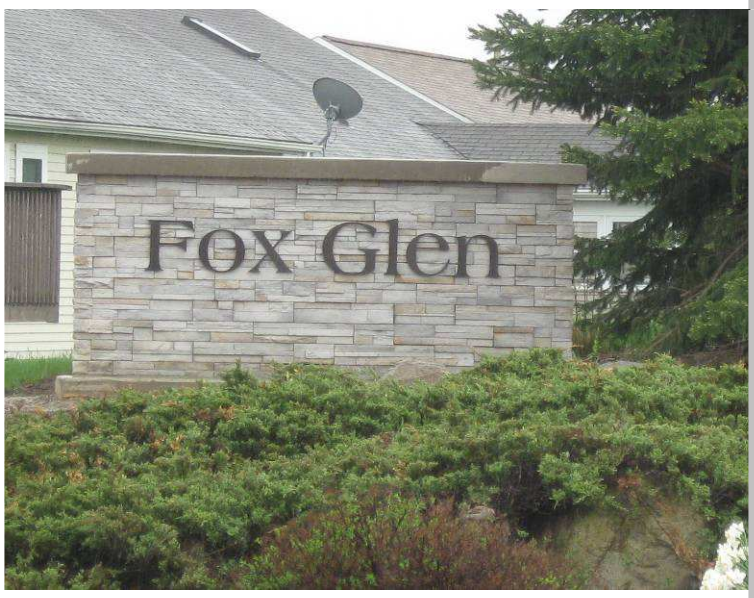
Fox Glen Condominium Association
2015 Drainage System Report

August 2015



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DRAINAGE INSPECTION REPORT

Background

As requested by Fox Glen Condominium Association and Select Management Company, Engineering Technologies Corporation (ETC) has inspected the storm drainage throughout the condominium community and updated the original 2011 Drainage Report. Most of the recommendations of the 2011 report have been implemented and appear to have addressed the most severe drainage conditions in the development. This report includes the drainage improvements previously completed and notes additional and/or continuing drainage concerns.

Site Inspection

ETC performed a physical inspection of the entire Fox Glen site including the detention basins, storm control structures, outlet pipes, and site grading areas around the units. Fox Glen had identified particular homeowner complaints, which were specifically inspected. Additionally, a sampling of the storm structure manholes (MH) and catch basins (CB) were re-inspected after the initial inspection performed in 20111. A list of our inventory of structures, the conditions noted and recommendations for rehabilitation is presented in Table A.

There are a total of five detention basins that serve this development along with a natural pond and surrounding wetland. An open, natural drainage course traverses this development and provides an outlet for detention basins A, B, C, D, and portions of the Valley Ranch Condominiums upstream of Fox Glen. Detention basin E is the largest basin, with permanent open water, and discharges westerly across Lohr Road through an enclosed storm sewer. Detention basins A, B, C, and D are designed to be normally dry basins, except after rain events for a relatively short period of time of a few days. All of the Fox Glen detention basins, the wetland areas on site, the open water natural pond, and the natural watercourses that travels through the Fox Glen property were visually inspected. An updated list of our inventory of the detention basins and water courses on the property is presented in Table B along with deficiencies noted and recommendations for maintenance and improvements.

Additionally, we visually inspected the surface drainage around the entire development to determine the causes and conditions of the surface ponding and wet areas. The surface drainage between units, along rear yards, from downspouts and natural drainage patterns were observed.

