



MEMORANDUM

September 10, 2021

TO: City Council Member Mike Cappel, Chair
Public Works Committee of City Council

FROM: Brian K. Riblet, City Manager *BKR*

SUBJECT: Public Works Committee Meeting on Monday, September 13, 2021

As a reminder, the Public Works Committee is scheduled to meet on Monday, September 13, 2021 at 5:30 p.m. at City Hall. Those items to be discussed include:

1. Huntersknoll Court Drainage Discussion-Gary Heitkamp, Public Works Director, will be present to discuss the attached Huntersknoll Court Drainage Study and proposed recommendations. Staff would like to obtain feedback from the Committee regarding reported drainage issues.
2. Other Business-The purpose of this agenda item is to provide an opportunity to discuss any issue or ask questions that may be on your mind.

Also attached are the minutes from the December 14, 2020 meeting of your Committee for review and approval at Monday's meeting.

Should you have any questions or concerns pertaining to these topics or have additional items to be discussed at the meeting, please do not hesitate to contact me.

c: Mayor and City Council Members (3)
Connie Gaylor, Administrative Coordinator
Department Heads

AGENDA

September 13, 2021
Montgomery City Hall
5:30 P.M.

1. Call to Order
2. Guests and Residents
3. Communications
4. New Business
 - a. Huntersknoll Court Drainage Discussion
5. Approval of Minutes- December 14, 2020
6. Other Business
7. Executive Session
8. Adjournment



4420 Cooper Rd., Ste. 200
Cincinnati, OH 45242
513.791.1700
www.ctconsultants.com

Huntersknoll Court Drainage Study

CT #190613

PREPARED FOR
The City of Montgomery

7315 Cornell Rd
Montgomery, OH 45242

513.792.8355

ISSUED 4.27.2020

REVISED 5.22.2020

REVISED 6.3.2020

INDEX

1.0 Introduction

- 1.1. Purpose and Location
- 1.2. Existing Conditions

2.0 Analysis

- 2.1 Method of Analysis
- 2.2 Existing Model Observations
- 2.3 Alternatives Considered

3.0 Recommendation and Conclusion

Appendices

- Appendix A - Tributary Area Map
- Appendix B - Existing Storm Sewer Map
- Appendix C - Proposed Storm Sewer Map
- Appendix D – Preliminary Opinion of Construction Cost
- Appendix E - Summary of Model Results and Full Results
- Appendix F - Hydraulic Grade Line Results



1.0 Introduction

Purpose and Location

The purpose of this study is to evaluate concerns of storm water flooding in the area of Huntersknoll Court and Trailwind Drive, and develop potential solutions to reduce the flooding. Located in the City of Montgomery, Hamilton County, Ohio, Huntersknoll Court and the surrounding area are a single-family residential neighborhood, developed in the 1960s to early 1970s. Huntersknoll Court is located east of Deerfield Road, south of the intersection of Deerfield Road and Pfeiffer Road. Trailwind Drive is located west of Deerfield Road in this same general area. Most residential lots in this area are just under 0.5 acre. The drainage area contributing to Huntersknoll court is approximately 90 acres, extending west across Deerfield Road past Southwind Drive to, and north to Pfeiffer Rd, see Appendix A - Tributary Area Map. The area ultimately drains to a 60" culvert under Montgomery Road.



Vicinity Map



Existing Conditions

Based on our initial meetings with the City, it is our understanding that during heavy rain events flooding occurs along the low-lying areas, including the storm sewer system in Huntersknoll Court, in the back yards of several homes on the south side of Huntersknoll Court, across Deerfield Road, and through yards to the cul-de-sac on Trailwind Drive. It was mentioned that Trailwind Court had overtopped, and that standing water was observed in the swale west of Trailwind Court.

Through research and speaking with homeowners in the area, the flooding problems have existed since the area was developed in the 70s. The City also has documentation of flooding problems in the area from the 1990s. Early 2019 had a series of large rain events, leading to several flood events that year. Most of the flow through yard areas are covered by private storm sewer easements, and storm sewers in the streets and some nearby segments are covered by public sewer easements. Over the years, homeowners in the area have made modifications to the swales through their yards, such as installing pipes and filling in swales, which have exacerbated the problem. These pipes are undersized and cannot adequately carry the flow. The area experienced some redevelopment in recent years, where existing homes are being demolished and replaced with larger homes. While this has increased the impervious surfaces within the drainage area, it is not believed to be a significant factor in increasing flooding in the area.

2.0 Analysis

Method of Analysis

The drainage area was analyzed using Autodesk Storm and Sanitary Analysis 2018 with SCS TR-55 methodology. The existing conditions model was based on a combination of fieldwork, record drawings, sewer video inspections, and GIS information. Drainage areas were delineated from GIS contours, with adjustments for drainage structures that could be seen in aerial photography, and localized topographic survey obtained by CT. Storage nodes have been included in the model to mimic and understand the flooding experienced in yard areas. A storage node was also included for the formal detention basin on the Church of the Saviour United Methodist property. The catch basins and manholes were input as junction structures with ponding enabled to help identify pipe deficits, more accurately depict hydraulic grade line, and provide a sense of ponding around the structures. Overland swales, weirs, and orifices were modeled as outlets to the storage nodes, or bypasses to undersized pipes. Once the existing conditions model was indicating similar conditions to known field conditions it was converted into proposed models. Proposed models were primarily run to determine appropriate pipe depths and slopes to reduce ponding in yards and streets.

CT conducted a field survey to locate and document top of grate elevations, pipe sizes, pipe invert, and connectivity for a majority of the study area. The existing storm sewer map can be found in Appendix B. The survey also included limited ground survey to help determine limits of ponding, or areas acting as natural detention facilities. Overland swales were modeled as typical swales or channels with adjustments to accommodate 10yr storm flows to reasonable values. The last junction in the model was treated as a free flowing outlet without any backwater effects.

The soil types for the drainage area were primarily developed urban areas in nature which do not provide for a hydrologic soil group; looking at a wider area shows nearby hydrologic soil group type C which was used as the basis for our curve numbers. Curve numbers assigned using aerial imagery, with the majority of curve numbers being 81; 1/3 acre residential subdivision lots. Curve numbers were adjusted up if the area seemed to have



significantly more impervious area such as pavement or houses and adjusted down if the area seemed to have more grassy areas. Time of concentration was generally taken as 10-minute minimums to catchments with larger areas adjusted based on checking the longer flow path against a 2 ft/sec - 4 ft/sec water velocity.

Rainfall for the area was modeled as SCS Type II distribution over a 24hr. The following rainfall values were used in the model: 1yr = 2.4 inches, 2yr = 2.9 inches; 5yr = 3.5 inches; 10yr = 4.0 inches; 25yr = 4.7 inches, 50yr = 5.2 inches; 100yr = 5.7 inches.

Storage nodes were added to the model to try and replicate ponding volumes, depths, and the potential to utilize overland flow paths and other secondary routing methods in case the flow exceeded a pipes capacity. The storage nodes in the existing conditions model include Ponding Area 1 located in the rear yard swale west of Trailwind Drive (TrailwindBasin); Ponding Area 2 located in the rear yard of 10341 Deerfield Road (STR-RY-1), Ponding Area 3 located in the swale south of 10350 Deerfield Road (Stor-37), and the detention basin associated with Church of the Saviour United Methodist (ChurchBasin). Overland flow paths were modeled from the Trailwind Basin down to Deerfield Road, and from Stor-37 around the downstream pipe back into a rear yard swale.

After the model was built, all of the rainfall events were run through the system and results from the model were compared to statements made from residents, previous maintenance calls, and records collected by the City. Flow meters and actual rainfall events were not used to calibrate the model. The model was run in Hydrodynamic mode without any soil exfiltration values and nodes were allowed to overflow pond. Overflow ponding was based on a typical area of 10 square feet in order to delay water until pipe capacity became available. Autodesk Storm and Sanitary Analysis takes a time-step nodal approach to modeling; rainfall is tracked as addition of hydrographs at each junction point. This approach allows us to determine time, duration and intensity of ponding or storage over the rainfall event until the end of the reporting period. Maximum values for any 5 minute period are recorded over the 3 day analysis time frame. The models run for this project included existing conditions, design the entire system to current standards, upgrade to 36" storm sewers, and upgrade to 42" storm sewers.

Existing Model Observations

For purposes of discussion, the existing conditions model was split into four subsystems, as shown in the exhibit on page 6. They include the storm sewer from Deerfield Road to Huntersknoll Court, the storm sewer from Trailwind Drive to Deerfield Road (Storm Run A), the rear yard swale and pipe from Deerfield Road to Huntersknoll Court (Storm Run B), and the downstream run from Huntersknoll Court to the outlet at the stream (Storm Run C). The following observations are based on the 10yr rainfall event using Manning's equation for pipe flow.

Trailwind Drive to Deerfield Road (Storm Run A)

- This system conveys water from Fourwinds Drive, Trailwind Drive, the rear of the houses located along Westwind Lane and Ivygate Lane, from the end of Trailwind drive through some rear yards, and into the low point of Deerfield Road.
- It appears that this system has been converted from overland flow to piped flow in order to accommodate houses. Pipes range from 12" to 30" and have several bends in them with the outlet of the system being a 27" pipe.
- This system is undersized to convey the 10yr storm event.



- The model indicates ponding within Trailwind Drive, and within yards and over-land/over-road flow in areas due to lack of catch basins, shallow and undersized pipes, and large drainage areas. The yard ponding is represented as Ponding Area 2 in the exhibit on page 6.

Rear Yard Swale from Deerfield Road to Huntersknoll Court (Storm Run B)

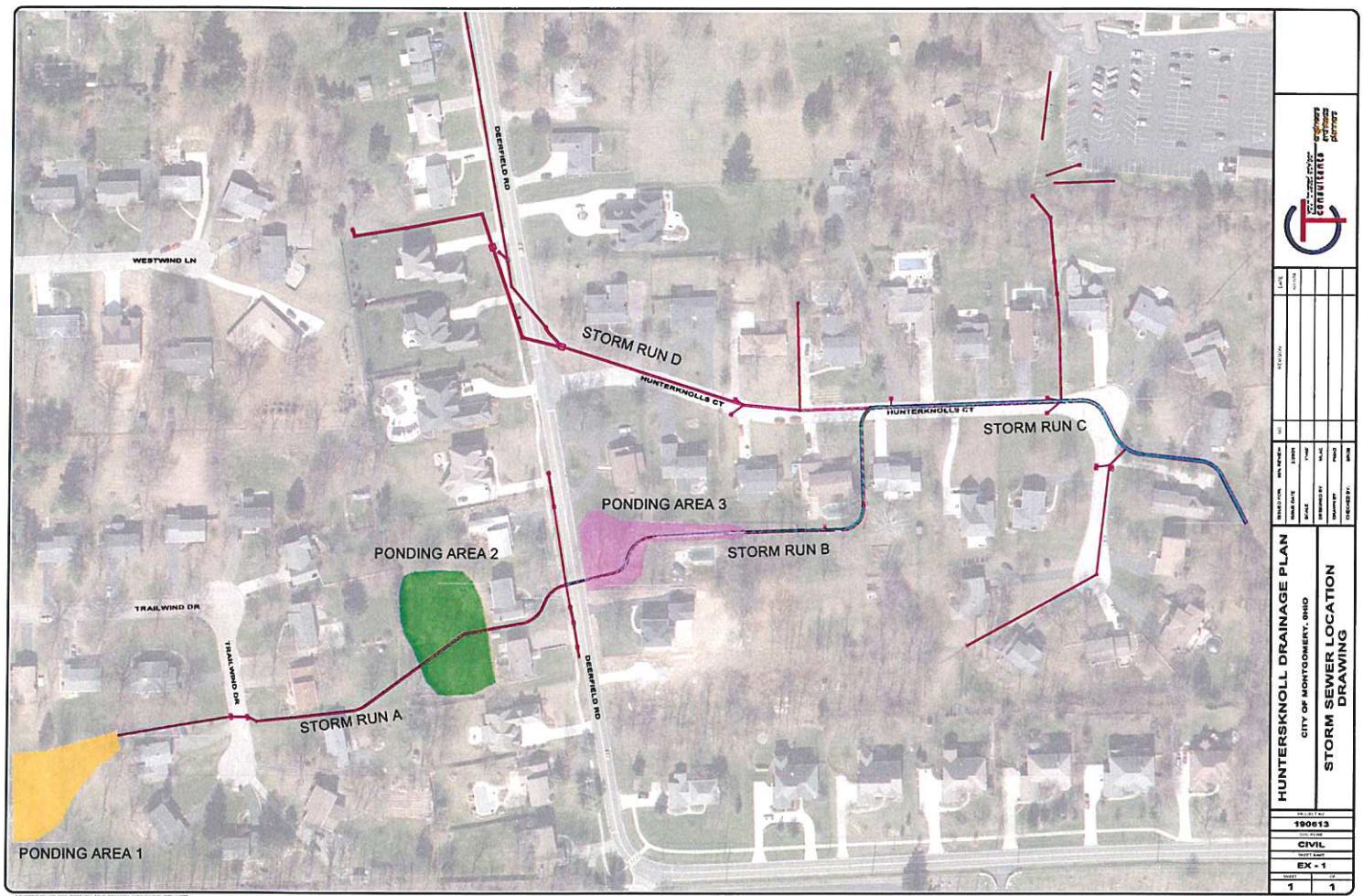
- This system conveys water from Trailwind Drive (Storm Run A) through swales and pipes in the rear yards south of Huntersknoll court.
- It appears that this system has been partially converted from overland flow to piped flow over the years by homeowners in order to accommodate houses, pools, fences and other rear yard improvements. Pipes range from 18" to 36" and have several bends in them with the outlet of the system being a 27" pipe.
- This system is undersized to convey the 10yr storm event.
- The model indicates ponding in Deerfield Road, and within yards and over-land/over-road flow in areas due to shallow and undersized pipes, and the amount of water coming from upstream in the system. The yard ponding is represented as Ponding Area 3 in the exhibit on page 6.

Huntersknoll Court to Outlet (Storm Run C)

- This system collects Storm Runs A, B and D, conveying water from Huntersknoll Court to the outlet, within pipes under the roadway and in between houses.
- This system appears to be adequately sized to convey the 10yr storm event.
- If the undersized storm sewers upstream of this run are improved, this system may be undersized to handle a 10yr storm event.
- Some roadway flooding has been experienced on Huntersknoll Court, but that flooding is believed to be attributed to inadequate inlet capacity. Additional inlets or larger inlets should be considered.
- The two storm sewer lines extending to the north from Huntersknoll Court have capacity to handle the 10yr storm event.

Deerfield Road to Huntersknoll Court (Storm Run D)

- This system conveys water from Southwind and Westwind Drive and the front yards of Deerfield Road through a 30" pipe system to Huntersknoll Court.
- This system appears to be adequately sized to convey the 10yr storm event.
- There are three catch basins to drain the large area from Westwind and Southwind Drive, the capacity of these inlets were not evaluated to see if they were adequately sized, and the City has no record of inlet capacity issues in this area.





Alternatives Considered

Several alternatives were considered during the proposed modeling evaluations, including:

- Designing the system using today's storm sewer standard requirements
- Upsize the most restricted areas to 36" storm sewers
- Upsize the most restricted areas to 36" and 42" storm sewers

CT also briefly evaluated the possibility of increasing the volume of ponding areas so that the existing infrastructure would work for a 10yr event. This model showed the need for more storage volume than was reasonably available, so this was not considered as a viable option.

[Design Undersized Pipes to Today's Standards](#)

This model evaluates upsizing Storm Runs A, B, and C to pass a 10-yr storm event within the pipe, and no HGL issues backing up out of the top of the catch basins. The remaining storm sewers were left as existing. While this option is able to alleviate ponding in backyards and streets up to the 10-yr storm, it requires significant upsizing of all storm runs within areas A, B, and C. This would require large pipe sizes, reconstruction of streets, and may impact nearby homes, therefore it is not considered a feasible option.

