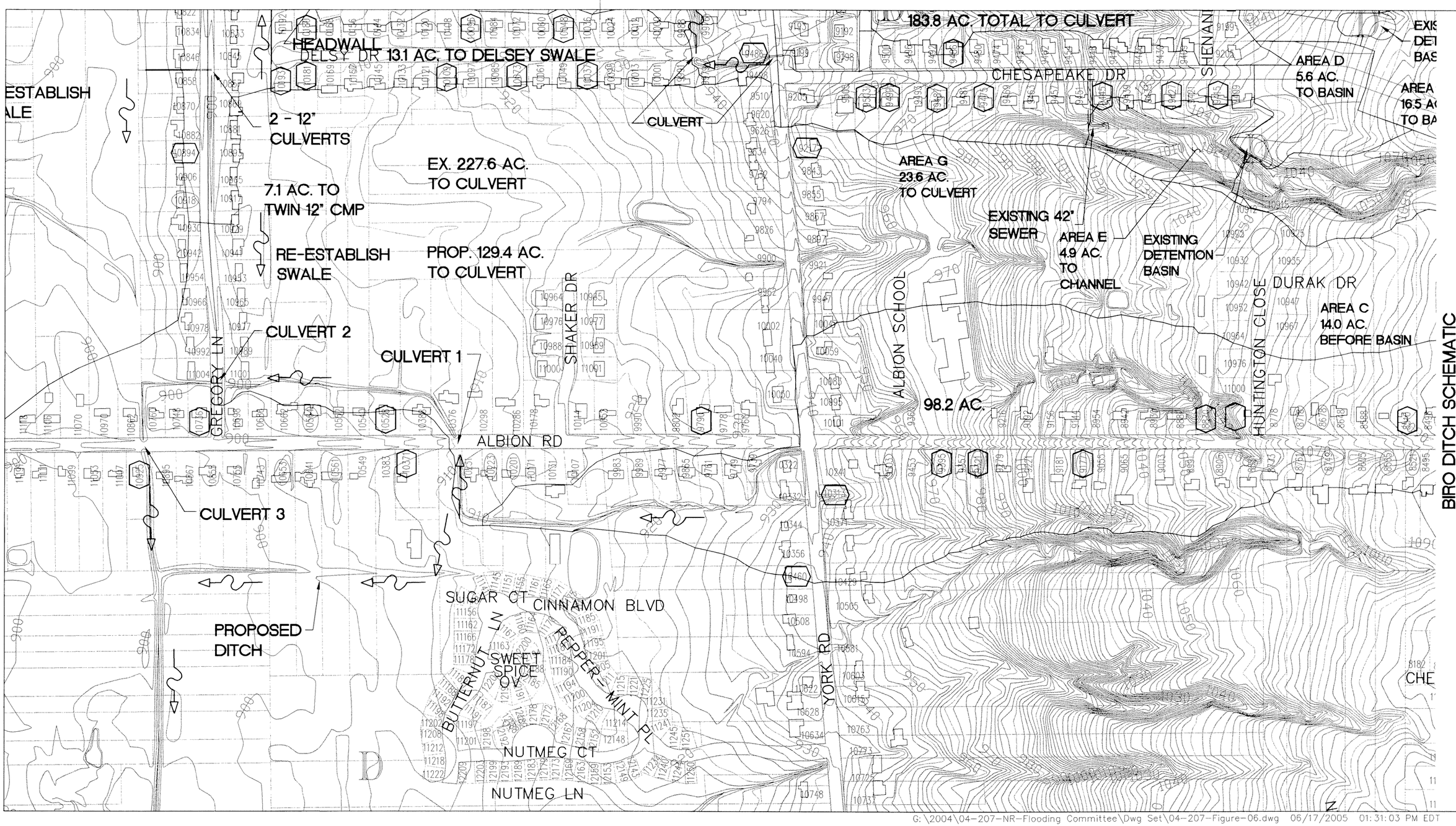

BIRO DITCH SCHEMATIC

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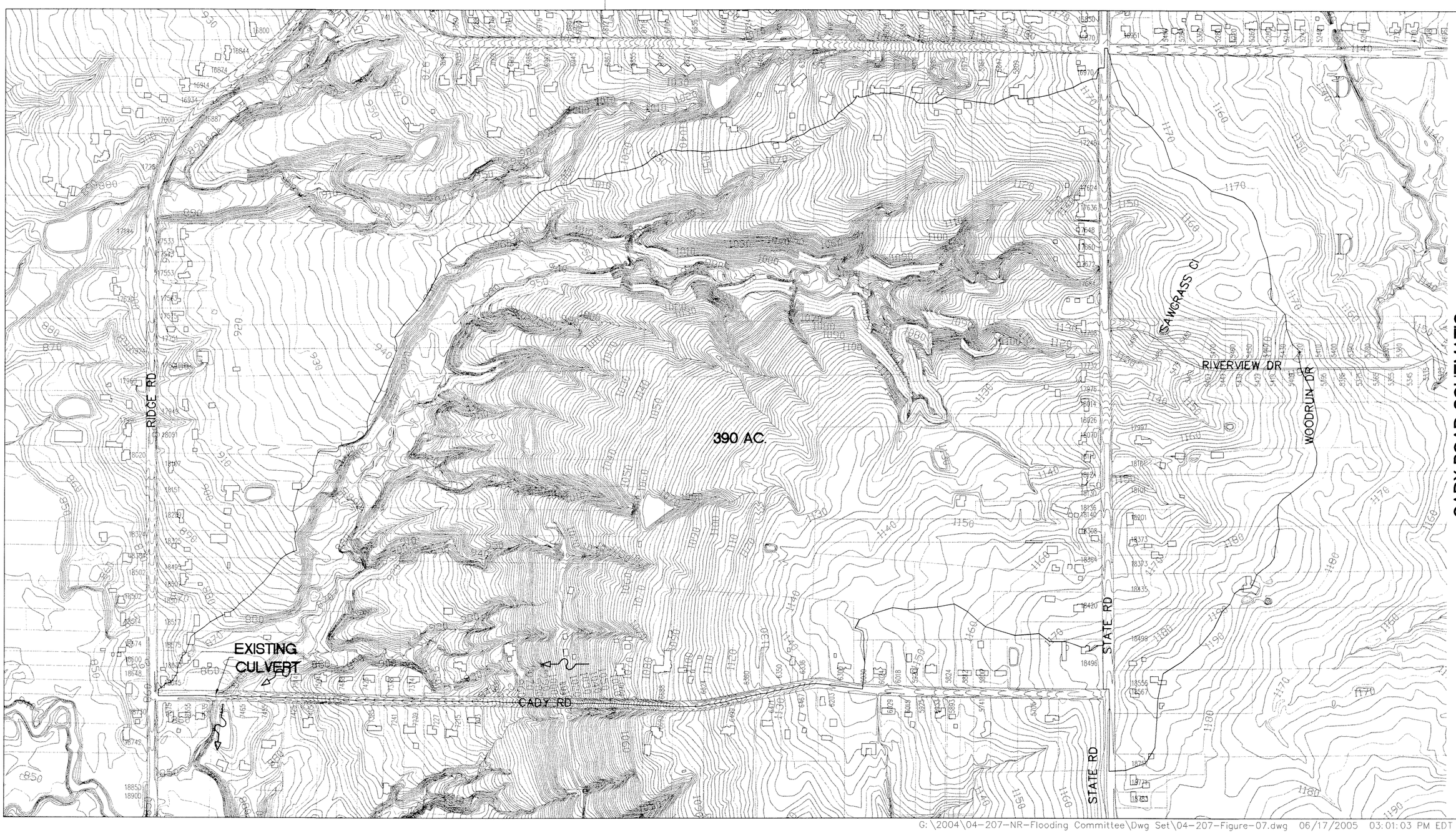

NORTH

SCALE IN FEET (HORIZONTAL)
450 0 450 900

STATE OF OHIO
ANDREW BLACKLEY III
NO. 49463
REGISTERED
PROFESSIONAL ENGINEER

No.	DESCRIPTION	DATE	BY
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1			

REVISIONS

CADY ROAD SCHEMATIC

STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05
04-207

FIGURE 07

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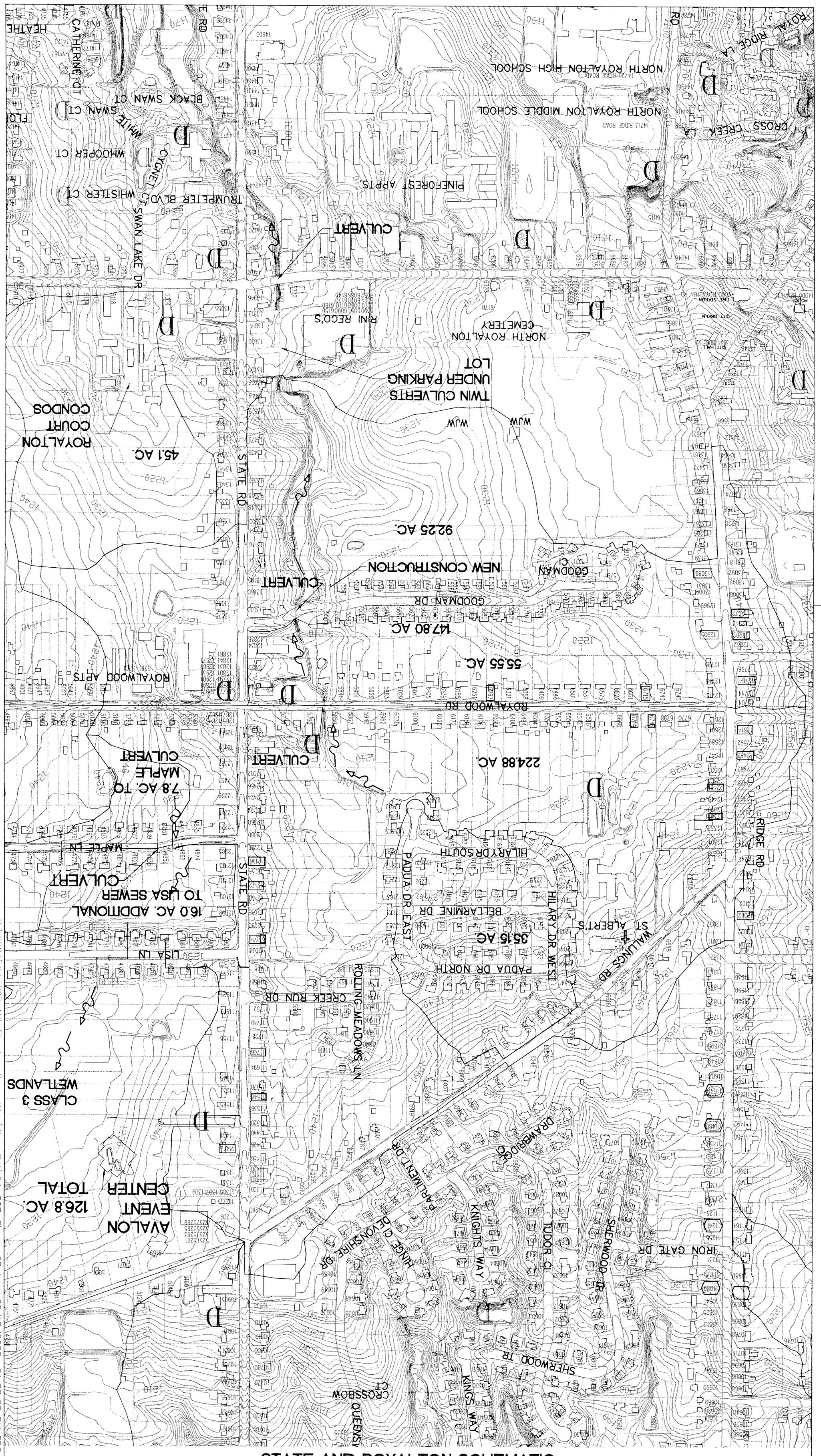

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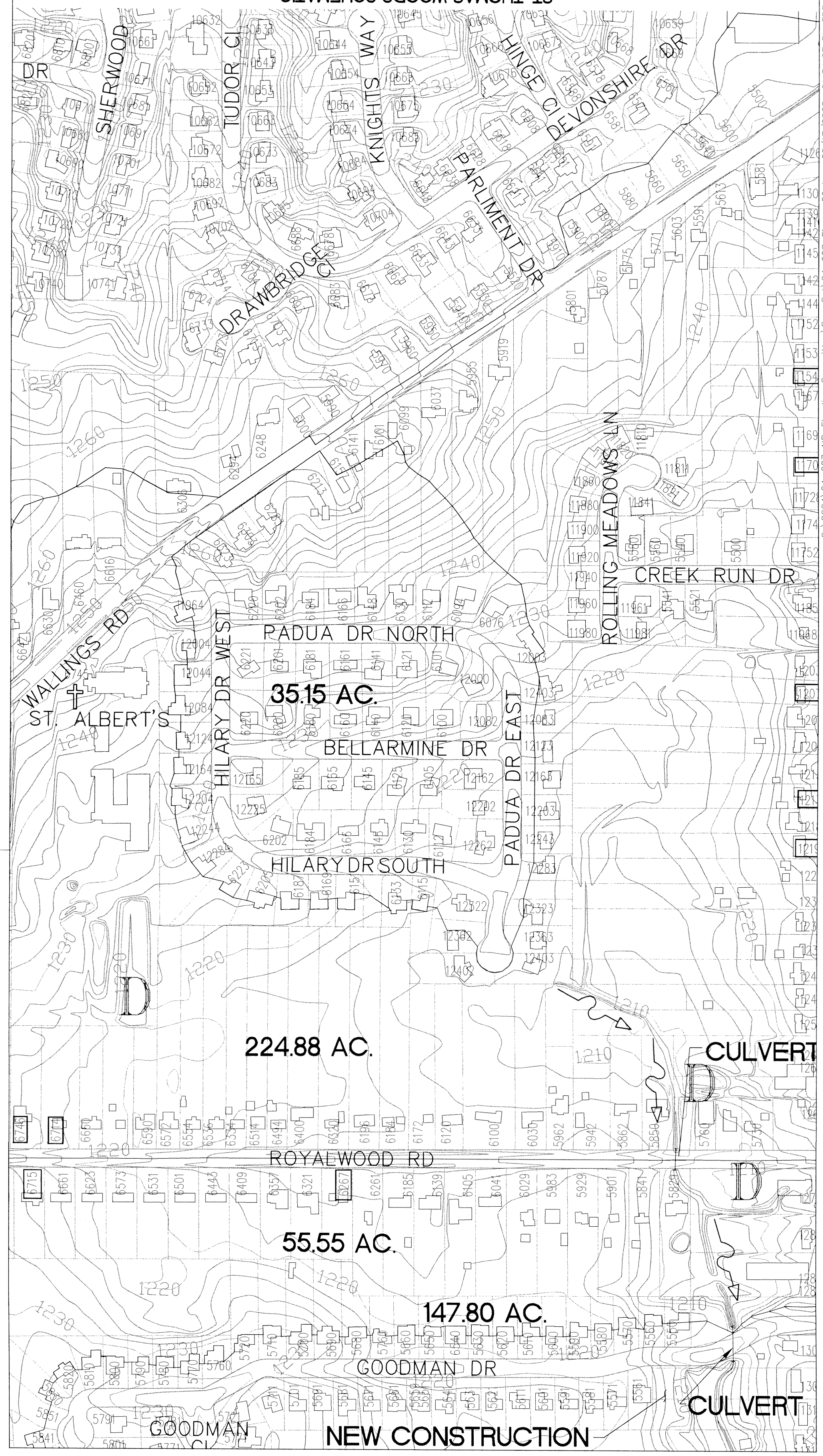
ST. THOMAS WOODS SCHEMATIC



STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05
04-207

FIGURE 09

No.	DESCRIPTION	DATE	BY
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REVISIONS

STATE OF OHIO — ANDREW K. BLACKLEY III — 49497 — PROFESSIONAL ENGINEER

SCALE IN FEET (HORIZONTAL): 250 0 250 500

NORTH

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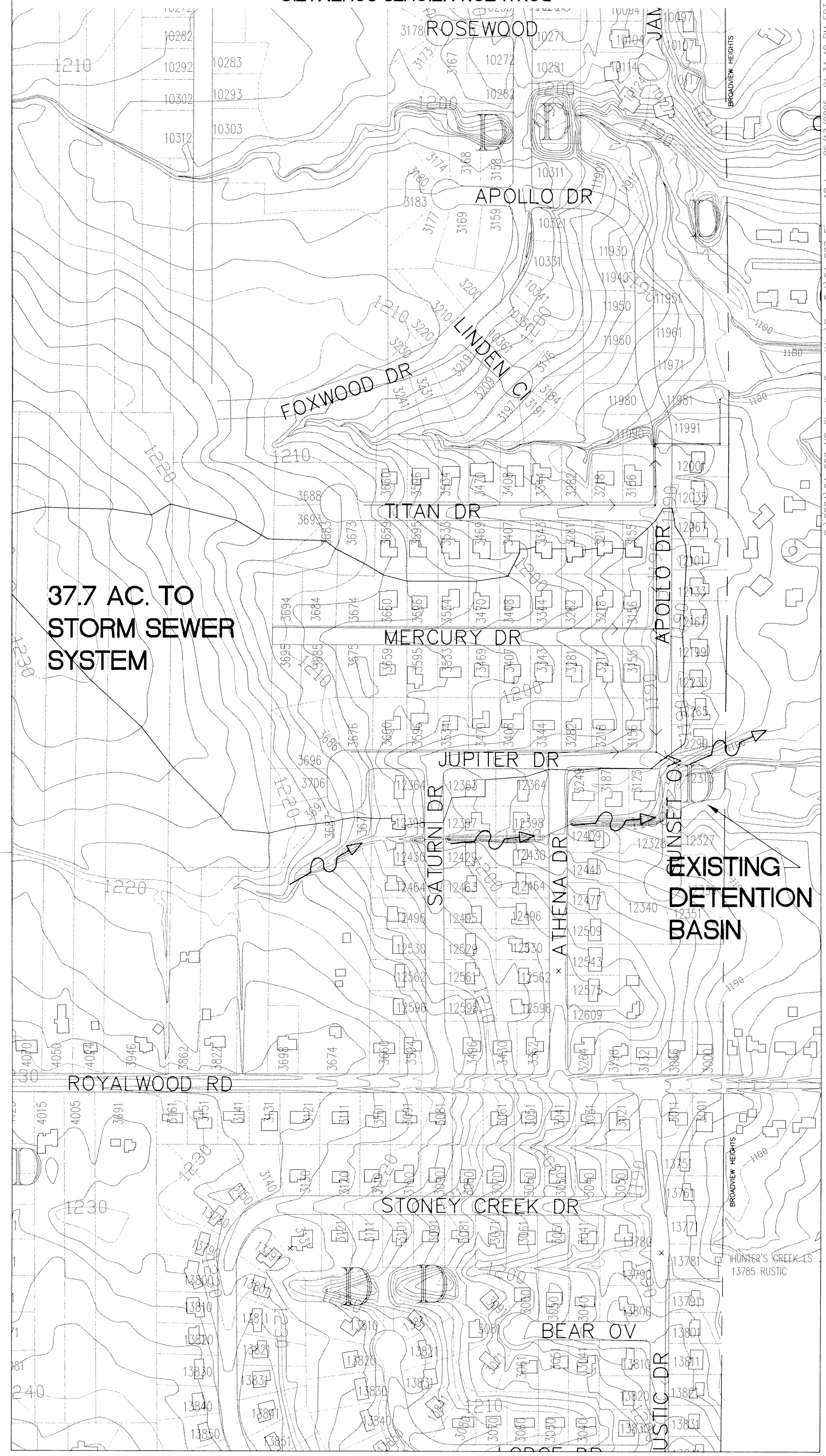
ROYALTON HEIGHTS SCHEMATIC



STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05
04-207
FIGURE 10

No.	DESCRIPTION	DATE	BY
1)			
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REVISIONS

STATE OF OHIO — ANDREW K. BLACKLEY III — NO. 49497 — REGISTERED PROFESSIONAL ENGINEER

SCALE IN FEET (HORIZONTAL): 250 0 250 500

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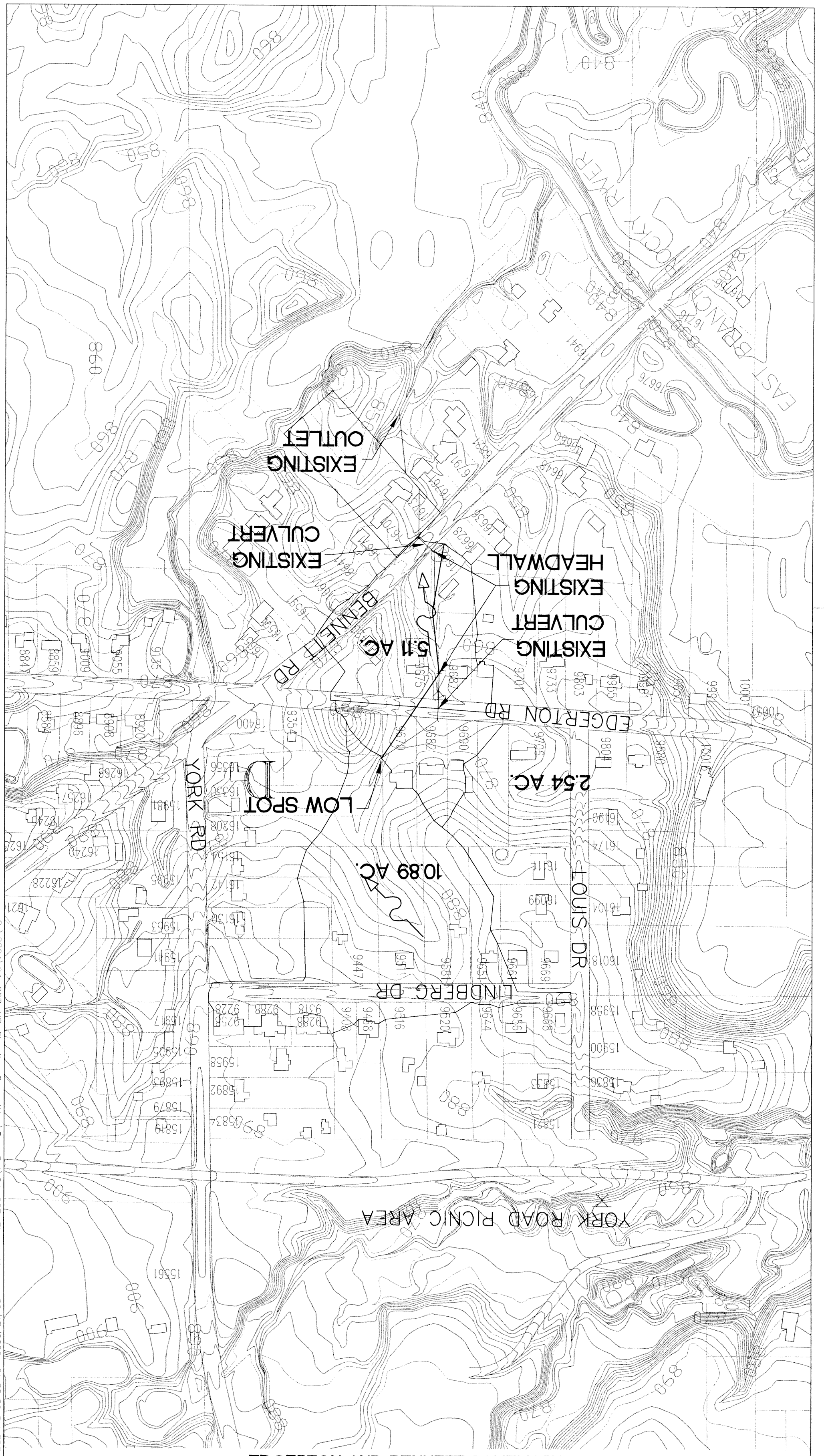

EDGERTON AND BENNETT SCHEMATIC

POSITIVE CROSS CONNECTIONS

FIGURE 11

06-15-05
04-207

STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

REVISIONS			
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No.	DESCRIPTION	DATE	BY

STATE OF OHIO
ANDREW K. BLACKLEY III
NO. 44487
PROFESSIONAL ENGINEER

250 0 250 500
SCALE IN FEET (HORIZONTAL)

NORTH

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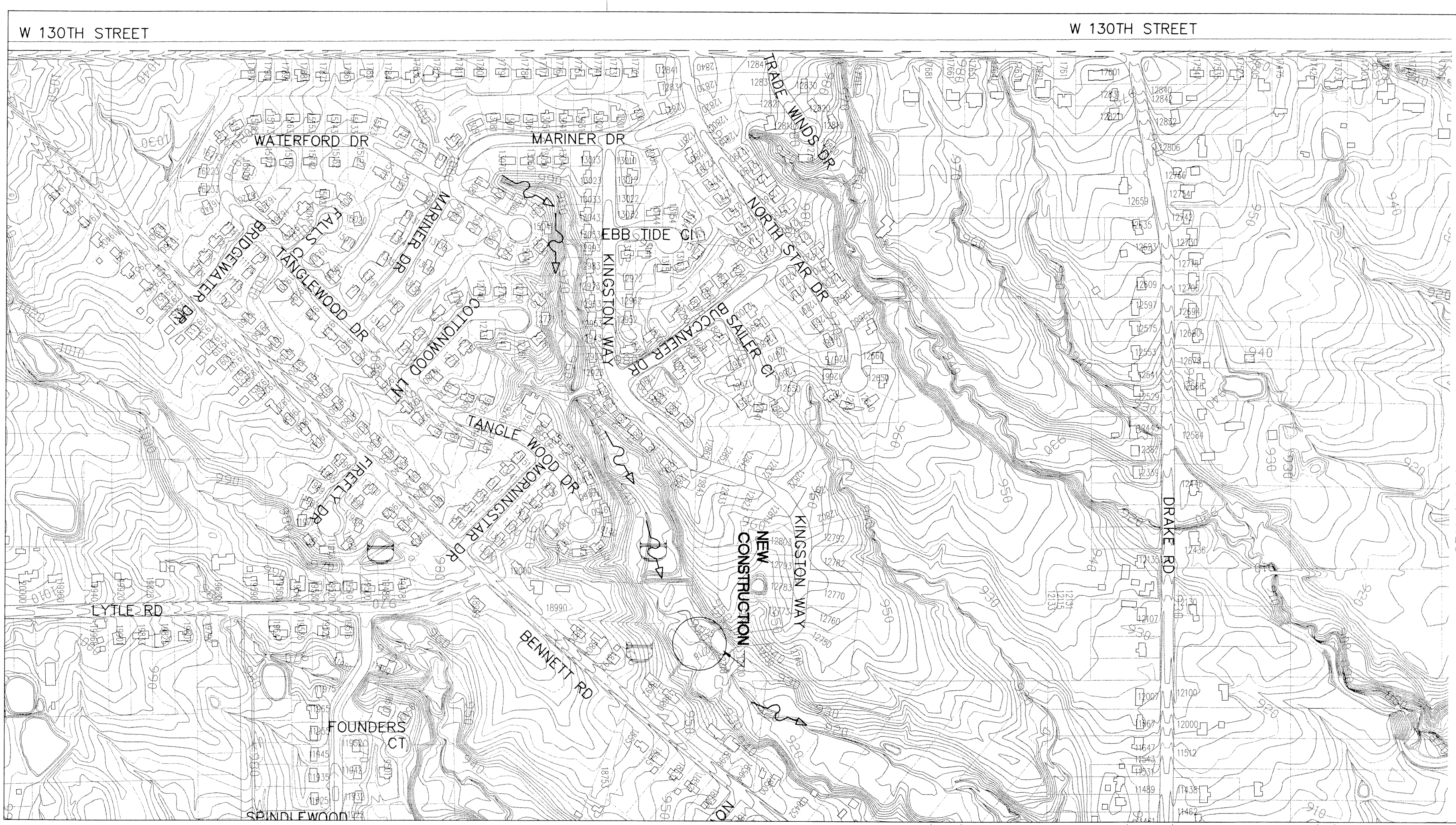

NORTH

SCALE IN FEET (HORIZONTAL)
350 0 350 700

STATE OF OHIO
ANDREW J. BLACKLEY III
NO. 49497
REGISTERED
PROFESSIONAL ENGINEER

REVISIONS

No.	DESCRIPTION	DATE	BY
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4)			
3)			
2)			
1)			

SPYGLASS ESTATES SCHEMATIC

STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05

04-207

FIGURE 12

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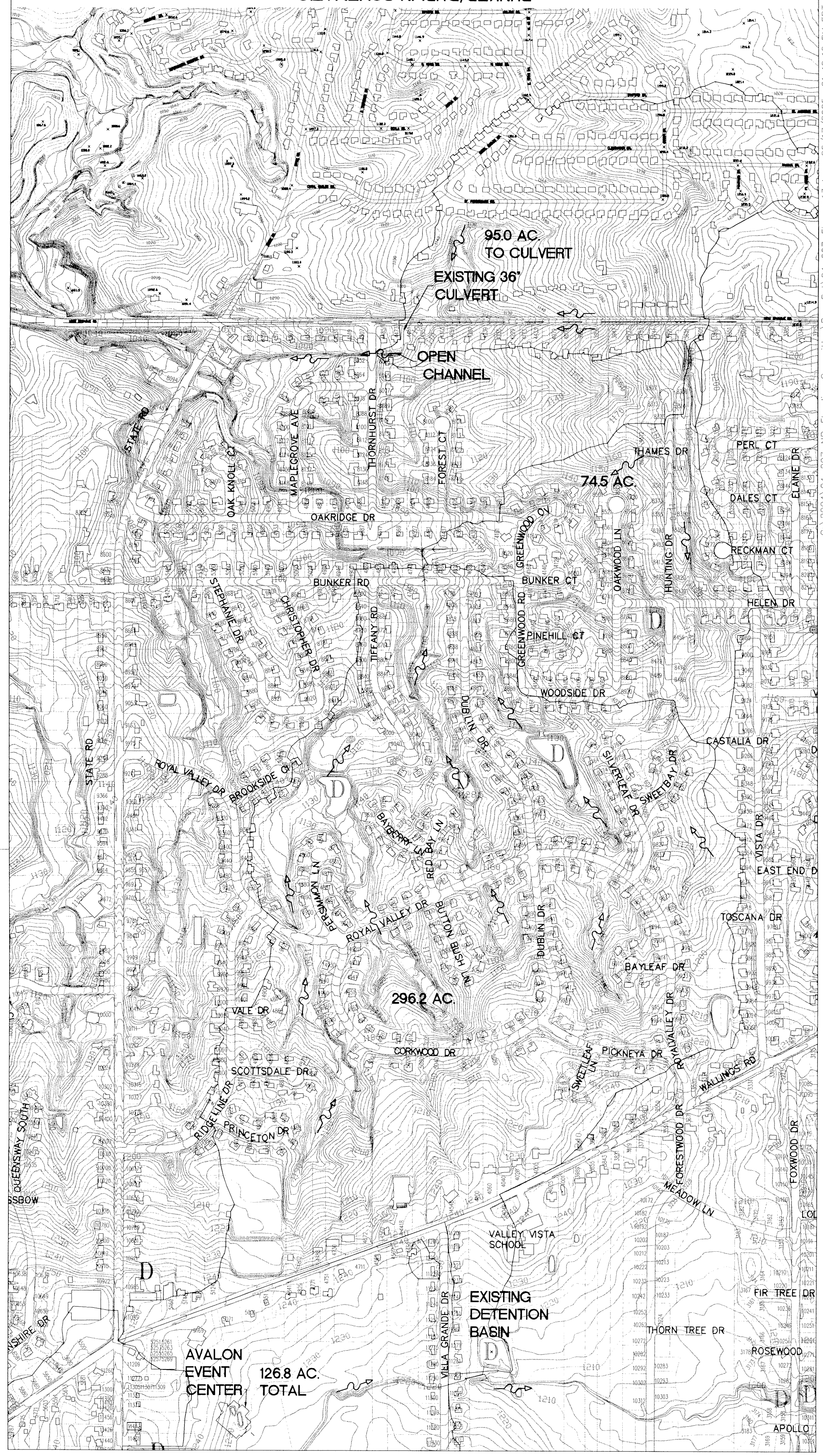
BUNKER/DUBLIN SCHEMATIC



STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS AND PLANNERS
TWO MERIT DRIVE
RICHMOND HEIGHTS, OHIO 44143
PH: (216) 731-6255 FAX: (216) 731-4483

POSITIVE CROSS CONNECTIONS

06-15-05
04-207
FIGURE 13

REVISIONS			
No.	DESCRIPTION	DATE	BY
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STATE OF OHIO ANDREW K. BLACKLEY III NO. 49497 REGISTERED PROFESSIONAL ENGINEER

SCALE IN FEET (HORIZONTAL)
550 0 550 1100

NORTH

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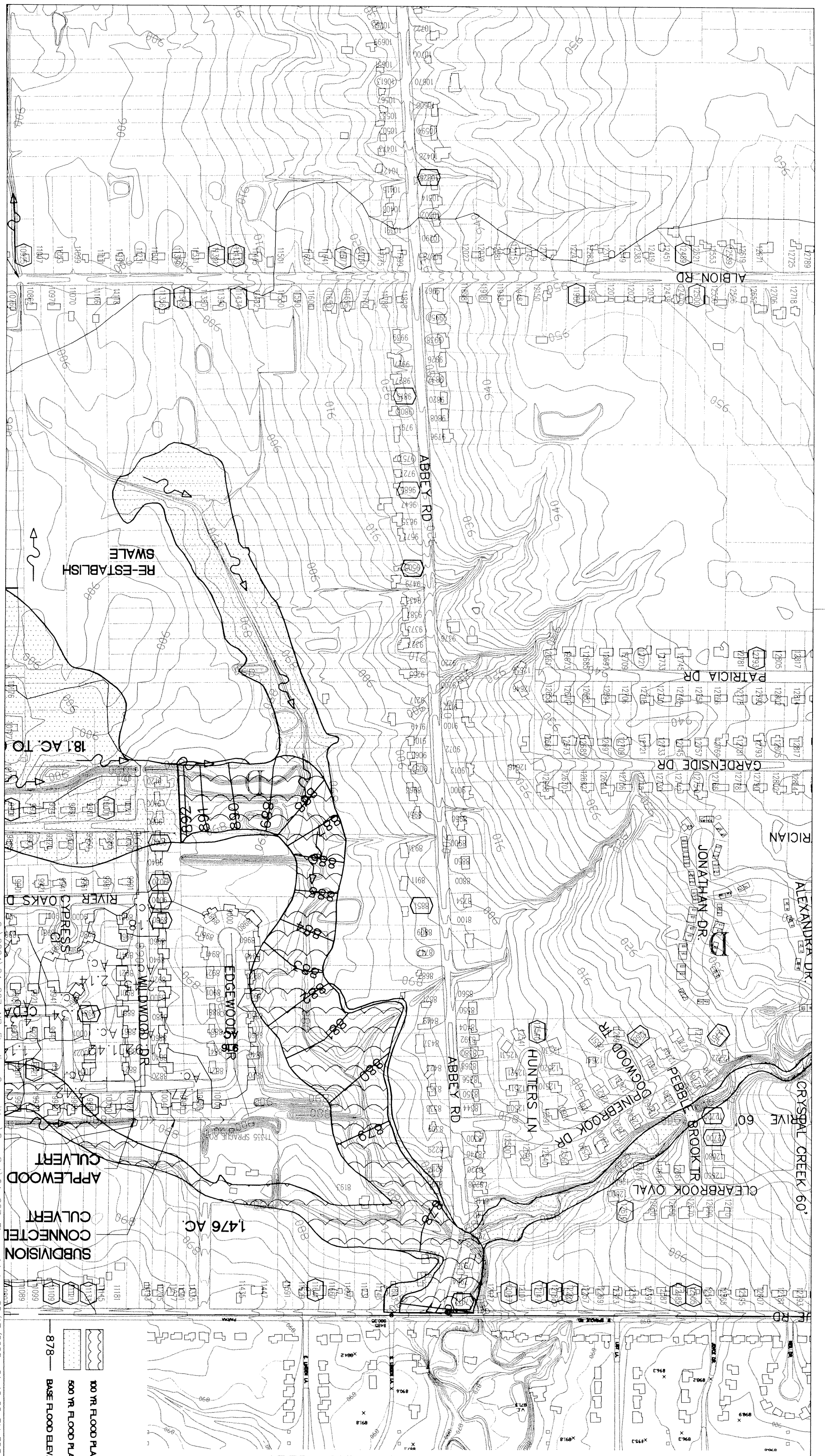

ABBEY AND SPRAGUE SCHEMATIC

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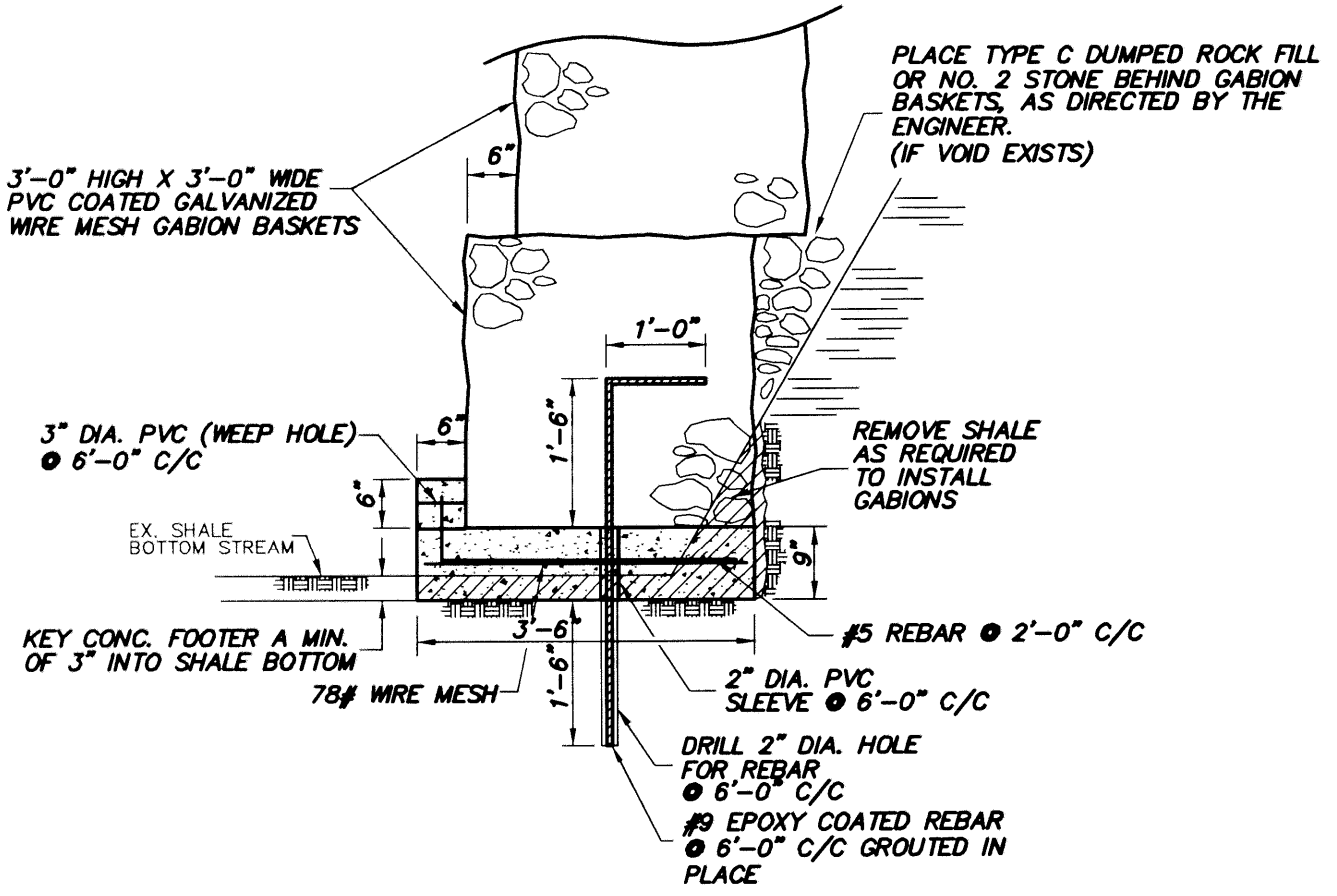
CITY OF NORTH ROYALTON

DRAINAGE AREA STUDY
TYPICAL GABION DETAIL



CONCRETE FOOTER & GABION BASKET

N.T.S.

SCALE: AS SHOWN	STEPHEN HOVANCSEK & ASSOCIATES CONSULTING ENGINEERS Two Merit Drive Richmond Heights, Ohio (216) 731-6255	**FIGURE 15**
DATE: 06/16/05		
JOB NO. 04-207		

G:\2004\04-207-NR-Flooding Committee\Dwg Set\04-207-Figure-15 Gabion Detail.dwg 06/17/2005 10:57:18 AM EDT

Photographs

Photo 1: Chesapeake Basin

Photo 2: Chesapeake Basin

Photo 3: Chesapeake Basin

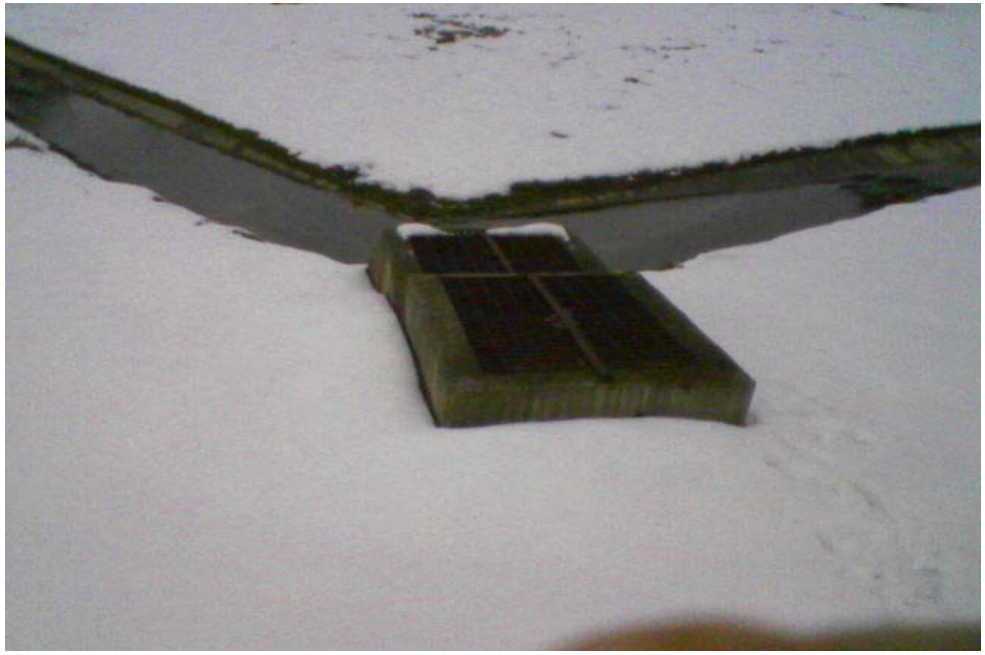


Photo 4: Chesapeake Basin

Photo 5: Hawley Channel

Photo 6: Hawley Culvert Inlet

Photo 7: Delsy Ditch to Hawley Culvert

Photo 8: Channel to Lynn Culvert

Photo 9: Hawley Culvert

Photo 10: Sanitary Flow into Manhole at 10845 Gregory During Rain

Photo 11: Applewood Channel

Photo 12: Applewood Channel

Photo 13: Applewood Culvert

Photo 14: Culvert Inlet at 7387 Pamela

Photo 15: Culvert Inlet at 7387 Pamela

Photo 16: Pamela Drive Sewer Inlet

Photo 17: Avalon Basin

Photo 18: Avalon Basin Outlet

Photo 19: Villa Grande Rear

Photo 20: 11220 Villa Grande Rear

Photo 21: 11210 Villa Grande Rear

Photo 22: Biro Ditch

Photo 23: Biro Ditch

Photo 24: Royalwood Culvert

Photo 25: Goodman Culvert Downstream

Photo 26: Giant Eagle Culverts Upstream

Photo 27: Giant Eagle Culvert Downstream

Photo 28: Royalton Culvert Downstream

Photo 29: Edgerton Rear

Photo 30: Edgerton Rear

Photo 31: 9670 Edgerton

Photo 32: Vacant Parcel North of 16620 Bennett

Photo 33: 16620 Bennett Side

Photo 34: Headwall at 16620 Bennett

Photo 35: 8700 Boston Road

Photo 36: 8700 Boston Road

Photo 37: 8700 Boston Road

Photo 38: 8700 Boston Road

Appendix A

Flooding Oversight Committee
Attendance Report

LAST NAME	FIRST NAME	ADDRESS	9/28	10/14	10/28	11/18	12/9	1/6	1/27	2/17	3/17	4/7	4/28	5/19
Adams	Steve	8575 Edgerton Rd	X	X	X									
Amato	Anthony	9861 Applewood Dr												
Belsan	John	11004 Gregory Ln												
Berry	Barbara	7345 Pamela Dr	X	X										
Bickel	Norm	10011 Gabriella Dr	X	X	X	X	X	X						
Bloom	Dave & Carolyn	12283 Padua Dr	X	X										
Bloomhuff	Scott	7950 Abbey Rd												
Breyley	Bruce	8382 York Rd												
Brosofski	Judy	10925 Huntington Close	X	X	X									
Bruene	Tom	5603 Wallings	X	X										
Brzytwa	Greg	10116 Hawley Dr												
Caniglia	Greg	5610 Goodman Dr	X		X									
Clemens	Judy	9498 York Rd				X								
Colella	Deanna	9670 Edgerton Rd.				X		X	X	X			X	
Cubbison	Bob & Jean	10881 Gregory Ln	X	X	X	X			X		X	X	X	X
Dauguerty	Cliff	9936 Gabriella Dr	X	X		X								
Demian	Doug & Pat	9900 Applewood Dr												
Demko	Barbara	10915 Huntington Close	X	X	X	X		X		X	X		X	X
Dios	Tom	7386 Pamela Dr	X	X	X	X	X	X	X	X	X	X	X	X
Dominick	Bernice	10942 Huntington Close	X	X	X		X	X		X	X	X	X	X
Eglitis	Janet	10145 Delsy Dr												
Fathauer	Ken	9635 Abbey Rd												
Galica	Thomas	12730 Drake Rd.						X						
Gregg	Bruce	10109 Delsy Dr	X	X	X		X							
Humm	Marilyn	7924 Abbey Rd				X								
Katona	Al	12403 Padua Dr		X										
Kazimir	George	10144 Delsy Dr	X	X										
Kern	Ray	7387 Pamela Dr	X			X	X		X	X		X		
Kljun	Dave	10084 Delsy Dr												
Lang	James	9973 Gabriella Dr	X	X	X	X								
Langan	Liz	9120 Wildwood Dr	X											
Lienerth	Michael	8961 Sassafras Circle												
McCullough	Mary Ann	9721 Sunrise Blvd L-5												
Morey	Fred	8980 Wildwood Dr	X		X	X								
Musgrave	Joann Griva	8719 Parkdale Dr												
Nevers	Guy	10181 Delsy Dr	X	X										
Nickell	John	10092 Hawley Dr		X	X	X	X	X	X	X		X	X	X
Oriold	Janet	11803 Sprague Rd												
Pifer	Sonya	9675 Edgerton Rd	X	X	X	X			X	X				

Flooding Oversight Committee
Attendance Report

LAST NAME	FIRST NAME	ADDRESS	9/28	10/14	10/28	11/18	12/9	1/6	1/27	2/17	3/17	4/7	4/28	5/19
Polacek	Jim & Laura	5244 Edgerton Rd	X	X										
Puhalik	Steve/Betty Jeanne	1120 Villa Grande Dr.	X	X	X	X		X	X	X	X	X	X	X
Recker	Paula	5287 White Swan Ct	X	X	X	X	X	X	X	X	X	X	X	X
Reed	Jeff & Marilyn	10925 Albion Rd												
Repko	Wayne	6148 Hilary Dr	X	X		X	X	X	X					
Rymut	Jim	10455 W. 130th St	X	X	X	X	X		X		X	X		X
Sagen	Burt	11936 Abbey Rd.						X						
Sak	John	7862 Pamela Dr	X	X	X	X	X	X				X		
Scott	Gerry & Linda	8908 Edgerton Rd	X	X		X								
Sheikh	Shahzad & Shagufta	10834 Gregory Ln												
Shipley	Ken	15965 York Rd.						X		X	X	X	X	X
Shostek	Joann	8240 Abbey Rd												
Simonis	Donald	10952 Huntington Close						X						
Soltis	James	9980 Applewood Dr							X					
Stafford	Chris	9881 River Oaks	X	X	X									
Suchma	Marlene	7936 Abbey Rd				X								
Todten	Bill	7475 Tilby Rd	X	X	X	X	X	X	X	X	X	X	X	
Urban	Jeff & Barb	8140 Abbey Rd	X			X		X	X					
Vinarcik	Tim	6357 Royalwood Rd												
Wagoner	Curtis & Dawn	7935 Abbey Rd											X	
Webb	Kathy	11001 Gregory Ln	X	X		X	X			X		X		X
Werner	Sarah	5200 Royalton Rd.						XX						
Woods	David	7863 Pamela Dr		X	X									
Wotowiec	John	10846 Gregory Ln	X											
Zednik	Debbie	9976 Delsy Dr		X										

Appendix B

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
January 6, 2005

1. Old Business
    a. Corrected/approve minutes from December 9, 2004 meeting

2. New Business
    a. Mayor's address
    b. Chairman update
        i. Disbanding Functional Sub-committees
    c. Area Sub-committee reports
    d. Functional Sub-committee reports

3. Engineer's Report
    a. Items requested at previous meeting
        i. Report on funding: grants, increasing fees, impact fees, stormwater fund, developer fees
        ii. Homeowner's Responsibility report
        iii. Survey results
        iv. Sewer cleaning logs
    b. Comprehensive Map
        i. Subdivision ages
        ii. Flood calls
        iii. Sewer cleaning
        iv. Positive test results
        v. FEMA delineated Floodplains
        vi. Royalton Recorder questionnaires
    c. Tasks to be completed
        i. Target specific areas for closer look
        ii. Identified sources in specified areas
        iii. Review plans, field visits, interview Area Sub-committees
    d. Additional Data
        i. Stormwater Management Plan
        ii. Additional Survey results
        iii. Soils Map
    e. Questions

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
January 27, 2005

1. Old Business
    a. Corrected/approve minutes from January 6, 2005 meeting
    b. Open floor to additional old business

2. New Business
    a. Chairman update
    b. Area Sub-committee reports

3. Engineer's Report
    a. Survey results have all been mapped
    b. Identified Areas
        i. Chesapeake Area
        ii. Cedar Estates
        iii. Hawley/Delsy Area
        iv. Pamela Drive Area
    c. Areas that need further investigation based on reported flooding
        i. Villa Grande Area
        ii. Apollo Area
        iii. Creek Run Area
        iv. Padua Area
        v. Turnpike Corridor being study by CDM
        vi. Maintenance work completed to date and downstream improvements may alleviate some instances of single parcel flooding.
    d. Public Education
    e. General Questions

4. Other Business

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
February 17, 2005

1. Old Business
    a. Corrected/approve minutes from January 27, 2005 meeting
    b. Soltis report on Stormwater Committee Public Education
    c. Open floor to any additional old business
2. New Business
    a. Chairman update
3. Engineer's Report
    a. Flooding calls spreadsheet
    b. Site visit completed for Kern residence (Pamela Drive)
    c. Site visit completed for Puhalik residence (Villa Grande)
    d. Site visit completed for Collela residence (Edgerton)
    e. Site visit completed for McDonald's/Condos (Royalton)
    f. Additional record data requested for all of these areas as well as Friar Post, Padua area, Avalon from City yesterday for further investigation and received tonight.
    g. Modeling of Cedar Estates/Chesapeake/Hawley Areas halted
    h. Areas that need further investigation based on reported flooding
    i. Public Education
    j. Available grants
    k. Reasons for Basement Flooding
    l. General Questions
4. Other Business

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
March 17, 2005

1. Old Business
    a. Corrected/approve minutes from February 17, 2005 meeting
    b. (If in attendance) Soltis report on Stormwater Committee Public Education
    c. Open floor to any additional old business
2. New Business
    a. Chairman update
3. Engineer's Report
    a. Field crew is starting field work
    b. Pamela Drive
        i. Option # 1 - Preliminary cost estimate for Dalia plans: $490,000 including Engineering, Surveying, and Inspection. Dalia plans will offer relief to Parkdale as well. (10 year storm design)
        ii. Option # 2 - Preliminary cost estimate for detention basin: $200,000 including Engineering, Surveying, Inspection, and property acquisition. Upgrade at Parkdale outlet possible if this option constructed.
        iii. Original plans for Pamela not available (constructed prior to City's engineering department inception) however record grading plan clearly states "centerline ditch". Dalia plans include ditching.
        iv. 1/3 of homes on Pamela and Parkdale tested positive for cross connections. Some can be eliminated with construction of Dalia plans with additional costs.
    c. Chesapeake Area
        i. Preliminary cost estimate to construct 7 acre-feet basin: $250,000 including Engineering, Surveying, Inspection, property acquisition
        ii. Preliminary cost estimate to modify existing basin: $7,500. Should be constructed in conjunction with proposed basin.
        iii. Rework outlet channel (rear yards of Hawley/Delsy properties) for 3' wide by 3' deep section with 2:1 side slopes and 1.5% slope
    d. Royalton Court Condos report requested. Approved through law department. Copy should be available shortly.
    e. Updated Riser report received from Wastewater. All manholes identified in 2004 are completed (45 total). Additional locations will be identified this spring during maintenance.
    f. Scope of Project and goals of Citizens Flooding Oversight Committee:
        i. Prioritize flooding related concerns throughout the City on behalf of the residents
        ii. Develop long-term and short-term plans that provide solutions to flooding concerns
        iii. Develop cost estimates for long-term and short-term plans
        iv. Identify available funding mechanisms to ensure appropriate fiscal responsibility
        v. Identify public outreach strategies to educate, inform, and solicit support from City residents.
4. Other Business

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
April 7, 2005

1. Old Business
    a. Corrected/approve minutes from March 17, 2005 meeting
    b. Open floor to any additional old business
2. New Business
    a. Chairman update
3. Engineer's Report
    a. Review of areas visited this week:
        i. Puhalik
        ii. Avalon Event Center detention basin
        iii. Maple Lane
        iv. Royalwood culvert
        v. Goodman culvert
        vi. Giant Eagle culvert
        vii. Royalton Road culvert
        viii. Collela property
        ix. Cady Road
    b. New recommendations:
        i. Edgerton/Bennet Road
        ii. Maple Lane
        iii. Biro ditch
    c. Progress Map:
        Added to City's website last week at the Mayor's Flooding Committee Link
    d. New area:
        Bunker Road – Spisak property area. City has completed some work in the area but resident is still having some problems. Video taping to have occurred yesterday by City. Existing culvert run from rear yard of second house on Dublin north to rear yard of Spisak property. Waiting to see if report of videotaping to decide if this is a drainage problem or infrastructure condition problem.
    e. Last meeting:
        Per scope of services, last meeting will be May 18, 2005. report delivered by June 18, 2005. all study areas will be completed by then
    f. Input from members for report.
        This is a Citizens Committee and the report should reflect some of your ideas.
4. Other Business

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
April 28, 2005

1. Old Business
    a. Corrected/approve minutes from April 7, 2005 meeting
    b. Open floor to any additional old business
2. New Business
    a. Chairman update
3. Engineer's Report
    a. Review of areas visited or investigated this week:
        i. Avalon Event Center walk through
        ii. Gregory Lane/Hawley/Delsy
        iii. Royalton Road (3643, 3881, 5297, 5801, 8377, 8395)
        iv. 1670 Bennett
        v. Jamestown #4 and Royalton Heights (Apollo)
        vi. Swan Lake
        vii. Spyglass
        viii. Thornhurst & Sprague
        ix. Lynn and Gabriella
        x. Cedar Estates
        xi. St. Thomas Woods
        xii. Spisak property
        xiii. Sprague and Abbey
    b. New recommendations:
        i. Eliminate cross connections on Delsy particularly as well as Gregory, Hawley and Chesapeake.
        ii. Re-establish rear yard swales on both sides of Gregory Lane
        iii. Replace twin 12" CMP culverts on Gregory
        iv. Video St. Thomas Woods sanitary, possible re-lining of sanitary to eliminate infiltration
        v. Residents should install elbow to direct discharge from footers/downspouts outlet towards direction of flow. Separate footer/downspout system, install sump pumps.
        vi. Residents with sump pumps can install water powered backup pump
    c. Progress Map:
        Updates to City's website this week at the Mayor's Flooding Committee Link
    d. Other news:
        Huntington Close - received FEMA grant to reconstruct washed out basin
        Puhalik source
        Turnpike drainage area overlaid on comprehensive map
4. Other Business

City of North Royalton
Volunteer Citizens Oversight Flooding Committee
Meeting Agenda
May 19, 2005

1. Old Business
    a. Corrected/approve minutes from April 28, 2005 meeting
    b. Open floor to any additional old business
2. New Business
    a. Chairman update
3. Engineer's Report
    a. Review of areas visited or investigated this week:
        i. Boston Road
        ii. Bennett Road
        iii. Wiltshire Road
        iv. River Road
        v. Spisak
        vi. Cedar Estates
    b. Interview with Wastewater Superintendent
    c. Recommendations/Projects
        i. Cedar Estates Improvements
        ii. Boston Road Erosion Control
        iii. Cross Connection Program and Flow Monitoring
    d. Additional Funding Sources
    e. FEMA mapping update
4. Other Business

Appendix C

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, NOVEMBER 18, 2004

LOCATION: NORTH ROYALTON CITY HALL **TIME: 7:00 P.M**

Attendees: **Law Director, Thomas O'Donnell**
Council President, Robert Stefanik
Council Council Members: Denise Bobulsky
Vincent Gentile
Lisa Uffman-Kirsch

Seventeen (17) Committee Members

John Sak, Paula Recker, Andrew Blackley, Susan Hamilton

1). Meeting minutes and sample questionnaires were distributed.
Sak requested comments or corrections on meeting minutes.
Recker corrected previous minutes for January meeting from January 8, 2005, to January 6, 2005.
Sak asked for motion to approve.
Dios motioned, 2nd by Nickell
All in favor.
Minutes approved.

2). Chair Info/Update:
A number of new people have signed in today. See the Chairman to find out what area group new people are in.
Need a list of names from Area Chairs for those requesting letter of introduction from Mayor. Please provide to secretary.
Sak hoped that Area Chairs would have confirmed the continued participation of interested parties on committee list by the December 9, 2004 meeting.
Sak asked that Functional Chairs choose a member to attend Council Meetings.
Sak requested progress reports from all subcommittees for the next meeting.

3). Area Committee Updates:
Sak opened floor to any Area Committee Updates.
Mr. Wayne Repko reported on Area 1.
Repko recently moved into the area, but has been a resident for twenty-seven (27) years.
Repko is a civil engineer and has designed some of the subdivisions south of the Turnpike. He believes the flooding was the result of (1) heavy rains (2) downstream channel modification by property owners. He would like an address map to record the information collected by the Committee.
Sak believes the City can make one available to the Committee.
Sak requested report be put in writing and given to the Recording Secretary.
No other Area Committee reports.

4.) Sak opened floor to any Functional Committee Updates.
No Functional Committee Updates.
Sak was asked for the names of the Functional Committee Chairs and will provide that after the meeting.