Fox Glen Condominiums

Table A

Storm Structure Inspection Notes *

Item No.	Structure ID	Diameter (ft)	Conditions Noted	Recommendations
1	R5-North	4	Fractured Mortar Joints	Point/Repair Under Casting
2	R5-South	4	Fractured Mortar Joints	Point/Repair Under Casting
3	R7	4	Fractured Mortar Joints	Point/Repair Under Casting
4	R8-East	4	Fractured Structure	Repair Structure
5	R9-West	2	Fractured Mortar Joints	Point/Repair Under Casting
6	R10-E	4	Fractured Mortar Joints	Point/Repair Under Casting
7	R11-W	2	Fractured Mortar Joints	Point/Repair Under Casting
8	R12	4	Fractured Mortar Joints	Reset Casting
9	R13	2	Fractured Structure	Repair Structure
10	R14	2	Good	
11	R15	2	Fractured Mortar Joints	Reset Casting
12	YB6A	4	Wet Spot Upstream Observed	Lower Casting Approx 8"
13		Inlet	Slot Drains Installed into Structure	Keep Surface Grates Clean
14	YB6	2	Good	
15		Inlet	Slot Drains Installed into Structure	Keep Surface Grates Clean
16	R23-W	4	Fractured Mortar Joints	Reset Casting
17	R24-E	4	Fractured Mortar Joints	Reset Casting
18	R25-W	2	Fractured Mortar Joints	Reset Casting
19	R27-E	4	Fractured Mortar Joints	Reset Casting
20	R29-E	4	Severe Offset > 2 feet	Minor Point/Repair Under Casting
21	R31-E	4	Offset < 2 feet	Minor Point/Repair Under Casting
22	TB28	2	Good	
23	YB30	2	Good	
24	YB32	2	Good	
25	R40	2	Fractured Structure, Apron Broken	Repair Structure
26	R42	4	Fractured Structure	Repair Structure
27		Inlet	Slot Drains Installed behind 3843-3865 into Detention Basin D	Keep Surface Grates Clean

* All Storm Structures are Precast Concrete without Sediment/ Debris Sumps

Fox Glen Condominiums

Table B

Detention Basin and Drainage Course Inventory

Basin	Location*	Conditions Noted	Recommendations
A	Along East Property Line behind ex Wetland Pond	Good Condition Heavy Weed Growth in Basin	Clear woody plant materials from Outlet Pipe and Downstream Channel
B	East of Fox Glen Drive behind Units 36-40	Good Condition Heavy Weed Growth in Basin	Clear woody plant materials from Downstream Channel
C	Between Rodeo & Santa Fe Trail behind Unit 12	Good Condition Heavy Weed Growth in Basin	Clear woody plant materials from Outlet Pipe and Downstream Channel
D	Between Rodeo & Santa Fe Trail behind Units 13-14	Good Condition Heavy Weed Growth in Basin	Clear woody plant materials from Outlet Pipe and Downstream Channel
E	NE corner of Ellsworth Rd & Lohr Rd behind Units 26-28	Very Good Condition	None
Ex. Swales Into Basin E	Grass Swales Along Lohr Rd and Ellsworth Road behind Units on Bridle Pass Drive	Good Grass growth but poor grade with settled and raised sections that cause ponding and long term wetness	Re-Grade ex grass swales to drain properly toward Basin E
Ex. Wetland & Pond	East of Intersection of Fox Glen Dr. & Santa Fe Trail	Heavy Brush in flow channel and around basin perimeter locations	Keep Flow Channel Clear of Woody Plant Materials & Sediment
Open Drainage Course	From Rodeo Drive to Ellsworth Road	Heavy Brush in flow channel	Keep Flow Channel Clear of Woody Plant Materials & Sediment

* See Location Map in Report

Evaluation

All off the storm structures were constructed of precast concrete, which is an excellent structure material. However, many of the structures had some block or brick leveling courses to bring the casting frame to proper elevations. Nearly all of the structures located in paved areas had fractures in the mortar joints and cinder blocks. Some structures had the casting frame offset from the center of the structure. Nearly all of the MH and CB structures need minor mortar joint repairs and many need block replacement or repair. This work is not critical at this time, and can probably be performed when then street is repaved in the future. These problems do not appear to have become more pronounced over the last few years since the original inspection in 2011.

The normally dry detention basins A, B, C, and D on the site were cleared of the heavy brush, weeds, and woody plant growth a few years ago. Some of the brush and weeds have re-established in the basins. The woody plants have not returned to these basins and must be kept from growth, especially around the detention storm control structures. Woody plants in the basin areas begin to collect debris and sediment which eventually reduces the storage capacity of the basins. Growth of plant materials in the stone filters reduces the flow through the filter rock and causes further back-up in the basin and upstream areas. Woody plants around the outlet control structures block the inlet holes around the perimeter of the structures and artificially raise the water level in the basin and retain water much longer than designed. No woody plants should be allowed to remain around the outlet control structures and woody plants should be removed from the basin areas every 3+ years as needed.

The surface ponding and wetness along with poor grass growth in the lawn areas is caused by 3 conditions, as follows:

1) The underlying site subgrade soils are a heavy, variegated clay soil. These soils show that even prior to development many of these areas had retained water. This clay soil transmits water very slowly and stays wet for long periods of time, restricting surface water from passing through to underlying, natural ground water elevations.

