

Sandra Drive Flood Mitigation Options

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Johnstown
Colorado





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The Problem



Terminology

Storm Frequencies:

Storm Precipitation (P)

5-year Minor Storm (P= 1.49 in.)

100-year Major Storm (P = 2.56 in.)

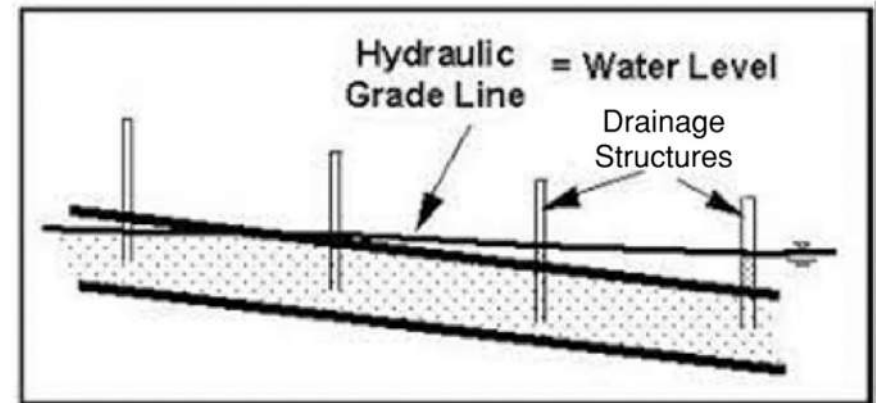
- Probability of Storm Event

Pittsburgh Storm Frequency Label	Annual Chance of Occurring	Rainfall in 1 Hour	Rainfall in 24 Hours
1-Year Storm	1 in 1 (100%)	0.969 inches	1.98 inches
2-Year Storm	1 in 2 (50%)	1.18 inches	2.35 inches
5-Year Storm	1 in 5 (20%)	1.49 inches	2.88 inches
10-Year Storm	1 in 10 (10%)	1.73 inches	3.31 inches
25-Year Storm	1 in 25 (4%)	2.05 inches	3.91 inches
50-Year Storm	1 in 50 (2%)	2.31 inches	4.40 inches
100-Year Storm	1 in 100 (1%)	2.56 inches	4.92 inches

<https://www.pgh2o.com/news-events/news/newsletter/2021-05-27-stormwater-tip-storm-size-what-it-means-why-it-matters>

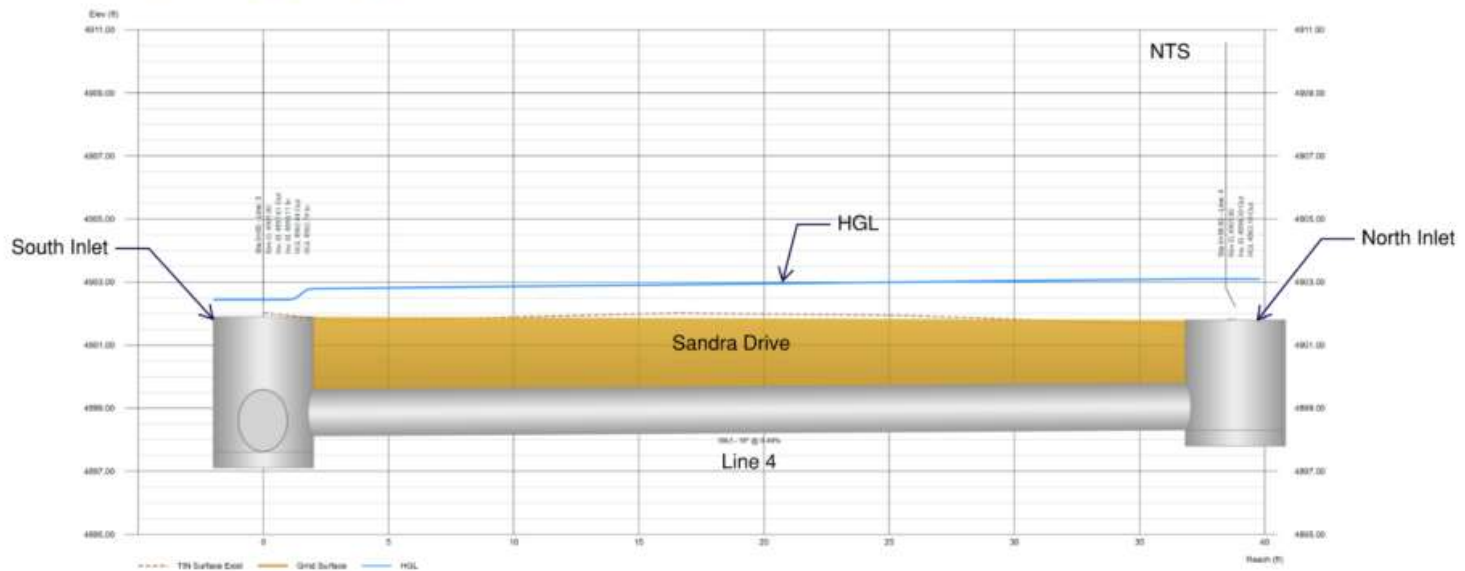
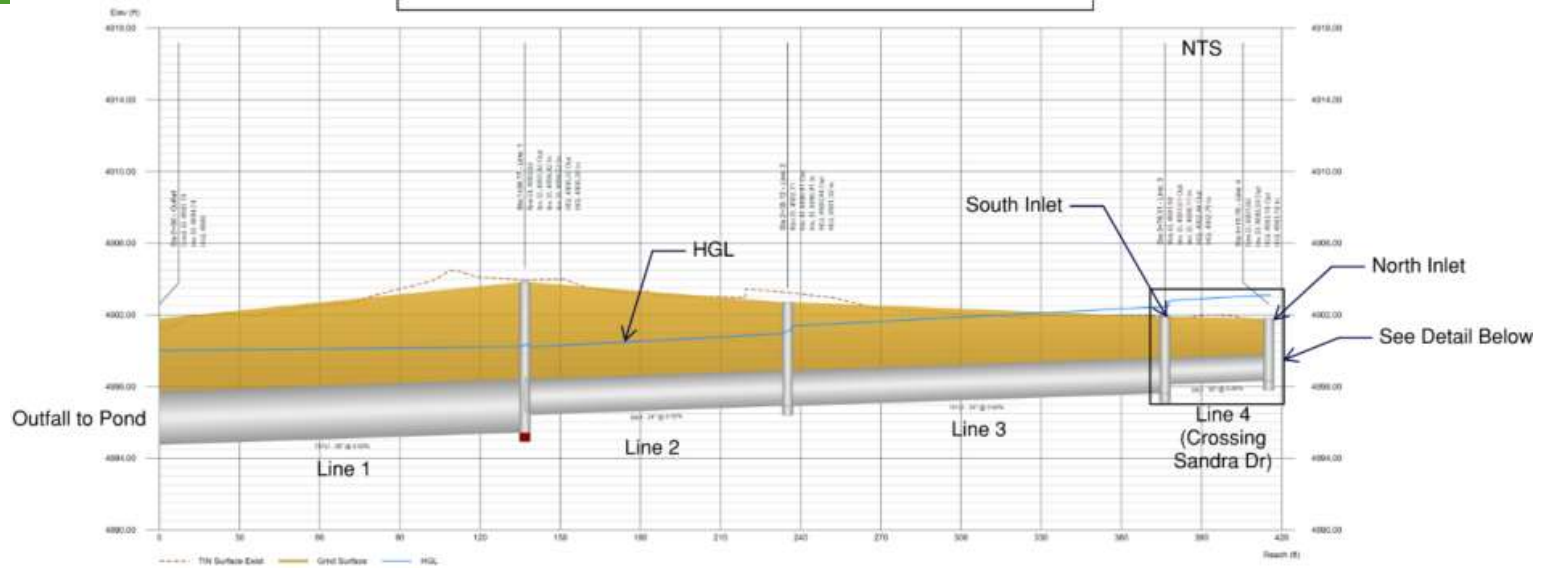
HGL – Hydraulic Grade Line

