Responder
Multi-Sensor Inspection

Sanitary Sewer S-500

Interceptor Sewer Condition Assessment

1322334-1322333
U/S MH: 1322334
D/S MH: 1322333
RECORD DRAWING DIAMETER (RCD): 90 in
Job: SJ500790
Inspection Date: 10/13/2010
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RedZone Robotics, Inc
91 43rd Street, Suite 250
Pittsburgh PA 15201
Phone 412.476.8980
Fax 412.476.8981
www.redzone.com

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1 Summary

1.1 Job

Prepared For	Lucas County Sanitary Engineers
Street Location	Jerome Road
Deployment Location/Manhole	1322333
Operator	D.Shrodes
Deployment Weather	Sunny (Dry)
Planned Inspection Distance	908 ft
Actual Inspection Distance	907 ft
Inspection Direction	Upstream
Upstream Location/Manhole	1322334
Downstream Location/Manhole	1322333
Record Drawing Diameter	90 in
Record Drawing Pipe Shape	Circular
Pipe Material	RCP

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1.2 Results

Observations	
Number of Observations	5
Number of Grade 4 & 5 Observations	0
Number of Continuous Observations	1
Flow Height	25 %
Ovality and Deflection	
Average ASTM Ovality	0.06 %
Minimum ASTM Ovality	0.00 %
Maximum ASTM Ovality	0.30 %
Average Deflection	-0.60 %
Minimum Deflection	-1.31 %
Maximum Deflection	0.50 %
Ovality Calculation Method	Half-Pipe
Sediment	
Average Sediment Depth	10.0 in
Total Sediment Volume	2427.0 ft^3
% of Pipe Flow Restriction Due to Sediment	6.1 %
Gas	
Inspected Distance with Average H2S Concentration Over 2 ppm	907.0 ft
% Inspected Distance with Average H2S Concentration over 2ppm	100.0 %
Average Concentration of H2S	9.3 ppm
Maximum Concentration of H2S	11 ppm
Average Temperature	66 degrees F
Maximum Temperature	67 degrees F
Corrosion and Buildup	
Number of Precision Scans	110
Average Measured Internal Pipe Dimensions	90.57 in
Average Measured ID Change in Precision Scans (radial)	0.28 in
Minimum Measured ID Change in Precision Scans (radial)	-1.15 in
Maximum Measured ID Change in Precision Scans (radial)	1.49 in

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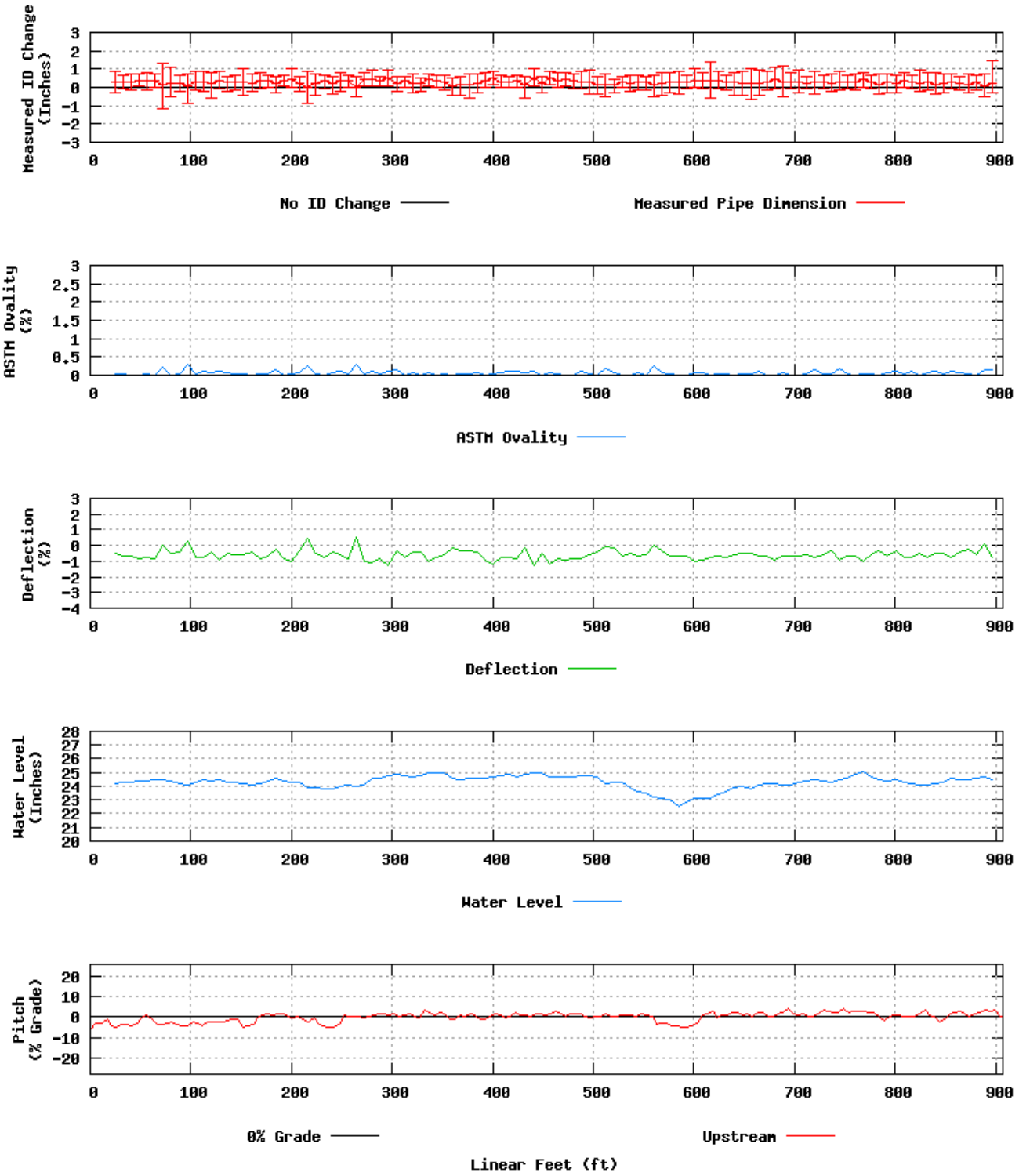
1.3 Segment Summary View

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



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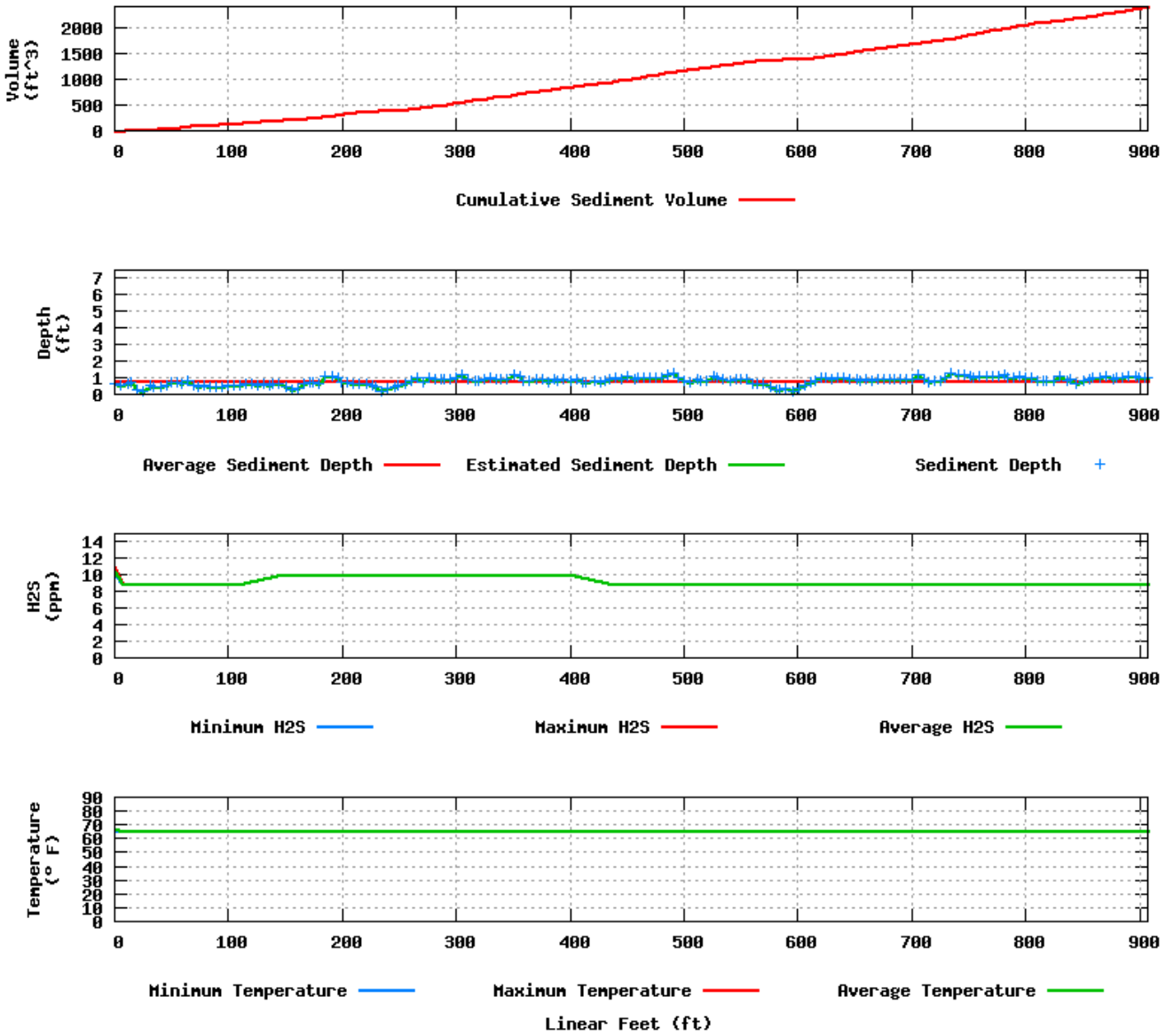
The inspected distance displayed below is the distance upstream from the 1322333 manhole.