5). Old Business:
Discuss Questionnaire:
Sak requested thoughts and ideas about the sample questionnaire.
Blackley suggested he go over the questionnaire with attendees. Blackley indicated the questionnaire is a draft and was open to revision.
A general discussion regarding the timeframe for the mailing followed. It was concluded that December 31, 2004 would allow sufficient time for responses from residents.
The Committee is to work with the City to get the mailing out.
The questionnaire will be sent to all residents.
Recker indicated there were not enough pieces to qualify for bulk mailing rates. Sak suggested Publicity Committee verify.
O'Donnell suggested utilizing the Royalton Recorder.
Sak felt a separate mailing would be more appropriate. A general concurrence followed.
An audience member suggested using the Recorder to notify residents of upcoming questionnaire and a 2nd notice to remind residents to return surveys.
Recker suggested self-addressed stamped envelopes to ensure good response.
An audience member suggested using different colored paper for each Area.
Another audience member suggested a blank space be inserted on each survey to be filled in corresponding to the Area from which the response was received.
Blackley indicated the completion of the name on each survey was optional however, the street address was important.
An audience member questioned why the results of the existing surveys cannot be utilized instead of performing another survey. A general discussion followed concluding that this questionnaire had more in-depth question and was not targeted to a specific area of the community as it will be a Citywide mailing.
Sak suggested perhaps the City has a permit envelope available. Recker had already investigated this option and it is not a possibility for this type of mailing. The City will be responsible for the mailing. Recker to do the handwork. Mayor's secretary will post.
Audience members volunteered to help with the letter preparation and envelope stuffing.
Blackley suggested some people might not respond for fear of affecting resale value of home.
An audience member questioned how the data would be provided to the committee.
Blackley indicated a database will be created that will allow for selective sorting of data. This data will be transferred to maps corresponding to the address for each question of the survey.
A general discussion of revisions and improvements to the questionnaire followed.
Blackley indicated the changes would be completed by tomorrow and forwarded to Recker and Sak.
Sak requested a motion to approve the changes to the questionnaire.
Nickell motioned, 2nd by Lang.
All in favor.
Motion approved.

6). New Business:

Mrs. Betty Jean Puhalik questioned what direction committee members should go from here? What are the sub-committees supposing to be doing while waiting for questionnaire results?

Sak indicated Area Chairs were given a list of objectives being (1) educate self about geography of problems areas and types of problems, (2) follow appropriate council committees and (3) read swale reports that were previously provided.

Sak indicated the building department used to perform the inspection of swales but stopped since they felt they were not qualified to do this. Inspections were suspended on September 1, 2004.

Puhalik asked whether the committee members were supposed to inspect swales, enter private property. Committee members are not being asked to enter private property. Sak suggested the members become familiar with the topography or lay of the land.

Nickell stated he was familiar with main flooding sources. Sak stated that the goal was to gain a general understanding covered by their Area.

Repko said the Hilary area was flooded to a depth of about four (4) feet during the June storm.

A general discussion followed regarding the number of people with personal flooding issues. Sak indicated the group was here to develop a total solution.

An audience member said that she could not trudge many yards and acres. She has been flooded twelve (12) times in fourteen (14) years and lives on Edgerton Road. The channel adjacent to her property has been widened but still floods. Eight (8) engineers have not been able to figure out where the water is coming from. Sak responded that the idea was to identify problems City wide. Much flooding occurs in immediate areas that people are familiar with.

An audience member asked about the existence of a storm sewer map. Repko suggested obtaining the Issue 2 Capital Improvement Report that inventoried all of the infrastructure in the City. Stephen Hovancsek & Associates does not have the task of creating a comprehensive storm sewer map. Blackley indicated the storm sewer map is a requirement of the Phase II Storm Management Plan. Blackley explained what information the City has provided. A CAD map was provided that will be used as a basis to show the problem areas reported by questionnaires.

An audience member requested a timetable for the questionnaire. Blackley indicated the results would be tallied by the end of January. The maps may not be completed in their entirety by then.

A general discussion of storm hydrology and the evolution of design standards over the years followed.

A general discussion of Homeowner's Associations that have failed or have not maintained their retention basins followed.

Villa Grande – Betty Jean/Homeowner's Association –none

Recker asked Puhalik if Villa Grande Homeowner's Association existed. Puhalik indicated there never was a Homeowner's Association. Property owner is maintaining property where subdivisions sign is sitting.

Recker asked audience if any known Associations are defunct.

Audience members indicated Oakridge and Jamestown Associations no longer existed.

Recker indicated that no one was maintaining these detention basins.

The City passed an ordinance against Homeowner's Associations from dissolving.

Sak requested a motion to adjourn the meeting.
Dios motioned, 2nd by Recker.
All in favor.
Meeting adjourned at 8:20 pm.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, DECEMBER 9, 2004

LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council President, Robert Stefanik
Council Council Members: Denise Bobulsky
Vincent Gentile
Lisa Uffman-Kirsch

Ten (10) Committee Members

John Sak, Paula Recker, Susan Hamilton

Meeting brought to order at 7:15 pm
Minutes were distributed.
Sak corrected previous minutes from 17 members as stated to 20 members as listed on sign in sheet.
Recker clarified previous minutes reading entire email sent by Richard Arrendale, Building Commissioner to John Sak dated November 3, 2004 regarding swales and final grading.
Sak asked for motion to approve.
Dios motioned, 2nd by audience member.
All in favor.
Minutes approved.

Sak opened floor to Area Committee Updates.
Mr. Wayne Repko reported on Area 1.
Repko and another Area 1 member have been contacting persons on list by phone to see if corrections made resulted in improvement or if subsequent flooding has occurred.
Most people do not have the experience to perform site visits. Upstream and downstream investigations are required with more than general knowledge of where the water is coming from.
City uses outside consultant for grade checks, which is not uncommon. Topo obtained from his new residence is stamped by City Engineer's office indicating the final grading is the responsibility of the developer and owner. The City is going through the expense of using a consultant but the ultimate responsibility lies with the developer and owner.
The City should make better use of the consultant.
No one from Area 1 has attended any Council Committee meetings yet.
Recker questioned what list Repko referred to in his report and when he received it.
Repko indicated the list he mentioned came from Sak and was a listing of calls that came into the City from the June 9th, 2004 storm and was received approximately 1 month ago.

Mr. John Nickell reported on Area 5.
Nickell observed cleaning on the west side of the Byro ditch. There was also a sewer cleaning signs sighted however no sewer cleaning trucks were observed. Part of Baldwin Creek in area still needs cleaned. Culverts are full of debris and sediment.

Recker commented that the Army Corp of Engineers report that was due in September has not yet been obtained but it was a priority with the City.
Nickell indicated that he spoke with long time residents of his neighborhood and the flooding in their area began after Chesapeake was constructed.
Recker questioned if Nickell has identified flooding problem in this entire area and what would be the solution to the problem.
Nickell answered that holding back more of the water coming from Chesapeake, dredging in Baldwin Creek, cleaning of sewers on Hawley would help solve the problem. The banks of the creek are eroded.
Recker questioned whether property owners that abut the creek are aware they are required to maintain the banks.
Nickell indicated that possibly some residents do and others aren't aware of this requirement.
An audience member indicated her neighbor does not maintain the banks and furthermore has kept her husband from maintaining the banks.
Recker suggested the committee pursue property owner education.
Repko indicated the Corp of Engineer's report would only be a report. A permit will still be required for dredging the creek. The process is slow and a number of environmental issues have to be tackled.
Recker asked if and where the code that states the property owner is responsible to maintain, repair and replace the banks of a watercourse exists. The consultant is to research.
Nickell suggested the City could use a Point of Sale Inspection to motivate homeowner's to clean up swales prior to sale. Recker tentatively indicated the City already attempted such legislation but it failed.
Nickell stated that the City relies heavily on the streams and creeks as part of its drainage system however the City's attitude is also that the creeks are on private property and therefore they won't maintain them.

Mr. Jim Rymut reported on Area 6.
Rymut called people on his list. Most showed up for previous meetings however, no one is at tonight's meeting.
Rymut indicated a number of basement flooding problems on Abbey Road.
Rymut is looking for a storm sewer map.
Rymut indicated a problem at the Garden Center at W. 130th and Albion.

Sak opened the floor to Functional Committee reports.
Mr. Norm Bickel discussed the list of maintenance items completed and the cost of brick and mortar and new manhole covers.
A discussion ensued regarding property owners' attitude towards removing debris from the grates of basins located within their property.

The Sanitary Sewer Chair indicated he reviewed the dye test report for Hawley Drive and Pamela drive and was under the opinion that the number of cross connections was not great. No one from the subcommittee has been able to attend the corresponding Council Committee meetings to date.

Nickell questioned if the meeting minutes were available online. The minutes are available on the Internet. An online review of the committee meetings would be a good idea.

Sak requested all reports be submitted in writing and copied to the secretary.

Sak opened the floor to questions for Councilman Stefanik, Chair of the Stormwater Committee who is present.
An audience member questioned the final paragraph of the legislation the reads "may issue a citation". Stefanik indicated this is common language and it gives the City flexibility to allow residents to fix the problem prior to issuing the citation.
An audience member asked how an understaffed Engineering Department would be able to add additional workload effectively. Stefanik indicated funding would be made available in the temporary budget to for an additional engineering position.
A discussion ensued regarding funding of the position and the status of the legislation between council members and the audience.

Sak requested Ms. Susan Hamilton disperse the address maps prepared for tonight's meeting. Maps were dispersed.

Sak opened the floor to new business.
An audience member questioned the status of the questionnaire. Sak indicated he would be discussing this shortly.
No additional new business was brought forward from the audience.

Sak read statement of resignation. A general discussion regarding Sak's resignation followed.

Dios motioned to accept Sak's resignation. Seconded by audience member. All in favor. Motion approved.

Dios nominated and motioned to appoint Nickell for the position of Committee Chairman.
Seconded by audience member. All in favor. Motion approved.

A discussion ensued regarding the information that has been given to the Consultant and what additional information is still needed.

Recker refuted Sak's statement in his resignation that she is a "personal friend" of the Mayor.
A general discussion regarding the purpose of the Committee, its findings, recommendations, and direction followed.

The Committee is to mark the known problem areas on the maps distributed by Hamilton for the next meeting.

The consultant was asked to obtain the survey results from the Mayor's office, a general list of homeowner's responsibilities, a report on funding options, increased fees, impact fees and developer fees, a copy of the Financial Analysis & Cost of Services report, and the sewer cleaning logs for 2004 for the January 6th, 2005 meeting. The consultant is to be the liaison between the City and the Committee.

Nickell requested a motion to adjourn.
Motioned by audience member, seconded by audience member.
All in favor.

Meeting adjourned at 8:55 pm.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, JANUARY 6, 2005

LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council President, Robert Stefanik
Council Council Members: Denise Bobulsky
Lisa Uffman-Kirsch

Fourteen (14) Committee Members

John Nickell, Paula Recker, Andy Blackley, Susan Hamilton

Meeting brought to order at 7:03 pm

Nickell greeted everyone and gave a general update of recent events

Nickell requested a motion to approve minutes of last meeting.
Dios motioned, 2nd by Dominick.
All in favor.
Minutes approved.

Blackley presented the Engineer's report.
Blackley discussed the items requested at the previous meeting. A report on funding was postponed until later in the process. A Homeowner's Responsibility report based on the Codified Ordinances of the City was distributed and discussed.
Hamilton discussed the Royalton Recorder survey data and comprehensive map being completed from all data sources.
Hamilton presented the sewer cleaning logs obtained from the City.
Blackley presented a number of maps containing information collected to date including ages of subdivisions, flood calls received by the City, streets where sewers have been cleaned, positive test results from dye and smoke testing, FEMA floodplains and results of questionnaires.
Blackley indicated the short term goals of the engineer would be to target specific area from the data obtained so far, identify the sources in these specific areas and review plans, complete field visits and interviews.
Blackley indicated the engineer will review the Stormwater Management Plan obtained from the City and sort through additional survey data received from the Mayor's office.

Dios questioned who was responsible to enforce regulations of the City.
A general discussion regarding the location, cause, and magnitude of various flooding areas as reported by the audience and the responsibilities of the City versus the homeowner ensued.

Nickell invited all in attendance to check the maps to make sure their properties were identified on the map and add additional data if known.

Blackley produced a soils map of the whole City and manual for anyone to view after the meeting.

Sak distributed resignation letter to anyone that would like a copy.

Nickell requested a motion to adjourn.
Motioned by Dios, 2nd by Puhalik.
All in favor.

Meeting adjourned at 8:45 pm.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, JANUARY 27, 2005

LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Member: Denise Bobulsky
Eleven (11) Committee Members
John Nickell, Paula Recker, Andrew Blackley, Susan Hamilton

Meeting brought to order at 7:07 pm

Nickell requested a motion to approve minutes of last meeting.
Dios motioned, 2nd by Kern.
All in favor.

Nickell opened floor to old business.
Dios discussed the Army Corp of Engineers report on Baldwin Creek. The ACE has run out of money to continue working on the report. Bobulsky indicated the City would need to pressure Congressman Brown to obtain additional funding to move the study forward. The engineer is to speak with the City Engineer to obtain a summary report from the Corp if one exists.

Nickell presented Chairman's report. Nickell attended the last Stormwater Committee meeting. Nickell met with Mr. Ivan Hack of the Stormwater Committee.

Nickell opened floor to new business.
Mr. Soltis presented his concern of the floodplain in Cedar Estates. A general discussion regarding the original mapping of the floodplain and the current remapping of the floodplain resulted.

Recker would like to see recommendations for maintenance in final report based on schedules from other communities.

Hamilton presented the Engineer's report.
Hamilton discussed the four identified areas: Chesapeake, Hawley/Delsy, Cedar Estates and Pamela, and the status of the analysis of these areas.
Hamilton presented copies of the Request for Proposal for the Pamela Drive Study from 1990 and the Ordinance hiring Dalia to prepare the "study" as well as their proposal.
Dios presented a synopsis of events, as he understood them for the Pamela Drive project.
Hamilton discussed areas that have been identified but not researched yet.
Mr. And Mrs. Puhalik indicated water problem on Villa Grande worsened since Avalon was constructed. A general discussion regarding Avalon ensued.
Hamilton requested suggestions for any additional areas that are known to residents but have not been identified from surveys and flooding calls. An audience member suggested the Thornhurst/Sprague area.
Mr. Rymut presented his concern regarding the Woodhill Development.

Blackley discussed Public Education.
Soltis to contact Hack to avoid duplication of Stormwater Committee effort.
Blackley suggested a possible general seminar on hydraulics for residents to understand how drainage systems work.

Blackley opened floor to questions or comments.
A general discussion initiated by Soltis regarding leaf pickup occurred.
Ms. Pifer questioned what requirements need to be met before installing improvements on private property. Blackley indicated a permit would be required.

Nickell requested a motion to adjourn.
Motioned by Mr. Cubbison, 2nd by Rymut.
All in favor.

Meeting adjourned.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, FEBRUARY 17, 2005

LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Members: Denise Bobulsky
Lisa Uffman-Kirsch
Ten (10) Committee Members
John Nickell, Paula Recker, Andrew Blackley, Susan Hamilton

Meeting opened at 7:15 pm.
John Nickell requested motion to approve minutes from January 27, 2005 meeting
Dios motions, Demko 2nd
All in favor. Minutes approved.
Mr. Soltis not in attendance to present report on Stormwater Committee public education effort.
Nickell opened floor to any additional old business. None presented.

Susan Hamilton presented Engineer's Report.
There are currently 599 flooding problem properties listed in the database being constructed. 121 or roughly 20% of these properties have a visible creek, stream, ditch on property. 35 properties or roughly 6% of the 599 properties had positive cross connections. The number of corrections to the cross connections is unknown.
FEMA and ODNR have listed 4 structures in the floodway, 84 structures in the fringe, and 16 structures in the buffer area of the floodplain.
Hamilton reported on the site visit completed on Pamela Drive, Villa Grande, Edgerton, and Royal Court Condos.
Additional data from all these areas as well as Friar Post, St. Thomas Woods had been previously requested from the City. Recker presented data to engineers prior to meeting.
Modeling of Cedar Estates/Chesapeake/Hawley Areas halted until survey crews can obtain some additional data. York Road culvert at Chesapeake appears to have sufficient capacity
Hamilton opened floor to suggestions for additional areas. Huntington Close and Gregory were cited.
Additional areas being reviewed are Friar Post, Sprague and W. 130th, Thornhurst and Sprague, resident on Boston Road. Uffman-Kirsch indicated Friar Post was a pump failure, Boston Road resident suffered from bank erosion problem.
Hamilton offered handouts for use in Public Education including Rainfall Distribution data, Yard Maintenance and Low Impact Yards, Community Rating System of the National Flood Insurance Program.
Blackley presented a list of possible funding sources that have been found to date.
Blackley presented a report on Causes for Basement Flooding. A general discussion regarding basement flooding and downspouts ensued.

The floor was opened up to questions/comments. An audience member requested a timeline and goals for the Engineer. A copy of the Proposal was distributed.
A general discussion regarding maintenance and Point of Sale inspections followed.
Uffman-Kirsch indicated the Wastewater Department has a report presented to the Utilities Committee on sanitary risers installed. The engineers will obtain a copy.

Nickell requested a motion to adjourn.
Dios motioned, Webb 2nd.
All in favor. Meeting adjourned at 8:50 pm.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, MARCH 17, 2005
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Members: Denise Bobulsky
Lisa Uffman-Kirsch
Thomas Koch
Vincent Gentile
Robert Stefanik
Nine (9) Committee Members
Paula Recker, Andrew Blackley, Susan Hamilton

Meeting opened at 7:03 pm.
Paula Recker requested motion to approve minutes from February 17, 2005 meeting.
Dominick motioned, Dios 2nd.
All in favor. Minutes approved.
The floor was opened to old business. An audience member questioned the hiring of the other consultant for the Turnpike study. CDM has been hired by the City. Another engineer has also been added to the Engineering Department.
Nickell not present. No Chairman report presented.
Susan Hamilton presented Engineer's Report.
Field crews have started gathering field data.
Option 1 for Pamela Drive based on previously designed plans would cost approximately $490,000. Plans would need to be reviewed and field data checked prior to bidding. Option 2 would be a detention basin located on private property. Easements would have to be obtained.
Original plans for Pamela are not on record with the City however grading plan clearly shows ditch along front yard.
Cross connections were located on 1/3 of the properties on Pamela and north end of Parkdale. It is uncertain if the homeowners have corrected any of these in the last 15 years.

One solution presented for the Chesapeake area was the construction of a 7 acre-foot detention basin at a preliminary cost of $250,000. The basin would be located on private property and easements would have to be obtained. A smaller outlet orifice at the existing Chesapeake basin could also be installed as part of this project. The outlet channel would need to be modified as well to provide a consistent cross section and slope. It is not clear if there are existing easements on the properties along this channel.
Mr. Cubbison offered additional information regarding Gabriella.

The City is forwarding a copy of the Royalton Court condominium report to the consultant.

A copy of the updated riser report was obtained from the Wastewater Department. Forty-five sanitary manholes were corrected. The grade of these manholes was raised to eliminate water from entering through the lid of the manhole. Additional manholes will be identified this spring and repaired.

Ms. Hamilton reviewed the goals of the committee.

Councilman Koch indicated a lack of maintenance of existing drainage facilities and lack of facilities in some areas. A detention basin between Lisa and Maple should be investigated.

The consultant agreed to produce a map showing areas that are being studied for the City's website.

MINUTES
CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, MARCH 17, 2005
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Mrs. Puhalik questioned the direction of the committee and the results. Mr. Blackley indicated the final report presented to the Committee and the City will contain recommendations for numerous areas in the City.

Councilman Gentile presented a general background of the Avalon area. The consultant will visit the site again when Mr. Jim Storer from the Cuyahoga Soil and Water Conservation District visits.

Ms. Hamilton passed out handouts from the ODNR website regarding ownership and cleaning of streams on private property.

Recker requested a motion to adjourn.
Dios motioned. Dominick 2nd.
All in favor. Meeting adjourned at 8:25 pm.

CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, APRIL 7, 2005
MINUTES
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Members: Robert Stefanik
Denise Bobulsky
Lisa Uffman-Kirsch
Ten (10)) Committee Members
John Nickell, Paula Recker, Andrew Blackley

1.) Old Business
Approve minutes – Dios/2nd Mrs. Dominick
Any additional old Business - none
2.) New Business – Chairman update - none
3.) Engineer's Report.
a. Review of areas visited this week:

- Puhalik: No obvious source found
- Avalon Event Center: Basin inlet headwall flowing, basin outlet pipe flowing, outlet to wetlands flowing, catch basin outlet from back driveway was dry, maintenance issues need to be addressed
- Maple Lane: Culvert under road is silted in. Outlet not visible.
- Royalwood culvert: Erosion of stream banks
- Goodman Culvert: No headwall at inlet end, maintenance required, chain link fence across stream, homemade bridge across stream, debris needs cleaned out, no erosion control on new home next to stream. Grass has not grown in yet
- Giant Eagle culvert: Homemade bridge across stream, gabion rock missing, outlet silted in, pipe has sediment in it. Downstream needs cleaned of construction debris, concrete curb, concrete wash out. Straighten channel to Royalton Road culvert
- Royalton Road culvert: New structure, downstream needs cleaned of debris, overgrown.
- Collela property: Standing water in low spot next to home. Outlet pipe was flowing into ditch at neighbor's property.
- Cady Road: Ditch filled in various places. In one area where ditching was filled and catch basins were installed, catch basins were at grade, very little water would enter these basins. Roadside ditch at low end of street (at stream) is stagnant and green. Minor cleaning and grading would fix this. County drainage structure needs updating. Neighbor adjacent to creek has septic system located in front yard, outlets to stream.

b. New recommendations:

- Edgerton/Bennet Road intersection area (Collela property) City to request County Engineer reconstruct road including roadside drainage. Construct sewer from low point through Edgerton to existing headwall, continue south through side yards to existing headwall on Bennett. Tie into existing storm sewer.
- Maple Lane Replace culvert under Road with 24" pipe. Will require regrading of ditch at inlet and outlet to rear yards between Maple and Lisa. Lisa culvert found to be sufficiently sized however, this drainage area leads to wetlands behind Avalon.

CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, APRIL 7, 2005
MINUTES
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

- Biro ditch: Construct larger ditch along north end of Cinnamon Lakes (one already exists here) to split flow through Biro ditch. Approximately half of drainage area would flow through this ditch and meet up with existing Biro ditch south of Albion Road.

c. Progress map: Added to City's website last week at the Mayor's Flooding Committee link.

d. New Area:

Bunker Road – Spisak property area. City has completed some work in the area but resident is still having some problems. Video taping to have occurred yesterday by City. Existing culvert runs from rear yard of second house on Dublin north to rear yard of Spisak property. Waiting to see report of videotaping to decide if this is a drainage problem or infrastructure condition problem.

e. Last meeting: Per Scope of Services, last meeting will be May 18, 2005. Report delivered by June 18th . All study areas previously discussed will be completed by then.

4.) Input from Residents.

- Hawley Road ditch
- North end of Gregory – does proposed Biro ditch work actually do something for this area?
- Ditches on west side of Gregory need to be cleaned out to facilitate drainage? Ditches are filled with debris;
- Walk Delsey area with John Nickell. Water flows to Abbey & Sprague – then where to?

5.) Other area to investigate:

- Cedar Estates problems
- Spyglass
- Ward 6 –outstanding issues – memo from Councilperson.
- Huntington Close – (above Abbey Road)
- Northern end of York Road
- 8884 York Road – west side abuts Cedar Estate
- St. Thomas Woods off of Wallings
- Maria Gardens retention basin – is it adequate?
- Ditching on Albion to W. 130th St.

6.) Final Report to be submitted to Committee on June 23, 2005, submit to City staff at least one week before for review.

- Prioritization must be addressed
- Responsibility for correcting problem
    1. County
    2. City
    3. Resident
- Discuss enforcement of regulations
- Discuss possible sources of funding
- Obtain copies of new Erosion Control and Stormwater Management Ordinances

Motion to adjourn by Dominick /2nd Dios

Next meeting April 28, 2005.

CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, APRIL 28, 2005
MINUTES
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Members: Denise Bobulsky
Nine (9) Committee Members
John Nickell, Paula Recker, Susan Hamilton

Nickell opened meeting at 7:05 pm.
Motion to approve minutes from April 7, 2005 meeting by Mrs. Dominick, 2nd by Mr. Cubbison
No new business presented.
Hamilton presented Engineer's Report
Hamilton reviewed areas visited or investigated this week:
Avalon Event Center walk-through: Merdes, Woodring, Puhaliks, Gentile, and Hamilton walked the area including the Avalon detention basin. Basin needs some cleaning. Hamilton also visited 2x during wet weather. Basin was functioning. Water was backing up in basin above top of outlet pipe. Downstream discharge was anticipated amount.
Gregory Lane/Hawley/Delsy: Hamilton, Nickell, and Cubbison walked and opened manholes. Rear swales on west side of Gregory are stagnant. Twin 12" culverts not sufficient for drainage area. Rear swales on east side of Gregory should be re-established with sufficient pipe sizes for any crossovers. Hamilton discussed configuration of system which is not conducive to efficient flow. Construction of large detention basin as previously recommended will reduce flow through this channel alleviating and or eliminating storm flooding in this whole area. Sanitary manhole opened at 10833 Gregory. Observed excessive clear water flow (raining that day). Dye/smoke testing from early 90's indicate 10/38 houses had cross connections on Delsy, which tie into Gregory sanitary. Three cross connections on Gregory, 7 cross connections on Hawley, 8 cross connections on Chesapeake and 1 on York are tributary to this sewer.
Royalton Road: 3643 – spoke with resident. Flooding coming over Royalton Road. Sewer work at Hunter's Creek alleviated the problem. 3881 – resident not home. 5297 – spoke with resident. Basement backup in June was only time experienced. Concerned over condition and size of sanitary sewer on Royalton Road. Suggested two sewer crews to clean sewers full time. 5801 – Cottman's Transmission – debris washed down and blocked creek. Leases property, not owner. June's flooding was first in 6 years. Also complained about ponding in parking lot. Hamilton walked upslope property. Downspouts at 5895 were overflowing. Overland flow from bank building down causing problem. Property owner could install catch basin in parking lot or work with neighboring properties to construct swale on south side of buildings to take water straight to creek instead of directly at Cottman's building. 8377 – creek overflowed for first time since 1990 when moved in. Resident waterproofed basement. No problems since June storm. Asked about maintenance of detention basin at Dover Farms. Hamilton observed some sediment buildup at detention basin. Spoke with resident of 3rd floor condo. Resident had never observed the water higher than the weir opening on outlet structure. 8395 – No answer. Observed newer bridge structure over driveway. Observed banks at 8701 eroding. Also observed grate installed at N. Akins at outlet of stream (Royal Park Condos) to these properties. The trash grate was collecting debris and should be monitored for clearing regularly.
16701 Bennett: No one home. Did not observe problem. Rear yard stream is part of Turnpike study. Will contact again to see where problem exists.
Jamestown #4 and Royalton Heights (Apollo): Observed detention basin in Royalton Heights was empty while water was raging in stream next to and behind. Checked plans at Engineering. Will have to review design of this basin Culvert north of basin was backing up because stream to east of basin was running so fast. Other basins in development seem to be functioning.
Swan Lake – reviewed plans at Engineering. No central pump station for units at Black Swan. These units must be served by individual pumps with 1 ½ inch PVC Forcemain until it reaches gravity sewer. Backup

CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, APRIL 28, 2005
MINUTES
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

battery power or generator is required for these units. If power goes out, any sewage in the line will flow back down PVC by gravity to the units that have the pumps installed.
Spyglass – No sewer backups reported, yard erosion and flooding only. Observed new construction on Kingston Way next to stream. No erosion control has been provided at any of the four lots at cul-de-sac. Excess soil being dumped on vacant lot next to 12706 on the banks of the stream. Inlet end of culvert is silted causing stream to carve new path around sediment eroding stream bank. Rear yard swale behind 12706 is silted in. Culvert pipe that drains rear yard swale has no headwall. Outlet end of large culvert needs cleaned.
Thornhurst & Sprague: Observed 36" pipe at side yard of 4473 that outlets to rear. Rock walls along channel look good. No erosion observed. Culvert under W. Sprague needs cleaned. Almost 47 acres, mostly from Parma, drain to this culvert. Quick calculations show that 1 to 1.5 feet of head over pipe will push this amount of water through although top of pipe is at or about same level as adjacent yard therefore water will flow through flood yard for 10 year storm. Resident could install larger pipe or remove pipe altogether. Additional modifications possible is County reconstructs roadway.
Lynn and Gabriella: Lynn culvert silted in. Low area at end of Lynn. Yard waste is being dumped in low area preventing water from leaving.
Cedar Estates: Plans obtained from City Engineer. Culvert at end of Wildwood needs cleaned. Pond at rear of 9120 Wildwood was filling up. Fence along drainage was backing up debris. Observed channel behind Applewood. Flowing well. Further study necessary.
St. Thomas Woods: Reviewed plans. System was constructed as side by side. Most likely, this area suffers from heavy Inflow and Infiltration, which overloads the system during wet weather. Possible candidate for re-lining or reconstruction of sanitary in separate trench. Hamilton explained relining procedure. Stream cleaning for outlet of subdivision was completed in 1992. Additional cleaning may be necessary.
Spisak property: No update from wastewater yet. Approximately 300 acres drains to culvert in rear yard.
Sprague and Abbey: 100-year flood plain. Footers at 7912 drain to creek.
New recommendations: Eliminate cross connections on Delsy particularly as well as Gregory, Hawley and Chesapeake.
Re-establish rear yard swales on both sides of Gregory Lane. Ordinance 05-24 requires maintenance of drainage systems on private property unless accepted by City for maintenance.
Replace twin 12" CMP culverts on Gregory.
Video St. Thomas Woods sanitary, possible re-lining or reconstruction of sanitary to eliminate infiltration
Residents should install elbow to direct discharge from footers/downspouts outlet towards direction of flow.
Separate footer/downspout system, install sump pumps.
Residents with sump pumps can install water powered backup pump. Hamilton presented manufacturer's sheet as example of water powered sump pump. Hamilton also presented pop up drainage emitter data sheet.
Progress Map: Updates to City's website this week at the Mayor's Flooding Committee Link
Other news: Huntington Close - received FEMA grant to reconstruct washed out basin
Turnpike drainage area overlaid on comprehensive map.
Need for public education was discussed. Bobulsky suggested contacting Gloria at the Royalton Recorder. Hamilton agreed to do so.
Motion to adjourn by Webb, 2nd by Cubbison.
Meeting adjourned at 8:37 pm.

CITY OF NORTH ROYALTON
CITIZENS COMMITTEE ON FLOODING
THURSDAY, MAY 19, 2005
MINUTES
LOCATION: NORTH ROYALTON CITY HALL TIME: 7:00 P.M.

Attendees: Council Members: Denise Bobulsky, Lisa Uffman–Kirsch, Bob Stefanik
Eight (8) Committee Members
John Nickell, Paula Recker, Susan Hamilton, Andy Blackley

1. Old Business – meeting opened at 7:08 pm.
   a. Motion to approve minutes from April 7, 2005 meeting by Webb, 2nd by Dios
   b. Floor opened to additional old business.
      Dios inquired about Abbey-Sprague ditch digging, Bobulsky indicated project would begin next week.
2. New Business
   a. Chairman – no new updates

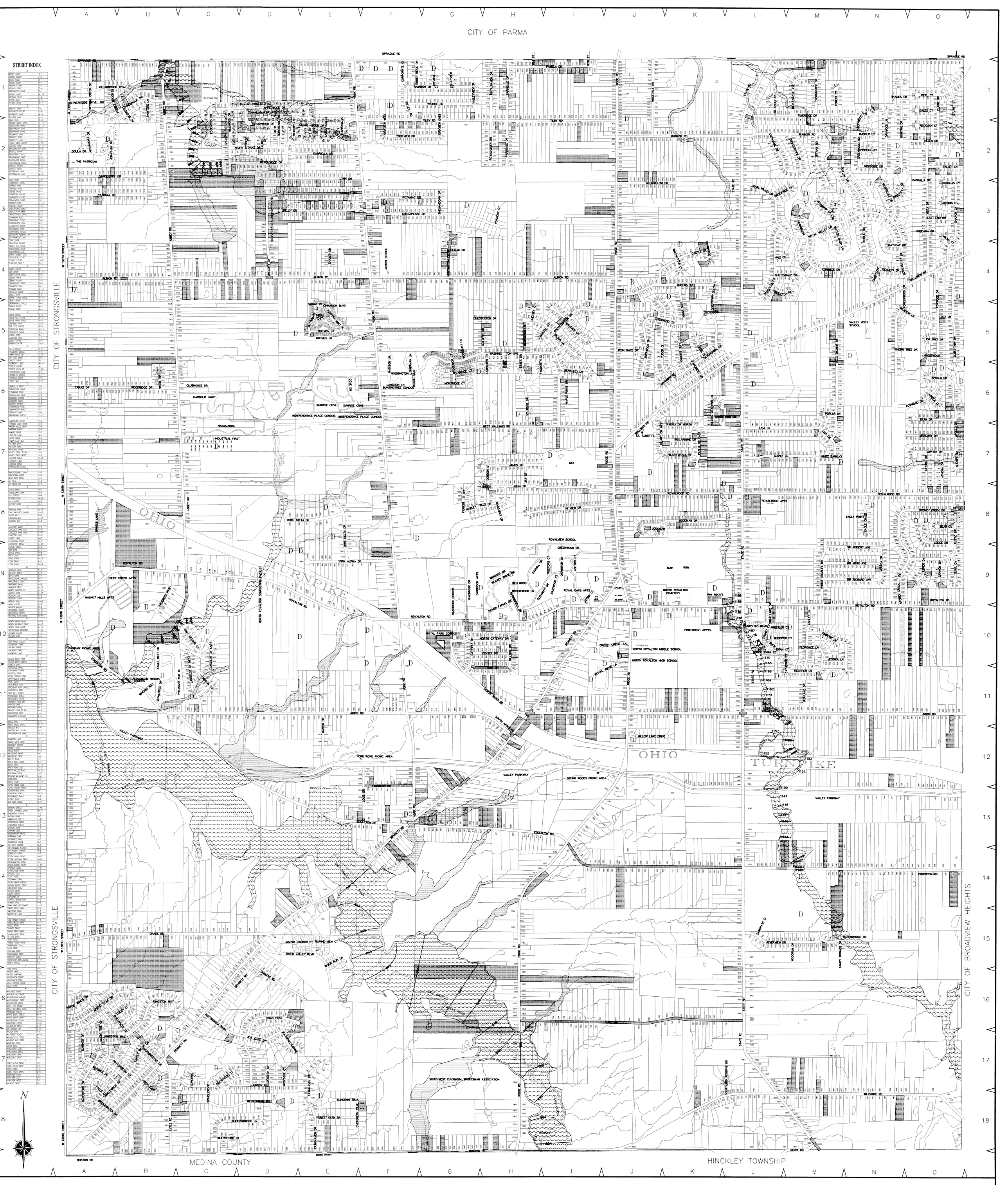
3. Engineer's Report
   a. Hamilton reviewed areas visited in the last month:
      i. Boston Road - 8700 Boston Road: Erosion problem with large drainage area originating in Medina County. The culvert is at an acute angle, so discharge is eroding the bank. Construction cost to install gabion baskets approximated at $55,000. Additional cost for surveying, engineering, and inspection are not included. Final report will include construction details and schematic site plan.
      ii. Bennett Road – 16701 Bennett Road: Water backing out of catch basin in Right-of-Way. Catch basin needs repaired and cleaned. Existing headwall and pipe are deteriorated. Discharges onto private property and flows down to the river. Culvert under Bennett is undersized, as is the outlet pipe. The outlet has not been located. Engineering records are not available. May be desirable to televise. Preliminary property document search did not turn up an existing easement.
      iii. Wiltshire Road – 4665 Wiltshire: Resident was contacted. Resident reported that his laterals were replaced. A catch basin in front of the house was filled with debris, but resident cleans it out occasionally. Property next door has a structure with no downspouts and disconnected downspouts; as a result, runoff enters this property and causes damage. Uffman-Kirsch indicated this area had once been a wetland area. Flow is impeded by a "bridge" spanning the swale located on adjacent property at rear of this property. Conclusion: The Building Department should investigate the lack of downspouts on the adjacent property. Other flooding complaints were probably related to
      blocked catch basins, which have since been cleaned.
      iv. River Road: Intersection of River and State flooded in 2003. No other reports of recent flooding. Stefanik indicated large catch basin nearby has since been cleaned.
      v. Spisak: Storm and sanitary sewers were recently televised – no problems were found. Property sits at low point of major drainage area at the juncture of two drainage ways.
      vi. Cedar Estates: The entire drainage system has been modeled and analyzed. The main problem is that the subdivision storm sewer system is connected at the invert of the culvert so that when the culvert is flowing the capacity of the storm sewer is reduced. The sewer was likely designed for a three (3) year storm. Recommendations: Remove culvert and replace with an open channel, which will lower the water surface elevation. Another solution is to install a new storm sewer (54"- 1000 L.F.) to a free outlet at a construction cost of $300,000. Costs are under development for all options. The location of the subdivision near the WWTP means that when

the plant is overloaded this development is first to be affected. Elimination of cross connections in the City will free up capacity at WWTP.

b. Interview with the Wastewater Superintendent: Charlie Johnson reported that 2/3 of sanitary sewers were cleaned (40 miles) last year. Crews are noting the worst areas, which they will return to clean more frequently. Manhole lids, which are low, are noted for raising. Another crew is televising sewers on a systematic basis to identify bad sections of pipe. He is most concerned about the number of cross connections and wants to hire a part-time investigator to identify and verify cross connections throughout the City. He would also like to set up a flow-monitoring program in house.
c. Blackley discussed EPA Capacity Management, Operations and Maintenance (CMOM) requirements, Infiltration and Inflow, impact on WWTP capacity and cost of operations. One cross connection is estimated to be equal to 64 regular domestic sanitary connections for a 5-year storm. Smoke and dye tests were done but the results were not acted on.
d. Recommendations: see discussions above.
e. Additional funding sources: Hamilton passed out handout. FEMA Hazard Mitigation Grant is being used by the City for some projects. Final report will note sources available to private individuals if information is available and resources for materials for private property improvements.
f. FEMA mapping update: FEMA has not authorized mapping contractor to begin Cuyahoga County re-mapping yet. Estimated 2007 for preliminary map revisions for Cuyahoga County.

4.) Other Business: Final report to be delivered on June 16.
Puhalik asked that the committee endorse riparian setback, erosion control and stormwater management ordinances recently adopted by Council.
Recker asked that the report address public education regarding things such as homeowner vs. City responsibility, easements, and enforcement of regulations.
A summary of recommendations should be published.

Motion to adjourn by Dios at 8:38 pm, 2nd by Cubbison.



CITY OF NORTH ROYALTON - OHIO

APPENDIX D
COMPREHENSIVE FLOOD STUDY MAP

JUNE, 2005

MAYOR
CATHY J. LUKS

SCALE IN FEET

0 1000 2000 3000 4000 5000

REPORTED FLOODING COMPLAINT

100 YEAR FLOOD PLAIN

500 YEAR FLOOD PLAIN

—850— BASE FLOOD ELEVATION

D DETENTION BASIN

Appendix E deleted for Web version.
See printed version for information.

Appendix F

CITY OF NORTH ROYALTON

Wastewater Department
Administration
440-237-5010 ext. 18
440-582-9281 fax

11675 Royalton Road North Royalton Ohio 44133
Cuyahoga County

Charles Johnson
Superintendent

To: Utilities Committee

Date: March 15, 2005

From: Charles Johnson
Wastewater Superintendent

Subject: Manhole risers

Below is a listing of all the manholes which were identified to require risers in 2004. As of this writing, they are all complete. We will continue to address the rest of the City as we perform preventive maintenance this spring.

6179 Castle Drive
8819 Dan Drive
1118 Hempstead Drive
Julia Drive (cul-de-sac) – no address
Lancelot Lane –(6)

1. 14711
2. 14776
3. 14776 (2 at this location)
4. 14786
5. 14855
6. 14856

Pebblebrook Drive – (2)

1. 12720
2. 12660

12731 Pinebrook Drive
4584 Poplar Lane
13941 Prince Charles Drive
Queensway Drive – (5)

1. 6600
2. 6650
3. 6680
4. 10535
5. 10555

Ridge Road – (2)

1. 11591
2. 11821

Royalwood Drive – (2)
1. 3101
2. 3131

Spyglass Estates – (5) – no addresses

State Road – (11)
1. 8681
2. 9053
3. 9369
4. 9781
5. 9921
6. 10217
7. 10327
8. 10627
9. 10787
10. 11921
11. 13585

Tudor Drive – (2)
1. 10560
2. 10570

8371 Wallings Road

York Alpha Drive – no address

cc: Mayor Luks
Scott Shantery

2002 Sanitary Main and Manhole Cleaning

Creek Run Drive (including Rolling Meadow Lane)
Jamestown Drive
Prince Charles Estates

- Monica Avenue
- Prince Charles Drive
- Sir John Avenue
- Sir Richard Avenue
- Sir Robert Avenue

Sharon Lane (including Milan Court, East End Drive, Dennis Court, Douglas Court)
Tiffany Road
Timber Ridge Development

- Timber Ridge Drive
- Rainbow Lane
- Yvonne Drive
- Ripley Road
- Valleyview Trail
- Valleyview Court
- Lakeview Court

Royalton Heights Subdivision

- Apollo Drive
- Athena Drive
- Jupiter Drive
- Mercury Drive
- Saturn Drive
- Sunset Oval
- Titan Drive

Royalton Road (from Pine Forest Apartments east to State Road)
Rustic Drive (includes Quail Oval)
State Road (from Goodman Drive north to Royalwood)
Woodridge Drive (includes Wood Oval)
Villa Grande Drive (including Poplar Lane, White Bark Circle)
York Road (from Tilby north to Sprague Road)
Yorkview Drive (including Yorkview East and Yorkview West)

2003 Sanitary Main and Manhole Cleaning

Ashley Woods
- Ashley Lane
- Catherine Court
- Florence Lane
- Heather Lane
- Jessica Lane
- Kimrose Lane

Bunker Estates
- Bunker Road
- Christopher Drive
- Stephanie Drive
- Tiffany Road

Devonshire Development
- Cavendish Court
- Founders Court
- Grayfriar Circle
- Harrow Place
- Montegue Court

Rye Gate (partial)

Goodman Drive (including Goodman Circle)

Maple Lane

Oakridge Estates
- Forest Court
- Bunker Court
- Greenwood Oval
- Greenwood Road
- Maple Grove Avenue
- Oak Knoll Court
- Oak Ridge Drive
- Oad Wood Lane
- Pine Hill Court

2003 Sanitary Main and Manhole Cleaning (Continued)

- Thornhurst Drive
- Woodside Drive

Royal Valley Estates

- Bayberry Lane
- Bayleaf Drive
- Brookside Circle
- Buttonbush Lane
- Corkwood Drive
- Dublin Drive
- Pinkneya Drive
- Persimmon Lane
- Redbay Lane
- Princeton Drive
- Ridgeline Drive
- Royal Valley Drive
- Scotsdale Drive
- Silverleaf Drive
- Sweetbay Drive
- Sweetleaf Lane

State Road (Goodman north to Royalwood)
Sprague Road (from York west to the "B" Treatment Plant)
Saint Thomas Woods

- Bellarmine Drive
- Hillary Drive West
- Hillary Drive South
- Padua Drive East
- Padua Drive North

Vista Development

- Dales Court
- Elaine Drive
- Helen Drive
- Hunting Drive

2003 Sanitary Main and Manhole Cleaning (Continued)

- Perl Court
- Reckman Court
- Stuart Court
- Thames Drive
- Valley Lane
- Vista Drive

Wallings Road (from Saint Thomas Woods east to Broadview line)
York Road (from Tilby north to Sprague)

2004 Sanitary Main and Manhole Cleaning (through September 30, 2004)

Akins Road (from Broadview Heights to Bennett Road)
Bunker Road (between Ridge and State)
Cedarwood Estates

- Applewood Drive
- Beechwood Drive
- Cedarwood Drive
- Cypress Circle
- Edgewood Drive
- Elmwood Oval
- Hickory Lane
- Ivy Oval
- Laurel Lane
- River Oaks Drive
- Sassafras Circle
- Timber Lane Trail
- Wildwood Drive

Chesapeake Drive (including Potomac Drive, Roanoke Court, Shenandoah Drive)
Delsey Drive
Foxwood Drive (including Linden Circle, Lola Drive, Firtree Drive, Rosewood Drive)
Gabriella Drive
Gardenside Drive
Glenwillow Drive
Gordon Street
Gregory Lane (partial)
Harley Hills (partial)
Hawley Drive
Highland Road
Highview Drive
Hunter's Creek Development

- Aspen Oval
- Bear Oval
- Cannon Oval
- Lodge Drive

2004 Sanitary Main and Manhole Cleaning (Continued)

- Quail Oval
- Rustic Drive
- Stoney Creek Drive

James Drive
Julia Drive
Lancelot Estates

- King Arthur Court
- Lancelot Lane East
- Lancelot Lane West
- Merlin Oval

Lisa Lane
Lynn Drive
Pamela Drive
Parkdale Drive
Patricia Drive
Pinebrook Development

- Clearbrook Oval
- Dogwood Trail
- Hunters Lane
- Pebblebrook Trail
- Pinebrook Drive

Progress Parkway
Ridge Road (from Tilby to Akins)
Ridgedale Drive
Royal Akins Development

- Center Drive
- Dan Drive
- Hillside Drive
- North Gateway
- South Gateway

Royalton Heights Development

- Apollo Drive (including Sunset Oval)
- Athena Drive

2004 Sanitary Main and Manhole Cleaning (Continued)

- Jupiter Drive
- Mercury Drive
- Saturn Drive
- Titan Drive

Royalhaven Drive
Royalwood Drive (including Eagle Chase and Eagle Point)
Saint Thomas Woods

- Bellarmine Drive
- Hillary Drive West
- Hillary Drive South
- Padua Drive East
- Padua Drive North

Spyglass Development

- Bridgewater Drive
- Buccaneer Drive
- Cottonwood Lane
- Ebbtide Circle
- Falls Circle
- Kingston Way
- Mariner Drive
- Morningstar Drive
- Northstar Drive
- Sailor Circle
- Tanglewood Drive
- Waterford Drive

State Road (from Sprague Road to Turnpike)
Tradewinds Drive
York Alpha Drive
York Beta Drive
York Delta Drive
York Theta Drive

Additional to the sanitary work listed above, the Service Department, cleaned the following storm water lines and catch basins in 2004. This work is being done in tandem with the Wastewater Department's sanitary cleaning.

2004 Storm and Catch Basin Cleaning

Cedarwood Estates

- Applewood Drive
- Beechwood Drive
- Cedarwood Drive
- Cypress Circle
- Edgewood Drive
- Elmwood Oval
- Hickory Lane
- Ivy Oval
- Laurel Lane
- River Oaks Drive
- Sassafras Circle
- Timber Lane Trail
- Wildwood Drive

Chesapeake Drive (including Potomac Drive, Roanoke Court, Shenandoah Drive)
Hawley Drive
Hillary Drive West
Hillary Drive South
Lynn Drive
Pamela Drive
Royalton Heights

- Saturn Drive
- Titan Drive

cc: Skip Mayer
All Council members

STEPHEN HOVANCSEK & ASSOCIATES, INC.
CONSULTING ENGINEERS & PLANNERS

Location _____ Sheet No. 1 of 1
Subject _____ Job No. 04-207
Computed by _____ Date _____ Checked by _____ Date _____

APPENDIX G

8" SANITARY SEWER @ 0.44% n = 0.015

Q = 0.7473 cfs = 0.483 MGD CAPACITY

FOR ONE HOME:

400 GPD
× 3.55 PEAK FACTOR

1,420 GPD

ASSUME AVERAGE LOT SIZE = 1/2 ACRE ≈ 20,000 SF

ADD INFILTRATION (375 GPD/ACRE):

+ 180 GPD

1,600 GPD/HOME

483,000 GPD / 1,600 GPD = 300 HOMES CAPACITY

ASSUME 1 HOUSE = 1800 SF ROOF

FOR 5-YEAR STORM: Q = 1800/43560 × 0.9 × 4.3 = 0.16 cfs

0.16 cfs / 0.75 cfs = 0.21 or 21%

0.21 × 300 = 64 HOMES EQUIVALENT

Appendix H

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 05-24

INTRODUCED BY: Uffman-Kirsch, Stefanik, Bobulsky, Gentile, Koch

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING AND HOUSING CODE, CHAPTER 1481 STORM WATER MANAGEMENT AND URBAN SEDIMENT POLLUTION ABATEMENT, SECTION 1481.08 MAINTENANCE OF SYSTEMS, BY AMENDING PARAGRAPH (a), AND DECLARING AN EMERGENCY

WHEREAS: The City of North Royalton has enacted a Storm Water Management and Urban Sediment Pollution Abatement Code; and

WHEREAS: It has been determined to be necessary to amend this code so that it applies to continuous maintenance of drainage systems on all private property; and

WHEREAS: It is therefore necessary to amend the Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, Chapter 1481 Storm Water Management and Urban Sediment Pollution Abatement, Section 1481.08 Maintenance of Systems, by amending paragraph (a).

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. Council hereby amends the Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, Chapter 1481 Storm Water Management and Urban Sediment Pollution Abatement, Section 1481.08 Maintenance of Systems, Paragraph (a) which shall hereinafter read as follows:

1481.08 MAINTENANCE OF SYSTEMS.

(a) Any portion of the drainage system ***on private property***, including on-site and off-site storage facilities, ~~that is constructed by the developer will~~ ***shall*** be continuously maintained by the owner of ***the property*** ~~a residential development or subsequently through a homeowners association in title of the affected lands~~, unless such system ***or portion thereof*** is officially accepted by the City for maintenance. The developer***/owner*** shall cause the maintenance obligation to be inserted in the chain of title to the affected lands as a covenant running with the land in favor of the City.

Section 2. Section 1481.08 of the Codified Ordinances is hereby amended as provided for herein and all other provisions of Chapter 1481 shall remain in full force and effect.

Section 3. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 4. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 5. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that Council has determined that it is immediately necessary to provide for these amendments so that the code applies to continuous maintenance of drainage systems on all private property.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Cathy Jukes
MAYOR

DATE PASSED: March 1, 2005

DATE APPROVED: March 3, 2005

First reading suspended
Second reading suspended
Third reading March 1, 2005

ATTEST: Louis G. Miller
DIRECTOR OF LEGISLATIVE SERVICES

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 05-14 INTRODUCED BY: Mayor Luks, Uffman-Kirsch

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 12 PLANNING AND ZONING CODE, CHAPTER 1242 ADMINISTRATION, ENFORCEMENT AND PENALTY, SECTION 1242.05 FEES FOR SERVICES TO ALLEVIATE AND IMPROVE STORM SEWER DRAINAGE PROBLEMS, AND DECLARING AN EMERGENCY

WHEREAS: The City of North Royalton has an established fee for services to alleviate and improve storm sewer drainage problems; and

WHEREAS: These fees have not been increased since 1991; and

WHEREAS: The costs for services to alleviate and improve storm sewer drainage problems continue to increase and;

WHEREAS: It is therefore necessary to amend the Codified Ordinances of the City of North Royalton, Part 12 Planning and Zoning Code, Chapter 1242 Administration, Enforcement and Penalty, Section 1242.05 Fees for Services to Alleviate and Improve Storm Sewer Drainage Problems by increasing said fees in order to meet the needs of the community.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. The Codified Ordinances of the City of North Royalton, Part 12 Planning and Zoning Code, Chapter 1242 Administration, Enforcement and Penalty, Section 1242.05 Fees for Services to Alleviate and Improve Storm Sewer Drainage Problems are hereby amended to read as follows:

1242.05 FEES FOR SERVICES TO ALLEVIATE AND IMPROVE STORM SEWER DRAINAGE PROBLEMS.

No building permit shall be issued for a dwelling unit, to any owner, subdivider or agent of either, until a fee of ***five hundred dollars ($500.00)*** ~~three hundred fifty ($350.00)~~ is paid to the city for each single-family home, and ***three hundred and fifty dollars ($350.00)*** ~~two hundred ($200.00)~~ for each multifamily dwelling, to be constructed, which fee shall be deposited in a separate city fund and used for fees for personal services, operation, maintenance and capital improvements to alleviate and improve storm water drainage in the City of North Royalton.

Section 2. Section 1242.05 Fees for Services to Alleviate and Improve Storm Sewer Drainage Problems is hereby amended as provided for herein and all other provisions of Chapter 1242 shall remain in full force and effect.

Section 3. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 4. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 5. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that Council has determined that it is immediately necessary to increase the established fee for services to alleviate and improve storm sewer drainage problems in order to meet the needs of the community.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Cathy Luks
MAYOR

DATE PASSED: February 15, 2005

DATE APPROVED: February 17, 2005

First reading suspended
Second reading suspended
Third reading February 15, 2005
Amended February 15, 2005

ATTEST: Lori Heller
DIRECTOR OF LEGISLATIVE SERVICES

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE 04-221 INTRODUCED BY: Stefanik, Gentile, Willey, Koch, Zaccardelli

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING AND HOUSING CODE, CHAPTER 1481 STORM WATER MANAGEMENT AND URBAN SEDIMENT POLLUTION ABATEMENT, SECTION 1481.08 MAINTENANCE OF SYSTEMS, BY AMENDING PARAGRAPH (d) AND CREATING NEW PARAGRAPHS (e) AND (f), AND DECLARING AN EMERGENCY

WHEREAS: The City of North Royalton has enacted a Storm Water Management and Urban Sediment Pollution Abatement Code; and

WHEREAS: It has been determined to be necessary to amend this code to include provisions for yearly inspections of facilities, creation of a Master Map of Storm Water Storage Facilities, a numbering system for each and every storm water storage facility, and corrective measures; and

WHEREAS: It is therefore necessary to amend the Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, Chapter 1481 Storm Water Management and Urban Sediment Pollution Abatement, Section 1481.08 Maintenance of Systems, by amending paragraph (d) and creating new paragraphs (e) and (f).

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. The Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, Chapter 1481 Storm Water Management and Urban Sediment Pollution Abatement, Section 1481.08 Maintenance of Systems, is hereby amended by amending paragraph (d) and creating new paragraphs (e) and (f) to hereinafter read as follows:

1481.08 MAINTENANCE OF SYSTEMS.

(a) Any portion of the drainage system, including on-site and off-site storage facilities, that is constructed by the developer will be continuously maintained by the owner of a residential development or subsequently through a homeowners association in title of the affected lands, unless such system is officially accepted by the City for maintenance. The developer shall cause the maintenance obligation to be inserted in the chain of title to the affected lands as a covenant running with the land in favor of the City.

(b) The need for maintenance can be minimized by designing low maintenance facilities. There are many design options which can result in nearly maintenance-free storm water control. Low maintenance is a priority in the design of all facilities.

(c) Multi-use facilities incorporating assets such as aesthetics and recreation can be incorporated with the design of these facilities.

~~(d) All facilities must be inspected and maintained by the owner/homeowners association twice yearly on May 1 and November 1, and periodically throughout the year to ensure that the facilities are operational. A written report shall be submitted to the City.~~

(d) All facilities must be inspected yearly by the Engineering Department or a designated substitute during the months of November through April to ensure that the facilities are 100% operational based on their design. A written report shall be generated by the Engineering Department and delivered to the Storm Water Committee no later than the last business day of June. The report will include the status of the system and any corrective measures to be taken by the responsible party.

(e) The Engineering Department or a designated substitute will create a Master Map of Storm Water storage facilities. Each and every storm water storage facility will be given a consecutive numerical nomenclature in that no two basins have the same number, and a GPS location will be recorded and placed on file at the point of water over flow. The numerical nomenclatures will be placed onto the Master Map of Storm Water storage facilities and updated in May and December of each year.

(f) In the event that corrective measures are required, the City Engineer or his/her designated substitute may issue a notice of violation which shall identify all of the deficiencies and permit 30 days for correction. If after subsequent inspection the corrections are not made, then the City Engineer or his/her designated substitute may issue a citation to the owner or person(s) responsible for maintenance of the facility. Said citation may be filed in Mayor's Court. If all of the corrective actions are not performed within the prescribed time period, the City will then make the necessary repairs and assess the costs as a tax assessment/lien to the responsible party/property in accordance with Ohio Law.

Section 2. Section 1481.08 of the Codified Ordinances is hereby amended as provided for herein and all other provisions of Chapter 1481 shall remain in full force and effect.

Section 3. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 4. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 5. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that Council has determined that it is immediately necessary to provide for these amendments in order to improve our storm water storage facility maintenance.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Cathy Zakes
MAYOR

DATE PASSED: December 21, 2004

DATE APPROVED: December 22, 2004

ATTEST: Lisa Ho Ala
DIRECTOR OF LEGISLATIVE SERVICES

First reading December 7, 2004
Second reading suspended
Third reading December 21, 2004
Amended December 21, 2004

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 04-212

INTRODUCED BY: Stefanik, Gentile, Willey, Koch, Bobulsky, Uffman-Kirsch, Mayor Luks

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING AND HOUSING CODE, BY REPEALING THE EXISTING CHAPTER 1466 FLOOD DAMAGE PREVENTION AND ENACTING NEW CHAPTER 1466 ENTITLED FLOOD DAMAGE REDUCTION, REPEALING ORDINANCE 1987-45, AND DECLARING AN EMERGENCY

WHEREAS: The flood hazard areas of the City of North Royalton are subject to periodic inundation which results in loss of life and property and which creates health and safety hazards, disruption of commerce and governmental services and extraordinary governmental expenditure for flood protection and relief, impairment of the tax base, all of which adversely affect the public health, safety and general welfare; and

WHEREAS: These flood losses are caused by the cumulative effect of obstructions in flood plains causing increases in flood heights and velocities and by the occupancy in flood hazard areas by uses vulnerable to floods, or hazardous to other lands which are inadequately elevated, flood proofed, or otherwise protected from flood damage; and

WHEREAS: The Ohio Constitution grants municipalities the legal authority to adopt land use and control measures pursuant to the Ohio Revised Code for promoting the public health, safety and general welfare of its citizens; and

WHEREAS: The National Flood Insurance Program provides relief in the form of flood insurance to communities which adopt flood plain management regulations that meet the requirements of the Federal Insurance Administration; and

WHEREAS: It is necessary to amend the Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, by repealing the existing Chapter 1466 Flood Damage Prevention, enacting a new Chapter 1466 entitled Flood Damage Reduction, and repealing Ordinance 1987-45; and

WHEREAS: Council desires to provide for this amendment.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. The Codified Ordinances of the City of North Royalton, Part 14 Building and Housing Code, is hereby amended by repealing the existing Chapter 1466 Flood Damage Prevention and enacting a new Chapter 1466 entitled Flood Damage Reduction, a copy of which is marked as Exhibit A and attached hereto as if fully rewritten.

Section 2. Chapter 1466 of the Codified Ordinances of the City of North Royalton is hereby amended as provided for herein and all other provisions of Part 14 shall remain in full force and effect.

Section 3. Ordinance 1987-45 is hereby repealed.

Section 4. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 5. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 6. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that Council has determined that it is immediately necessary to amend Section 1466 in the best interest of the health, safety and welfare of the citizens of North Royalton.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Carty Luks
MAYOR

DATE PASSED: February 1, 2005

DATE APPROVED: February 3, 2005

First reading November 16, 2004
Second reading December 7, 2004
Third reading February 1, 2005
Amended February 1, 2005

ATTEST:
DIRECTOR OF LEGISLATIVE SERVICES

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Uffman-Kirsch
NAYS: none
ABSENT: Zaccardelli

CHAPTER 1466
FLOOD DAMAGE REDUCTION

1466.01 Findings of Fact
The City has special flood hazard areas that are subject to periodic inundation which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base. Additionally, structures that are inadequately elevated, flood proofed, or otherwise protected from flood damage also contribute to the flood loss. In order to minimize the threat of such damages and to achieve the purposes hereinafter set forth, these regulations are adopted.