- Indicates the water level of a pipe system
- 5-year HGL
- 100-year HGL

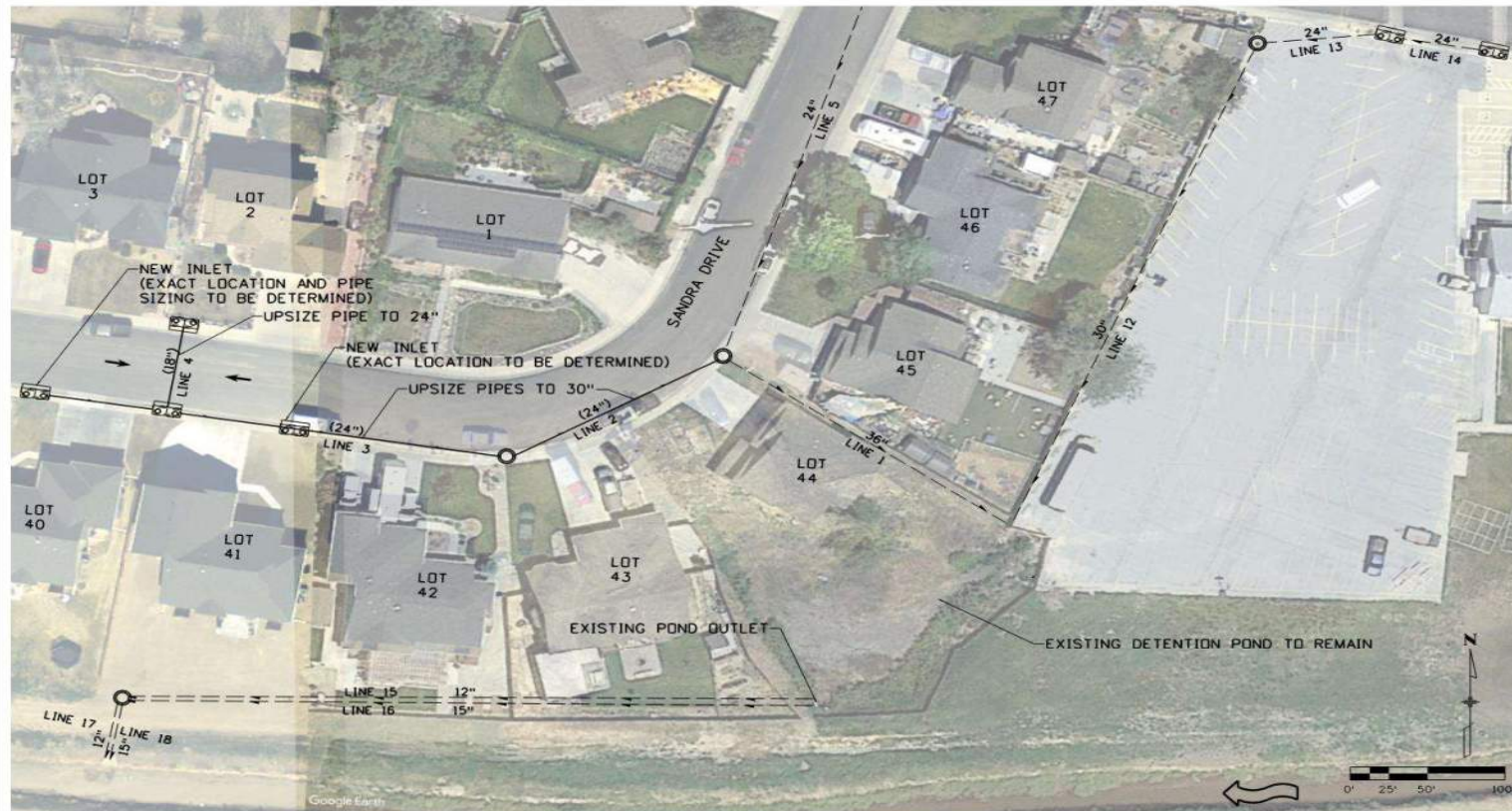


http://onlinemanuals.txdot.gov/TxDOTOnlineManuals/TxDOTManuals/hyd/hydraulic_grade_line_analysis.htm