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2 Observations

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Inspection report

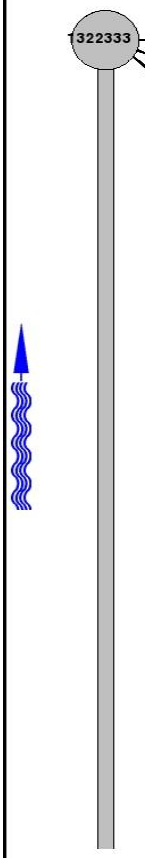
Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
10/13/2010		**1 Dry**	**D.SHRODES**	**1**	**1322343**
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
				N No Pre-Cleaning	

Street:	**Jerome Rd**	Flow Control:		Start MH:	**1322333**
City:	**Lucas County**	Year Renewed		End MH:	**1322334**
Location Code:	**D Easement/Right of Way**	Tape/Media #:	**T2**	Total length surveyed:	**907.33 ft**

Purpose:	**F Routine Assessment**	Dia/Height:	**C Circular 90"/90"**
Use:	**SS Sanitary**	Material:	**RCP Reinforced Concrete Pipe** Pipe Joint length:
Drain. Area:		Lining:	
		Category:	

Comment:

Location details:



1:475	position		code	observation	counter	photo	grade
	0.00		AMH	Manhole, Remark: 1322333	00:00:00	9_1a	
	0.00		MWL	Water Level, 25 % of cross sectional area	00:00:00	10_2a	
	0.00	**S1**	SRVZ	Surface Reinforcement Visible Unknown, from 08 to 04 o´clock, within 8 inch: YES, start, Remark: position varies	00:00:00	11_3a, b	S 5

SJ500790-3.mdb // page: 1

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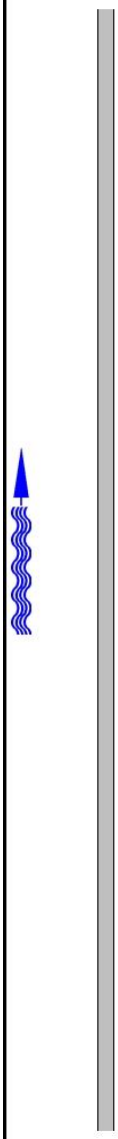
Inspection report

Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
10/13/2010		**1 Dry**	**D.SHRODES**	**1**	**1322343**
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
				N No Pre-Cleaning	

1:475	position	code	observation	counter	photo	grade



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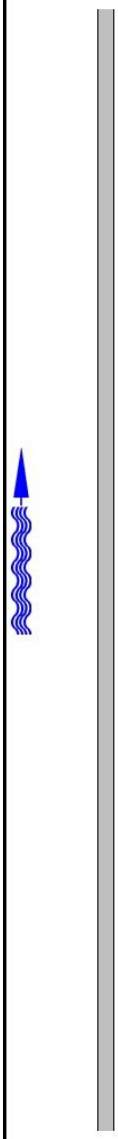
Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
10/13/2010		**1 Dry**	**D.SHRODES**	**1**	**1322343**
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
				N No Pre-Cleaning	

1:475	position	code	observation	counter	photo	grade



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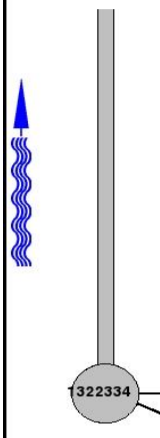
Inspection report

Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
10/13/2010		**1 Dry**	**D.SHRODES**	**1**	**1322343**
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
				N No Pre-Cleaning	

1:475



position		code	observation	counter	photo	grade
907.33	F1	SRVZ	Surface Reinforcement Visible Unknown, from 08 to 04 o´clock, within 8 inch: YES, end, Remark: position varies	00:00:00		S 5
907.33		AMH	Manhole, Remark: 1322334	00:00:00	13_5a	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5c00	0000	905	0	905	5	0	5

SJ500790-3.mdb // page: 4

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Inspection photos

City:	Street:	Date:	section number:	PSR:
Lucas County	**Jerome Rd**	**10/13/2010**	**1**	**1322343**

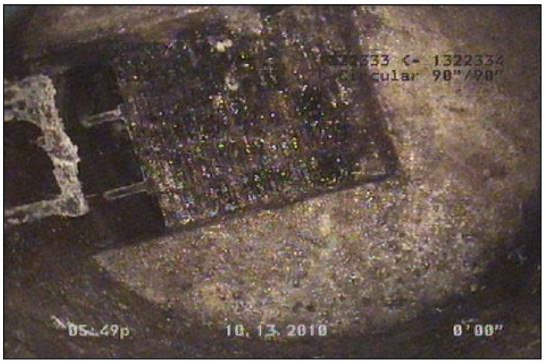

Photo: 9_1a, Tape/Media No.: T2, 00:00:00
0FT, Manhole, Remark: 1322333

Photo: 10_2a, Tape/Media No.: T2, 00:00:00
0FT, Water Level, 25 % of cross sectional area

Photo: 11_3a, Tape/Media No.: T2, 00:00:00
0FT, Surface Reinforcement Visible Unknown, from 08 to 04 o´clock, within 8 inch: YES, start, Remark: position varies

Photo: 11_3b, Tape/Media No.: T2, 00:00:00
0FT, Surface Reinforcement Visible Unknown, from 08 to 04 o´clock, within 8 inch: YES, start, Remark: position varies

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Inspection photos

City:	Street:	Date:	section number:	PSR:
Lucas County	**Jerome Rd**	**10/13/2010**	**1**	**1322343**

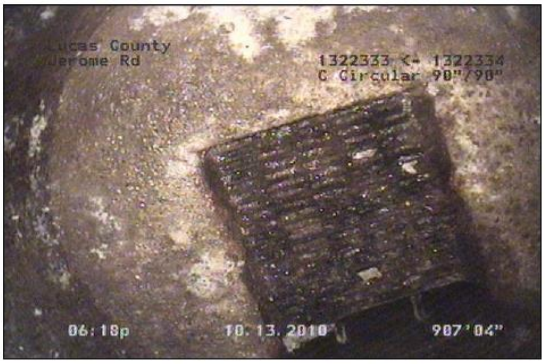

Photo: 13_5a, Tape/Media No.: T2, 00:00:00
907.33FT, Manhole, Remark: 1322334

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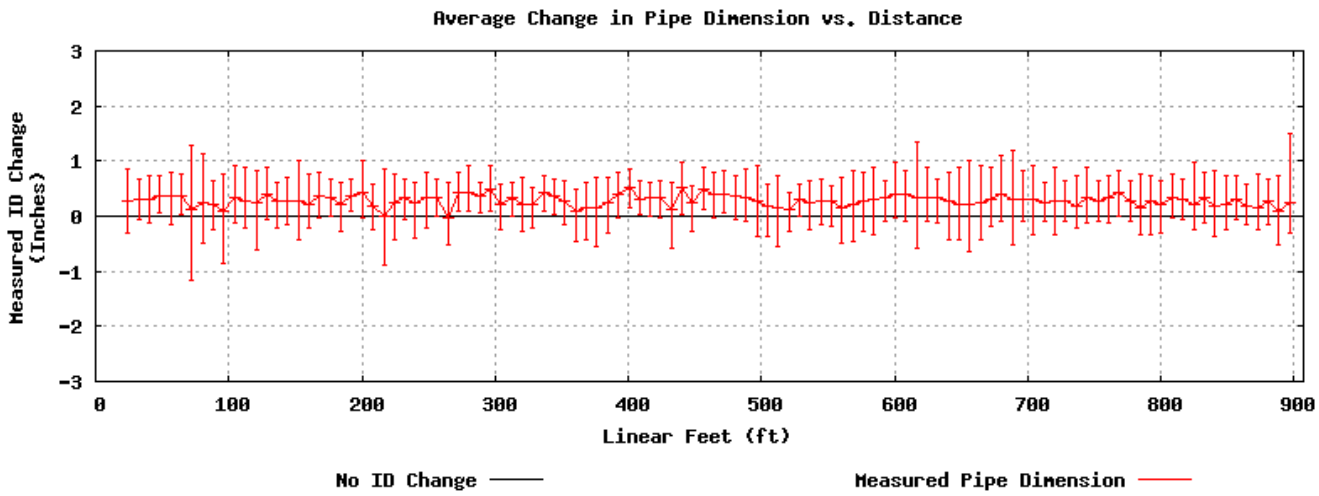
3 Ovality and Deflection

3.1 Average ID Graph

The inspected distance displayed below is the distance upstream from the 1322333 manhole.