2) The initial grading of the site as part of the development and construction was not adequately performed to direct all surface runoff toward the detention basins, natural draingeways, or the new CB's and MH's that were installed. There are low areas and high spots even where sufficient slopes were available to provide good surface slopes; the construction grading was not carefully performed to assure proper drainage. Generally, surface runoff in lawn areas should be provided with 1% (minimum) to 2% (recommended) surface slopes to assure proper drainage. Examples of poor grading include the lawn area north of Ellsworth Road behind 3962-3990 Bridle Pass Drive and in the lawn area east of Lohr Road behind 3908 - 3944 Bridle Pass Drive. These are the two most significant ponding/wet areas noted in Fox Glen. Both of these grass swales have sufficient slope in excess of 1.5% but the grading is not consistent with steeper sections that drain well and very flat or settled sections that drain poorly.

3) The entire site has very little topsoil. While most of the soils sampling was performed in areas showing surface ponding and poor grass growth, a few other areas were also excavated. Nearly all of this development was provided with about 1" to 2" of clay loam topsoil as part of the initial construction.

Conclusions and Recommendations

There are minor maintenance and improvements needed at the detention basins and downstream channels. There are also two areas of surface ponding and long-term wetness that were observed and are significant concerns to the homeowners. Our condominium recommendations are presented below on Table C. In addition to the condominium drainage concerns noted by our inspection, Fox Glen sent a list of homeowner drainage concerns/complaints to be included in our report. These specific homeowner concerns are listed on Table D along with our recommendations for improvements

Fox Glen Condominiums **Table C**

RECOMMENDATIONS

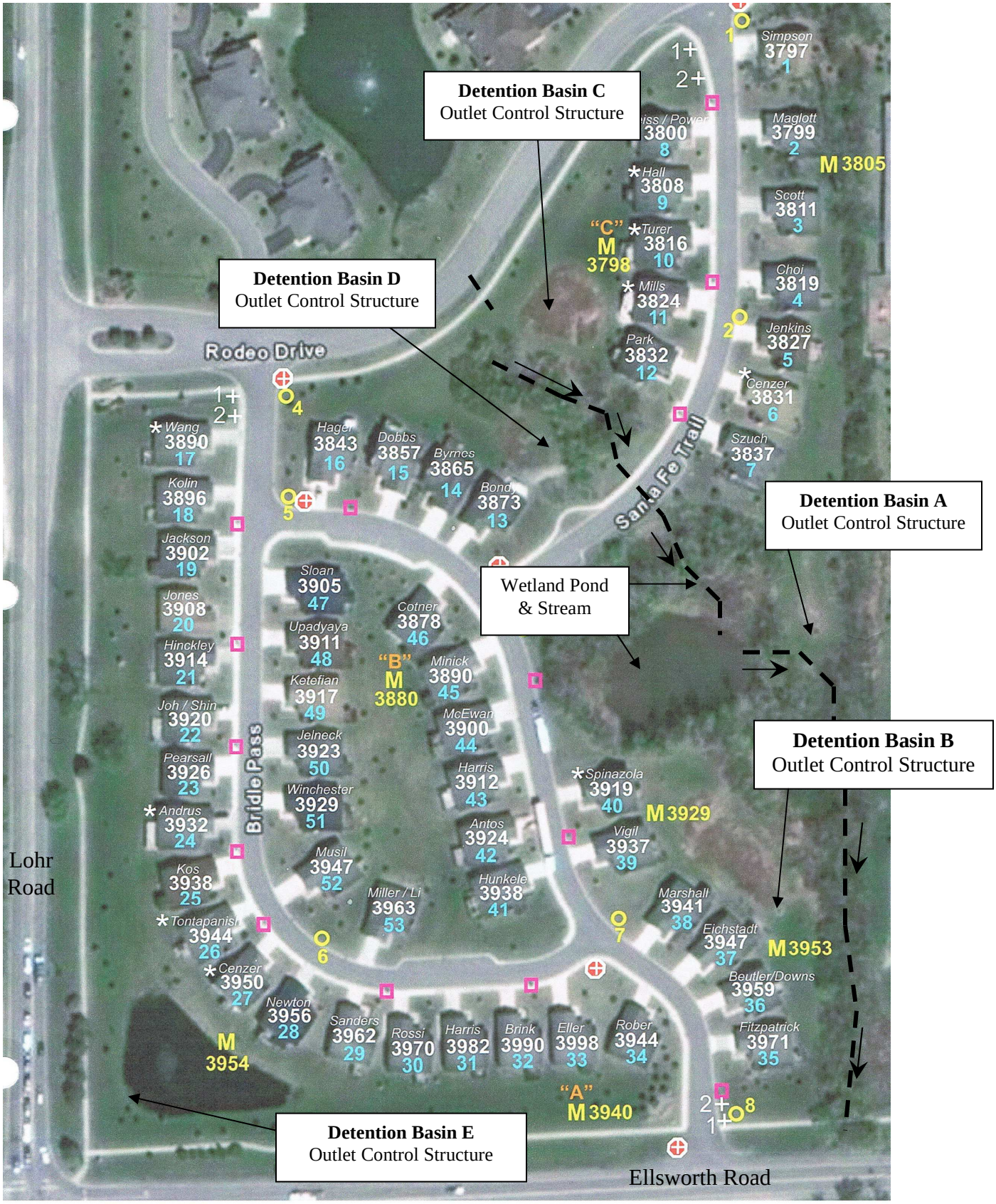
No.	Description	Recommended Work	Estimated Cost
1	Detention Basins A-D Stream Corridor	Remove Woody Plants from Outlet Pipes and Downstream Channels	$8,500
2	Ex Wetland Pond	Remove Woody Plants and Accumulated Brush Backfill existing Outlet CMP Pipe	$8,000
3	Re-grade Rear Yard Grass Swale Along Ellsworth Rd behind 3962-3990 Bridle Pass	Regrade existing swale to provide consistent ditch sloped to eliminate surface ponding	$6,500
4	Re-grade Rear Yard Grass Swale Along Lohr Rd behind 3908 - 3944 Bridle Pass Drive	Regrade existing swale to provide consistent ditch sloped to eliminate surface ponding	$7,500
5	Repair Storm Structures	Perform with future Road Repaving Project	$9,000
			$39,500