1466.02 Statement of Purpose
It is the purpose of these regulations to promote the public health, safety and general welfare, and to:

a. Protect human life and health;
b. Minimize expenditure of public money for costly flood control projects;
c. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
d. Minimize prolonged business interruptions;
e. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;
f. Help maintain a stable tax base by providing for the proper use and development of areas of special flood hazard so as to protect property and minimize future flood blight areas;
g. Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions;
h. Minimize the impact of development on adjacent properties within and near flood prone areas;
i. Ensure that the flood storage and conveyance functions of the floodplain are maintained;
j. Minimize the impact of development on the natural, beneficial values of the floodplain;
k. Prevent floodplain uses that are either hazardous or environmentally incompatible; and
l. Meet community participation requirements of the National Flood Insurance Program.

1466.03 Methods of Reducing Flood Loss
In order to accomplish its purposes, these regulations include methods and provisions for:

a. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water hazards, or which result in damaging increases in flood heights or velocities;
b. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
c. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
d. Controlling filling, grading, dredging, excavating, and other development which may increase flood damage; and,
e. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

1466.04 Lands to Which These Regulations Apply
These regulations shall apply to all areas of special flood hazard within the jurisdiction of the City as identified in Section 1466.05.

1466.05 Basis for Establishing the Areas of Special Flood Hazard
For the purposes of these regulations, the following studies and/or maps are adopted:

a. Flood Insurance Study for the City of North Royalton dated March 1980.
b. Flood Insurance Rate Map for the City of North Royalton dated September 17, 1980.
c. Flood Boundary and Floodway Map for the City of North Royalton dated September 17, 1980.

Other studies and/or maps which may be relied upon for establishment of the flood protection elevation, delineation of the 100-year floodplain, floodways or delineation of other areas of special flood hazard.

Any hydrologic and hydraulic engineering analysis authored by a registered Professional Engineer in the State of Ohio which has been approved by the City as required by Section 1466.26 Subdivisions and Large Scale Developments.

Any revisions to the aforementioned maps and/or studies are hereby adopted by reference and declared to be a part of these regulations. Such maps and/or studies are on file at the City Building Department, 11545 Royalton Road, North Royalton, Ohio.

1466.06 Abrogation and Greater Restrictions
These regulations are not intended to repeal any existing ordinances (resolutions) including subdivision regulations, zoning or building codes. In the event of a conflict between these regulations and any other ordinance (resolution), the more restrictive shall be followed. These regulations shall not impair any deed restriction covenant or easement but the land subject to such interests shall also be governed by the regulations.

1466.07 Interpretation
In the interpretation and application of these regulations, all provisions shall be:

a. Considered as minimum requirements;
b. Liberally construed in favor of the governing body; and,
c. Deemed neither to limit nor repeal any other powers granted under state statutes. Where a provision of these regulations may be in conflict with a state or Federal law, the strictest of those regulatory provisions shall apply.

1466.08 Warning and Disclaimer of Liability
The degree of flood protection required by these regulations is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. These regulations do not imply that land outside the areas of special flood hazard or uses permitted within such areas will be free from flooding or flood damage. These regulations shall not create liability on the part of the City, any officer or employee thereof, or the Federal Emergency Management Agency, for any flood damage that results from reliance on these regulations or any administrative decision lawfully made thereunder.

1466.09 Severability
Should any section or provision of these regulations be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of the regulations as a whole, or any part thereof other than the part so declared to be unconstitutional or invalid.

1466.10 Definitions
Unless specifically defined below, words or phrases used in these regulations shall be interpreted so as to give them the meaning they have in common usage and to give these regulations the most reasonable application.

a. Accessory Structure
A structure on the same lot with, and of a nature customarily incidental and subordinate to, the principal structure.

b. Appeal
A request for review of the floodplain administrator's interpretation of any provision of these regulations or a request for a variance.

c. Base Flood
The flood having a one percent chance of being equaled or exceeded in any given year. The base flood may also be referred to as the 1% chance annual flood or one-hundred (100) year flood.

d. Base (100-Year) Flood Elevation (BFE)
The water surface elevation of the base flood in relation to a specified datum, usually the National Geodetic Vertical Datum of 1929 or the North American Vertical Datum of 1988, and usually expressed in Feet Mean Sea Level (MSL). In Zone AO areas, the base flood elevation is the natural grade elevation plus the depth number (from 1 to 3 feet).

e. Basement
Any area of the building having its floor subgrade (below ground level) on all sides.

f. Development
Any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

g. Enclosure Below the Lowest Floor
See "Lowest Floor."

h. Executive Order 11988 (Floodplain Management)
Issued by President Carter in 1977, this order requires that no federally assisted activities be conducted in or have the potential to affect identified special flood hazard areas, unless there is no practicable alternative.

i. Federal Emergency Management Agency (FEMA)
The agency with the overall responsibility for administering the National Flood Insurance Program.

j. Fill
A deposit of earth material placed by artificial means.

k. Flood *or* Flooding
A general and temporary condition of partial or complete inundation of normally dry land areas from:
1. The overflow of inland or tidal waters, and/or
2. The unusual and rapid accumulation or runoff of surface waters from any source.

l. Flood Hazard Boundary Map (FHBM)
Usually the initial map, produced by the Federal Emergency Management Agency, or U.S. Department of Housing and Urban Development, for a community depicting approximate special flood hazard areas.

m. Flood Insurance Rate Map (FIRM)
An official map on which the Federal Emergency Management Agency or the U.S. Department of Housing and Urban Development has delineated the areas of special flood hazard.

n. Flood Insurance Risk Zones
Zone designations on FHBMs and FIRMs that indicate the magnitude of the flood hazard in specific areas of a community. Following are the zone definitions:
Zone A:
Special flood hazard areas inundated by the 100-year flood; base flood elevations are not determined.
Zones A1-30 and Zone AE:
Special flood hazard areas inundated by the 100-year flood; base flood elevations are determined.
Zone AO:
Special flood hazard areas inundated by the 100-year flood; with flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths are determined.
Zone AH:
Special flood hazard areas inundated by the 100-year flood; flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations are determined.
Zone A99:
Special flood hazard areas inundated by the 100-year flood to be protected from the 100-year flood by a Federal flood protection system under construction; no base flood elevations are determined.
Zone B and Zone X (shaded):
Areas of 500-year flood; areas subject to the 100-year flood with average depths less than 1 foot or with contributing drainage area less than 1 square mile; and areas protected by levees from the base flood.
Zone C and Zone X (unshaded):
Areas determined to be outside the 500-year floodplain.

o. Flood Insurance Study (FIS)
The official report in which the Federal Emergency Management Agency or the U.S. of Housing and Urban Development has provided flood profiles, floodway boundaries (sometimes shown on Flood Boundary and Floodway Maps), and the water surface elevations of the base flood.

p. Flood Plain Administrator
Flood Plain Administrator shall refer to and mean the City Building Commissioner.

q. Flood Protection Elevation
The Flood Protection Elevation, or FPE, is the base flood elevation plus 1 foot of freeboard. In areas where no base flood elevations exist from any authoritative source, the flood protection elevation can be historical flood elevations, or base flood elevations determined and/or approved by the floodplain administrator.

r. Floodway
A floodway is the channel of a river or other watercourse and the adjacent land areas that have been reserved in order to pass the base flood discharge. A floodway is typically determined through a hydraulic and hydrologic engineering analysis such that there is no cumulative increase in the water surface elevation of the base flood discharge.
The floodway is an extremely hazardous area, and is usually characterized by any of the following: Moderate to high velocity flood waters, high potential for debris and projectile impacts, and moderate to high erosion forces.

s. Freeboard
A factor of safety usually expressed in feet above a flood level for the purposes of floodplain management. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, obstructed bridge openings, debris and ice jams, and the hydrologic effect of urbanization in a watershed.

t. Historic structure

Any structure that is:

1. Listed individually in the National Register of Historic Places (a listing maintained by the U.S. Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listings on the National Register;
2. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; or
3. Individually listed on the State of Ohio's inventory of historic places maintained by the Ohio Historic Preservation Office.
4. Individually listed on the inventory of historic places maintained by the City whose historic preservation program has been certified by the Ohio Historic Preservation Office.

u. Hydrologic and hydraulic engineering analysis

An analysis performed by a professional engineer, registered in the State of Ohio, in accordance with standard engineering practices as accepted by FEMA, used to determine flood elevations and/or floodway boundaries.

v. Letter of Map Change (LOMC)

A Letter of Map Change is an official FEMA determination, by letter, to amend or revise effective Flood Insurance Rate Maps, Flood Boundary and Floodway Maps, and Flood Insurance Studies. LOMC's are broken down into the following categories:

Letter of Map Amendment (LOMA)

A revision based on technical data showing that a property was incorrectly included in a designated special flood hazard area. A LOMA amends the current effective Flood Insurance Rate Map and establishes that a specific property is not located in a special flood hazard area.

Letter of Map Revision (LOMR)

A revision based on technical data that, usually due to manmade changes, shows changes to flood zones, flood elevations, floodplain and floodway delineations, and planimetric features. One common type of LOMR, a LOMR-F, is a determination concerning whether a structure or parcel has been elevated by fill above the base flood elevation and is, therefore, excluded from the special flood hazard area.

Conditional Letter of Map Revision (CLOMR)

A formal review and comment by FEMA as to whether a proposed project complies with the minimum National Flood Insurance Program floodplain management criteria. A CLOMR does not amend or revise effective Flood Insurance Rate Maps, Flood Boundary and Floodway Maps, or Flood Insurance Studies.

w. Lowest floor

The lowest floor of the lowest enclosed area (including basement) of a structure. This definition excludes an "enclosure below the lowest floor" which is an unfinished or flood resistant enclosure usable solely for parking of vehicles, building access or storage, in an area other than a basement area, provided that such enclosure is built in accordance with the applicable design requirements specified in these regulations for enclosures below the lowest floor.

x. Manufactured home

A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle". For the purposes of these regulations, a manufactured home includes manufactured homes and mobile homes as defined in Chapter 3733 of the Ohio Revised Code.

y. Manufactured home park

As specified in the Ohio Administrative Code 3701-27-01, a manufactured home park means any tract of land upon which three or more manufactured homes, used for habitation are parked, either free of charge or for revenue purposes, and includes any roadway, building, structure, vehicle, or enclosure used or intended for use as part of the facilities of the park. A tract of land that is subdivided and the individual lots are not for rent or rented, but are for sale or sold for the purpose of installation of manufactured homes on the lots, is not a manufactured home park, even though three or more manufactured homes are parked thereon, if the roadways are dedicated to the local government authority.

z. National Flood Insurance Program (NFIP)

The NFIP is a Federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the Federal government that states if a community will adopt and enforce floodplain management regulations to reduce future flood

risks to all development in special flood hazard areas, the Federal government will make flood insurance available within the community as a financial protection against flood loss.

aa. New construction
Structures for which the "start of construction" commenced on or after the initial effective date of the City Flood Insurance Rate Map, effective date September 17, 1980 and includes any subsequent improvements to such structures.

bb. Person
Includes any individual or group of individuals, corporation, partnership, association, or any other entity, including state and local governments and agencies. An agency is further defined in the Ohio Revised Code Section 111.15 as any governmental entity of the state and includes, but is not limited to, any board, department, division, commission, bureau, society, council, institution, state college or university, community college district, technical college district, or state community college. "Agency" does not include the general assembly, the controlling board, the adjutant general's department, or any court.

cc. Recreational vehicle
A vehicle which is (1) built on a single chassis, (2) 400 square feet or less when measured at the largest horizontal projection, (3) designed to be self- propelled or permanently towable by a light duty truck, and (4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

dd. Registered Professional Architect
A person registered to engage in the practice of architecture under the provisions of sections 4703.01 to 4703.19 of the Revised Code.

ee. Registered Professional Engineer
A person registered as a professional engineer under Chapter 4733 of the Revised Code.

ff. Registered Professional Surveyor
A person registered as a professional surveyor under Chapter 4733 of the Revised Code.

gg. Special Flood Hazard Area
Also known as "Areas of Special Flood Hazard", it is the land in the floodplain subject to a one percent or greater chance of flooding in any given year. Special flood hazard areas are designated by the Federal Emergency Management Agency on Flood Insurance Rate Maps, Flood Insurance Studies, Flood Boundary and Floodway Maps and Flood Hazard Boundary Maps as Zones A, AE, AH, AO, A1-30, A99, and B. Special flood hazard areas may also refer to areas that are flood prone and designated from other federal state or local sources of data including but not limited to historical flood information reflecting high water marks, previous flood inundation areas, and flood prone soils associated with a watercourse.

hh. Start of construction
The date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of a building.

ii. Structure
A walled and roofed building, manufactured home, or gas or liquid storage tank that is principally above ground.

jj. Substantial Damage
Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

kk. Substantial Improvement
Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include:

1. Any improvement to a structure which is considered "new construction,"
2. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified prior to

the application for a development permit by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

3. Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure".

ll. Variance
A grant of relief from the standards of these regulations consistent with the variance conditions herein.

mm. Violation
The failure of a structure or other development to be fully compliant with these regulations.

1466.11 Designation of the Floodplain Administrator
The City Building Commissioner is hereby appointed to administer and implement these regulations and is referred to herein as the Floodplain Administrator.

1466.12 Duties and Responsibilities of the Floodplain Administrator
The duties and responsibilities of the Floodplain Administrator shall include but are not limited to:

a. Evaluate applications for permits to develop in special flood hazard areas.
b. Interpret floodplain boundaries and provide flood hazard and flood protection elevation information.
c. Issue permits to develop in special flood hazard areas when the provisions of these regulations have been met, or refuse to issue the same in the event of noncompliance.
d. Inspect buildings and lands to determine whether any violations of these regulations have been committed.
e. Make and permanently keep all records for public inspection necessary for the administration of these regulations including Flood Insurance Rate Maps, Letters of Map Amendment and Revision, records of issuance and denial of permits to develop in special flood hazard areas, determinations of whether development is in or out of special flood hazard areas for the purpose of issuing floodplain development permits, elevation certificates, variances, and records of enforcement actions taken for violations of these regulations.
f. Enforce the provisions of these regulations.
g. Provide information, testimony, or other evidence as needed during variance hearings.
h. Coordinate map maintenance activities and FEMA follow-up.
i. Conduct substantial damage determinations to determine whether existing structures, damaged from any source and in special flood hazard areas identified by FEMA, must meet the development standards of these regulations.

1466.13 Floodplain Development Permits
It shall be unlawful for any person to begin construction or other development activity including but not limited to filling; grading; construction; alteration, remodeling, or expanding any structure; or alteration of any watercourse wholly within, partially within or in contact with any identified special flood hazard area, as established in Section 1466.05, until a floodplain development permit is obtained from the Floodplain Administrator. Such floodplain development permit shall show that the proposed development activity is in conformity with the provisions of these regulations. No such permit shall be issued by the Floodplain Administrator until the requirements of these regulations have been met.

1466.14 Application Required
An application for a floodplain development permit shall be required for all development activities located wholly within, partially within, or in contact with an identified special flood hazard area. Such application shall be made by the owner of the property or his/her authorized agent, herein referred to as the applicant, prior to the actual commencement of such construction on a form furnished for that purpose. Where it is unclear whether a development site is in a special flood hazard area, the Floodplain Administrator may require an application for a floodplain development permit to determine the development's location. Such applications shall include, but not be limited to:

a. Site plans drawn to scale showing the nature, location, dimensions, and topography of the area in question; the location of existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing.
b. Elevation of the existing, natural ground where structures are proposed.
c. Elevation of the lowest floor, including basement, of all proposed structures.
d. Such other material and information as may be requested by the Floodplain Administrator to determine conformance with, and provide enforcement of these regulations.
e. Technical analyses conducted by the appropriate design professional registered in the State of Ohio and submitted with an application for a floodplain development permit when applicable:
    1. Floodproofing certification for non-residential floodproofed structure as required in Section 1466.28.

2. Certification that fully enclosed areas below the lowest floor of a structure not meeting the design requirements of Section 1466.27(E) are designed to automatically equalize hydrostatic flood forces.
3. Description of any watercourse alteration or relocation that the flood carrying capacity of the watercourse will not be diminished, U.S. Army Corps of Engineers approval, and maintenance assurances as required in Section 1466.32(C).
4. A hydrologic and hydraulic analysis demonstrating that the cumulative effect of proposed development, when combined with all other existing and anticipated development will not increase the water surface elevation of the base flood in special flood hazard areas where the Federal Emergency Management Agency has provided base flood elevations but no floodway as required by Section 1466.32(B).
5. A hydrologic and hydraulic engineering analysis showing impact of any development on flood heights in an identified floodway as required by Section 1466.32(A).
6. Generation of base flood elevation(s) for subdivision and large scale developments as required by Section 1466.26.

1466.15 Review and Approval of a Floodplain Development Permit Application

a. Review

1. After receipt of a complete application, the Floodplain Administrator shall review the application to ensure that the standards of these regulations have been met. No floodplain development permit application shall be reviewed until all information required in Section 1466.14 has been received by the Floodplain Administrator.
2. The Floodplain Administrator shall review all floodplain development permit applications to assure that all necessary permits have been received from those federal, state or local governmental agencies from which prior approval is required. The applicant shall be responsible for obtaining such permits as required including permits issued by the U.S. Army Corps of Engineers under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and the Ohio Environmental Protection Agency under Section 401 of the Clean Water Act.

b. Approval

Within forty-five (45) days after the receipt of a complete application, the Floodplain Administrator shall either approve or disapprove the application. If an application is approved, a floodplain development permit shall be issued. All floodplain development permits shall be conditional upon the commencement of work within one (1) year from date of issuance of permit. A floodplain development permit shall expire one (1) year after issuance unless the permitted activity has been substantially begun and is continually pursued to completion.

1466.16 Inspections

The Floodplain Administrator shall make periodic inspections at appropriate times throughout the period of construction in order to monitor compliance with permit conditions.

1466.17 Post-Construction Certifications Required

The following as-built certifications are required after a floodplain development permit has been issued:

a. For new or substantially improved residential structures, or nonresidential structures that have been elevated, the applicant shall have a *Federal Emergency Management Agency Elevation Certificate* completed by a registered surveyor to record as-built elevation data. For elevated structures in Zone A and Zone AO areas without a base flood elevation, the elevation certificate may be completed by the property owner or owner's representative.
b. For all development activities subject to the standards of Section 1466.20 (A), a Letter of Map Revision.

1466.18 Revoking a Floodplain Development Permit

A floodplain development permit shall be revocable, if among other things, the actual development activity does not conform to the terms of the application and permit granted thereon. In the event of the revocation of a permit, an appeal may be taken to the City Board of Zoning Appeals in accordance with Section 1466.33 thru 1466.37 of these regulations.

1466.19 Exemption from Filing a Development Permit

An application for a floodplain development permit shall not be required for:

a. Maintenance work such as roofing, painting, and basement sealing, or for small nonstructural development activities (except for filling and grading) valued at less than $5,000.
b. Development activities in an existing or proposed manufactured home park that are under the authority of the Ohio Department of Health and subject to the flood damage reduction provisions of the Ohio Administrative Code Section 3701.

c. Major utility facilities permitted by the Ohio Power Siting Board under Section 4906 of the Ohio Revised Code.
d. Hazardous waste disposal facilities permitted by the Hazardous Waste Siting Board under Section 3734 of the Ohio Revised Code.
e. Development activities undertaken by a federal agency and which are subject to Federal Executive Order 11988 – Floodplain Management.

Any proposed action exempt from filing for a floodplain development permit is also exempt from the standards of these regulations.

1466.20 Map Maintenance Activities

To meet National Flood Insurance Program minimum requirements to have flood data reviewed and approved by FEMA, and to ensure that the City's flood maps, studies and other data identified in Section 1466.05 accurately represent flooding conditions so appropriate floodplain management criteria are based on current data, the following map maintenance activities are identified:

a. Requirement to Submit New Technical Data
   1. For all development proposals that impact floodway delineations or base flood elevations, the community shall ensure that technical data reflecting such changes be submitted to FEMA within six months of the date such information becomes available. These development proposals include:
      A. Floodway encroachments that increase or decrease base flood elevations or alter floodway boundaries;
      B. Fill sites to be used for the placement of proposed structures where the applicant desires to remove the site from the special flood hazard area;
      C. Alteration of watercourses that result in a relocation or elimination of the special flood hazard area, including the placement of culverts; and
      D. Subdivision or large scale development proposals requiring the establishment of base flood elevations in accordance with Section 1466.26.
   2. It is the responsibility of the applicant to have technical data, required in accordance with Section 1466.20(A), prepared in a format required for a Conditional Letter of Map Revision or Letter of Map Revision, and submitted to FEMA. Submittal and processing fees for these map revisions shall be the responsibility of the applicant.
   3. The Floodplain Administrator shall require a Conditional Letter of Map Revision prior to the issuance of a floodplain development permit for proposed floodway encroachments.
   4. Floodplain development permits issued by the Floodplain Administrator shall be conditioned upon the applicant obtaining a Letter of Map Revision from FEMA for any development proposal subject to Section 1466.20(A)(1).

b. Right to Submit New Technical Data
   The Floodplain Administrator may request changes to any of the information shown on an effective map that does not impact floodplain or floodway delineations or base flood elevations, such as labeling or planimetric details. Such a submission shall include appropriate supporting documentation made in writing by the Mayor of the City and may be submitted at any time.

c. Annexation/Detachment
   Upon occurrence, the Floodplain Administrator shall notify FEMA in writing whenever the boundaries of the City have been modified by annexation or the community has assumed authority over an area, or no longer has authority to adopt and enforce floodplain management regulations for a particular area. In order that the City's Flood Insurance Rate Map accurately represent the City boundaries, include within such notification a copy of a map of the City suitable for reproduction, clearly showing the new corporate limits or the new area for which the City has assumed or relinquished floodplain management regulatory authority.

1466.21 Data Use and Flood Map Interpretation

The following guidelines shall apply to the use and interpretation of maps and other data showing areas of special flood hazard:

a. In areas where FEMA has not identified special flood hazard areas, or in FEMA identified special flood hazard areas where base flood elevation and floodway data have not been identified, the Floodplain Administrator shall review and reasonably utilize any other flood hazard data available from a federal, state, or other source.
b. Base flood elevations and floodway boundaries produced on FEMA flood maps and studies shall take precedence over base flood elevations and floodway boundaries by any other source that reflect a <u>reduced</u> floodway width and/or <u>lower</u> base flood elevations. Other sources of data, showing <u>increased</u> base flood elevations and/or <u>larger</u> floodway areas than are shown on FEMA flood maps and studies, shall be reasonably used by the Floodplain Administrator.
c. When Preliminary Flood Insurance Rate Maps and / or Flood Insurance Study have been provided by FEMA:

1. Upon the issuance of a Letter of Final Determination by the FEMA, the preliminary flood hazard data shall be used and replace all previously existing flood hazard data provided from FEMA for the purposes of administering these regulations.
2. Prior to the issuance of a Letter of Final Determination by FEMA, the use of preliminary flood hazard data shall only be required where no base flood elevations and /or floodway areas exist or where the preliminary base flood elevations or floodway area exceed the base flood elevations and/or floodway widths in existing flood hazard data provided from FEMA. Such preliminary data may be subject to change and / or appeal to FEMA.

d. The Floodplain Administrator shall make interpretations, where needed, as to the exact location of the flood boundaries and areas of special flood hazard. A person contesting the determination of the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 1466.33 thru 1466.37 Appeals and Variances.

e. Where a map boundary showing an area of special flood hazard and field elevations disagree, the base flood elevations or flood protection elevations (as found on an elevation profile, floodway data table, established high water marks, etc.) shall prevail.

1466.22 Substantial Damage Determinations

Damages to structures may result from a variety of causes including flood, tornado, wind, heavy snow, fire, etc. After such a damage event, the Floodplain Administrator shall:

a. Determine whether damaged structures are located in special flood hazard areas;

b. Conduct substantial damage determinations for damaged structures located in special flood hazard areas; and

c. Make reasonable attempt to notify owners of substantially damaged structures of the need to obtain a floodplain development permit prior to repair, rehabilitation, or reconstruction.

Additionally, the Floodplain Administrator may implement other measures to assist with the substantial damage determination and subsequent repair process. These measures include issuing press releases, public service announcements, and other public information materials related to the floodplain development permits and repair of damaged structures; coordinating with other federal, state, and local agencies to assist with substantial damage determinations; providing owners of damaged structures materials and other information related to the proper repair of damaged structures in special flood hazard areas; and assist owners of substantially damaged structures with Increased Cost of Compliance insurance claims.

1466.23 Use and Development Standards for Flood Hazard Reduction

The following use and development standards apply to development wholly within, partially within, or in contact with any special flood hazard area as established in Section 1466.05 or 1466.21(A):

1466.24 Use Regulations

a. Permitted Uses

All uses not otherwise prohibited in this section, or any other applicable land use regulation adopted by the City, are allowed provided they meet the provisions of these regulations.

b. Prohibited Uses

1. Private water supply systems in all special flood hazard areas identified by FEMA, permitted under Section 3701 of the Ohio Revised Code.
2. Infectious waste treatment facilities in all special flood hazard areas, permitted under Section 3734 of the Ohio Revised Code.

1466.25 Water and Wastewater Systems

The following standards apply to all water supply, sanitary sewerage and waste disposal systems. If regulated by the Ohio Revised Code, the strictest regulatory standards shall apply.

a. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems;

b. New and replacement sanitary sewerage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and,

c. On-site waste disposal systems shall be located to avoid impairment to or contamination from them during flooding.

1466.26 Subdivisions and Large Developments

a. All subdivision proposals shall be consistent with the need to minimize flood damage and are subject to all applicable standards in these regulations;

b. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;

c. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and

d. In all areas of special flood hazard where base flood elevation data are not available, the applicant shall provide a hydrologic and hydraulic engineering analysis that generates base flood elevations for all subdivision proposals and other proposed developments containing at least 5 lots or 5 acres, whichever is less.

e. The applicant shall meet the requirement to submit technical data to FEMA in Section 466.20(A)(1)(d) when a hydrologic and hydraulic analysis is completed that generates base flood elevations as required by Section 1466.26(D).

1466.27 Residential Structures

a. New construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. Where a structure, including its foundation members, is elevated on fill to or above the base flood elevation, the requirements for anchoring (1466.27(A)) and construction materials resistant to flood damage (1466.27(B)) are satisfied.

b. New construction and substantial improvements shall be constructed with methods and materials resistant to flood damage.

c. New construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or elevated so as to prevent water from entering or accumulating within the components during conditions of flooding.

d. New construction and substantial improvement of any residential structure, including manufactured homes, shall have the lowest floor, including basement, elevated to or above the flood protection elevation. In Zone AO areas with no elevations specified, the structure shall have the lowest floor, including basement, elevated at least two feet above the highest adjacent natural grade.

e. New construction and substantial improvements, including manufactured homes, that do not have basements and that are elevated to the flood protection elevation using pilings, columns, posts, or solid foundation perimeter walls with openings sufficient to allow unimpeded movement of flood waters may have an enclosure below the lowest floor provided the enclosure meets the following standards:
   1. Be used only for the parking of vehicles, building access, or storage; and
   2. be designed and certified by a registered professional engineer or architect to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters; or
   3. have a minimum of two openings on different walls having a total net area not less than one square inch for every square foot of enclosed area, and the bottom of all such openings being no higher than one foot above grade. The openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

f. Manufactured homes shall be affixed to a permanent foundation and anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors.

g. Repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and is the minimum necessary to preserve the historic character and design of the structure, shall be exempt from the development standards of Section 1466.27.

h. In AO Zones, new construction and substantial improvement shall have adequate drainage paths around structures on slopes to guide floodwaters around and away from the structure.

1466.28 Nonresidential Structures

a. New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet the requirements of Section 1466.27(A) – (C) and (E) – (G).

b. New construction and substantial improvement of any commercial, industrial or other non-residential structure shall either have the lowest floor, including basement, elevated to or above the level of the flood protection elevation; or, together with attendant utility and sanitary facilities, shall meet all of the following standards:
   1. Be dry floodproofed so that the structure is watertight with walls substantially impermeable to the passage of water to the level of the flood protection elevation;
   2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,
   3. Be certified by a registered professional engineer or architect, through the use of a *Federal Emergency Management Floodproofing Certificate,* that the design and methods of construction are in accordance with Section 1466.28 (B)(1) and (2).

c. In Zone AO areas with no elevations specified, the structure shall have the lowest floor, including basement, elevated at least two feet above the highest adjacent natural grade.

1466.29 Accessory Structures
Relief to the elevation or dry floodproofing standards may be granted for accessory structures containing no more than 600 square feet. Such structures must meet the following standards:
a. They shall not be used for human habitation;
b. They shall be constructed of flood resistant materials;
c. They shall be constructed and placed on the lot to offer the minimum resistance to the flow of flood waters;
d. They shall be firmly anchored to prevent flotation;
e. Service facilities such as electrical and heating equipment shall be elevated or floodproofed to or above the level of the flood protection elevation; and
f. They shall meet the opening requirements of Section 1466.27(E)(3);

1466.30 Recreational Vehicles
Recreational vehicles must meet at least one of the following standards:
a. They shall not be located on sites in special flood hazard areas for more than 180 days, or
b. They must be fully licensed and ready for highway use, or
c. They must meet all standards of Section 1466.27.

1466.31 Above Ground Gas or Liquid Storage Tanks
All above ground gas or liquid storage tanks shall be anchored to prevent flotation or lateral movement resulting from hydrodynamic and hydrostatic loads.

1466.32 Assurance of Flood Carrying Capacity
Pursuant to the purpose and methods of reducing flood damage stated in these regulations, the following additional standards are adopted to assure that the reduction of the flood carrying capacity of watercourses is minimized:
a. Development in Floodways
   1. In floodway areas, development shall cause no increase in flood levels during the occurrence of the base flood discharge. Prior to issuance of a floodplain development permit, the applicant must submit a hydrologic and hydraulic analysis, conducted by a registered professional engineer, demonstrating that the proposed development would not result in any increase in the base flood elevation; or
   2. Development in floodway areas causing no increases in the base flood elevation may be permitted provided all of the following are completed by the applicant:
      A. Meet the requirements to submit technical data in Section 1466.20 (A);
      B. An evaluation of alternatives which would not result in increased base flood elevations and an explanation why these alternatives are not feasible;
      C. Certification that no structures are located in areas which would be impacted;
      D. Documentation of individual legal notices to all impacted property owners within and outside the community, explaining the impact of the proposed action on their property; and
      E. Concurrence of the Mayor of the City and the Chief Executive Officer of any other communities impacted by the proposed actions.
b. Development in Riverine Areas with Base Flood Elevations but No Floodways
   1. In riverine special flood hazard areas identified by FEMA where base flood elevation data are provided but no floodways have been designated, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the base flood elevation at any point. Prior to issuance of a floodplain development permit, the applicant must submit a hydrologic and hydraulic analysis, conducted by a registered professional engineer, demonstrating that this standard has been met.
c. Alterations of a Watercourse
   For the purpose of these regulations, a watercourse is altered when any change occurs within its banks. The extent of the banks shall be established by a field determination of the "bankfull stage." The field determination of "bankfull stage" shall be based on methods presented in Chapter 7 of the *USDA Forest Service General Technical Report RM-245, Stream Channel Reference Sites: An Illustrated Guide to Field Technique* or other applicable publication available from a Federal, State, or other authoritative source. For all proposed developments that alter a watercourse, the following standards apply:
   1. The bankfull flood carrying capacity of the altered or relocated portion of the watercourse shall not be diminished. Prior to the issuance of a floodplain development permit, the applicant must submit a description of the extent to which

any watercourse will be altered or relocated as a result of the proposed development, and certification by a registered professional engineer that the bankfull flood carrying capacity of the watercourse will not be diminished.

2. Adjacent communities, the U.S. Army Corps of Engineers, and the Ohio Department of Natural Resources, Division of Water, must be notified prior to any alteration or relocation of a watercourse. Evidence of such notification must be submitted to the Federal Emergency Management Agency.
3. The applicant shall be responsible for providing the necessary maintenance for the altered or relocated portion of said watercourse so that the flood carrying capacity will not be diminished. The Floodplain Administrator may require the permit holder to enter into an agreement with the City specifying the maintenance responsibilities. If an agreement is required, it shall be made a condition of the floodplain development permit.
4. The applicant shall meet the requirements to submit technical data in Section 1466.20 (A)(1)(c) when an alteration of a watercourse results in the relocation or elimination of the special flood hazard area, including the placement of culverts.

1466.33 Powers and Duties

a. In accordance with Section 1264.04, the City Board of Zoning Appeals shall hear and decide appeals where it is alleged there is an error in any order, requirement, decision or determination made by the Floodplain Administrator in the administration or enforcement of these regulations.
b. Authorize variances in accordance with Section 1466.35 of these regulations.

1466.34 Appeals

Any person affected by any notice and/or order, or other official action of the Floodplain Administrator, including a representative of the City, may timely file an appeal, in writing, signed by the applicant or applicant's counsel, within fifteen (15) days of the decision or mailing of the decision to the applicant pursuant to Section 1264.04. A hearing shall be granted on the matter before the Board of Zoning Appeals. In the Notice of Appeal, the applicant on appeal shall provide a brief statement of the grounds for such appeal and all other information required in Section 1264.04. Upon receipt of the appeal, the Floodplain Administrator shall transmit said notice and all pertinent information on which the Floodplain Administrator's decision was made to the Board of Zoning Appeals.

Upon receipt of the notice of appeal, the Board of Zoning Appeals shall fix a reasonable time for the appeal, give notice in writing to parties in interest, and decide the appeal within a reasonable time after it is submitted.

1466.35 Variances

Any person having standing to believe that the use and development standards of these regulations would result in unnecessary hardship may file an application for a variance. The Board of Zoning Appeals shall have the power to authorize, in specific cases, such variances from the standards of these regulations, not inconsistent with Federal regulations, as will not be contrary to the public interest where, owning to special conditions of the lot or parcel, a literal enforcement of the provisions of these regulations would result in unnecessary hardship.

a. Application for a Variance
   1. Any owner, or agent thereof, of property for which a variance is sought shall make an application for a variance by filing it with the Floodplain Administrator, who upon receipt of the variance shall transmit it to the Board of Zoning Appeals.
   2. Such application at a minimum shall contain the following information: Name, address, and telephone number of the applicant; legal description of the property; parcel map; description of the existing use; description of the proposed use; location of the floodplain; description of the variance sought referring to each specific code section or requirement and identifying and/or quantifying any amount for such variance; and reason for the variance request.
   3. Notice of the filing of the appeal and the date for hearing shall be provided in accordance with Section 1264.05(b).
b. Public Hearing

   At such hearing the applicant shall present such statements and evidence as the Board of Zoning Appeals requires. In considering such variance applications, the Board of Zoning Appeals shall consider and make findings of fact on all evaluations, all relevant factors, standards specified in other sections of these regulations and the following factors:
   1. The danger that materials may be swept onto other lands to the injury of others.
   2. The danger to life and property due to flooding or erosion damage.

3. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.
4. The importance of the services provided by the proposed facility to the community.
5. The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage.
6. The necessity to the facility of a waterfront location, where applicable.
7. The compatibility of the proposed use with existing and anticipated development.
8. The relationship of the proposed use to the comprehensive plan and floodplain management program for that area.
9. The safety of access to the property in times of flood for ordinary and emergency vehicles.
10. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site.
11. The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

Variances shall only be issued upon:

1. A showing of good and sufficient cause beyond a preponderance of the evidence.
2. A determination that failure to grant the variance would result in exceptional hardship due to the physical characteristics of the property. Increased cost or inconvenience of meeting the requirements of these regulations does not constitute an exceptional hardship to the applicant.
3. A determination that the granting of a variance will not result in increased flood heights beyond that which is allowed in these regulations; additional threats to public safety; extraordinary public expense, nuisances, fraud on or victimization of the public, or conflict with existing local laws.
4. A determination that the structure or other development is protected by methods to minimize flood damages.
5. A determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

Upon consideration of the above factors and the purposes of these regulations, the Board of Zoning Appeals may attach such conditions to the granting of variances as it deems necessary to further the purposes of these regulations.

c. Other Conditions for Variances
   1. Variances shall not be issued within any designated floodway or special flood hazard area if any increase in flood levels during the base flood discharge would result.
   2. Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items in Section 1466.35(B)(1) to (11) have been fully considered. As the lot size increases beyond one-half acre, the technical justification required for issuing the variance increases.
   3. Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

1466.36 Procedure at Hearings

1. All testimony shall be given under oath.
2. A complete record of the proceedings shall be kept, except confidential deliberations of the Board, but including all documents presented and a verbatim record of the testimony of all witnesses.
3. The applicant shall proceed first to present evidence and testimony in support of the appeal or variance.
4. The administrator may present evidence or testimony in opposition to the appeal or variance.
5. All witnesses shall be subject to cross-examination by the adverse party or their counsel.
6. Evidence that is not admitted may be proffered and shall become part of the record for appeal.
7. The Board shall have the power to issue subpoenas which shall issue upon written request for the attendance of witnesses. A reasonable deposit to cover the cost of issuance and service shall be collected in advance.
8. The Board shall prepare in writing, conclusions of fact supporting its decision. The decision may be announced at the conclusion of the hearing and thereafter issued in writing or the decision may be issued in writing within a reasonable time after the hearing.

1466.37 Appeal to the Court
Any party or person with standing including a representative of the City aggrieved by the decision of the Board of Zoning Appeals may appeal such decision to the Cuyahoga County Court of Common Pleas, as provided in Chapter 2506 of the Ohio Revised Code.

1466.38 Compliance Required

a. No structure or land shall hereafter be located, erected, constructed, reconstructed, repaired, extended, converted, enlarged or altered without full compliance with the terms of these regulations and all other applicable regulations which apply to uses within the jurisdiction of these regulations, unless specifically exempted from filing for a development permit as stated in Section 1466.19.
b. Failure to obtain a floodplain development permit shall be a violation of these regulations and shall be punishable in accordance with Section 1466.99.
c. Floodplain development permits issued on the basis of plans and applications approved by the Floodplain Administrator authorize only the use, and arrangement, set forth in such approved plans and applications or amendments thereto. Use, arrangement, or construction contrary to that authorized shall be deemed a violation of these regulations and punishable in accordance with Section 1466.99.

1466.39 Notice of Violation
Whenever the Floodplain Administrator determines that there has been a violation of any provision of these regulations, he shall give notice of such violation to the person responsible therefore and order compliance with these regulations as hereinafter provided. Such notice and order shall:

a. Be put in writing on an appropriate form;
b. Include a list of violations, referring to the section or sections of these regulations that have been violated, and order remedial action which, if taken, will effect compliance with the provisions of these regulations;
c. Specify a reasonable time for performance;
d. Advise the owner, operator, or occupant of the right to appeal;
e. Be served on the owner, occupant, or agent in person. However, this notice and order shall be deemed to be properly served upon the owner, occupant, or agent if a copy thereof is sent by registered or certified mail to the person's last known mailing address, residence, or place of business, and/or a copy is posted in a conspicuous place in or on the dwelling affected.

1466.99 Violations and Penalties
Violation of the provisions of these regulations or failure to comply with any of its requirements shall be deemed to be a strict liability offense, and shall constitute a First Degree misdemeanor. Whoever is convicted of or pleads guilty to a violation of this section shall be sentenced in accordance with Section 698.02.

Each day such violation continues shall be considered a separate offense. Nothing herein contained shall prevent the City from taking such other lawful action as is necessary to prevent or remedy any violation.

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 04-205 INTRODUCED BY: Stefanik, Bobulsky, Gentile

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING & HOUSING CODE, TITLE SIX MISCELLANEOUS BUILDING REGULATIONS BY CREATING A NEW CHAPTER 1492 ENTITLED CONTROLLING RIPARIAN SETBACKS AND WETLANDS SETBACKS, AND DECLARING AN EMERGENCY

WHEREAS: Flooding is a significant threat to public health and safety and public and private property in the city, and riparian areas and wetlands lessen flood damage by holding runoff and releasing it slowly over time; and

WHEREAS: Streambank erosion in the city is a significant threat to public health and safety and public and private property, and riparian areas and wetlands control runoff and reduces its erosive force; and

WHEREAS: Insufficient control of riparian areas and wetlands can result in significant damage to receiving water resources, impairing the capacity of these resources to sustain aquatic systems and their associated aquatic life use designations; and

WHEREAS: There is a regional effort to reduce the flooding and erosion and to protect water quality, riparian areas and wetlands and to protect and enhance the water resources of the city, and the city recognizes its obligation as a part of a watershed to reduce flooding and erosion and to protect water quality by controlling runoff within its borders; and

WHEREAS: To promote public health and safety and sound economic development in the city, it is important to provide homebuilders, developers, and landowners with consistent, technically feasible, and operationally practical standards for storm water management; and

WHEREAS: 40 Codified Federal Register (CFR) Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities, including this city to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities; and

WHEREAS: Article XVIII, Section 3 of the Ohio Constitution grants municipalities the legal authority to adopt rules to abate soil erosion and water pollution by soil sediments.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. Council has determined that it is necessary to amend the Codified Ordinances of the City of North Royalton, Part 14 Building & Housing Code, Title Six Miscellaneous Building Regulations by creating a new Chapter 1492 entitled Controlling Riparian Setbacks and Wetlands Setbacks which is attached hereto as Exhibit A and incorporated as if fully rewritten herein.

Section 2. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 3. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 4. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that it is immediately necessary to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Cathy Lakes
MAYOR

DATE PASSED: November 3, 2004

DATE APPROVED: November 4, 2004

First reading suspended
Second reading suspended
Third reading November 3, 2004
Amended November 3, 2004

ATTEST: Lori Hoe Clerk
DIRECTOR OF LEGISLATIVE SERVICES

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

CHAPTER 1492
CONTROLLING RIPARIAN SETBACKS AND WETLANDS SETBACKS

CITY: Throughout this regulation the city shall mean the City of North Royalton, State of Ohio, and its designated agents and representatives.

COMPREHENSIVE STORM WATER MANAGEMENT PLAN: The Riparian and Wetland Setback Plan developed to meet this regulation will be coordinated and combined with the Post-Construction Water Quality Plan and the Construction Site Conservation Plan that are developed for the same site. These plans will be titled and numbered in one consecutive sequence to make a Comprehensive Storm Water Management Plan for the site. The Comprehensive Storm Water Management Plan so developed will serve as the Storm Water Pollution Prevention Plan (SWP3) required by Ohio EPA as part of the NPDES Storm Water Permit for General Construction.

PURPOSE : The intent of this regulation is to:

A. Protect the receiving stream's physical, chemical, and biological characteristics and to maintain stream functions.

B. Establish consistent, technically feasible and operationally practical standards to achieve a level of storm water quantity and quality control that will minimize damage to public and private property and degradation of water resources, and will promote and maintain the health, safety, and welfare of the residents of the city.

C. Preserve to the maximum extent practicable the natural drainage characteristics of the city and building sites and minimize the need to construct, repair, and replace enclosed storm drain systems.

D. Preserve to the maximum extent practicable natural infiltration and ground water recharge, and maintain subsurface flow that replenishes water resources, wetlands, and wells.

E. Prevent unnecessary stripping of vegetation and loss of soil, especially adjacent to water resources and wetlands.

F. Reduce the need for costly maintenance and repairs to roads, embankments, sewage systems, ditches, water resources, wetlands, and storm water management practices that are the result of inadequate storm water control due to the loss of riparian areas and wetlands.

G. Reduce the long term expense of remedial projects needed to address problems caused by inadequate storm water control.

DISCLAIMER OF LIABILITY: Neither submission of a plan under the provisions herein, nor compliance with the provisions of these regulations, shall relieve any person or entity from responsibility for damage to any person or property that is otherwise imposed by law.

CONFLICTS, SERVABILITY, NUISANCES & RESPONSIBILITY:

1. Where this ordinance imposes a greater restriction upon land than is imposed or required by other city provisions of law, ordinance, contract or deed, the provisions of this ordinance shall prevail.

2. If a court of competent jurisdiction declares any clause, section, or provision of these regulations invalid or unconstitutional, the validity of the remainder shall not be affected thereby.

3. These regulations shall not be construed as authorizing any person to maintain a private or public nuisance on his or her property. Compliance with the provisions of this regulation shall not be a defense in any action to abate such nuisance.

4. Failure of the city to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve the owner from the responsibility for the condition or damage resulting there from, and shall not result in the city, its officers, employees, or agents being responsible for any condition or damage resulting there from.

EFFECTIVE DATE: This ordinance and its regulations shall become effective upon their passage.

SCOPE: This ordinance applies to development areas having new or relocated projects involving highways, underground cables, pipelines, property/parcel splits, industrial projects, commercial projects, building activities on farms, redevelopment of urban areas and all other land uses not specifically exempted. This ordinance does not apply to:

1. Land disturbing activities related to producing agricultural crops or Silviculture operations regulated by the Ohio Agricultural Sediment Pollution Abatement Rules (1501: 15-3-01 to 1501: 15-3-09 of the Ohio Administrative Code) and existing at the time of passage of this regulation.

2. Strip mining operations regulated by Chapter 1513 of the Ohio Revised Code and existing at the time of passage of this regulation.

3. Surface mining operations regulated by Chapter 1514 of the Ohio Revised Code and existing at the time of passage of this regulation.

CONSULTATIONS: In implementing these regulations the City Engineer or other city officials may consult with the local county Soil and Water Conservation District (SWCD), state and federal agencies and other technical experts as necessary. Any costs associated with such consultations may be assessed to the applicant or his or her designated representative.

RIPARIAN AND WETLAND SETBACK REQUIREMENTS:

1. It is hereby determined that the system of wetlands, riparian areas, rivers, streams, and other natural watercourses within the city contributes to the health, safety, and general welfare of the residents. The specific purpose and intent of this part of these regulations is to regulate uses and developments within riparian and wetland setbacks that would impair the ability of riparian and wetland areas to:

   A. Reduce flood impacts by absorbing peak flows, slowing the velocity of floodwaters, and regulating base flow.

   B. Assist in stabilizing the banks of watercourses to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks.

   C. Reduce pollutants in watercourses during periods of high flows by filtering, settling, and transforming pollutants already present in watercourses.

   D. Reduce pollutants in watercourses by filtering, settling, transforming and absorbing pollutants in runoff before they enter watercourses.

   E. Provide watercourse habitats with shade and food.

   F. Provide habitat to a wide array of aquatic organisms, wildlife, many of which are on Ohio's Endangered and/or Threatened Species listings, by maintaining diverse and connected riparian and wetland vegetation.

   G. Benefit the city economically by minimizing encroachment on wetlands and watercourse channels and the need for costly engineering solutions such as dams, retention basins, and rip rap to protect structures and reduce property damage and threats to the safety of residents; and by contributing to the scenic beauty and environment of the city, and thereby preserving the character of the city, the quality of life of the residents of the city, and corresponding property values.

2. The following regulations have been enacted to protect these services of riparian and wetland areas by providing reasonable controls governing structures and uses within a wetland and/or riparian setback along designated watercourses in the city.

3. Applicability and Compliance:

   A. These regulations shall apply to:
      1) All lands that are within the jurisdiction of the city and that border designated watercourses and wetlands as defined in these regulations.

      2) These regulations shall apply to property/parcel split plan approvals, site plan approvals, and land development plan approvals requested of the city.

      3). These regulations shall apply to all building permits, which involve soil disturbing activities.

   B. The city shall issue no approvals or permits without full compliance with the terms of these regulations.

ESTABLISHMENT OF DESIGNATED WATERCOURSES AND RIPARIAN SETBACKS:

1. Designated watercourses shall include those watercourses meeting any one of the following criteria:

   A. All watercourses draining an area greater than ½ square mile, or

   B. All watercourses draining an area less than ½ square mile and having a defined bed and bank.

   C. In determining if watercourses have a defined bed and bank, the city may consult with a representative of the local county SWCD or other technical experts as necessary.

2. Riparian setbacks on designated watercourses are established as follows:

   A. A minimum of 300 feet on both sides of all watercourses draining an area greater than 300 square miles.

   B. A minimum of 120 feet on both sides of all watercourses draining an area greater than 20 square miles and up to and including 300 square miles.

   C. A minimum of 75 feet on both sides of all watercourses draining an area greater than one half square mile and up to and including 20 square miles.

   D. A minimum of 25 feet on both sides of all watercourses draining an area less than one half square mile and having a defined bed and bank as determined above.

3. Riparian Setback Map:

   A. The city shall use the latest edition of the official soil survey that shows drainage features, on the paper maps in the back of the book, as the map identifying designated watercourses and their riparian setbacks. The drainage features identified on the paper maps in the official soil survey and the information contained therein shall be believed to be accurate.

   B. At the time of application of this regulation, if any discrepancy is found between the Riparian Setback Map and the criteria for designated watercourses or riparian setbacks as set forth in these regulations, the criteria shall prevail.

   C. In reviewing and interpreting the maps the city may consult with a representative of the local county SWCD and other technical experts as necessary.

4. The following conditions shall apply in riparian and wetland setbacks:

   A. Riparian and wetland setbacks shall be measured in a perpendicular and horizontal direction outward from the ordinary high water mark of each designated watercourse and defined wetland boundary.

   B. Except as otherwise provided in this regulation, riparian and wetland setbacks shall be preserved in their natural state and shall be established and marked in the field prior to any soil disturbing or land clearing activities.

   C. Where the 100-year floodplain is wider than a riparian setback on either or both sides of a designated watercourse, the riparian setback shall be extended to the outer edge of the 100-year floodplain. The 100-year floodplain shall be determined by the project engineer conducting a hydrologic analysis of the project area in conformance with standard engineering practices and approved by the City Engineer.

   D. Where wetlands are identified within a riparian setback, the minimum riparian setback width shall be extended to the outer boundary of the wetland. In addition, wetlands shall be protected to the extent detailed in these regulations.

   E. Wetlands shall be delineated by a site survey approved by the city using delineation protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of application of this regulation. If a conflict exists between the delineation protocols of these two agencies, the delineation protocol that results in the most inclusive area of wetland shall apply.

5. The applicant or his or her designated representative shall be responsible for delineating riparian and wetland setbacks, including any expansions or modifications as required by these regulations, and identifying these setbacks on all property/parcel splits, commercial development or other land

development plans, and/or building permit applications submitted to the city. This delineation may be done by a metes and bounds, or higher level, survey and shall be subject to review and approval by the city. As a result of this review, the city may consult with a representative of the local county SWCD or other technical experts as necessary.

6. Prior to any soil disturbing activity, riparian and wetland setbacks shall be clearly delineated on site by the applicant or his or her designated representative, and such delineation shall be maintained throughout soil disturbing activities.

7. No approvals or permits shall be issued by the city prior to on-site delineation of riparian and wetland setbacks in conformance with these regulations.

8. Upon completion of an approved property/parcel split, land development, or other improvement, riparian and wetland setbacks shall be permanently recorded on the plat records and written recorded easement.

ESTABLISHMENT OF WETLAND SETBACKS:

1. Wetland setbacks are established as follows:

   A. A minimum of 120 feet surrounding and including all Ohio EPA Category 3 Wetlands, or current equivalent Ohio EPA classification.

   B. A minimum of 75 feet surrounding and including all Ohio EPA Category 2 Wetlands, or current equivalent Ohio EPA classification.

PROCEDURE FOR WETLAND SETBACKS:

1. No change to parcel boundaries or landuse:

   A. Upon filing a request for a building permit that does not involve changing of any parcel boundaries or changes in land use, the applicant will check for indicators of wetlands on the National Wetlands Inventory maps, and Ohio Wetlands Inventory map, and the Cuyahoga County Wetlands Inventory (if applicable). A photo copy of the applicable section of each map will be attached to the permit application.

   B. If a potential wetland is shown on any of the maps or if there is reason for the city to believe that an unmapped wetland exists on or within 120 feet of the project site the applicant will retain a qualified wetland professional to evaluate the proposed project site for wetlands or wetland buffer areas. If no wetland or wetland buffer areas are found, the applicant shall submit a letter from the qualified wetland professional with the preliminary plat or permit application verifying his or her negative findings.

2. New residential or commercial or other type development and projects involving a change to parcel boundaries or a landuse change:

   A. Upon filing a request for approval of a preliminary plat or building permit for new residential, commercial or other type of development that involves changes in any parcel boundaries or changes in landuse, the applicant or his or her designated representative shall retain a qualified wetland professional to survey the proposed development site for wetlands. If no wetlands are found, the applicant or his or her designated representative shall submit a letter with the preliminary plat or permit application verifying that a qualified wetland professional has surveyed the site and found no wetlands. If wetlands are found, the following procedures shall be followed:

   B. A qualified wetland professional, acceptable to the City Engineer, shall determine the presence of Ohio EPA Category 2 or 3 wetlands (or current equivalent Ohio EPA classification) on the proposed development site using the latest version of the Ohio Rapid Assessment Method for wetland evaluation approved at the time of application of this regulation. Acceptance of this determination shall be subject to approval by the City Engineer

   C. If Ohio EPA Category 2 or 3 wetlands (or current equivalent Ohio EPA classification) are located on the proposed development site, the applicant or his or her designated representative shall delineate these wetlands and the wetland setback in conformance with these regulations. The applicant or his or her designated representative shall identify all delineated wetlands and their associated setbacks on all property/parcel split plans, land development plans, and/or permit applications submitted to the city.

1) Wetlands shall be delineated by a site survey, approved by the city, using delineation protocols accepted by the US Army Corps of Engineers and the Ohio EPA at the time of application of this regulation. If conflict exists between the delineation protocols of these two agencies, the delineation protocol that results in the most inclusive area of wetland shall apply.

2) Wetland setbacks shall be delineated through a metes and bounds, or higher level, survey subject to approval by the city.

D. Prior to any soil or vegetation disturbing activity, the applicant or his or her designated representative shall delineate wetland setbacks on the development site in such a way that they can be clearly viewed, and such delineation shall be maintained throughout construction.

E. No approvals or permits shall be issued by the city prior to delineation of wetland setbacks in conformance with this regulation.

3. Upon completion of an approved property/parcel split, commercial development or other land development or improvement, riparian and wetland setbacks shall be permanently recorded on the plat records and written recorded easement(s) and shall be maintained as open space thereafter through a permanent conservation easement. A third party, not the landowner or permittee or the city, that is allowed by state law shall be given the conservation easement. If no third party will accept the conservation easement, the city shall accept it and protect it in perpetuity.

USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS:

1. By-Right Uses Without A Permit: Open space uses that are passive in character shall be permitted in riparian and wetland setbacks, including, but not limited to, those listed in these regulations. No use permitted under these regulations shall be construed as allowing public trespass on privately held lands.

A. Recreational Activity. Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, fishing, hunting, picnicking, and similar uses.

B. Removal of Damaged or Diseased Trees. Damaged or diseased trees may be removed.

C. Revegetation and/or Reforestation. Riparian and wetland setbacks may be revegetated with non-invasive plant species.

D. Maintenance of lawns, gardens and landscaping: Lawns, gardens and landscaping, that existed at the time this ordinance was passed, may be maintained as long as they are not increased in size.

2. By-Right Uses With A Permit:

A. Selective Harvesting of Timber. Selective harvesting of timber may be allowed upon presentation of a Forest Management and Harvest Plan prepared by a Qualified Forester and accepted by the City Engineer.

1) Any landowner harvesting timber for sale shall post a performance guarantee with the city. This performance guarantee shall be in the form of a Surety Bond, Escrow Account, Certified Check or Cash as required in Section 818.01 Permit Fee and Bond Required, and it shall be held until completion of the timber-harvesting operation.

2) Due to the potential for felled logs and branches to damage downstream properties and/or to block ditches or otherwise exacerbate flooding, logs or branches resulting from permitted selective harvesting that are greater than 6 inches in diameter at the cut end shall be cut into sections no longer than 6 feet or removed from the 100-year floodplain. Harvested trees or felled logs and branches that are part of a designed and approved Streambank Stabilization and Erosion Control Measure shall be allowed to remain in a designated watercourse.

3) The Forest Management and Harvest Plan must:

a) Show that the site will be adequately stocked after the approved selective harvest. "Adequately stocked" shall be defined as the residual stocking level greater than the B-Level on the Allegheny Hardwood Stocking Guide produced by the United States Forest Service, or other United

States Forest Service stocking guides as dictated by the forest city to be harvested.

b) Show that trees located less than 25 feet from the ordinary high water mark will not be impacted by the proposed harvesting.

c) Include a map of the site. This map shall specify the location of any skid and haul roads required for transporting harvested trees and fire wood from riparian and wetland setbacks.

d) Include the method to be used to transport harvested trees from riparian and wetland setbacks.

e) Specify the erosion control Best Management Practices that will be employed during and after the proposed harvest. These erosion control practices shall be in conformance with the Ohio Department of Natural Resources, Division of Forestry's BMPs for Erosion Control on Logging Jobs in Ohio.

f) Provide the US Army Corps of Engineers and the Ohio EPA Wetland and Stream protection permit numbers and the associated permit requirements.

B. Streambank Stabilization and Erosion Control Measures. Streambank stabilization and erosion control measures may be allowed provided that such measures are ecologically compatible and substantially utilize natural materials and native plant species where practical. The streambank stabilization and erosion control measures shall only be undertaken upon approval of an Soil Erosion and Sediment Control Plan by the city

C. Crossings. Crossings of designated watercourses and through riparian setbacks by publicly and privately owned sewer and/or water lines and public and private utility transmission lines shall only be allowed upon approval of a Crossing Plan by the city Engineer. Such crossings shall minimize disturbance in riparian setbacks and shall mitigate any necessary disturbances. Erosive materials will not be used in making stream crossings.

USES PROHIBITED IN RIPARIAN AND WETLAND SETBACKS: Any use not authorized under these regulations shall be prohibited in riparian and wetland setbacks. By way of example, the following uses are specifically prohibited; however, prohibited uses are not limited to those examples listed here:

1. Construction. There shall be no structures of any kind.

2. Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for non-commercial composting of uncontaminated natural materials, and except as permitted under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations.

3. Roads or Driveways. There shall be no roads or driveways permitted in riparian and/or wetland setback area, except as permitted under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations. There shall be no roads or driveways or roads permitted in wetlands or watercourses without a permit issued by the US Army Corps of Engineers and/or the Ohio EPA.

4. Motorized Vehicles. There shall be no use of motorized vehicles, except as permitted under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations.

5. Disturbance of Natural Vegetation. There shall be no disturbance, including mowing, of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds; for such plantings as are consistent with this regulation; for such disturbances as are approved under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations; and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of this regulation. Nothing in this regulation shall be construed as requiring a landowner to plant or undertake any other activities in riparian and wetland setbacks.

6. Parking Lots. There shall be no parking lots or other human-made impervious cover, except as permitted under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations.

7. New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Riparian and wetland setbacks shall not be used for the disposal or treatment of sewage except in accordance with local county Board of Health regulations in effect at the time of application of this regulation.

8. Crossings. Crossings of designated riparian and wetland setbacks by publicly and privately owned sewer and/or water lines and small public and small private utility transmission lines without a permit issued by the US Army Corps of Engineers and/or the Ohio EPA.

NON-CONFORMING STRUCTURES OR USES IN RIPARIAN AND WETLAND SETBACKS:

1. A non-conforming use within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is not otherwise permitted under these regulations, may be continued. However, the use shall not be changed or enlarged unless it is changed to a use permitted under these regulations.

2. A non-conforming structure within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is not otherwise permitted under these regulations, may be continued. However, the existing building footprint or roofline may not be expanded or enlarged in such a way that would move the structure closer to the stream or wetland.

3. A non-conforming structure or use or deteriorated structure within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is discontinued, terminated, or abandoned for a period of six (6) months or more, may not be revived, restored, or re-established.

4. A non-conforming structure or use that is discontinued may be resumed any time within six (6) months from such discontinuance but not thereafter. No change or resumption shall be permitted that is more detrimental to riparian and wetland setbacks, as measured against the intent and objectives of these regulations as determined by the city, than the existing or former non-conforming structure or use.