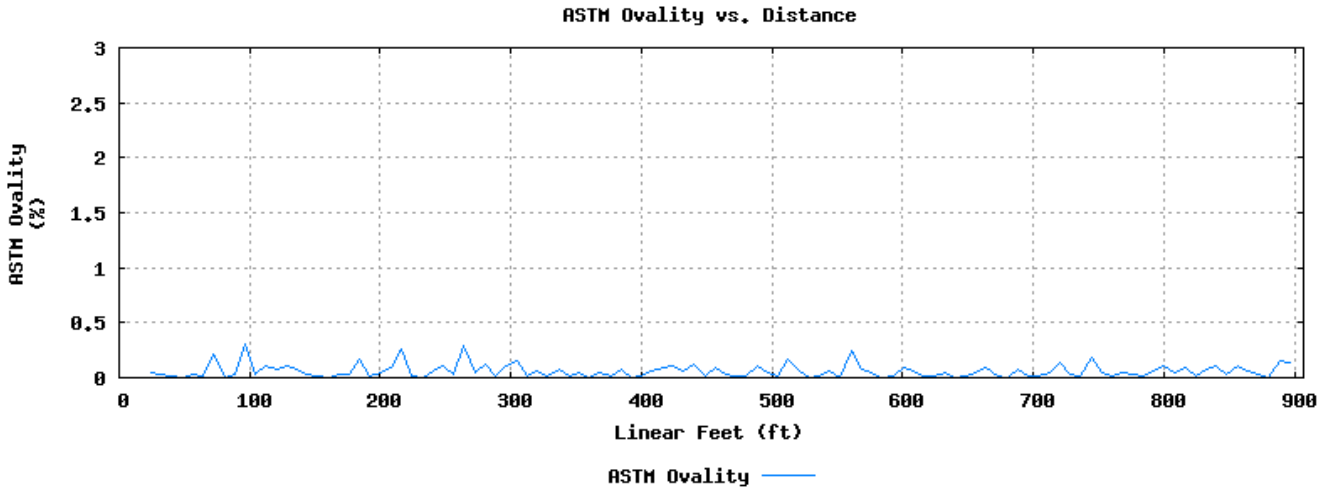


3.2 ASTM Ovality Graph (Half-Pipe)

The ASTM F1216 Ovality formula uses minimum and maximum diameters. We assume that the minimum and maximum diameters are orthogonal.

$$\text{Ovality} = (100\%)(Rh-Rv)/(Rh+Rv)$$

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



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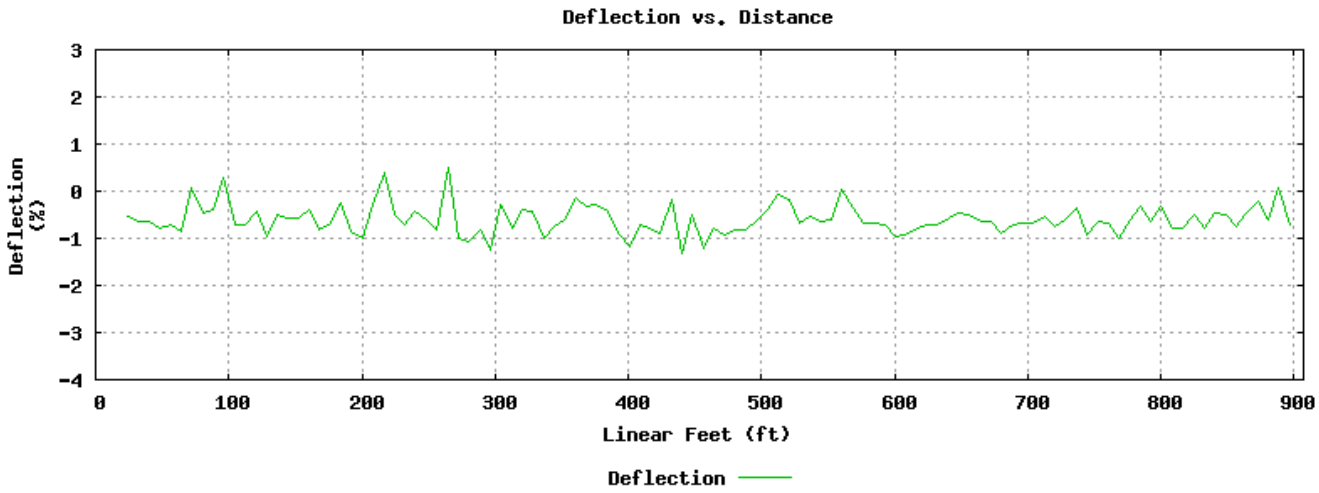
3.3 Deflection Graph (Half-Pipe)

Deflection is based on the vertical radius (half of the vertical diameter) and the RCD. For non-round pipe models, we use the record drawing model's vertical radius as the "RCD".

$$\text{Deflection} = (100\%)\ (1 - 2Rv/RCD)$$

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



3.4 Ovality Graph (Half-Pipe)

Ovality is based on the ratio of the minimum diameter (assumed to be vertical) to the maximum diameter (assumed to be horizontal). When only the top half of the pipe is visible, we double the vertical radius to get vertical diameter.

$$\text{Ovality} = (100\%)(1-Rv/Rh)$$

The inspected distance displayed below is the distance upstream from the 1322333 manhole.

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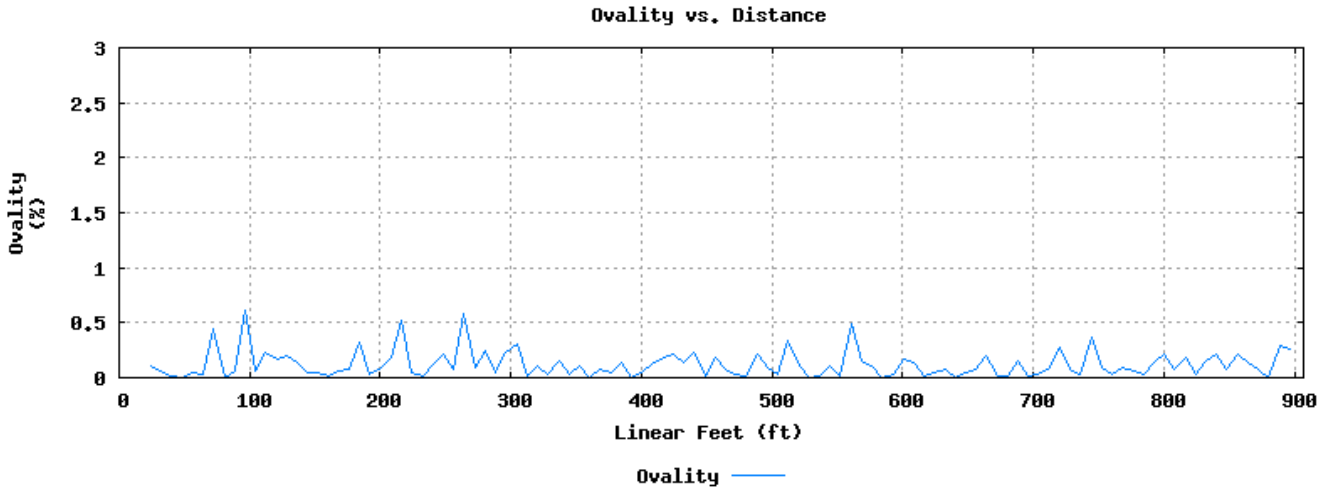