[Upsize Storm Run A and B to 36" Storm Sewers](#)

This model increases the pipes from Trailwind Drive to Huntersknoll Court to a 36" storm sewer and lowers them deeper into the ground, in an attempt to keep the 10yr storm contained within the pipes and catch basins/manhole structures. This is not quite achievable, as some areas still exceed the top of grate elevation in low points for a short duration. The advantage of this model is that it avoids replacing pipes in Storm Run C, under Huntersknoll Court, reducing street reconstruction costs. Ultimately, this model was not considered as a viable option because it requires the addition of a small detention basin in order to work, and there is not enough space along Storm Runs A and B to construct a basin.

[Upsize Storm Run A and B to 36" and 42" Storm Sewers](#)

This model increases the pipes from Trailwind Drive to Huntersknoll Court to a combination of 36" and 42" storm sewers, attempting to keep the 10yr storm sewer within the pipes and structures. With the implementation of this improvement the 10yr event is contained within the majority of the pipe/structures for Storm Runs A and B, with only short duration ponding at the low point catch basins, but to a much lesser degree than what is currently experienced. This scenario is an improvement over the previous model, as it does not require a small detention basin in order to achieve the results of containing the most of the 10yr storm event within the structures.

3.0 Recommendation and Conclusion

CT Consultants recommends the option of upsizing Storm Runs A and B to a combination of 36" and 42" pipe sizes as shown in Appendix C. This approach provides a balance between controlling flooding of the lower year storm events and project cost. This option would bring the storm sewer system close to current design standards and reduce frequent flooding of yards, while keeping the existing pipes within Huntersknoll Court as is, reducing costs and disruption to the street. A preliminary opinion of construction cost for this approach is provided in Appendix D.

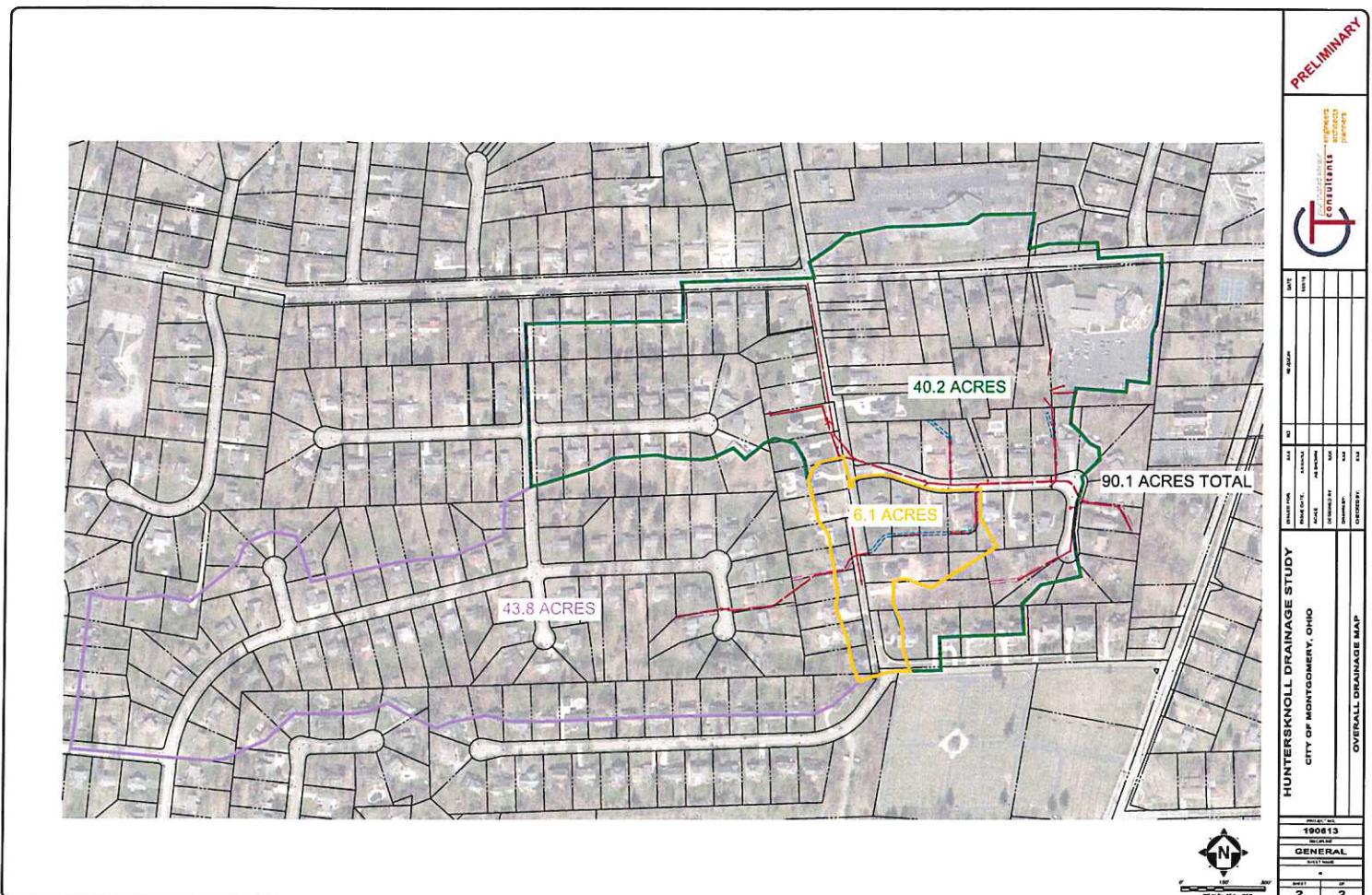
Based on the modeling scenarios performed, resolving the issues will require reconstruction of pipes within a developed and crowded area through privately owned yards. Some concerns to consider when thinking about reconstructing the pipes:



- Houses and a couple of pools are in close proximity to the pipes, increasing pipe depth may require temporary bracing and shoring.
- The reconstruction in Storm Run B is at the toe of a slope, and slope stability should be evaluated to reduce the potential of slippage during construction.
- During detailed design a more complete survey should be performed to locate finished floor elevations of houses and other physical features in the improvement area to determine proper inlet location, elevation and the potential for grading of swales.
- The majority of stormwater entering the pipe system is from up-stream, so bypass stormwater pumping during construction may be warranted.
- There are several blind bends in the pipes that make pipe cleaning and locating difficult. Proposed pipes should have proper structures at all bends, and changes in slope or direction.
- Inlet capacities were not factored into the modeling. The type of inlet can have an impact on the flow into the system, and should be evaluated during final design.