Fox Glen Condominiums

HOMEOWNER SPECIFIC CONCERNS

Table D

	Location / Address	Recommendations
1	3831 Santa Fe	a) Repair cracked downspout pipe in entry flower bed at SW corner of garage b) Move rear splash block to SW house corner downspout c) Clean downspout at NW corner of garage d) Seal cracks in driveway to prevent wash-out under slab
2	3816 Santa Fe	a) Seal minor crack in south foundation wall b) Clean downspout outlet at SW & SE corners of house and install 6" PVC to protect ends c) Water seeping from under homeowner's paver patio & causing settlement. This will require removal of portions of the patio pavers and installation of proper drainage under patio with proper outlet(s)
3	3797 Santa Fe	a) Raise settled walk at entry b) Re-grade side and rear areas to drain properly and Install good topsoil on bare ground
4	3857 Fox Glen	Regrade elevations to drain from the rear NW corner of house or install small yard basin. Also front gutter flows down the side yard hill to this area.
5	3843 Fox Glen	Extend connection pipe from upper downspout discharge to existing slot drain. There is also a likely groudwater condition from berms along the west and south sides of this unit causing the sump pump to run often. A deep underdrain would be required to extend easterly to address this problem.
6	3914 Bridle Pass	a) Lift SW concrete entry sidewalk & regrade adjacent raised grass area b) Re-connect SE garage downspout to unknown outlet
7	3923 Bridlle Pass	Repair/seal rear gutter and repair sprinkler leak
8	3926 Bridle Pass	Re-grade grass swale parallel to Lohr Road behind 3908 to 3944 Bridle Pass
9	3956 Bridle Pass	Re-grade wet heavy clay area in rear yard to drain to Detention Basin E
10	3970 Bridle Pass	Re-grade grass swale parallel to Ellsworth Rd behind 3962 to 3990 Ellsworth Rd
11	3982 Bridle Pass	Re-grade grass swale parallel to Ellsworth Rd behind 3962 to 3990 Ellsworth Rd
12	3990-62 Bridle Pass	Re-grade grass swale parallel to Ellsworth Rd behind 3962 to 3990 Ellsworth Rd