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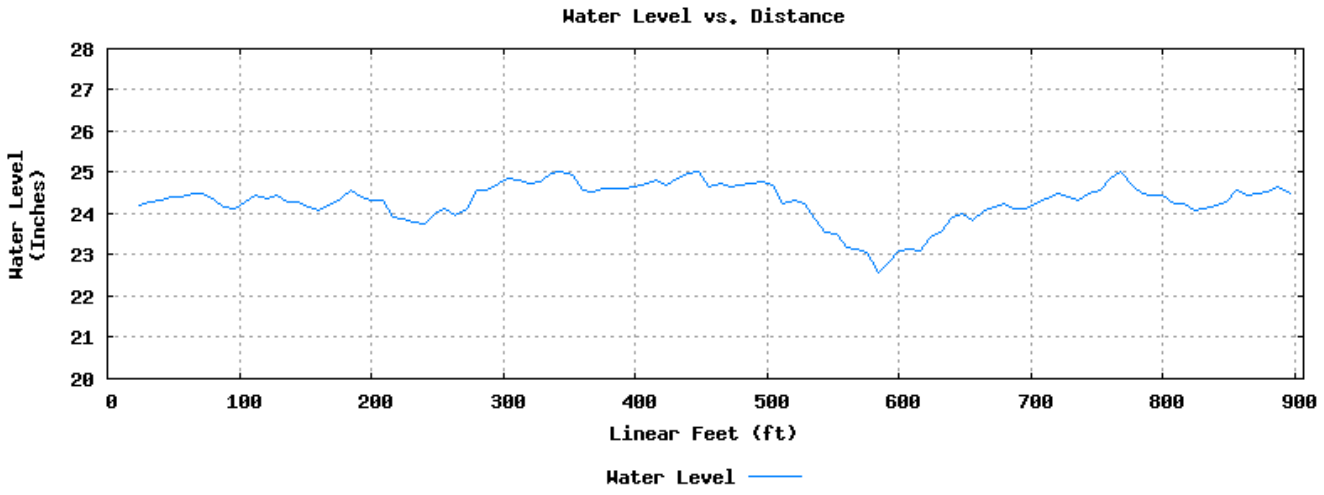
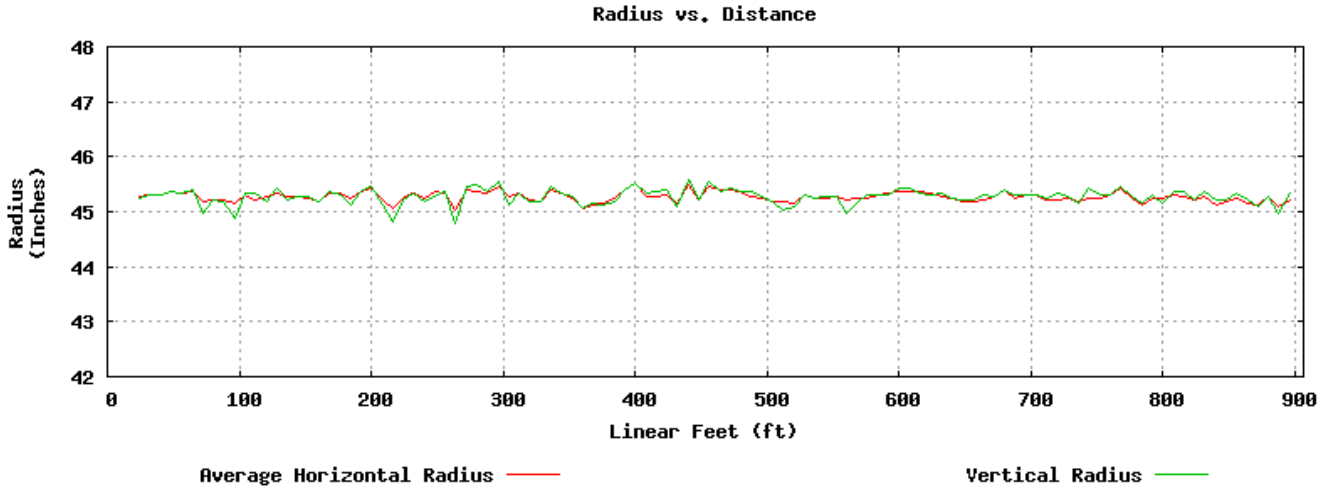
3.5 Water Level

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



3.6 Vertical and Horizontal Radius

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



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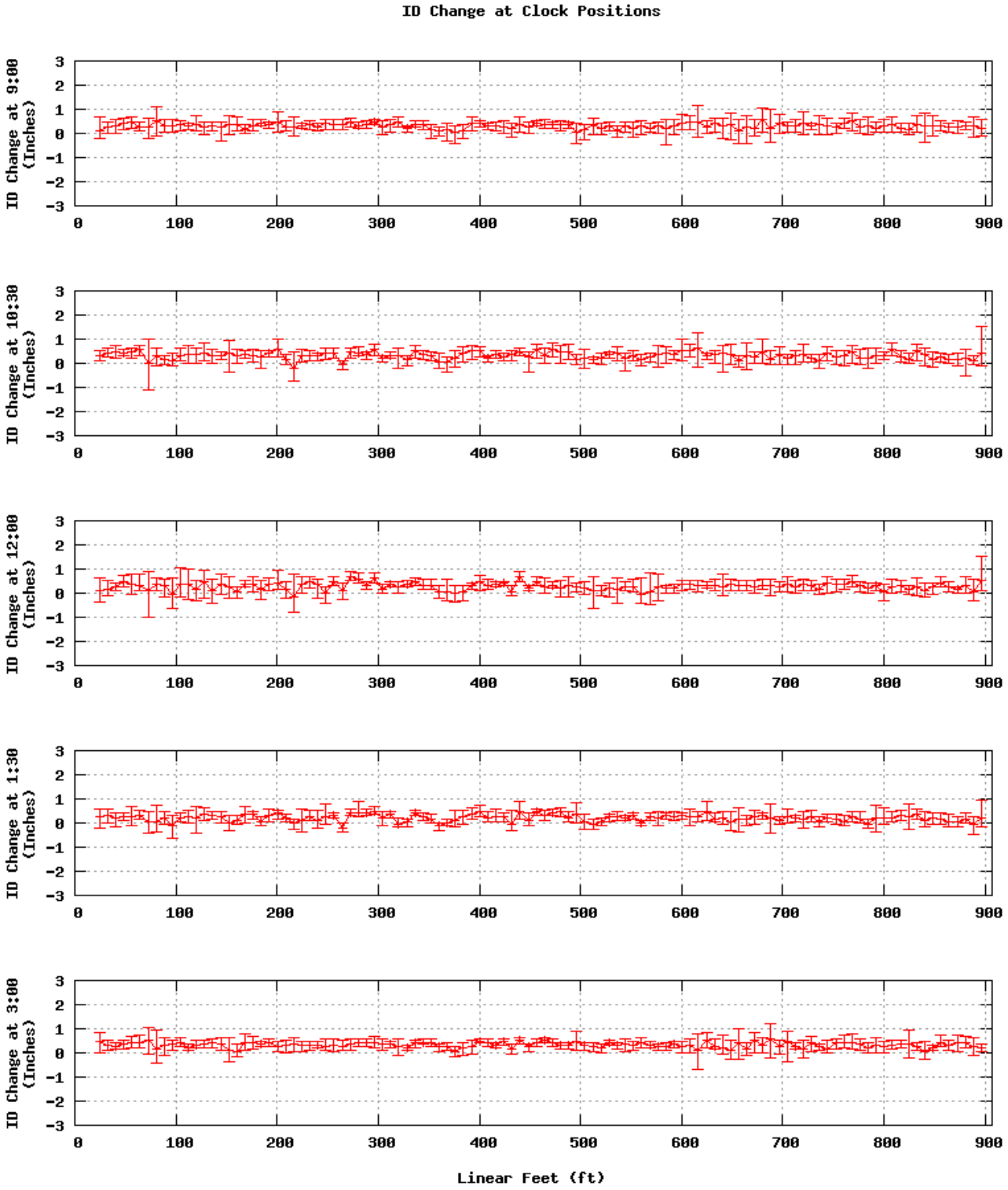
3.7 ID at Clock Positions

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



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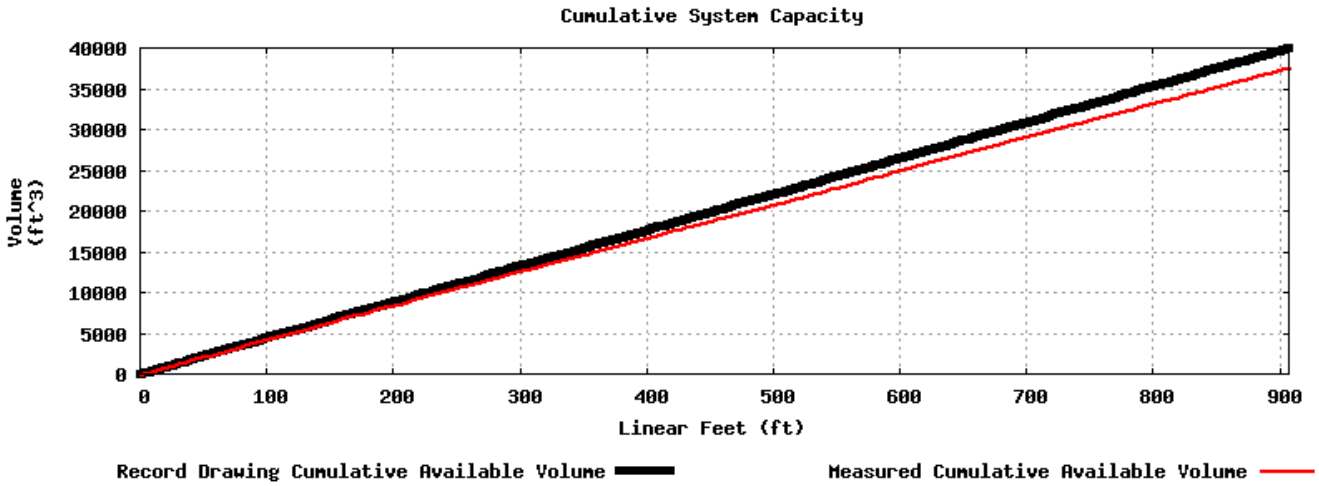
4 Sediment