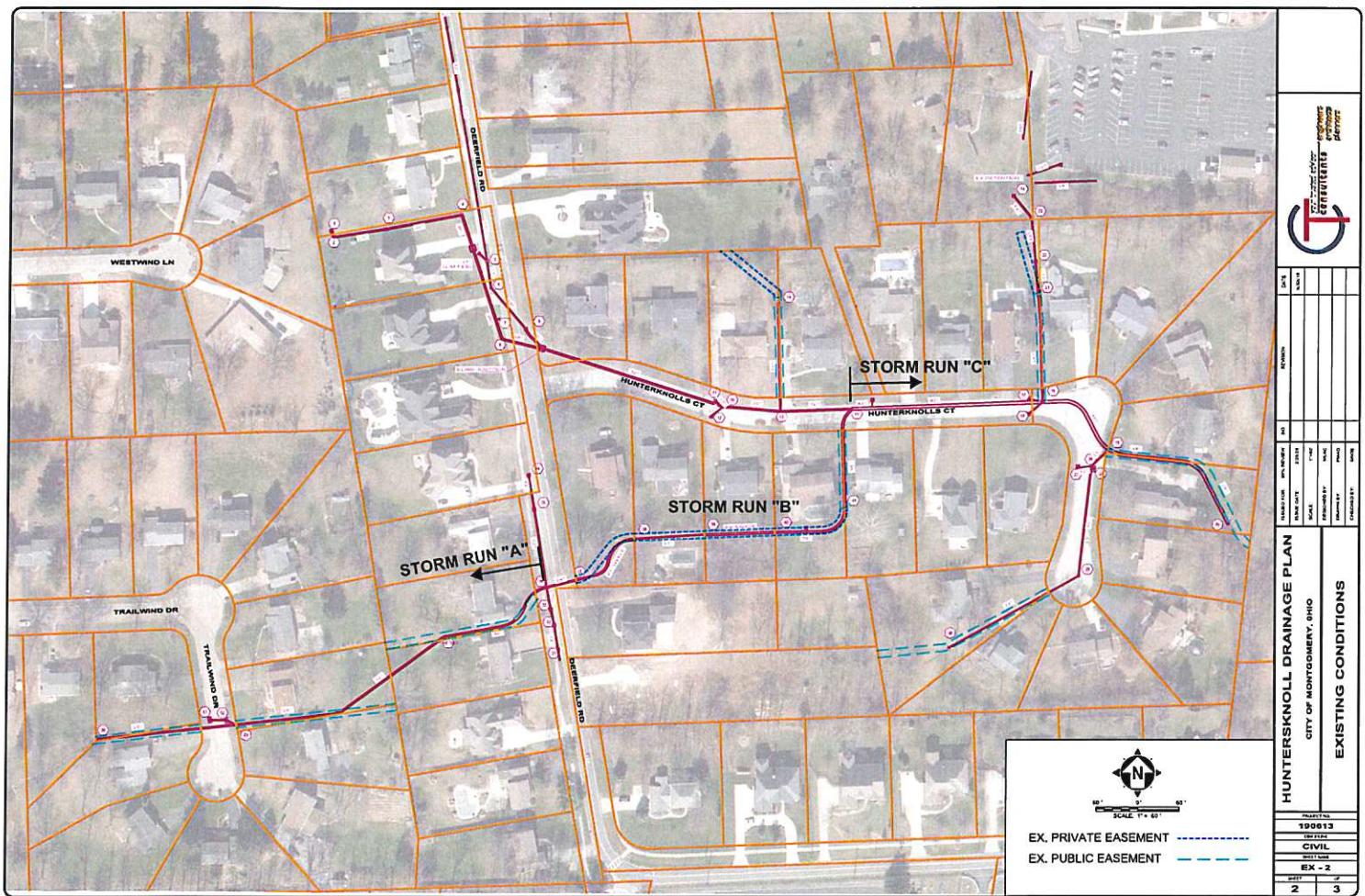
Appendix A

Tributary Area Map



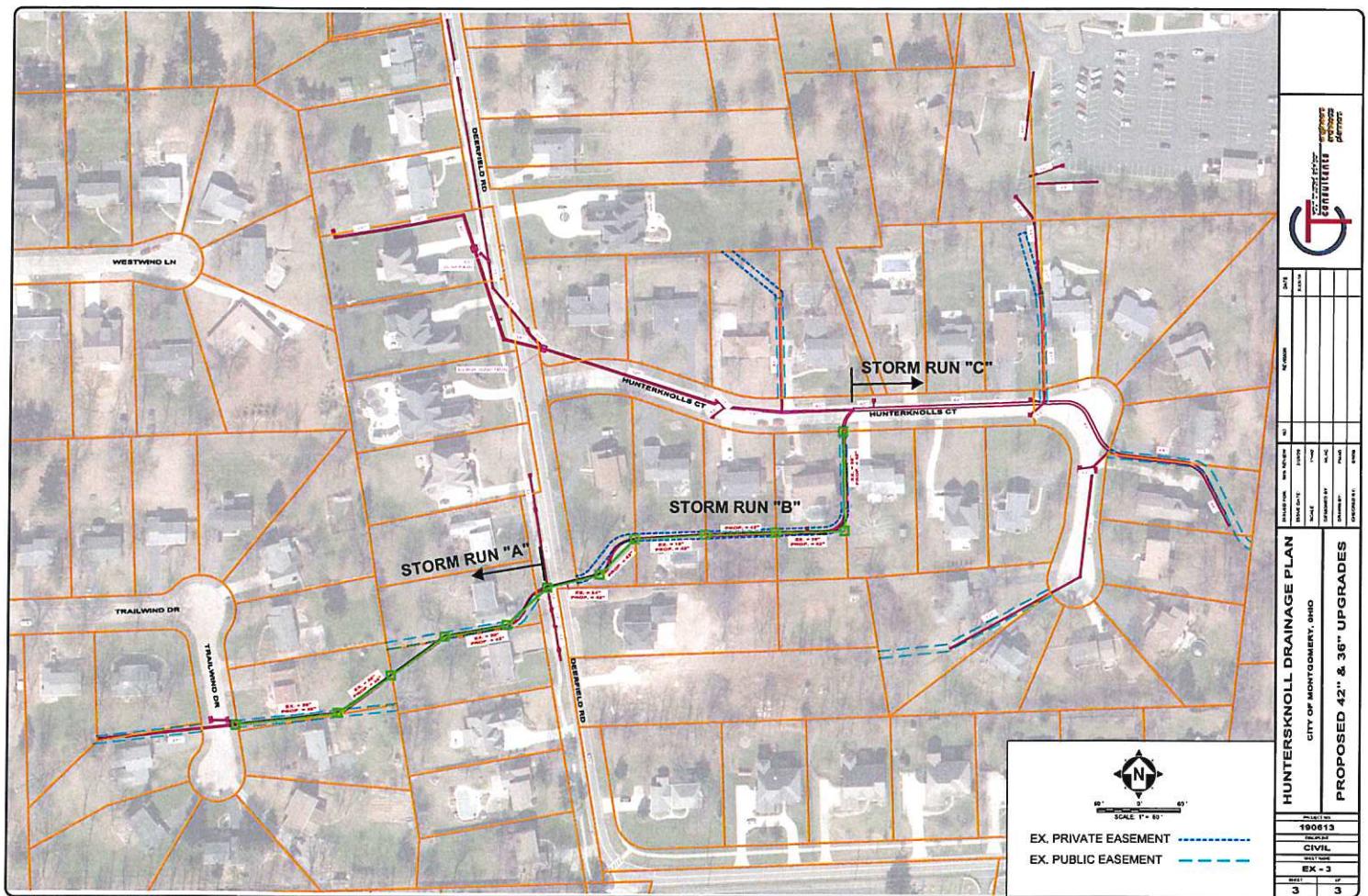
Appendix B

Existing Storm Sewer Map



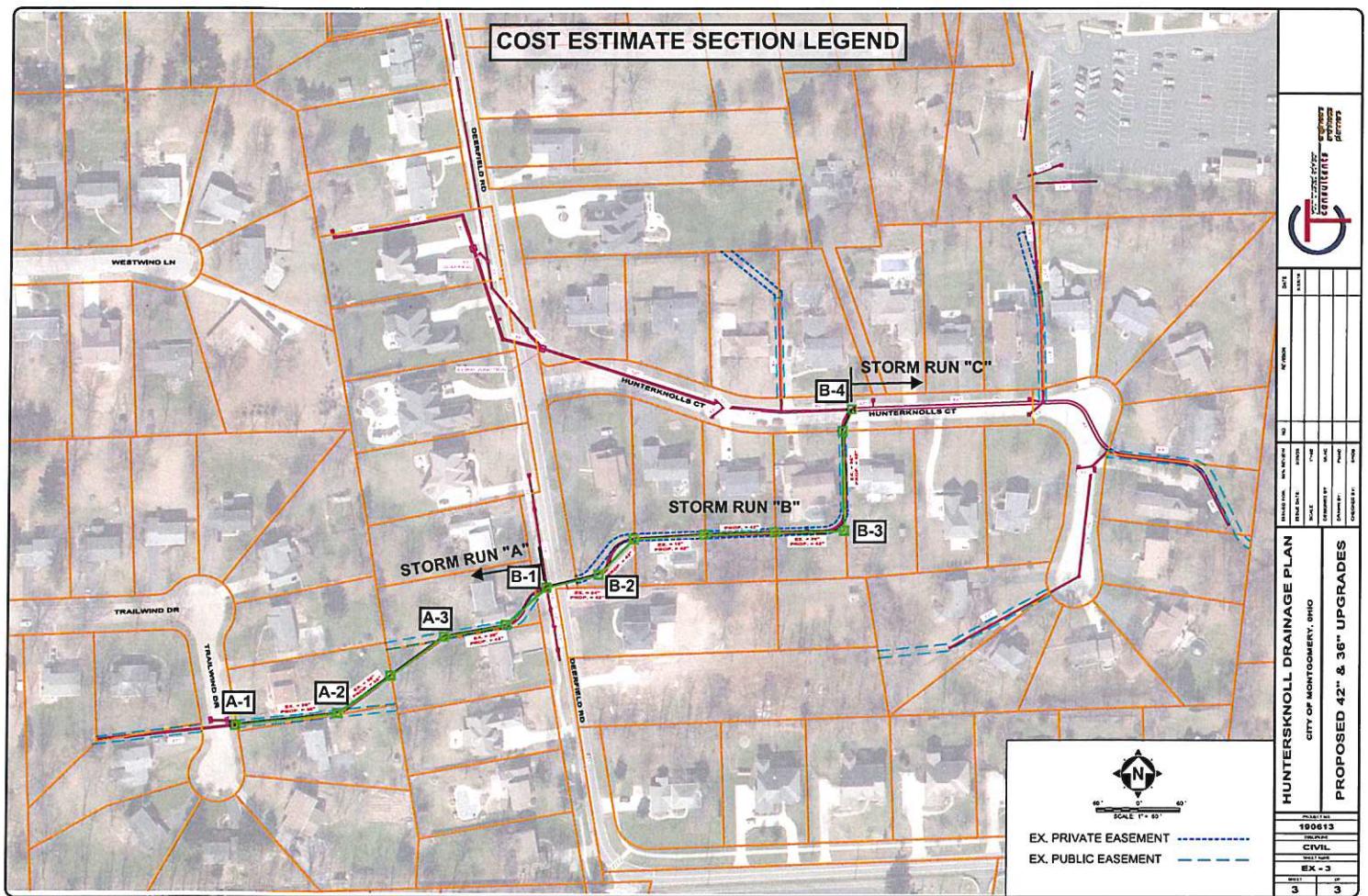
Appendix C

Proposed Storm Sewer Map



Appendix D

Preliminary Opinion of Construction Cost



CT Consultants, Inc						
Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION A-1 TO A-2)						
Montgomery, Ohio						
Project #190613						
Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$4,000.00	\$4,000.00
2	202	PIPE AND STRUCTURE REMOVAL	145	LF	\$40.00	\$5,800.00
3	611	CONDUIT, 36" TYPE B	145	LF	\$140.00	\$20,300.00
4	611	STRUCTURES	2	EA	\$5,000.00	\$10,000.00
5	SPECIAL	FENCE RESTORATION	150	LF	\$30.00	\$4,500.00
6	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	664	SY	\$5.00	\$3,320.00
7	SPECIAL	BYPASS PUMPING	12.78%	LUMP	\$20,000.00	\$2,555.07
SUBTOTAL					\$50,475.07	
+30% CONTINGENCY					\$15,224.93	
TOTAL A-1 TO A-2					\$65,700.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 6 of 6

CT Consultants, Inc						
Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION A-2 TO A-3)						
Montgomery, Ohio						
Project #190613						
Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$4,000.00	\$4,000.00
2	202	PIPE AND STRUCTURE REMOVAL	190	LF	\$40.00	\$7,600.00
3	611	CONDUIT, 36" TYPE B	190	LF	\$140.00	\$26,600.00
4	611	STRUCTURES	2	EA	\$5,000.00	\$10,000.00
5	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	870	SY	\$5.00	\$4,350.00
6	SPECIAL	BYPASS PUMPING	16.74%	LUMP	\$20,000.00	\$3,348.02
SUBTOTAL					\$55,898.02	
+30% CONTINGENCY					\$16,801.98	
TOTAL A-2 TO A-3					\$72,700.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 5 of 6

CT Consultants, Inc

Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION A-3 TO B-1)
Montgomery, Ohio
Project #190613

Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$4,000.00	\$4,000.00
2	202	PIPE AND STRUCTURE REMOVAL	165	LF	\$40.00	\$6,600.00
3	441	ASPHALT DRIVEWAY REMOVE AND REPLACE	50	SY	\$140.00	\$7,000.00
4	611	CONDUIT, 42" TYPE B	165	LF	\$180.00	\$29,700.00
5	611	STRUCTURES	2	EA	\$5,000.00	\$10,000.00
6	SPECIAL	SHORING AND BRACING	100	LF	\$800.00	\$80,000.00
7	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	755	SY	\$5.00	\$3,775.00
8	SPECIAL	BYPASS PUMPING	14.54%	LUMP	\$20,000.00	\$2,907.49
SUBTOTAL					\$143,982.49	
+30% CONTINGENCY					\$43,217.51	
TOTAL A-3 TO B-1					\$187,200.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 4 of 6

CT Consultants, Inc

Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION B-1 TO B-2)
Montgomery, Ohio
Project #190613

Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$2,000.00	\$2,000.00
2	202	PIPE AND STRUCTURE REMOVAL	85	LF	\$40.00	\$3,400.00
3	253	PAVEMENT REMOVE & REPLACE	32	SY	\$200.00	\$6,400.00
4	608	SIDEWALK REMOVE & REPLACE	100	SF	\$30.00	\$3,000.00
5	611	CONDUIT, 42" TYPE B	85	LF	\$180.00	\$15,300.00
6	611	STRUCTURES	1	EA	\$5,000.00	\$5,000.00
7	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	389	SY	\$5.00	\$1,945.00
8	SPECIAL	BYPASS PUMPING	7.49%	LUMP	\$20,000.00	\$1,497.80
SUBTOTAL					\$38,542.80	
+30% CONTINGENCY					\$11,657.20	
TOTAL B-1 TO B-2					\$50,200.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 3 of 6

CT Consultants, Inc

Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION B-2 TO B-3)
Montgomery, Ohio
Project #190613

Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$8,000.00	\$8,000.00
2	202	PIPE AND STRUCTURE REMOVAL	375	LF	\$40.00	\$15,000.00
3	611	CONDUIT, 42" TYPE B	375	LF	\$180.00	\$67,500.00
4	611	STRUCTURES	4	EA	\$5,000.00	\$20,000.00
5	SPECIAL	FENCE RESTORATION	250	LF	\$30.00	\$7,500.00
6	SPECIAL	SHORING AND BRACING	120	LF	\$800.00	\$96,000.00
7	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	1718	SY	\$5.00	\$8,590.00
8	SPECIAL	BYPASS PUMPING	33.04%	LUMP	\$20,000.00	\$6,607.93
SUBTOTAL					\$229,197.93	
+30% CONTINGENCY					\$68,802.07	
TOTAL B-2 TO B-3					\$298,000.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 2 of 6

CT Consultants, Inc

Project: Hunters Knoll Drainage Study - Preliminary Opinion of Construction Cost (SECTION B-3 TO B-4)
Montgomery, Ohio
Project #190613

Item No.	Spec. No.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Item Cost
1	201	CLEARING AND GRUBBING	1	LUMP	\$4,000.00	\$4,000.00
2	202	PIPE AND STRUCTURE REMOVAL	175	LF	\$40.00	\$7,000.00
3	253	PAVEMENT REMOVE & REPLACE	23	SY	\$200.00	\$4,600.00
4	609	CURB REMOVE & REPLACE	16	LF	\$90.00	\$1,440.00
5	611	CONDUIT, 42" TYPE B	175	LF	\$180.00	\$31,500.00
6	611	STRUCTURES	2	EA	\$5,000.00	\$10,000.00
7	SPECIAL	SHORING AND BRACING	60	LF	\$800.00	\$48,000.00
8	659	SEEDING AND MULCHING (TO INCLUDE ALL YARD RESTORATION)	801	SY	\$5.00	\$4,005.00
9	SPECIAL	BYPASS PUMPING	15.42%	LUMP	\$20,000.00	\$3,083.70
SUBTOTAL					\$113,628.70	
+30% CONTINGENCY					\$34,171.30	
TOTAL B-3 TO B-4					\$147,800.00	

Final engineering, design, construction administration, and construction observation costs are not included in the above estimate.

*DENOTES CONTINGENCY ITEM - USE ONLY AT THE DIRECTION OF THE ENGINEER

Printed: 6/3/2020
Page 1 of 6

Appendix E

Summary of Model Results and Full Model Results



Existing Conditions Analysis – 5yr Event

Storm Run	Drainage Area Acres	Storm Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	35.84	48.20	74
B	49.86	47.78	66.61	72
C	90.09	109.91	139.42	79
Ponding Area	Drainage Area Acres	Stored Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	8,843	3.02	1
2	7.59	17,285	3.61	5
3	51.2	7,784	3.84	4.5

Upgrade Storm Run A & B to 36" Pipe – 5yr Event

Storm Run	Drainage Area Acres	Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	68.80	75.57	91
B	49.86	72.37	76.86	94
C	90.09	125.04	139.42	90
Ponding Area	Drainage Area Acres	Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	3,944	2.2	1
2	7.59			
3	51.2	9,381	6.22	0.75

Upgrade Storm Run A & B to 42" & 36" Pipe – 5yr Event

Storm Run	Drainage Area Acres	Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	70.54	87.20	81
B	49.86	72.37	76.86	94
C	90.09	133.44	139.42	96
Ponding Area	Drainage Area Acres	Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	3,944	2.19	1.5



Existing Conditions Analysis – 10yr Event

Storm Run	Drainage Area Acres	Storm Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	36.28	48.20	78
B	49.86	49.76	66.61	75
C	90.09	126.72	139.42	91
Ponding Area	Drainage Area Acres	Stored Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	12,561	3.39	1
2	7.59	33,575	4.56	6
3	51.2	7,906	3.87	5.5

Upgrade Storm Run A & B to 36" Pipe – 10yr Event

Storm Run	Drainage Area Acres	Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	79.58	75.57	105
B	49.86	81.25	76.86	106
C	90.09	139.34	139.42	100
Ponding Area	Drainage Area Acres	Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	6,008	2.68	1.5
2	7.59			
3	51.2	21,782	9.24	1

Upgrade Storm Run A & B to 42" & 36" Pipe – 10yr Event

Storm Run	Drainage Area Acres	Water Flow CFS	Manning's Capacity CFS	% of Capacity Used
A	43.75	80.57	87.20	93
B	49.86	90.97	100.56	91
C	90.09	148.49	139.42	107
Ponding Area	Drainage Area Acres	Volume of Water Cubic Feet	Depth of Ponding Feet	Time to drain Hours
1	28.1	5,798	2.60	1.5

Huntersknoll Court
Existing Conditions - 5-yr

Existing Conditions - 5-yr

Hunters Knoll Storm Sewer Calculations 5yr Event - Existing Conditions																														
From	To	Drainage Area	CN	Time to Run-Off	Peak Combined Area	Weighted Area	Pipe Diameter	US CN	US Invert	US Rim	US HGL	US HGL	DS Elev	DS Length	Slope	DS Invert	DS Rim	DS HGL	DS HGL	n	Ent Losses	Exit Losses	Max Travel Time	Peak Flow	Design Flow	Max Flow / Design Ratio	Total Flow	Total Time	Reported Condition	
		(Acres)	(Min)	(CFS)	(Acres)	(Acres)	(Inches)	(ft)	(ft)	(ft)	(ft)	(ft)	Elev	Elev	Freeboard	Elev	Elev	Elev	Elev	Freeboard	Flow	Losses	Velocity	Flow	Time	Ratio	Capacity	Flow	Time	Calculated
													(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/sec)	(min)	(cfs)	(cfs)	(min)	(min)	
STR1	STR2	6.76	80.00	17.00	13.08	6.76	60.00	30	784.14	788.64	785.52	2.12	10	1.03	784.04	788.90	786.39	2.51	0.015	0.50	0.50	0.50	0.50	2.73	0.06	12.97	36.15	0.36	0.00	Calculated
STR2	STR3	3.33	83.00	12.00	8.22	10.09	60.99	30	784.04	788.90	788.39	2.51	74	0.50	783.67	787.60	785.88	1.72	0.015	0.50	0.50	0.42	0.29	0.09	25.08	0.80	0.00	Calculated		
STR3	STR4	1.58	80.00	12.00	3.44	11.67	60.86	30	783.67	787.60	785.88	1.72	110	0.50	783.12	789.32	784.70	4.62	0.015	0.50	0.50	0.50	0.50	5.80	0.32	23.14	25.17	0.92	0.00	Calculated
STR4	STR7	0.22	94.00	10.00	0.81	11.89	81.10	30	783.12	789.32	784.70	4.62	75	2.06	781.57	784.41	783.34	1.02	0.015	0.50	0.50	0.50	0.50	6.70	0.19	23.82	51.08	0.47	0.00	Calculated
STR7	STR8	0.09	85.00	10.00	0.25	11.98	81.13	30	781.57	784.41	783.39	1.02	29	1.35	781.18	784.88	782.34	2.56	0.015	0.50	0.50	0.50	0.50	7.89	0.06	24.04	41.29	0.58	0.00	Calculated
STR8	STR9	0.12	65.00	10.00	0.34	12.10	61.17	30	781.18	784.88	782.34	2.56	37	7.37	778.48	781.58	779.73	1.85	0.015	0.50	0.50	0.50	0.50	10.51	0.06	24.33	96.49	0.25	0.00	Calculated
STR5	STR6	1.35	81.00	12.00	3.07	1.35	81.00	18	781.27	785.68	783.31	2.37	112	-0.84	782.21	784.86	782.58	2.28	0.015	0.50	0.50	0.50	0.50	2.63	0.71	3.05	8.34	0.37	0.00	Calculated
STR6	STR9	0.17	85.00	10.00	0.48	1.52	81.45	18	782.21	784.86	782.58	2.28	46	8.09	778.48	781.58	779.73	1.85	0.015	0.50	0.50	0.50	0.50	3.71	0.21	3.51	25.89	0.14	0.00	Calculated
STR9	STR10	1.79	81.00	12.00	4.08	15.41	81.18	30	778.48	781.58	779.73	1.85	303	3.50	767.88	777.52	789.50	8.02	0.015	0.50	0.50	0.50	0.50	10.86	0.46	31.50	66.51	0.47	0.00	Calculated
STR11	STR10	0.66	83.00	10.00	1.70	0.66	83.00	12	773.62	777.82	774.12	3.50	14	3.03	773.20	777.52	789.50	8.02	0.015	0.50	0.50	0.50	0.50	5.02	0.05	5.02	5.37	0.31	0.00	Calculated
STR12	STR10	0.08	94.00	10.00	0.31	0.00	84.00	12	773.20	777.52	773.93	3.63	21	7.20	773.20	777.52	789.50	8.02	0.015	0.50	0.50	0.50	0.50	3.27	0.11	0.30	4.98	0.06	0.00	Calculated
STR13	STR10	0.00	84.00	10.00	0.00	0.00	84.00	30	767.88	772.52	769.50	8.02	21	3.51	765.01	775.64	786.72	8.18	0.015	0.50	0.50	0.50	0.50	9.61	0.14	33.27	66.59	0.50	0.00	Calculated
STR14	STR13	4.18	77.00	17.00	7.91	4.18	77.00	18	771.00	776.80	771.65	5.15	154	3.90	765.01	775.64	787.48	8.18	0.015	0.50	0.50	0.50	0.50	5.14	0.10	6.95	17.97	0.39	0.00	Calculated
STR15		0.00	80.00	0.00	0.00	0.00	20.33	30	765.01	775.64	767.46	8.48	101	3.79	761.18	774.00	785.39	8.61	0.015	0.50	0.50	0.50	0.50	8.58	0.20	39.29	69.21	0.57	0.00	Calculated
STR50	BasinInflow	12.50	80.00	20.00	22.42	12.50	80.00	787.50	790.50	790.52	-0.02			789.50	780.06	-0.56														
STR50	OverlandOutflow							790.50	792.25	792.25				787.50	783.00	787.50	789.57	-2.07	0.015	0.50	0.50	0.50	0.50	4.63	0.58	16.47	37.95	0.43	0.00	Calculated
STR51	STR52	0.00	80.00	0.00	0.00	12.50	80.00	27	786.24	789.50	790.06	-0.56	162	2.00	782.76	787.50	786.78	-1.28	0.015	0.50	0.50	0.50	0.50	7.93	0.05	31.52	26.60	1.18	0.00	Calculated
STR52		22.12	82.00	25.00	34.62	81.28	27	785.00	787.50	789.57	-2.07	24	0.98	782.76	787.50	786.78														
STR52	OverlandOutflow							787.50	787.50	787.50				782.76	786.00	787.17														
STR53	STR52	1.53	79.00	12.00	3.18	81.18	36.15	27	782.76	787.50	788.78	-1.28	14	1.00	782.62	788.00	787.17	0.83	0.015	0.50	0.50	0.50	0.50	9.64	0.02	38.00	26.87	1.41	0.00	Calculated
STR53	YardDrain	0.00	80.00	0.00	0.00	36.15	81.18	30	782.12	786.00	787.17	0.33	325	1.84	776.14	781.51	782.78	-3.27	0.015	0.50	0.50	0.50	0.50	8.79	0.62	37.41	48.20	0.78	0.00	Calculated
STR53	YardDrain	7.59	79.00	16.00	14.36	7.59	79.00	780.65	780.22	782.26	-2.04			776.93	777.51	782.78														
STR53	OverlandOutflow							780.65	780.22	782.26				776.93	772.86	777.76	780.15	-2.39	0.015	0.50	0.50	0.50	0.50	7.30	0.41	35.84	48.20	0.74	0.00	Calculated
STR54	STR53	0.00	80.00	0.00	0.00	43.74	80.80	30	776.14	779.51	782.78	-3.27	178	1.84	772.86	777.76	780.15													
STR54	STR53	0.81	83.00	10.00	2.08	0.81	83.00	12	778.05	780.80	782.27	-2.67	35	3.18	776.93	778.53	782.26	-3.73	0.015	0.50	0.50	0.50	0.50	4.13	0.14	2.08	5.51	0.38	0.00	Calculated
STR54	STR53	0.08	85.00	10.00	0.23	0.89	83.18	12	776.93	778.53	782.26	-2.3	167	775.55	779.75	781.27	-3.32	0.015	0.50	0.50	0.50	0.50	8.74	0.04	6.67	3.99	1.72	106.00	Surcharged	
STR54	STR53	0.12	83.00	10.00	0.31	0.01	83.16	12	776.55	777.95	781.27	-3.12	32	2.15	775.86	777.76	780.15	-2.39	0.015	0.50	0.50	0.50	0.50	8.88	0.06	4.53	85.00	1.54	0.00	Calculated