SANDRA DRIVE EXISTING STORM SEWER - 5 YEAR



Sandra Drive Storm Sewer Improvements



STORM SEWER SUMMARY		
PHASE 1		
LINE #	PIPE SIZE EXISTING	PIPE SIZE PROPOSED
1	36"	36"
2	24"	30"
3	24"	30"
4	18"	24"
5	24"	TO REMAIN
12 - 14	VARIES	TO REMAIN
15 - 18	VARIES	TO REMAIN

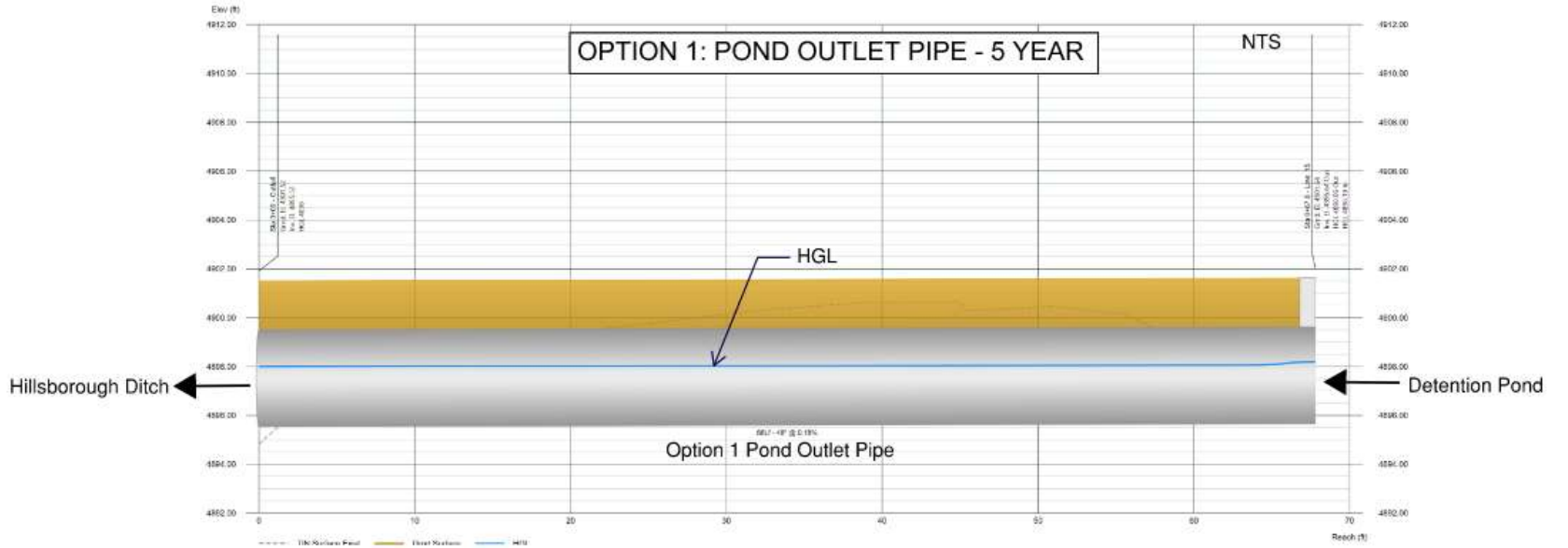
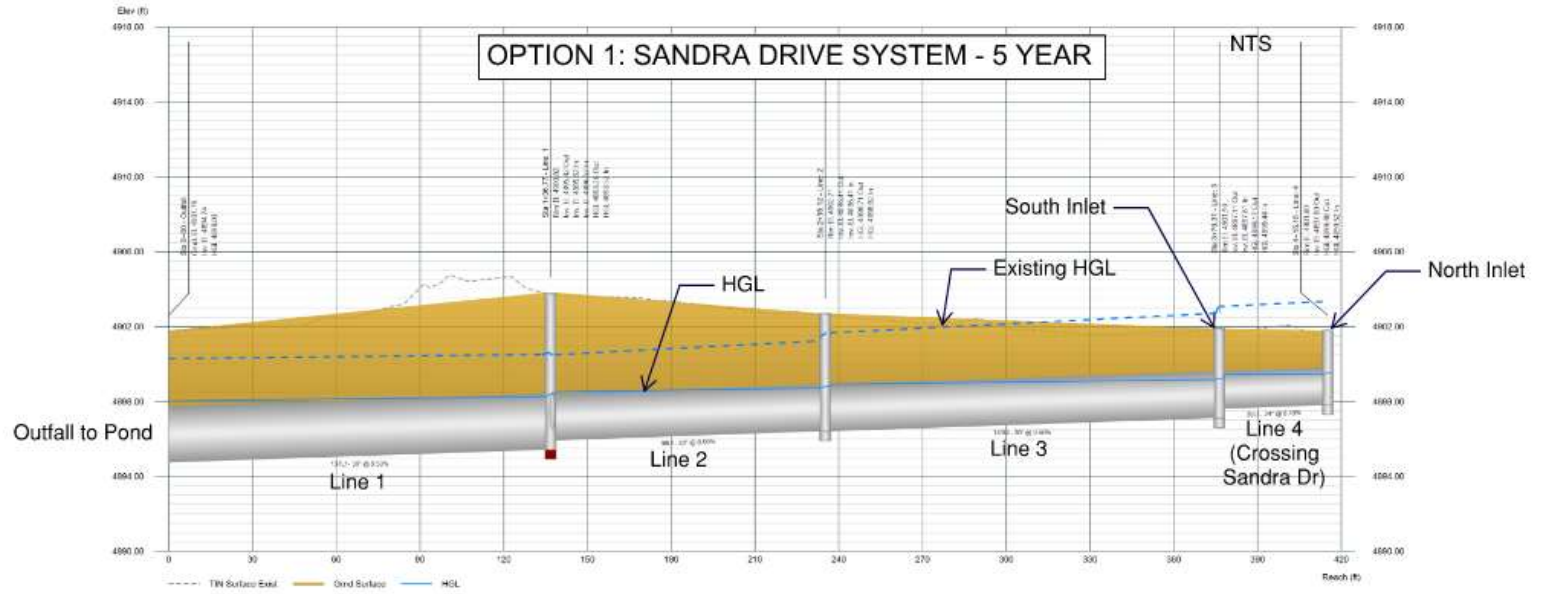
LEGEND:

- CONCEPTUAL STORM DRAIN
- EXISTING STORM DRAIN
- STORM INLET
- DIRECT FLOW DIRECTION
- DITCH FLOW DIRECTION

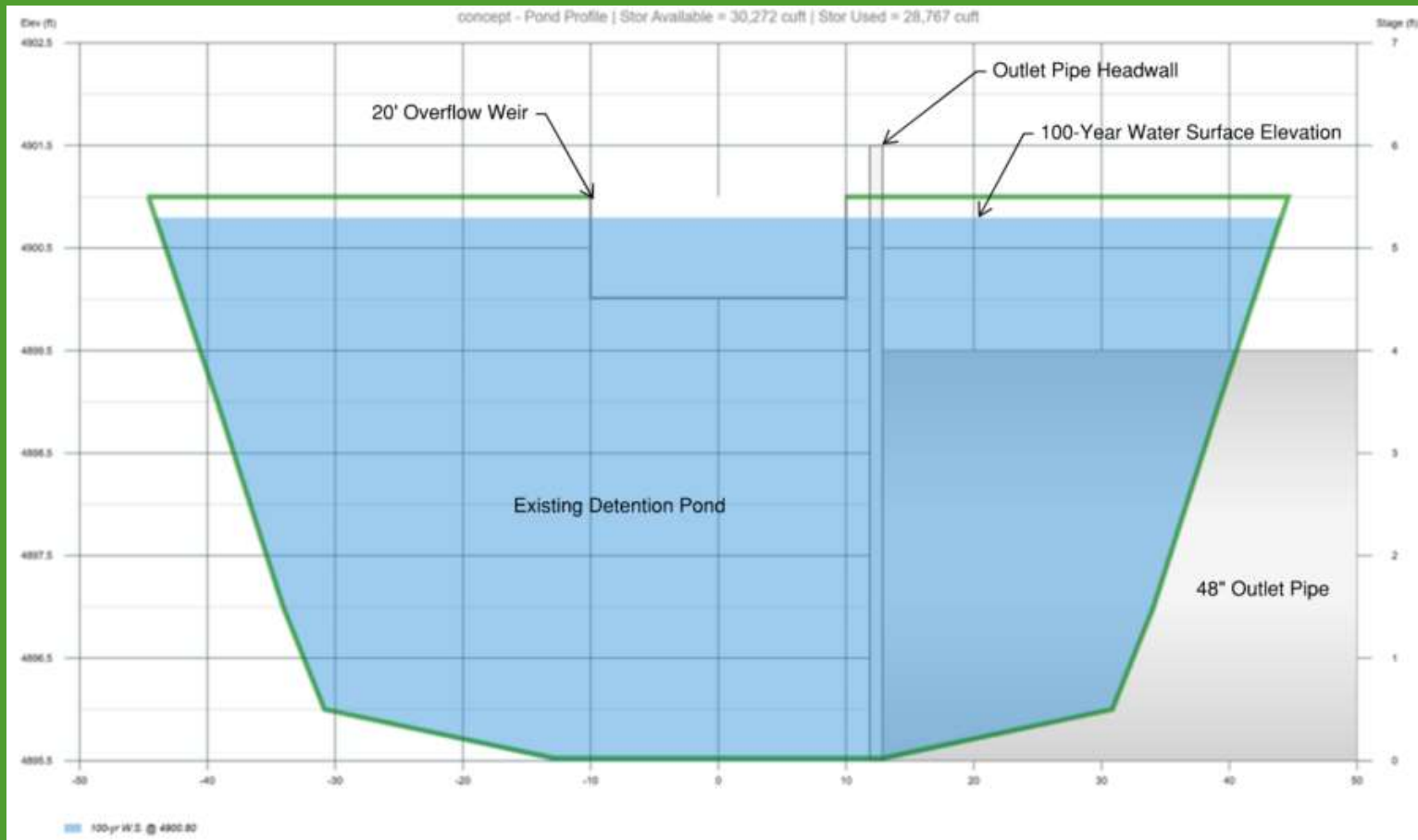
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File Name: 152297-SandraDrive_StormSewerPlan-Phase 1.dgn	Date:	Comments:	Init.			No Revisions:	Revised:	Void:	Designer: ARF	Detailer: ARF	Structure Numbers:
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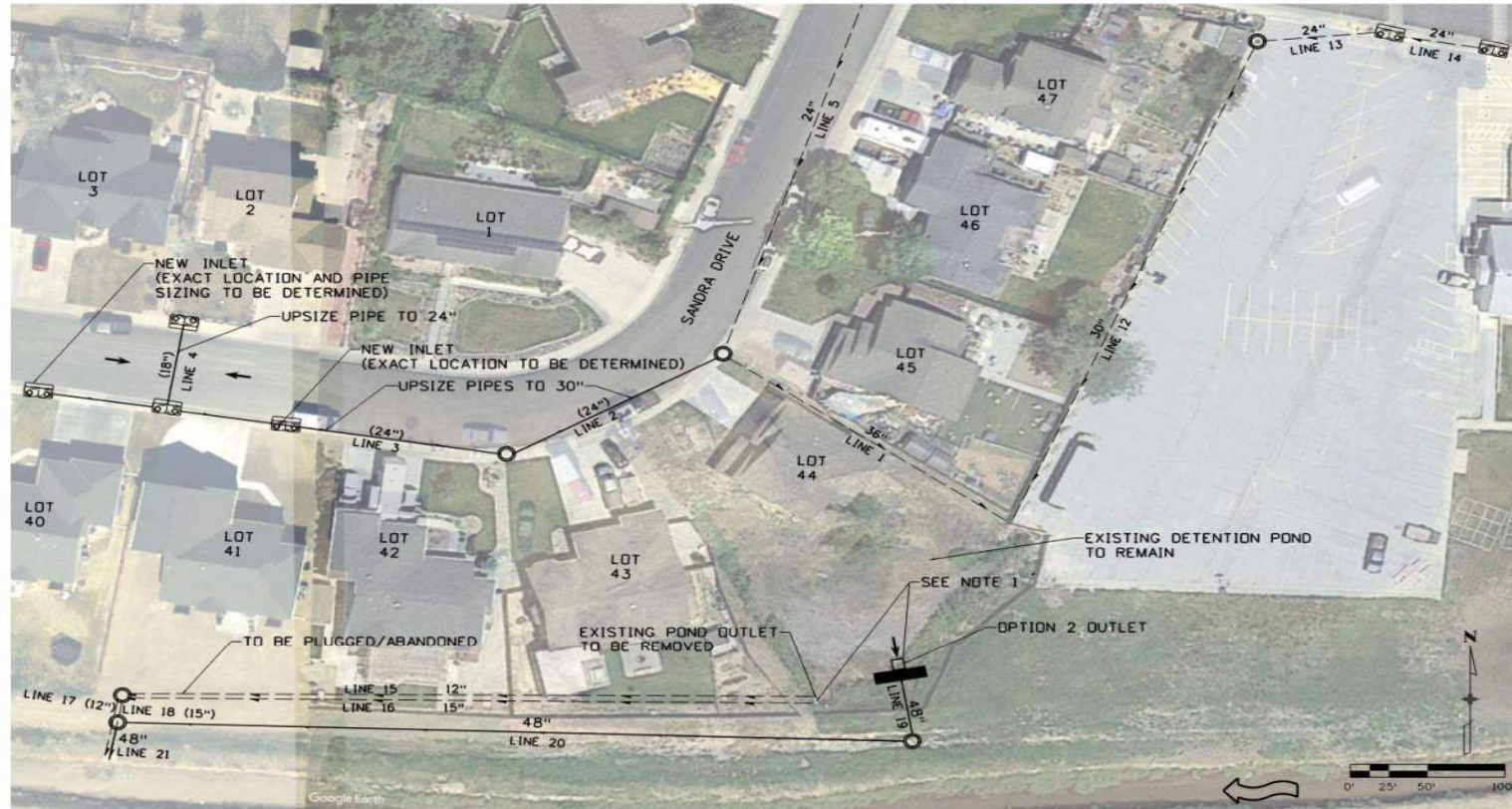
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Option 1: New Outlet Structure