4.1 Cumulative System Capacity

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



Inspection Distance	907 ft
Record Drawing Available Capacity	40070.0 ft^3
Measured Available Capacity	37643.1 ft^3
% Available Capacity	93.9 %

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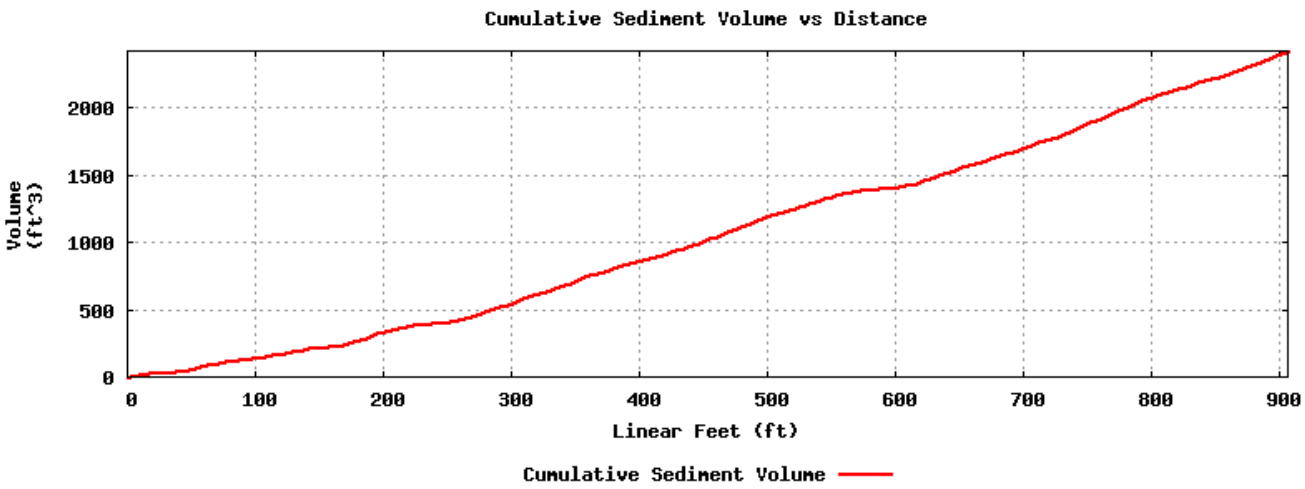
4.2 Cumulative Sediment Volume

The actual free space capacity is derived from the cross sectional sonar scans. In order to determine sediment volume, the actual free space capacity is subtracted from the total as-built capacity.

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



Inspection Distance	907 ft
Cumulative Sediment Volume	2427.0 ft ^{3}

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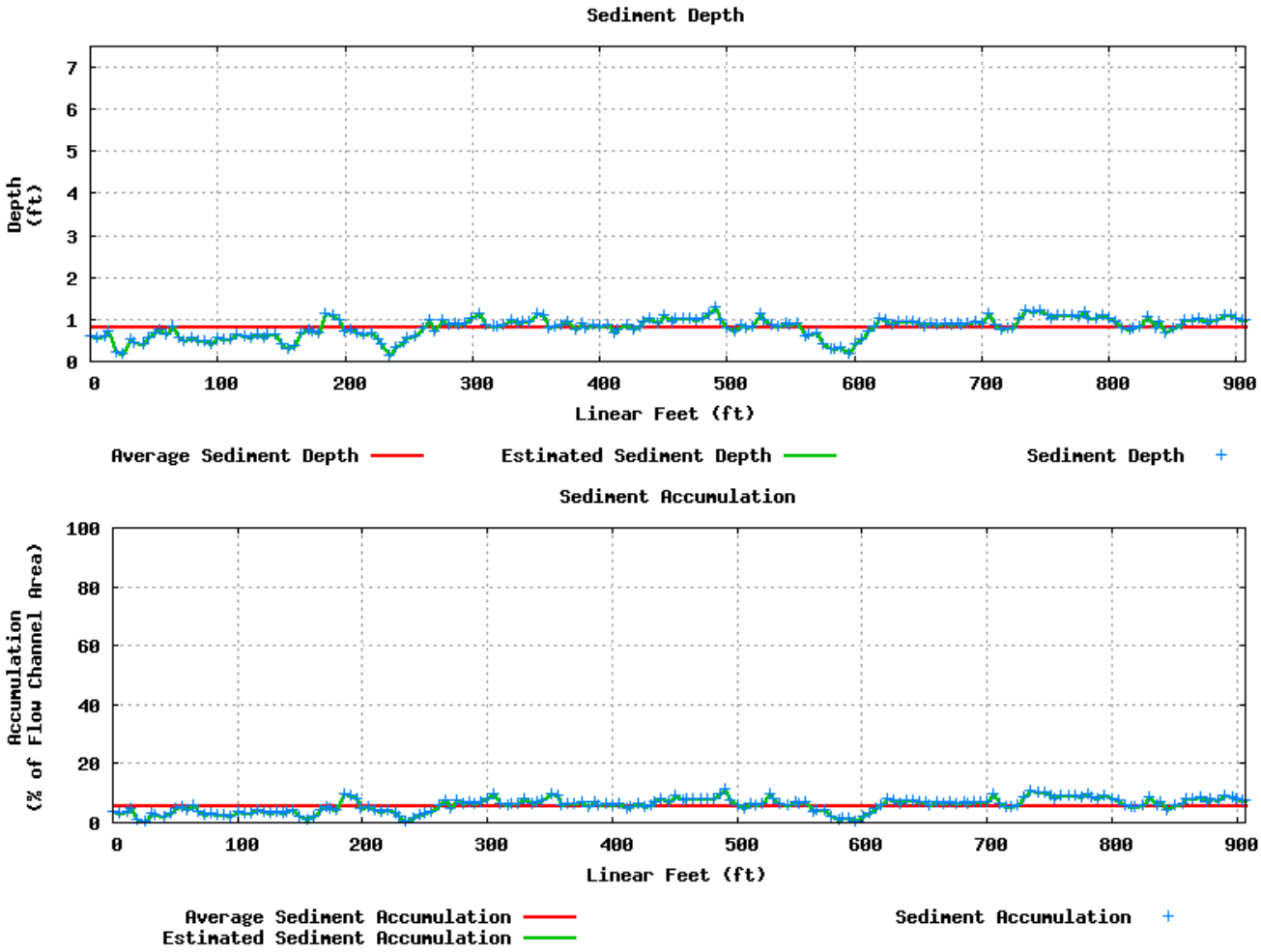
4.3 Average Sediment Depth

The standard sediment depth measurement graph represents a comprehensive summary of pipe sediment depth over distance.

The inspected distance displayed below is the distance upstream from the 1322333 manhole.



Measure	Location	Depth	Accumulation
Maximum	490.5 ft	15.4 in	11.4 %
Minimum	234.4 ft	1.9 in	0.5 %
Average	N/A	10.0 in	6.1 %

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4.4 Cleaning Recommendations

The table below depicts the level of cleaning recommended throughout the inspected length. The recommendations are based on sediment volume, not type of material.

Recommendation	% of Capacity Lost	Distance Inspected	% of Total Length
No Cleaning	0% to 5%	274.1 ft	30 %
Light Cleaning	6% to 15%	632.9 ft	70 %
Moderate Cleaning	16% to 30%	0 ft	0 %
Heavy Cleaning	> 30%	0 ft	0 %

4.5 Cleaning Recommendations by Location

Start Location	End Location	Recommendations
0.0 ft	50.3 ft	No Cleaning
50.3 ft	54.8 ft	Light Cleaning
54.8 ft	59.2 ft	No Cleaning
59.2 ft	64.0 ft	Light Cleaning
64.0 ft	171.1 ft	No Cleaning
171.1 ft	173.8 ft	Light Cleaning
173.8 ft	179.2 ft	No Cleaning
179.2 ft	204.0 ft	Light Cleaning
204.0 ft	260.9 ft	No Cleaning
260.9 ft	560.8 ft	Light Cleaning
560.8 ft	610.8 ft	No Cleaning
610.8 ft	907.0 ft	Light Cleaning