Huntersknoll Court
Existing Conditions - 5-yr

Huntersknoll Court
Existing Conditions - 10-yr

ମାତ୍ରାବିନ୍ଦୁ - ୧

Hunters Knoll Storm Sewer Calculations 10yr Event - Existing Conditions																									
From US	To DS	Drainage Area	CN	Time to Run-Off	Pipe Diameter	Combined Weighted Cn	US Length	Slope	DS Invert	DS HGL	DS HGL	n	DS Losses	Max Travel Time	Peak Flow	Design Flow	Total Flow	Reported Condition							
		(Acres)	(Min)	(CFS)	(Inches)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)		Flow	Time	Flow	Time	Time								
STR1	STR2	6.76	80.00	17.00	16.34	6.76	60.00	30	784.14	788.64	781.45	1.19	1.03	784.04	788.60	787.29	1.61	0.015	0.50	3.29	0.05	10.00	SURCHARGED		
STR2	STR3	3.33	83.00	12.00	10.09	30	80.99	30	784.04	788.90	787.29	1.61	74	0.50	783.67	787.60	786.52	1.08	0.015	0.50	5.07	0.24	24.67	SURCHARGED	
STR3	STR4	1.58	83.00	12.00	4.30	11.67	60.96	30	783.67	787.66	786.52	1.08	110	0.50	783.12	789.32	785.03	4.29	0.015	0.50	6.35	0.29	23.05	> CAPACITY	
STR4	STR7	0.22	94.00	10.00	0.94	11.89	61.10	30	783.12	789.32	785.03	4.29	75	0.26	781.57	784.41	783.71	0.70	0.015	0.50	7.02	0.18	28.88	Calculated	
STR7	STR8	0.09	85.00	10.00	0.30	11.98	81.13	30	781.57	784.41	783.71	0.70	29	1.35	781.18	784.68	782.55	2.33	0.015	0.50	8.19	0.06	30.19	Calculated	
STR8	STR9	0.12	85.00	10.00	0.41	12.10	81.17	30	781.18	784.88	782.55	2.33	37	7.37	778.48	781.58	780.06	1.52	0.015	0.50	10.84	0.06	30.64	Calculated	
STR9	STR6	1.35	81.00	12.00	3.81	1.35	81.00	18	781.27	785.88	785.55	2.13	112	-0.04	782.21	784.86	782.63	2.23	0.015	0.50	3.18	0.59	3.78	Calculated	
STR6	STR9	0.17	85.00	10.00	0.59	1.52	81.45	18	782.21	784.86	785.23	2.23	46	0.09	778.48	781.58	780.06	1.52	0.015	0.50	3.67	0.20	4.35	Calculated	
STR9	STR10	1.79	81.00	12.00	5.05	15.41	81.18	30	779.48	781.58	780.06	1.52	303	3.50	767.86	777.52	773.43	4.09	0.015	0.50	10.96	0.46	38.61	Calculated	
STR10	STR11	0.66	83.00	10.00	2.08	0.66	83.00	12	773.82	777.82	774.19	3.43	14	3.03	773.20	777.52	773.43	4.09	0.015	0.50	5.24	0.04	2.06	Calculated	
STR10	STR13	0.08	94.00	10.00	0.38	0.08	94.00	12	773.75	777.56	773.95	3.61	21	2.60	773.20	777.52	773.43	4.09	0.015	0.50	5.04	0.10	4.98	Calculated	
STR10	STR13	0.00	0.00	0.00	0.00	16.15	81.31	30	767.98	777.52	773.43	4.09	82	3.51	65.01	775.64	771.45	4.19	0.015	0.50	9.54	0.14	38.22	Calculated	
STR14	STR13	4.18	77.00	17.00	8.92	4.18	77.00	18	776.80	773.58	773.43	3.22	154	3.90	765.01	775.64	771.45	4.19	0.015	0.50	5.49	0.47	8.86	Calculated	
STR13	STR15	0.00	0.00	0.00	0.00	20.33	86.43	30	775.01	775.64	771.45	4.19	101	3.79	761.18	774.00	768.17	5.83	0.015	0.50	9.71	0.17	47.64	Calculated	
TrailWindBasin																									
Basin Inflow																									
STR50	STR12	12.50	80.00	20.98	28.10	12.50	86.00	787.50	792.00	790.89	1.11	789.50	790.67	-1.17											
Overland Outflow																									
STR51	STR51	0.00	0.00	0.00	0.00	12.50	80.00	27	780.50	789.50	790.67	-1.17	162	2.00	787.50	780.42	-2.92	0.015	0.50	4.69	0.58	16.97	Calculated		
STR52	STR52	22.12	82.00	25.00	47.89	34.62	81.28	27	783.00	787.50	790.42	-2.92	24	0.98	782.76	787.50	-1.66	0.015	0.50	7.89	0.05	31.39	Calculated		
STR53	STR52	1.53	78.00	12.00	3.98	36.15	81.18	27	787.26	787.50	788.16	-1.66	14	1.00	782.62	788.00	787.56	0.44	0.015	0.50	9.68	0.02	38.20	Calculated	
STR54	STR53	0.00	0.00	0.00	0.00	36.15	81.18	30	787.50	788.00	787.56	0.44	325	1.84	778.65	781.14	783.14	-3.63	0.015	0.50	8.71	0.62	37.46	Calculated	
Overland Outflow																									
STR55	STR54	7.59	78.00	16.00	18.06	7.59	78.00	30	778.65	784.22	783.21	1.01	776.93	776.93	-1.67	0.015	0.50	7.39	0.40	36.28	Calculated				
YardDrain																									
STR56	STR56	0.00	0.00	0.00	0.00	43.74	80.80	30	780.22	776.14	779.51	783.14	-3.63	178	1.84	772.86	777.76	780.43	-2.67	0.015	0.50	7.39	0.40	48.20	Calculated
STR31	STR32	0.81	83.00	10.00	2.57	0.81	83.00	12	778.95	778.60	783.22	-3.62	35	3.18	776.93	778.51	783.21	-4.68	0.015	0.50	5.51	0.44	149.00	Calculated	
STR32	STR33	0.08	85.00	10.00	0.28	0.89	83.18	12	778.53	783.21	783.21	-4.68	32	1.67	775.86	777.76	780.43	-2.87	0.015	0.50	5.51	0.55	156.00	Calculated	
STR33	STR33	0.12	83.00	10.00	0.38	0.101	83.16	12	776.55	777.85	781.92	-3.97	32	2.15	775.86	777.76	780.43	-2.87	0.015	0.50	5.51	0.66	156.00	Calculated	

Huntersknoll Court
Existing Conditions - 10-yr

Hunters Knoll Storm Sewer Calculations 10yr Event - Existing Conditions																										
From	To	Drainage Area	CN	Peak Time	Combined Run-Off	Weighted Area	Pipe Diameter	US Invert	US Length	Slope	DS Invert	DS Length	DS	n	Ent	Exit	Max Travel Time	Peak Flow	Design Flow	Max Flow / Ratio	Total Time	Reported Condition				
US	DS	(Acres)	(CFS)	(Min)	(Inches)	(Acres)	(Inches)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)		(ft)	(ft)	(ftsec)	(cfs)	(cfs)	(min)	(min)					
STR34	STR35	0.51	83.00	10.00	1.62	0.51	83.00	12	783.16	784.48	783.49	1.00	49	720	779.63	780.67	0.26	0.015	0.50	0.50	7.59	0.11	1.64	8.28	> CAPACITY	
STR35	STR36	0.19	83.00	10.00	0.61	0.70	83.00	12	779.43	780.93	780.67	0.26	112	3.00	776.06	777.76	780.43	-2.67	0.015	0.50	0.50	5.19	0.36	1.99	5.35	Calculated
STR36	STR37	0.26	83.00	10.00	0.83	45.71	80.90	24	772.86	777.76	780.43	-2.67	46	2.37	771.76	771.76	771.76	0.015	0.50	0.50	0.50	13.27	0.06	41.69	30.21	SURCHARGED
STR37	STR38	1.91	81.00	12.00	5.38	47.62	80.91	771.75	778.10	775.63	2.47				773.92	774.27	-0.35					1.38	170.00			
Basin Inflow																										
STR38	Overland Outflow	0.00	0.00	0.00	0.00	47.62	80.91	18	774.34						773.02							45.31				
STR39	STR40	1.34	81.00	12.00	3.77	48.96	80.91	300	771.15	774.15	774.27	-0.35	99	0.64	771.15	774.15	772.07	2.08	0.015	0.50	0.50	7.65	0.22	10.33	7.31	Calculated
STR40	STR41	0.00	0.00	0.00	0.00	48.96	80.91	36	770.21	773.67	771.98	1.69	115	6.24	763.03	771.87	765.79	2.08	0.015	0.50	0.50	1.89	0.92	44.60	289.31	Calculated
STR41	STR42	0.90	82.00	10.00	3.45	49.86	80.93	36	763.03	771.87	769.79	2.08	139	1.33	761.18	774.00	768.17	5.83	0.015	0.50	0.50	10.27	0.19	49.30	144.42	Calculated
STR42	STR43	1.77	82.00	12.00	5.19	71.96	80.81	42	761.18	774.00	768.17	5.83	272	1.33	757.57	768.11	762.09	5.02	0.015	0.50	0.50	8.11	0.29	49.76	66.61	SURCHARGED
STR43	STR44	1.55	81.00	12.00	4.37	1.55	81.00	12	761.25	767.76	763.75	4.01	20	3.32	760.57	768.11	763.09	5.02	0.015	0.50	0.50	6.28	0.05	4.33	10.52	Calculated
STR44	STR45	0.98	82.00	10.00	3.67	0.96	82.00	12	761.57	767.65	763.67	3.98	27	3.72	760.57	768.11	763.09	5.02	0.015	0.50	0.50	6.62	0.07	3.28	5.96	SURCHARGED
STR45	STR46	8.60	85.23	18.00	25.22	8.60	65.23	777.37	784.00	782.46	1.54				781.78	774.48	7.30						24.27			
Basin Inflow																										
STR46	Overland Outflow	0.00	0.00	0.00	0.00	8.60	85.23	18	782.34						777.33	772.46	5.33	0.015	0.50	0.50	8.92	0.06	10.63	21.12	Calculated	
STR47	STR48	0.00	0.00	0.00	0.00	8.60	85.23	18	771.33	777.79	772.46	5.33	63	4.88	768.27	773.57	768.28	4.29	0.015	0.50	0.50	10.08	0.10	13.48	20.12	Calculated
STR48	STR49	2.80	78.00	14.00	6.72	11.40	83.45	21	768.07	773.57	769.28	4.29	46	5.11	765.71	771.21	766.76	4.45	0.015	0.50	0.50	10.27	0.07	16.52	31.03	Calculated
STR49	STR50	0.00	0.00	0.00	0.00	11.40	83.45	21	765.71	771.21	766.76	4.45	153	5.31	757.57	768.11	763.09	5.02	0.015	0.50	0.50	8.08	0.32	16.60	31.84	SURCHARGED
STR50	STR51	0.00	0.00	0.00	0.00	65.87	81.18	48	757.57	768.11	763.09	5.02	135	1.14	756.03	770.24	760.58	9.66	0.015	0.50	0.50	9.26	0.24	116.32	132.95	Calculated
STR51	STR52	1.23	80.00	12.00	3.34	1.23	80.00	12	765.34	769.49	766.41	3.08	19	1.49	765.05	769.61	762.88	6.73	0.015	0.50	0.50	4.60	0.07	3.32	3.77	Calculated
STR52	STR53	0.30	90.00	10.00	1.18	0.30	90.00	12	763.75	768.45	764.24	5.21	6	1.57	763.68	769.61	762.88	6.73	0.015	0.50	0.50	3.54	0.03	1.16	3.87	Calculated
STR53	STR54	2.69	80.00	14.00	6.98	2.69	80.00	12	774.72	776.72	776.86	-0.14	210	4.66	764.93	771.95	765.83	6.12	0.015	0.50	0.50	9.63	0.36	6.65	6.65	Calculated
STR54	STR55	0.00	0.00	0.00	0.00	2.69	80.00	15	784.93	771.95	765.83	6.12	157	4.67	757.62	769.61	762.88	6.73	0.015	0.50	0.50	5.97	0.44	6.61	12.99	Calculated
STR55	STR56	0.00	0.00	0.00	0.00	4.22	80.71	15	757.62	768.61	762.88	6.73	34	4.66	756.03	770.24	766.58	9.66	0.015	0.50	0.50	8.50	0.07	10.43	12.99	SURCHARGED
STR56	Structure20	0.00	0.00	0.00	0.00	90.09	81.16	48	756.03	770.24	760.58	9.66	214	1.25	753.35			0.015	0.50	0.50	0.00	10.88	0.33	126.72	139.42	Calculated