VARIANCES WITHIN RIPARIAN AND WETLAND SETBACKS:

1. The city may grant a variance from this regulation as provided herein. In determining whether there is unnecessary hardship or practical difficulty such as to justify the granting of a variance, the city shall consider the potential harm or reduction in riparian and/or wetland area functions that may be caused by a proposed structure or use.

2. In making a variance determination, the city shall consider the following:

   A. Varying the front, rear and side yard setback before the riparian and wetland setbacks are varied.

   B. Variances should not be granted for asphalt or concrete paving in the riparian and wetland setbacks in any situation where gravel or porous pavement (i.e., porous pavers, and similar products) will do the job.

3. In making a variance determination, the city may consider the following:

   A. A parcel existing at the time of passage of this ordinance is made unbuildable.

   B. The soil type natural vegetation of the parcel, as well as the percentage of the parcel that is in the 100-year floodplain. The criteria of the city's flood damage prevention regulations may be used as guidance when granting variances in the 100-year floodplain.

   C. The extent to which the requested variance impairs the flood control, soil erosion control, sediment control, water quality protection, or other functions of the riparian and/or wetland area. This determination shall be based on sufficient technical and scientific data.

   D. The degree of hardship this regulation places on the landowner, and the availability of alternatives to the proposed activity.

   E. Soil disturbing activities permitted in a riparian and/or wetland setback through variances should be implemented in order to minimize clearing to the extent possible, and to include Best Management Practices necessary to minimize soil erosion and maximize sediment control.

   F. The presence of significant impervious cover, or smooth vegetation such as maintained lawns, in riparian setback areas compromises their benefits to the city.

G. A reduction in storm water infiltration into the soil in wetland areas will occur.

H. A requested above ground fence does not increase the existing area of mowed grass or lawn.

BOUNDARY INTERPRETATION & APPEALS PROCEDURE:

1. When an applicant or his or her designated representative disputes the boundary of a riparian or wetland setback or the ordinary high water mark of a watercourse, the applicant or his or her designated representative shall submit documentation to the city which describes the boundary, the applicant's proposed boundary, and justification for the proposed boundary change.

2. The city shall evaluate this documentation and shall make a written determination within a reasonable period of time, not to exceed sixty (60) days, a copy of which shall be submitted to the applicant. If during this evaluation the city requires further information, it may be required of the applicant. In the event that the city requests such additional information, the sixty (60) day limit on the city's review shall be postponed until the applicant provides such information.

3. Any party aggrieved by any wetland or riparian setback determination under this regulation may appeal to the Board of Zoning Appeals.

INSPECTION OF RIPARIAN AND WETLAND SETBACK:

1. The delineation of riparian and/or wetland setbacks shall be inspected by the city, as follows:

   A. Prior to any soil disturbing activities authorized by the city under for a property/parcel split, land development plan, and/or building permit. The applicant or his or her designated representative shall provide the city with at least five (5) working days notice prior to starting soil disturbing or land clearing activities. A video tape record is required to be performed and submitted.

   B. Prior to starting any of the activities authorized by the city under the *USES PERMITTED IN RIPARIAN AND WETLAND SETBACKS* section of these regulations, the applicant or his or her designated representative shall provide the city with at least five (5) working days notice prior to starting such activities.

   C. Any time evidence is brought to the attention of the city that uses or structures are occurring that may reasonably be expected to violate the provisions of these regulations.

VIOLATIONS: No person shall violate, or cause, or knowingly permit to be violated, any of the provisions of these regulations, or fail to comply with any such provisions or with any lawful requirements of any public authority made pursuant to these regulations, or knowingly use or cause or permit the use of any lands in violation of these regulations or in violation of any permit granted under these regulations.

PENALTIES:

1. Whoever violates or fails to comply with any provision of this regulation is guilty of a misdemeanor of the first degree and shall be fined no more than one thousand dollars ($1,000.00) or imprisoned for no more than one hundred eighty (180) days, or both, for each offense.

2. A separate offense shall be deemed committed each day during or on which a violation or noncompliance occurs or continues.

3. Upon notice from the City Engineer, or designated representative, that work is being performed contrary to this regulation, such work shall immediately stop. Such notice shall be in writing and shall be given to the owner or person responsible for the development area, or person performing the work, and shall state the conditions under which such work may be resumed; provided, however, in instances where immediate action is deemed necessary for public safety or the public interest, the City Engineer may require that work be stopped upon verbal order pending issuance of the written order.

4. The imposition of any other penalties provided herein shall not preclude the city, by or through its Law Director and/or any of his or her assistants, from instituting an appropriate action or proceeding in a Court of Proper Jurisdiction to prevent an unlawful development or to restrain, correct or abate a violation, or to require compliance with the provisions of this regulation or other applicable laws, or ordinances, rules or regulations or the orders of the City Engineer.

DEFINITIONS, as used in this ordinance:

APPROVING AUTHORITY: The official responsible for administering the applicable program(s).

BEST MANAGEMENT PRACTICE (BMP): Any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. BMPs may include structural practices, conservation practices and operation and maintenance procedures.

CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC): A person that has subscribed to the Code of Ethics and have met the requirements established by the CPESC Council of Certified Professional In Erosion and Sediment Control, Inc. to be a Certified Professional in Erosion and Sediment Control.

CHANNEL: A natural stream that conveys water, or a ditch or channel excavated for the natural flow of water.

CONCENTRATED STORM WATER RUNOFF: Surface water runoff which converges and flows primarily through water conveyance features such as swales, gullies, waterways, channels or storm sewers, and which exceeds the maximum specified flow rates of filters or perimeter controls intended to control sheet flow.

CONSERVATION: The wise use and management of natural resources.

DAMAGED OR DISEASED TREES: Trees that have split trunks; broken tops; heart rot; insect or fungus problems that will lead to imminent death; undercut root systems that put the tree in imminent danger of falling; leaning as a result of root failure that puts the tree in imminent danger of falling, or any other condition that puts the tree in imminent danger of being uprooted or falling.

DESIGNATED WATERCOURSE: A watercourse that is contained within, flows through, or borders the city and meets the criteria set forth in these regulations.

DETERIORATED STRUCTURE: A structure which has sustained substantial damage from any origin whereby the cost of restoring the structure to its before damaged condition would be equal to, or greater than 50% of the market value of the structure before the damage occurred.

DEVELOPMENT AREA: Any tract, lot, or parcel of land, or combination of tracts, lots or parcels of land, which are in one ownership, or are contiguous and in diverse ownership, where earth disturbing activity is to be performed.

DITCH: An excavation, either dug or natural, for the purpose of drainage or irrigation, and having intermittent flow.

DUMPING: The grading, pushing, piling, throwing, unloading or placing of soil or other material.

EARTH DISTURBING ACTIVITY: Any grading, excavating, filling, or other alteration of the earth's surface where natural or man-made ground cover is destroyed.

EROSION: The process by which the land surface is worn away by the action of water, wind, ice or gravity.

EXISTING: In existence at the time of the passage of this ordinance and these regulations.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA): The agency with overall responsibility for administering the National Flood Insurance Program.

GRADING: Earth disturbing activity such as excavation, stripping, cutting, filling, stockpiling, or any combination thereof.

IMPERVIOUS COVER: Any surface that cannot effectively absorb or infiltrate water. This includes roads, streets, parking lots, rooftops, and sidewalks.

INTERMITTENT STREAM: A natural channel that may have some water in pools but where surface flows are non-existent or interstitial (flowing through sand and gravel in stream beds) for periods of one week or more during typical summer months.

LARGER COMMON PLAN OF DEVELOPMENT OR SALE: A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

LANDSLIDE: The rapid mass movement of soil and rock material downhill under the influence of gravity in which the movement of the soil mass occurs along an interior surface of sliding.

LOCAL COUNTY SWCD: The local county Soil and Water Conservation District.

NATIONAL WETLANDS INVENTORY MAP: Wetland maps that were created by the Fish and Wildlife Service, United States Department of Interior.

NATURAL RESOURCES CONSERVATION SERVICE (NRCS): An agency of the United States Department of Agriculture, formerly known as the Soil Conservation Service (SCS).

NPDES PERMIT: A National Pollutant Discharge Elimination System Permit issued by Ohio EPA under the authority of the USEPA, and derived from the Federal Clean Water Act.

NOXIOUS WEED: Any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the Department. For the purposes of this regulation, the most recent version of this list at the time of application of these regulations shall prevail.

OHIO EPA: The Ohio Environmental Protection Agency.

OHIO WETLANDS INVENTORY MAP: Wetland maps that were created by the Natural Resources Conservation Service, USDA and the Ohio Department of Natural Resources.

ORDINARY HIGH WATER MARK: The point of the bank or shore to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction or prevention of woody terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic.

OUTFALL: An area where water flows from a structure such as a conduit, storm sewer, improved channel or drain, and the area immediately beyond the structure which is impacted by the velocity of flow in the structure.

PERSON: Any individual, corporation, partnership, joint venture, agency, unincorporated association, municipal corporation, township, county, state agency, the federal government, or any combination thereof.

PERENNIAL STREAM: A natural channel that contains water throughout the year, except possibly during periods of extreme drought.

PROFESSIONAL ENGINEER: A person registered in the State of Ohio as a Professional Engineer, with specific education and experience in water resources engineering, acting in strict conformance with the Code of Ethics of the Ohio Board of Registration for Engineers and Surveyors.

QUALIFIED FORESTER: Any forester employed by the Ohio Department of Natural Resources, Division of Forestry, or any person attaining the credential of Certified Forester as conferred by the Society of American Foresters.

QUALIFIED WETLAND PROFESSIONAL means an individual competent in the areas of botany, hydric soils, and wetland hydrology, and is acceptable to the City Engineer.

REDEVELOPMENT: The demolition or removal of existing structures or land uses and construction of new ones.

RETENTION BASIN: A storm water management pond that maintains a permanent pool of water. These storm water management ponds include a properly engineered/designed volume dedicated to the temporary storage and slow release of runoff waters.

RIPARIAN AREA: Naturally vegetated land adjacent to watercourses which, if appropriately sized, helps to limit erosion, reduce flood flows, and/or filter and settle out runoff pollutants, or which performs other functions consistent with the purposes of these regulations.

RIPARIAN SETBACK: Those lands within the city which are alongside streams, and which fall within the area defined by the criteria set forth in these regulations.

SEDIMENT: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by wind, water, gravity or ice, and has come to rest on the earth's surface either on dry land or in a body of water.

SEDIMENT CONTROL: The limiting of sediment being transported, by controlling erosion or detaining sediment-laden water, and allowing the sediment to settle out.

SEDIMENT POLLUTION: A failure to use management or conservation practices to control wind or water erosion of the soil and to minimize the degradation of water resources by soil sediment in conjunction with land grading, excavating, filling, or other soil disturbing activities on land used or being developed for commercial, industrial, residential, or other purposes.

SENSITIVE AREA: An area or water resource that requires special management because of its susceptibility to sediment pollution, or because of its importance to the wellbeing of the surrounding communities, region, or the state and includes, but is not limited to, the following:

A. Ponds, wetlands or small lakes with less than five acres of surface area;
B. Small streams with gradients less than ten feet per mile with average annual flows of less than 3.5 feet per second containing sand or gravel bottoms.
C. Drainage areas of a locally designated or an Ohio designated Scenic River.
D. Riparian and wetland areas.

SHEET FLOW: Water runoff in a thin uniform layer or rills and which is of small enough quantity to be treated by sediment barriers.

SIVICULTURE: The theory and practice of controlling forest establishment, composition and growth.

SLIP: A landslide as defined under "Landslides."

SLOUGHING: A slip or downward movement of an extended layer of soil resulting from the undermining action of water or the earth disturbing activity of man.

SOIL: Unconsolidated erodible earth material consisting of minerals and/or organics.

SOIL CONSERVATION SERVICE, USDA: The federal agency now titled the "Natural Resources Conservation Service," which is an agency of the United States Department of Agriculture.

SOIL DISTURBING ACTIVITY: Clearing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to, soil erosion and sediment pollution.

SOIL EROSION AND SEDIMENT CONTROL PLAN: A written and/or drawn soil erosion and sediment pollution control plan to minimize erosion and prevent off-site sedimentation throughout all earth disturbing activities on a development area.

SOIL EROSION AND SEDIMENT CONTROL PRACTICES: Conservation measures used to control sediment pollution and including structural practices, vegetative practices and management techniques.

SOIL SURVEY: The official soil survey produced by the Natural Resources Conservation Service, USDA in cooperation with the Division of Soil and Water Conservation, ODNR and the local Board of County Commissioners.

STORM WATER CONVEYANCE SYSTEM: All storm sewers, channels, streams, ponds, lakes, etc., used for conveying concentrated storm water runoff, or for storing storm water runoff.

STREAM: A body of water running or flowing on the earth's surface, or a channel in which such flow occurs. Flow may be seasonally intermittent.

SUBSTANTIAL DAMAGE: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would be equal to, or greater than 50% of the market value of the structure before the damage occurred.

USEPA: The United States Environmental Protection Agency.

100-YEAR FLOODPLAIN: Any land susceptible to being inundated by water from a base flood. The base flood is the flood that has a one percent (1%) or greater chance of being equaled or exceeded in any given year. For the purposes of this regulation, the 100-year floodplain shall be defined by FEMA or a site-specific Floodplain Delineation in conformance with standard engineering practices and approved by the city.

WATERCOURSE: Any natural, perennial, or intermittent channel, stream, river or brook.

WATER RESOURCES: All streams, lakes, ponds, wetlands, water courses, waterways, drainage systems, and all other bodies or accumulations of surface water, either natural or artificial, which are situated wholly or partly within, or border upon this state, or are within its jurisdiction, except those private waters which do not combine or affect a junction with natural surface waters.

WETLAND: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

WETLAND, OHIO EPA CATEGORY 2 WETLANDS: Those wetlands classified by the Ohio EPA as Category 2 wetlands under OAC 3745-1-54 (C) (2), or current equivalent Ohio EPA classification, in accordance with generally accepted wetland functional assessment methods acceptable to the U.S. Army Corps of Engineers and Ohio EPA at the time of application of this regulation.

WETLAND, OHIO EPA CATEGORY 3 WETLANDS: Those wetlands classified by the Ohio EPA as Category 3 wetlands under OAC 3745-1-54(C)(3), or current equivalent Ohio EPA classification, in accordance with generally accepted wetland functional assessment methods acceptable to the U.S. Army Corps of Engineers and Ohio EPA at the time of application of this regulation.

WETLAND SETBACK: Those lands within the city that fall within the area defined by the criteria set forth in these regulations.

WINTER: October 1st to April 1st of each year.

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 04-204 INTRODUCED BY: Stefanik, Bobulsky, Gentile

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING & HOUSING CODE, TITLE SIX MISCELLANEOUS BUILDING REGULATIONS BY CREATING A NEW CHAPTER 1490 ENTITLED CONTROLLING POST-CONSTRUCTION WATER QUALITY RUNOFF, AND DECLARING AN EMERGENCY

WHEREAS: Flooding and streambank erosion in the city are a significant threat to public health and safety and public and private property, and storm water quantity control slows runoff and reduces its erosive force, and flood damage; and

WHEREAS: Insufficient quality of storm water runoff can result in significant damage to receiving water resources, impairing the capacity of these resources to sustain aquatic systems and their associated aquatic life use designations; and

WHEREAS: There is a regional effort to improve the quality of water in the rivers, streams, ponds, and lakes within various watersheds in the city and to protect and enhance the water resources of the city, and the city recognizes its obligation as a part of a watershed and the region to protect water quality by controlling runoff within its borders; and

WHEREAS: Title 40 Codified Federal Register (C.F.R.) Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities, including City of North Royalton, to develop a Storm Water Management Program to address the quality of storm water runoff, among other components, during and after soil disturbing activities; and

WHEREAS: Article XVIII, Section 3 of the Ohio Constitution and Chapter 1511 of the Ohio Revised Code grants municipalities the legal authority to adopt rules to abate water pollution by soil sediments; and

WHEREAS: To promote public health and safety and sound economic development in the city, it is important to provide homebuilders, developers, and landowners with consistent, technically feasible, and operationally practical standards for water quality runoff management.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. Council has determined that it is necessary to amend the Codified Ordinances of the City Of North Royalton, Part 14 Building & Housing Code, Title Six Miscellaneous Building Regulations by creating a new Chapter 1490 entitled Controlling Post-Construction Water Quality Runoff which is attached hereto as Exhibit A and incorporated as if fully rewritten herein.

Section 2. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 3. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 4. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that it is immediately necessary to provide homebuilders, developers, and landowners with consistent, technically feasible, and operationally practical standards for water quality runoff management.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

PRESIDENT OF COUNCIL APPROVED: MAYOR

DATE PASSED: November 3, 2004 DATE APPROVED: November 4, 2004

ATTEST: DIRECTOR OF LEGISLATIVE SERVICES

First reading suspended
Second reading suspended
Third reading November 3, 2004
Amended November 3, 2004

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

CHAPTER 1490
CONTROLLING POST-CONSTRUCTION WATER QUALITY RUNOFF

CITY: Throughout this regulation the city shall mean the City of North Royalton, State of Ohio, and its designated agents and representatives.

COMPREHENSIVE STORM WATER MANAGEMENT PLAN: The Post-Construction Water Quality Plan developed to meet this regulation will be coordinated and combined with the Riparian and Wetland Setback Plan and the Construction Site Conservation Plan that are developed for the same site. These plans will be titled and numbered in one consecutive sequence to make a Comprehensive Storm Water Management Plan for the site. The Comprehensive Storm Water Management Plan so developed will serve as the Storm Water Pollution Prevention Plan (SWP3) required by Ohio EPA as part of the NPDES Storm Water Permit for General Construction.

PURPOSE: The intent of this regulation is to:

1. Allow development while reducing damage to receiving water resources and drainage systems that may be caused by new development or redevelopment activities.

2. Protect and maintain the receiving stream's physical, chemical, biological characteristics and stream functions.

3. Provide perpetual management of storm water runoff quality and quantity.

4. Establish consistent technically feasible and operationally practical standards to achieve a level of storm water quantity and quality control that will minimize damage to public and private property and degradation of water resources, and will promote and maintain the health, safety, and welfare of the residents of the Community.

5. Control storm water runoff resulting from soil disturbing activities.

6. Preserve, to the maximum extent practicable (MEP), the natural drainage characteristics of the building site.

7. Preserve, to the maximum extent practicable (MEP), natural infiltration and groundwater recharge, and maintain subsurface flow that replenishes water resources, wetlands, and wells.

8. Assure that storm water quality controls are incorporated into site planning and design at the earliest possible stage.

9. Reduce the need for costly treatment and mitigation for the damage to and loss of water resources that are the result of inadequate storm water quality control.

10. Reduce the long-term expense of remedial projects needed to address problems caused by inadequate storm water quality control.

11. Require the incorporation of water quality protection that encourages and promotes habitat preservation into the construction of storm water management practices.

12. Ensure that all storm water quality practices are properly designed, constructed, and maintained.

DISCLAIMER OF LIABILITY: Neither submission of a plan under the provisions herein, nor compliance with the provisions of these regulations, shall relieve any person or entity from responsibility for damage to any person or property that is otherwise imposed by law.

CONFLICTS, SERVABILITY, NUISANCES & RESPONSIBILITY:

1. Where this ordinance imposes a greater restriction upon land than is imposed or required by other Community provisions of law, ordinance, contract or deed, the provisions of this ordinance shall prevail.

2. If a court of competent jurisdiction declares any clause, section, or provision of these regulations invalid or unconstitutional, the validity of the remainder shall not be affected thereby.

3. These regulations shall not be construed as authorizing any person to maintain a private or public nuisance on their property. Compliance with the provisions of this regulation shall not be a defense in any action to abate such nuisance.

4. Failure of the Community to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve the owner from the responsibility for the condition or damage resulting there from, and shall not result in the Community, its officers, employees, or agents being responsible for any condition or damage resulting there from.

EFFECTIVE DATE: This ordinance and its regulations shall become effective upon their passage.

SCOPE: This ordinance applies to development areas having new or relocated projects involving highways, underground cables, pipelines, subdivisions, industrial projects, commercial projects, building activities on farms, redevelopment of urban areas and all other land uses not specifically exempted. This ordinance does not apply to:

1. Land-disturbing activities related to producing agricultural crops or Silviculture operations regulated by the Ohio Agricultural Sediment Pollution Abatement Rules (1501: 15-3-01 to 1501: 15-3-09 of the Ohio Administrative Code) and existing at the time of passage of this regulation.

2. Strip mining operations regulated by Chapter 1513 of the Ohio Revised Code and existing at the time of passage of this regulation.

3. Surface mining operations regulated by Chapter 1514 of the Ohio Revised Code and existing at the time of passage of this regulation.

4. Linear construction projects, (e.g., pipeline or utility line installation), which do not result in the installation of impervious surface and are independent of other construction projects (not part of a larger common plan of development or sale). However, linear construction projects must be designed to minimize the number of stream crossings and the width of disturbance.

5. Transportation projects that are subject to industry specific Ohio EPA Rules are exempt from these rules.

6. It is not the role of the community to point out each and every part of the rules and how to implement them on the individual job sites. It is the project owner's responsibility to be proactive in meeting the intent, purpose and requirements of these regulations.

CONSULTATIONS: In implementing these regulations the Community Engineer or other Community officials may consult with the local county SWCD, state and federal agencies and other technical experts as necessary. Any costs associated with such consultations may be assessed to the applicant or his or her designated representative.

POST-CONSTRUCTION WATER QUALITY CONTROL PLAN: In order to control Post-Construction water quality damage and damage to public and private lands, the owner of each development area shall be responsible for developing a Post-Construction Storm Water Management Plan.

1. This plan will be combined with the Construction Site Conservation Plan and the Riparian Setback and Wetland Setback Plans that are also developed for the site.

2. This plan will contain a description of controls appropriate for each construction operation covered by these regulations, and the operator will implement such controls in a timely manner.

3. The BMPs used to satisfy the conditions of these regulations shall meet the standards and specifications in the current edition of the Ohio *Rain Water and Land Development* manual, ODOT Post-Construction storm water standards, or other manual that is acceptable to the Community Engineer or Ohio EPA.

4. The plan must make use of the practices that preserve the existing natural condition to the Maximum Extent Practicable (MEP).

5. To meet the Post-Construction requirements of this regulation, the Post-Construction Water Quality Plan must contain a description of the Post-Construction Best Management Practices (BMPs) that will be installed during construction for the site and the rationale for their selection. The rationale must address the anticipated impacts on the channel and floodplain morphology, hydrology, and water quality.

6. This plan will identify the person or entity responsible for continued maintenance of all vegetative and/or mechanical BMPs for both the construction and Post-Construction phases of the development.

7. Long-term maintenance requirements and schedules of all BMPs for both the construction and Post-Construction phases of the development will be identified.

8. This plan will contain long-term maintenance inspection schedules, including the printed name and contact point of the Post-Construction landowner (e.g., president of the homeowners association, store manager, apartment complex manager, etc.).

9. This plan will identify the person or entity financially responsible for maintaining the permanent inspection and maintenance of permanent storm water conveyance and storage structures and other conservation practices.

10. The method of ensuring that funding will be available to conduct the long-term maintenance and inspections of all permanent storm water, soil erosion and sediment control and water quality practices will be identified.

11. The Post-Construction Plan will also contain the following information depending on the size of the development sites as well as any additional information required by the community engineer:

A. Development Sites Smaller than Five Acres: A development site that will disturb one (1) or more, but less than five (5) acres of land and is not a part of a larger common plan of development or sale which will disturb five or more acres of land shall identify:

(1) Storm Water Issues: A statement as to how the decreased storm water quality that will be caused by the planned development project will be handled

(2) Description of Measures: A description of the BMPs that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed.

(3) Upland Areas: Structural measures placed on upland areas to the degree attainable.

(4) Map: A map of the entire site showing the overall development.

(5) Riparian and/or Wetland Setback: All riparian and wetland setback areas will be identified on the plans. They will also be marked in the field prior to the start of construction.

(6) BMPs: Best Management Practices used in the Post-Construction Water Quality Plan may include but are not limited to:
- (a) Permanent Storm Water Detention ponds that provide extended detention of the water volume.
- (b) Flow attenuation by use of open vegetated swales and natural depressions
- (c) Onsite infiltration of runoff
- (d) Sequential systems that combine several practices
- (e) Permanent conservation easements, preferably with the easement being held by a third party with no vested interest in ever seeing the property developed
- (f) Natural Channel Design for drainageways
- (g) Bioengineering in drainageways
- (h) Recreating floodplains
- (i) Chemical and biological filters in storm sewer inlets
- (j) Sand Filters
- (k) Allowing roof water from buildings to run across lawn areas to remove pollutants
- (l) Onsite sewage disposals system replacement or conversion to sanitary sewers
- (m) Low Impact Development Design
- (n) Countryside Development Design meeting the criteria of the Western Reserve Resource Conservation and Development Area.
- (o) Aquatic benches in Retention Basins and ponds.

7. Technical Basis: The plans will contain a rational statement utilized to select the BMPs used to control pollution and to maintain and protect water quality.

B. **Development Sites 5 Acres or Larger:** A development site that disturbs five (5) or more acres of land or will disturb less than five (5) acres, but is a part of a larger common plan of development or sale, which will disturb five (5) or more acres of land shall identify:

(1) Storm Water Detention: The Post-Construction BMP(s) chosen must be able to detain storm water runoff for protection of the stream channels, stream erosion control, and improved water quality.

(2) Structural BMPs: Structural (designed) Post-Construction storm water treatment practices shall be incorporated into the permanent drainage system for the site.

(3) Properly Sized BMPs: The BMP(s) chosen must be sized to treat the water quality volume (WQ_v) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1. 1. The WQ_v shall be equivalent to the volume of runoff from a 0.75-inch rainfall and shall be determined according to one of the two following methods:

(a) Through a site hydrologic study approved by the local municipal permitting authority that uses continuous hydrologic simulation and local long-term hourly precipitation records or

(b) Using the following equation:

1. $WQ_v = C * P * A / 12$ where: WQ_v = water quality volume in acre-feet C = runoff coefficient appropriate for storms less than 1 inch (see Table 1) P = 0.75 inch precipitation depth A = area draining into the BMP in acres

Table 1 Runoff Coefficients Based on the Type of Land Use

Land Use	Runoff Coefficient
Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space and Recreational Areas	0.2

(4) Where the land use will be mixed, the runoff coefficient should be calculated using a weighted average. For example, if 60% of the contributing drainage area to the storm water treatment structure is Low Density Residential, 30% is High Density Residential, and 10% is Open Space, the runoff coefficient is calculated as follows (0.6)(0.3) + (0.3)(0.5) + (0.1)(0.2) = 0.35.

(5) An additional volume equal to 20 percent of the WQ_v shall be incorporated into the BMP for sediment storage and/or reduced infiltration capacity. The BMPs will be designed according to the methodology included in the Ohio *Rainwater and Land Development* manual, ODOT Post-Construction storm water standards, or other manual that is acceptable to Ohio EPA. .

(6) BMPs shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage available for successive rainfall events as described in Table 2 below

Table 2: Target Draw Down (Drain) Times for Structural Post-Construction Treatment Control Practices

Best Management Practice	Drain Time of WQv
Infiltration	24 - 48 hours
Vegetated Swale and Filter Strip	24 hours
Extended Detention Basin (Dry Basins)	48 hours
Retention Basins (Wet Basins)*	24 hours
Constructed Wetlands (above permanent pool)	24 hours
Media Filtration, Bioretention	40 hours

Provide both a permanent pool and an extended detention volume above the permanent pool, each sized at 0.75 * WQ_v

(7) The owner may request approval from the Community Engineer to use alternative structural Post-Construction BMPs if the owner can demonstrate, in a way that is acceptable to Ohio EPA rules and regulations, that the alternative BMPs are

equivalent in effectiveness to those listed in Table 2 above. The use of alternative or vender supplied Post-Construction BMPs should be limited to redevelopment projects where justification is provided that the traditional BMPs in Table 2 are technically and economically infeasible.

(8) Construction activities shall be exempt from this condition if it can be demonstrated that the WQ_v is provided within an existing structural Post-Construction BMP that is part of a larger common plan of development or sale or if structural Post-Construction BMPs are addressed in a regional or local storm water management plan.

(9) For redevelopment projects (i.e., developments on previously developed property), Post-Construction practices shall either ensure a 20 percent net reduction of the site impervious area, provide for treatment of at least 20 percent of the WQ_v, or a combination of the two.

(10) Site Description:
- (a) The prior land uses of the site
- (b) The nature and type of construction activity (e.g., low density residential, shopping mall, highway, etc.)
- (c) Total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavating, filling or grading, <u>including off-site</u> borrow, fill or spoil areas and <u>off-site</u> utility installation areas)
- (d) Amount of the impervious area and percent imperviousness created by the construction activity
- (e) Name and/or location of the immediate receiving stream or surface water(s) <u>and</u> the first subsequent named receiving water <u>and</u> the major river watersheds in which it is located.

(11) A vicinity sketch locating:
- (a) The development area
- (b) The larger common plan of development or sale
- (c) All pertinent surrounding natural features within 200 feet of the development site including, but not limited to:
- (d) Water resources such as wetlands, springs, lakes, ponds, rivers and streams (including intermittent streams with a defined bed and bank)
- (e) Conservation Easements
- (f) Other sensitive natural resources and areas receiving runoff from the development

(12) The existing and proposed topography shown in the appropriate contour intervals as determined by the community engineer (generally one-foot contours are used).

(13) The location and description of existing and proposed drainage patterns and facilities, including any allied drainage facilities beyond the development area and the larger common plan of development or sale.

(14) Existing and proposed watershed boundary lines, direction of flow and watershed acreage.

(15) The person or entity responsible for continued maintenance of all permanent vegetative and/or mechanical Post-Construction water quality conservation practices (BMPs).

(16) The location of any existing or planned riparian and/or wetland setback areas on the property.

EASEMENTS: Future access to all permanent vegetative and/or mechanical Post-Construction water quality conservation practices (BMPs) and other areas, as required by the Community Engineer, shall be secured by means of easements.

1. The easements shall be recorded in the name of the Community and, in single-family residential developments, the homeowners association.

2. Such easements shall be not less than twenty (20) feet in width, in addition to the width of the facility it is to serve. Further, an easement of this type shall be provided on one (1) side of the flood control or similar-type facility.

3. Access along the initial drainage system shall be by means of easements. Such easements shall be not less than twenty (20) feet in width, with a minimum ten (10) foot width on either side of the centerline.

4. Access adjacent to storage facilities shall consist of a twenty (20) foot easement in the case of detention (dry) basins, and a twenty (20) foot easement with a twenty-five 25 foot level bench in the case of retention (wet) basins, measured from the top of the bank, and shall include the storage facility itself.

5. Easements for the emergency flow ways shall be a minimum of twenty (20) feet in width, or larger if required by the Community Engineer.

6. Flood control or storm drainage easements containing underground facilities shall have a minimum width of twenty (20 feet.

7. The easements shall be restricted against the planting within said easement of trees, shrubbery or plantings with woody growth characteristics, and against the construction therein of buildings, accessory buildings, fences, walls or any other obstructions to the free flow of storm water and the movement of inspectors and maintenance equipment and also restricted against the changing of final grade from that described by the grading plan.

MAINTENANCE: Any portion of the permanent Post-Construction water quality management systems, including on-site and off-site treatment/storage facilities that are constructed by the owner, will be continuously maintained into perpetuity.

1. Detail drawings and maintenance plans must be provided for all Post-Construction Best Management Practices (BMPs).

2. Maintenance plans must ensure that pollutants collect within structural Post-Construction BMP practices be disposed of in accordance with local, state and federal guidelines.

3. Maintenance plans shall be provided by the permittee to both the Community Engineer and the Post-Construction operator of the BMP (including homeowner associations) upon completion of construction activities and prior to the Community Engineer giving final approval for the completed construction.

4. Single-Family Residential Developments: A Homeowners' Association shall be created and placed in title of the affected lands and shall be continuously responsible for Post-Construction maintenance and inspections into perpetuity.

5. Multi-Family, Commercial and Industrial Developments: The plans will clearly state that the owner of the property shall be continuously responsible for Post-Construction maintenance and inspections into perpetuity.

6. Maintenance Design: Low maintenance requirements are a priority in the design and construction of all facilities. Multi-use facilities incorporating assets such as aesthetics and recreation may be incorporated into the design of the drainage facilities. All permanent drainage, soil erosion, sediment control, water quality management systems and BMPs, including on-site and off-site structures and vegetation that are constructed or planted, must be inspected and maintained into perpetuity by the responsible party designated in the plans and the requirements of this ordinance. Inspections and maintenance will be incorporated periodically throughout the year to ensure that the facilities are properly operational.

7. Perpetual Maintenance Inspections: One (1) inspection with a written report will be performed each year. The written report will be given to the Community Engineer by May 1st of each and every year after the Best Management Practice (BMP) has been completed.

   A. Structures that require a permit from the Ohio Division of Water: A written and stamped report from a professional engineer on the status of all structural BMPs that require a permit from the Ohio Department of Natural Resources (ODNR) Division of Water. This applies to all BMPs that require a permit either at the time of construction or fall under the jurisdiction of ODNR Division of Water at any time after construction is completed.

   B. Easements: A written report from an inspector on the status of all storm water management easements for each project shall be submitted to the Community Engineer by May 1st of each year into perpetuity. These reports will document if restricted plantings, fences and structures are on the easement and will identify the location of the noted easement restriction violations.

   C. Best Management Practices (BMPs) that do not have a high risk for loss of life, bodily injury, or damage to structures or infrastructure related to imminent failure as determined by the

Community Engineer: A written and stamped report from a professional engineer, landscape architect or Certified Professional In Erosion and Sediment Control (CPESC) on the status of permanent soil erosion, sediment control, water quality management systems and the status of the related easements shall be submitted to the Community Engineer by May 1st of each year into perpetuity.

D. BMPs that have a potential loss of Life: A written and stamped report covering the status of all BMPs that have a potential for loss of life, bodily injury, or damage to structures or infrastructure will be prepared by a professional engineer or other individual possessing a valid state license that authorizes them to design the same type of BMP for construction.

MINIMUM STANDARDS: In order to control pollution of water resources, the owner or person responsible for the development area shall use conservation planning and practices to maintain the level of conservation established in the following standards.

1. Standards and Specifications: Post-Construction runoff practices used to satisfy these standards shall meet the standards and specifications in the current edition of the *Rainwater and Land Development* manual, NRCS Field Office Technical Guide for the local county, or the Ohio EPA, which ever is most stringent.

2. Water Quality Basins:
   A. Pool Geometry: The minimum length-to-width ratio for the pond is 3:1 (the length will be three (3) times the width).

   B. Riser in Embankment: The riser shall be located within the embankment for purposes of maintenance access. Access to the riser will be by manholes.

   C. Water Drains: Each retention basin shall have a drainpipe that can completely drain the pond. The drain shall have an elbow within the pond to prevent sediment deposition from plugging the drain.

   D. Adjustable Gate Valves: Both the Water Quality and the Storm Water Management Basin drains shall have adjustable gate valves. Valves shall be located inside of the riser at a point where they will remain dry and can be operated in a safe and convenient manner. During the annual inspections the valves shall be fully opened and closed at least once, and the certifying official shall attest to this on the inspection form. To prevent vandalism, the handwheel shall be chained to a ringbolt or manhole step.

   E. Principal Spillway: Each principal spillway shall be designed in accordance with the Natural Resources Conservation Service (NRCS) standards and specifications for the office serving the local county. Each principal spillway shall have the capacity to pass the 100 year design storm flows. The inlet or riser size for the pipe drops shall be designed so that the flow through the structure goes from weir flow control to pipe flow control without going into orifice control in the riser. The crest elevation of the primary spillway shall be no less than one foot below the emergency spillway crest. Premium joint pipe is required and a removable trash rack shall be installed at each location. Anti-seep collars shall be provided for all pipe conduits through an embankment.

   F. Emergency Spillway: An emergency spillway shall be provided on each Water Quality and Storm Water Management basin. Emergency spillways shall convey flood flows safely past the embankment, and shall be designed in accordance with NRCS standards and specifications for the office serving the local county. Emergency spillways shall have a 100-year design storm capacity unless exempted in writing by the Community Engineer.

   G. Embankments: Each dam embankment shall be designed in accordance with the NRCS standards and specifications for the office serving the county that the project is located in. Anti-seep collars shall be provided for all pipe conduits through an embankment.

   H. Safety Features:
      1) The primary spillway opening shall not permit access to the public and other non-maintenance personnel.

      2) The perimeter of all water pool areas that are deeper than three (3) feet shall be surrounded by benches that meet the following:

         a) A safety bench, with a maximum slope of 3%, which extends outward, on dry land, from the shoreline. This bench will be a minimum of 25 feet wide to provide for the safety of individuals and maintenance vehicles that are

adjacent to the water pool. The safety bench may be landscaped, without the use of structures, to prevent access to the water pool.

b) Side slopes between the safety bench and the aquatic bench shall not be steeper than 3:1 (3 feet horizontal for every 1 foot vertical).

c) An aquatic bench that extends inward from the shoreline far enough to ensure public safety and has a maximum depth of 15 inches below the normal water surface elevations. The aquatic bench may be landscaped to prevent access to the deeper water pool. The aquatic bench may also be incorporated into the Post-Construction Water Quality Plan.

d) Side slopes beyond the aquatic bench and below the permanent water level shall not be steeper than 2:1 (2 feet horizontal for every 1 foot vertical).

e) The contours of the pond will be designed and managed to eliminate drop-offs and other hazards. Side slopes getting to the pond shall not exceed 3:1 and shall terminate on a safety bench.

I. Water Quality Basin: If a Water Quality Basin is needed and can not be incorporated into an existing or planned Detention or Retention Basin then a separate Water Quality Basin will need to be planned, designed, constructed and maintained into perpetuity.

J. Water Quality Basins will not be constructed in any permanent or intermittent stream channel.

K. Flexibility: These standards are general guidelines and shall not limit the right of the Community Engineer to impose at any time additional and/or more stringent requirements nor shall the standards limit the right of the Community Engineer to waive, in writing, individual requirements.

1) If the Community Engineer waives, in writing, individual requirements the owner will provide the Community Engineer with the information and documentation required to assure Ohio EPA that the waived requirement will not degrade water quality.

ALTERNATIVE ACTIONS: Where the Community Engineer determines that site constraints exist in a manner that compromises the intent of this ordinance to improve the management of storm water runoff as established in this ordinance, practical alternatives may be used to result in an improvement of water quality and/or a reduction of storm water runoff. Such alternatives must be in keeping with the intent and likely cost of those measures that would otherwise be required to meet the objectives of this section. When possible, all practical alternatives shall be implemented within the drainage area of the proposed development project. Practical alternatives can include, but are not limited to:

1. Fees shall be paid in an amount specified by the Community Engineer. The Community shall apply these fees to storm water management practices that improve the existing water quality.

2. Implementation of off-site storm water management practices.

3. Watershed or stream restoration.

4. Retrofitting of an existing storm water management practice.

5. Other practices approved by the Community Engineer in keeping with the intent of this section.

COMPLIANCE WITH OTHER RULES AND REGULATIONS:

1. Ohio Dam Safety Laws: The provisions of the Ohio Dam Safety Laws shall be followed. Proof of compliance with the Ohio Dam Safety Law administered by the ODNR Division of Water shall be, but is not limited to, a copy of the ODNR Division of Water permit number or a copy of the project approval letter from the ODNR Division of Water or a letter from the site owner explaining why the Ohio Dam Safety Law is not applicable. The written proof will be provided to the Community Engineer before a construction permit will be issued.

2. NPDES Permits: The provisions of the National Pollutant Discharge Elimination System (NPDES) Permits for construction activity, by the Ohio EPA, shall be followed. Proof of compliance shall be, but is not limited to, a copy of the Ohio EPA NPDES Permit number or a letter from the site owner explaining why the NPDES Permit is not applicable. The written proof will be provided to the Community Engineer before a construction permit will be issued.

3. Federal And State Wetland Permits: The provisions of the U.S. Army Corps of Engineers dredge and fill permits for federally-protected wetlands shall be followed. The provisions of Ohio EPA's Isolated Wetlands Permits shall also be followed. Wetlands and other waters of the United States shall be delineated by protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of the application of these regulations. Written proof of compliance with both permit programs will be provided to the Community Engineer before a construction permit will be issued. Proof of compliance shall be, but is not limited to, the following:

   A copy of the U.S. Army Corps of Engineers Individual Permit, if required for the project, showing project approval and any restrictions that apply to site activities; or

   A site plan showing that any proposed fill of waters of the United States conforms to the general and specific conditions specified in the applicable Nationwide Permit; or

   A letter from the site owner verifying that a qualified professional has surveyed the site and found no wetlands or other waters of the United States. Such a letter shall be noted on site plans submitted to the Community.

VIOLATIONS: No person shall violate, or cause, or knowingly permit to be violated, any of the provisions of these regulations, or fail to comply with any such provisions or with any lawful requirements of any public authority made pursuant to these regulations, or knowingly use or cause or permit the use of any lands in violation of these regulations or in violation of any permit granted under these regulations.

PENALTIES:

1. Whoever violates or fails to comply with any provision of this regulation is guilty of a misdemeanor of the first degree and shall be fined no more than one thousand dollars ($1,000.00) or imprisoned for no more than one hundred eighty (180) days, or both, for each offense.

2. A separate offense shall be deemed committed each day during or on which a violation or noncompliance occurs or continues.

3. Upon notice from the Community Engineer, or designated representative, that work is being performed contrary to this regulation, such work shall immediately stop. Such notice shall be in writing and shall be given to the owner or person responsible for the development area, or person performing the work, and shall state the conditions under which such work may be resumed; provided, however, in instances where immediate action is deemed necessary for public safety or the public interest, the Community Engineer may require that work be stopped upon verbal order pending issuance of the written order.

4. The imposition of any other penalties provided herein shall not preclude the Community, by or through its Law Director and/or any of his or her assistants, from instituting an appropriate action or proceeding in a Court of Proper Jurisdiction to prevent an unlawful development or to restrain, correct or abate a violation, or to require compliance with the provisions of this regulation or other applicable laws, or ordinances, rules or regulations or the orders of the Community Engineer.

CONSTRUCTION AND MAINTENANCE GUARANTEE: All permanent storm water, soil erosion, sediment control and water quality practices not specifically waived by the Community shall be constructed prior to the granting of the Final Plat Approval. Upon the request of the owner, the Community may defer the construction or installation of a permanent storm water, soil erosion, sediment control or water quality practice prior to the approval of the final plat where, in the Community Engineer's judgment, such proper construction or installation is not immediately necessary for the protection of the public health and safety; and where the prior installation or construction of such improvement would constitute an undue hardship on the owner because in the case of new vegetation or weather conditions, or because in the case of concrete, building construction could cause cracking and excessive wear and tear on new structures. In such event, the Community shall require a Security Bond, Escrow Account, Certified Check or Cash to guarantee that such deferred improvements will be properly constructed or installed within an agreed specified time, but not to exceed six (6) months after the filing of such final plat.

The owner will provide a maintenance guarantee for all permanent improvements, soil erosion, and sediment control and water quality practices.

The Community shall require a Security Bond, Escrow Account, Certified Check or Cash to guarantee that the planned temporary and permanent soil erosion, sediment control and water quality practices will be constructed and removed in a timely manner, as determined by the Community Engineer.

1. The Guarantee: The guarantee of both performance and maintenance will be in the form of a Security Bond, Escrow Account, Verified Check or Cash. The Security Bond, Escrow Account, Verified Check or Cash will be used by the Community to complete any guaranteed construction or removal of

improvements or temporary and permanent soil erosion, sediment control and water quality practices that are not adequately completed, maintained or removed by the owner in a timely manner, as determined by the Community Engineer. The Security Bond, Escrow Account, Verified Check or Cash will be in the total amount of both the performance guarantee and the maintenance guarantee. Ohio municipalities and counties may require performance bonds or other guarantees for water management improvement as stated in the ORC Chapter 711.101.

A. Security Bond, Escrow Account, Verified Check or Cash shall be deposited with the Community prior to review by the Community Engineer and/or its consultants to cover professional services of the Community Engineer, Building Commissioner, Zoning Inspector and/or other experts required by the Community Engineer, Community Council, Mayor or Review Boards.

B. No soil disturbing activities shall be permitted until a Security Bond, Escrow Account, Verified Check or Cash has been posted to the satisfaction of the Community Engineer sufficient for the Community to perform the obligations otherwise to be performed by the owner or person responsible for the development area as stated in this regulation, and to allow all work to be performed as needed in the event that the owner or person responsible for the development area fails to comply with the provisions of this regulation. The Security Bond, Escrow Account, Verified Check or Cash shall be released only after all work required by this regulation has been completed to the satisfaction of the Community Engineer and all permit and inspection fees required by these regulations have been paid in full.

C. No project subject to this regulation shall commence without the Soil Erosion and Sediment Control, and Storm Water Management, and Water Quality Plans having been approved by the Community Engineer.

2. Performance Guarantee: The furnishing of a performance guarantee will be maintained in an amount of not less than 120% of the estimate approved by the Community Engineer, of installation of the deferred improvements.

3. Maintenance Guarantee: The maintenance guarantee shall be maintained for a period of not less than (two) 2 years after final acceptance of the storm water, soil erosion, sediment control, and water quality practices in an amount equal to 5% of the estimate approved by the Community Engineer, of the construction and, where necessary, removal of such practices.

4. Time Extension: The Community Engineer may extend the time allowed for the installation of the improvements for which the performance guarantee has been provided with the receipt of a written request from the owner.

5. Completion: Upon completion of the construction of improvements or temporary and/or permanent, soil erosion, sediment control, and water quality practices and the removal of the temporary soil erosion, sediment control, and water quality practices for which the performance guarantee has been provided the owner shall notify the Community Engineer of this fact.

6. Inspection: The Community will not release the Security Bond, Escrow Account, Verified Check or Cash guarantee until the Community Engineer has inspected the site to ensure that the guaranteed item(s) have been completed and/or removed.

7. Release: The Construction Maintenance Guarantee shall not be released by the Community until all temporary soil erosion and sediment control practices that are no longer needed have been removed, properly disposed of and any trapped sediment has been stabilized.

APPLICATION PROCEDURES FOR POST-CONSTRUCTION WATER QUALITY PLANS:

1. This plan will be combined with the Soil Erosion and Sediment Control, Storm Water Management, Riparian Setback and Wetland Setback Plans that have also been developed for the site.

2. Plans developed by the site owners and approved by the Community in accordance with this regulation do not relieve the site owner of responsibility for obtaining all other necessary permits and/or approvals from federal, state, county, and local agencies and departments. If requirements vary, the most stringent requirement shall be followed.

3. The site owner shall submit a report from the local county soil and water conservation district, which reviews the owner's development, plans and improvement plans. The applicant or his or her designated representative will pay any costs associated with obtaining the report(s) from the local county SWCD. These reports shall address the planned development, and Soil Erosion and Sediment Control, Storm Water Management, Riparian Setback and Wetland Setback Plans and Other Sensitive Areas.

4. Plans submitted to the Community Engineer for, review and approval, shall be accompanied by other required permits and documentation relevant to the project, including but not limited to the US Army Corps Of Engineers, Ohio EPA, ODNR Division of Water and Ohio EPA NPDES Permit for Construction Activities

5. Five (5) sets of the plans and necessary data required by this regulation shall be submitted to the Community Engineer as follows:

   A. Format:
      1) Text material will be on 8.5 by 11 inch paper.
      2) Drawings will be on paper sized no larger than 24 inch by 36 inches.

   B. Construction projects
      1) At the preliminary plan approval request the preliminary plans shall show all of the following existing and planned features: streams, water bodies, wetlands, riparian and wetland setback areas permanent BMPs, storm water management detention and retention basins.

      2) At the Improvement plan approval request.

   C. For general clearing projects: Forty-five (45) working days prior to any soil-disturbing activities.

   D. Permits List: A list of all the permits that will be needed from federal, state and local agencies.

   E. Long-term Maintenance:

      1) The requirements and schedules of all permanent vegetative and/or mechanical Post-Construction water quality conservation BMPs.

      2) Long-term maintenance inspection schedules for all permanent vegetative and/or mechanical Post-Construction water quality conservation BMPs.

      3) The person or entity financially responsible for inspecting and maintaining all permanent vegetative and/or mechanical Post-Construction water quality conservation BMPs.

      4) The method of ensuring that funding will be available to conduct the long-term maintenance and inspections of all permanent vegetative and/or mechanical Post-Construction water quality conservation BMPs.

6. SWCD Compliance Approval: A letter or report from the local county SWCD that states that the Soil Erosion and Sediment Control, Storm Water Management and Riparian Setback and Wetland Setback Plans all appear to meet Ohio EPA and local regulations. It should be noted that only the Ohio EPA and the local communities can state that any plans or activities meet their regulations and rules.

7. The Community Engineer shall review the plans, including the approval report from the local county SWCD, and shall approve or return these with comments and recommendations for revisions, within forty-five (45) working days after receipt of the plan as described above. A plan rejected because of deficiencies shall receive a report stating specific problems and the procedures for filing a revised plan. At the time of receipt of a revised plan another forty-five (45) day review period shall begin.

8. Approved plans shall remain valid for two (2) years from the date of approval. After two (2) years the plan(s) approval automatically expires.

9. No soil-disturbing activity shall begin before all necessary local, county, state and federal permits have been granted to the owner or operator.

10. The Community will do construction inspections until the site is stabilized as determined by the Community Engineer. The construction will not be considered completed until the Community Engineer has conducted the Post-Construction inspections.

DEFINITIONS, as used in this ordinance:

BEST MANAGEMENT PRACTICE (BMP): Any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. BMPs may include structural practices, conservation practices and operation and maintenance procedures.

CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC): A person that has subscribed to the Code of Ethics and have met the requirements established by the CPESC Council of Certified Professional In Erosion and Sediment Control, Inc. to be a Certified Professional in Erosion and Sediment Control.

CHANNEL: A natural stream that conveys water, or a ditch or channel excavated for the natural flow of water.

CONSERVATION: The wise use and management of natural resources.

DEVELOPMENT AREA: Any tract, lot, or parcel of land, or combination of tracts, lots or parcels of land, which are in one ownership, or are contiguous and in diverse ownership, where earth disturbing activity is to be performed.

DITCH: An excavation, either dug or natural, for the purpose of drainage or irrigation, and having intermittent flow.

EARTH DISTURBING ACTIVITY: Any grading, excavating, filling, or other alteration of the earth's surface where natural or man-made ground cover is destroyed.

EROSION: The process by which the land surface is worn away by the action of water, wind, ice or gravity.

EROSION AND SEDIMENT CONTROL: A written and/or drawn soil erosion and sediment pollution control plan to minimize erosion and prevent off-site sedimentation throughout all earth disturbing activities on a development area.

EROSION AND SEDIMENT CONTROL PRACTICES: Conservation measures used to control sediment pollution and including structural practices, vegetative practices and management techniques.

EXISTING: In existence at the time of the passage of this ordinance and these regulations.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA): The agency with overall responsibility for administering the National Flood Insurance Program.

GRADING: Earth disturbing activity such as excavation, stripping, cutting, filling, stockpiling, or any combination thereof.

GRUBBING: Removing, clearing or scalping material such as roots, stumps or sod.

IMPERVIOUS COVER: Any surface that cannot effectively absorb or infiltrate water. This includes roads, streets, parking lots, rooftops, and sidewalks.

INTERMITTENT STREAM: A natural channel that may have some water in pools but where surface flows are non-existent or interstitial (flowing through sand and gravel in stream beds) for periods of one week or more during typical summer months.

LARGER COMMON PLAN OF DEVELOPMENT OR SALE: A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

LANDSLIDE: The rapid mass movement of soil and rock material downhill under the influence of gravity in which the movement of the soil mass occurs along an interior surface of sliding.

LOCAL COUNTY SWCD: The local county Soil and Water Conservation District.

NATURAL RESOURCES CONSERVATION SERVICE (NRCS): An agency of the United States Department of Agriculture, formerly known as the Soil Conservation Service (SCS).

NPDES PERMIT: A National Pollutant Discharge Elimination System Permit issued by Ohio EPA under the authority of the USEPA, and derived from the Federal Clean Water Act.

OHIO EPA: The Ohio Environmental Protection Agency.

OUTFALL: An area where water flows from a structure such as a conduit, storm sewer, improved channel or drain, and the area immediately beyond the structure which is impacted by the velocity of flow in the structure.

PERSON: Any individual, corporation, partnership, joint venture, agency, unincorporated association, municipal corporation, township, county, state agency, the federal government, or any combination thereof.

PROFESSIONAL ENGINEER: A person registered in the State of Ohio as a Professional Engineer, with specific education and experience in water resources engineering, acting in strict conformance with the Code of Ethics of the Ohio Board of Registration for Engineers and Surveyors.

REDEVELOPMENT: The demolition or removal of existing structures or land uses and construction of new ones.

RETENTION BASIN: A storm water management pond that maintains a permanent pool of water. These storm water management ponds include a properly engineered/designed volume dedicated to the temporary storage and slow release of runoff waters.

RIPARIAN AREA: Naturally vegetated land adjacent to watercourses which, if appropriately sized, helps to, limit erosion, reduce flood flows, and/or filter and settle out runoff pollutants, or which performs other functions consistent with the purposes of these regulations.

RIPARIAN SETBACK: Those lands within the Community which are alongside streams, and which fall within the area that the Community prohibits and restricts changes in landuse and the building of structures.

SEDIMENT: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by wind, water, gravity or ice, and has come to rest on the earth's surface either on dry land or in a body of water.

SEDIMENT BASIN: A temporary Sediment Pond that releases runoff at a controlled rate. It is designed to slowly release runoff, detaining it long enough to allow most of the sediment to settle out of the water. The outlet structure is usually a designed pipe riser and barrel. The entire structure is removed after construction. Permanent storm water detention structures can be modified to function as temporary Sediment Basins.

SEDIMENT CONTROL: The limiting of sediment being transported by controlling erosion or detaining sediment-laden water, allowing the sediment to settle out.

SEDIMENT POLLUTION: A failure to use management or conservation practices to control wind or water erosion of the soil and to minimize the degradation of water resources by soil sediment in conjunction with land grading, excavating, filling, or other soil-disturbing activities on land used or being developed for commercial, industrial, residential, or other purposes.

SEDIMENT TRAP: A temporary sediment-settling pond having a simple spillway outlet structure stabilized with geotextile and rip rap.

SENSITIVE AREA: An area or water resource that requires special management because of its susceptibility to sediment pollution, or because of its importance to the well-being of the surrounding communities, region, or the state and includes, but is not limited to, the following:

1. Ponds, wetlands or small lakes with less than five acres of surface area;
2. Small streams with gradients less than ten feet per mile with average annual flows of less than 3.5 feet per second containing sand or gravel bottoms.
3. Drainage areas of a locally designated or an Ohio designated Scenic River.
4. Riparian and wetland areas.

SETTLING POND: A runoff detention structure, such as a Sediment Basin or Sediment Trap, which detains sediment-laden runoff, allowing sediment to settle out.

SHEET FLOW: Water runoff in a thin uniform layer or rills and which is of small enough quantity to be treated by sediment barriers.

SLIP: A landslide as defined under "Landslides."

SLOUGHING: A slip or downward movement of an extended layer of soil resulting from the undermining action of water or the earth disturbing activity of man.

SOIL: Unconsolidated erodible earth material consisting of minerals and/or organics.

SOIL CONSERVATION SERVICE, USDA: The federal agency now titled the "Natural Resources Conservation Service," which is an agency of the United States Department of Agriculture.

SOIL STABILIZATION: Vegetative or structural soil cover that controls erosion, and includes permanent and temporary seed, mulch, sod, pavement, etc.

SOIL SURVEY: The official soil survey produced by the Natural Resources Conservation Service, USDA in cooperation with the Division of Soil and Water Conservation, ODNR and the local Board of County Commissioners.

STORM WATER RUNOFF: Surface water runoff which converges and flows primarily through water conveyance features such as swales, gullies, waterways, channels or storm sewers, and which exceeds the maximum specified flow rates of filters or perimeter controls intended to control sheet flow.

STREAM: A body of water running or flowing on the earth's surface, or a channel with defined bed and banks in which such flow occurs. Flow may be seasonally intermittent.

USEPA: The United States Environmental Protection Agency.

WATERCOURSE: Any natural, perennial, or intermittent channel, stream, river or brook.

WATER RESOURCES: All streams, lakes, ponds, wetlands, water courses, waterways, drainage systems, and all other bodies or accumulations of surface water, either natural or artificial, which are situated wholly or partly within, or border upon this state, or are within its jurisdiction, except those private waters which do not combine or affect a junction with natural surface waters.

WETLAND: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

WETLAND SETBACK: Those lands within the Community that fall within the area defined by the criteria set forth in these regulations.

THE CITY COUNCIL OF NORTH ROYALTON, OHIO

ORDINANCE NO. 04-203 INTRODUCED BY: Stefanik, Bobulsky, Gentile

AN ORDINANCE AMENDING THE CODIFIED ORDINANCES OF THE CITY OF NORTH ROYALTON, PART 14 BUILDING & HOUSING CODE, TITLE SIX MISCELLANEOUS BUILDING REGULATIONS BY CREATING A NEW CHAPTER 1488 ENTITLED CONTROLLING CONSTRUCTION SITE SOIL EROSION, SEDIMENT, AND OTHER WASTES AND STORM WATER RUNOFF, AND DECLARING AN EMERGENCY

WHEREAS: Flooding and streambank erosion in the city are a significant threat to public health and safety and public and private property, and storm water quantity control slows runoff and reduces its erosive force, and flood damage; and

WHEREAS: Insufficient control of storm water quantity can result in significant damage to receiving water resources, impairing the capacity of these resources to sustain aquatic systems and their associated aquatic life use designations; and

WHEREAS: Soil is most vulnerable to erosion by wind and water during soil disturbing activities and this eroded soil necessitates repair of sewers and ditches and dredging of rivers, harbors, and lakes; accelerates downstream bank erosion and damage to public and private property; endangers water resources by reducing water quality; and causes the siltation of aquatic habitat; and

WHEREAS: There is a regional effort to reduce the flooding, erosion and sedimentation within various watersheds and the city and to protect and enhance the water resources of the city, and the city recognizes its obligation as a part of a watershed and the region to reduce flooding and erosion and to protect water quality by controlling runoff within its borders; and

WHEREAS: To promote public health and safety and sound economic development in the city, it is important to provide homebuilders, developers, and landowners with consistent, technically feasible, and operationally practical standards for storm water management and soil erosion and sediment control; and

WHEREAS: Title 40 Codified Federal Register (C.F.R.) Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated cities, including the City of North Royalton, to develop a Storm Water Management Program to address among other components, erosion, sedimentation, and the quality of storm water runoff during and after soil disturbing activities; and

WHEREAS: Article XVIII, Section 3 of the Ohio Constitution and Chapter 1511 of the Ohio Revised Code grants municipalities the legal authority to adopt rules to abate soil erosion and water pollution by soil sediments.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF NORTH ROYALTON, COUNTY OF CUYAHOGA AND STATE OF OHIO, THAT:

Section 1. Council has determined that it is necessary to amend the Codified Ordinances, Part 14 Building & Housing Code, Title Six Miscellaneous Building Regulations, by creating a new Chapter 1488 entitled Controlling Construction Site Soil Erosion, Sediment, and Other Wastes and Storm Water Runoff which is attached hereto as Exhibit A and incorporated as if fully rewritten herein.

Section 2. This Ordinance shall supersede all previously adopted Ordinances in direct conflict herewith.

Section 3. It is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and that all deliberations of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 4. This Ordinance is hereby declared to be an emergency measure immediately necessary for the preservation of the public peace, health, safety and welfare of the city, and for the further reason that it is immediately necessary to provide for operationally practical standards for storm water management and soil erosion and sediment control.