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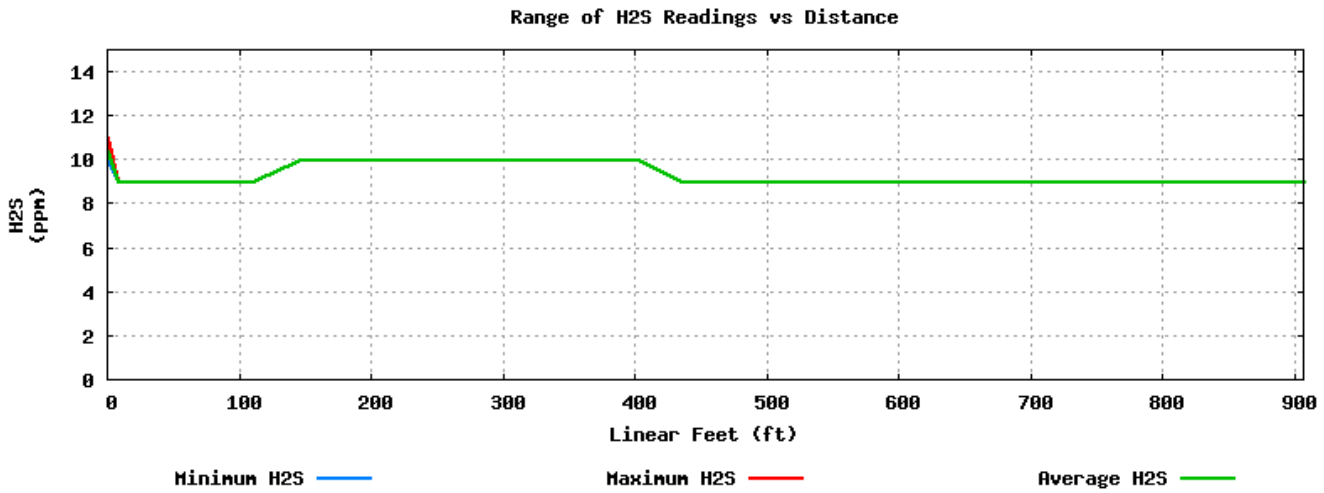
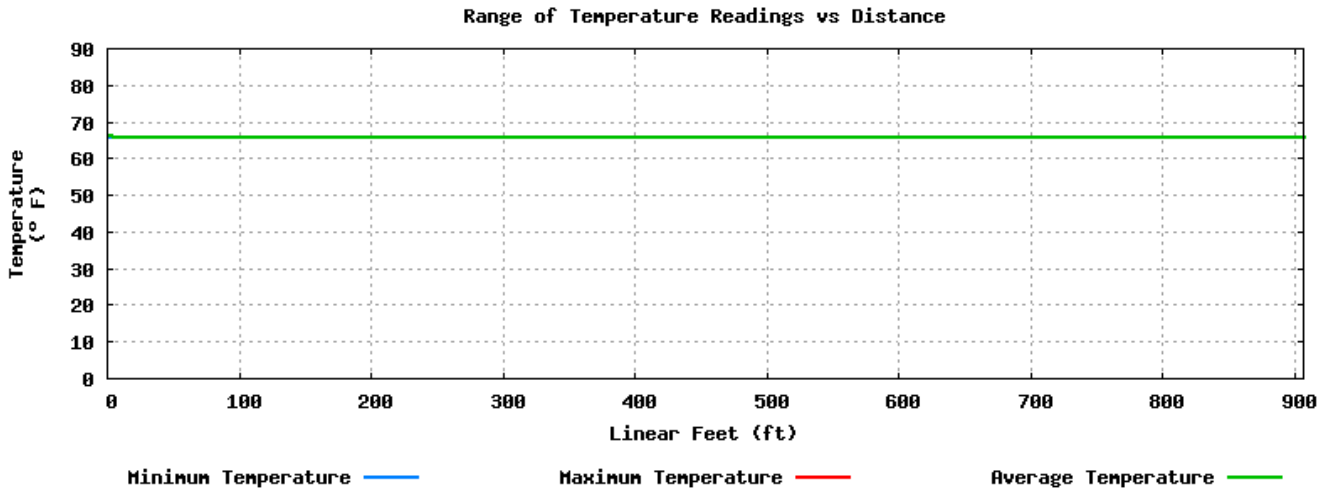
5 Gas

The inspected distance displayed below is the distance upstream from the 1322333 manhole.





General Results	H2S Concentration	Temperature
Maximum	11 ppm	67 degrees F
Minimum	9 ppm	66 degrees F
Average	9.3 ppm	66 degrees F

H2S Concentration	Cumulative Inspected Distance	% of Inspected Distance
Maximum > 2.0 ppm	907.0 ft	100.0 %
Average > 2.0 ppm	907.0 ft	100.0 %

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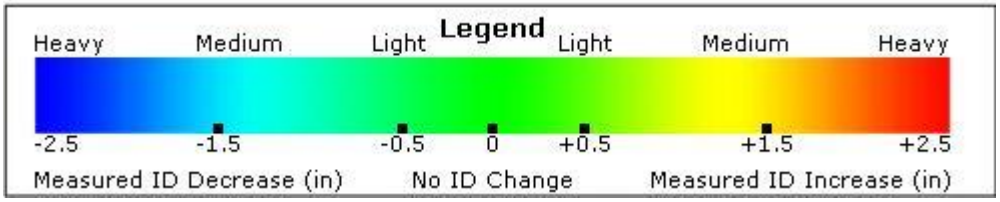
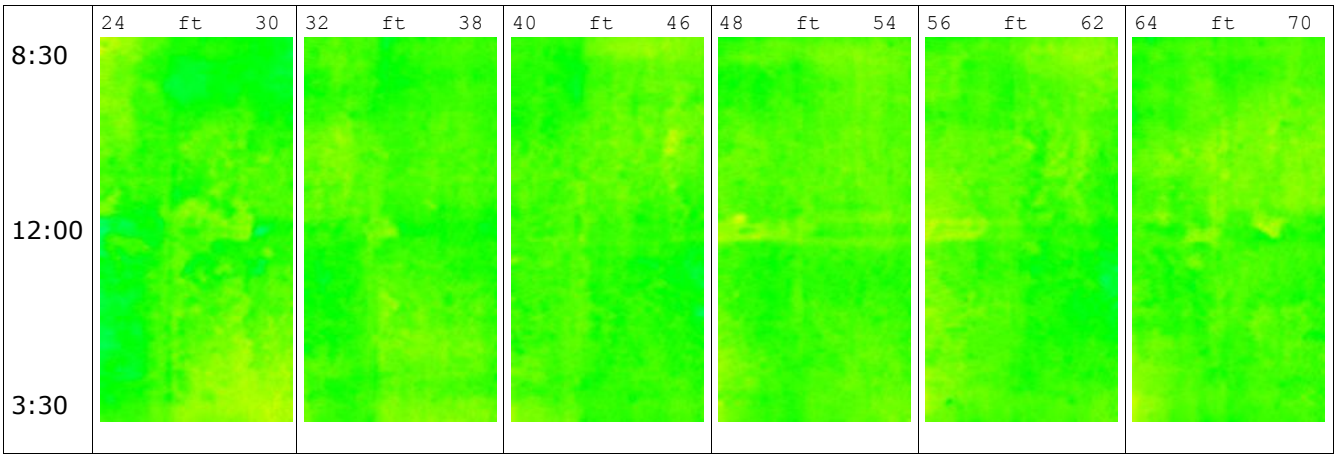
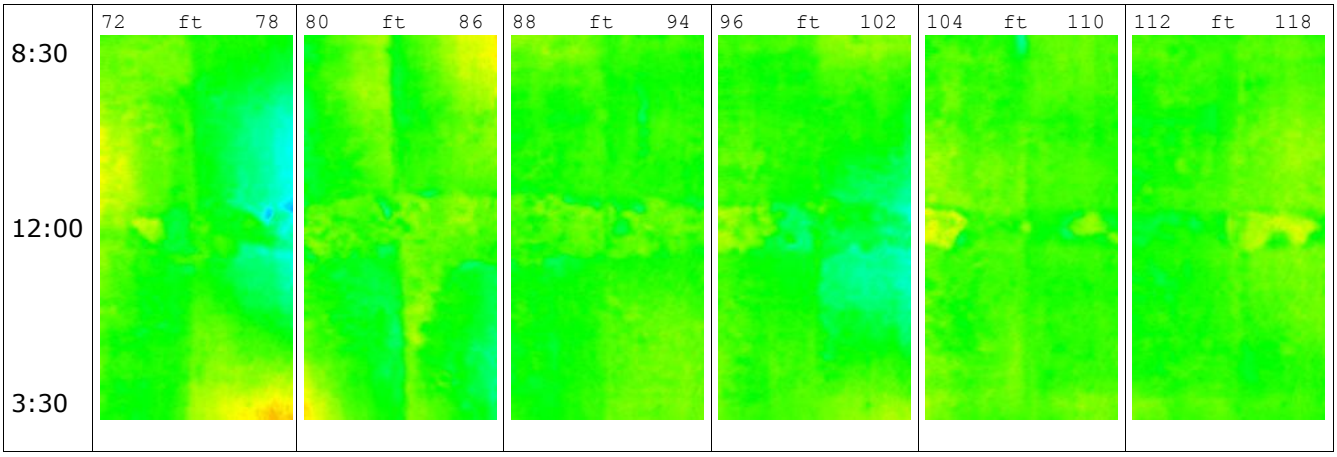
6 Corrosion and Buildup

Laser scans marked with a ✳ symbol have been identified as a pipe feature such as a tap, lateral, connection, or access shaft. In order to accurately represent the pipe's condition, the data contained in scans of pipe features is excluded from the measurements and graphs of ovality, pipe geometry, and pipe wall loss.