**Huntersknoll Court
36" Storm Sewer Upgrade - 5-yr**

Hunters Knoll Storm Sewer Calculations 35" Svc Yr																										
From Us	To Ds	Drainage Area	CN	Time to Run-Off	Peak Combined Area	Weighted Area	Pipe Diameter	US Invert	US Length	Slope	DS Invert	DS Length	DS HGL	DS n	Ent Losses	Exit Losses	Max Travel Velocity	Max Flow / Capacity (cfs)	Design Flow (cfs)	Max Flow / Capacity (cfs)	Design Flow (cfs)	Max Flow / Capacity (cfs)	Reported Condition			
STR1	STR2	6.76	80.00	12.00	13.08	6.76	80.00	784.14	788.64	786.10	2.54	10	1.03	784.04	789.90	786.01	2.89	0.015	0.25	0.25	3.20	0.05	12.97	36.15	Calculated	
STR2	STR3	3.33	83.00	10.00	8.22	10.09	80.99	30	784.04	786.50	786.01	2.89	74	0.50	785.67	787.50	785.52	2.08	0.015	0.25	0.25	5.00	0.05	20.08	25.08	Calculated
STR3	STR4	1.58	80.00	10.00	3.44	11.67	80.86	30	785.67	787.50	785.52	2.08	110	0.50	785.12	787.32	784.52	4.80	0.015	0.25	0.25	6.88	0.27	23.16	25.17	Calculated
STR4	STR7	0.22	94.00	10.00	0.81	11.89	81.10	30	785.12	787.32	784.52	4.80	75	2.06	781.57	784.41	783.12	1.29	0.015	0.25	0.25	7.92	0.16	23.88	51.08	Calculated
STR7	STR8	0.09	85.00	10.00	0.25	11.98	81.13	30	781.57	784.41	783.12	1.29	29	1.35	781.18	784.88	782.19	2.69	0.015	0.25	0.25	9.53	0.05	24.12	41.29	Calculated
STR8	STR9	0.12	85.00	10.00	0.34	12.10	81.17	30	781.18	784.88	782.19	2.69	37	3.37	776.48	781.58	779.71	1.87	0.015	0.25	0.25	11.95	0.05	24.47	96.49	Calculated
STR9	STR6	1.35	81.00	12.00	3.07	1.35	81.00	18	781.27	787.00	793.20	2.48	112	-0.04	782.21	784.86	782.58	2.28	0.015	0.25	0.25	2.63	0.71	3.05	8.34	Calculated
STR6	STR9	0.17	85.00	10.00	0.48	1.52	81.45	18	782.21	784.86	782.58	2.28	46	0.09	778.48	781.58	779.71	1.87	0.015	0.25	0.25	3.74	0.21	3.51	25.99	Calculated
STR9	STR10	1.79	81.00	12.00	4.08	15.41	81.18	30	782.21	784.86	782.58	1.87	303	3.50	767.88	771.52	769.33	8.19	0.015	0.25	0.25	11.86	0.43	31.78	66.51	Calculated
STR10	STR11	0.66	83.00	17.00	1.70	0.68	83.00	12	773.62	777.62	774.07	3.55	14	3.01	773.20	777.52	769.33	8.19	0.015	0.25	0.25	5.46	0.04	1.69	5.37	Calculated
STR11	STR10	0.08	94.00	10.00	0.31	0.08	94.00	12	773.75	777.56	773.92	3.64	21	2.60	773.20	777.52	769.33	8.19	0.015	0.25	0.25	3.38	0.10	1.69	4.98	Calculated
STR10	STR13	0.00	0.00	0.00	0.00	16.15	81.31	30	767.88	777.52	769.33	8.19	82	3.51	765.01	775.64	767.38	8.26	0.015	0.25	0.25	10.72	0.13	33.55	66.59	Calculated
STR13	STR14	4.18	77.00	10.00	7.01	4.18	77.00	18	776.80	778.80	771.65	5.15	154	3.90	765.01	775.64	767.38	8.26	0.015	0.25	0.25	5.14	0.50	6.95	17.37	Calculated
STR14	STR13	0.00	0.00	0.00	0.00	20.33	80.43	30	765.01	775.64	767.38	8.26	101	3.79	761.18	774.00	765.93	8.07	0.015	0.25	0.25	8.42	0.20	39.43	69.21	Calculated
STR13	STR50	12.50	80.00	16.00	14.36	12.50	80.00	781.50	792.00	769.70	2.30	789.50	787.49	2.01												
TrailWindBasin																										
Basin Inflow																										
STR50	STR51	0.00	0.00	0.00	0.00	12.50	80.00	27	786.24	789.50	787.49	2.01	162	2.00	787.50	787.50	783.85	3.65	0.015	0.25	0.25	9.25	0.29	22.33	53.53	Calculated
STR51	STR52	22.12	82.00	25.00	34.62	81.28	36	786.58	787.50	783.85	3.65	24	1.02	786.33	787.50	782.97	4.53	0.015	0.25	0.25	8.41	0.05	56.02	58.46	Calculated	
STR52	STR53	1.53	79.00	12.00	3.18	36.15	81.18	36	780.33	787.50	782.97	4.53	14	1.79	780.08	788.00	782.09	5.91	0.015	0.25	0.25	11.03	0.02	59.59	77.33	Calculated
STR53	Overland Outflow	0.00	0.00	0.00	0.00	36.15	81.18	36	787.50	788.00	782.09	5.91	325	2.85	780.82	779.51	776.88	2.63	0.015	0.25	0.25	9.82	0.55	59.41	97.54	Calculated
YardDrain	STR36	7.59	79.00	20.00	22.42	43.74	80.80	36	780.82	778.51	776.88	2.63	178	1.28	768.53	777.76	774.31	3.45	0.013	0.25	0.25	10.56	0.28	68.80	75.57	SURCHARGED
STR31	STR32	0.81	83.00	14.00	2.09	0.81	83.00	12	778.05	779.60	778.50	1.10	35	3.18	776.93	778.53	777.56	0.97	0.015	0.25	0.25	4.80	0.12	2.08	5.51	Calculated
STR32	STR33	0.08	85.00	10.00	0.23	0.89	83.18	12	778.93	780.53	777.56	0.97	23	1.67	776.93	777.95	777.16	0.79	0.015	0.25	0.25	4.53	0.08	2.30	3.99	Calculated
STR33	STR34	0.12	83.00	10.00	0.31	1.01	83.16	12	778.55	777.95	777.16	0.97	32	2.15	75.86	777.76	774.31	3.45	0.015	0.25	0.25	5.57	0.10	2.60	4.53	Calculated

Huntersknoll Court
36" Storm Sewer Upgrade - 5-yr

Hunters Knoll Storm Sewer Calculations 36" Syr Event																									
From	To	Drainage Area	CN	Time to Run-Off	Peak Combined Area	Weighted CN	Pipe Diameter	US Invert	US Rim	US Slope	DS Invert	DS Rim	DS Slope	n	Ent.	Exit	Max Travel Time	Peak Flow	Design Flow	Max Flow / Ratio	Total Time	Reported Condition			
US	DS	(Acres)	(CFS)	(Min)	(Inches)	(Inches)	(ft)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)		Losses	Losses	Flow Time	Flow	Design Flow	Capacity (cfs)	(min)	(min)			
STR34	STR35	0.51 83.00	10.00	1.32	0.51	83.00	12	783.16	784.48	783.44	1.04	49	7.20	779.63	780.93	779.84	1.09	0.015	0.25	7.49	0.11	1.31	8.28	0.16	
STR35	STR36	0.19 83.00	10.00	0.49	0.70	83.00	12	779.43	780.93	779.84	1.09	1.12	3.00	776.08	777.76	774.31	3.45	0.015	0.25	0.25	6.02	0.11	1.79	5.35	0.34
STR36	STR38	0.26 83.00	10.00	0.68	45.71	80.90	36	768.03	777.76	774.31	3.45	60	2.13	765.75			0.013	0.25	0.25	9.98	0.10	70.51	97.42	0.72	
STR38	STR39	1.91 81.00	10.00	0.34	47.62	80.91	36	768.75	780.00	772.97	7.03	99	1.53	785.23	774.15	771.18	2.87	0.013	0.25	0.25	10.00	0.17	70.67	82.51	0.86
Basin Inflow																									
STR39	STR40	1.34 81.00	12.00	3.04	48.96	80.91	36	771.15	774.15	771.16	2.97	105	0.90	770.21	773.67	768.42	4.25	0.035	0.50	0.50	1.89	0.92	44.60	289.41	0.15
STR40	STR41	0.00 0.00	0.00	0.00	48.96	80.91	36	764.18	773.67	769.42	4.25	115	1.00	763.03	771.87	767.74	4.13	0.013	0.25	0.25	10.18	0.19	71.99	65.69	1.08
STR41	STR15	0.90 82.00	10.00	2.81	49.86	80.93	36	763.03	771.87	767.74	4.13	139	1.33	761.18	774.00	765.93	8.07	0.013	0.25	0.25	10.24	0.23	72.37	76.66	0.94
STR15	STR16	1.77 82.00	17.00	4.21	71.96	80.81	42	761.18	774.00	765.93	8.07	272	1.33	757.57	768.11	761.34	6.77	0.015	0.25	0.25	10.61	0.43	102.08	100.52	1.02
STR16	STR16	1.55 81.00	12.00	3.52	1.55	81.00	12	761.25	767.76	761.92	5.84	20	3.32	760.57	768.11	761.34	6.77	0.015	0.25	0.25	6.80	0.05	3.48	5.63	0.62
STR16	STR16	0.96 82.00	12.00	2.99	0.96	82.00	12	761.57	767.65	762.09	5.56	27	3.72	760.57	768.11	761.34	6.77	0.016	0.25	0.25	6.80	0.07	2.63	5.96	0.44
Church Basin																									
STR24	STR24	8.60 65.23	18.00	26.94	8.60	85.23	27	777.37	784.00	781.98	2.01														
Overland Outflow																									
STR24	STR23	0.00 0.00	0.00	0.00	8.60	85.23	18	781.78	774.23	7.55	40	5.38	771.33	777.79	772.06	5.73	0.016	0.25	0.25	9.63	0.07	8.22	21.12	0.39	
STR23	STR22	0.00 0.00	0.00	0.00	8.60	85.23	18	771.33	777.79	772.06	5.73	63	4.88	768.27	773.57	768.94	4.63	0.016	0.25	0.25	10.18	0.10	8.22	20.12	0.41
STR22	STR21	2.80 78.00	12.00	5.31	11.40	63.45	21	768.07	773.57	768.94	4.63	46	5.11	765.71	771.21	768.46	4.75	0.016	0.25	0.25	11.09	0.07	12.13	31.03	0.59
STR21	STR16	0.00 0.00	0.00	0.00	11.40	83.45	21	765.71	771.21	768.46	4.75	153	5.31	757.57	768.11	761.34	6.77	0.015	0.25	0.25	6.58	0.39	12.12	31.64	0.38
STR16	STR19	0.00 0.00	0.00	0.00	85.87	81.18	48	757.57	768.11	761.34	6.77	135	1.14	756.03	770.24	755.45	10.79	0.015	0.25	0.25	10.01	0.22	116.90	132.95	0.68
STR26	STR25	1.23 80.00	14.00	2.67	1.23	80.00	12	765.34	768.49	766.04	3.45	19	1.49	765.05	769.81	766.60	9.01	0.015	0.25	0.25	4.79	0.07	2.63	3.77	0.70
STR25	STR25	0.30 90.00	12.00	1.00	0.30	90.00	12	763.75	769.45	764.15	5.30	6	1.57	763.68	769.61	766.60	9.01	0.015	0.25	0.25	3.67	0.03	0.98	3.67	0.25
STR30	STR29	2.69 80.00	12.00	5.59	2.69	80.00	12	774.72	776.72	775.44	1.28	210	4.66	764.93	771.95	766.51	6.44	0.015	0.25	0.25	9.85	0.36	5.34	6.68	0.80
STR29	STR25	0.00 0.00	0.00	0.00	2.69	80.00	15	764.93	771.95	765.51	6.44	157	4.67	757.82	769.61	766.60	9.01	0.015	0.25	0.25	5.78	0.45	5.33	12.09	0.44
STR25	STR19	0.00 0.00	0.00	0.00	4.22	80.71	15	757.62	768.61	760.60	9.01	34	4.66	756.03	770.24	755.45	10.79	0.015	0.25	0.25	7.08	0.03	8.69	12.09	0.72
STR19	Structure20	0.00 0.00	0.00	0.00	90.09	81.16	48	756.03	770.24	759.45	10.79	214	1.25	753.35			0.015	0.25	0.25	11.64	0.31	125.04	139.42	0.90	

Huntersknoll Court
36" Storm Sewer Upgrade - 10-yr

Huntersknoll Storm Sewer Calculations 10yr Event - 36in																								
From	To	Drainage Area	CN	Time to Run-Off	Peak Combined Area	Weighted Area	Pipe CN	US Invert	US Depth	US Length	Slope	DS Invert	DS Depth	DS Losses	n	Ent. Flow	Max Travel Time	Peak Flow	Design Flow	Max Flow / Design Flow	Total Time	Reported Condition		
US	DS	(MIn)	(CFS)	(Acres)	(Acres)	(Inches)	(ft)	(ft)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	Elev	Freeboard	Elev	Rim	HGL	Flow	Flow	Flow	Time	
STR1	STR2	6.76	80.00	17.00	16.34	6.76	80.00	30	784.14	786.64	786.61	2.03	10	1.03	784.04	2.38	0.015	0.25	3.36	0.05	16.20	36.15		
STR2	STR3	3.33	83.00	12.00	10.99	10.79	90.99	30	784.04	786.90	786.52	2.38	74	0.50	783.67	786.50	1.63	0.015	0.25	5.18	0.24	24.88	25.98	
STR3	STR4	1.56	80.00	12.00	4.30	11.67	60.86	30	783.67	787.60	785.97	1.63	110	0.50	783.12	789.32	784.76	4.56	0.015	0.25	7.03	0.26	28.82	25.17
STR4	STR5	0.22	84.00	10.00	0.94	11.89	81.10	30	783.12	789.32	784.76	4.56	75	2.06	781.57	784.41	783.35	1.06	0.015	0.25	8.28	0.15	29.65	51.08
STR5	STR6	0.99	85.00	10.00	0.30	11.98	81.13	30	781.57	784.41	783.35	1.06	29	1.35	781.18	784.88	782.35	2.53	0.015	0.25	9.83	0.05	29.92	41.29
STR6	STR7	0.12	85.00	10.00	0.41	12.10	81.17	30	781.18	784.88	782.35	2.53	37	1.37	778.48	781.58	779.87	1.71	0.015	0.25	12.08	0.05	30.29	96.19
STR7	STR8	1.35	81.00	12.00	3.81	61.00	81.45	18	781.27	785.68	783.41	2.27	112	-0.84	782.21	784.86	782.63	2.23	0.015	0.25	3.18	0.59	3.78	8.44
STR8	STR9	0.17	85.00	10.00	0.59	1.52	81.45	18	782.21	784.86	782.63	2.23	46	8.09	778.48	781.58	779.87	1.71	0.015	0.25	4.04	0.19	4.35	25.89
STR9	STR10	1.79	81.00	12.00	5.05	15.41	81.18	30	778.48	781.58	779.87	1.71	303	3.50	787.88	777.52	772.19	5.33	0.015	0.25	11.91	0.42	39.24	66.31
STR10	STR11	0.66	83.00	10.00	2.08	0.66	83.00	12	773.62	777.62	774.13	3.49	14	3.03	773.20	777.52	772.19	5.33	0.015	0.25	5.73	0.04	2.07	5.37
STR11	STR12	0.08	94.00	10.00	0.36	0.08	94.00	12	773.75	777.58	773.94	3.62	21	2.60	773.20	777.52	772.19	5.33	0.015	0.25	3.53	0.10	0.35	4.98
STR12	STR13	0.00	77.00	17.00	0.00	16.15	81.31	30	767.88	777.52	772.19	5.33	82	3.51	765.01	775.64	770.75	4.69	0.015	0.25	10.72	0.13	38.90	66.39
STR13	STR14	4.18	77.00	17.00	6.92	4.18	77.00	18	771.00	776.80	772.12	4.68	154	3.90	755.01	775.64	770.75	4.89	0.015	0.25	5.57	0.46	8.64	17.97
STR14	STR15	0.00	0.00	0.00	0.00	20.33	80.43	30	765.01	775.64	770.75	4.89	101	3.79	761.18	774.00	768.27	5.73	0.015	0.25	9.87	0.17	47.48	69.21
TrunkWd/Basin																								
STR50	Basin Inflow	12.50	80.00	20.00	28.10	12.50	80.00	787.50	792.00	790.18	1.82	787.50	789.50	786.01	0.49	787.50	789.50	786.01	0.49	0.0	27.97			
STR50	Overland Outflow	0.00	0.00	0.00	0.00	12.50	47.89	34.62	790.50	789.50	786.01	0.49	162	2.00	783.00	787.50	787.73	-0.23	0.015	0.25	9.30	0.29	24.65	37.95
STR51	STR52	22.12	82.00	25.00	47.89	2.12	80.00	27	786.24	789.50	786.01	-0.23	24	1.02	780.33	787.50	786.83	0.67	0.015	0.25	9.40	0.04	66.42	51.46
STR52	STR53	1.53	79.00	12.00	3.99	36.15	61.18	36	780.33	787.50	786.83	0.67	14	1.79	780.08	786.00	786.93	2.07	0.015	0.25	11.07	0.02	68.46	77.33
STR53	Overland Outflow	0.00	0.00	0.00	0.00	36.15	61.18	36	787.50	788.00	785.93	2.07	325	2.85	770.82	779.51	780.76	-1.25	0.015	0.25	9.84	0.55	68.45	97.54
STR53	YardDain	7.59	79.00	18.00	43.74	80.80	36	770.62	779.51	780.76	-1.25	178	1.28	788.53	777.76	777.68	0.08	0.013	0.25	11.26	0.26	79.58	75.57	
STR53	Overland Outflow	0.81	63.00	10.00	2.57	0.81	63.00	12	778.05	779.60	778.57	1.03	35	3.18	776.93	778.53	778.22	0.31	0.015	0.25	4.93	0.12	2.55	5.51
STR32	STR33	0.08	65.00	10.00	0.28	0.89	83.18	12	776.93	778.53	778.22	0.31	23	1.67	776.55	777.95	777.99	-0.04	0.015	0.25	4.69	0.08	2.81	3.99
STR32	STR33	0.12	63.00	10.00	0.38	1.01	83.16	12	776.55	777.95	777.99	-0.04	32	2.15	775.86	777.76	777.68	0.08	0.015	0.25	5.81	0.03	3.18	4.53