THEREFORE, provided this Ordinance receives the affirmative vote of two-thirds of all members elected to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor; otherwise, from and after the earliest period allowed by law.

Robert A. Stefanik
PRESIDENT OF COUNCIL

APPROVED: Cody Lake
MAYOR

DATE PASSED: November 3, 2004

DATE APPROVED: November 4, 2004

First reading suspended
Second reading suspended
Third reading November 3, 2004

ATTEST: Lori Heller
DIRECTOR OF LEGISLATIVE SERVICES

YEAS: Stefanik, Bobulsky, Gentile, Willey, Koch, Zaccardelli, Uffman-Kirsch

NAYS: none

CHAPTER 1488
CONTROLLING CONSTRUCTION SITE SOIL EROSION, SEDIMENT, AND OTHER WASTES AND STORM WATER RUNOFF

CITY: Throughout this regulation the city shall mean the City of North Royalton, State of Ohio, and its designated agents and representatives.

COMPREHENSIVE STORM WATER MANAGEMENT PLAN: The Construction Site Conservation Plan developed to meet this regulation will be coordinated and combined with the Riparian and Wetland Setback Plan and the Post-Construction Water Quality Plan that are developed for the same site. These plans will be titled and numbered in one consecutive sequence to make a Comprehensive Storm Water Management Plan for the site. The Comprehensive Storm Water Management Plan so developed will serve as the Storm Water Pollution Prevention Plan (SWP3) required by Ohio EPA as part of the NPDES Storm Water Permit for General Construction.

PURPOSE: The intent of this regulation is to establish consistent technically feasible and operationally practical standards to achieve a level of storm water management, and erosion and sediment control that will minimize damage to public and private property and the degradation of water resources, and will promote and maintain the health, safety, and welfare of the residents of the city.

This regulation further intends, but is not limited, to:

1. Allow development while minimizing increases in downstream flooding, erosion, and sedimentation.

2. Reduce damage to receiving water resources and drainage systems that are caused by new development or redevelopment activities.

3. Control storm water runoff resulting from soil disturbing activities.

4. Assure that development site owners control the volume and rate of storm water runoff originating from their property so that surface water and ground water are protected, soil erosion is controlled, and flooding potential is not increased.

5. Preserve to the maximum extent practicable the natural drainage characteristics of the building site and minimize the need to construct, repair, and replace enclosed storm drain systems.

6. Preserve to the maximum extent practicable natural infiltration and groundwater recharge, and maintain subsurface flow that replenishes water resources, wetlands, and wells.

7. Assure that storm water controls are incorporated into site planning and design at the earliest possible stage.

8. Prevent unnecessary stripping of vegetation and loss of soil, especially adjacent to water resources and wetlands.

9. Reduce the need for costly maintenance and repairs to roads, embankments, sewage systems, ditches, water resources, wetlands, and storm water management practices that are the result of inadequate soil erosion, sediment and storm water control.

10. Reduce the long-term expense of remedial projects needed to address problems caused by inadequate storm water, erosion and sediment control.

11. Require the construction of storm water management practices that serve multiple purposes including flood control, soil erosion and sediment control, and require water quality protection; and encourage such practices that promote recreation and habitat preservation.

12. Ensure that all storm water management, soil erosion and sediment control practices are properly designed, constructed, and maintained.

DISCLAIMER OF LIABILITY: Neither submission of a plan under the provisions herein, nor compliance with the provisions of these regulations, shall relieve any person or entity from responsibility for damage to any person or property that is otherwise imposed by law.

CONFLICTS, SERVABILITY, NUISANCES & RESPONSIBILITY:

1. Where this ordinance imposes a greater restriction upon land than is imposed or required by other city provisions of law, ordinance, contract or deed, the provisions of this ordinance shall prevail.

2. If a court of competent jurisdiction declares any clause, section, or provision of these regulations invalid or unconstitutional, the validity of the remainder shall not be affected thereby.

3. These regulations shall not be construed as authorizing any person to maintain a private or public nuisance on their property. Compliance with the provisions of this regulation shall not be a defense in any action to abate such nuisance.

4. Failure of the city to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve the owner from the responsibility for the condition or damage resulting there from, and shall not result in the city, its officers, employees, or agents being responsible for any condition or damage resulting there from.

EFFECTIVE DATE: This ordinance and its regulations shall become effective upon their passage.

SCOPE: This ordinance applies to development areas having new or relocated projects involving highways, underground cables, pipelines, subdivisions, industrial projects, commercial projects, building activities on farms, redevelopment of urban areas and all other land uses not specifically exempted. This ordinance does not apply to:

1. Land disturbing activities related to producing agricultural crops or Silviculture operations regulated by the Ohio Agricultural Sediment Pollution Abatement Rules (1501: 15-3-01 to 1501: 15-3-09 of the Ohio Administrative Code) and existing at the time of passage of this regulation.

2. Coal surface mining operations regulated by Chapter 1513 of the Ohio Revised Code and existing at the time of passage of this regulation.

3. Other surface mining operations regulated by Chapter 1514 of the Ohio Revised Code and existing at the time of passage of this regulation.

CONSULTATIONS: In implementing these regulations the City Engineer or other city officials may consult with the local county SWCD, state and federal agencies and other technical experts as necessary. Any costs associated with such consultations may be assessed to the applicant or his or her designated representative.

CONSTRUCTION SITE CONSERVATION PLAN: In order to control storm water damage and sediment pollution of water resources, wetlands, riparian areas, other natural areas, and public and private lands, the owner of each development area shall be responsible for developing a comprehensive Construction Site Conservation Plan. This plan will address storm water management (volume and peak rate of runoff), soil erosion, sediment and other wastes control. This plan must contain a description of controls appropriate for each construction operation covered by these regulations, and the operator must implement the planned controls in a timely manner. The plans and BMPs used to satisfy the conditions of these regulations shall meet the standards and specifications in the current edition of the Ohio *Rain Water and Land Development* manual. The plans must make use of the practices that preserve the existing natural condition to the Maximum Extent Practicable.

1. **Development Sites Under 1 (One) Acre In Size:** Individual development sites that are larger than 8,000 square feet and smaller than one (1) acre (43,560 square feet) in total size of disturbed area, can submit abbreviated soil erosion and sediment control plans with the topography plan for the requested permit(s). The abbreviated plan must cover the following items, in addition to any other items from this ordinance that are required by the City Engineer.

   A. Storm Water Issues: A statement as to how the increased storm water runoff that will be caused by the planned development project will be handled. This statement must identify the Best Management Practices (BMPs) the new construction project will include in order to address storm water runoff.

   B. Redevelopment Exemption: Owners of development sites that were created by demolishing an older existing structure can request, in writing, that the City Engineer exempt them from the storm water issues if the total soil surface area being made impermeable is the same or less than the total soil surface area that was impermeable due to the structure(s) being torn down and removed.

   C. Riparian and Wetland Setbacks: All riparian and wetland setback areas will be identified in the plan and in the field before construction starts.

   D. Soil Erosion and Sediment Issues: A sketch of the entire development site must be submitted that identifies the location of:

1) All existing and planned impervious areas, storm water inlets, drainage swales, wetlands, streams, conservation easements and other natural features to be saved and protected on the property.

2) All existing and planned temporary and permanent conservation practices for the site. Residential lots shall include at a minimum the following:
   a) Soil erosion and sediment control BMPs, and;
   b) Construction Entrance, and;
   c) Temporary Grass Seeding with 2 tons per acre of straw mulch, and;
   d) Storm Drain Inlet Protection around every storm yard inlet on the site or accepting drainage from the site, and;
   e) Silt Fence protection for any stream located on or close to the site and lacking an adequate vegetative buffer, and;
   f) Silt Fence to prevent sediment discharge into street storm sewer inlets where no centralized sediment control exists for the drainage area that includes the lot, and;
   g) Construction fence to protect any conservation easements, riparian setbacks and wetland setbacks from encroachment by construction activities.

E. The schedule for the use of Temporary Seeding developed according to the Temporary Seeding Table contained in the Minimum Standards Section of this ordinance must be included. The location of construction material stockpile areas, if such have been approved by the City Engineer, with a description of the Soil Erosion and Sediment Controls to be maintained on the stockpile area prior to, during, and after the area is used for stockpiling.

2. **Development Sites 1 (One) Acre In Size or Larger:** All developments that have a *larger common plan of development or sale* equal to or larger than one (1) acre in size of disturbed area are subject to this ordinance and shall follow all of the requirements set forth in this ordinance.

A. Description of the Plan of Construction: The following information shall be included in the Construction Site Conservation Plan:

1) Site Description:
   a) A description of the prior land uses of the site.
   b) A description of the nature and type of construction activity (e.g., low density residential, shopping mall, highway, etc.).
   c) A description of the total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavating, filling or grading, including off-site borrow, fill or spoil areas and off-site utility installation areas).
   d) An estimate of the impervious area and percent imperviousness created by the construction activity.
   e) The types of soils within, or affected by, the development area, and the location of all highly erodible or unstable soils as determined by the most current edition of the soil survey of the county, by the Natural Resources Conservation Service (NRCS),
   f) An onsite, detailed Soils Engineering Report if required by the City Engineer.
   g) The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water and the major river watersheds in which it is located.

2) A vicinity sketch locating:
   a) The larger common plan of development or sale
   b) The development area
   c) All pertinent surrounding natural features within 200 feet of the development site including, but not limited to:
      01 Water resources such as wetlands, springs, lakes, ponds, rivers and streams (including intermittent streams with a defined bed and bank)
      02 Conservation Easements
      03 Other sensitive natural resources
      04 The sensitive areas receiving runoff from the development
   d) All off-site borrow or spoil areas
   e) All off-site utility installation areas that are related to the planned project

3) The existing and proposed topography shown in the appropriate contour intervals as approved by the City Engineer (generally one-foot contours are used).

4) The location and description of existing and proposed drainage patterns and facilities, including any allied drainage facilities beyond the development area and the larger common plan of development or sale.

5) Existing and proposed watershed boundary lines, direction of flow and watershed acreage.

6) The person or entity responsible for continued maintenance of all vegetative and/or mechanical BMPs for both the construction and post-construction phases of the development.

7) Long-term maintenance requirements and schedules of all BMPs for both the construction and post-construction phases of the development.

8) Long-term maintenance inspection schedules.

9) The person or entity financially responsible for conducting the inspections of, and the maintenance of, permanent storm water conveyance and storage structures and all other conservation practices.

10) The method of ensuring that funding will be available to conduct the long-term maintenance and inspections of all permanent storm water, soil erosion and sediment control and water quality practices.

11) The location of any existing or planned riparian and/or wetland setback areas on the property.

12) The plan must clearly describe, for each major construction activity, the appropriate BMPs and the general timing (or sequence) during the construction process of when the measures will be implemented; and, who (which contractor) will be responsible for implementation (e.g., Contractor A will clear, grub and install perimeter controls and Contractor B will maintain perimeter controls until final stabilization; Contractor C will conduct and document the scheduled inspections.)

13) Location and description of any storm water discharges associated with dedicated asphalt and concrete plants covered by this regulation and the Best Management Practices to address pollutants in these storm water discharges.

B. Construction Site Conservation Plan Elements: the Construction Site Conservation Plan shall include, at a minimum, the following information:

1) The Construction Site Conservation Plan shall include a map showing the location of:
   a) The limits of earth disturbing activity including excavations, filling, grading or clearing.
   b) Drainage patterns during major phases of construction.
   c) The location of each proposed soil erosion and sediment control BMP, including:
      01 Permanent soil erosion control practices to be left in place after construction operations have been completed (e.g. level spreaders, permanent erosion control matting, gabions, rock lined channels, etc.),
      02 Areas likely to require temporary stabilization during the course of site development,
      03 Designated construction entrances where vehicles will access the construction site,
      04 In-stream activities including stream crossings,
      05 Areas designated for the storage or disposal of solid, sanitary and toxic wastes,
      06 Dumpsters,
      07 Cement truck washout,
      08 Fuel tanks
      09 BMPs that divert runoff away from disturbed areas and steep slopes where practicable including rock check dams, pipe slope drains, diversions to direct flow away from exposed soils, and protective grading practices,
      10 Sediment settling ponds drawn to scale.
   d) Existing and proposed locations of buildings, roads, parking facilities and utilities.
   e) Boundaries of wetlands and stream channels the owner intends to fill or relocate for which the owner has approval from the US Army Corps of Engineers and/or Ohio EPA.

2) The Construction Site Conservation Plan shall include a list of soil erosion and sediment control BMPs being used and the standards and specifications, including detailed drawings, for each BMPs. This list shall include:

a) Methods of controlling the flow of runoff from disturbed areas so as to prevent or minimize erosion.

b) Identification of the Structural Practices to be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. A description shall be included of how each selected control will store runoff so as to let sediments settle out and/or divert flows away from exposed soils or act to limit runoff from exposed areas.

c) Identification for each Structural Practice of its size, detail drawings, maintenance requirements and design calculations.

d) The type and amount of plant seed, live plants, fertilizer, agricultural ground limestone and mulch to be used. Specification of soil testing requirements for fertility and lime requirements will be included. Specification for the use of perennial grass seed will also be included.

e) Settling ponds will be identified with basic dimensions and the calculations for size and volume.

f) Detailed drawings and installation requirements of all other structural control BMPs.

g) Any other soil erosion and sediment control related BMPs and items that are required by the City Engineer.

h) For developments where the overall plan does not call for centralized sediment control capable of controlling multiple individual lots, a detail drawing of a project specific typical individual lot showing standard individual lot soil erosion and sediment control practices and the sequence and timing of BMP installation for the individual lots. This does not remove or eliminate the responsibility to designate and install specific soil erosion and sediment control practices for the storm water discharges.

3) The Construction Site Conservation Plan shall include the scheduling, phasing, and coordination of construction operations and erosion and sediment control BMPs, including vegetative plantings and mulch.

C. The Construction Site Conservation Plan shall include a description of the Storm Water Management (SWM) practices to be used on the site. The SWM element of the Plan shall include, at a minimum, the following:

1) A map showing the location, drawn to scale, of permanent SWM conveyance, detention and retention structures, other SWM control structures and the SWM easements.

2) A general description of the SWM strategy proposed to meet this ordinance.

3) Design calculations for all permanent SWM conveyance, detention and retention structures, and other SWM control structures.

4) Any other SWM related items required by the City Engineer.

EASEMENTS: Future access to floodplains, flood control facilities, runoff storage facilities, storm sewers and other drainage ways and structures, as required by the City Engineer, shall be secured by means of easements.

1. The easements shall be recorded in the name of the city and, in single-family residential developments, the homeowners association.

2. Such easements shall be not less than twenty (20) feet in width, in addition to the width of the facility it is to serve. Access easements of this type shall be provided on one (1) side of the flood control, or similar type facility.

3. Access along the initial drainage system shall be by means of easements. Such easements shall be not less than twenty (20) feet in width, with a minimum ten (10) foot width on either side of the centerline.

4. Access adjacent to storage facilities shall consist of a twenty (20) foot easement in the case of detention (dry) basins, and a twenty (20) foot easement with a twenty-five 25 foot level bench in the case of retention (wet) basins, measured from the top of the bank, and shall include the storage facility itself.

5. Easements for the emergency flow ways shall be a minimum of twenty (20) feet in width, or larger if required by the City Engineer.

6. Flood control or storm drainage easements containing underground facilities shall have a minimum width of twenty (20) feet.

7. The easements shall be restricted against the planting within said easement of trees, shrubbery or plantings with woody growth characteristics, and against the construction therein of buildings, accessory buildings, fences, walls or any other obstructions to the free flow of storm water and the movement of inspectors and maintenance equipment and also restricted against the changing of final grade from that described by the grading plan.

MAINTENANCE: Any portion of the permanent drainage and soil erosion systems, including on-site and off-site storage facilities that are constructed by the owner, will be continuously maintained into perpetuity.

1. Maintenance plans shall be provided by the permittee to both the City Engineer and the post-construction operator of the BMP (including homeowner associations) upon completion of construction activities and prior to the City Engineer giving final approval for the completed construction.

2. Single Family and Multi-family Residential Developments: A Homeowners' Association shall be created and placed in title of the affected lands and shall be continuously responsible for post-construction maintenance and inspections into perpetuity.

3. Apartments, Commercial and Industrial Developments: The plans will clearly state that the owner of the property shall be continuously responsible for post-construction maintenance and inspections into perpetuity.

4. Maintenance Design: All temporary and permanent soil erosion and sediment control practices shall be designed and constructed to minimize maintenance requirements. Multi-use facilities incorporating assets such as aesthetics and recreation may be incorporated into the design of the drainage facilities. All permanent drainage, soil erosion, sediment control, water quality management systems and BMPs, including on-site and off-site structures and vegetation that are constructed or planted, must be inspected and maintained into perpetuity by the responsible party designated in the plans. Inspections and maintenance will be incorporated periodically throughout the year to ensure that the facilities are properly operational.

5. Perpetual Maintenance Inspections: One (1) inspection with a written report will be performed each year. The written report will be given to the City Engineer by May 1st of each and every year after the Best Management Practice (BMP) has been completed.

   A. Structures that require a permit from the Ohio Division of Water: A written and stamped report from a professional engineer on the status of all structural BMPs that require a permit from the Ohio Department of Natural Resources (ODNR) Division of Water. This applies to all BMPs that require a permit either at the time of construction or fall under the jurisdiction of the ODNR Division of Water at any time after construction is completed.

   B. Easements: A written report from an inspector on the status of all storm water management easements for each project shall be submitted to the City Engineer by May 1st of each year into perpetuity. These reports will document if restricted plantings, fences and structures are on the easement and will identify the location of the noted easement restriction violations.

   C. Best Management Practices (BMPs) that do not have a high risk for loss of life, bodily injury, or damage to structures or infrastructure related to imminent failure as determined by the City Engineer: A written and stamped report from a professional engineer, landscape architect or Certified Professional In Erosion and Sediment Control (CPESC) on the status of permanent soil erosion, sediment control, water quality management systems and the status of the related easements shall be submitted to the City Engineer by May 1st of each year into perpetuity.

   D. BMPs that have a potential loss of Life: A written and stamped report covering the status of all BMPs that have a potential for loss of life, bodily injury, or damage to structures or infrastructure will be prepared by a professional engineer or other individual possessing a valid state license that authorizes them to design the same type of BMP for construction.

MINIMUM STANDARDS: In order to control sediment pollution of water resources, the owner or person responsible for the development area shall use conservation planning and practices to maintain the level of conservation established in the following standards.

1. The plan shall include measures that control the flow of runoff from disturbed areas so as to prevent soil erosion from occurring.

2. Structural Practices shall be used to control erosion and trap sediment from areas remaining disturbed for more than 14 days.

3. Sediment Barriers: Sheet flow runoff from denuded areas shall be intercepted by Silt Fence or Diversions to protect adjacent properties and water resources from sediment. Where intended to

provide sediment control, Silt Fence shall be placed on a level contour. The relationship between the maximum drainage areas to Silt Fence for a particular slope is shown in the table below.

Table 1: Silt Fence Applicability

Maximum drainage area (in acres) to 100 linear feet of Silt Fence	**Range of slope for a particular drainage area (in percent)**
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

This does not preclude the use of other sediment barriers designed to control sheet flow runoff. The total runoff flow treated by a sediment barrier shall not exceed the design capacity for that sediment barrier. Straw Bale Barriers are not acceptable.

4. Storm Water Diversion Practices: Storm water diversion practices shall be used to keep runoff away from disturbed areas and steep slopes where practicable. Such practices, which include Swales, Dikes or Berms, Pipe Slope Drains and Diversions, may receive storm water runoff from areas up to ten (10) acres. Storm water diversion practices alone are not considered a sediment control practice unless those are used in conjunction with a sediment settling pond.

5. All sediment control practices must be capable of ponding runoff in order to be considered functional.

6. Clearing and Grubbing will be done in two (2) or more phases. The first phase will include only those locations necessary to install the perimeter soil erosion, sediment and storm water control BMPs. After the perimeter controls are in place and functioning, the remaining phase(s) of clearing and grubbing may continue.

7. Timing of Sediment Trapping Practices: Sediment control practices shall be functional throughout all phases of up slope earth disturbing activity. Settling facilities, perimeter controls and other practices intended to trap sediment shall be implemented **prior** to grading and within seven (7) days from the start of grubbing. They shall continue to function until the up slope development area is permanently restabilized. As construction progresses and the topography is altered, appropriate controls must be constructed or existing controls altered to address the changing drainage patterns.

8. Stabilization of Denuded Areas: Disturbed areas must be stabilized as specified in the tables below, or according to the Ohio EPA NPDES Storm Water Permit Rules, whichever is most restrictive:

Table 2: Permanent Stabilization

Area requiring permanent stabilization	**Time frame to apply erosion controls**
Any areas that will lie dormant for one (1) year or more	Within seven (7) days of the most recent disturbance
Any areas within fifty (50) feet of a stream and at final grade	Within two (2) days of reaching final grade
Any other areas at final grade	Within seven (7) days of reaching final grade within that area

Table 3: Temporary Stabilization

Area requiring temporary stabilization	Time frame to apply erosion controls
Any disturbed areas within 50 feet of a stream and not at final grade	Within two days of the most recent disturbance if the area will remain idle for more than 21 days
For all construction activities, any disturbed areas that will be dormant for more than 21 days but less than one year, and not within 50 feet of a stream	Within seven days of the most recent disturbance within the area For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of NPDES permit coverage for the individual lot(s). Proof of permit coverage transfer from Ohio EPA must be submitted to the City Engineer. The City Engineer shall then inspect the lot to ensure that the Temporary Seeding has been done.
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed.

9. Sediment Settling Ponds: Storm water runoff that exceeds the design capacity of sediment barriers and concentrated storm water flows shall pass through a sediment settling facility.

   A. Where storm sewer drainage areas include 10 or more acres disturbed at one time, a temporary (or permanent) sediment settling pond must be provided until final stabilization of the site. In single-family residential construction, final stabilization is after the houses are built and permanent landscaping is done.

      1) Alternative equivalent controls may be used if the owner can show, in writing, that the Ohio EPA approved the use the alternatives in the (Ohio EPA NPDES Permit for Construction Activity) Storm Water Pollution Prevention Plan (SWP3) for the site.

      2) It is recommended that for drainage locations of less than 10 acres, smaller sediment settling basins and/or Sediment Traps be used.

   B. Each facility's storage capacity shall be no less than sixty-seven (67) cubic yards per acre of total contributing drainage area. The storage volume will be measured from the bottom of the basin to the top of the primary (principle) spillway.

   C. Permanent storm water management ponds that are designed to trap sediment during construction shall be designed to provide for a slow release of sediment-laden water. The draw down time must be at least 72 hours, or meet the criteria in the Ohio *Rainwater and Land Development* manual whichever is most stringent.

   D. The design configuration between inlet(s) and the outlet of settling ponds must provide at least two units of length for each one unit of width (> 2:1 length to width ratio).

   E. The depth of the sediment settling pond must be less than or equal to five (5) feet.

   F. Sediment must be removed from the sediment settling ponds when the design capacity has been reduced by 40%.

   G. Public safety, especially as it relates to children, must be considered in the design. Alternative sediment controls must be used where site limitations would preclude a safe design.

   H. Temporary sediment settling ponds will not be constructed in any stream channel.

   I. Temporary sediment settling pond will not be constructed in any future pavement or building foundation area.

10. Storm Sewer Inlet Protection:

   A. All storm sewer inlets that accept water runoff from the development area shall be protected so that sediment-laden water will not enter the storm sewer, unless the storm drain system drains to a Sediment Settling Pond and is exempted in writing by the City Engineer. In areas where

construction will be ongoing, such as subdivisions, the storm sewer protection shall be maintained until all up slope areas reach final stabilization, as determined by the City Engineer.

B. At the end of this period the site owner shall hydraulically clean the storm sewers to the satisfaction of the City Engineer. All sediments shall be removed from the system and shall not be flushed downstream.

11. Storm Sewer & Other Drainage Outlets: All storm sewers, footer drains, roof gutter drains and all other drains will be outletted at the bottom of the slope. The slope below the outlet will be able to control the water being drained through the storm sewer or other drains without causing erosion of the stream or channel banks or channel bottom or other areas that the water is outletted on.

12. Working Near, Or Crossing Streams and Wetlands:

A. Construction vehicles shall avoid water resources, wetlands, riparian areas, and their setbacks. If construction vehicles must cross these areas during construction, an approved temporary crossing shall be constructed. Streams, including intermittent streams with a defined bed and banks, shall be restabilized immediately after in-channel work is completed, interrupted, or stopped. Erodible materials will not be used in making stream crossings.

B. No soil, rock, debris, or any other material shall be dumped or placed into a water resource or into such proximity that it may slough, slip, or erode into a water resource unless such dumping or placing is authorized by the approving authority and, when applicable, the US Army Corps Of Engineers and Ohio EPA, for such purposes as, but not limited to, constructing bridges, culverts, and erosion or sediment control structures.

C. If construction activities disturb areas adjacent to streams, structural practices shall be designed and implemented on site to protect the adjacent streams from the impacts of sediment runoff.

D. No temporary or permanent sediment controls will be constructed in a stream channel.

E. Streams and wetland setbacks required by the city will be implemented. As a minimum a setback of 25 feet, as measured from the ordinary high water mark of the surface water, will be maintained in its natural state as a permanent buffer.

13. Construction Entrance:

A. Measures shall be taken to prevent soil transport onto public roads, or surfaces where runoff is not checked by sediment controls.

B. Stone with geotextile construction entrance(s) shall be implemented as required by the City Engineer and the Ohio EPA. These will be planned and installed according to the requirements in the most recent edition of the Ohio *Rainwater and Land Development* manual.

C. Where soil is transported onto a public road surface, the roads shall be cleaned thoroughly at the end of each day, or more frequently, in order to ensure public safety. Soil shall be removed from paved surfaces by shoveling or sweeping. Street washing shall be allowed only after shoveling or sweeping has removed most of the sediment and street sewer inlet protection is properly installed unless end of sewer sediment ponds exist and are properly functioning.

D. Erodible material ramps in streets will not be used to enable equipment to cross curbs. Non-erosive materials (e.g. wood and stone) can be used.

14. Unstable Soils:

A. Unstable soils will be as determined by the local county Soil Survey or by a detailed soils report.

B. The City Engineer may require detailed soil reports when deemed necessary.

C. Unstable soils prone to slipping or land sliding shall not be graded, excavated, filled or have loads imposed upon them unless the work is performed in accordance with a qualified professional engineer's recommendations to correct, eliminate, or adequately address the problems.

15. Cut And Fill Slopes: Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion and slippage. Consideration shall be given to the length and steepness of the slope, soil type, up slope drainage area, groundwater conditions and slope stabilization. The minimum final

unreinforced soil slopes will have a horizontal to vertical ratio of 2:1 (the horizontal will be two (2) times the vertical).

16. Stabilization of Outfalls and Channels: Outfalls and constructed or modified channels shall be designed and constructed to withstand the expected velocity of flow from the planned post-development frequency storm without eroding. The planned post-construction velocity and flow shall include the entire contributing watershed.

17. Establishment of Permanent Vegetation: A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until ground cover is achieved which, in the opinion of the City Engineer, has 80% vegetative density over the entire disturbed area and provides adequate cover, and is mature enough to satisfactorily control soil erosion and survive adverse weather conditions.

18. Disposition of Temporary Practices: All temporary soil erosion and sediment control practices shall be disposed of immediately after final site stabilization is achieved or after the temporary practices are no longer needed, unless otherwise required by the City Engineer. Trapped sediment shall be permanently stabilized to prevent further erosion. The Construction Maintenance Guarantee shall not be released by the city until all temporary soil erosion and sediment control practices that are no longer needed have been removed, properly disposed of and any trapped sediment has been stabilized.

19. Underground Utility Construction: The construction of underground utility lines, pipes, etc. shall be subject to the following criteria:

    A. Trenches shall remain open for no more than five days.

    B. There shall be no turbid discharges to surface waters resulting from dewatering activities. If trench or ground water contains sediment, it must pass through a sediment settling pond or other equally effective sediment control device, prior to being discharged from the construction site or to waters of the state.

    C. When discharging clean ground water care must be taken to ensure that it does not become pollutant laden by crossing over disturbed soils or other pollutant sources.

20. Inspections:

    A. If inspections or other information indicates a control has been used inappropriately or incorrectly or it has failed, it must be replaced or modified for the site conditions.

    B. The owner of the development area shall have the site inspected for soil erosion, sediment control and other environmental concerns every seven (7) calendar days, and within twenty-four (24) hours of a 0.5 inch or greater rainfall event until the City Engineer certifies the site as being stable. The City Engineer certification does not relieve the permittee from meeting the Ohio EPA NPDES inspection requirements.

    C. The owner, or his designated representative, shall keep a written log of each inspection and any subsequent improvements to the soil erosion, sediment control or other environmental controls. The inspections shall include the date of the inspection, the name of the inspector, weather conditions, and the actions needed to correct the identified problems.

    D. The inspection log will include the date and actions taken to correct problems noted in past inspection logs.

    E. If the construction site is subject to Ohio EPA's National Pollutant Discharge Elimination System (NPDES) permit for construction activity, a copy of all of the required inspection sheets will be submitted to the City Engineer within three (3) working days of the date that the inspection was conducted.

    F. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system.

    G. Erosion and sediment controls identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly.

    H. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters.

    I. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

J. If the inspection reveals that a control practice is in need of repair or maintenance, with the exception of sediment settling ponds, it must be repaired or maintained within three (3) days of the inspection. Sediment settling ponds must be repaired or maintained within ten (10) days of the inspection.

K. If any inspection reveals that a control practice fails to perform its intended function and that another, more appropriate control practice is required, the Construction Site Conservation Plan must be amended and the new control practice must be installed within 10 days of the inspection.

L. If the inspection reveals that a control practice has not been implemented in the time required by this ordinance it must be installed within ten (10) days from the date of inspection.

M. If the inspection reveals that a planned control practice is not needed, the record must contain a statement of explanation as to why the control practice is not needed.

21. Control of Materials and Debris: Site management practices shall be implemented to prevent toxic materials, hazardous materials, or other debris from entering the city's and state's water resources or wetlands. These practices shall include, but are not limited to, the following:

A. A covered dumpster shall be made available for the proper disposal of construction site waste materials, garbage, plaster, drywall, grout, gypsum and etc. A second covered dumpster will be provided for the proper disposal of toxic and hazardous wastes.

B. The washing of excess concrete material into a street, catch basin, or other public facility or natural resource shall not occur. A designated area for concrete washouts shall be made available and used for all concrete washouts.

C. All fuel tanks and drums shall be stored in a marked storage area. A dike shall be constructed around this storage area with a minimum capacity equal to 110% of the volume of the largest container in the storage area. All additional requirements of the local fire authority must be followed. If the fuel tanks have a self-contained "dike," the plug will be kept in the "dike" tank at all times.

D. Any toxic or hazardous wastes and/or contaminated soils must be disposed of according to all applicable environmental laws and statutes. Local health districts and Ohio EPA can provide guidance on these issues.

E. On a site with a prior industrial landuse or a site that is contaminated with gasoline, fuel oil, hydrocarbon based chemicals or other Ohio EPA regulated contaminates, the storm water is considered wastewater. A permit from Ohio EPA is required to address these sites.

F. Proper permits shall be obtained for development projects on solid waste landfill sites.

G. Paint, paint washing liquids, excess paints and other paint wastes are considered solid wastes and shall be disposed of in accordance with applicable state regulations. Appropriate handling of these wastes shall occur at the site so as to prevent the discharge of these wastes into surface or ground waters.

1. Water based paint washing liquids and small quantities of excess water based paints may be disposed of by flushing down a connected sanitary sewer but may not be disposed of in an on-lot disposal system.
2. All other paints, paint thinners, and paint cleaning materials will be disposed of in the site's hazardous waste disposal dumpster.

H. Restroom facilities will be provided for site workers at all times that workers are present on the site and during all phases of the construction.

I. All required permits from appropriate federal, state, or local agencies are required to develop land with a previous industrial or commercial use or another use that may have led to soil contamination by a regulated pollutant.

22. Pre-winter Stabilization: If the development area will, or is planned to remain, active through the winter months, the owner of the development area shall hold a Pre-Winter Stabilization Meeting. The meeting will be held before October 1st. The owner shall invite the operator, developer, engineer, contractor, City Engineer and anyone else requested by the City Engineer to the meeting.

23. Storm Water Basins:

A. Pool Geometry: The minimum length-to-width ratio for the pond is 3:1 (the length will be three (3) times the width).

B. Riser in Embankment: The riser shall be located within the embankment for purposes of maintenance access. Access to the riser will be by manholes.

C. Water Drains: Each retention basin shall have a drainpipe that can completely drain the pond. The drain shall have an elbow within the pond to prevent sediment deposition from plugging the drain.

D. Adjustable Gate Valves: Both the storm water management and water quality basin drains shall have adjustable gate valves. Valves shall be located inside the riser at a point where they will remain dry and can be operated in a safe and convenient manner. During the annual inspections the valves shall be fully opened and closed at least once, and the certifying official shall attest to this on the inspection form. To prevent vandalism, the handwheel shall be chained to a ringbolt or manhole step.

E. Principal Spillway: Each principal spillway shall be designed in accordance with the NRCS standards and specifications for the office serving the county. Each principal spillway shall have the capacity to pass the 100-year design storm flow. The inlet or riser size for the pipe drops shall be designed so that the flow through the structure goes from weir flow control to pipe flow control without going into orifice control in the riser. The crest elevation of the primary spillway shall be no less than one foot below the emergency spillway crest. Premium joint pipe is required and a removable trash rack shall be installed at each location. Anti-seep collars shall be provided for all pipe conduits through an embankment.

F. Emergency Spillway: An emergency spillway shall be provided on each storm water management basin. Emergency spillways shall convey flood flows safely past the embankment, and shall be designed in accordance with NRCS standards and specifications for the office serving the local county. Emergency spillways shall have a 100-year design storm capacity unless exempted in writing by the City Engineer.

G. Embankments: Each dam embankment shall be designed in accordance with the NRCS standards and specifications for the office serving the county that the project is located in. Anti-seep collars shall be provided for all pipe conduits through an embankment.

H. Safety Features:

1) The primary spillway opening shall not permit access to the public and other non-maintenance personnel.

2) The perimeter of all water pool areas that are deeper than three (3) feet shall be surrounded by benches that meet the following:

a) A safety bench, with a maximum slope of 3%, which extends outward, on dry land, from the shoreline. This bench will be a minimum of 25 feet wide to provide for the safety of individuals and maintenance vehicles that are adjacent to the water pool. The safety bench may be landscaped, without the use of structures, to prevent access to the water pool.

b) Side slopes between the safety bench and the aquatic bench shall not be steeper than 3:1 (3 feet horizontal for every 1 foot vertical).

c) An aquatic bench that extends inward from the shoreline far enough to ensure public safety and has a maximum depth of 15 inches below the normal water surface elevations. The aquatic bench may be landscaped to prevent access to the deeper water pool.

d) Side slopes beyond the aquatic bench and below the permanent water level shall not be steeper than 2:1 (2 feet horizontal for every 1 foot vertical).

e) The contours of the pond will be designed and managed to eliminate drop-offs and other hazards.

f) Side slopes getting to the pond shall not exceed 3:1 and shall terminate on a safety bench.

g) Soil erosion and sediment control practices used to satisfy these standards shall meet the standards and specifications in the current edition of the Ohio *Rainwater and Land Development* manual, NRCS Field Office Technical Guide for the local county or the Ohio EPA, which ever is most stringent.

24. These standards are general guidelines and shall not limit the right of the City Engineer to impose at any time additional, more stringent requirements, nor shall the standards limit the right of the City Engineer to waive, in writing, individual requirements.

25. Soil limitations shall be determined by using the current edition of the county soil survey written by the NRCS, USDA.

26. Methods for controlling increases in storm water runoff peaks and volumes may include, but are not limited to:
    A. Retarding flow velocities by increasing friction; for example, grassed road ditches rather than paved street gutters where practical, discharging roof water to vegetated areas, or grass and rock-lined drainage channels.

    B. Grading and use of grade control structures to provide a level of control in flow paths and stream gradients.

    C. Induced infiltration of increased storm water runoff into soil, where practical; for example, constructing special infiltration areas where soils are suitable, retaining topsoil for all areas to be vegetated, or providing good infiltration areas with proper emergency overflow facilities.

    D. Provisions for detention and retention, for example, permanent retention ponds and lakes, dry detention basins, and subsurface detention tanks.

STREAM CHANNEL AND FLOODPLAIN EROSION DESIGN CRITERIA:

1. Runoff Rate: The peak runoff rate from the development area shall not be greater after development than it was before development. The applicant shall provide calculations proving no increase in the runoff rates from the one (1), two (2), five (5), ten (10), twenty-five (25), fifty (50) and one hundred (100) year storms.

2. Runoff Volume: Increases in the runoff volume shall be offset by further restricting runoff rates. Based on the increase in runoff volume, the applicant shall determine the critical storm for the development area. The runoff rate from the critical storm shall be restricted to the one (1) year pre-development storm runoff rate. The critical storm shall be calculated as follows:

    A. Determine the total volume of runoff from a one-year frequency, twenty-four hour storm, occurring on the development area before and after development.

    B. From the volumes in paragraph (1) determine the percent of increase in volume of runoff due to development according to the equation (Q after divided by the Q before) X 100 and, using this percentage, select the critical storm from this table:

Table 4: Critical Storm Selection

The Percentage Increase In Volume Of Runoff Is:		
Equal To Or Greater Than	**And Less Than**	**The 24-Hour "Critical Storm" For Discharge Will Be**
0	10	1 Year
10	20	2 Years
20	50	5 Years
50	100	10 Years
100	250	25 Years
250	500	50 Years
500	----	100 Years

3. Detention Or Retention Basin Exemption For Redevelopment Or For Expansion Of Existing Facilities:

    A. For any development regulated by this ordinance, the construction of a detention or retention basin may not be required for the development if the post-development peak discharge for a 100 year frequency 24 hour storm increases the existing peak discharge by one (1) cubic foot per second or less using the TR-55 method of calculation or other method approved by the City Engineer. The City Engineer can waive this requirement if existing storm sewers and drainage structures can safely handle the expected increase in flow.

    B. Only one (1) exemption will be allowed per parcel. Any subsequent expansion must provide for detention or retention and must include the previously exempted area.

4. Where the City Engineer determines that site constraints exist in a manner that compromises the intent of this ordinance to improve the management of storm water runoff as established in this section, practical alternatives may be used to result in an improvement of water quality and/or a reduction of

storm water runoff. Such alternatives must be in keeping with the intent and likely cost of those measures that would otherwise be required to meet the objectives of this section. When possible, all practical alternatives shall be implemented within the drainage area of the proposed development project. Practical alternatives can include, but are not limited to:

A. Fees shall be paid in an amount specified by the City Engineer. These fees shall be applied by the city to storm water management practices that reduce existing storm water runoff.

B. Implementation of off-site storm water management practices.

C. Watershed or stream restoration.

D. Retrofitting of an existing storm water management practice.

E. Other practices approved by the City Engineer in keeping with the intent of this section.

COMPLIANCE WITH OTHER RULES AND REGULATIONS:

1. Ohio Dam Safety Laws: The provisions of the Ohio Dam Safety Laws shall be followed. Proof of compliance with the Ohio Dam Safety Law administered by the ODNR Division of Water shall be, but is not limited to, a copy of the ODNR Division of Water permit number or a copy of the project approval letter from the ODNR Division of Water or a letter from the site owner explaining why the Ohio Dam Safety Law is not applicable. The written proof will be provided to the City Engineer before a construction permit will be issued.

2. NPDES Permits: The provisions of the National Pollutant Discharge Elimination System (NPDES) Permits, issued by the Ohio EPA, shall be followed. Proof of compliance shall be, but is not limited to, a copy of the Ohio EPA NPDES Permit number or a letter from the site owner explaining why the NPDES Permit is not applicable. The written proof will be provided to the City Engineer before a construction permit will be issued.

3. Federal And State Wetland Permits: The provisions of the U.S. Army Corps of Engineers dredge and fill permits for federally-protected wetlands shall be followed. The provisions of Ohio EPA's Isolated Wetlands Permits shall also be followed. Wetlands and other waters of the United States shall be delineated by protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of the application of these regulations. Written proof of compliance with both permit programs will be provided to the City Engineer before a construction permit will be issued. Proof of compliance shall be, but is not limited to, the following:

   A copy of the U.S. Army Corps of Engineers Individual Permit, if required for the project, showing project approval and any restrictions that apply to site activities; **or**

   A site plan showing that any proposed fill of waters of the United States conforms to the general and specific conditions specified in the applicable Nationwide Permit; **or**

   A letter from the site owner verifying that a qualified professional has surveyed the site and found no wetlands or other waters of the United States. Such a letter shall be noted on site plans submitted to the city.

VIOLATIONS: No person shall violate, or cause, or knowingly permit to be violated, any of the provisions of these regulations, or fail to comply with any such provisions or with any lawful requirements of any public authority made pursuant to these regulations, or knowingly use or cause or permit the use of any lands in violation of these regulations or in violation of any permit granted under these regulations.

PENALTIES:

1. Whoever violates or fails to comply with any provision of this regulation is guilty of a misdemeanor of the first degree and shall be fined no more than one thousand dollars ($1,000.00) or imprisoned for no more than one hundred eighty (180) days, or both, for each offense.
2. A separate offense shall be deemed committed each day during or on which a violation or noncompliance occurs or continues.

3. Upon notice from the City Engineer, or designated representative, that work is being performed contrary to this regulation, such work shall immediately stop. Such notice shall be in writing and shall be given to the owner or person responsible for the development area, or person performing the work, and shall state the conditions under which such work may be resumed; provided, however, in instances where immediate action is deemed necessary for public safety or the public interest, the City Engineer may require that work be stopped upon verbal order pending issuance of the written order.

4. The imposition of any other penalties provided herein shall not preclude the city, by or through its Law Director and/or any of their assistants, from instituting an appropriate action or proceeding in a Court of Proper Jurisdiction to prevent an unlawful development or to restrain, correct or abate a violation, or to require compliance with the provisions of this regulation or other applicable laws, or ordinances, rules or regulations or the orders of the City Engineer.

CONSTRUCTION AND MAINTENANCE GUARANTEE: All permanent storm water, soil erosion, other wastes control, and water quality practices not specifically waived by the city shall be constructed prior to the granting of the Final Plat Approval. Upon the request of the owner, the city may defer the construction or installation of a permanent storm water, soil erosion, sediment, or other wastes control or water quality practice prior to the approval of the final plat where, in the City Engineer's judgment, such proper construction or installation is not immediately necessary for the protection of the public health and safety; and where the prior installation or construction of such improvement would constitute an undue hardship on the owner because in the case of new vegetation or weather conditions, or because in the case of concrete, building construction could cause cracking and excessive wear and tear on new structures. In such event, the city shall require a Security Bond, Escrow Account, Certified Check or Cash to guarantee that such deferred improvements will be properly constructed or installed within an agreed specified time, but not to exceed six (6) months after the filing of such final plat.

The owner will provide a maintenance guarantee for all permanent improvements, and soil erosion, wastes controls, and water quality practices.

The city shall require a Security Bond, Escrow Account, Certified Check or Cash to guarantee that the planned temporary and permanent soil erosion, sediment, and other wastes controls and water quality practices will be constructed and removed in a timely manner, as determined by the City Engineer.

1. The Guarantee: The guarantee of both performance and maintenance will be in the form of a Security Bond, Escrow Account, Verified Check or Cash. The Security Bond, Escrow Account, Verified Check or Cash will be used by the city to complete any guaranteed construction or removal of improvements or temporary and permanent soil erosion, sediment, and other wastes control practices that are not adequately completed, maintained or removed by the owner in a timely manner, as determined by the City Engineer. The Security Bond, Escrow Account, Verified Check or Cash will be in the total amount of both the performance guarantee and the maintenance guarantee. Ohio municipalities and counties may require performance bonds or other guarantees for water management improvement as stated in the ORC Chapter 711.101.

   A. Security Bond, Escrow Account, Verified Check or Cash shall be deposited with the city prior to review by the City Engineer and/or its consultants to cover professional services of the City Engineer, Building Commissioner, Zoning Inspector and/or other experts required by the City Engineer, City Council, Mayor or Review Boards.

   B. No soil disturbing activities shall be permitted until a Security Bond, Escrow Account, Verified Check or Cash has been posted to the satisfaction of the City Engineer sufficient for the city to perform the obligations otherwise to be performed by the owner or person responsible for the development area as stated in this regulation, and to allow all work to be performed as needed in the event that the owner or person responsible for the development area fails to comply with the provisions of this regulation. The Security Bond, Escrow Account, Verified Check or Cash shall be released only after all work required by this regulation has been completed to the satisfaction of the City Engineer and all permit and inspection fees required by these regulations have been paid in full.

   C. No project subject to this regulation shall commence without the Construction Site Conservation Plan having been approved by the City Engineer.

2. Performance Guarantee: The furnishing of a performance guarantee will be maintained in an amount of not less than 120% of the estimate approved by the City Engineer, of installation of the deferred improvements.

3. Maintenance Guarantee: The maintenance guarantee shall be maintained for a period of not less than 2 (two) years after final acceptance of the storm water, soil erosion, sediment, and other wastes control practices in an amount equal to 5% of the estimate approved by the City Engineer, of the construction and, where necessary, removal of such practices.

4. Time Extension: The City Engineer may extend for cause the time allowed for the installation of the improvements for which the performance guarantee has been provided with the receipt of a written request from the owner.

5. Completion: Upon completion of the construction of improvements or temporary and/or permanent, soil erosion, sediment, and other wastes control practices and the removal of the temporary soil erosion,

sediment, and other wastes control practices for which the performance guarantee has been provided the owner shall notify the City Engineer of this fact.

6. Inspection: The city will not release the Security Bond, Escrow Account, Verified Check or Cash guarantee until the City Engineer has inspected the site to ensure that the guaranteed item(s) have been completed and/or removed.

7. Slow Release Devices: Performance and maintenance guarantees will be maintained on the temporary sediment removal slow release devices installed in detention and retention basins until the entire site has reached final soil stabilization. Final stabilization in single-family residential developments is when 90% of the homes are constructed with their lawns completely installed and any remaining unbuilt lots having been permanently stabilized with a uniform ground cover at a growth density of 80% or better.

8. Release: The Construction Maintenance Guarantee shall not be released by the city until all temporary soil erosion and sediment control practices that are no longer needed have been removed, properly disposed of and any trapped sediment has been stabilized.

APPLICATION PROCEDURES FOR CONSTRUCTION CONSERVATION PLANS (CCP):

1. This plan will be combined with the Post-Construction Water Quality, Riparian Setback and Wetland Setback Plans that have also been developed for the site.

2. Plans developed by the site owners and approved by the city in accordance with this regulation do not relieve the site owner of responsibility for obtaining and complying with all other necessary permits and/or approvals from federal, state, county, and local agencies and departments. If requirements vary, the most stringent requirement shall be followed. Plans submitted to the City Engineer for review and approval, shall be accompanied by all other required permits and documentation relevant to the project, including but not limited to the permits required and issued by the US Army Corps Of Engineers, Ohio EPA and ODNR Division of Water.

3. The application must include a letter or report from the local county SWCD that states that the Construction Site Conservation Plan, the Riparian and Wetland Setback Plan and the Post-construction Water Quality Plan have been reviewed for consistency with Ohio EPA and local regulations.

4. Five (5) sets of the plans and necessary data required by this regulation shall be submitted to the City Engineer with text material being submitted on 8.5 by 11 inch paper and drawings on no larger than 24 by 36 inch sized paper. Submittals shall include:
   1) At the preliminary plan approval request, the preliminary plans only need to show all of the following existing and planned features: streams, water bodies, wetlands, riparian and wetland setback areas, permanent BMPs and storm water management detention and retention basins.

   2) At the improvement plan approval request, the entire Comprehensive Storm Water Management Plan must be submitted.

5. The City Engineer shall review the plans, including the review report from the local county SWCD, and shall approve or return these with comments and recommendations for revisions within forty-five (45) working days after receipt of the plan as described above. A plan rejected because of deficiencies shall receive a report stating specific problems. At the time of receipt of a revised plan, another forty-five (45) day review period shall begin.

6. Approved plans shall remain valid for two (2) years from the date of approval. After two (2) years the plan(s) approval automatically expires.
7. No soil disturbing activity shall begin before all necessary local, county, state and federal permits have been granted to the owner or operator.

8. The city will require and may perform construction inspections until the site reaches final stabilization as determined by the City Engineer.

DEFINITIONS, as used in this ordinance:

APPROVING AUTHORITY: The official responsible for administering the applicable program(s).

BEST MANAGEMENT PRACTICE (BMP): Any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. BMPs may include structural practices, conservation practices and operation and maintenance procedures.

CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC): A person that has subscribed to the Code of Ethics and have met the requirements established by the CPESC Council of Certified Professional In Erosion and Sediment Control, Inc. to be a Certified Professional in Erosion and Sediment Control.

CHANNEL: A natural stream that conveys water, or a ditch or channel excavated for the natural flow of water.

CONCENTRATED STORM WATER RUNOFF: Surface water runoff which converges and flows primarily through water conveyance features such as swales, gullies, waterways, channels or storm sewers, and which exceeds the maximum specified flow rates of filters or perimeter controls intended to control sheet flow.

CONSERVATION: The wise use and management of natural resources.

CUT AND FILL SLOPES: A portion of land surface or area from which soil material is excavated and/or filled.

DENUDED AREA: A portion of land surface on which the vegetation or other soil stabilization features have been removed, destroyed or covered, and which may result in or contribute to erosion and sedimentation.

DETENTION BASIN: A storm water management pond that remains dry between storm events. Storm water management ponds include a properly engineered/designed volume which is dedicated to the temporary storage and slow release of runoff waters.

DEVELOPMENT AREA: Any tract, lot, or parcel of land, or combination of tracts, lots or parcels of land, which are in one ownership, or are contiguous and in diverse ownership, where earth-disturbing activity is to be performed.

DITCH: An excavation, either dug or natural, for the purpose of drainage or irrigation, and having intermittent flow.

DUMPING: The grading, pushing, piling, throwing, unloading or placing of soil or other material.

EARTH DISTURBING ACTIVITY: Any grading, excavating, filling, or other alteration of the earth's surface where natural or man-made ground cover is destroyed.

EARTH MATERIAL: Soil, sediment, rock, sand, gravel, and organic material or residue associated with or attached to the soil.

EROSION: The process by which the land surface is worn away by the action of water, wind, ice or gravity.

EXISTING: In existence at the time of the passage of these regulations.

FREQUENCY STORM: A rainfall event of a magnitude having a specified average recurrence interval and is calculated with Natural Resources Conservation Service, USDA Type II twenty-four hour curves or depth-duration frequency curves.

GRADING: Earth disturbing activity such as excavation, stripping, cutting, filling, stockpiling, or any combination thereof.

GRUBBING: Removing, clearing or scalping material such as roots, stumps or sod.

LARGER COMMON PLAN OF DEVELOPMENT OR SALE: A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.
LANDSLIDE: The rapid mass movement of soil and rock material downhill under the influence of gravity in which the movement of the soil mass occurs along an interior surface of sliding.

LOCAL COUNTY SWCD: The local county Soil and Water Conservation District.

NATURAL RESOURCES CONSERVATION SERVICE (NRCS): An agency of the United States Department of Agriculture, formerly known as the Soil Conservation Service (SCS).

NPDES PERMIT: A National Pollutant Discharge Elimination System Permit issued by Ohio EPA under the authority of the USEPA, and derived from the Federal Clean Water Act.

OHIO EPA: The Ohio Environmental Protection Agency.

ORDINARY HIGH WATER MARK: The point of the bank or shore to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction or prevention of woody terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic.

OUTFALL: An area where water flows from a structure such as a conduit, storm sewer, improved channel or drain, and the area immediately beyond the structure which is impacted by the velocity of flow in the structure.

PERSON: Any individual, corporation, partnership, joint venture, agency, unincorporated association, municipal corporation, township, county, state agency, the federal government, or any combination thereof.

PROFESSIONAL ENGINEER: A person registered in the State of Ohio as a Professional Engineer, with specific education and experience in water resources engineering, acting in strict conformance with the Code of Ethics of the Ohio Board of Registration for Engineers and Surveyors.

REDEVELOPMENT: The demolition or removal of existing structures or land uses and construction of new ones.

RETENTION BASIN: A storm water management pond that maintains a permanent pool of water. These storm water management ponds include a properly engineered/designed volume dedicated to the temporary storage and slow release of runoff waters.

RIPARIAN AREA: Naturally vegetated land adjacent to watercourses which, if appropriately sized, helps to stabilize streambanks, limit erosion, reduce flood flows, and/or filter and settle out runoff pollutants, or which performs other functions consistent with the purposes of these regulations.

RIPARIAN SETBACK: Those lands within the city which are alongside streams where earth disturbing activities will not take place and natural vegetation will not be removed.

SEDIMENT: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by wind, water, gravity or ice, and has come to rest on the earth's surface either on dry land or in a body of water.

SEDIMENT SETTLING POND: A temporary Sediment Pond that releases runoff at a controlled rate. It is designed to slowly release runoff, detaining it long enough to allow most of the sediment to settle out of the water. The outlet structure is usually a designed pipe riser and barrel. The entire structure is removed after construction. Permanent storm water detention structures can be modified to function as temporary Sediment Basins.

SEDIMENT CONTROL: The limiting of sediment being transported by controlling erosion or detaining sediment-laden water and, allowing the sediment to settle out.

SEDIMENT BARRIER: A sediment control device such as a geotextile Silt Fence or a grass Filter Strip, usually capable of controlling only small flow rates. (Straw bale barriers are not acceptable.)
SEDIMENT POLLUTION: A failure to use management or conservation practices to control wind or water erosion of the soil and to minimize the degradation of water resources by soil sediment in conjunction with land grading, excavating, filling, or other soil disturbing activities on land used or being developed for commercial, industrial, residential, or other purposes.

SENSITIVE AREA: An area or water resource that requires special management because of its susceptibility to sediment pollution, or because of its importance to the well-being of the surrounding communities, region, or the state and includes, but is not limited to, the following:

1. Ponds, wetlands or small lakes with less than five acres of surface area;
2. Small streams with gradients less than ten feet per mile with average annual flows of less than 3.5 feet per second containing sand or gravel bottoms.
3. Drainage areas of a locally or Ohio designated Scenic River.
4. Riparian and wetland areas.

SETTLING POND: A runoff detention structure, such as a Sediment Basin or Sediment Trap, which detains sediment-laden runoff, allowing sediment to settle out.

SHEET FLOW: Water runoff in a thin uniform layer or rills and which is of small enough quantity to be treated by sediment barriers.

SLIP: A landslide as defined under "Landslides."

SLOUGHING: A slip or downward movement of an extended layer of soil resulting from the undermining action of water or the earth disturbing activity of man.

SOIL: Unconsolidated erodible earth material consisting of minerals and/or organics.

SOIL CONSERVATION SERVICE, USDA: The federal agency now titled the "Natural Resources Conservation Service," which is an agency of the United States Department of Agriculture.

SOIL EROSION AND SEDIMENT CONTROL PLAN: A written and/or drawn soil erosion and sediment pollution control plan to minimize erosion and prevent off-site sedimentation throughout all earth disturbing activities on a development area.

SOIL EROSION AND SEDIMENT CONTROL PRACTICES: Conservation measures used to control sediment pollution and including structural practices, vegetative practices and management techniques.

SOIL STABILIZATION: Vegetative or structural soil cover that controls erosion, and includes permanent and temporary seeding, mulch, sod, pavement, etc.

SOIL SURVEY: The official soil survey produced by the Natural Resources Conservation Service, USDA in cooperation with the Division of Soil and Water Conservation, ODNR and the local Board of County Commissioners.

STORM WATER CONTROL STRUCTURE: Practice used to control accelerated storm water runoff from development areas.

STORM WATER CONVEYANCE: All storm sewers, channels, streams, ponds, lakes, etc., used for conveying concentrated storm water runoff, or for storing storm water runoff.

STORM WATER POLLUTION PREVENTION PLAN (SWP3): The plan required by Ohio EPA to meet the requirements of its National Pollutant Discharge Elimination System (NPDES) Permit program for construction activities.

STREAM: A body of water running or flowing on the earth's surface, or a channel with a defined bed and banks in which such flow occurs. Flow may be seasonally intermittent.

UNSTABLE SOIL: A portion of land surface or area which is prone to slipping, sloughing or landslides, or is identified by Natural Resources Conservation Service methodology as having a low soil strength.

USEPA: The United States Environmental Protection Agency.
WASTEWATER: Any water that is contaminated with gasoline, fuel oil, hydrocarbon based chemicals, paint, paint washing liquids or other paint wastes, sanitary wastes, or any other Ohio EPA regulated contaminants.

WATERCOURSE: Any natural, perennial, or intermittent channel with a defined bed and banks, stream, river or brook.

WATER RESOURCES: All streams, lakes, ponds, wetlands, water courses, waterways, drainage systems, and all other bodies or accumulations of surface water, either natural or artificial, which are situated wholly or partly within, or border upon this state, or are within its jurisdiction, except those private waters which do not combine or affect a junction with natural surface waters.

WETLAND: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas. (40 Codified Federal Register (CFR) 232, as amended). Wetlands shall be delineated by a site survey approved by the city using delineation protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of application of this regulation. If a conflict exists between the delineation protocols of these two agencies, the delineation protocol that results in the most inclusive area of wetlands shall apply.

WETLAND SETBACK: Those lands adjacent to wetlands where earth disturbing activities will not take place and natural vegetation will not be removed.

WINTER: October 1st to April 1st of each year.