6.1 Precision Scans







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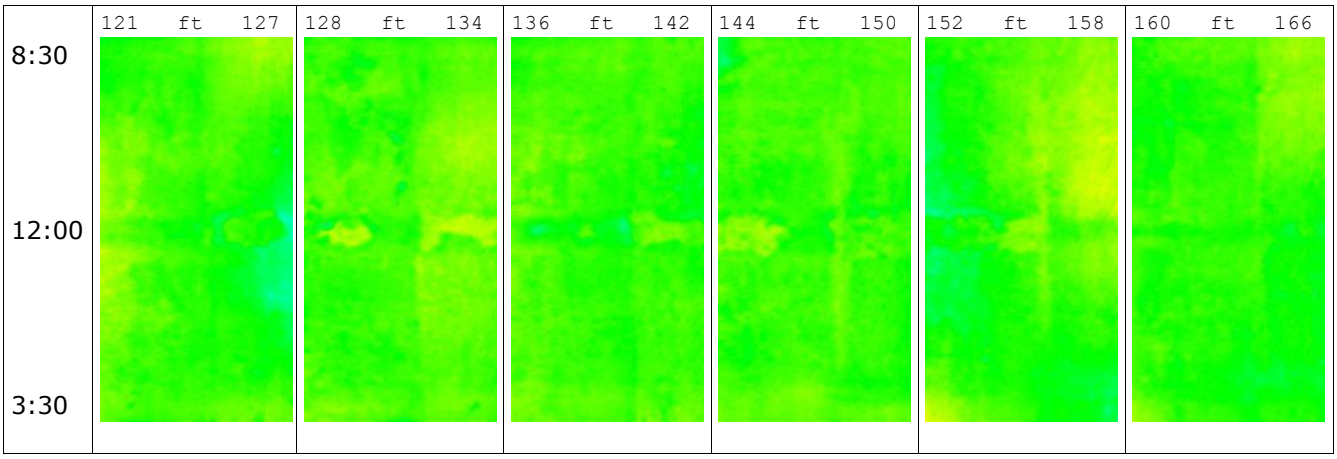

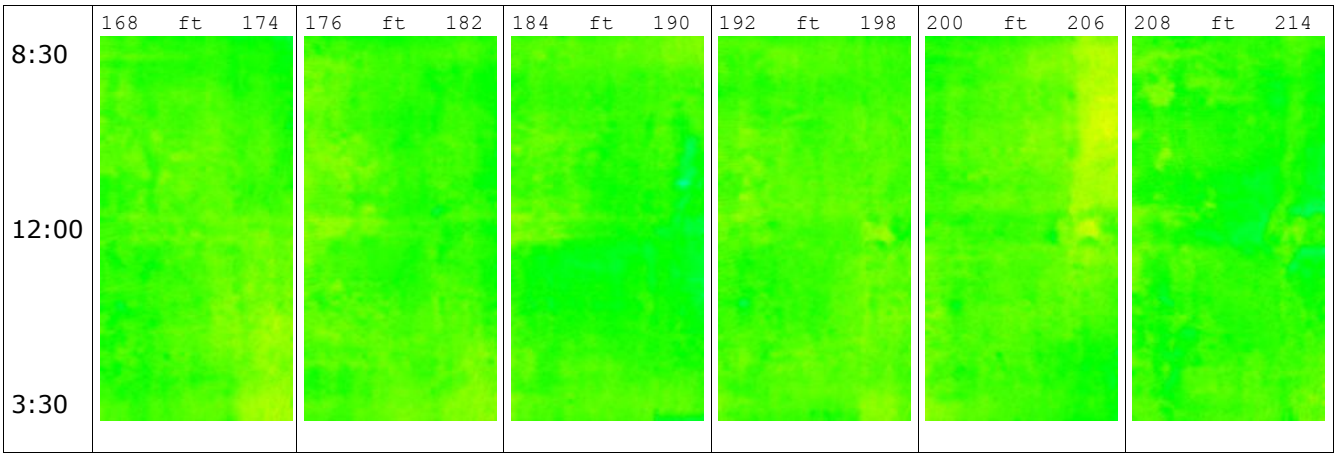

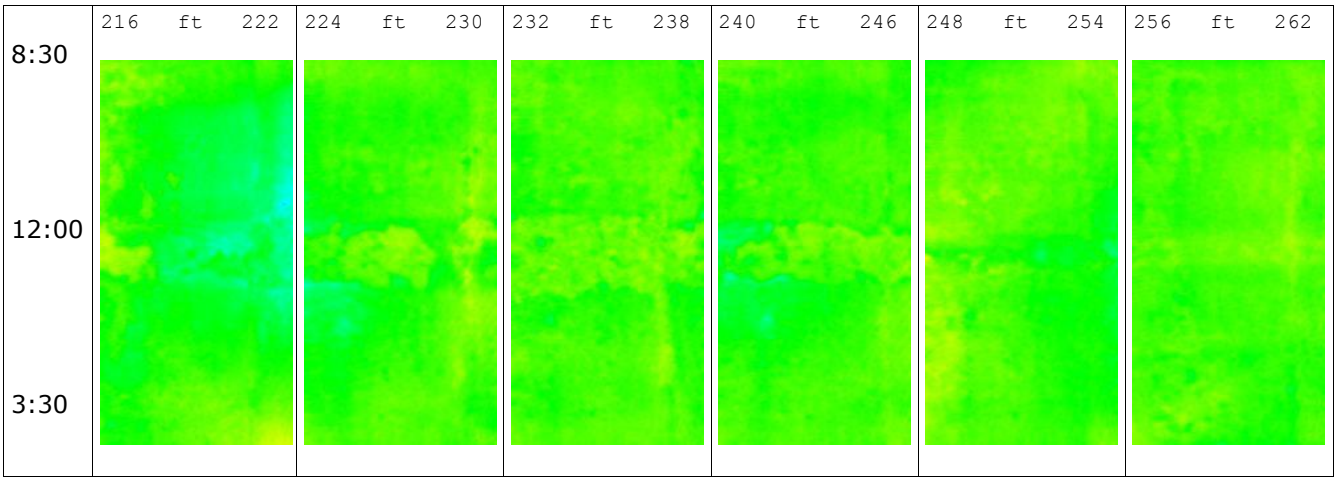

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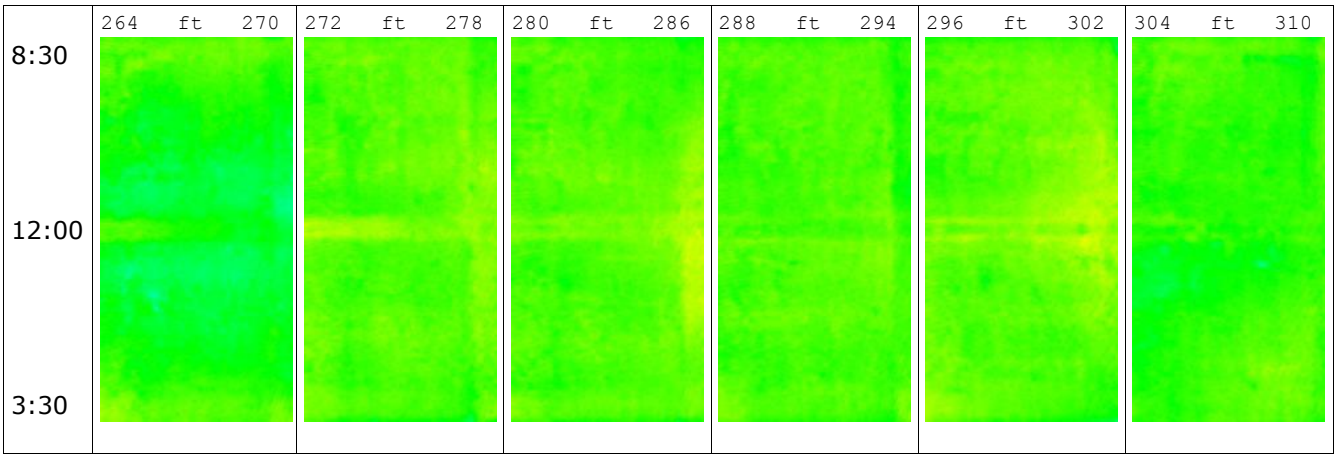