Huntersknoll Court
36" Storm Sewer Upgrade - 10-yr

Hunters Knoll Storm Sewer Calculations 10yr Event - 36in																										
From	To	Drainage Area	CN	Time to Run-Off	Peak Combined Area	Weighted Area	Pipe	US	US	US	US Length	Slope	DS	DS	DS	n	Ent. Losses	Exit Losses	Max Travel Time	Peak Flow	Design Flow	Max Flow / Ratio	Reported Condition			
US	DS	(Acres)	(Min)	(CFS)	(Acres)	(Acres)	CN	Diameter	Invert	Rim	HGL	HGL	Invert	Rim	HGL	n	(ft)	(ft)	(ft)	(ft)	(ft)	(ftsec)	(min)			
STR34	STR35	0.51	83.00	10.00	1.62	0.51	83.00	12	783.16	784.48	783.47	1.01	49	7.20	779.63	780.93	779.89	1.04	0.015	0.25	7.91	0.10	1.61	8.28	0.19	
STR35	STR36	0.19	83.00	10.00	0.61	0.70	83.00	12	779.43	780.93	779.89	1.04	112	3.00	776.06	777.76	777.58	0.08	0.015	0.25	6.34	0.30	2.20	5.35	0.41	
STR36	STR38	0.26	83.00	10.00	0.83	45.71	80.90	36	788.03	777.76	777.68	0.08	60	2.13	786.75				0.013	0.25	11.55	0.03	81.65	97.42	0.84	
STR38	STR39	1.91	81.00	12.00	5.38	47.62	80.91	36	768.75	780.00	775.98	4.01	99	1.53	785.23	774.15	773.85	0.30	0.013	0.25	11.26	0.15	79.58	82.51	0.96	
Basin Inflow																										
Overland Outflow																										
STR39	STR40	1.34	81.00	12.00	3.77	48.96	80.91	36	771.15	774.15	773.85	0.30	105	0.90	770.21	773.67	771.91	1.76	0.013	0.50	1.89	0.50	44.80	289.41	0.00	
STR40	STR41	0.00	0.00	0.00	0.00	48.96	80.91	36	764.16	773.67	771.91	1.76	115	1.00	763.03	771.87	770.13	1.74	0.013	0.25	11.44	0.17	80.89	66.69	0.21	
STR41	STR15	0.90	82.00	10.00	3.45	49.86	80.93	36	783.03	771.87	770.13	1.74	139	1.33	761.18	774.00	768.27	5.73	0.013	0.25	11.49	0.20	81.25	76.86	1.06	
STR15	STR16	1.77	82.00	12.00	5.19	71.96	80.81	42	761.16	774.00	768.27	5.73	222	1.33	757.57	768.11	762.75	5.36	0.015	0.25	11.85	0.39	112.13	100.52	0.15	
STR16	STR17	1.55	81.00	12.00	4.37	82.00	81.00	12	761.25	767.76	763.19	4.57	20	3.32	760.57	768.11	762.75	5.36	0.015	0.25	6.87	0.05	4.31	5.63	0.77	
STR17	STR18	0.56	82.00	10.00	3.67	0.96	82.00	12	761.57	767.65	762.97	4.68	27	3.72	760.57	768.11	762.75	5.36	0.015	0.25	7.14	0.06	3.29	5.96	0.35	
Church Basin																										
Basin Inflow																										
STR24	STR25	8.60	85.23	18.00	25.22	8.60	85.23	18	782.34	773.50	781.74	774.37	7.41	40	5.38	771.33	777.79	772.35	5.44	0.015	0.25	9.99	0.07	10.83	21.12	0.51
STR25	STR22	0.00	0.00	0.00	0.00	8.60	85.23	18	771.33	777.79	772.35	5.44	63	4.88	768.27	773.57	768.13	4.44	0.015	0.25	11.28	0.09	13.49	20.12	0.67	
STR22	STR21	2.80	78.00	14.00	6.72	11.40	83.45	21	788.07	773.57	789.13	4.44	46	5.11	765.71	771.21	768.73	4.48	0.015	0.25	11.27	0.07	16.54	31.03	0.53	
STR21	STR16	0.00	0.00	0.00	0.00	11.40	83.45	21	785.11	771.21	786.73	4.48	153	5.31	757.57	768.11	762.75	5.36	0.015	0.25	9.21	0.31	16.85	31.64	0.87	
STR16	STR19	0.00	0.00	0.00	0.00	85.87	81.18	48	757.57	768.11	782.75	5.36	135	1.14	756.03	770.24	760.46	9.78	0.015	0.25	10.31	0.22	129.51	132.95	10.00	
STR19	STR26	1.23	80.00	12.00	3.34	80.00	12	765.34	769.49	766.18	3.31	19	1.49	765.05	769.61	762.16	7.45	0.015	0.25	4.98	0.07	3.28	3.77	0.67		
STR26	STR28	0.30	90.00	10.00	1.18	0.30	90.00	12	763.75	769.45	764.19	5.26	6	1.57	763.66	769.61	762.16	7.45	0.015	0.25	3.83	0.02	1.16	3.87	0.30	
STR28	STR30	2.69	80.00	14.00	6.98	2.68	80.00	12	774.72	776.72	775.64	1.08	210	4.66	764.93	771.95	765.72	6.23	0.015	0.25	9.97	0.35	6.71	6.66	> CAPACITY	
STR30	STR29	0.00	0.00	0.00	0.00	2.68	80.00	15	764.93	771.95	765.72	6.23	157	4.67	757.62	769.61	762.16	7.45	0.015	0.25	6.28	0.42	6.65	12.09	0.35	
STR29	STR25	0.00	0.00	0.00	0.00	4.22	80.71	15	757.62	769.61	782.16	7.45	34	4.68	766.03	770.24	760.46	9.78	0.015	0.25	8.59	0.07	10.54	12.09	0.87	
STR25	STR19	0.00	0.00	0.00	0.00	90.09	81.16	48	756.03	770.24	760.46	9.78	214	1.25	753.35			0.015	0.25	0.25	11.70	0.30	139.34	138.42	1.00	
STR19	Structure20																						Calculated SURCHARGED			

Huntersknoll Court
42" Storm Sewer Upgrade - 5-yr

Hunters Knoll 42" SI90™ Sewer Calculations Svr Event

Huntersknoll Court
42" Storm Sewer Upgrade - 5-yr

Hunters Knoll 42" Storm Sewer Calculations by Event

From US	To DS Area	CN	Time to Run-Off	Peak Combined Area	Weighted CN	Pipe Diameter	US Invert	US Rim	US HGL	US Length	Slope	DS Invert	DS Rim	DS HGL	n	Ent	Exit Losses	Flow Losses	Flow Time	Max Flow / Design Flow	Total Time	Reported Condition		
(Acres)	(Min)	(CFS)	(Acres)	(Inches)	(Inches)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/sec)	(cfs)	(min)	(min)		
STR34	STR40	0.51	83.00	10.00	1.32	0.51	83.00	12	783.16	784.48	783.44	1.04	49	7.20	779.63	780.93	779.84	1.09	0.015	0.25	7.48	0.11	3.28	0.16
STR35	STR41	0.19	83.00	10.00	0.49	0.70	83.00	12	779.43	780.93	779.84	1.09	112	3.00	776.06	777.76	775.55	5.21	0.015	0.25	6.02	0.11	1.79	0.34
STR36	STR42	0.26	83.00	10.00	0.68	45.71	80.90	42	767.65	777.76	772.55	5.21	143	1.00	786.22	773.92	771.44	2.48	0.013	0.25	8.16	0.29	74.12	99.63
STR38	STR44	0.00	0.00	0.00	0.00	45.71	80.90	42	768.22	773.92	771.44	2.48	99	1.00	785.23	774.15	770.51	3.64	0.013	0.25	8.16	0.20	76.14	101.86
STR39	STR45	0.00	0.00	0.00	0.00	45.71	80.90	42	771.76	774.34	772.12	2.22											15.00 SURCHARGED	
Basin Inflow																								
STR39	STR40	1.34	81.00	12.00	3.04	48.95	80.91	42	771.15	774.15	770.51	3.64	105	0.90	770.21	773.87	769.54	4.13	0.035	0.50	0.50	0.50	0.00	0.00
STR40	STR41	0.00	0.00	0.00	0.00	48.95	80.91	42	764.18	772.67	769.54	4.13	115	1.00	763.03	771.87	768.53	3.34	0.013	0.25	8.68	0.22	78.72	100.80
STR41	STR41	0.90	82.00	10.00	2.61	49.86	80.93	42	763.03	771.87	768.53	3.34	139	1.33	761.18	774.00	767.21	6.79	0.015	0.25	8.45	0.27	79.86	100.48
STR15	STR16	1.77	82.00	17.00	4.21	71.95	80.81	42	761.18	774.00	767.21	6.79	272	1.33	757.57	768.11	761.86	6.25	0.015	0.25	0.25	0.25	0.00	0.00
STR16	STR16	1.55	81.00	12.00	3.52	1.55	81.00	12	761.25	767.76	762.10	5.66	20	3.32	760.57	768.11	761.86	6.25	0.015	0.25	6.79	0.05	5.49	5.83
STR16	STR16	0.96	62.00	12.00	2.99	0.96	62.00	12	761.57	767.65	762.09	5.56	27	3.72	760.57	768.11	761.86	6.25	0.015	0.25	6.80	0.07	2.63	5.86
Church Basin																								
STR24	STR24	8.60	85.23	18.00	20.94	8.60	85.23	777.37	782.34	781.98	0.36				781.78	774.23	7.55				20.13			
Overland Outflow																								
STR24	STR23	0.00	0.00	0.00	0.00	8.60	85.23	18	773.50	781.78	774.23	7.55	40	5.38	771.33	777.78	772.06	5.73	0.015	0.25	0.25	0.25	0.00	0.00
STR23	STR22	0.00	0.00	0.00	0.00	8.60	85.23	18	771.33	777.78	772.06	5.73	63	4.88	768.27	773.57	768.94	4.63	0.015	0.25	10.18	0.10	8.22	21.12
STR22	STR21	2.80	78.00	12.00	5.31	11.40	83.45	21	768.07	773.57	768.94	4.63	46	5.11	785.71	771.21	768.50	4.71	0.015	0.25	11.00	0.07	12.13	31.03
STR21	STR19	0.00	0.00	0.00	0.00	11.40	83.45	21	765.71	771.21	768.50	4.71	153	5.31	757.57	768.11	761.86	6.25	0.015	0.25	6.50	0.39	12.12	31.84
STR19	STR16	0.00	0.00	0.00	0.00	65.87	81.18	48	757.57	768.11	761.86	6.25	135	1.14	756.03	770.24	755.75	10.49	0.015	0.25	10.89	0.22	125.34	132.95
STR26	STR25	1.23	80.00	14.00	2.67	1.23	80.00	12	765.34	769.49	766.04	3.45	19	1.49	785.05	769.61	760.86	8.75	0.015	0.25	4.79	0.07	2.63	3.77
STR25	STR25	0.30	90.00	12.00	1.00	0.30	90.00	12	763.75	768.45	764.15	5.30	6	1.57	763.68	789.61	760.86	8.75	0.015	0.25	3.67	0.03	0.98	3.87
STR29	STR29	2.69	80.00	12.00	5.59	2.69	80.00	12	774.72	776.72	775.44	1.28	210	4.66	784.93	771.95	765.51	6.44	0.015	0.25	9.84	0.36	5.34	6.66
STR29	STR25	0.00	0.00	0.00	0.00	2.69	80.00	15	784.93	771.95	765.51	6.44	157	4.67	757.62	789.61	760.86	8.75	0.015	0.25	5.78	0.45	5.31	6.44
STR25	STR19	0.00	0.00	0.00	0.00	4.22	80.71	15	757.62	788.61	760.86	8.75	34	4.66	756.03	770.24	755.75	10.49	0.015	0.25	6.98	0.08	8.56	12.69
STR19	Structure20	0.00	0.00	0.00	0.00	90.09	81.16	48	756.03	770.24	759.75	10.49	214	1.25	753.35			0.015	0.25	11.68	0.30	133.44	139.42	