Detention Basin C
Outlet Control Structure
Detention Basin D
Outlet Control Structure
Detention Basin A
Outlet Control Structure
Wetland Pond
& Stream
Detention Basin B
Outlet Control Structure
Detention Basin E
Outlet Control Structure
Rodeo Drive
Santa Fe Trail
Bridle Pass
Lohr
Road
Ellsworth Road
Simpson 3797 1
Maglott 3799 2
M 3805
Hall 3808 9
Scott 3811 3
"C" M 3798
Turer 3816 10
Choi 3819 4
Mills 3824 11
Jenkins 3827 5
Park 3832 12
Cenzer 3831 6
Szuch 3837 7
Wang 3890 17
Hager 3843 16
Dobbs 3857 15
Byrnes 3865 14
Bond 3873 13
Kolin 3896 18
Jackson 3902 19
Sloan 3905 47
Jones 3908 20
Cotner 3878 46
Upadyaya 3911 48
Hinckley 3914 21
"B" M 3880
Minick 3890 45
Ketefian 3917 49
Joh / Shin 3920 22
McEwan 3900 44
Jelneck 3923 50
Pearsall 3926 23
Harris 3912 43
Winchester 3929 51
Spinazola 3919 40
M 3929
Andrus 3932 24
Antos 3924 42
Vigil 3937 39
Musil 3947 52
Kos 3938 25
Hunkele 3938 41
Miller / Li 3963 53
Marshall 3941 38
Tontapanish 3944 26
Eichstadt 3947 37
M 3953
Cenzer 3950 27
Beutler/Downs 3959 36
Newton 3956 28
Sanders 3962 29
Rossi 3970 30
Harris 3982 31
Brink 3990 32
Eller 3998 33
Rober 3944 34
Fitzpatrick 3971 35
M 3954
"A" M 3940