Appendix I

Chesapeake Detention Improvement
City of North Royalton
Preliminary Engineer's Estimate
6/8/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201:	CLEARING AND GRUBBING	LUMP	LUMP	$5,000.00	$5,000.00
2	ITEM 203	EXCAVATION	15000	CY	$12.00	$180,000.00
3	ITEM 203:	EMBANKMENT	2100	CY	$2.00	$4,200.00
4	ITEM 601:	DUMPED ROCK FILL	4	CY	$120.00	$480.00
4	ITEM 602:	CONCRETE MASONRY	2	CY	$500.00	$1,000.00
5	ITEM 603:	30" RCP	50	LF	$135.00	$6,750.00
6	ITEM 411:	STABILIZED CRUSHED AGGREGATE ACCESS DRIVE	75	CY	$35.00	$2,625.00
7	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$2,500.00	$2,500.00
8	ITEM 624:	MOBILIZATION	LUMP	LUMP	$2,500.00	$2,500.00
9	ITEM 659:	SEEDING AND MULCHING	14000	SY	$1.00	$14,000.00
10	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$21,906.00	$21,906.00
		TOTAL				$240,961.00
		Engineering & Surveying				$31,400.00
		Construction Inspection				$8,160.00
						$280,521.00

Gregory Lane Sewer Improvement
for
City of North Royalton
Preliminary Engineer's Estimate
6/6/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$500.00	$500.00
2	ITEM 253:	PAVEMENT REPAIR	25	SY	$80.00	$2,000.00
3	ITEM 601:	CONCRETE MASONRY	1	CY	$1,000.00	$1,000.00
3	ITEM 603:	19" X 30" RCP	280	LF	$95.00	$26,600.00
4	ITEM 604:	INLET MANHOLE	1	EACH	$2,000.00	$2,000.00
5	ITEM 614:	MAINTAINING TRAFFIC	LUMP	LUMP	$1,000.00	$1,000.00
6	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$1,000.00	$1,000.00
7	ITEM 624:	MOBILIZATION	LUMP	LUMP	$2,000.00	$2,000.00
8	ITEM 659:	SEEDING AND MULCHING	250	SY	$8.00	$2,000.00
9	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$3,800.00	$3,800.00
		TOTAL				$41,900.00
		Engineering & Surveying				$5,100.00
		Construction Inspection				$3,900.00
						$50,900.00

Cedar Estates Storm Sewer Improvement (w/o detention)
City of North Royalton
Preliminary Engineer's Estimate
6/6/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$2,000.00	$2,000.00
2	ITEM 451:	CONCRETE PAVEMENT REPAIR	400	SY	$50.00	$20,000.00
3	ITEM 451:	CONCRETE PAVEMENT REPAIR (drives)	500	SY	$50.00	$25,000.00
4	ITEM 603:	15" RCP	190	LF	$58.00	$11,020.00
5	ITEM 603:	18" RCP	615	LF	$68.00	$41,820.00
6	ITEM 603:	21" RCP	872	LF	$85.00	$74,120.00
7	ITEM 603:	24" RCP	276	LF	$90.00	$24,840.00
8	ITEM 603:	27" RCP	730	LF	$109.00	$79,570.00
9	ITEM 603:	30" RCP	574	LF	$128.00	$73,472.00
10	ITEM 603:	36" RCP	1506	LF	$158.00	$237,948.00
11	ITEM 603:	42" RCP	484	LF	$185.00	$89,540.00
12	ITEM 603:	48" RCP	250	LF	$200.00	$50,000.00
13	ITEM 603:	60" RCP	509	LF	$295.00	$150,155.00
14	ITEM 603:	72" RCP	726	LF	$350.00	$254,100.00
15	ITEM 603:	78" RCP	1050	LF	$380.00	$399,000.00
16	ITEM 604:	MANHOLE	40	EACH	$2,600.00	$104,000.00
17	ITEM 604:	JUNCTION CHAMBER	2	EACH	$7,500.00	$15,000.00
17	ITEM 614:	MAINTAINING TRAFFIC	LUMP	LUMP	$10,000.00	$10,000.00
18	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$5,000.00	$5,000.00
19	ITEM 624:	MOBILIZATION	LUMP	LUMP	$5,000.00	$5,000.00
20	ITEM 659:	SEEDING AND MULCHING	5500	SY	$5.00	$27,500.00
21	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$169,900.00	$169,900.00
		TOTAL				$1,868,985.00
		Engineering & Surveying				$136,200.00
		Construction Inspection				$24,500.00
						$2,029,685.00

Cedar Estates Storm Sewer Improvement (w/detention)
City of North Royalton
Preliminary Engineer's Estimate
6/6/05

PRELIMINARY COST ESTIMATE				STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 207: TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$2,000.00	$2,000.00
2	ITEM 451: CONCRETE PAVEMENT REPAIR	400	SY	$50.00	$20,000.00
3	ITEM 451: CONCRETE PAVEMENT REPAIR (drives)	500	SY	$50.00	$25,000.00
4	ITEM 603: 15" RCP	598	LF	$58.00	$34,684.00
5	ITEM 603: 18" RCP	314	LF	$68.00	$21,352.00
6	ITEM 603: 21" RCP	995	LF	$85.00	$84,575.00
7	ITEM 603: 24" RCP	276	LF	$90.00	$24,840.00
8	ITEM 603: 27" RCP	1014	LF	$109.00	$110,526.00
9	ITEM 603: 30" RCP	290	LF	$128.00	$37,120.00
10	ITEM 603: 36" RCP	1809	LF	$158.00	$285,822.00
11	ITEM 603: 42" RCP	500	LF	$185.00	$92,500.00
12	ITEM 603: 48" RCP	936	LF	$200.00	$187,200.00
13	ITEM 603: 54" RCP	222	LF	$260.00	$57,720.00
14	ITEM 603: 60" RCP	176	LF	$295.00	$51,920.00
15	ITEM 603: 66" RCP	292	LF	$310.00	$90,520.00
16	ITEM 603: 78" RCP	360	LF	$380.00	$136,800.00
17	ITEM 604: MANHOLE	40	EACH	$2,600.00	$104,000.00
18	ITEM 604: JUNCTION CHAMBER	2	EACH	$7,500.00	$15,000.00
19	ITEM 614: MAINTAINING TRAFFIC	LUMP	LUMP	$10,000.00	$10,000.00
20	ITEM 623: CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$5,000.00	$5,000.00
21	ITEM 624: MOBILIZATION	LUMP	LUMP	$5,000.00	$5,000.00
22	ITEM 659: SEEDING AND MULCHING	5500	SY	$5.00	$27,500.00
23	ITEM SPECIAL: DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$142,900.00	$142,900.00
	TOTAL				$1,571,979.00
	Engineering & Surveying				$119,200.00
	Construction Inspection				$24,500.00
					$1,715,679.00

Cedar Estates Detention Improvement
City of North Royalton
Preliminary Engineer's Estimate
6/8/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201:	CLEARING AND GRUBBING	LUMP	LUMP	$5,000.00	$5,000.00
2	ITEM 203	EXCAVATION	22500	CY	$12.00	$270,000.00
3	ITEM 203:	EMBANKMENT	5600	CY	$2.00	$11,200.00
4	ITEM 601:	DUMPED ROCK FILL	2	CY	$120.00	$240.00
4	ITEM 602:	CONCRETE MASONRY	2	CY	$500.00	$1,000.00
5	ITEM 603:	21" RCP	92	LF	$90.00	$8,280.00
6	ITEM 411:	STABILIZED CRUSHED AGGREGATE ACCESS DRIVE	150	CY	$35.00	$5,250.00
7	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$2,500.00	$2,500.00
8	ITEM 624:	MOBILIZATION	LUMP	LUMP	$2,500.00	$2,500.00
9	ITEM 659:	SEEDING AND MULCHING	30000	SY	$1.00	$30,000.00
10	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$33,597.00	$33,597.00
		TOTAL				$369,567.00
		Engineering & Surveying				$36,700.00
		Construction Inspection				$8,160.00
						$414,427.00

Pamela Road Storm Sewer Improvement
City of North Royalton
Preliminary Engineer's Estimate
3/15/05

PRELIMINARY COST ESTIMATE				STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201: CLEARING AND GRUBBING	LUMP	LUMP	$1,500.00	$1,500.00
2	ITEM 202: CATCH BASIN REMOVED	3	EACH	$500.00	$1,500.00
3	ITEM 207: TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$2,000.00	$2,000.00
4	ITEM 209: LINEAR GRADING (DITCHES 6" MIN, 12" MAX.)	1600	LF	$5.00	$8,000.00
5	ITEM 253: ASPHALT PAVEMENT REPAIR (DRIVES AND ROAD)	750	SY	$50.00	$37,500.00
6	ITEM 253: CONCRETE PAVEMENT REPAIR (DRIVES)	240	SY	$50.00	$12,000.00
7	ITEM 304 CATCH BASIN 2-3	1	EACH	$2,500.00	$2,500.00
8	ITEM 411: STABILIZED CRUSHED AGGREGATE (8" DRIVES)	15	CY	$55.00	$825.00
9	ITEM 601: DUMPED ROCK FILL, TYPE C	2	CY	$120.00	$240.00
10	ITEM 603: 12" RCP, TYPE B	519	LF	$53.00	$27,507.00
11	ITEM 603: 12" RCP, TYPE C	587	LF	$48.00	$28,176.00
12	ITEM 603: 24" RCP, TYPE C	275	LF	$85.00	$23,375.00
13	ITEM 603: 27" RCP, TYPE C	72	LF	$100.00	$7,200.00
14	ITEM 603: 30" RCP, TYPE B	40	LF	$120.00	$4,800.00
15	ITEM 603: 30" RCP, TYPE C	1157	LF	$115.00	$133,055.00
16	ITEM 603: 36" RCP, TYPE B	63	LF	$145.00	$9,135.00
17	ITEM 603: 36" RCP, TYPE C	656	LF	$150.00	$98,400.00
18	ITEM 603: STORM CONNCTION SHORT	22	EACH	$800.00	$17,600.00
19	ITEM 604: INLET BASIN	19	EACH	$1,800.00	$34,200.00
20	ITEM 604: MANHOLE	24	EACH	$2,500.00	$60,000.00
21	ITEM 614: MAINTAINING TRAFFIC	LUMP	LUMP	$2,000.00	$2,000.00
22	ITEM 623: CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$2,000.00	$2,000.00
23	ITEM 624: MOBILIZATION	LUMP	LUMP	$2,500.00	$2,500.00
24	ITEM 659: SEEDING AND MULCHING	1625	SY	$5.00	$8,125.00
25	ITEM SPECIAL: DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$52,414.00	$52,414.00
	TOTAL				$576,552.00
	Engineering & Surveying				$23,800.00
	Construction Inspection				$16,320.00
					$616,672.00

Pamela Detention Improvement
City of North Royalton
Preliminary Engineer's Estimate
6/8/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201:	CLEARING AND GRUBBING	LUMP	LUMP	$5,000.00	$5,000.00
2	ITEM 203	EXCAVATION	13700	CY	$12.00	$164,400.00
3	ITEM 203:	EMBANKMENT	900	CY	$2.00	$1,800.00
4	ITEM 601:	DUMPED ROCK FILL	2	CY	$120.00	$240.00
4	ITEM 602:	CONCRETE MASONRY	2	CY	$500.00	$1,000.00
5	ITEM 603:	15" RCP	50	LF	$55.00	$2,750.00
6	ITEM 411:	STABILIZED CRUSHED AGGREGATE ACCESS DRIVE	60	CY	$35.00	$2,100.00
7	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$2,500.00	$2,500.00
8	ITEM 624:	MOBILIZATION	LUMP	LUMP	$2,500.00	$2,500.00
9	ITEM 659:	SEEDING AND MULCHING	13000	SY	$1.00	$13,000.00
10	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$19,529.00	$19,529.00
		TOTAL				$214,819.00
		Engineering & Surveying				$25,100.00
		Construction Inspection				$8,160.00
						$248,079.00

Maple Lane Sewer Improvement
for
City of North Royalton
Preliminary Engineer's Estimate
6/6/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$500.00	$500.00
2	ITEM 209:	LINEAR GRADING	250	LF	$8.00	$2,000.00
3	ITEM 253:	PAVEMENT REPAIR	16	SY	$100.00	$1,600.00
4	ITEM 601:	CONCRETE MASONRY	1	CY	$1,000.00	$1,000.00
5	ITEM 603:	14" X 23" RCP	28	LF	$75.00	$2,100.00
6	ITEM 614:	MAINTAINING TRAFFIC	LUMP	LUMP	$1,000.00	$1,000.00
7	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$1,000.00	$1,000.00
8	ITEM 624:	MOBILIZATION	LUMP	LUMP	$2,000.00	$2,000.00
9	ITEM 659:	SEEDING AND MULCHING	225	SY	$8.00	$1,800.00
10	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$1,300.00	$1,300.00
		TOTAL				$14,300.00
		Engineering & Surveying				$6,200.00
		Construction Inspection				$3,900.00
						$24,400.00

Biro Ditch Relief Improvement
City of North Royalton
Preliminary Engineer's Estimate
4/1/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201:	CLEARING AND GRUBBING	LUMP	LUMP	$5,000.00	$5,000.00
2	ITEM 209:	LINEAR GRADING, AS PER PLAN	1535	LF	$30.00	$46,050.00
3	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$3,000.00	$3,000.00
4	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$2,500.00	$2,500.00
5	ITEM 624:	MOBILIZATION	LUMP	LUMP	$5,000.00	$5,000.00
6	ITEM 659:	SEEDING AND MULCHING	3100	SY	$5.00	$15,500.00
7	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$7,705.00	$7,705.00
		TOTAL				$84,755.00
		Engineering & Surveying				$14,570.60
		Construction Inspection				$3,808.00
						$103,133.60

Edgerton Road Relief Storm Sewer Improvement
City of North Royalton
Preliminary Engineer's Estimate
4/1/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM 201:	CLEARING AND GRUBBING	LUMP	LUMP	$1,000.00	$1,000.00
2	ITEM 202:	HEADWALL REMOVED	1	EACH	$500.00	$500.00
3	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$1,000.00	$1,000.00
4	ITEM 253:	ASPHALT PAVEMENT REPAIR	75	SY	$150.00	$11,250.00
5	ITEM 603:	21" RCP	330	LF	$80.00	$26,400.00
6	ITEM 603:	24" RCP	900	LF	$90.00	$81,000.00
7	ITEM 604:	MANHOLE	6	EACH	$2,500.00	$15,000.00
8	ITEM 614:	MAINTAINING TRAFFIC	LUMP	LUMP	$1,000.00	$1,000.00
9	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$1,000.00	$1,000.00
10	ITEM 624:	MOBILIZATION	LUMP	LUMP	$3,000.00	$3,000.00
11	ITEM 659:	SEEDING AND MULCHING	LUMP	LUMP	$3,000.00	$3,000.00
12	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$14,415.00	$14,415.00
		TOTAL				$158,565.00
		Engineering & Surveying				$23,427.80
		Construction Inspection				$8,160.00
						$190,152.80

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1						
2	ITEM 202:	HEADWALL REMOVED	1	EACH	$500.00	$500.00
3	ITEM 207:	TEMPORARY SOIL AND EROSION CONTROL	LUMP	LUMP	$500.00	$500.00
4	ITEM 253:	ASPHALT PAVEMENT REPAIR	40	SY	$150.00	$6,000.00
5	ITEM 601:	CONCRETE MASONRY	1	CY	$500.00	$500.00
6	ITEM 603:	24" RCP	28	LF	$90.00	$2,520.00
7	ITEM 604:	MANHOLE	1	EACH	$2,500.00	$2,500.00
8	ITEM 614:	MAINTAINING TRAFFIC	LUMP	LUMP	$1,000.00	$1,000.00
9	ITEM 623:	CONSTRUCTION LAYOUT STAKING, AS PER PLAN	LUMP	LUMP	$500.00	$500.00
10	ITEM 624:	MOBILIZATION	LUMP	LUMP	$1,000.00	$1,000.00
11	ITEM 659:	SEEDING AND MULCHING	LUMP	LUMP	$1,000.00	$1,000.00
12	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$1,602.00	$1,602.00
		TOTAL				$17,622.00
		Engineering & Surveying				$4,754.64
		Construction Inspection				$3,808.00
						$26,184.64

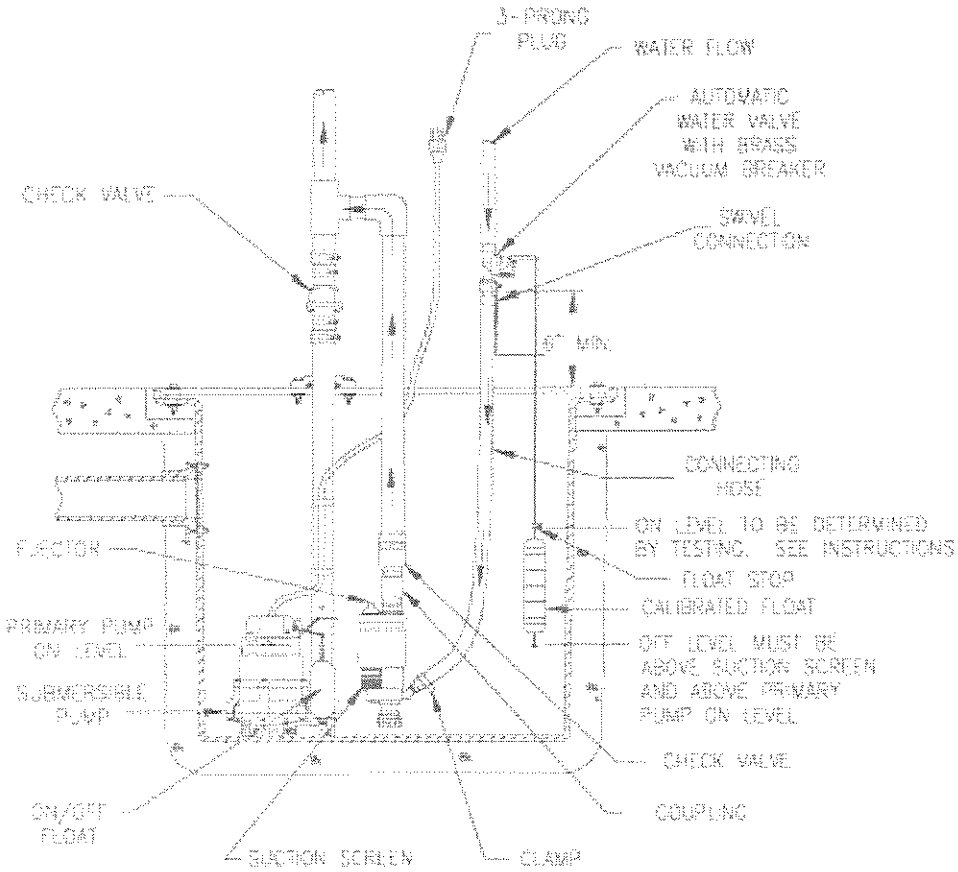
Boston Road Erosion Improvement
City of North Royalton
Preliminary Engineer's Estimate
6/15/05

PRELIMINARY COST ESTIMATE					STEPHEN HOVANCSEK & ASSOCIATES Engineer's Estimate	
#	DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	TOTAL
1	ITEM SPECIAL:	PVC GALVANIZED WIRE MESH GABIONS	150	CY	$200.00	$30,000.00
2	ITEM SPECIAL:	CONCRETE FOOTER FOR GABION BASKETS	170	LF	$110.00	$18,700.00
3	ITEM 601:	DUMPED ROCK FILL, TYPE C	2	CY	$120.00	$240.00
4	ITEM 659:	RESTORATION OF DISTURBED AREAS	LUMP	LUMP	$5,000.00	$5,000.00
5	ITEM SPECIAL:	DISCRETIONARY ALLOWANCE TO BE UTILIZED AS DIRECTED BY THE ENGINEER FOR UNSCHEDULED WORK ITEMS NOT INCLUDED IN THIS PROPOSAL OR SHOWN ON THE PLANS	LUMP	LUMP	$5,394.00	$5,394.00
		TOTAL				$59,334.00
		Engineering & Surveying				$11,520.00
		Construction Inspection				$5,712.00
						$76,566.00

Appendix J

CITY OF NORTH ROYALTON
WATER POWERED BACK –UP PUMP

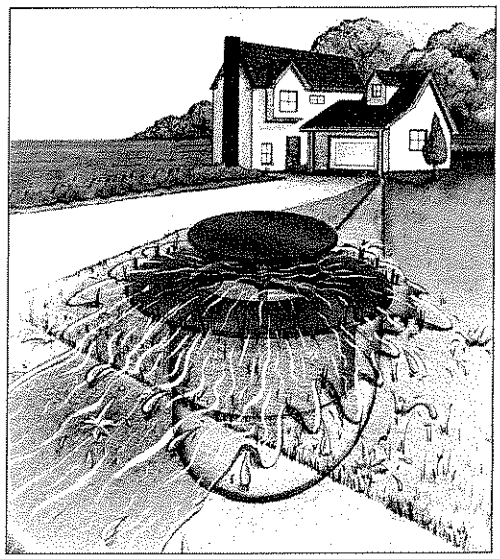
Typical Installation with Submersible Pump



POP-UP DRAINAGE EMITTER

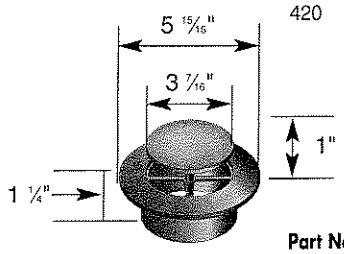
The Pop-Up Drainage Emitter is easy, safe and an efficient solution.

- It allows water to be diverted and released to water-safe areas away from structures, erosion-prone landscapes and poor drainage areas.
- It allows water captured by grates, catch basins, channel drains, Flo-Well, downspouts and roof gutter systems to flow through the drainage pipe and away from structural foundations to safe or useful areas. For example, water can be routed from a low area next to a foundation to a water safe area such as a curbside drainage system.
- It is opened by the hydrostatic pressure of water flowing through the drain pipe. As flow diminishes the Emitter closes again. The special patented design allows the Emitter to open with a negligible amount of pressure. Since the Emitter is closed during dry weather, debris and rodents cannot enter the drain pipes.
- It does not rise high enough to interfere with mowers.
- Spring automatically retracts – closes and prevents damage from lawn mowers.
- It blends into the surrounding landscapes.



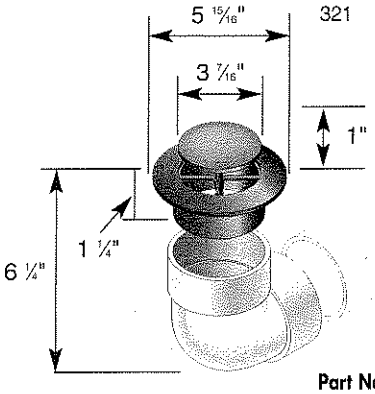
Allows water to flow to street without core drilling the curb.

3" & 4" POP-UP DRAINAGE EMITTER



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	List Price (EA)	Product Class	Specifications
420	3" & 4" Pop-Up Drainage Emitter	Green	20	0.28	12.16	10ND	NDS #420, 3" and 4" Polyolefin Pop-Up Drainage Emitter, Center Drive Pop-Up with UV inhibitor.

Fits 3" and 4" hub Sewer and Drain Fittings
Can now be installed in vertical applications - ideal for discharging water from retaining walls and street curbs. Spring automatically retracts.

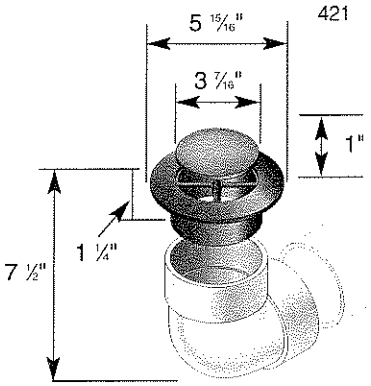


Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	List Price (EA)	Product Class	Specifications
321	3" Emitter with Elbow	Green	25	0.60	15.30	10ND	NDS #321, 3" Polyolefin Pop-Up Drainage Emitter, Center Drive Pop-Up with UV inhibitor, PVC 90 degree elbow with 1/4" Drain hole.

May be used with Flo-Well to relieve overflow.

Can now be installed in vertical applications - ideal for discharging water from retaining walls and street curbs
Spring automatically retracts - prevents damage from lawn mowers.

Part Number 321 will be discontinued. Please use Part Number 430.



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	List Price (EA)	Product Class	Specifications
421	4" Emitter with Elbow	Green	20	0.85	18.92	10ND	NDS #321, 4" Polyolefin Pop-Up Drainage Emitter, Center Drive Pop-Up with UV inhibitor, PVC 90 degree elbow with 1/4" Drain hole.

May be used with Flo-Well to relieve overflow.

Can now be installed in vertical applications - ideal for discharging water from retaining walls and street curbs
Spring automatically retracts - prevents damage from lawn mowers.

Part Number 421 will be discontinued. Please use Part Number 430.

Note: All dimensions are nominal. All weights are for shipping purposes only. List prices are in U.S. Dollars.

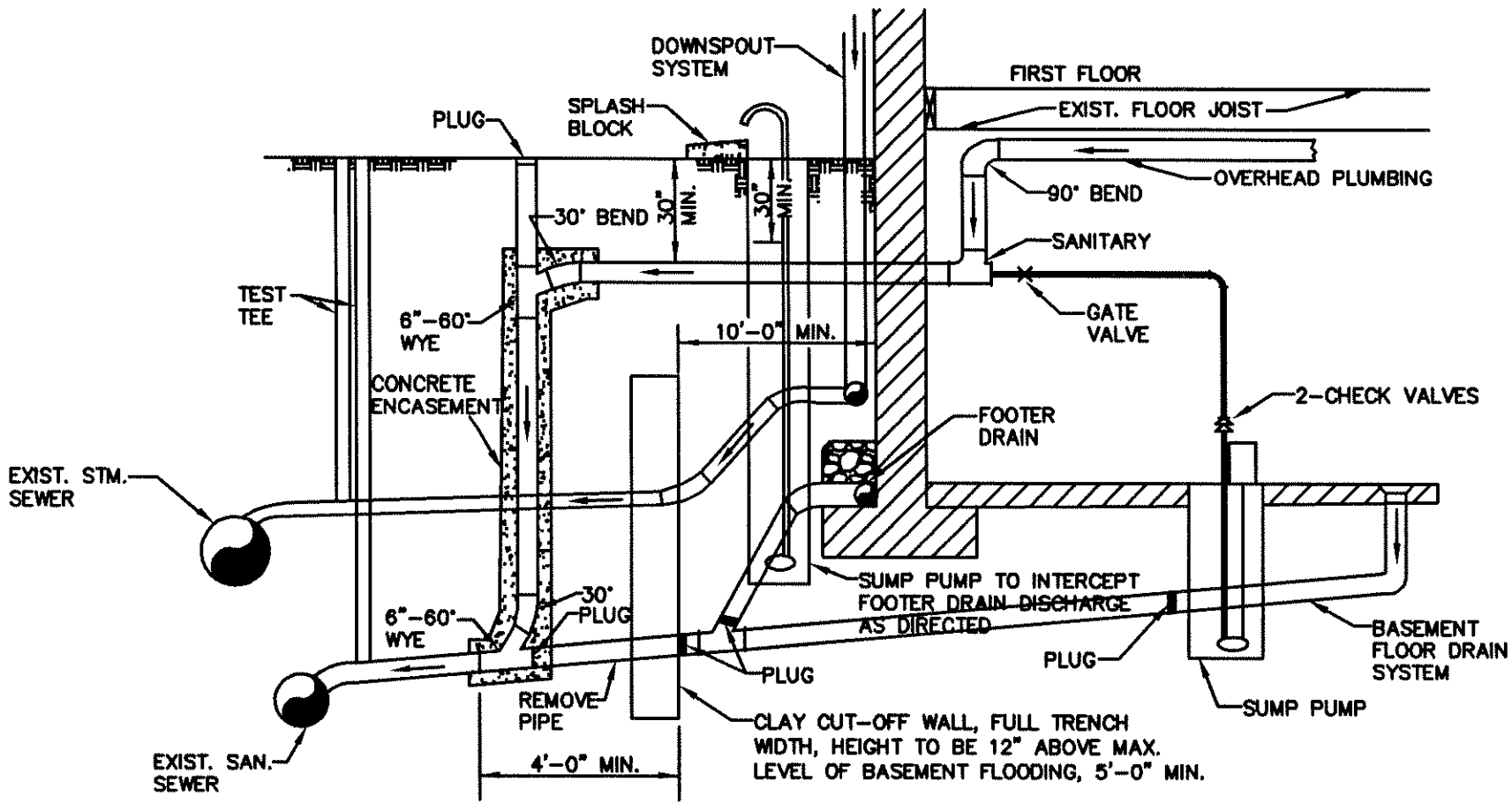
For customer service, please send your fax to: 1-800-726-1998 or call 1-800-726-1994.

NDS

CITY OF NORTH ROYALTON
MICRO-RETENTION RAIN BARREL

Typical Installation

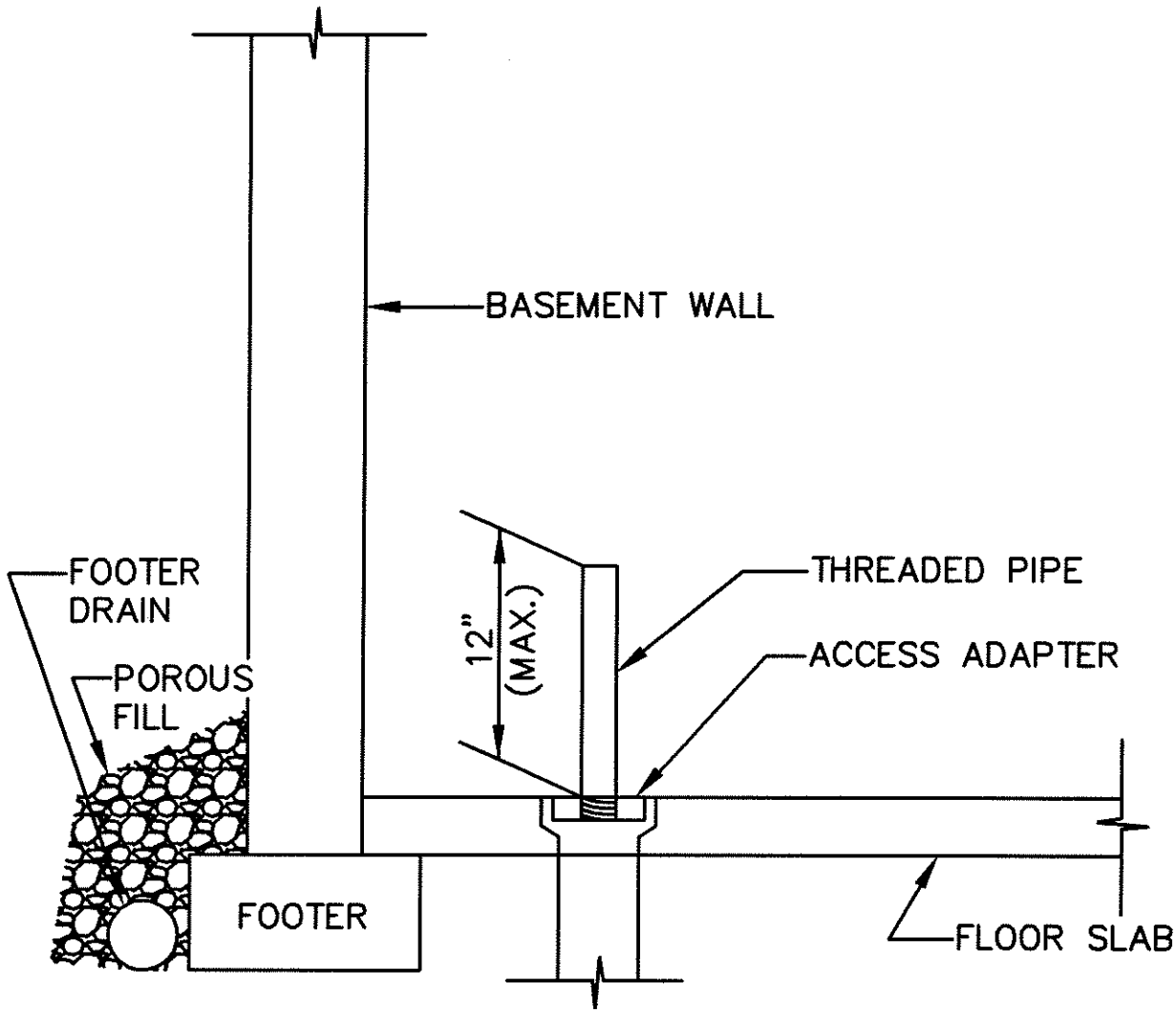
One rain barrel is required at each downspout. Water is stored for use in gardening, etc.



OVERHEAD PLUMBING DETAIL
TWO CONNECTIONS-FOOTER DRAIN TO SANITARY

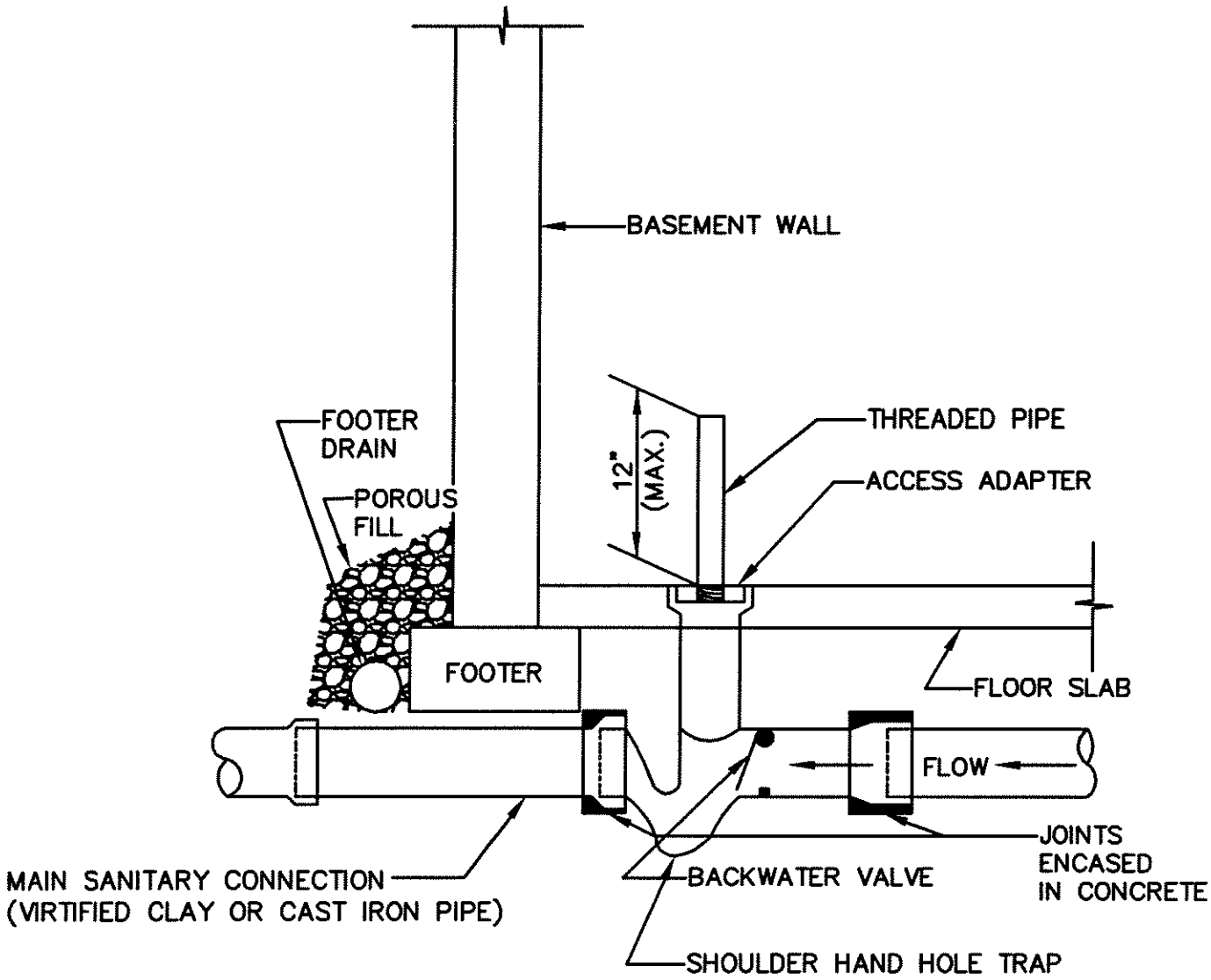
SCALE: NONE
DATE: 12/03
JOB NO: 04-207

STEPHEN HOVANCSEK & ASSOCIATES
CONSULTING ENGINEERS
Two Merit Drive Richmond Heights, Ohio
(216) 731-6255



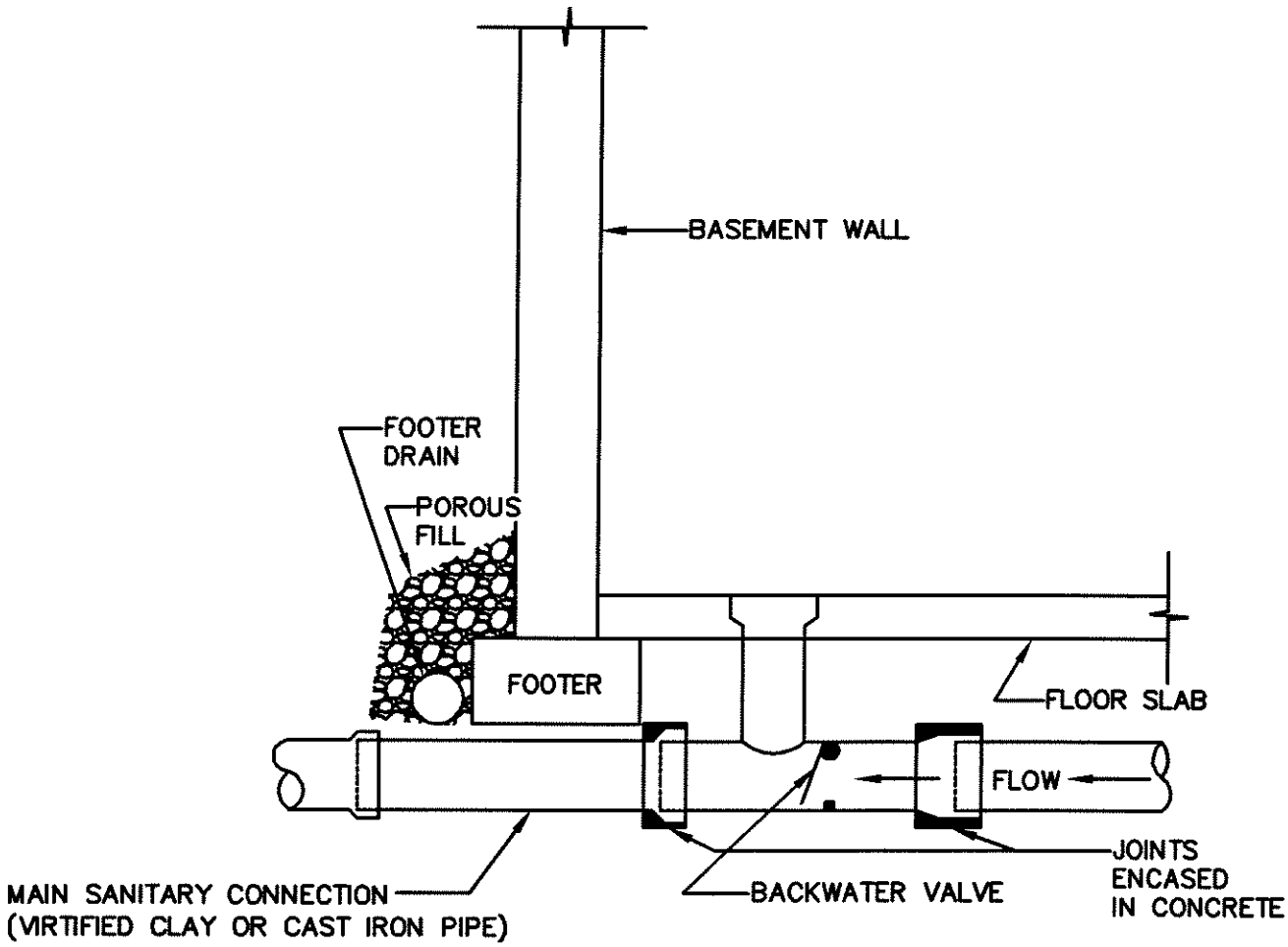
FLOOR DRAIN STACK

SCALE: NONE	STEPHEN HOVANCSEK & ASSOCIATES CONSULTING ENGINEERS Two Merit Drive Richmond Heights, Ohio (216) 731-6255	
DATE: 12/03		
JOB NO: 04-207		



FLOOR DRAIN STACK AND BACKWATER VALVE

SCALE: NONE	STEPHEN HOVANCSEK & ASSOCIATES CONSULTING ENGINEERS Two Merit Drive Richmond Heights, Ohio (216) 731-6255	
DATE: 12/03		
JOB NO: 04-207		



BACKWATER VALVE

SCALE: NONE	STEPHEN HOVANCSEK & ASSOCIATES CONSULTING ENGINEERS Two Merit Drive Richmond Heights, Ohio (216) 731-6255	
DATE: 12/03		
JOB NO: 04-207		

STEPHEN HOVANCSEK & ASSOCIATES, INC.
Consulting Engineers & Planners
TWO MERIT DRIVE • RICHMOND HEIGHTS, OHIO 44143
(216) 731-6255 FAX NO: (216) 731-4483

RESIDENTIAL RESPONSIBILITIES

A COLLECTION OF ORDINANCES PERTAINING TO YARD MAINTENANCE, DRAINAGE WAYS, ETC.

PART SIX: GENERAL OFFENSES CODE

CHAPTER 606: GENERAL PROVISIONS; ADMINISTRATION AND ENFORCEMENT

606.14 OBSTRUCTING OFFICIAL BUSINESS

(a) No person, without privilege to do so and with purpose to prevent, obstruct or delay the performance by a public official of any authorized act within his or her official capacity, shall do any act that hampers or impedes a public official in the performance of his or her lawful duties.

(b) Whoever violates this section is guilty of obstructing official business. Except as otherwise provided in this subsection, obstructing official business is a misdemeanor of the second degree. If a violation of this section creates a risk of physical harm to any person, obstructing official business is a felony to be prosecuted by appropriate state law. Punishment shall be as provided in Section 698.02. (ORC 2921.31)

CHAPTER 660: SAFETY, SANITATION AND HEALTH

660.03 LITTERING

(a) No person, regardless of intent, shall deposit litter or cause litter to be deposited on any public property, on private property not owned by him or her, or in or on waters of the Municipality or the State, unless one of the following applies:

(1) The person is directed to do so by a public official as part of a litter collection drive;

(2) Except as provided in subsection (b) hereof, the person deposits the litter in a litter receptacle in a manner that prevents its being carried away by the elements; or

(3) The person is issued a permit or license covering the litter pursuant to Ohio R.C. Chapter 3734 or 6111.

(b) No person, without privilege to do so, shall knowingly deposit litter, or cause it to be deposited, in a litter receptacle located on any public property or on any private property not owned by him or her, unless one of the following applies:

(1) The litter was generated or located on the property on which the litter receptacle is located.

(2) The person is directed to do so by a public official as part of a litter collection drive.

(3) The person is directed to do so by a person whom he or she reasonably believes to have the privilege to use the litter receptacle.

(4) The litter consists of any of the following:

A. The contents of a litter bag or container of a type and size customarily carried and used in a motor vehicle;

B. The contents of an ash tray of a type customarily installed or carried and used in a motor vehicle;

C. Beverage containers and food sacks, wrappings and containers of a type and in an amount that may reasonably be expected to be generated during routine commuting or business or recreational travel by a motor vehicle;

D. Beverage containers, food sacks, wrappings, containers and other materials of a type and in an amount that may reasonably be expected to be generated during a routine day by a person and deposited in a litter receptacle by a casual passerby.

(c) (1) As used in paragraph (b)(1) hereof, "public property" includes any private property open to the public for the conduct of business, the provision of a service, or upon the payment of a fee, but does not include any private property to which the public otherwise does not have a right of access.

(2) As used in paragraph (b)(4) hereof, "casual passerby" means a person who does not have depositing litter in a litter receptacle as his or her primary reason for traveling to or by the property on which the litter receptacle is located.

(d) As used in this section: (1) "Litter" means garbage, trash, waste, rubbish, ashes, cans, bottles, wire, paper, cartons, boxes, automobile parts, furniture, glass or anything else of an unsightly or unsanitary nature.

(2) "Deposit" means to throw, drop, discard or place.

(3) "Litter receptacle" means a dumpster, trash can, trash bin, garbage can or similar container in which litter is deposited for removal.

(e) This section may be enforced by any police officer of the Municipality or any other law enforcement officer having jurisdiction within the Municipality.

(f) Whoever violates this section is guilty of a misdemeanor of the third degree and shall be subject to the penalty provided in Section 698.02. The sentencing court may, in addition to or in lieu of the penalty provided herein, require a person who violates this section to remove litter from any public or private property or from waters of the Municipality or the State. (ORC 3767.32)

660.04 NOXIOUS ODORS; FILTHY ACCUMULATIONS; POLLUTING AND DIVERTING WATERCOURSES

(a) No person shall erect, continue, use or maintain a dwelling, building, structure or place for a residence or for the exercise of a trade, employment or business, or for the keeping or feeding of an animal, which dwelling, building, structure or place, or which activity, by occasioning noxious exhalations or noisome or offensive smells, becomes

injurious to the health, comfort or property of individuals or of the public. No person shall cause or allow offal, filth or noisome substances to be collected or remain in any place to the damage or prejudice of others or of the public. No person shall unlawfully obstruct or impede the passage of a navigable river, harbor or collection of water, or corrupt or render unwholesome or impure, a watercourse, stream or water, or unlawfully divert such watercourse from its natural course or state to the injury or prejudice of others. (ORC 3767.13; Adopting Ordinance)

(b) No person shall cause or permit refuse or filth from a gas works or gas well, including salt brine or petroleum, crude oil, refined oil, or a compound, mixture or residuum of oil or filth from an oil well, oil tank, oil vat or place of deposit of crude or refined oil, to run into or be poured, emptied or thrown into a watercourse, stream, lake, ditch or drain, or into a place from which it may run or wash therein. (Ord. 90-255. Passed 11-20-90.)

(c) Whoever violates any of the provisions of this section is guilty of a misdemeanor of the third degree and shall be subject to the penalty provided in Section 698.02. (ORC 3767.99(C))

660.05 DUTY TO KEEP SIDEWALKS IN REPAIR AND CLEAN

(a) No owner or occupant of abutting lands shall fail to keep the sidewalks, curbs or gutters in repair and free from snow, ice or any nuisance.

(ORC 723.011)

Whoever violates this section is guilty of a minor misdemeanor and shall be subject to the penalty provided in Section 698.02.

660.11 NOTICE TO FILL LOTS, REMOVE PUTRID SUBSTANCES

(a) No person shall fail to comply with the following requirements within the lawful time after service or publication of the notice or resolution is made as required by law: To fill or drain any lot or land or remove all putrid substances therefrom, or remove all obstructions from culverts, covered drains or natural watercourses as provided in Ohio R.C. 715.47.

Whoever violates this section is guilty of a minor misdemeanor. A separate offense shall be deemed committed each day during or on which a violation occurs or continues. The penalty shall be as provided in Section 698.02.

660.14 WEEDS AND GRASS

(a) Every owner, occupant or person in control of any lot or parcel of land in the Municipality shall cause such lot or parcel of land to be kept free, for a distance of not less than fifty feet from any dwelling, building, structure or public roadway, including ditches and tree lawns, of any and all noxious weeds, grass and woody vegetation by cutting, by digging them under or by any other method approved by the Building Commissioner.

(b) Every owner, occupant or person in control of any lot or parcel of land shall also cause that portion of such lot or land, which lies within fifty feet of any dwelling, building or structure located on any contiguous lot or parcel of land, to

be kept free of all such noxious weeds, woody vegetation, underbrush and nonedible grass in a manner provided in subsection (a) hereof.

(c) The Building Commissioner, upon notification of a violation of subsection (a) or (b) hereof, shall cause written notice to be mailed by certified mail to the tax mailing address of the owner of such land notifying him or her that noxious weeds, grass and woody vegetation, are growing on such land and that the same must be cut within five days after such notice is mailed.

(d) Upon failure to comply within the prescribed five day period, the Building Commissioner shall cause the noxious weeds, grass and woody vegetation, to be immediately cut by the direct employment of labor or by the Municipal employees and shall thereafter give notice to the owner of such parcel by certified mail at his or her tax mailing address to pay the costs of such cutting of weeds, grass and woody vegetation, which notice shall be accompanied by a statement of the amount of cost incurred. If such statement is not paid within thirty days after the mailing of such notice, then a collection cost of seventy dollars ($70.00) shall be added thereto, and such amount shall be certified to the County Auditor for collection in the same manner as other taxes and assessments are collected. The remedy provided for herein shall be in addition to the penalty provided for in subsection (e) hereof.

(e) Whoever violates any of the provisions of this section is guilty of a minor misdemeanor. The penalty shall be as provided in Section 698.02.

(Ord. 1976-198. Passed 12-1-76; Ord. 97-189. Passed 10-21-97; Ord. 02-73. Passed 6-18-02.)

660.15 SNOW REMOVAL

(a) No snow plowing or removal shall be conducted in such a way as to obstruct, hinder or cause injury to any public or private road, sidewalk or driveway, to any fire hydrant or to the landscaping of property, whether or not such road, sidewalk, driveway, fire hydrant or landscaping abuts the property being plowed.

(Ord. 95-9. Passed 1-3-95; Ord. 01-165. Passed 11-7-01.)

(b) This section shall apply to damage caused by the accumulation of snow as well as damage caused by personnel or plowing equipment.

(c) Nothing in this section shall relieve property owners or commercial snow plowing companies from compliance with Section 412.01 or 660.05 of these Codified Ordinances. (Ord. 1985-9. Passed 3-6-85.)

Whoever violates this section is guilty of a minor misdemeanor. A separate offense shall be deemed committed each day during or on which a violation occurs or continues. The penalty shall be as provided in Section 698.02.

PART TEN: STREETS, UTILITIES AND PUBLIC SERVICES CODE

CHAPTER 1022: DRAINAGE DITCHES AND CULVERTS

1022.01 VARYING LOCATION, DIRECTION, SIZE OR CAPACITY; PERMIT REQUIRED

No person shall divert, obstruct, drain or otherwise vary the location, direction, size or capacity of any drainage ditch, depression or other conduit for the drainage of water or sewage, situated within any dedicated street within the Municipality, without first obtaining a permit therefore from the Building Commissioner or his or her designee. (Ord. 2602. Passed 4-1-59; Ord. 04-48. Passed 2-17-04.)

1022.03 DITCH TILES AND DRAINPIPES

(a) No person shall install or reinstall ditch tiles on individual parcels of land within the limits of a street or highway without first obtaining the appropriate permits, instructions and approval from the City Engineer.

(b) The installation of ditch tiles or pipes shall be located in line with the existing ditch or the authorized roadway cross-section.

(c) All drainpipes shall have vertical riser pipes with an acceptable grating spaced a maximum of fifty feet along the line.

(d) Upon the filing of an application for the installation of ditch tiles or pipes, a fee as set forth in Chapter 214 of the Administration Code shall be paid to the Building Commissioner.

(e) The size, location, slope and pipe material shall be approved by the City Engineer prior to any installation.

(f) The installation of temporary ditch tiles or pipes does not relieve the abutting property owners of the financial liability of being assessed for a complete storm sewerage system that may be installed at a future date.

(g) This section applies only to enclosing ditches across the major frontage of a parcel of property and does not apply in any way to requirements and ordinances regarding driveway culvert pipes.
(Ord. 1970-107. Passed 5-6-70.)

(h) At all locations where an Ohio Department of Transportation-type headwall is required, a City standard trash grate shall be installed, as set forth in Exhibit A following.

EXHIBIT A

TRASH GRATE INSTALLATION

[*See printed version of the Codified Ordinances to view diagram.*]

1022.05 OBSTRUCTION OF DRAINAGE DITCHES

(a) No person shall, except as provided in subsection (b) hereof, obstruct, impede, divert, enclose or vary the location, direction, size or capacity of any drain, ditch, drainage ditch, culvert, sewer, natural watercourse or other

watercourse, depression or conduit for the drainage of water, situated within the Municipality. The Building Commissioner shall require anyone requesting a building permit to sign a covenant to comply with this section.

(b) No person shall be deemed guilty of a violation of this section if such person acts pursuant to any permit expressly authorizing such action and issued by a duly authorized official of the Municipality, or acts pursuant to plans, specifications and profiles approved by the City Engineer in compliance with Section 1022.06(a) and (b).

(c) The Building Commissioner, upon the advice of the City Engineer, shall serve upon any person who has committed any act prohibited by subsection (a) hereof a notice that such person has violated the provisions of this section, which notice shall set forth in detail the manner of the violation. Such notice shall be sufficiently served if it is mailed by certified mail to the usual place of residence or the usual place of business of the offender or, if a corporation, to its usual place of business. The offender shall be allowed ten days from the day on which the notice is placed in the mail to take all necessary measures to cease the violation and in all respects to restore circumstances as they existed prior to the violation. (Ord. 2606. Passed 4-15-59; Ord. 1984-184. Passed 2-6-85.)

1022.06 CONSTRUCTION OF CULVERTS

(a) Whoever constructs a driveway over, landscapes over or passes or travels as a means of ingress and egress over any drainage ditch or other depression in the land alongside of any public street or way, which ditch or depression at any time serves as a conduit for the drainage of water, shall construct in such ditch or depression, and under such driveway, landscaping or any other construction by means of which ingress and egress is effected, a culvert. The culvert shall have a minimum diameter of twelve inches, but prior to the installation of the culvert, plans and profiles covering the proposed installation shall be submitted to the City Engineer. The City Engineer shall determine whether or not the culvert is adequate to meet the hydraulic drainage requirements of the drainage ditch or depression and the surrounding drainage area in order to properly safeguard the health and safety of the residents in the area and protect the property therein, and whether or not the proposed location of the culvert is proper in relation to the grade of the street or way. The City Engineer shall either approve the plans and profiles or approve the plans and profiles with such modification in the size and location of the proposed culvert as will adequately meet the hydraulic drainage requirements of the drainage ditch or depression and the surrounding drainage area and will place the culvert in proper relation to the grade of the street. The determination of the City Engineer shall be conclusive.

(b) Before any permit to build or construct upon lots or lands drained by any ditch or depression is issued to any person required by subsection (a) hereof to install a culvert, such person shall install such culvert in accordance with the plans and specifications approved, or approved with modifications, by the City Engineer. In lieu thereof, such person shall post, with the Director of Finance, either cash money or a bond, approved by the Director of Law and executed by the applicant as principal and by a compensated surety company as surety, in an amount equal to the actual cost of installing the culvert in accordance with such plans and profiles, as estimated by the City Engineer. The City Engineer's estimate of the cost shall be conclusive.

(c) Such cash or bond shall be returned to the applicant by the Director of Finance upon receipt from the City Engineer of a certificate stating that the culvert has been installed in accordance with such plans and profiles.
(Ord. 2561. Passed 2-4-59.)

CHAPTER 1024: DRIVEWAYS

1024.01 CONSTRUCTION; PERMIT REQUIRED

No person who is the owner or occupant of lands within the Municipality shall construct any private driveway or road in, across or through any public drainage ditch, drain, open storm sewer or natural watercourse within the limits of any public highway without first obtaining a permit therefore from the Building Commissioner.
(Ord. 1972-189. Passed 4-4-73.)

1024.02 CULVERT OR PIPE REQUIRED; SPECIFICATIONS.

(a) No permit as provided in Section 1024.01 shall be granted unless, in constructing the private driveway or road, there is to be placed in the public drainage ditch, drain, open storm sewer or natural watercourse, a culvert, pipe or other device of such size and construction as will reasonably provide against the blocking, obstruction or improper diversion of water flowing therein.

(b) The Building Commissioner may prescribe the grade, length, position, dimensions and type of construction of a culvert, pipe or other device, having due regard to the terrain, the known and calculated volume of water flow and such other factors as may reasonably be expected to bear upon the use of such culvert, pipe or other device and the roadway or driveway in which it is to be installed.
(Ord. 1630. Passed 4-5-50.

CHAPTER 1060: GARBAGE AND RUBBISH COLLECTION AND DISPOSAL

1060.03 SPECIAL ITEMS AND EVENTS

(a) Grass clippings, leaves, and flowers, properly placed in paper yard waste bags or in standard rubbish containers (32 gallon) separated from rubbish, and hedge, shrubbery, and tree trimmings cut to four (4) foot lengths, not more than two (2) feet in diameter, bundled only with cotton cord and weighing not more than sixty-five (65) pounds, shall be collected without charge on regularly scheduled collection days. If collection is desired on other than a regularly scheduled collection day, the application and collection charge provisions for special collections must be complied with.

(b) Hot water tanks, refrigerators, stoves and other household furniture and appliances shall be collected without charge. Such items must be placed on the tree lawn, and if collection is desired on other than the regularly scheduled collection day, an application must first be made to and approved by the Director of Public Service and Properties as to the scheduling thereof.

(c) Earth, rocks, tree stumps, broken concrete, building materials, automobile parts and liquid and industrial wastes shall not be collected.

(d) On those days properly announced and scheduled as special clean-up events, all solid waste, except those items listed in subsection (c) hereof, shall be collected without charge if placed on the tree lawn.

(Ord. 1974-141. Passed 12-18-74; Ord. 2000-175. Passed 11-8-00.)

PART TWELVE: PLANNING AND ZONING CODE

CHAPTER 1260: GENERAL PROVISIONS AND DEFINITIONS

1260.18 REMOVAL OF SOIL PROTECTION OF DRAINAGE COURSES

Soil, sand or gravel shall not be stripped or removed except excess soil, sand or gravel resulting from excavations or grading operations in connection with the construction or alteration of a building or completion of a grading plan for which a permit has been issued.

No building or structure shall be erected within any area described by the Engineer as a drainage course. For the purpose of this Zoning Code, a drainage course includes any area such as drainage ways, channels, streams and creeks, designated as such on geodetic or City topographic maps, and further includes any area designed or intended for use for drainage purposes as shown on a recorded subdivision.

No filling of land or excavation of land shall be permitted within a drainage course, or on any lands within 100 feet, or more than 100 feet when so designated on the Zoning Map, of the centerline of such drainage course, except upon issuance of a certificate by the Engineer that such filling will not obstruct the flow of water or otherwise reduce the water-carrying capacity of such drainage course, or affect the design and character of such drainage course.

(Ord. 97-215. Passed 4-21-98.)

CHAPTER 1262: ADMINISTRATION, ENFORCEMENT AND PENALTY

1262.11 VIOLATIONS

(a) No person shall erect, construct, alter, repair or maintain any building or structure, or use any land, in violation of any of the provisions of this Zoning Code or any regulation enacted pursuant thereto.

(b) No person shall willfully violate any rule or regulation adopted by the Council or the Planning Commission in connection with the administration and enforcement of this Zoning Code.

(c) Unless the Planning Commission has given its prior consent thereto, which shall be confirmed by action of Council, no person shall sell, transfer or change the use of common land, a street, a recreation area, a park or other open land that has been set aside, with the approval of the Planning Commission, for exclusive use, in common, by abutting or other owners or occupants of land.

(d) No person shall:

(1) Use or occupy any land, or place, build, erect, alter, remodel, restore or rebuild thereon any building or structure, or permit any building or structure to remain on such land, or use, occupy or operate such building or structure, in any way or for any use or purpose which is not permitted by the provisions of this Zoning Code;

(2) Aid, assist or participate with any other person in placing, building, erecting, altering, remodeling, restoring or rebuilding any building or structure which is not permitted by the provisions of this Zoning Code;

(3) Violate or fail to perform any condition, stipulation or safeguard set forth in any permit issued pursuant to this Zoning Code, or continue to use or occupy the premises or building as previously authorized by such permit beyond the duration limit therein stated;

(4) Refuse to permit the Building Commissioner or his or her assistant to enter any premises in the City to investigate a reported violation of the provisions of this Zoning Code;

(5) Knowingly make any materially false statement of fact in an application to the Building Commissioner or his or her assistants for a permit or in any plans or specifications submitted in relation to any application under this Zoning Code;

(6) Being an owner or lessee of any premises, knowingly suffer or permit a violation of this Zoning Code to occur or exist on such premises; or

(7) Violate any provision of this Zoning Code for which no penalty is otherwise provided.

(Ord. 1970-232. Passed 9-15-71; Ord 1985-40. Passed 6-5-85.)

(e) No person, when an order to remove or correct any violation of any of the provisions of this Zoning Code, in any building or tract of land in the City, has been served on the owner, agent, lessee or tenant of the building or tract of land, or part thereof, or upon the architect, builder, contractor or any other person who commits or assists in any such violation, shall fail to comply with such order within fifteen days after the service of notice thereof.

(Ord. 1981-153. Passed 11-18-81.)

(f) No person, when an order has been issued by the Building Department and/or the Police Department to remove or correct any violation of this Zoning Code regarding the parking or storage of motor vehicles, shall fail to comply with such order within twenty-four hours after the service of notice thereof.

(Ord. 1980-191. Passed 2-18-81.)