Huntersknoll Court
42" Storm Sewer Upgrade - 10-yr

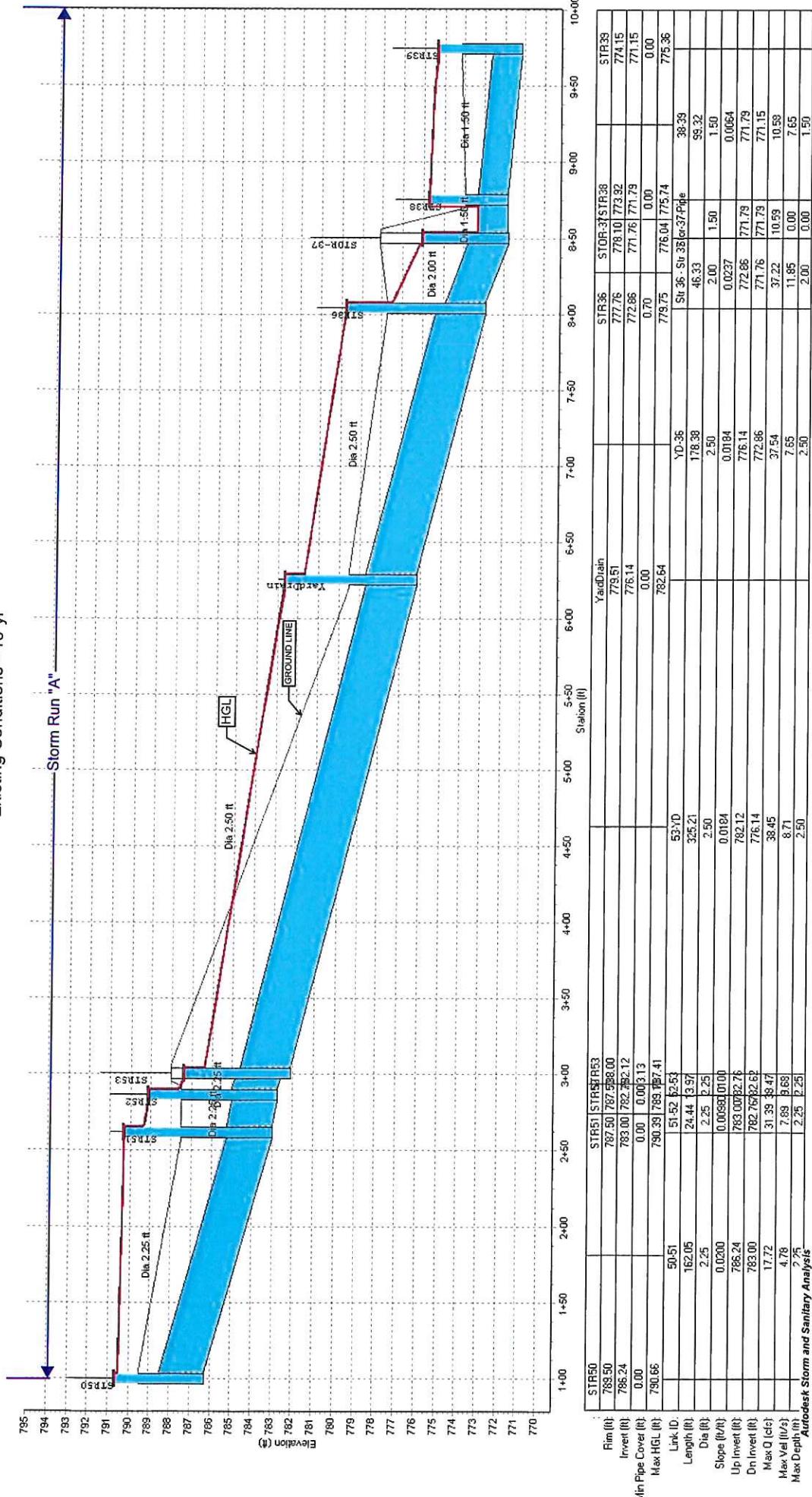
Huntersknoll Court
42" Storm Sewer Upgrade - 10-yr

Hunters Knoll 42" Storm Sewer Calculations 10yr Event

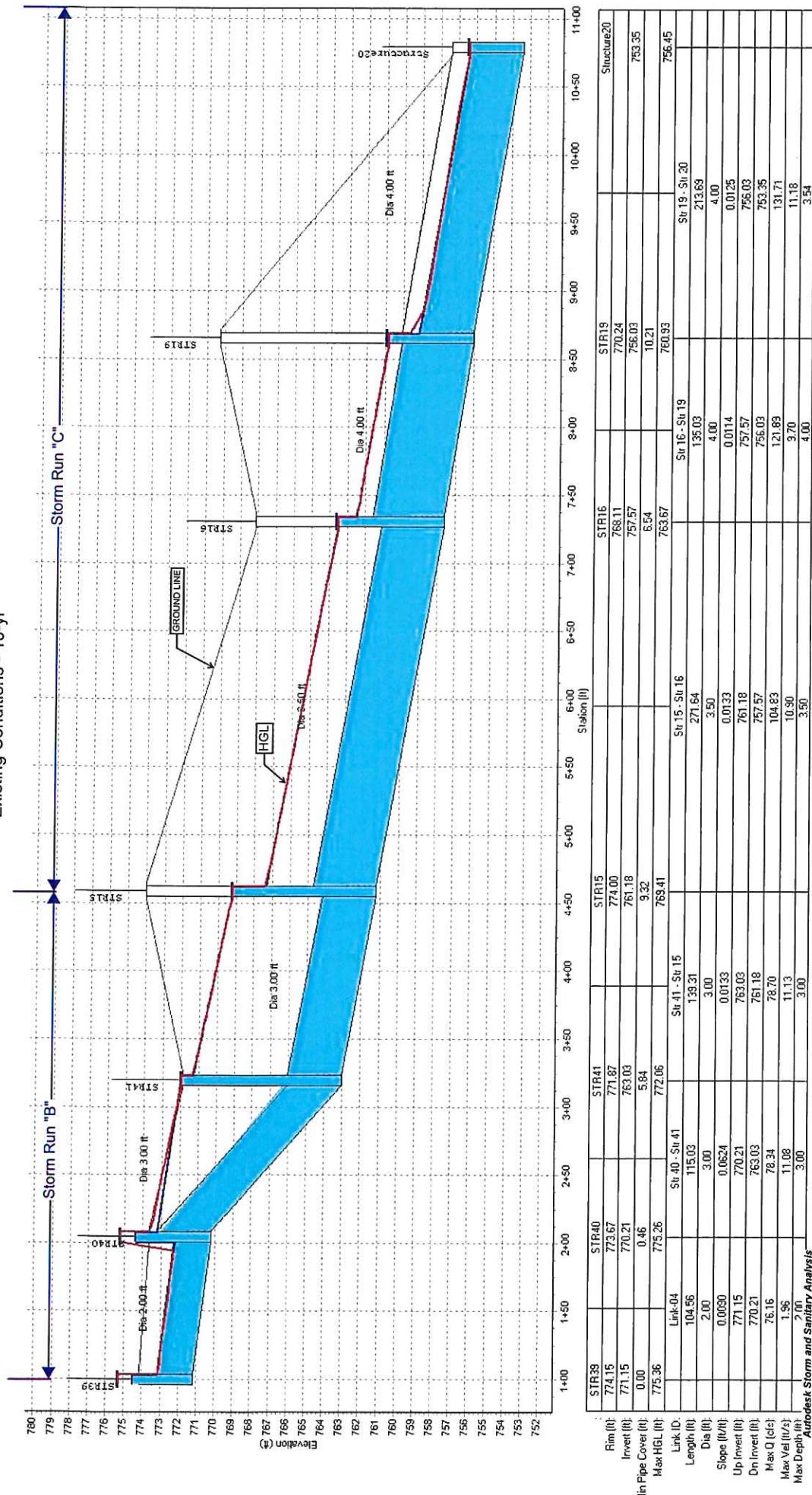
From US	To DS	Drainage Area	CN	Time to Run-Off Inlet	Peak Computed Area (Acres)	Weighted Area (CFS)	Pipe Diameter (inches)	US Invert (ft)	US Elev (ft)	US Freeboard (ft)	US Length (ft)	Slope (%)	DS Invert (ft)	DS Elev (ft)	DS HGL (ft)	n	Exit Losses	Max Travel Time (min)	Design Flow (cfs)	Max Flow / Design Flow Ratio	Total Time Surcharged (min)	Reported Condition				
STR34	STR35	0.51 83.00	10.00	1.62	0.51	83.00	12	783.16	784.48	783.47	1,01	49	720	779.63	780.93	778.89	1.04	0.015	0.25	7.91	0.10	1.61	8.28	0.19	Calculated	
STR35	STR36	0.19 83.00	10.00	0.61	0.70	83.00	12	779.43	780.93	779.89	1.04	112	3.00	776.06	777.76	776.42	1.34	0.015	0.25	6.34	0.30	2.20	5.15	0.41	Calculated	
STR36	STR37	0.26 83.00	10.00	0.83	45.71	80.90	42	767.65	777.76	776.42	1.34	143	1.00	786.22	773.92	774.89	-0.97	0.013	0.25	8.62	0.28	32.90	99.53	0.63	26.00 SURCHARGED	
STR37	STR39	0.00 80.00	0.00	0.00	45.71	80.90	42	768.22	773.92	774.89	-0.97	99	1.00	785.23	774.15	774.11	0.04	0.013	0.25	9.25	0.18	89.01	101.96	0.87	27.00 SURCHARGED	
Basin Inflow																										
STR39	STR40	1.34 81.00	12.00	3.77	48.96	80.91	42	771.15	774.15	774.11	0.04	105	0.90	770.21	773.67	772.88	0.69	0.035	0.50	0.50	1.89	0.92	24.60	289.41	0.15	Calculated
STR40	STR41	0.00 80.00	0.00	0.00	48.96	80.91	42	764.18	773.67	772.98	0.69	115	1.00	783.03	771.87	771.79	0.08	0.013	0.25	9.42	0.20	90.59	100.50	0.90	27.00 SURCHARGED	
STR41	STR15	0.90 82.00	10.00	3.45	49.86	80.93	42	763.03	771.87	771.79	0.08	139	1.33	761.18	774.00	772.24	3.76	0.015	0.25	9.46	0.25	90.97	100.48	0.91	27.00 SURCHARGED	
STR15	STR16	1.77 82.00	12.00	5.19	71.96	80.81	42	761.18	774.00	770.24	3.76	272	1.33	757.57	768.11	763.68	4.43	0.015	0.25	0.25	12.89	0.36	122.08	100.52	1.21	27.00 SURCHARGED
STR16	STR17	1.55 81.00	12.00	4.37	1.55	81.00	12	761.25	767.76	764.07	3.69	20	3.32	760.57	768.11	763.68	4.43	0.015	0.25	6.85	0.05	4.33	5.63	0.77	18.00 SURCHARGED	
STR17	STR18	0.96 82.00	10.00	3.67	0.96	82.00	12	761.57	767.65	764.07	3.58	27	3.72	760.57	768.11	763.68	4.43	0.015	0.25	7.14	0.06	3.29	5.96	0.55	16.00 SURCHARGED	
ChurchBasin																										
Basin Inflow																										
STR24	STR23	0.00 0.00	0.00	0.00	6.60	65.23	18	773.50	781.78	774.37	7.41	40	5.38	771.33	777.79	772.25	5.44	0.015	0.25	0.25	9.99	0.07	10.83	21.12	0.51	0.00 Calculated
STR23	STR22	0.00 0.00	0.00	0.00	8.60	85.23	18	771.33	777.79	772.35	5.44	63	4.88	768.27	773.57	769.13	4.44	0.015	0.25	0.25	11.28	0.09	13.50	20.12	0.67	Calculated
STR22	STR21	2.80 78.00	14.00	6.72	11.40	63.45	21	768.01	773.57	769.13	4.44	46	5.11	765.71	771.21	768.86	4.35	0.015	0.25	0.25	11.08	0.07	16.54	31.93	0.53	Calculated
STR21	STR16	0.00 0.00	0.00	0.00	11.40	63.45	21	765.71	771.21	766.86	4.35	153	5.31	757.57	768.11	762.98	4.43	0.015	0.25	0.25	7.85	0.33	16.64	31.84	0.53	0.00 Calculated
STR16	STR19	0.00 0.00	0.00	0.00	65.07	81.18	48	757.57	768.11	763.68	4.43	135	1.14	756.03	770.24	761.06	9.18	0.015	0.25	0.25	11.08	0.20	139.19	132.95	1.05	17.00 SURCHARGED
STR19	STR25	1.23 80.00	12.00	3.34	1.23	80.00	12	765.34	769.49	766.18	3.31	19	1.49	765.05	769.61	762.73	6.88	0.015	0.25	0.25	4.98	0.07	3.28	3.77	0.87	0.00 Calculated
STR25	STR28	0.30 90.00	10.00	1.18	0.30	90.00	12	763.75	768.45	764.19	5.26	6	1.57	763.66	769.61	762.73	6.88	0.015	0.25	0.25	3.83	0.02	1.16	3.87	0.30	0.00 Calculated
STR28	STR30	2.68 80.00	14.00	6.98	2.69	80.00	12	774.72	776.72	775.63	1.9	210	4.66	764.93	771.95	765.77	6.18	0.015	0.25	0.25	9.98	0.35	6.74	6.86	1.01	> CAPACITY
STR30	STR25	0.00 0.00	0.00	0.00	2.68	80.00	15	764.93	771.95	765.77	6.18	157	4.67	757.62	769.61	762.73	6.88	0.015	0.25	0.25	6.10	0.43	6.64	12.09	0.55	Calculated
STR25	STR19	0.00 0.00	0.00	0.00	4.22	80.71	15	757.62	768.61	762.73	6.88	34	4.66	756.03	770.24	761.06	9.18	0.015	0.25	0.25	8.58	0.07	10.53	12.98	0.87	35.00 SURCHARGED
STR19	Structure20	0.00 0.00	0.00	0.00	90.09	81.16	48	756.03	770.24	761.06	9.18	214	1.25	753.35			0.015	0.25	12.06	0.30	148.49	139.12	1.07	0.00 > CAPACITY		

Appendix F
Hydraulic Grade Line (HGL)
Results

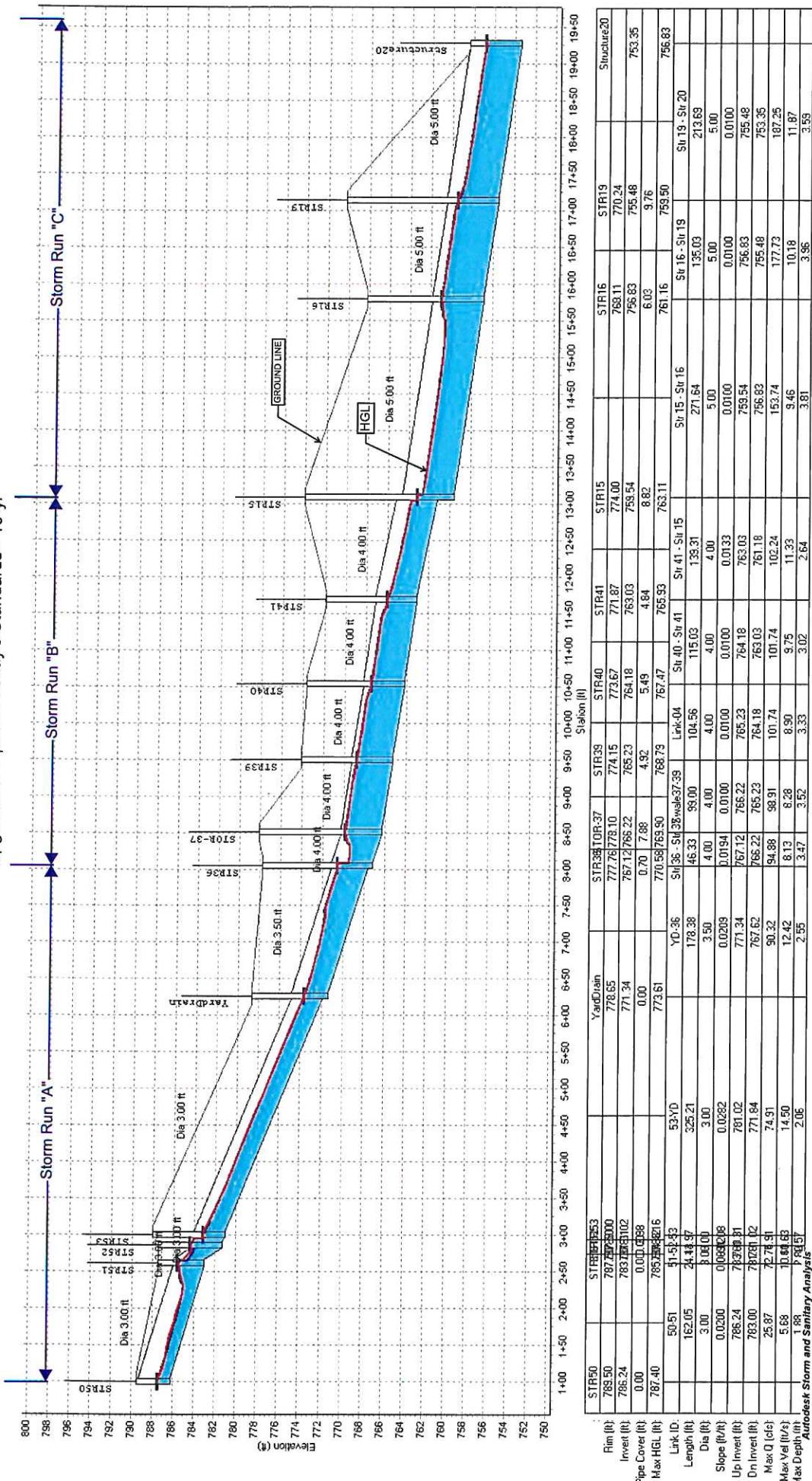
Huntersknoll Court
Existing Conditions - 10-yr