Appendix

Pictures: Detention Basin A

Detention Basin B

Detention Basin C

Detention Basin D

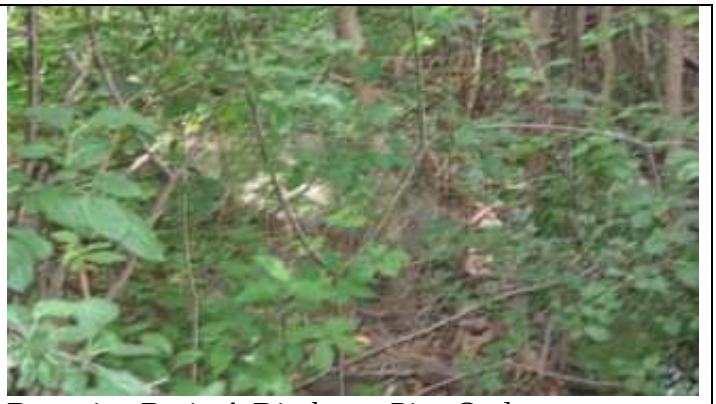
Detention Basin E

Stream Corridor and Natural Pond Wetland

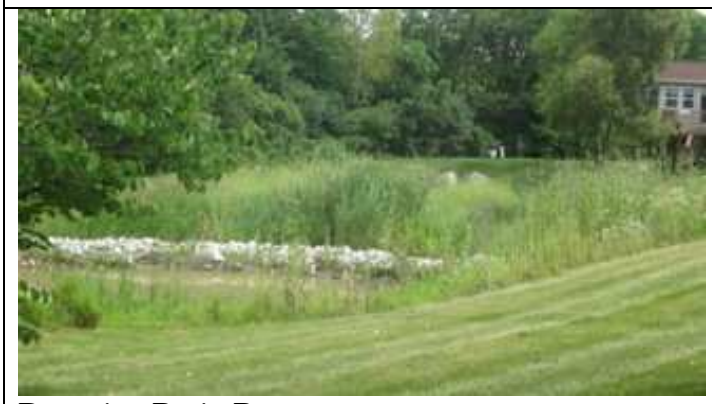
Grass Swale along Ellsworth Road

Grass Swale along Lohr Road

Detention Basin A



Detention Basin A Discharge Pipe Outlet



Detention Basin B

Detention Basin B

Detention Basin B Discharge Pipe Outlet

Detention Basin C

Detention Basin C

Detention Basin C Outlet

Detention Basin C Outlet

Detention Basin D

Detention Basin D

Detention Basin D Outlet

Detention Basin D Outlet

Detention Basin / Pond E

Outlet Control Structure Detention Basin E

Santa Fe Road Crossing Inlet at Detention Basin D

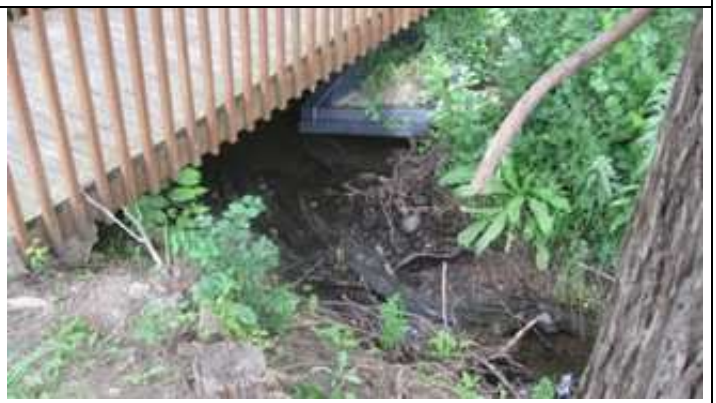
Santa Fe Spillway into Detention Basin D

Santa Fe Road Crossing Pipe Outlet

Outlet Discharge Stream downstream of Santa Fe

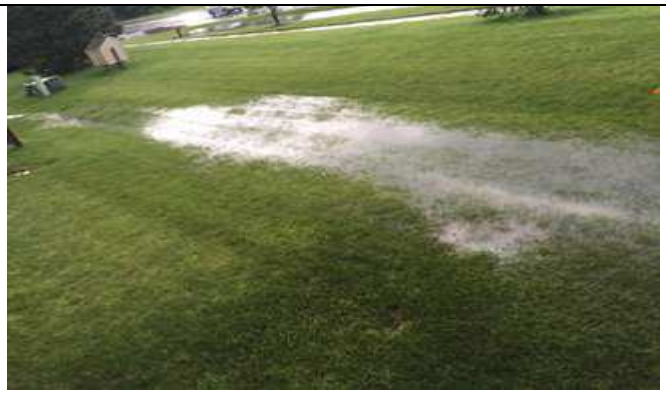
Wetland Pond Discharge Pipe

Discharge Culvert at Ellsworth Road

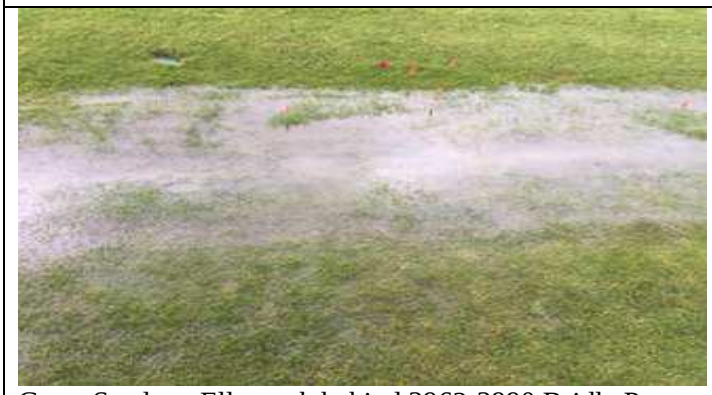


Washout Under Walkway Bridge at Ellsworth Rd.

Grass Swale along Ellsworth Rd behind 3962-3990 Bridle Pass



Grass Swale along Ellsworth behind 3962-3990 Bridle Pass

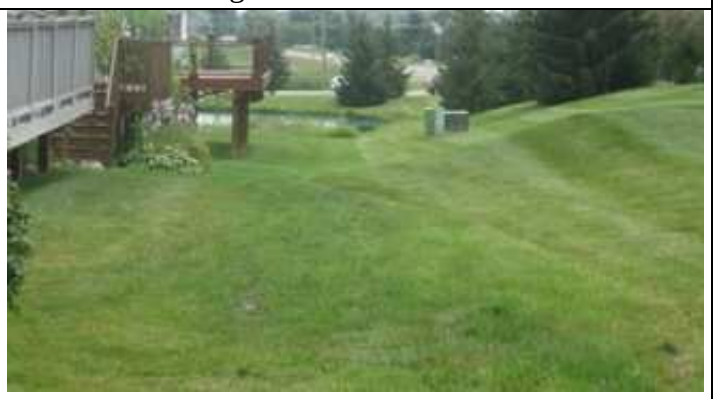


Grass Swale at Ellsworth behind 3962-3990 Bridle Pass

Grass Swale along Lohr Rd at Detention Basin E

Grass Swale along Lohr Rd at Detention Basin E

Grass Swale along Lohr Rd at Detention Basin E



Grass Swale along Lohr Rd at Detention Basin E