Ditch Outlet Option 2



STORM SEWER SUMMARY		
OPTION 2 - ROUTE TO EX. POND OUTLET		
LINE #	PIPE SIZE EXISTING	PIPE SIZE PROPOSED
1	36"	36"
2	24"	30"
3	24"	30"
4	18"	24"
5, 12 - 14	VARIABLES	TO REMAIN
15 - 18	VARIABLES	TO BE PLUGGED
19 - 21	N/A	48"

- LEGEND:**
- CONCEPTUAL STORM DRAIN
 - EXISTING STORM DRAIN
 - STORM INLET
 - DIRECT FLOW DIRECTION
 - DITCH FLOW DIRECTION

- NOTES:**
- EXISTING DETENTION POND OUTLET STRUCTURE TO BE REMOVED, AND NEW OUTLET STRUCTURE WITH EMERGENCY SPILLWAY TO BE PLACED AT START OF LINE 19

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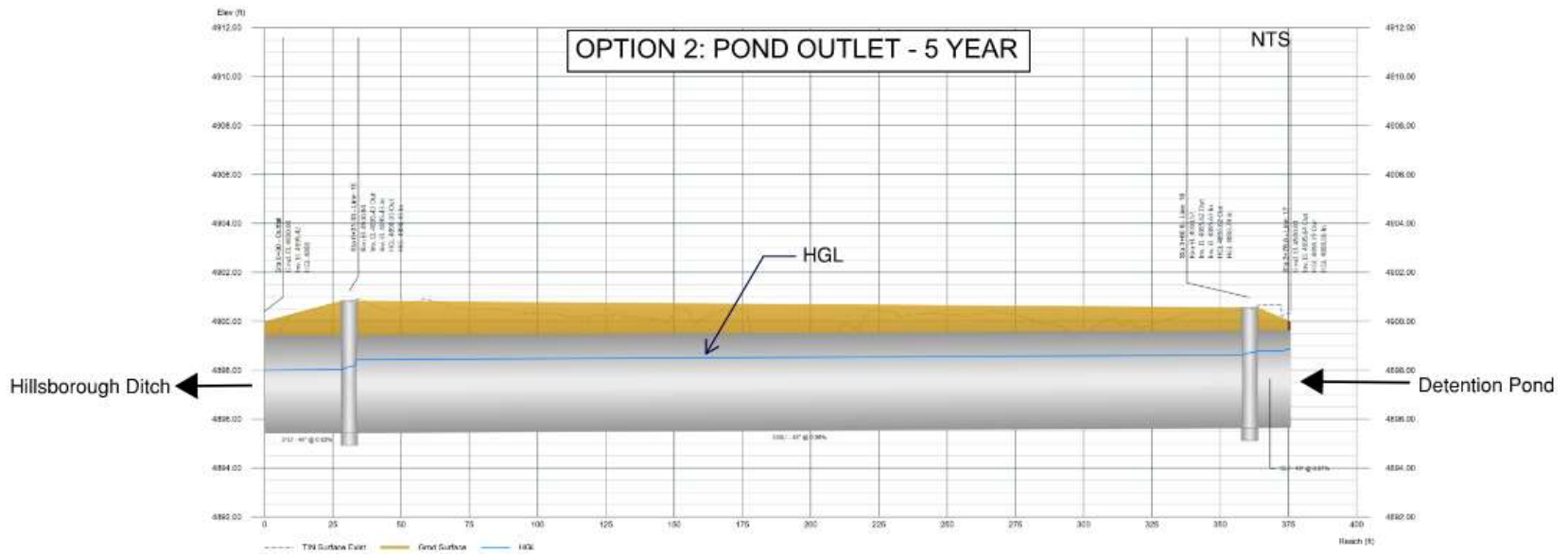
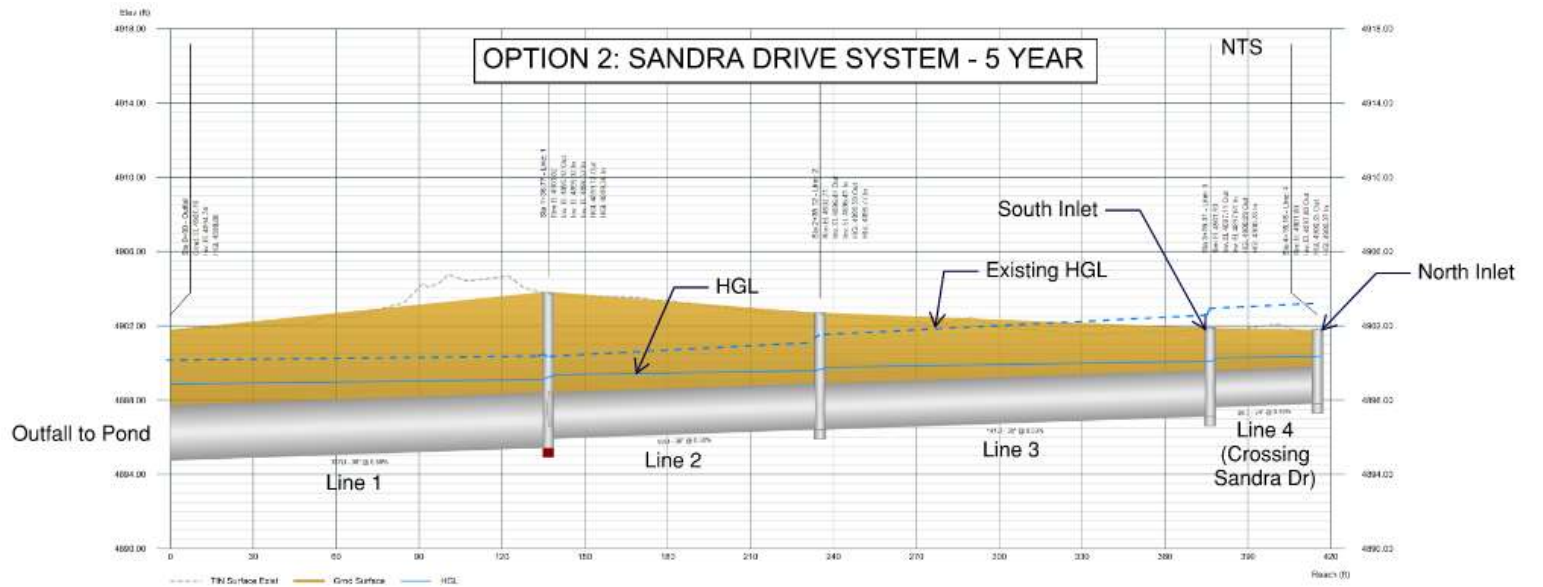
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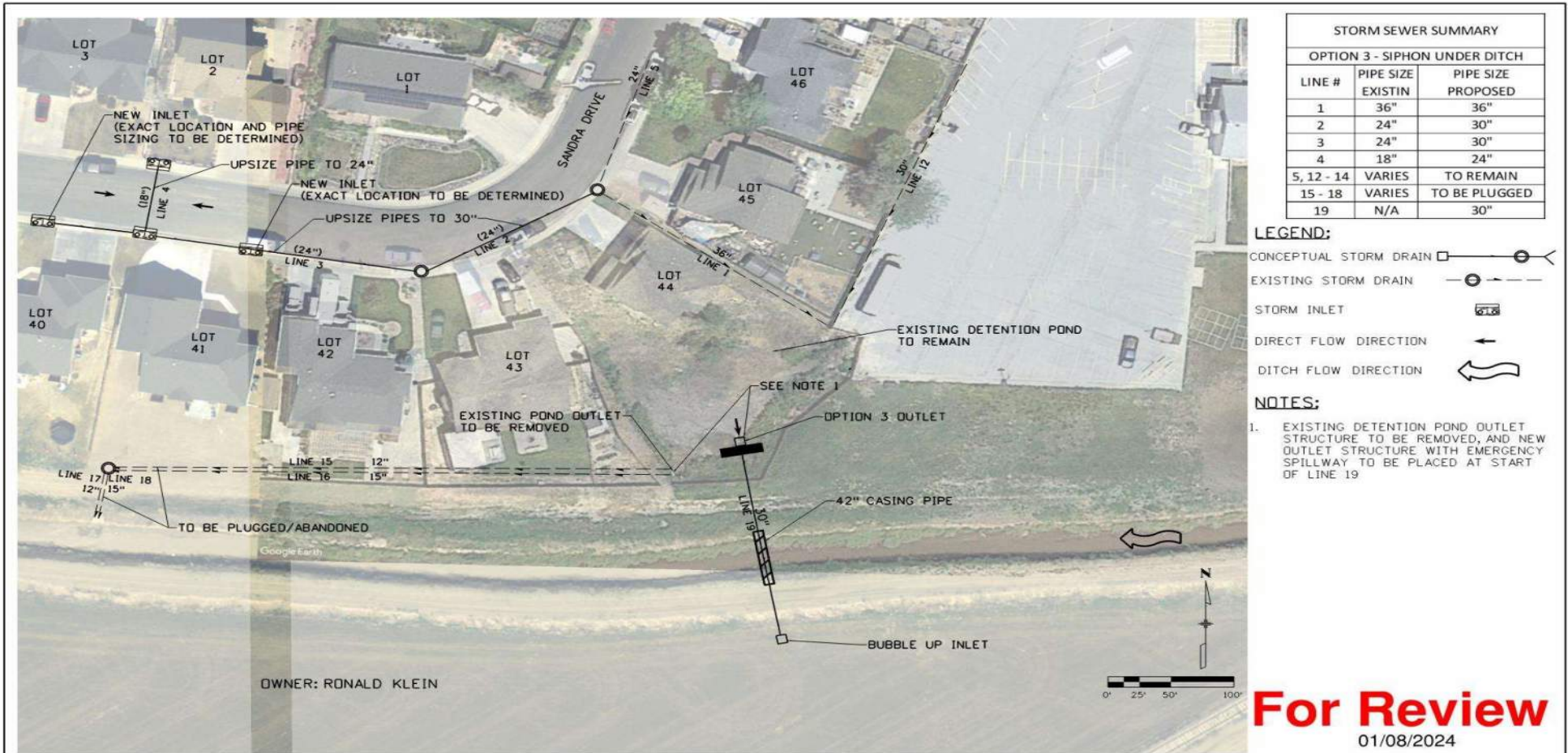
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Ditch Outlet Option 3 - Siphon