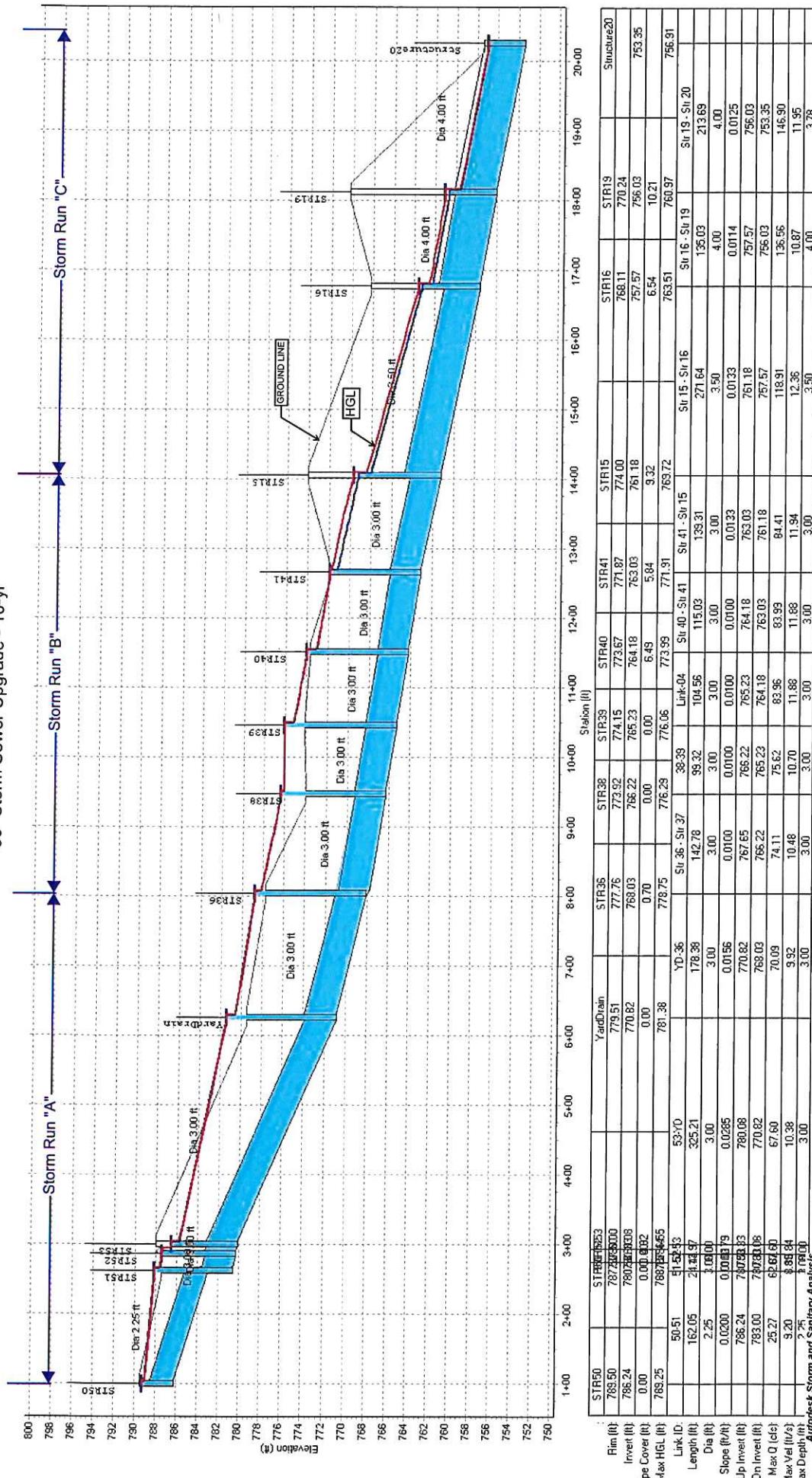
Huntersknoll Court
Existing Conditions - 10-yr



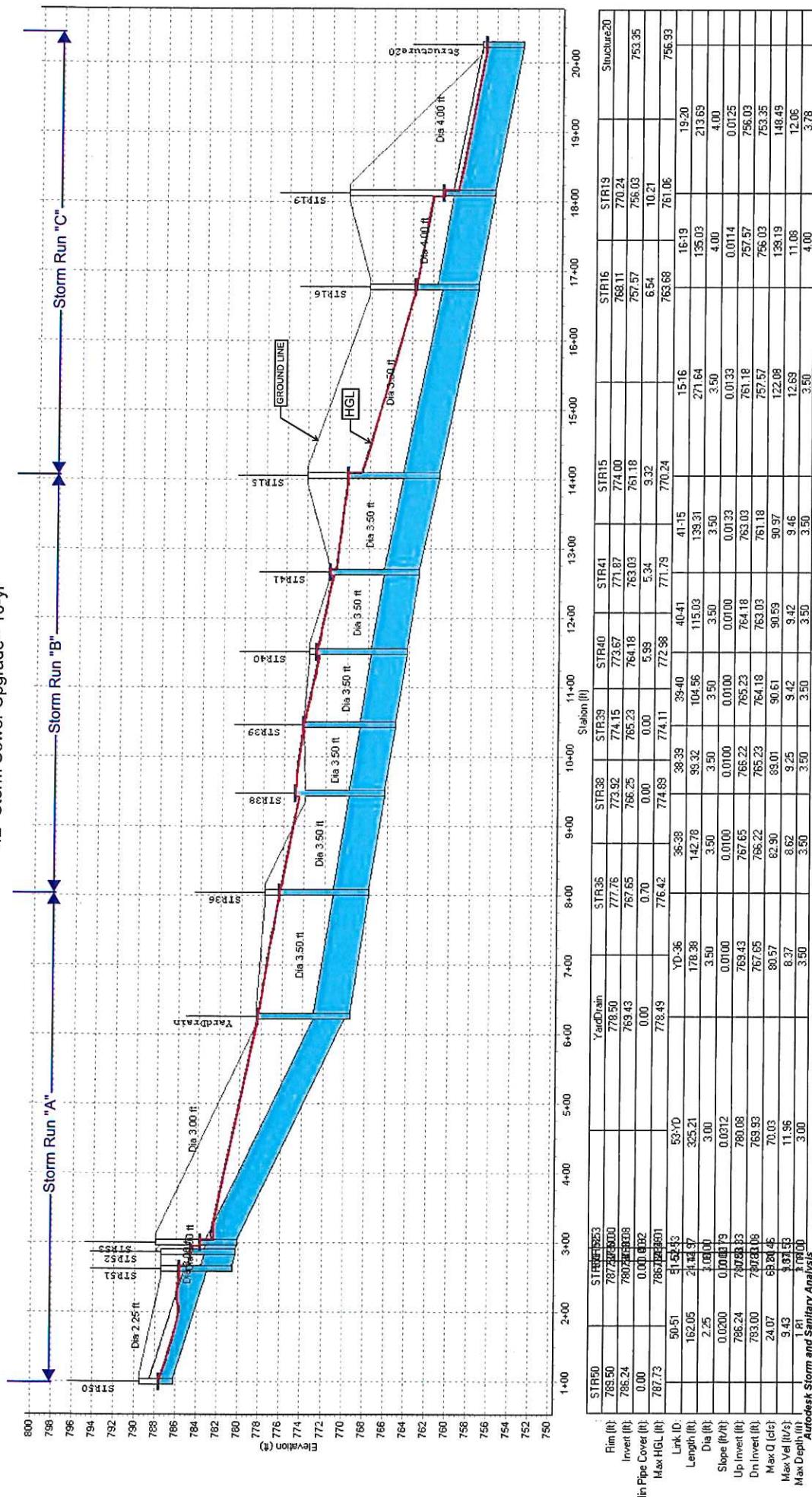
Huntersknoll Court Upgrade All Pipes to Today's Standards - 10-yr



Huntersknoll Court 36" Storm Sewer Upgrade - 10-yr



**Huntersknoll Court
42" Storm Sewer Upgrade - 10-yr**



These minutes are a draft of the proposed minutes from the Public Works Committee of City Council meeting. They do not represent the official record of proceedings until formally adopted by the Public Works Committee of City Council. Formal adoption is noted by signature of the Chair within the minutes.

City of Montgomery
Public Works Committee Meeting
December 14, 2020

Staff Present

Brian Riblet, City Manager
Tracy Roblero, Asst. City Manager/Acting Comm. Dev. Dir.
Gary Heitkamp, Public Works Director
Connie Gaylor, Clerk of Council

Council Committee Members Present

Mike Cappel, Chair - Teleconference
Craig Margolis
Lynda Roesch - Teleconference

The Public Works Committee of Council convened its meeting for December 14, 2020 at 4:30 p.m. in person and by telephone conference with Mr. Cappel presiding. This remote access meeting was allowed by emergency legislation adopted last week by the Ohio General Assembly and approved by the Governor. The emergency legislation added language to RC Section 121.22 allowing public meetings by telephone conference during the current pandemic and declared State of Emergency. As required by the statute, notice of the telephonic meeting was publicized more than 24 hours in advance to allow public access through the same conference call in service. The public was also given a backup number to call in the event there were technical difficulties. This Notice was posted on the City's website and a similar Notice was sent to The Cincinnati Enquirer.

Guests and Residents

Mr. Cappel asked if there were any guests or residents on the phone line. There was no response. There were no guests and residents present at City Hall.

Update of Pfeiffer/Deerfield Road Roundabout

Mr. Heitkamp updated the Committee on the progress of the Pfeiffer/Deerfield Road roundabout project. He explained that since the last update provided in July the biggest highlights include shifting the roadway from north to east towards the Church which mitigates the impact on the other three corners. He stated in order to make that fit it would mean purchasing the house owned by the Church on the corner.

Mr. Heitkamp explained that an Open House was held on October 22 at which 22 people attended. He stated that it went smoothly with a variety of feedback provided by the attendees.

Mr. Heitkamp provided the following highlights from the open house:

- Concerns regarding pedestrian safety were shared but attendees did acknowledge that the current situation was not good as vehicles often do not see pedestrians in the crosswalks. Mr. Heitkamp explained that splitter islands were added to the design to increase safety. He explained with these islands a pedestrian could only cross in one direction at a time making them more aware of traffic.
- Concerns regarding traffic from Deerfield Road being able to enter the roundabout due to heavy traffic from Pfeiffer Road. Mr. Heitkamp explained that Jeff Heimann with Strand provided an opinion on this concern stated that there would be gaps in the traffic due to turning movements on Pfeiffer Road.
- Concerns regarding traffic backing up to Montgomery Road, causing backup on Montgomery road turning onto Pfeiffer. Mr. Heitkamp stated that he felt like that would be a rare occurrence happening when there may be an accident on the interstate that causes traffic to divert to other routes.

These minutes are a draft of the proposed minutes from the Public Works Committee of City Council meeting. They do not represent the official record of proceedings until formally adopted by the Public Works Committee of City Council. Formal adoption is noted by signature of the Chair within the minutes.

Public Work Committee of City Council Minutes

December 14, 2020

Page 2

Mr. Heitkamp added that once the roundabout is constructed that he planned to look at traffic signal timings to tweak timing patterns.

- Concerns regarding the speed of traffic were shared. Mr. Heitkamp explained that the roadway was designed with curbing to intentionally slow down traffic. He stated that it was designed for a 15-mph speed limit.

Mr. Heitkamp explained that there was a potential to add LED Pedestrian activated signs like are seen by our parks and the school entrances. He explained that Strand Associates is finalizing a report compiling all the feedback from the Open House along with emails received and would be presenting that soon.

Mr. Heitkamp stated that a utility meeting was held on December 8 by Strand Associates that included representatives from Duke electric and gas and other where they discussed the impacts of the roundabout or any red flags that they may have identified.

Mr. Heitkamp explained that Stage II plans and the final right of way plans would be submitted to ODOT by January 11, 2021. He stated that he anticipates starting the right of way acquisitions by March of 2021 and completing that process by the end of 2021. He stated that because of the legal process of acquiring the property from the church that it would take most of the year to complete that. He added that he anticipates construction beginning in the spring or summer of 2022.

Mr. Margolis stated that he felt the splitter islands were very important to the safety of pedestrians. He asked how many driveways would have to be moved.

Mr. Heitkamp replied there would be three but that two of those are on one property that has a "u" shape driveway.

Mr. Margolis stated it didn't look like there was enough room to accommodate a "u" shape with the new design. He asked if there was push back from that property owner.

Mr. Heitkamp stated that there was not. He explained that he has been in constant contact with the property owners throughout the process and they have expressed satisfaction with the process and the design.

Ms. Roesch asked with the reallocation of the roadway but shifting it towards the church if all property owners were satisfied with that.

Mr. Heitkamp stated they were.

Proposed 2021 Street Resurfacing Program

Mr. Heitkamp discussed with the Committee the streets recommended to be included in the 2021 Street Resurfacing Program. Mr. Heitkamp explained that staff has completed field inspections, and begun field reconnaissance and utility coordination, of the streets listed above. A preliminary opinion of construction cost for the rehabilitation and resurfacing of the streets listed indicate that the 1.83 centerline miles of roadway can be completed for the \$900,000 budgeted in the Capital Improvement Program.

These minutes are a draft of the proposed minutes from the Public Works Committee of City Council meeting. They do not represent the official record of proceedings until formally adopted by the Public Works Committee of City Council. Formal adoption is noted by signature of the Chair within the minutes.

Public Work Committee of City Council Minutes

December 14, 2020

Page 3

Mr. Heitkamp stated, that if approved, the preparation of the construction plans, engineer's opinion of construction cost, and bid package will be completed by early January. This would allow the program to be publicly advertised as early as January 21, 2021, followed by a bid opening on February 4, 2021. Based on a satisfactory bid result, staff would make a recommendation to award the contract at the February 17, 2021 City Council Work Session. Construction would be anticipated to begin as early as April 2021.

Ms. Roesch asked if the contractors are busy in the spring.

Mr. Heitkamp replied that it is hard to predict because of 2020 projects that may overlap but he feels it is good to get the bids out early to get onto their schedules early in the year.

Mr. Margolis asked if the bid included fire hydrants.

Mr. Heitkamp stated that the fire hydrant replacement is budgeted in a separate line item but he works with the fire department to schedule the replacements while curbs and pavement are being replaced.

Mr. Margolis asked if we were still on a 16-to-18-year resurfacing schedule for the streets.

Mr. Heitkamp replied that we are for most streets. He stated that most of the streets included in the bid were last resurfaced in 2005.

Mr. Cappel asked for a motion to support the proposed street resurfacing program.

Mr. Margolis made a motion of support. Ms. Roesch seconded. The Committee unanimously agreed.

Minutes

Vice Mayor Margolis moved to approve the July 13, 2020 Public Works Committee minutes. Ms. Roesch seconded. The Committee unanimously approved the minutes.

Adjournment

Vice Mayor Margolis made a motion to move to adjourn. Ms. Roesch seconded. The Committee unanimously agreed. The meeting adjourned at 4:52 pm

Chair