PART FOURTEEN: BUILDING AND HOUSING CODE

CHAPTER 1464: EXTERIOR PROPERTY MAINTENANCE

1464.08 DUTIES OF OWNERS, OPERATORS AND OCCUPANTS

The exterior of the premises and all structures thereon shall be kept free of unsanitary conditions, nuisances and hazards to the safety of occupants, pedestrians and other persons utilizing the premises. Any such unsanitary condition, nuisance or hazard posing imminent danger to the health, safety and welfare of any person shall be immediately removed

and abated by the owner, operator and occupant, and all other unsanitary conditions, nuisances or hazards shall be removed and abated by the owner, operator or occupant within seven days of receipt of notice by the Building Commissioner or other enforcement officer. The owner, operator and occupant shall keep premises free of hazards and in compliance with the following provisions:

(a) Refuse. Exterior property areas of all premises shall be kept free of any debris, object, material or condition which may create a health, accident or fire hazard, which is a public nuisance or which constitutes a blighting or deteriorating influence on the neighborhood. Brush, broken glass, stumps, roots, filth, garbage, trash, motor vehicles, boats or trailers in a condition of disrepair or deterioration or parts thereof and debris shall not be permitted on any property.

(b) Natural Growth. Lawns, landscaping and trees shall be maintained so as not to constitute a blighting or deteriorating effect in the neighborhood. Dead and dying trees and limbs or other natural growth which, by reason of rotting or deteriorating conditions or storm damage, constitute a hazard to persons in the vicinity thereof shall not be permitted on any property. Trees shall be pruned and trimmed to prevent such conditions.

(c) Overhanging. Loose and overhanging objects which, by reason of location above ground level, constitute a danger of falling on persons or property in the vicinity thereof shall not be permitted.

(d) Ground Surface Hazards. Holes, excavations, breaks, projections and obstructions at any place on the premises which are a hazard to persons using the premises shall not be permitted.

(e) Recurring Accumulations of Storm Water. Natural drainage or adequate run-off drains shall be provided and maintained to eliminate any recurrent or excessive accumulation of storm water.

(f) Maintenance of Foundations.

(1) All foundations of every dwelling structure shall be maintained structurally sound and in good repair.

(2) All foundations of every dwelling structure shall be maintained in such condition as to prevent the seepage or leaking of water within the space enclosed within such foundations.

(3) All openings into the foundations of every dwelling structure shall be protected against the entrance of rodents.

(g) Chimneys; Flue and Vent Attachments. Chimneys and flue and vent attachments thereto shall be maintained structurally sound, free from defects and so as to capably perform at all times the functions for which they were designed. Chimneys, flues, gas vents or other draft-producing equipment shall provide sufficient draft to develop the rated output of the connected equipment, shall be structurally safe, durable and smoke tight and shall be capable of withstanding the action of flue gases.

(h) Exterior Porches, Landings Balconies, Stairs and Fire Escapes. Exterior porches, landings, balconies, stairs and fire escapes shall be provided with banisters or railings properly designed and maintained to minimize the hazard of persons falling therefrom, and the same shall be kept structurally sound, in good repair and free from defects.

(i) Condition of Exterior of Premises and Structures. The exterior of all structures and premises shall be maintained so that the appearance of the premises and all buildings thereon reflect a level of maintenance in keeping with the area and so that the condition of the premises and structures shall not constitute a blighting factor for adjoining property owners nor an element leading to the progressive deterioration and downgrading of the area. All replacements and repairs must match and conform to the original design if not replaced completely. All radio and television antennas, satellite dishes and receiving stations with supporting structures shall require the planting and maintenance of evergreens for screening purposes.

(j) Landscaping. All premises and vacant land shall be kept landscaped and lawns, hedges and bushes shall be kept trimmed and from becoming overgrown and unsightly.

(k) Signs. All signs permitted by reason of other regulations or as a lawful nonconforming use shall be maintained in good repair, and printed matter, pictures or illustrations contained thereon shall be completely maintained or when no longer in use completely removed.

(l) Reconstruction of Walls and Sidings. All reconstruction of walls and sidings shall be of standard quality and appearance commensurate with the character of the properties in the area. The materials used will not be of a kind that, by their appearance under prevailing appraisal practices and standards, will depreciate the values of neighboring and adjoining premises.

(m) General Maintenance. The exterior of every structure or accessory structure, including fences, shall be maintained in good repair and all surfaces thereof shall be kept painted where necessary for purposes of preservation and appearance. The same shall be maintained free of broken glass, loose shingles, crumbling stone or brick, excessive peeling paint or other conditions reflective of deterioration or inadequate maintenance to the end that the property itself may be preserved, safety and fire hazards eliminated and adjoining properties and the neighborhood protected from blighting influences.

(n) Store Fronts. All store fronts shall be kept in good repair, shall be painted where required and shall not constitute a safety hazard or nuisance. If repairs to a store front become necessary, such repairs shall be made with the same or similar materials used in the construction of the store front in such a manner as to permanently repair the damaged area. Any cornice visible above a store front shall be kept painted, where required, and in good repair.

(o) Structural Soundness. Every building and accessory structure, and every part thereof, shall be kept structurally sound and in a state of good repair to avoid safety, health or fire hazards, including:

(1) Exterior walls, sidings and roofs. Exterior walls, sidings and roofs shall be kept maintained structurally sound, in good repair and free from defects.

(2) Painting and other protective coating. All exposed surfaces susceptible to decay shall be kept at all times painted or otherwise provided with a protective coating sufficient to prevent deterioration.

(3) Weather and watertightness. Every dwelling shall be so maintained as to be weather and watertight.

(4) Repairs. Exterior walls, roofs, windows, window frames, doors, door frames, foundations and other parts of the structure shall be so maintained as to keep water from entering the structure. Damaged materials shall be repaired or replaced promptly. Places showing signs of rot, leakage, deterioration or corrosion shall be restored and protected against weathering or seepage.

(p) Freedom from Infestation. All parts of the premises shall be maintained so as to prevent infestation.

(q) Refuse Receptacles. All premises shall have approved receptacles or other conveniences for the disposal of rubbish, garbage, refuse or other waste matter, as required by the Building Division. The owner or operator, or his or her agent, shall provide suitable screening to cause receptacles for the disposal of rubbish, garbage, refuse or other waste matter to be invisible from ground level to those residents living in residential areas or from a street right of way abutting commercial property from that property, and such screening shall require review and approval by the Planning Commission.

Existing premises which presently have refuse receptacles which do not have suitable screening are required to be screened by the owner or operator, or his or her agent. Planning Commission review and approval shall be required.

(r) Mailbox Supports. All mailbox supports in the City shall comply with the following guidelines and criteria established by the American Association of State Highway and Transportation Officials:

(1) Timber post with maximum of four inch by four inch measurement or four and one-half inch diameter.

(2) Standard wall pipe with maximum two and one-half inch diameter.

(3) Any material with equal break-away characteristics of paragraphs (r)(1) and (2) hereof not exceeding the maximum diameters or measurements established in paragraphs (r)(1) and (2) hereof.

Mailbox supports shall be maintained in good repair and free from defects.

Mailbox supports in City rights-of-way which do not comply with the guidelines and criteria established herein are public nuisances representing physical conditions dangerous to human life and detrimental to the health, safety and welfare of persons.

(Ord. 1970-167. Passed 10-7-70; Ord. 1986-73. Passed 2-18-87; Ord. 1986105. Passed 10-1-86; Ord. 91-220. Passed 9-3-91; Ord. 91-247. Passed 9-17-91; Ord. 91-248. Passed 9-17-91; Ord. 92-135. Passed 7-7-92.)

(s) Residential Composting of Yard Waste. Composting of yard waste shall be permitted on residential property. Any area of yard waste composting shall be located in the rear yard at least ten feet from the rear and side yard lot lines, at least ten feet from any accessory building or unattached garage and at least twenty feet from any residential dwelling or attached garage. Composting material must be adequately contained and composting areas must be screened at ground level with fencing, hedges or shrubbery. Fencing must be in compliance with the Zoning Code of the City.

(t)Sale of used motor vehicles and boats. Any resident of the Municipality shall, at any given time, be permitted to display for sale, in the open, one used motor vehicle or boat, which is titled and registered to them, on property of which he or she is the owner, upon satisfaction of the following conditions:

(1)If requested, the owner of the property must provide proof of ownership of said motor vehicle or boat to the North Royalton Building Commissioner or his designate anytime during the period it is on display for sale.

(2)Said motor vehicle must display current license plates duly registered to that motor vehicle while on sale and/or display.

(3)Said motor vehicle or boat may not be set on display for sale within the City right-of-way.

(4)For purposes of this chapter, "motor vehicle" shall have the same meaning/definition as that contained in Ohio R.C. 4501.01(B), with the exception of those motor vehicles specifically excluded in Chapter 1282, Section 1282.08(a) of the North Royalton Planning & Zoning Code.

(Ord. 92-229. Passed 12-15-92; Ord. 2000-64. Passed 4-18-00.)

CHAPTER 1468: GRADING

1468.01 REGULATION OF GRADE CHANGES

(a) No person shall, by excavating, filling or other means, change the grade of any lot or parcel of land in such manner as to:

(1) Create a nuisance upon such property by the obstruction of the natural drainage of water from such property;

(2) Adversely affect adjacent private or public property by the diversion of surface water onto adjacent property, by the increase in the rate of runoff of surface water onto such adjacent property or by the interference with, or obstruction of, natural drainage of water from such adjacent property;

(3) Interfere with or obstruct the public sanitary or storm sewer system, interfere with or obstruct a natural watercourse or adversely affect established wetlands;

(4) By reason of the type of fill material used, or the manner of filling, create a nuisance by permitting such material, or the polluting effluent therefrom, to flow, wash or drain onto adjacent private or public property, into a natural watercourse or into the public sanitary or storm sewer system.

(b) No person shall, except pursuant to a building permit for a new structure issued by the Department of Buildings, change, by more than one inch, the average elevation of any portion of a lot or parcel of land without a permit for a change of grade issued by the Department of Buildings. Such permit shall not be issued until an application by the owner of the property, accompanied by a site plan, drawing, sketch and such data as the Engineering Department may deem to be necessary, is submitted and approved by the City Engineer.

The City Engineer shall determine that such application complies with the purpose, intent and basic planning objectives of the district and the criteria, standards and regulations expressed in this chapter, and that such change of grade is designed and will be accomplished and maintained in such a manner as to avoid interfering with or impairing the use or enjoyment of neighboring premises.

(c) All grading activities, including excavating, filling, grading, the delivery and removal of materials used or resulting from any such excavation or filling, and the delivery and removal of equipment used in such activities, shall be

so conducted that materials used in or resulting from such activities, or debris, will not be deposited onto any street or other public or private property (other than the lot or parcel of land whose grade is being so changed), or, if so deposited, will promptly (and not later than the day of such depositing) be removed therefrom.

(d) Any individual making application to change the grade of any parcel shall, in addition to obtaining the approval of the City Engineer, be charged at the rate set forth in Chapter 214 of these Codified Ordinances for the services of the City Engineer rendered in such case.

(e) As used in this section:

(1) "Natural watercourse" means a river, creek, brook or branch, and the flood plain thereof.

(2) "Lot" means any sublot in a recorded subdivision.

(3) "Parcel of land" means any parcel of land, other than a lot, identified as a separate parcel on the tax duplicate.

(Ord. 92-133. Passed 5-5-92.)

CHAPTER 1481: STORM WATER MANAGEMENT AND URBAN SEDIMENT POLLUTION ABATEMENT

1481.08 MAINTENANCE OF SYSTEMS

(a) Any portion of the drainage system, including on-site and off-site storage facilities, that is constructed by the developer will be continuously maintained by the owner of a residential development or subsequently through a homeowners association in title of the affected lands, unless such system is officially accepted by the City for maintenance. The developer shall cause the maintenance obligation to be inserted in the chain of title to the affected lands as a covenant running with the land in favor of the City.

(b) The need for maintenance can be minimized by designing low maintenance facilities. There are many design options which can result in nearly maintenance-free storm water control. Low maintenance is a priority in the design of all facilities.

(c) Multi-use facilities incorporating assets such as aesthetics and recreation can be incorporated with the design of these facilities.

(d) All facilities must be inspected and maintained by the owner/homeowners association twice yearly on May 1 and November 1, and periodically throughout the year to ensure that the facilities are operational. A written report shall be submitted to the City.

(Ord. 1989-179. Passed 11-20-89.)

Appendix L

OHIO STREAM MANAGEMENT GUIDE

"Who Owns Ohio's Streams?"

Guide No. 02

Over the years, Ohio citizens have frequently contacted the Department of Natural Resources seeking assistance in the resolution of problems they have encountered related to water resources. Many of the questions posed have concerned the authorities and duties of government, as well as the rights and responsibilities of individuals, with regard to surface water. This fact sheet poses some of the more frequently-asked questions, and provides the responses which have been passed along. It is intended to assist the lay person in understanding the basic legal concepts involved with some of Ohio's more common water rights issues. A more comprehensive analysis can be obtained through review of the references cited, which is strongly recommended. For those persons involved in water rights conflicts, this fact sheet is intended as a prelude to consultation with an attorney, not as a substitute for it.

Who owns Ohio's streams? Ohio's Constitution does not address this question, nor has there been a statute enacted in Ohio to address it. So the answer must be derived from the common law.

What is "the common law"? The common law, in this context, is the system of law initially developed in England by the higher courts and stated in the written opinions of these courts based on general customs or on reason and fixed principles of justice.[1&2] English common law had been adopted in the American colonies prior to the Revolutionary War, and those parts of it that were consistent with the Constitution of the United States were retained. Since then, opinions of federal and state courts in this country have modified, refined, and added to the common law of the United States and the State of Ohio.

What if the federal or state government passes a law that contradicts the common law? This type of law, called a statute, overrides the common law. Common law is used by the courts to interpret statutes and to determine the outcome of cases in which statutes are not controlling.

Are there situations not addressed by the common law? Yes, but because the common law is founded on the "laws of nature and the dictates of reason", even in the absence of a precedent it is adaptable to new situations and circumstances.[1&2] A precedent is a past decision of a higher court (an appeals court or supreme court) which serves as an example for other courts to follow in similar cases. In situations where there is no clear precedent to follow, it is difficult to predict how the common law may be adapted or modified. Even in situations where there is a clear precedent, it still may be modified or reversed by a new court decision and a new precedent established. Significant changes to the common law, which normally are the result of Ohio or U.S. Supreme Court decisions, occur due to changing circumstances, an expanding knowledge base, and changing attitudes in society and in the courts.

So what does the common law say about who owns Ohio's streams? There are two components to a stream, the water flowing in it and the land beneath the water. The nature of flowing water makes it impossible for a landowner to exercise the kind of control over it that is essential for it to be considered private property. Despite a landowner's efforts to retain it, the water will inevitably seep into the ground or evaporate into the air or flow downhill onto the next property. Water is a "public good" and not ownable as private property. Landowners do have rights to make use of the water flowing through their property including the right to withdraw it and otherwise control it to the extent that nature permits, so long as the rights of others are not infringed upon.[3] Such rights are known as "riparian rights", meaning they are derived through the ownership of streamside property.

As to who owns the land beneath a stream, under Ohio common law the owner of the land beside the stream also owns the land beneath it. If the land on each side is owned by two different owners, then each owns to the center of the stream unless otherwise specified by the landowners' deeds. On navigable streams there is a public right of navigation, spelled out originally in the Northwest Ordinance, which states that navigable waters shall be common highways, forever free to the people of the United States. On such streams, boaters have the right to navigate on the stream, regardless of who owns the land beside it. Because of this, some have claimed that the owners of land beside a navigable stream do not own the land beneath it. But Ohio courts have

long held that the owners of the land on the banks of a navigable stream are also owners of the beds to the middle of the stream, as in the common law.[4] One exception is the submerged land beneath the Ohio portion of Lake Erie, which is owned and held in trust for the public by the State of Ohio.

Does a landowner who owns the land on both sides of a stream (and, therefore, beneath the stream as well) have the right to construct a dam across it? There are no constitutional provisions and, in most instances, no statutes that address this type of action. Under the common law, dam construction is allowed so long as it doesn't infringe on the rights of others. If a dam is constructed so that the water retained behind it backs up onto an upstream landowner's property and causes harm, the dam owner may be held liable in court for an unreasonable interference with the flow of surface water.[5] If the dam curtails the flow of water downstream and prevents reasonable uses by downstream property owners, the dam owner may also be held liable in court. If the dam collapses during a normal flood and causes harm to downstream landowners, the dam owner may likewise be held liable.[6] On navigable streams, the construction of a dam may interfere with the public's right to navigate the stream. This could result in a court decision disallowing a dam because it is an impediment to the public's right of navigation.[7]

There are also both state and federal statutes which are, in some instances, relevant to construction of a dam. Depending on the size of the dam and the amount of water it would retain, it may fall under the jurisdiction of Ohio's dam safety statute which requires a construction permit from the Ohio Department of Natural Resources, Division of Water.[8] The purpose of the dam safety program is to require that dams are designed and constructed according to appropriate specifications to assure their structural integrity and the public safety. On a few large rivers in Ohio, construction of dams and other impediments to navigation is regulated by the U.S. Army Corps of Engineers. Impediments to navigation on these streams are generally not permitted.[9] Construction of a dam may also constitute placement of fill into waters of the United States, which may require a federal permit, also from the U.S. Army Corps of Engineers.[10] The federal and state statutes which are relevant to dam construction are outlined in Guide 06 *Permit Checklist for Stream Modification Projects.*

Whether or not a stream is navigable seems to affect landowner rights in Ohio. What is a navigable stream and how can I find out if a particular stream is navigable? Under Ohio common law, navigability cannot be determined by a precise formula which fits every stream under all circumstances and at all times. This means that the courts must decide the navigability of streams one at a time, on a case-by-case basis. Factors provided as guidelines for the courts include the stream's capacity for boating in its natural condition, its capacity for boating after the making of reasonable improvements and its accessibility to public destinations.[11] A natural temporary obstruction to navigation, such as a logjam or sandbar, does not destroy the otherwise navigable nature of a stream.

Traditionally, a test of navigability has been whether a stream is used or could be used as a highway for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water. Recently, the definition of navigability has been broadened to include a stream's capacity for recreational navigation as well. The modern view is that navigation for pleasure and recreation is as important in the eyes of the law as navigation for commercial purposes.[12] At any rate, under Ohio common law it is not possible to know with certainty whether or not a specific stream is subject to the public's right of navigation until a court has made such a determination.

Navigability is also defined in different ways by several federal and state statutes based upon the regulatory jurisdictions of the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. These definitions are relevant only within the context of the statutes in which they appear. More information about these statutes and their applicability can be found in Guide 06 *Permit Checklist for Stream Modification Projects.* Fact sheets explaining Section 404 permits and Section 401 water quality certifications are available from the Ohio Environmental Protection Agency by calling (614) 644-2001.[13]

Do landowners along a stream have the right to improve drainage on their land and route the drainage outlets into the stream? Again, there are no constitutional provisions or statutes which address this concern. Under the common law in Ohio, landowners have the right to make a reasonable use of their land, even though altering the flow of surface water may cause harm to others. Landowners incur liability only when their harmful interference with the flow of surface water is unreasonable.[14]

But if the outlet is a "natural watercourse," aren't property owners allowed to discharge drainage water into it even if it does cause damage downstream? Yes, but only if their actions are reasonable. Historically, the courts in Ohio maintained that upstream landowners could place surface water above and beyond the natural flow into natural watercourses without being liable to downstream owners.[15] However, more recent court decisions have applied a "reasonable use" rule instead. Under this rule, landowners are neither permitted to dispose of surface water any way they wish nor are they prohibited from interfering with the natural flow of

surface water to the detriment of others. Landowners are liable for damages caused by their interference with the natural flow of surface water only when their actions are "unreasonable".[14]

Who determines when the harmful interference with the flow of surface water is unreasonable? The reasonability of an alteration of the flow of surface water is decided by the courts on a case-by-case basis. A landowner along a stream who believes he or she has been harmed by another streamside landowner's actions must seek relief through court action. The court determines whether or not the harm is significant and material, whether it is unreasonable, and what the appropriate remedy should be. If the court determines that the harm is significant and material and that it is unreasonable, it may require that the action causing the harm be discontinued by granting an injunction against it. The court may also allow the action causing the harm to continue, but specify that compensation for damages be paid.

If a drainage improvement diverts water into a stream from land that does not naturally drain into that stream, isn't that illegal? Not necessarily. Historically, when the courts in Ohio allowed upstream landowners to place surface water above and beyond the natural flow into natural watercourses without being liable to downstream owners, one of the conditions was that none of the additional water could come from outside the watershed.[15] However, since the courts have been applying the reasonable use rule, the prohibition on diversion may no longer apply.[16] Under the reasonable use rule, such a diversion may be allowed unless a court determines that it constitutes a harmful interference with the flow of surface water that is unreasonable.

It is important to note that a state statute overrides the common law for diversions of water out of either the Lake Erie or Ohio River Basins in quantities greater than 100,000 gallons per day. A permit from the Ohio Department of Natural Resources is required for such diversions.[17] And under federal statute, diversions out of the Lake Erie Basin, regardless of quantity, must have the approval of all the Great Lakes States' Governors.[18]

Who is responsible for clearing natural obstructions, such as logjams and sandbars, from streams to keep them free flowing? It is not clear than anyone has such a responsibility. Governmental entities at the municipal, county, state, and federal levels have the statutory **authority** to undertake stream clearing and drainage improvement projects, but no governmental entity at any level has been assigned by statute the **responsibility** for such activities. The common law also does not specify that property owners must keep the streams flowing through their property clear of natural obstructions. Natural obstructions in a stream on one property may cause harm to upstream property owners by reducing the stream's capacity for conveying runoff, resulting in flooding or reducing the effectiveness of artificial drainage systems. If these problems were caused by a landowner's actions, such as the construction of a dam across the stream, this harm would be actionable in court. It is unclear whether or not a landowner's inaction in failing to remove natural obstructions from the stream is similarly actionable.

On watercourses where drainage improvements have been made under authority of County Ditch[19] statutes, there are requirements for maintenance that may include removal of logjams, sandbars, and other natural obstructions. A county ditch project doesn't change a streamside landowner's basic rights to the use of the watercourse and, in fact, improves its capacity for carrying away excess water. The county (or a joint county board for multi-county drainage projects) retains a maintenance easement along the stream, and is required by the statute to maintain the original drainage project.[20] Landowners pay an annual maintenance assessment for these services. There are similar maintenance provisions on streams where water management improvement projects have been undertaken by one of Ohio's Conservancy Districts.[21]

Municipal governments also have the authority to undertake stream clearing and drainage improvement projects, and some cities and villages have enacted ordinances requiring that streams be maintained in their free-flowing states within the municipal boundaries.

The statutory authorities available for removing obstructions are discussed in Guide 04, A *Catalog of Contacts for Stream Topics.* The Ohio Department of Natural Resources recommends that, before an obstruction removal project is begun, consultation be made with the applicable local, state, and federal agencies listed in Guide 06, *Permit Checklist for Stream Modification Projects.* The extent of permit requirements will depend on the location and design of the particular project.

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13 Section 404 Permits and Section 401 Water Quality Certifications, Ohio Environmental Protection Agency fact sheets.

14 McGlashan v. Spade Rockledge Corp., (1980), 62 Ohio St. 2d 55. See also: Myotte v. Mayfield, (1977), 54 Ohio App. 2d 97; Chudzinski v. Sylvania, (1976), 53 Ohio App. 2d 151; Masley v. Lorain, (1976), 48 Ohio St. 2d 334. An excellent discussion on this and related topics can be found in: Brown, L.C. and J.L. Stearns, Ohio's Drainage Laws—An Overview, Bulletin 822, OSU Extension, Columbus, Ohio.

15 Munn v. Horvitz, (1964), 175 Ohio St. 521.

16 Joseph, v. Wyss, (1991), 72 Ohio App. 3d 199.

17 Ohio Revised Code, §1501.32.

18 Federal Water Resources Development Act of 1986, Section 1109.

19 Ohio Revised Code, Chapters 6131, 6133, 6135, and 6137.

20 The maintenance requirement applies only to county ditch projects done after 1957.

21 Ohio Revised Code, Chapter 6101.

This Guide is one of a series of Ohio Stream Management Guides covering a variety of watershed and stream management issues and methods of addressing stream related problems. All Guides, including an **Index of Titles**, are available from the Ohio Department of Natural Resources. To obtain copies contact the ODNR Public Information Center at:

1952 Belcher Drive Building. C-1
Columbus, Ohio 43224-1386
614/265-6791

The guides are also available on-line as web pages and PDF files so you may print high quality orignals at your location. You will find the guides on-line at: http://www.dnr.state.oh.us/odnr/water/pubs/onlnpubs.html.

For more information call the ODNR, Division of Water at 614/265-6739. Each Guide is designed to be easily and clearly reproduced and can be bound in a notebook. **Single copies are available free of charge. When distributing guides at meetings or in mailings, please use the printed editions or the PDF file as a master for reproducing the number of copies you need.**

Prepared by the Ohio Department of Natural Resources, Leonard P. Black, Division of Water, principal author. Input from staff of several ODNR divisions and other local, state and federal agencies is used in the development of the Ohio Stream Management Guides. Funding for the production of the Ohio Stream Management Guides is provided in part through a federal grant under section 319 of the Clean Water Act. This Ohio Stream Management Guide is not intended to function as advice on legal issues. Please contact an attorney if legal advice is required..

Guides are available on-line at:
http://www.dnr.state.oh.us/odnr/water/pubs/onlnpubs.html

OHIO Department of Natural Resources

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OHIO STREAM MANAGEMENT GUIDE

Stream Debris and Obstruction Removal

A Proactive Landowner's Guide to Maintaining a Free-Flowing Stream

Guide No. 18

PREFACE

Over the years, Ohio citizens have frequently contacted the Department of Natural Resources seeking assistance in the resolution of problems they have encountered related to water resources. One of the most common concerns raised by private landowners involves the situation in which trees and other debris accumulate in stream channels and obstruct streamflow through their properties. These obstructions, sometimes referred to as logjams, may become large enough to disrupt existing drainage patterns and contribute to flooding. In-stream debris often gets lodged behind bridge and culvert openings, which can cause higher flood levels and result in additional land inundation and property damage. Some streams also serve as recreational boating resources, and logjams may interfere with canoeing or other small watercraft navigation. This fact sheet poses some of the frequently raised questions regarding logjams, and provides responses from the Ohio Department of Natural Resources.

WHAT IS A LOGJAM?

A logjam is any woody vegetation, with or without other debris, which obstructs a stream channel and creates a backwater condition. Logjams occur naturally, providing beneficial stream structure and cover for fish and wildlife and allowing nutrient-rich sediment to be deposited on adjacent floodplains. However, Ohio's streams are also expected to function as efficient drainage outlets, conveying water off the land in a timely manner. Logjams may inhibit this drainage function.

DO LOGJAMS CONTRIBUTE TO FLOODING?

Yes, especially during small-scale floods. Since a logjam and the backwater pool created behind it take up volume in the stream channel or floodplain, less natural storage is available when a flood event occurs. This can elevate the level of small-scale flood events, those that occur several times a year. Such impacts can be significant to farm fields and residences in the floodplain and to particularly low-lying, flood-prone areas. A logjam can also lengthen the duration of inundation during these floods, which can have a significant impact on crops planted in floodplain fields.

The amount by which a logjam reduces the floodplain's natural storage capacity is inadequate to make a significant difference in flood elevation during large-scale flood events. Thus, removing logjams is generally not considered an effective measure to mitigate large-scale floods. Large-scale flood events can create, relocate, or enlarge logjams, though, by carrying debris from the floodplain into the stream channel and blocking bridge and culvert openings, resulting in localized impacts.

HOW DOES A LOGJAM FORM?

A logjam most commonly forms when a relatively large object, often a tree that has fallen into a stream channel, becomes wedged or blocked across the streambed. Sometimes human activities induce stream obstructions, like when trimmings from tree pruning or large appliances and other litter are dumped in a stream or left in a floodplain and subsequently are carried into the stream by high water. When an object obstructs the channel, it slows the flow and creates a pool of water behind it. As the water slows or stops behind the object, sediment suspended in the water settles out. The deposited sediment adds to the obstruction and causes additional debris to be trapped on and behind it. As more sediment and debris accumulate around and behind the obstruction, the logjam becomes larger and more tightly packed, forming a natural dam across the stream.

WHY SHOULD LOGJAMS BE REMOVED?

The formation of a logjam is a natural phenomenon and there are beneficial as well as detrimental impacts. A logjam provides structure and cover for fish and other aquatic organisms. The pool created behind the logjam provides critical aquatic habitat during low flow conditions, and the stirring and mixing oxygenates the water as it cascades over, around, and through

the logjam.

A logjam may also negatively impact the stream. A tightly packed stream obstruction can act as a barrier to fish migration. Other problems caused by logjams are more insidious. A stream's energy is naturally channeled toward the route of least resistance, which is often around the obstruction. As the stream's flow is directed around an obstruction, it scours away the stream bank until a new channel is created. As the stream flows in its new channel around the logjam, it is re-directed toward the opposite bank. This begins a process, depicted in Figure 1, in which the stream's energy is directed subsequently from one bank to the other as the water flows downstream, eroding the stream banks and undercutting riparian vegetation as it creates a series of meanders. In an undeveloped watershed, where the streamside vegetation on a newly cut channel is similar to the vegetation on the original channel, such meandering and channel relocation is not really a problem. In a developed watershed, where the streamside vegetation consists of a narrow corridor with adjacent farm fields and housing tracts, stream meandering and relocation can inflict considerable riparian property damage and also degrade the quality of the stream habitat as the limited riparian habitat is destroyed.

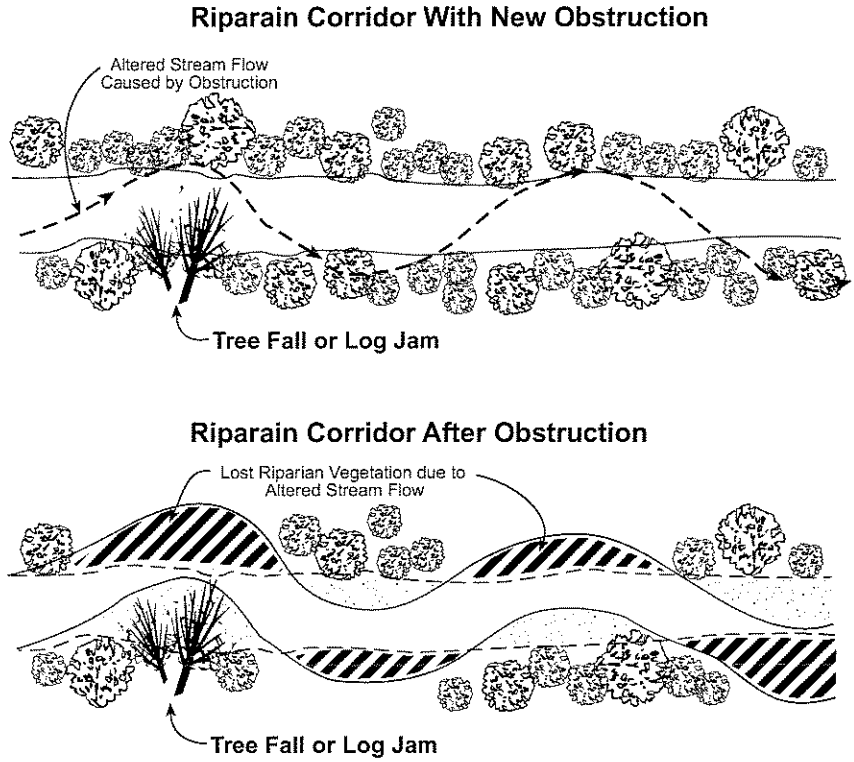

Figure 1. Effects of Obstruction on Riparian Corridor

IS THERE A GOVERNMENT AGENCY RESPONSIBLE FOR REMOVING LOGJAMS IN ORDER TO KEEP OHIO STREAMS FREE FLOWING?

No. Governmental entities at the municipal, county, state, and federal levels have the statutory authority to undertake stream clearing and drainage improvement projects, but no governmental entity at any level has been assigned by statute the responsibility for such logjam removal activities. For more information on legal responsibilities regarding logjams see Guide 02, Who Owns Ohio Streams? The Ohio Department of Natural Resources recommends that, before an obstruction removal project is begun, there should be consultation with the applicable local, state, and federal regulatory agencies listed in Guide 06, Permit Checklist for Stream Modification Projects. The extent of permit requirements will depend on the location and design of the particular project.

Technical, educational, and other assistance may be available for obstruction removal projects. Township trustees, county engineers, soil & water conservation districts, conservancy districts, local emergency management agency and floodplain management coordinators, and staff with The Ohio State University Extension may all be possible sources of information or assistance to individuals. State agencies (e.g., the Ohio Department of Natural Resources, the Ohio Environmental Protection Agency) and federal agencies (e.g., the USDA Natural Resource Conservation Service) may also provide assistance to organized groups. Successful logjam removal projects have been undertaken in Ohio on many streams, some by volunteers and others using state and local appropriations and/or landowner assessments.

ARE RIPARIAN PROPERTY OWNERS REQUIRED TO REMOVE LOGJAMS FROM STREAMS ON THEIR PROPERTY?

Landowners generally are not required by statute to remove logjams from streams on their properties. Statutes do exist that grant county commissioners (Ohio Revised Code ß 6151.14) and township trustees (Ohio Revised Code ß 505.82) the authority to remove stream obstructions on private property and charge the costs of removal back to the property owner; however, these statutes are rarely used.

The common law also does not specify that landowners must keep the streams flowing through their properties clear of natural obstructions. An obstruction to streamflow on one property can result in damages to upstream properties by reducing the stream's capacity for conveying runoff, contributing to flooding, or reducing the effectiveness of artificial drainage systems. Landowners have the right to pursue civil litigation for damages to their property caused by the unreasonable actions of others, but it is unclear whether a landowner's inaction in failing to remove natural stream obstructions could be successfully litigated. For more information on this subject, see Guide 02, *Who Owns Ohio Streams?*

While they are not required to remove logjams, landowners can contribute to the stability and overall health of their streams by proactively removing obstructions to flow. Such activities, especially on streams with limited riparian habitat, help maintain the multiple use nature of streams for fish and wildlife, drainage, recreation, and other purposes. A regular program for stream maintenance and obstruction removal may alleviate the need for a large, expensive channel restoration project later on.

HOW SHOULD IT BE DETERMINED WHAT ACTIVITIES ARE NEEDED ON A STREAM?

The easiest way to deal with logjams is to remove them before significant sediment and debris has been deposited. Riparian landowners should conduct routine stream inspections twice a year to identify fallen trees and other debris on their properties that need to be removed from the stream and floodplain. Special inspections should be made following large storm events, during which debris is commonly deposited. A volunteer organization could be formed to undertake annual stream walks or canoe trips of the entire stream (with landowner permission and support) to identify obstructions that need to be removed, develop a work plan of needed activities, and perhaps even assist landowners in the obstruction removal. Such a group can serve a valuable function to riparian landowners by building support throughout the watershed for a regular inspection and maintenance program.

HOW SHOULD STREAM OBSTRUCTIONS BE REMOVED AND WHAT TOOLS ARE NEEDED?

Fallen trees and other debris in the floodplain should be removed, buried, or secured as soon as possible. Fallen trees and other debris encountered in the stream should be removed at the earliest appropriate time. Standing trees should be left as they are. All debris should be buried, secured, or removed from the floodplain so that it won't be re-deposited during the next flood. Debris removal should be conducted only during low flow periods, which typically occur during late summer, autumn, and winter. Small debris can be removed from the channel without any tools or equipment. Larger logs and trees across the channel will need to be cut into manageable pieces and dragged out of the stream. Accumulated sediment can be raked and grubbed to remove vegetation. Large equipment should not be placed within the stream channel. Any disturbed areas along the stream channel should be seeded immediately to avoid unnecessary streambank erosion. If stream bank erosion has already occurred where a logjam has been removed, bank stabilization may be appropriate. For more information on bank stabilization methods, see Guide 07, Restoring Stream Banks With Vegetation, Guide 08, Trees for Ditches, Guide 11, Tree Kickers, Guide 12, Evergreen Revetments, Guide 13, Forested Buffer Strips, Guide 14, Live Fascines, Guide 15, Gabion Revetments, Guide 16, Rip Rap Revetments, and Guide 17, Live Cribwalls.

The following equipment is typically used for logjam removal projects: hand tools to facilitate removal of small debris; articulated log skidders with cable winches to remove larger logs; a chain saw or reciprocating saw to cut large logs and trees to manageable size; an adequate length of cable, chain, or rope to attach to the logs to facilitate their removal; a tractor, truck, or team of draft horses on the top of the stream bank to pull the logs out of the stream; and a wagon or truck on which to load the debris for subsequent removal from the floodplain.

Large logjams that are already well established need to be left for properly trained and equipped crews to remove. Specialized power equipment and explosives should never be used by anyone other then highly trained experts. The use of expensive and elaborate equipment is often not necessary when landowners take the time to perform routine maintenance and upkeep on their properties.

WHAT PRECAUTIONS SHOULD BE TAKEN BEFORE AND DURING AN OBSTRUCTION REMOVAL PROJECT?

The Ohio Department of Natural Resources recommends a consultation with the county engineer and local floodplain coordinator prior to initiation of an obstruction removal project. All tractors and other wheeled or tracked vehicles need to be kept out of the stream channel and well away from the top of the bank. Logjam removal activities should never be attempted alone, and a crew leader should be appointed to keep visual contact with everyone on the crew. The utmost caution should be taken to pro-

tect the personal safety of all workers. To avoid unnecessary damage to the streambank or riparian corridor, a single route to and from the project site should be utilized.

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and Land Development—Ohio's Standards for Stormwater Management, Land Development, and Urban Stream Protection, 2nd edition, 1996, the Ohio Department of Natural Resources in cooperation with the USDA Natural Resources Conservation Service and the Ohio Environmental Protection Agency.

This Guide is one of a series of Ohio Stream Management Guides covering a variety of watershed and stream management issues and methods of addressing stream related problems. All Guides, including an Index of Titles, are available from the Ohio Department of Natural Resources. To obtain copies contact the ODNR Division of Water at 1939 Fountain Square Court, Building. E-1, Columbus, Ohio 43224-1385 or 614/265-6744 or e-mail to: infomail@dnr.state.oh.us.

For more information about the project call Jason Remich at ODNR, Division of Water at 614/265-6744. Each Guide is designed to be easily and clearly reproduced and can be bound in a notebook. Single copies are available free of charge. When distributing guides at meetings or in mailings, please use printed editions as a master for reproducing the number of copies you need, or you may print high quality originals from PDF files available on-line at: //www.dnr.state.oh.us/odnr/water/pubs/onlnpubs.html

Prepared by the Ohio Department of Natural Resources, Leonard black, Division of Water, principal author. Input from staff of several ODNR divisions, and local, state and federal agencies are used in the development of the Ohio Stream Management Guides. Funding for the production of the Ohio Stream Management Guides is provided in part through a grant under Section 319 of the federal Clean Water Act.

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Appendix M

U.S. Environmental Protection Agency

2002-2003: The Year of Clean Water

Stormwater Month Outreach Materials and Reference Documents

To celebrate the 30th anniversary of the Clean Water Act, the Environmental Protection Agency (EPA) has launched a year-long series of monthly events, each focusing on a different aspect of the Act. April 2003 has been designated as Stormwater Month!

Spring is a great time to focus on stormwater (April showers...) and this year, as Phase II of the NPDES stormwater regulations come into effect, there is even more reason to get the word out. These regulations place new requirements on approximately 5,000 small and medium-sized cities and towns and as many as 200,000 construction sites (1 to 5 acres).

Stormwater pollution from point sources and nonpoint sources is a challenging water quality problem. Unlike pollution from industry or sewage treatment facilities, which is caused by a discrete number of sources, stormwater pollution is caused by the daily activities of people everywhere. Rainwater and snowmelt run off streets, lawns, farms, and construction and industrial sites and pick up fertilizers, dirt, pesticides, oil and grease, and many other pollutants on the way to our rivers, lakes, and coastal waters. Stormwater runoff is our most common cause of water pollution. Because stormwater pollution is caused by so many different activities, traditional regulatory controls will only go so far. Education and outreach are key components to any successful stormwater program.

Outreach Materials

Recognizing this, EPA has developed a set of materials that state or local governments can customize and use in their own stormwater outreach campaigns. The electronic files on this page contain space for officials to add their own contact information and inexpensively reproduce these materials. Below you'll find materials for the general public, homeowners, construction site operators, and children.

Stormwater Reference Documents

In addition to the featured outreach materials, links are provided to key stormwater reference documents. Use the table of contents box to find key stormwater regulations, permits and applications, and guidance documents

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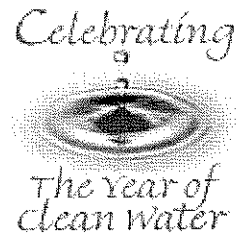
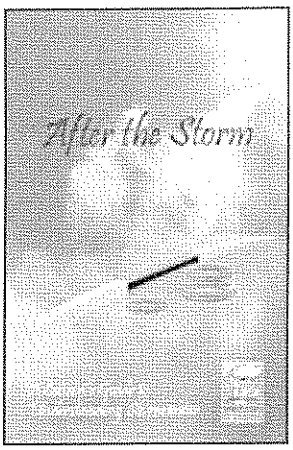
produced by EPA for industrial facilities, construction sites, and communities with municipal separate storm sewer systems (MS4s). Most states are authorized to implement the stormwater program, so be sure to check with your state (or the EPA Regional Office, for unauthorized states) for specific requirements. To determine if your state is authorized, please use this state authorization table.

For more information on stormwater and nonpoint source pollution, please visit:

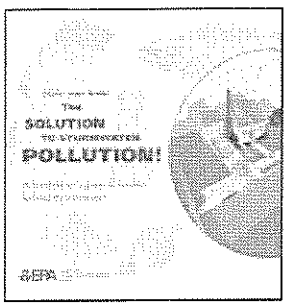


- http://www.epa.gov/npdes/stormwater - EPA's stormwater program homepage
- http://www.epa.gov/owow/nps - EPA's nonpoint source program homepage
- http://www.CICAcenter.org - The Construction Industry Compliance Assistance Center homepage EXIT disclaimer. Click here [PDF Format] for a brief description of this web site.

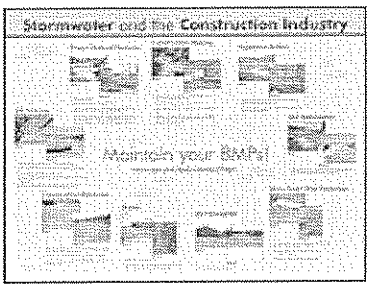
Stormwater Outreach Materials



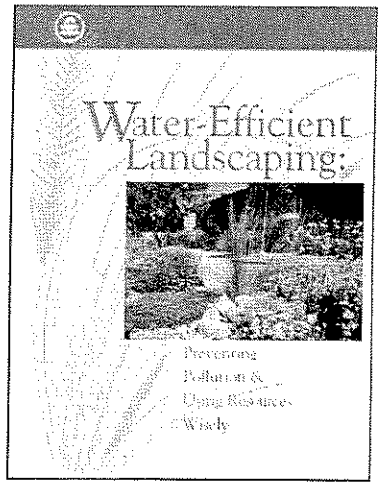
After the Storm Brochure [PDF Format] - Provides a broad overview of stormwater pollution, including runoff from residential and commercial properties, farms, construction sites, automotive facilities, forestry operations, and others. May be customized. *EPA 833-B-03-002*



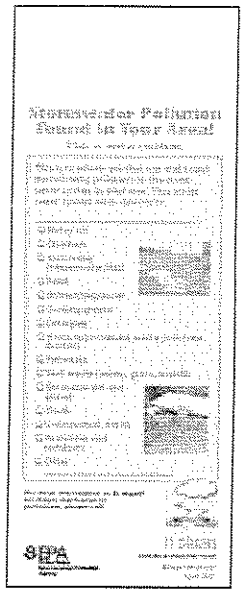
Make Your Home the Solution to Stormwater Pollution Brochure [PDF Format] - This short brochure is targeted directly to homeowners and provides tips on a wide variety of simple things that homeowner's can do to prevent stormwater pollution. May be customized. *EPA 833-B-03-003*



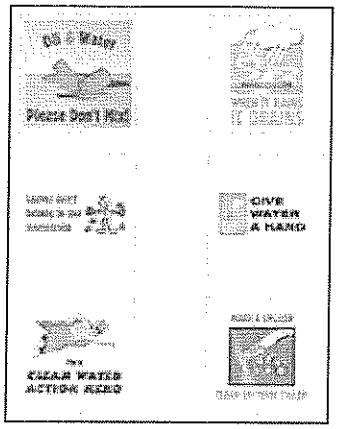
Stormwater and the Construction Industry Poster - Great for construction sites of all sizes! You can print this poster on 11x17 paper. Side one [PDF Format] of this informative poster illustrates proper installation of common sediment and erosion control practices (best management practices). Side two [PDF Format] describes the process for developing and implementing a stormwater pollution prevention plan and obtaining permit coverage. The complete 30x40 poster [PDF Format] is also available. May be customized. *EPA 833-H-03-001*



Water Efficient Landscaping [PDF Format] - This booklet describes the benefits of water-efficient, low-impact landscaping. It includes examples of successful projects, programs, and contacts. *EPA 832-F-02-002*

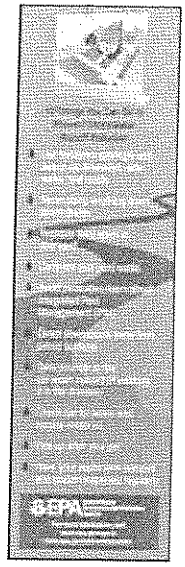


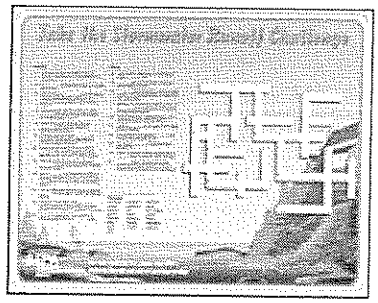
Door Hanger: "Stormwater Pollution Found in Your Area!" [PDF Format] - Provides a friendly reminder to keep trash, chemicals, and other pollutants out of storm drains. For use by stormwater inspectors and other local officials, in conjunction with illicit discharge elimination systems. May be customized. *EPA 833-F-03-002*



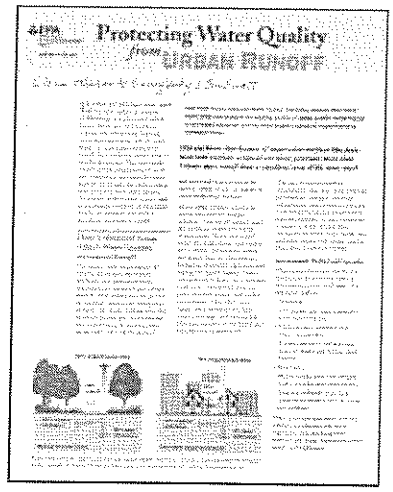
Kid's Stormwater Stickers [PDF Format] - Kids love to collect and trade stickers! There are two pages with 12 colorful stickers that will help kids learn about some key water pollution issues. *EPA 833-E-03-001*

Bookmark: "10 Things That You Can Do to Prevent Stormwater Runoff Pollution" [PDF Format] - Great promotional item! This handy bookmark lists 10 simple things anyone can do to prevent stormwater pollution. *EPA 841-H-03-003*

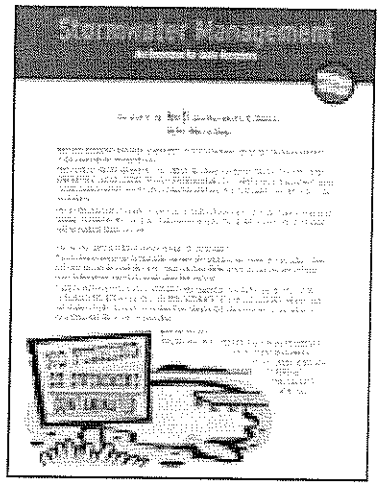




Placemat: "Take the Stormwater Challenge" [PDF Format] - Provides a fun learning opportunity for middle school children and can be used to generate classroom discussion or further exploration of water pollution issues. May be customized *EPA 841-H-03-002*

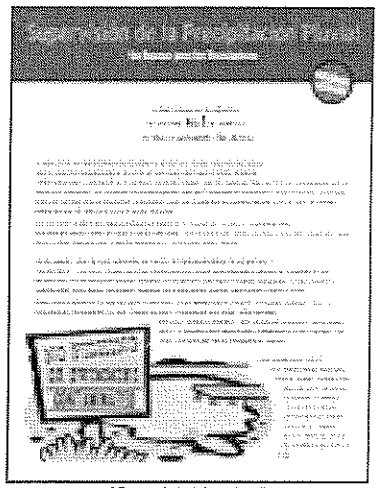


Protecting Water Quality from Urban Runoff [PDF Format] - This fact sheet explains how urbanized areas affect water quality through increased runoff and pollutant loads and what homeowners can do to prevent stormwater pollution. *EPA 841-F-03-003*



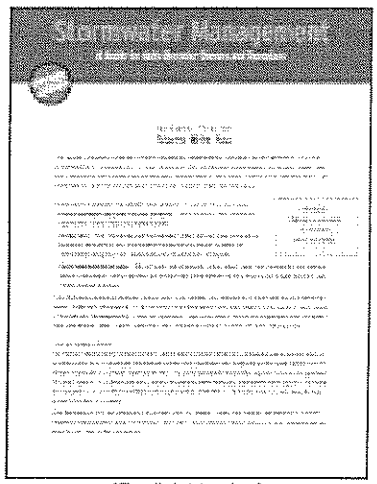
Stormwater Management: An Overview for Auto Recyclers [PDF Format] - This 1-page brochure, developed by Sustainable Conservation, describes how auto

[English Version]



[Spanish Version]

recycling businesses can contribute to stormwater pollution. It also offers five steps to prevent polluted runoff. This brochure is also available in *Spanish*. You may use this file to reproduce this brochure. Printed copies are not available from EPA.



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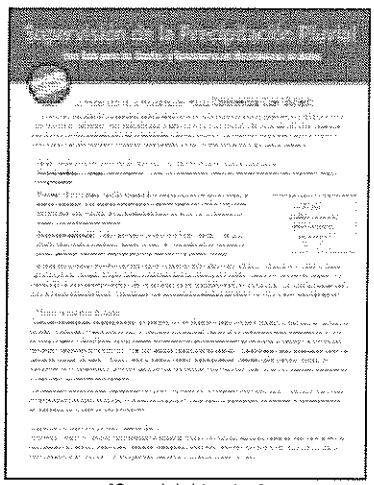
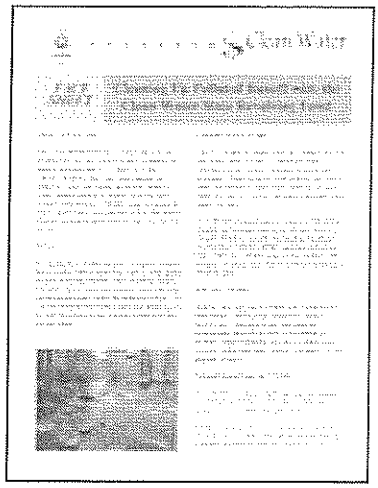


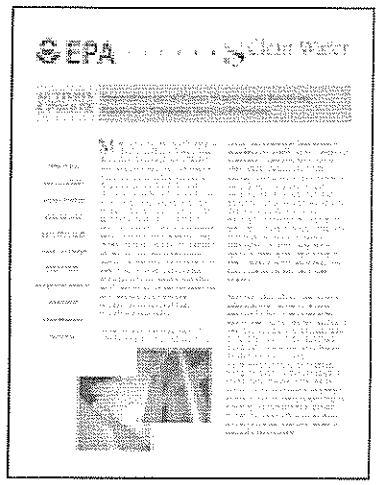
[Spanish Version]

Stormwater Management: A Guide for Auto Recycler Owners and Operators [PDF Format] - This 8-page brochure, developed by Sustainable Conservation, describes how auto recyclers and operators can prevent polluted runoff through activities such as employee training, spill cleanup, and parts storage. This brochure is also available in *Spanish*. You may use this file to reproduce this brochure. Printed copies are not available from EPA.

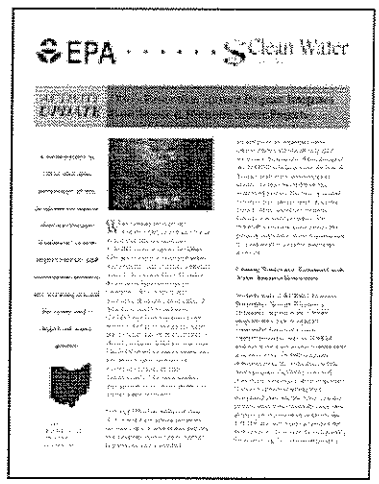
Cleaning Up Polluted Runoff with the Clean Water State Revolving Fund [PDF Format] - Financing is always an issue! This fact sheet provides an overview on financing runoff-related projects with the Clean Water State Revolving Fund



(CWSRF). It explains how the SRFs work and provides some brief examples of the kinds of projects that have been funded by different states. *EPA 832-F-03-004*

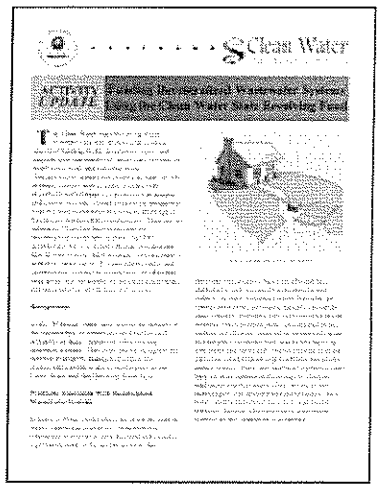


Innovative Use of Clean Water State Revolving Funds for Nonpoint Source Pollution [PDF Format] - This fact sheet explains the creative approaches many states have taken to find nonpoint source runoff projects using the Clean Water State Revolving Fund. Innovative uses include using linked deposit and pass-through loans. *EPA 832-F-02-004*



Ohio's Restoration Sponsor Program Integrates Point Source & Nonpoint Source Projects [PDF Format] - This fact sheet summarizes how Ohio EPA has used the Clean Water State Revolving Fund to creatively fund runoff projects. *EPA 832-F-02-001*

Funding Decentralized Wastewater Systems Using the Clean Water State Revolving Fund [PDF Format] - This fact sheet describes options for using the Clean Water State Revolving Fund to finance installation, repair, and upgrading of septic systems. *EPA 832-F-03-003*



Ordering Materials

You may order copies of the Stormwater Month Outreach Materials and Reference Documents CD *(EPA 833-C-03-001)* and printed copies of these materials free of charge. Please contact EPA's NPDES program at npdesbox-request@epa.gov or fax your request to 202-564-6392. Please include the words "Stormwater Month Materials" in your e-mail or fax.

Customizing a Publication

Each publication can be printed as is or customized using one of the options below:

1. Using the full version of Adobe Acrobat 5.0 (not the free version) allows the user to read a PDF, insert information in the fields provided, and save the new file. To insert local contact information on the PDF, click on each of the fields (name, agency, address, phone, and e-mail) in the "for more information" section on each publication. Replace the text with your information. Save and print the updated file and print it to a local printer or send to a professional printer.
2. Using the free version of Adobe Acrobat (http://www.adobe.com/products/acrobat/readstep.html) EXIT disclaimer, access the files below. Click on each of the fields (name, agency, address, phone, and e-mail) in the "for more information" section on each publication. Replace the text with your information. You will NOT be able to save the new information, but you will be able to print to a local printer.
3. Or simply stamp your agency's contact information in the "for more information" section of each publication.

Materials to be Customized

After the Storm Brochure [PDF Format]
EPA 833-B-03-002

Door Hanger: "Stormwater Pollution Found in Your Area!" [PDF Format]
EPA 833-F-03-002

Make Your Home the Solution to Stormwater Pollution Brochure [PDF Format]
EPA 833-B-03-003

Placemat: "Take the Stormwater Challenge" [PDF Format]
EPA 841-H-03-002

Stormwater and the Construction Industry Poster - side 1 and side 2 [PDF Format]
EPA 833-H-03-001

Stormwater and the Construction Industry Poster - Complete 30x40 Poster [PDF Format]
EPA 833-H-03-001

Printing a Publication

Each publication can be printed to your local printer or sent to a professional printing company. Document specifications for each publication are provided below. The Kid's Stormwater Stickers and Bookmark: "10 Things That You Can Do to Prevent Polluted Runoff" cannot be customized.

Title	Size	Color	Assembly	Recommended Paper Weight
After the Storm Brochure	11x17	7-color	quarter-fold to 5.5x8.5	80 lb., offset, recycled
Make Your Home the Solution to Stormwater Pollution Brochure	5.5x17	4-color	twice-fold to 5.5x8.5	80 lb., offset, recycled
Stormwater and the Construction Industry Poster	30x40	4-color		80 lb., offset, recycled
Door Hanger: "Stormwater Pollution Found in Your Area!"	4.25x11	2-color	standard die-cut	65 lb., cover, recycled
Kid's Stormwater Stickers	8.5x11	4-color		Pressure sensitive white paper
Bookmark: "10 Things That You Can Do to Prevent Polluted Runoff"	2.5x8.5	4-color		80 lb., cover, recycled
Placemat: "Take the Stormwater Challenge"	14x11	4-color		60-70 lb., offset, recycled

Stormwater Reference Documents

This web site contains links to the key stormwater regulations and guidance documents developed by EPA. To search **all** stormwater and NPDES publications by keyword, program area, or document type, please visit the NPDES Publications site.

- Stormwater Regulations
- Stormwater Permits and Applications
- EPA Guidance Documents
  - Storm Water Discharges from Construction Activities
  - Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s)
  - Storm Water Discharges from Industrial Facilities

Construction Industry Compliance Assistance Web Site EXIT disclaimer - In early 2002, EPA's Office of Compliance (OC) established a national work group to address issues related to the construction industry. The purpose of the work group is to identify existing and planned compliance assistance activities, foster communication among stakeholders, and develop tools to identify and address outstanding compliance needs. Click here [PDF Format] for a brief description of this web site.

Compliance Assistance Tools Project EXIT disclaimer - This web site presents current information on the Auto Recyclers and Construction sector compliance assistance tools. It includes materials, a compendium database, and a gap analysis.

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Last updated on April 01, 2003 4:34 PM
URL: http://cfpub.epa.gov/npdes/stormwatermonth.cfm

Water-Efficient Landscaping:

Preventing Pollution & Using Resources Wisely

A Message from the Administrator

Christine Todd Whitman

I believe water is the biggest environmental issue we face in the 21st Century in terms of both quality and quantity. In the 30 years since its passage, the Clean Water Act has dramatically increased the number of waterways that are once again safe for fishing and swimming. Despite this great progress in reducing water pollution, many of the nation's waters still do not meet water quality goals. I challenge you to join with me to finish the business of restoring and protecting our nation's waters for present and future generations.

United States Environmental Protection Agency
Office of Water (4204M)
EPA832-F-02-002
September 2002
www.epa.gov/owm/water-efficiency/index.htm

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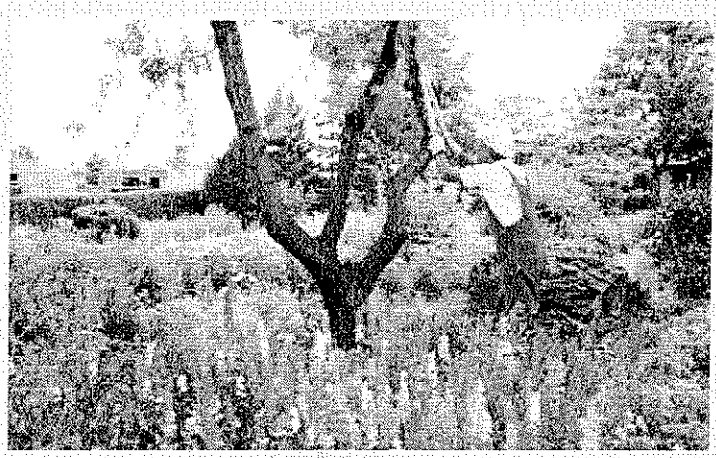


What is Water-efficient Landscaping?