STORM SEWER SUMMARY		
OPTION 3 - SIPHON UNDER DITCH		
LINE #	PIPE SIZE EXISTIN	PIPE SIZE PROPOSED
1	36"	36"
2	24"	30"
3	24"	30"
4	18"	24"
5, 12 - 14	VARIABLES	TO REMAIN
15 - 18	VARIABLES	TO BE PLUGGED
19	N/A	30"

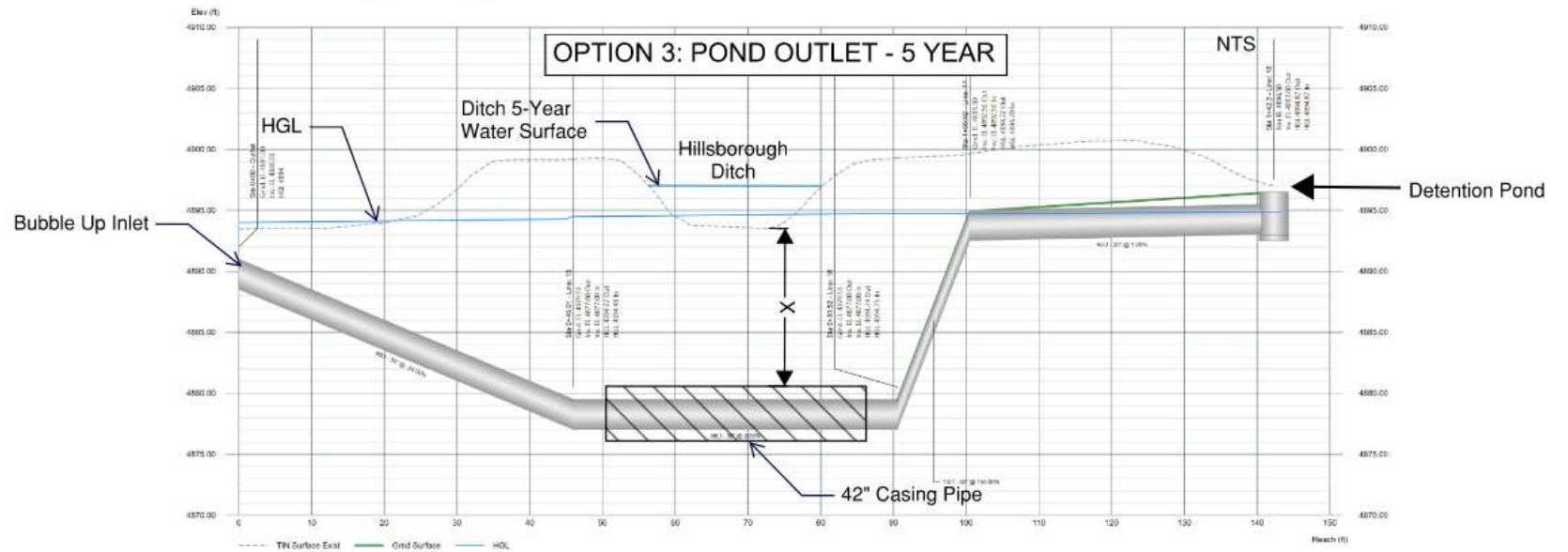
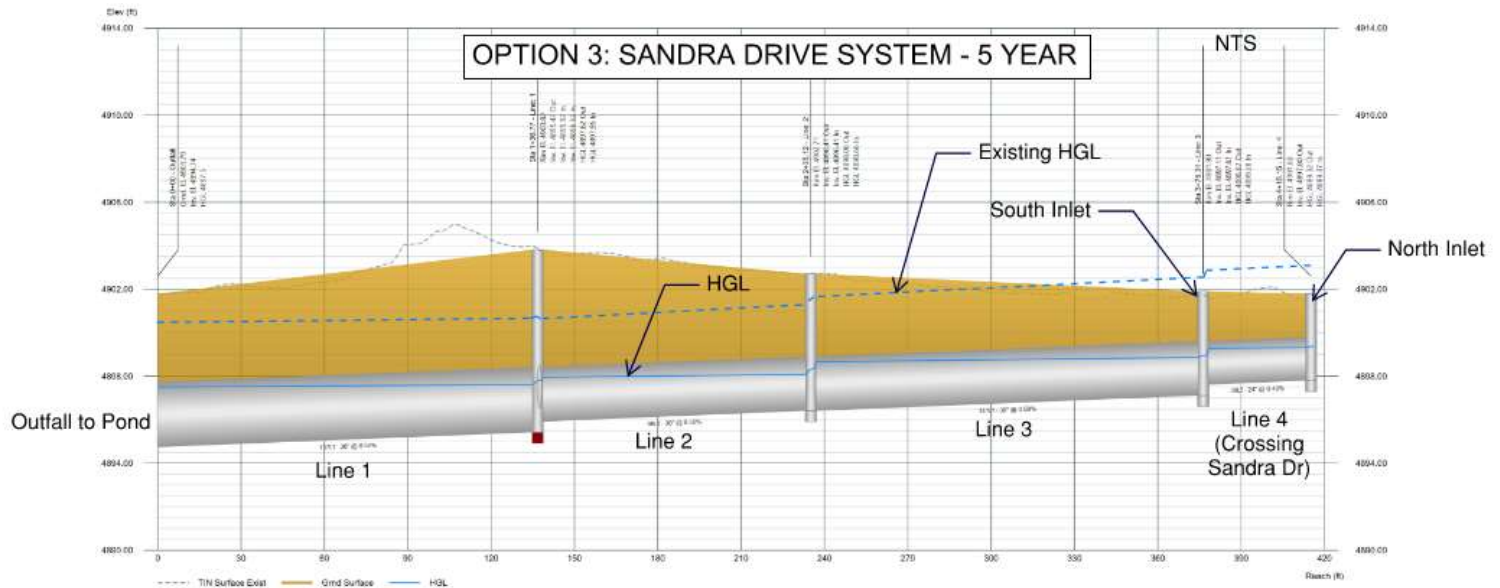
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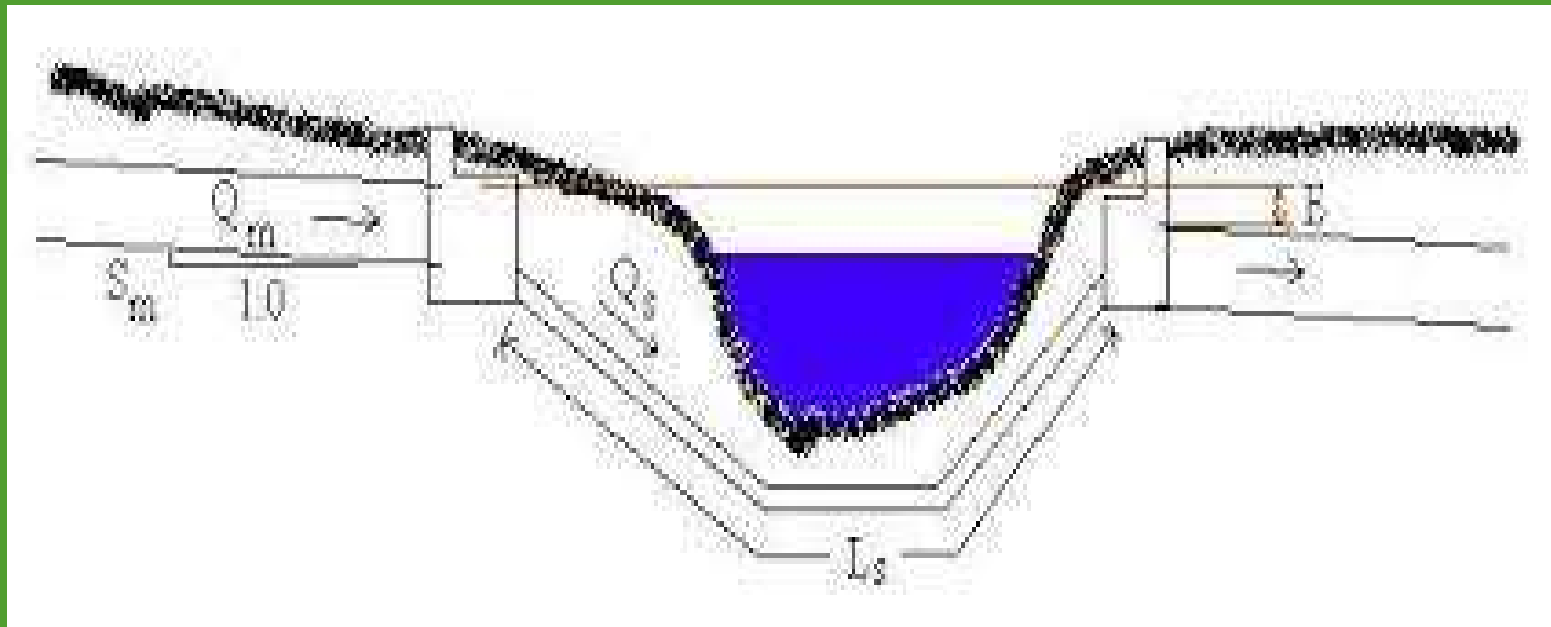
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Option 3: Siphon Under the Ditch



<https://www.lmnoeng.com/Channels/InvertedSiphon.php>



Summary:

- Flooding in Sandra Drive is due to multiple storm/hail events occurring in a short time frame, as well as undersized storm sewer and an undersized pond outlet.
- To reduce the effects of future flooding, a more efficient pond outlet system and upsized storm sewer system is required.
- Three viable 5-year storm options have been identified to reduce the risk of flooding in Sandra Drive. All three options include Sandra Drive storm sewer improvements.
 - **Option 1:** Requires new pond outlet going directly to the ditch.
 - **Option 2:** Requires new pond outlet / storm sewer to the existing Hillsborough Ditch discharge point.
 - **Option 3:** Requires new pond outlet that siphons flow from the pond to a point just downstream of Hillsborough Ditch.
- Design field survey will be required for further design of preferred option
- All options are subject to Town and Hillsborough Ditch approval.
- Benesch and the Town will continue to work with residents to find an agreeable solution.

Additional Photos



 **benesch** Existing Detention Pond



Existing Pond Outlet



 **benesch** Existing Outfall into Ditch



Hillsborough Ditch Looking Downstream



 **benesch** Existing Ditch Connection to the East



Farmland South of Ditch



Questions?