Water, many agree, is our most precious natural resource; without it, life ceases. Yet judging by our water use and consumption practices, many of us in the United States seem to take it for granted. A typical household uses approximately 260 gallons of water per day. "Water conscious" individuals often install high-efficiency shower heads and toilets and wash only full loads of clothes and dishes to reduce consumption. But in the summer, the amount of water used outdoors by a household can exceed the amount used for all other purposes in the entire year. This is especially true in hot, dry climates.

Gardening and lawn care account for the majority of this seasonal increase, but other outdoor activities, such as washing cars and filling swimming pools, also contribute. According to the U.S. Geological Survey, of the 26 billion gallons of water consumed daily in the United States[1], approximately 7.8 billion gallons, or 30 percent[2], is devoted to outdoor uses. The majority of this is used for landscaping. In fact, it is estimated that the typical suburban lawn consumes 10,000 gallons of water above and beyond rainwater each year (Vickers, p 140).

Many mistakenly believe that stunning gardens and beautiful lawns are only possible through extensive watering, fertilization, and pesticide application. As this booklet will demonstrate, eye-catching gardens and landscapes that save water, prevent pollution, and protect the environment are, in fact, easily achieved by employing water-efficient landscaping. Water-efficient landscaping produces attractive landscapes because it utilizes designs and plants suited to local conditions.

This booklet describes the benefits of water-efficient landscaping. It includes several examples of successful projects and programs, as well as contacts, references, and a short bibliography. For specific information about how to best apply water-efficient landscaping principles to your geographical area, consult with your county extension service and local garden and nursery centers. Local governments and water utilities also possess a wealth of information and suggestions for using water more efficiently in all aspects of your life, including landscaping.

Xeriscape garden at Denver Water

1 W.B. Solley, R.R. Pierce, and H.A. Perlman. 1998. *Estimated Use of Water in the United States in 1995* (USGS Circular 1200). USGS. Reston, VA. p.27.

2 Amy Vickers. 2001. *Handbook of Water Use and Conservation*. WaterPlow Press. Amherst, MA. p. 140.

Xeriscaped front yard in Colorado Springs

Many terms and schools of thought have been used to describe approaches to water-efficient landscaping. Some examples include "water-wise," "water-smart," "low-water," and "natural landscaping." While each of these terms varies in philosophy and approach, they are all based on the same principles and are commonly used interchangeably. One of the first conceptual approaches developed to formalize these principles is known as "Xeriscape[3] landscaping." Xeriscape landscaping is defined as "quality landscaping that conserves water and protects the environment." The word "Xeriscape" was coined and copyrighted by Denver Water Department in 1981 to help make water conserving landscaping an easily recognized concept. The word is a combination of the Greek word "*xeros*," which means "dry," and "landscape."

The seven principles upon which Xeriscape landscaping is based are:

- Proper planning and design
- Soil analysis and improvement
- Appropriate plant selection
- Practical turf areas
- Efficient irrigation
- Use of mulches
- Appropriate maintenance

The eight fundamentals of water-wise landscaping, below, illustrate the similarities in the underlaying concepts and principles of Xeriscape landscaping and other water-efficient approaches.

- Group plants according to their water needs.
- Use native and low-water-use plants.
- Limit turf areas to those needed for practical uses.
- Use efficient irrigation systems.
- Schedule irrigation wisely.
- Make sure soil is healthy.
- Remember to mulch.
- Provide regular maintenance.

In short, plan and maintain your landscape with these principles of water efficiency in mind and it will continue to conserve water and be attractive.

3 Denver Water welcomes the use of the term Xeriscape in books, articles, and speeches promoting water conserving landscape. EPA is using this term with permission from Denver Water. For permission to use "Xeriscape" in your publications, call Denver Water at 303 628-6330.

Why Use Water-efficient Landscaping?

Proper landscaping techniques not only create beautiful landscapes, but also benefit the environment and save water. In addition, attractive, water-efficient, low-maintenance landscapes can increase home values.

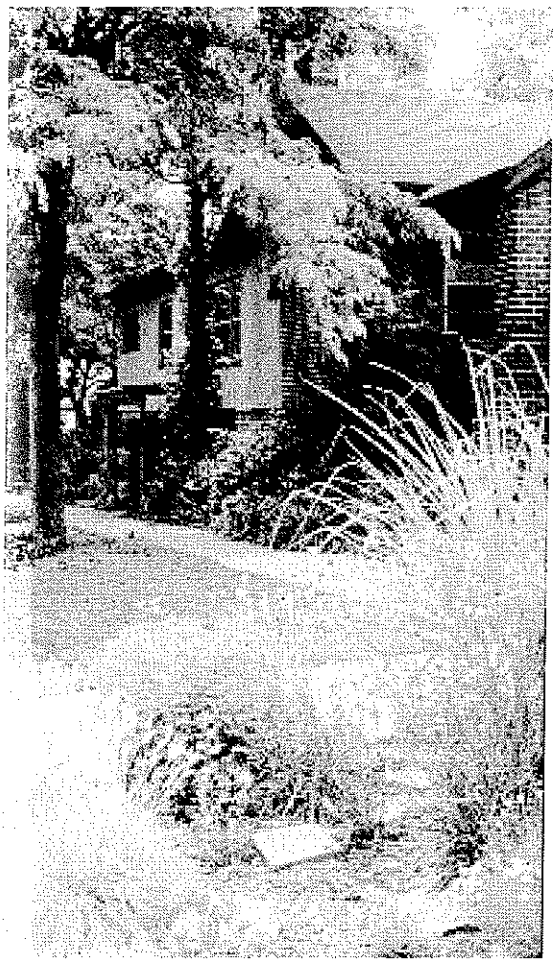
Water-efficient landscaping offers many economic and environmental benefits, including:

- Lower water bills from reduced water use.
- Conservation of natural resources and preservation of habitat for plants and wildlife such as fish and waterfowl.
- Decreased energy use (and air pollution associated with its generation) because less pumping and treatment of water is required.
- Reduced home or office heating and cooling costs through the careful placement of trees and plants.
- Reduced runoff of stormwater and irrigation water that carries top soils, fertilizers, and pesticides into lakes, rivers, and streams.
- Fewer yard trimmings to be managed or landfilled.
- Reduced landscaping labor and maintenance costs.
- Extended life for water resources infrastructure (e.g., reservoirs, treatment plants, groundwater aquifers), thus reduced taxpayer costs.

Meadow Sage (Salvia pratensis) *is the background for New Mexico Evening Primrose* (Oenothera berlandieri 'siskiyou')

How is Water-efficient Landscaping Applied?

Landscaping that conserves water and protects the environment is not limited to arid landscapes with only rocks and cacti. Through careful planning, landscapes can be designed to be both pleasing to the senses and kind to the environment. One simple approach to achieving this is applying and adopting the basic principles of water-efficient landscaping to suit your climatic region. The seven principles of Xeriscape landscaping are used below to describe these basic concepts in greater detail.



Dragon's Blood Sedum (Sedum spurium) *under Honeylocust Trees* (Gleditsia triaconthos)

Proper planning and design

Developing a landscape plan is the first and most important step in creating a water-efficient landscape. Your plan should take into account the regional and microclimatic conditions of the site, existing vegetation, topography, intended uses of the property, and most importantly, the grouping of plants by their water needs. Also consider the plants' sun or shade requirements and preferred soil conditions. A well-thought-out landscape plan can serve as your roadmap in creating beautiful, water-efficient landscapes and allow you to continually improve your landscape over time.

Soil analysis and improvements

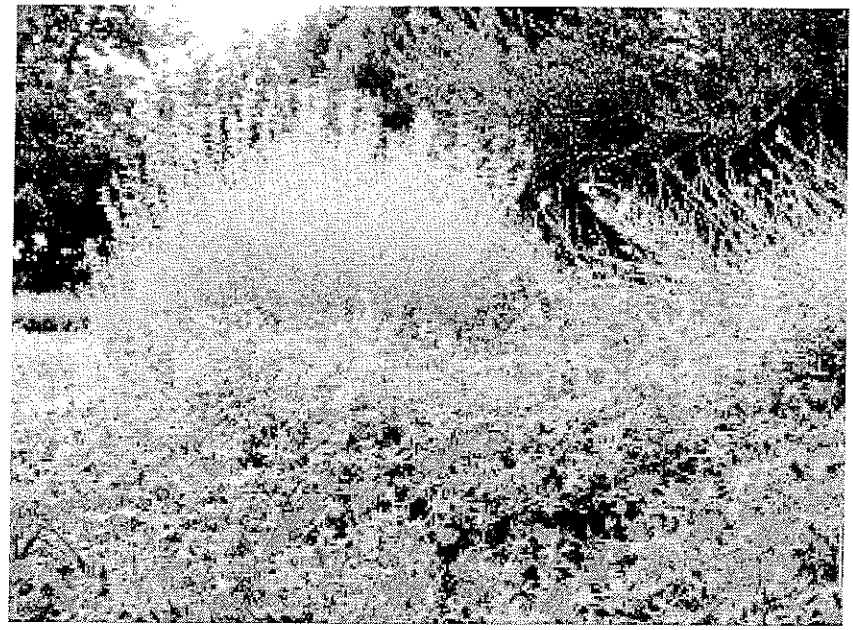
Because soils vary from site to site, test your soil before beginning your landscape improvements. Your county extension service can analyze the pH levels; nutrient levels (e.g., nitrogen, phosphorus, potassium); and the sand, silt, clay, and organic matter content of your soil. It can also suggest ways to improve your soil's ability to support plants and retain water (e.g., through aeration or the addition of soil amendments or fertilizers).

Appropriate plant selection

Your landscape design should take into account your local climate as well as soil conditions. Focus on preserving as many existing trees and shrubs as possible because established plants usually require less water and maintenance. Choose plants native to your region. Native plants, once established, require very little to no additional water beyond normal rainfall. Also, because they are adapted to local soils and climatic conditions, native plants commonly do not require the addition of fertilizers and are more resistant to pests and disease.

When selecting plants, avoid those labeled "hard to establish," "susceptible to disease," or "needs frequent attention," as these types of plants frequently require large amounts of supplemental water, fertilizers, and pesticides. Be careful when selecting non-indigenous species as some of them may become invasive. An invasive plant might be a water guzzler and will surely choke out native species. Your state or county extension service or local nursery can help you select appropriate plants for your area.

The key to successful planting and transplanting is getting the roots to grow into the surrounding soil as quickly as possible. Knowing when and where to plant is crucial to speeding the establishment of new plants. The best time to plant will vary from species to species. Some plants will thrive when planted in a dormant or inactive state. Others succeed when planted during the season when root generation is highest and sufficient moisture is available to support new growth (generally, spring is the best season, but check plant tags or consult with your local nursery for specific species).



Wine Cup (Callirhoe involucrata) *and Sunset Hyssop* (Agastache rupestris) *in the Denver Water Xeriscape Garden*

Practical turf areas

How and where turf is placed in the landscape can significantly reduce the amount of irrigation water needed to support the landscape. Lawns require a large amount of supplemental water and generally greater maintenance than other vegetation. Use turf where it aesthetically highlights the house or buildings and where it has practical function, such as in play or recreation areas. Grouping turf areas can increase watering efficiency and significantly reduce evaporative and runoff losses. Select a type of grass that can withstand drought periods and become dormant during hot, dry seasons. Reducing or eliminating turf areas altogether further reduces water use.

Efficient irrigation

Efficient irrigation is a very important part of using water efficiently outdoors, and applies in any landscape—whether Xeriscape or conventional. For this reason, an entire section of this booklet addresses efficient irrigation; it can be found on page 6.

Use of mulches

Mulches aid in greater retention of water by minimizing evaporation, reducing weed growth, moderating soil temperatures, and preventing erosion. Organic mulches also improve the condition of your soil as they decompose. Mulches are typically composed of wood bark chips, wood grindings, pine straws, nut shells, small gravel, or shredded landscape clippings. Avoid using rock mulches in sunny areas or around non-arid climate plants, as they radiate large amounts of heat and promote water loss that can lead to scorching. Too much mulch can restrict water flow to plant roots and should be avoided.

Appropriate maintenance

Water and fertilize plants only as needed. Too much water promotes weak growth and increases pruning and mowing requirements. Like any landscape, a water-efficient yard will require regular pruning, weeding, fertilization, pest control, and irrigation. As your water-efficient landscape matures, however, it will require less maintenance and less water. Cutting turf grass only when it reaches two to three inches promotes deeper root growth and a more drought-resistant lawn. As a rule of thumb, mow your turf grass before it requires more than one inch to be removed. The proper cutting height varies, however, with the type of grass, so you should contact your county extension service or local nursery to find out the ideal cutting height for your lawn. Avoid shearing plants or giving them high nitrogen fertilizers during dry periods because these practices encourage water-demanding new growth.

Water-efficient Landscape Irrigation Methods

With common watering practices, a large portion of the water applied to lawns and gardens is not absorbed by the plants. It is lost through evaporation, runoff, or being pushed beyond the root zone because it is applied too quickly or in excess of the plants' needs. The goal of efficient irrigation is to reduce these losses by applying only as much water as is needed to keep your plants healthy. This goal is applicable whether you have a Xeriscape or a conventional landscape.

To promote the strong root growth that supports a plant during drought, water deeply and only when the plant needs water. For clay soils, watering less deeply and more often is recommended. Irrigating with consideration to soil type, the condition of your plants, the season, and weather conditions—rather than on a fixed schedule—significantly increases your watering efficiency. Grouping plants according to similar water needs also makes watering easier and more efficient.

Purple Fountain Grass (Pennisetum setaceum "Rubrum") *and Marigolds* (Calendula officinalis) *in planter bed*

Irrigating lawns, gardens, and landscapes can be accomplished either manually or with an automatic irrigation system. Manual watering with a hand-held hose tends to be the most water-efficient method. According to the AWWA Research Foundation's outdoor end use study, households that manually water with a hose typically use 33 percent less water outdoors than the average household. The study also showed that households with in-ground sprinkler systems used 35 percent more water, those with automatic timers used 47 percent more water, and those with drip irrigation systems used 16 percent more water than households without these types of systems. These results show that in-ground sprinkler and drip irrigation systems must be operated properly to be water-efficient.

You can use a hand-held hose or a sprinkler for manual irrigation. To reduce water losses from evaporation and wind, avoid sprinklers that produce a fine mist or spray high into the air. Soaker hoses can also be very efficient and effective when used properly. Use a hand-held soil moisture probe to determine when irrigation is needed.

To make automatic irrigation systems more efficient, install system controllers such as rain sensors that prevent sprinkler systems from turning on during and immediately after rainfall, or soil moisture sensors that activate sprinklers only when soil moisture levels drop below preprogrammed levels. You can also use a weather-

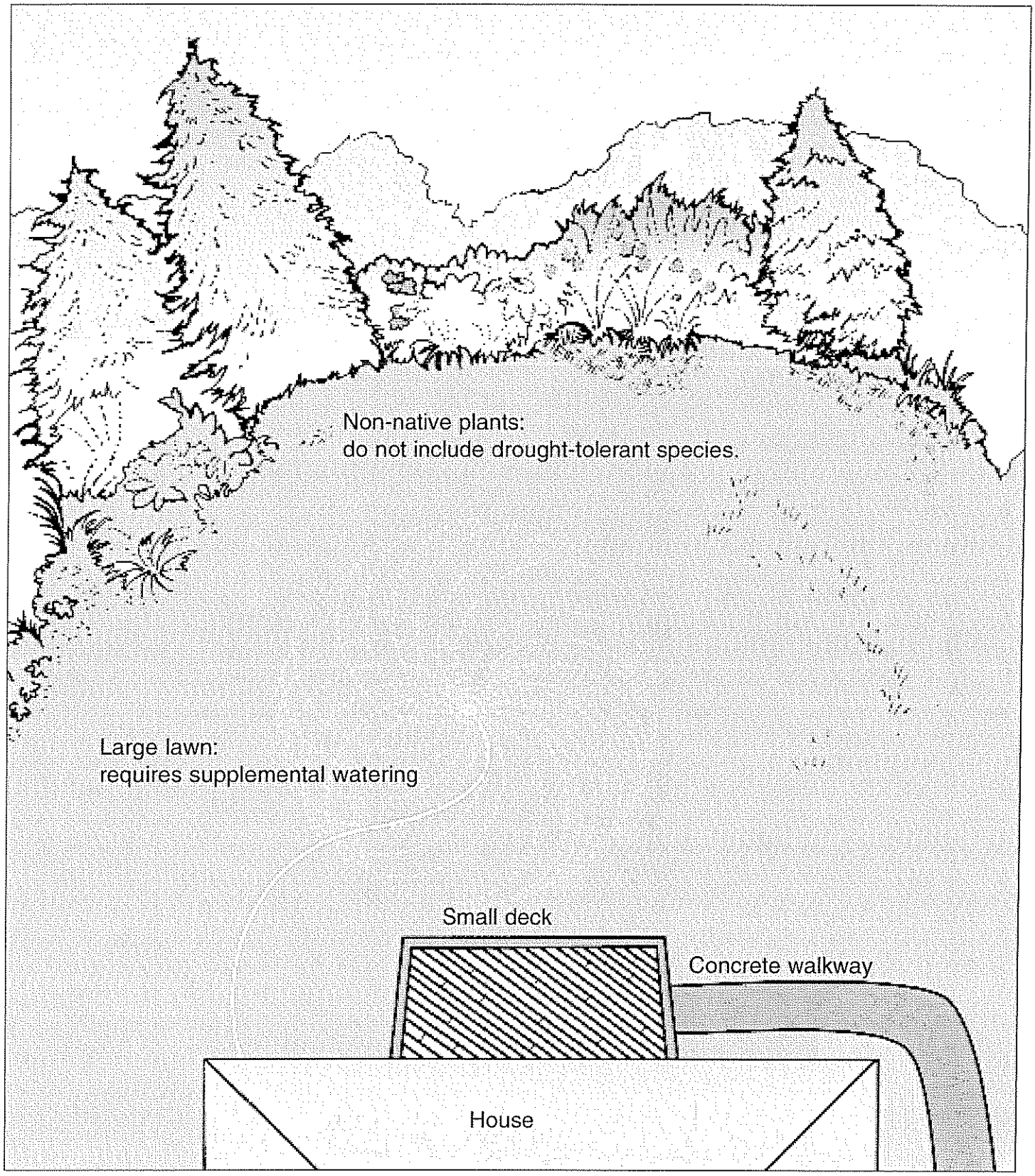
driven programming system. Drip-type irrigation systems are considered the most efficient of the automated irrigation methods because they deliver water directly to the plants' roots. It is also important to revise your watering schedule as the seasons change. Over-watering is most common during the fall when summer irrigation schedules have not been adjusted to the cooler temperatures.

To further reduce your water consumption, consider using alternative sources of irrigation water, such as gray water, reclaimed water, and collected rainwater. According to the AWWA Research Foundation, homes with access to alternative sources of irrigation reduce their water bills by as much as 25 percent.[4] Graywater is untreated household waste water from bathroom sinks, showers, bathtubs, and clothes washing machines. Graywater systems pipe this used water to a storage tank for later outdoor watering use. State and local graywater laws and policies vary, so you should investigate what qualifies as gray water and if any limitations or restrictions apply. Reclaimed water is waste water that has been treated to levels suitable for nonpotable uses. Check with local water officials to determine if it is available in your area. Collected rainwater is rainwater collected in cisterns, barrels, or storage tanks. Commercial rooftop collection systems are available, but simply diverting your downspout into a covered barrel is an easy, low-cost approach. When collecting rainwater, cover all collection vessels to prevent animals and children from entering and to prevent mosquito breeding. Some states might have laws which do not allow collection of rainwater, so be sure to check with your state's water resource agency before implementing a rainwater collection system.

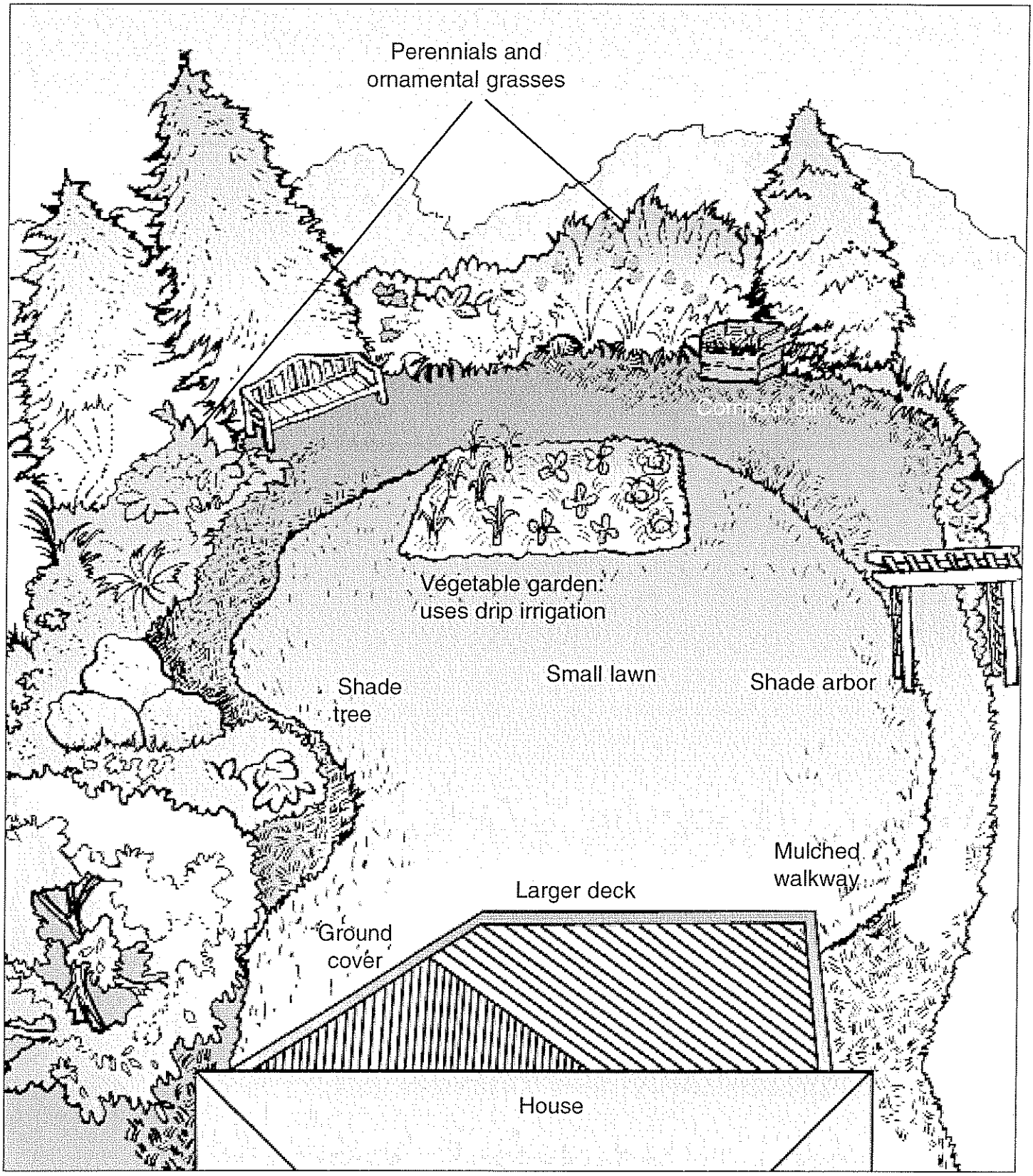
Red Valerian (Centranthus ruber)

4 AWWA Research Foundation. 1999. *Residential End Uses of Water.* <www.waterwiser.org>

Non-xeriscaping

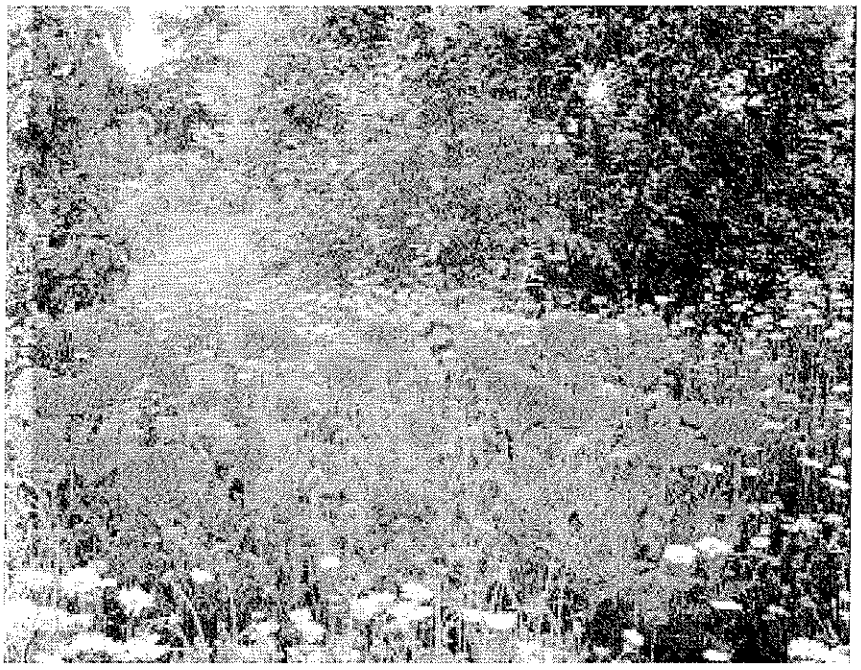


Xeriscaping



Examples of Successful Water-efficient Landscaping Projects

Water-efficient landscaping techniques can be used by individuals, companies, state, tribal, and local governments, and businesses to physically enhance their properties, reduce long-term maintenance costs, and create environmentally conscious landscapes. The following examples illustrate how water-efficient landscapes can be used in various situations.



Oriental Poppies (Paparer orientale)

Homeowner–public/private partnership

- The South Florida Water Management District, the Florida Nurserymen and Growers Association, the Florida Irrigation Society, and local businesses worked together to produce a television video called "Plant It Smart with Xeriscape." The video shows how a typical Florida residential yard can be retrofitted with Xeriscape landscaping to save energy, time, and money. The showcase yard (selected from 70 applicants) had a history of heavy water use—more than 90,000 gallons per month. After the retrofit, the yard's aesthetic value was enhanced; plus it now uses 75 percent less water and relies on yard trimmings for mulch and compost.
- The Southwest Florida Water Management District (SWFWMD), the City of St. Petersburg, and Pinellas County, Florida, produced a video called "Xeriscape It!" It shows a landscape being installed using the seven Xeriscape principles. The SWFWMD also funded several Xeriscape demonstration sites and maintains a Xeriscape demonstration garden at its Brooksville, Florida, headquarters. The garden features a variety of native and non-native plants and is available for public viewing, along with a landscape plant identification guide.
- Residents of Glendale, Arizona, can receive a $100 cash rebate for installing or converting more than half of their landscapable area to non-grass vegetation. The Glendale Water Conservation Office conducts an inspection of the converted lawn to ensure compliance with rebate requirements and then issues a rebate check to the homeowner. The purpose of the Landscape Rebate Program is to permanently reduce the amount of water used to irrigate grass throughout Glendale.

State government

- Although perceived as a water-rich state, Florida became the first to enact a statewide Xeriscape law. Florida's legislature recognized that its growing population and vulnerable environment necessitated legal safeguards for its water resources. The Xeriscape law requires Florida's Departments of Management Ser-

vices and Transportation to use Xeriscape landscaping on all new public properties and to develop a 5-year program to phase in Xeriscape on properties constructed before July 1992. All local governments must also consider requiring the use of Xeriscape and offering incentives to install Xeriscaping.

- Texas also developed legislation requiring Xeriscape landscaping on new construction projects on state property beginning on or after January 1994. Additional legislation, enacted in 1995, requires the Department of Transportation to use Xeriscape practices in the construction and maintenance of roadside parks. All municipalities may consider enacting ordinances requiring Xeriscape to conserve water.

City government

In Las Vegas, Nevada, homeowners can receive up to $1,000 for converting their lawn to Xeriscape, while commercial landowners can receive up to a $50,000 credit on their water bill. The city and several other surrounding communities hope these eye-catching figures will help Las Vegas meet its goal of saving 25 percent of the water it would otherwise have used by the year 2010; to date, it has saved 17 percent. Local officials plan to reach the target with the assistance of incentive programs encouraging Xeriscape, a city ordinance limiting turf to no more than 50 percent of new landscapes, grassroots information programs, and a landscape awards program specifically for Xeriscaped properties. Preliminary results of a five-year study show that residents who converted a portion of their lawns to Xeriscape reduced total water consumption by an average of 33 percent. The xeric vegetation required less than a quarter of the water typically used and one-third the maintenance (both in labor and expenditures) compared to traditional turf.

Yellow Ice Plant (Delosperma nubigenum) *close-up*

Developers

Howard Hughes Properties (HHP), a developer and manager of more than 25,000 acres of residential, commercial, and office development property, has enthusiastically used drought tolerant landscaping on all of its properties since 1990. Most of the company's properties are located in Las Vegas, one of the country's fastest growing metropolitan areas. To conserve resources, the city and county have implemented regulations requiring developers to employ certain Xeriscape principles in new projects. Specifically, a limited percentage of grass can be used on projects, and it must be kept away from streets. As the area's first large-scale developer to recognize the need and value in incorporating drought tolerant landscaping in parks, streetscapes, and open spaces, HHP uses native and desert-adaptive plants that survive and thrive in the Las Vegas climate with minimal to moderate amounts of water.

Drip system irrigation controllers are linked to weather stations that monitor the evapotranspiration rate. This allows HHP to determine the correct amount of water to be applied to plants at any given time. HHP tests the irrigation systems regularly and adds appropriate soil amendments to promote healthy plant growth. The maintenance program also includes pest management, the use of mulching mowers, and the use of rock mulch top dressing on all non-turf planting areas. These measures combine to ensure a beautiful, healthy, and responsible landscape.

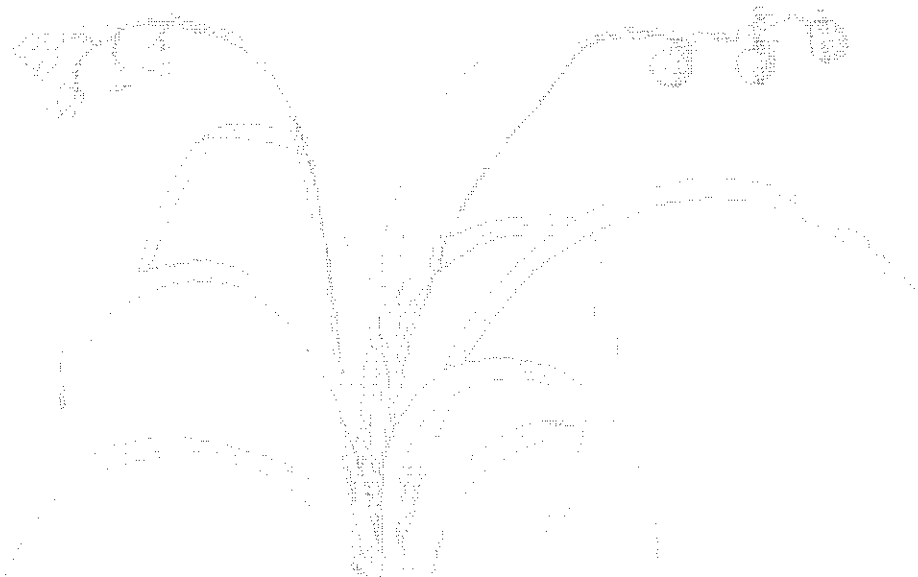
Public/private partnerships

Even the most water-conscious homeowners in Southern California are over-watering by 50 to 70 gallons per day. The excess water washes away fertilizers and pesticides, which pollute natural waterways. The quantity of water wasted (and the dollars that pay for it) are even more substantial for large-scale commercial properties and developments.

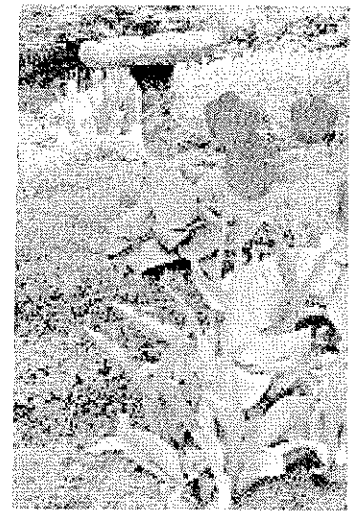
An innovative partnership in Orange County links landscape water management, green material management, and non-point source pollution prevention goals into one program—the Landscape Performance Certification Program. This program emphasizes efficient landscape irrigation and features a "landscape irrigation budget" based on a property's landscape area, type, and the daily weather. The Municipal Water District monitors actual water use through a system of 12,000 dedicated water meters installed by participating landscape managers.

Participants, including landscapers, property managers, and homeowner associations, can compare the actual cost of water used on their property with the calculated budget. Those staying within budget are awarded certification, a proven marketing tool. This new voluntary program is implemented by the Municipal Water District with input from the California Landscape Contractors' Association, the Orange County Integrated Management Department, the Metropolitan Water District of Southern California, and local nurseries and has the support of 32 retailing water suppliers. The program is already credited with increasing the use of arid-climate shrubs and landscaping to accommodate drip irrigation, and has resulted in cost savings to water customers.

Miscanthus sinensis (Miscanthus grass, also called Maiden grass) *variety with leaves turning yellow for fall.*



For More Information



Turkish Speedwell (Veronica liwanensis) *in background and tulips in foreground.*

The following list of organizations can provide more information on water-efficient landscaping. This is not meant to be an exhaustive list, rather it is intended to help you locate local information sources and possible technical assistance.

Water Management Districts or Utilities

Your local water management district often can provide information on water conservation, including water efficient landscaping practices. Your city, town, or county water management district can be found in the Blue Pages section of your local phone book or through your city, town, or county's Web site if it has one. If you do not know your city, town, or county's Web site, check for a link on your state's Web site. URLs for state Web sites typically follow this format: <www.state.(two letter state abbreviation).us>.

State/County Extension Services

Your state or county extension service is also an excellent source of information. Many extension services provide free publications and advice on home landscaping issues including tips on plant selection and soil improvement. Some also offer a soil analysis service for a nominal fee. Your county extension service can be found in the Blue Pages section of your local phone book under the county government section or through your county's Web site if it has one. The U.S. Department of Agriculture's Cooperative State Research, Education, and Extension Service (www.reeusda.gov/statepartners/usa.htm) provides an online directory of land-grant universities which can help you locate your state extension service. Government Guide (www.governmentguide.com) is yet another online resource that might prove helpful in locating state or local agencies.

Organizations

The following is a partial list of organizations located across the United States that provide helpful information on water-efficient landscaping.

American Water Works Association (AWWA)
6666 West Quincy Avenue
Denver, CO 80235
Telephone: 303 794-7711
and
1401 New York Avenue, NW, Suite 640
Washington, DC 20005
Telephone: 202 628-8303
Web: <www.awwa.org>

Arizona Municipal Water Users Association (AMWUA)
Web: <www.amwua.org/program-xeriscape.htm>

BASIN
City of Boulder Environmental Affairs
P.O. Box 791
Boulder, CO 80306
Phone: 303 441-1964
E-mail: basin@bcn.boulder.co. us
Web: <bcn.boulder.co.us/basin/local/seven.html>

Denver Water
1600 West 12th Avenue
Denver, CO 80204
Phone: 303 628-6000
Fax: 303 628-6199
TDDY: 303 534-4116
Office of Water Conservation hotline:
303 628-6343
E-mail: jane.earle@denverwater.org
Web: <www.water.denver.co.gov/conservation/conservframe.html>

New Mexico Water Conservation Program/Water Conservation Clearinghouse
P. O. Box 25102
Santa Fe, NM 87504
Phone: 800 WATER-NM
E-mail: waternm@ose.state.nm.us
Fax: 505 827-3813
Web: <www.ose.state.nm.us/water-info/conservation/index.html>

Project WET - Water Education for Teachers
201 Culbertson Hall
Montana State University
Bozeman, MT 59717
Phone: 406 994-5392
Web: <www.montana.edu/wwwwet>

Rocky Mountain Institute
1739 Snowmass Creek Road
Snowmass, CO 81654-9199
Phone: 970 927-3851
Web: <www.rmi.org>

Southern Nevada Water Authority
1001 S. Valley View Boulevard, Mailstop #440
Las Vegas, NV 89153
Phone: 702 258-3930
Web: <www.snwa.com>

Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899
Phone: 352 796-7211 or 800 423-1476 (Florida only)
Web: <www.swfwmd.state.fl.us/watercon/xeris/swfxeris.html>

Sustainable Sources Green Building Program: Sustainable Building Source Book
E-mail: info@greenbuilder.com
Web: <www.greenbuilder.com/sourcebook/xeriscape.html>

Water Conservation Garden – San Diego County
12122 Cuyamaca College Drive West
El Cajon, CA 92019
Phone: 619 660-0614
Fax: 619 660-1687
E-mail: info@thegarden.org
Web: <www.thegarden.org/garden/xeriscape/index.html> and <www.sdcwa.org/manage/conservation-xeriscape.phtml>\

WaterWiser: The Water Efficiency Clearing House
(Operated by AWWA in cooperation with the U.S. Bureau of Reclamation)
6666 West Quincy Avenue
Denver, CO 80235
Phone: 800 559-9855
Fax: 303 794-6303
E-mail: bewiser@waterwiser.org
Web: <www.waterwiser.org>

Xeriscape Colorado!, Inc.
P.O. Box 40202
Denver, CO 80204-0202
Web: <www.xeriscape.org>

Resources

The following is a partial list of publications on resource efficient landscaping. For even more information, particularly on plants suited to your locale, consult your local library, county extension service, nursery, garden clubs, or water utility.

Ball, Ken and American Water Works Association Water Conservation Committee. *Xeriscape Programs for Water Utilities*. Denver: American Water Works Association, 1990.

Bennett, Jennifer. *Dry-Land Gardening: A Xeriscaping Guide for Dry-Summer, Cold-Winter Climates*. Buffalo: Firefly, 1998.

Bennett, Richard E. and Michael S. Hazinski. *Water-Efficient Landscape Guidelines*. Denver: American Water Works Association, 1993.

Brenzel, Kathleen N., ed. *Western Garden Book*, 2001 Edition. Menlo Park: Sunset Publishing Corporation, 2001.

City of Aurora, Colorado Utilities Department. *Landscaping for Water Conservation: Xeriscape!* Aurora: Colorado Utilities Department, 1989.

Johnson, Eric and Scott Millard. *The Low-Water Flower Gardener: 270 Unthirsty Plants for Color, Including Perennials, Ground Covers, Grasses & Shrubs*. Tucson: Ironwood Press, 1993.

Knopf, James M. *The Xeriscape Flower Gardener*. Boulder: Johnson Books, 1991.

Knopf, James M., ed. *Waterwise Landscaping with Trees, Shrubs, and Vines: A Xeriscape Guide for the Rocky Mountain Region, California, and the Desert Southwest*. Boulder: Chamisa Books, 1999.

Knox, Kim, ed. *Landscaping for Water Conservation: Xeriscape*. Denver: City of Aurora and Denver Water, 1989.

Nellis, David W. *Seashore Plants of South Florida and the Caribbean: A Guide to Identification and Propagation of Xeriscape Plants*. Sarasota: Pineapple Press, Inc., 1994.

Perry, Bob. *Landscape Plants for Western Regions: An Illustrated Guide to Plants for Water Conservation*. Claremont: Land Design Publishing, 1992.

Phillips, Judith. *Natural by Design: Beauty and Balance in Southwest Gardens*. Santa Fe: Museum of New Mexico Press, 1995.

Phillips, Judith. *Plants for Natural Gardens: Southwestern Native & Adaptive Trees, Shrubs, Wildflowers & Grasses*. Santa Fe: Museum of New Mexico Press, 1995.

Robinette, Gary O. *Water Conservation in Landscape Design and Maintenance*. New York: Nostrand Reinhold, 1984.

Rumary, Mark. *The Dry Garden*. New York: Sterling Publishing Co., Inc., 1995.

Springer, Lauren. *The Undaunted Garden: Planting for Weather-Resilient Beauty*. Golden: Fulcrum Publishing, 1994.

Springer, Lauren. *Waterwise Gardening*. New York: Prentice Hall Gardening, 1994.

Stephens, Tom, Doug Welsh, and Connie Ellefson. *Xeriscape Gardening, Water Conservation for the American Landscape*. New York: Macmillan Publishing, 1992.

Sunset Books, eds. *Waterwise Gardening: Beautiful Gardens with Less Water*. Menlo Park: Lane Publishing Company, 1989.

Vickers, Amy. *Handbook of Water Use and Conservation*. Amherst, MA: WaterPlow Press, 2001.

Weinstein, Gayle. *Xeriscape Handbook : A How-To Guide to Natural, Resource-Wise Gardening*. Golden: Fulcrum Publishing, 1998.

Williams, Sara. *Creating the Prairie Xeriscape*. Saskatchewan: University Extension Press, 1997.

Winger, David, ed. *Xeriscape Plant Guide: 100 Water-Wise Plants for Gardens and Landscapes*. Golden: Fulcrum Publishing, 1998.

Winger, David, ed. *Xeriscape Color Guide*. Golden: Fulcrum Publishing, 1998.

Winger, David, ed. *Evidence of Care: The Xeriscape Maintenance Journal, 2002, Vol. 1*, Colorado WaterWise Council, 2001.

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For copies of this publication contact:
EPA Water Resources Center (RC-4100)
U.S. Environmental Protection Agency
Ariel Rios Building, 1200 Pennsylvania Avenue, NW.
Washington, DC 20460

For more information regarding water efficiency, please contact:
Water Efficiency Program (4204M)
U.S. Environmental Protection Agency
Ariel Rios Building, 1200 Pennsylvania Avenue, NW.
Washington, DC 20460
<www.epa.gov/OWM/water-efficiency/index.htm>

EPA
United States
Environmental Protection Agency (4204M)
Washington, DC 20460

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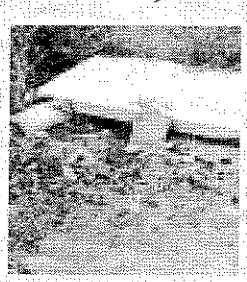
Stormwater Pollution Found in Your Area!

This is not a citation.

This is to inform you that our staff found the following pollutants in the storm sewer system in your area. This storm sewer system leads directly to

_____

- ❑ Motor oil
- ❑ Oil filters
- ❑ Antifreeze/ transmission fluid
- ❑ Paint
- ❑ Solvent/degreaser
- ❑ Cooking grease
- ❑ Detergent
- ❑ Home improvement waste (concrete, mortar)
- ❑ Pet waste
- ❑ Yard waste (leaves, grass, mulch)
- ❑ Excessive dirt and gravel
- ❑ Trash
- ❑ Construction debris
- ❑ Pesticides and fertilizers
- ❑ Other



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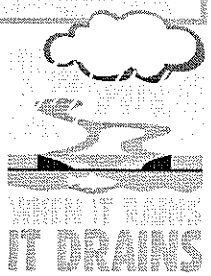
For more information or to report an illegal discharge of pollutants, please call:



EPA
United States Environmental Protection Agency

www.epa.gov/npdes/stormwater

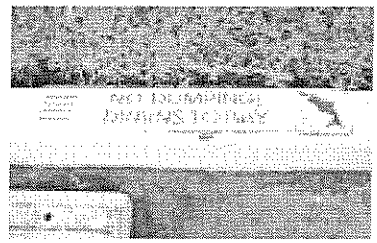
EPA 833-F-03-002
April 2003

Stormwater runoff is precipitation from rain or snowmelt that flows over the ground. As it flows, it can pick up debris, chemicals, dirt, and other pollutants and deposit them into a storm sewer system or waterbody.

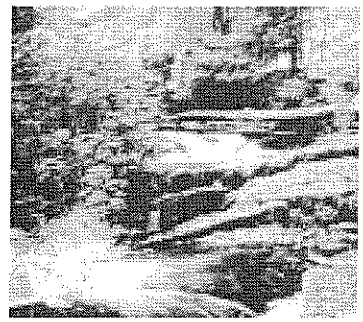
Anything that enters a storm sewer system is discharged *untreated* into the waterbodies we use for swimming, fishing, and providing drinking water.

Remember:
Only Rain Down the Drain

To keep the stormwater leaving your home or workplace clean, follow these simple guidelines:

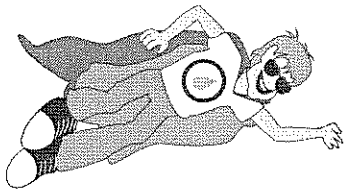


- Use pesticides and fertilizers sparingly.
- Repair auto leaks.
- Dispose of household hazardous waste, used auto fluids (antifreeze, oil, etc.), and batteries at designated collection or recycling locations.
- Clean up after your pet.
- Use a commercial car wash or wash your car on a lawn or other unpaved surface.
- Sweep up yard debris rather than hosing down areas. Compost or recycle yard waste when possible.
- Clean paint brushes in a sink, not outdoors. Properly dispose of excess paints through a household hazardous waste collection program.
- Sweep up and properly dispose of construction debris like concrete and mortar.



Leaves don't
belong in the
stormdrain

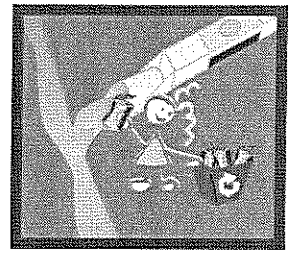
GIVE
WATER
A HAND



I'm a

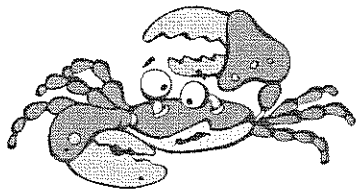
CLEAN WATER
ACTION HERO

MAKE A SPLASH



CLEAN UP YOUR TRASH

Junk from the Gutter

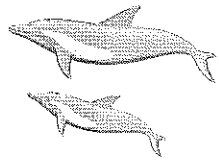


Makes us Sputter

Clean Water

I Can Help!

Please Don't Pour

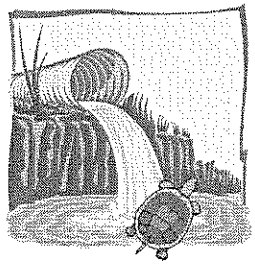


That's Our Front Door

Muck! Yuck!

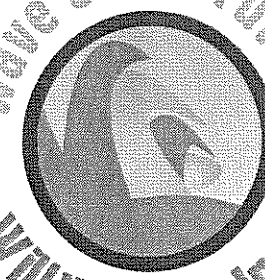
Sad Duck

DIRT IN THE DRAIN

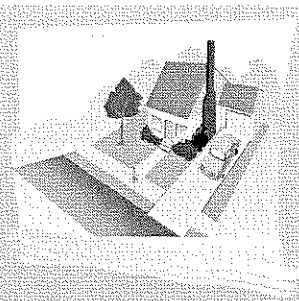


TURTLES COMPLAIN

Wave of the Future!



Will We Swim In It?



10 Things You Can Do to Prevent Stormwater Runoff Pollution

- Use landscape sustainably and switch to permeable patios, walks, and tracks.
- Never dump anything down storm drains.
- Vegetate bare spots in your yard.
- Compost your yard waste.
- Avoid pesticides; learn about Integrated Pest Management (IPM).
- Direct downspouts away from paved surfaces.
- Take your car to the car wash instead of washing it in the driveway.
- Check car for leaks, and recycle motor oil.
- Pick up after your pet.
- Have your septic tank pumped and system inspected regularly.

EPA United States Environmental Protection Agency

For more information, visit
www.epa.gov/nps or
www.epa.gov/npdes/stormwater

Clean Water
Everybody's
Business

EPA
United States Environmental Protection Agency

EPA 841-F-03-003

Protecting Water Quality *from* URBAN RUNOFF

Clean Water Is Everybody's Business

In urban and suburban areas, much of the land surface is covered by buildings and pavement, which do not allow rain and snowmelt to soak into the ground. Instead, most developed areas rely on storm drains to carry large amounts of runoff from roofs and paved areas to nearby waterways. The stormwater runoff carries pollutants such as oil, dirt, chemicals, and lawn fertilizers directly to streams and rivers, where they seriously harm water quality. To protect surface water quality and groundwater resources, development should be designed and built to minimize increases in runoff.

The most recent National Water Quality Inventory reports that runoff from urbanized areas is the leading source of water quality impairments to surveyed estuaries and the third-largest source of impairments to surveyed lakes.

Did you know that because of impervious surfaces like pavement and rooftops, a typical city block generates more than 5 times more runoff than a woodland area of the same size?

How Urbanized Areas Affect Water Quality

Increased Runoff

The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands traps rainwater and snowmelt and allows them to filter slowly into the ground. In contrast, impervious (nonporous) surfaces like roads, parking lots, and rooftops prevent rain and snowmelt from infiltrating, or soaking, into the ground. Most of the rainfall and snowmelt remains above the surface, where it runs off rapidly in unnaturally large amounts.

Storm sewer systems concentrate runoff into smooth, straight conduits. This runoff gathers speed and erosional power as it travels underground. When this runoff leaves the storm drains and empties into a stream, its excessive volume and power blast out streambanks, damaging streamside vegetation and wiping out aquatic habitat. These increased storm flows carry sediment loads from construction sites and other denuded surfaces and eroded streambanks. They often carry higher water temperatures from streets, roof tops, and parking lots, which are harmful to the health and reproduction of aquatic life.

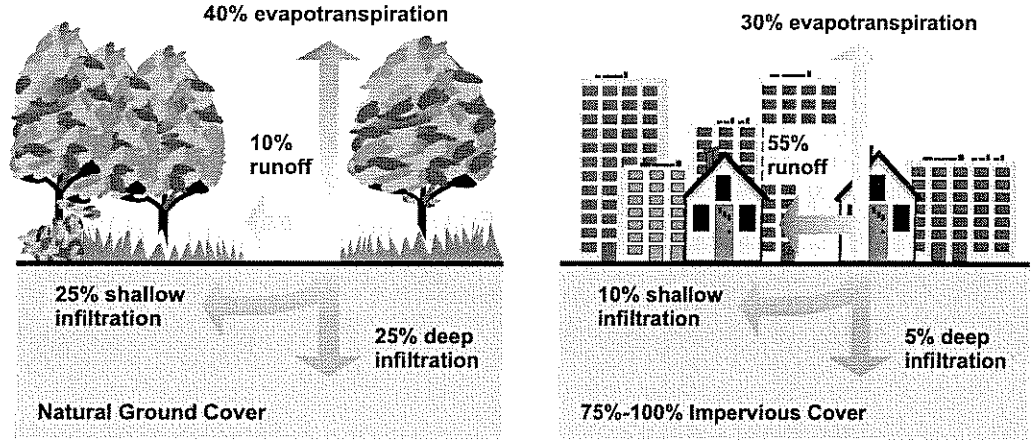
The loss of infiltration from urbanization may also cause profound groundwater changes. Although urbanization leads to great increases in flooding during and immediately after wet weather, in many instances it results in lower stream flows during dry weather. Many native fish and other aquatic life cannot survive when these conditions prevail.

Increased Pollutant Loads

Urbanization increases the variety and amount of pollutants carried into streams, rivers, and lakes. The pollutants include:

- Sediment
- Oil, grease, and toxic chemicals from motor vehicles
- Pesticides and nutrients from lawns and gardens
- Viruses, bacteria, and nutrients from pet waste and failing septic systems
- Road salts
- Heavy metals from roof shingles, motor vehicles, and other sources
- Thermal pollution from dark impervious surfaces such as streets and rooftops

These pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe and unpleasant.



Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface ruunoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.

Managing Urban Runoff

What Homeowners Can Do

To decrease polluted runoff from paved surfaces, households can develop alternatives to areas traditionally covered by impervious surfaces. Porous pavement materials are available for driveways and sidewalks, and native vegetation and mulch can replace high maintenance grass lawns. Homeowners can use fertilizers sparingly and sweep driveways, sidewalks, and roads instead of using a hose. Instead of disposing of yard waste, they can use the materials to start a compost pile. And homeowners can learn to use Integrated Pest Management (IPM) to reduce dependence on harmful pesticides.

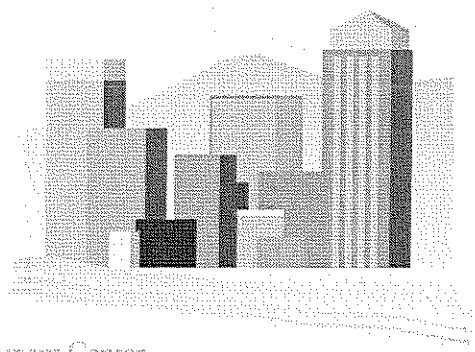
In addition, households can prevent polluted runoff by picking up after pets and using, storing, and disposing of chemicals properly. Drivers should check their cars for leaks and recycle their motor oil and antifreeze when these fluids are changed. Drivers can also avoid impacts from car wash runoff (e.g., detergents, grime, etc.) by using car wash facilities that do not generate runoff. Households served by septic systems should have them professionally inspected and pumped every 3 to 5 years. They should also practice water conservation measures to extend the life of their septic systems.

Controlling Impacts from New Development

Developers and city planners should attempt to control the volume of runoff from new development by using low impact development, structural controls, and pollution prevention strategies. Low impact development includes measures that conserve natural areas (particularly sensitive hydrologic areas like riparian buffers and infiltrable soils); reduce development impacts; and reduce site runoff rates by maximizing surface roughness, infiltration opportunities, and flow paths.

Controlling Impacts from Existing Development

Controlling runoff from existing urban areas is often more costly than controlling runoff from new developments. Economic efficiencies are often realized through approaches that target "hot spots" of runoff pollution or have multiple benefits, such as high-efficiency street sweeping (which addresses aesthetics, road safety, and water quality). Urban planners and others responsible for managing urban and suburban areas can first identify and implement pollution prevention strategies and examine source control opportunities. They should seek out priority pollutant reduction opportunities, then protect natural areas that help control runoff, and finally begin ecological restoration and retrofit activities to clean up degraded water bodies. Local governments are encouraged to take lead roles in public education efforts through public signage, storm drain marking, pollution prevention outreach campaigns, and partnerships with citizen groups and businesses. Citizens can help prioritize the clean-up strategies, volunteer to become involved in restoration efforts, and mark storm drains with approved "don't dump" messages.



Related Publications

Turn Your Home into a Stormwater Pollution Solution!
www.epa.gov/nps

This web site links to an EPA homeowner's guide to healthy habits for clean water that provides tips for better vehicle and garage care, lawn and garden techniques, home improvement, pet care, and more.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas
www.epa.gov/owow/nps/urbanmm

This technical guidance and reference document is useful to local, state, and tribal managers in implementing management programs for polluted runoff. Contains information on the best available, economically achievable means of reducing pollution of surface waters and groundwater from urban areas.

Onsite Wastewater Treatment System Resources
www.epa.gov/owm/onsite

This web site contains the latest brochures and other resources from EPA for managing onsite wastewater treatment systems (OWTS) such as conventional septic systems and alternative decentralized systems. These resources provide basic information to help individual homeowners, as well as detailed, up-to-date technical guidance of interest to local and state health departments.

Low Impact Development Center
www.lowimpactdevelopment.org

This center provides information on protecting the environment and water resources through integrated site design techniques that are intended to replicate preexisting hydrologic site conditions.

Stormwater Manager's Resource Center (SMRC)
www.stormwatercenter.net

Created and maintained by the Center for Watershed Protection, this resource center is designed specifically for stormwater practitioners, local government officials, and others that need technical assistance on stormwater management issues.

Strategies: Community Responses to Runoff Pollution
www.nrdc.org/water/pollution/storm/stoinx.asp

The Natural Resources Defense Council developed this interactive web document to explore some of the most effective strategies that communities are using around the nation to control urban runoff pollution. The document is also available in print form and as an interactive CD-ROM.

For More Information

U.S. Environmental Protection Agency
Nonpoint Source Control Branch (4503T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
www.epa.gov/nps

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Avoiding Flood Damage: A Checklist for Homeowners

FEDERAL EMERGENCY MANAGEMENT AGENCY

Are you looking for ways to protect your home from flooding? There are many things you can do, depending on the flood hazard in your area, the characteristics of your property, and the zoning and building codes in your community. Some methods are fairly simple and inexpensive; others will require a professional contractor.

This homeowner's checklist will help you become familiar with what you can do. For more information about the costs and benefits of each method, talk to a professional builder, architect or contractor. You should also ask your building department about building permit requirements.

Do you know your flood risk?

Call your local emergency management office, building department or floodplain management office for information about flooding. Ask to see a flood map of your community. There may be a projected flood elevation for your neighborhood. This information will help you determine how much water is likely to come in.

Do you have enough flood insurance?

Even if you have taken steps to protect your home from flooding, you still need flood insurance if you live in a floodplain. Homeowners' policies do not cover flood damage, so you will probably need to purchase a separate policy under the National Flood Insurance Program (NFIP).

It takes 30 days for a flood policy to take effect. This is why you need to purchase flood insurance before flooding occurs. If your insurance agent is unable to write a flood policy, call 1-800-638-6620 for information.

Is the main electric switchbox located above potential flood waters?

The main electric panel board (electric fuses or circuit breakers) should be at least 12" above the projected flood elevation for your home. The panel board height is regulated by code. All electrical work should be done by a licensed electrician.

Are electric outlets and switches located above potential flood waters?

Consider elevating all electric outlets, switches, light sockets, baseboard heaters and wiring at least 12" above the projected flood elevation for your home.

You may also want to elevate electric service lines (at the point they enter your home) at least 12" above the projected flood elevation.

In areas that could get wet, connect all receptacles to a ground fault interrupter (GFI) circuit to avoid the risk of shock or electrocution.

Have electrical wiring done by a licensed electrician.

Are the washer and dryer above potential flood waters?

For protection against shallow flood waters, the washer and dryer can sometimes be elevated on masonry or pressure-treated lumber at least 12" above the projected flood elevation. Other options are moving the washer and dryer to a higher floor, or building a floodwall around the appliances.

Are the furnace and water heater above potential flood waters?

The furnace and water heater can be placed on masonry blocks or concrete at least 12" above the projected flood elevation, moved to inside a floodwall or moved to a higher floor. (You have more

options for protecting a new furnace. Ask your utility about rebates for new energy efficient furnaces. The rebate plus the savings in fuel costs could make the purchase feasible.)

Furnaces that operate horizontally can be suspended from ceiling joists if the joists are strong enough to hold the weight. Installing a draft-down furnace in the attic may be an option if allowed by local codes. Some heating vents can be located above the projected flood elevation.

Outside air conditioning compressors, heat pumps or package units (single units that include a furnace and air conditioner) can be placed on a base of masonry, concrete or pressure treated lumber.

All work must conform to state and local building codes.

Is the fuel tank anchored securely?

A fuel tank can tip over or float in a flood, causing fuel to spill or catch fire. Cleaning up a house that has been inundated with flood waters containing fuel oil can be extremely difficult and costly.

Fuel tanks should be securely anchored to the floor. Make sure vents and fill line openings are above projected flood levels.

Propane tanks are the property of the propane company. You'll need written permission to anchor them. Ask whether the company can do it first.

Be sure all work conforms to state and local building codes.

Does the floor drain have a float plug?

Install a floating floor drain plug at the current drain location. If the floor drain pipe backs up, the float will rise and plug the drain.

Does the sewer system have a backflow valve?

If flood waters enter the sewer system, sewage can back up and enter your home. To prevent this, have a licensed plumber install an interior or exterior backflow valve. Check with your building department for permit requirements.

You may have other options for avoiding flood damage depending on your needs and financial resources. These include building drainage systems around the property, sealing openings such as low windows, building levees, constructing exterior floodwalls around basement doors and window wells, improving exterior walls, elevating buildings above projected flood levels and relocating buildings away from floodplains.

For more information, talk to a professional builder, architect or contractor. Ask your building department about building permit requirements.