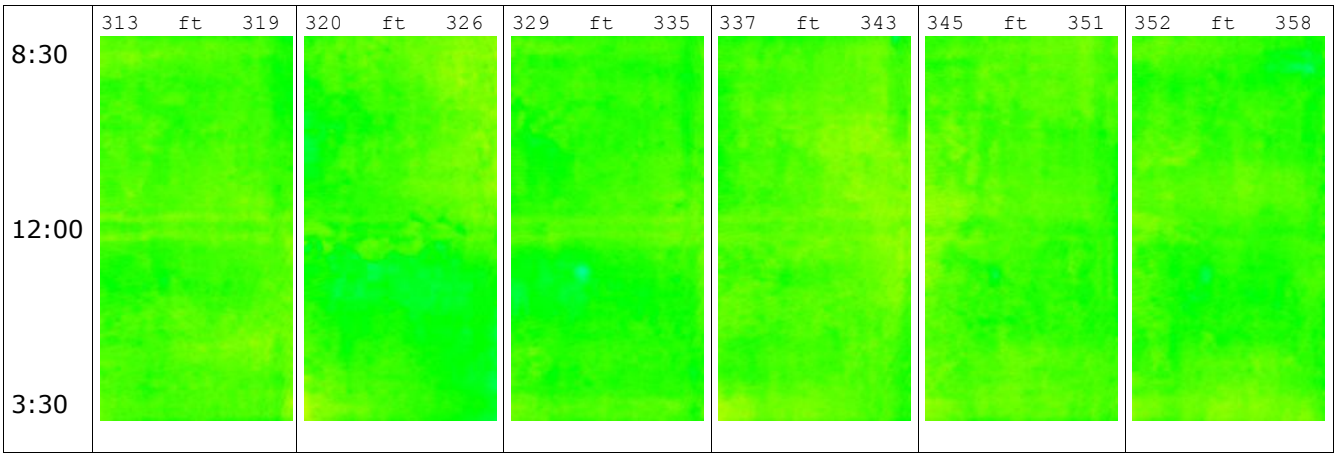

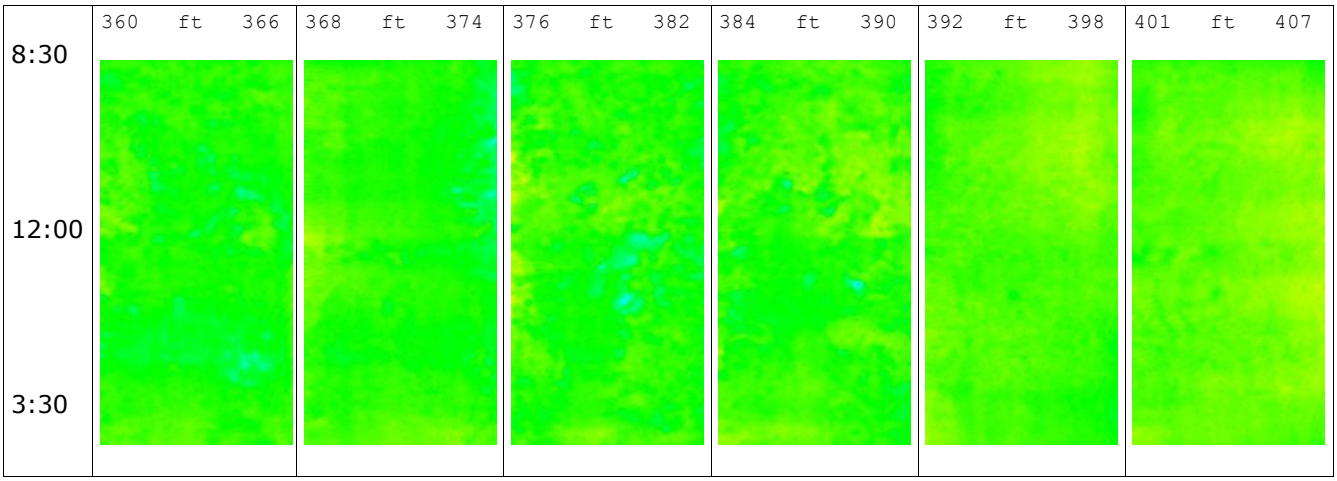

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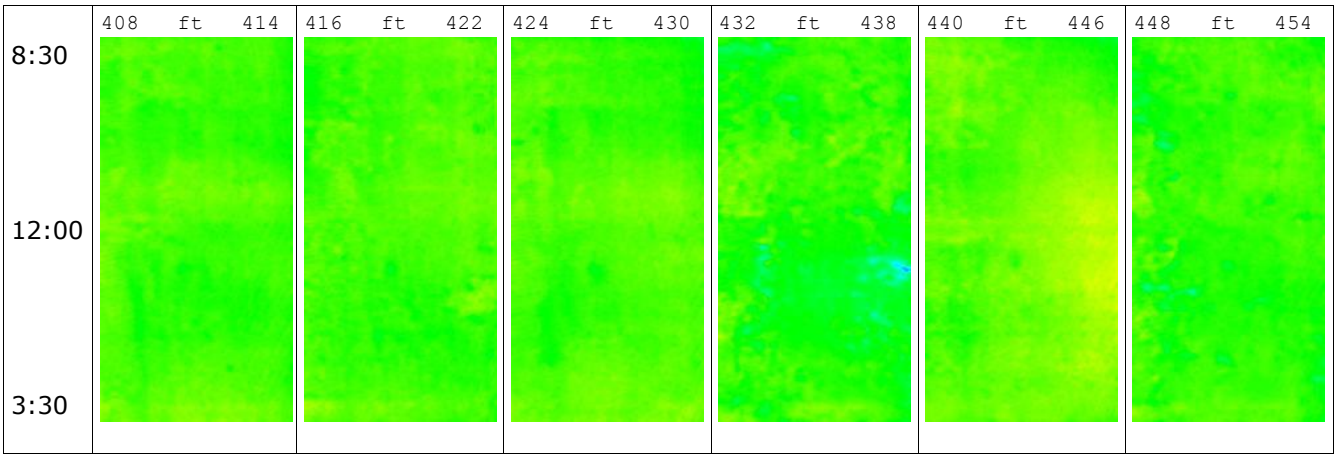

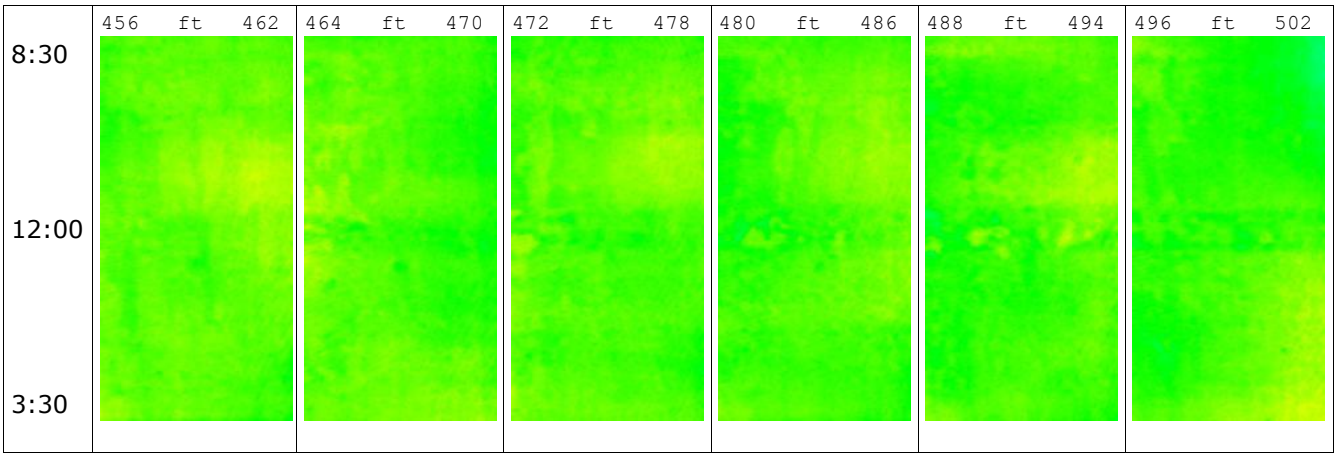

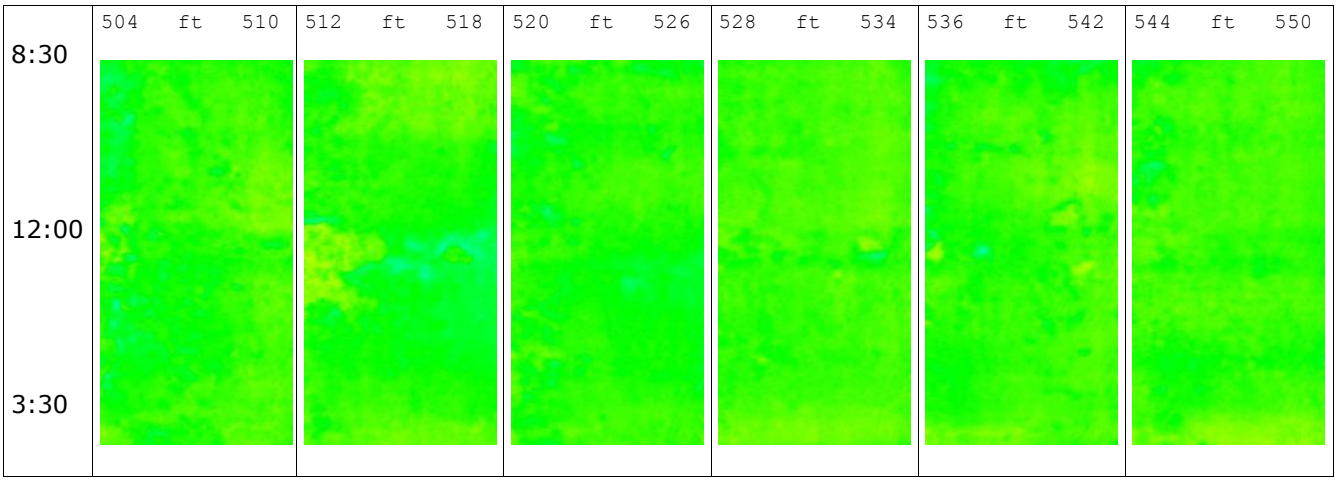

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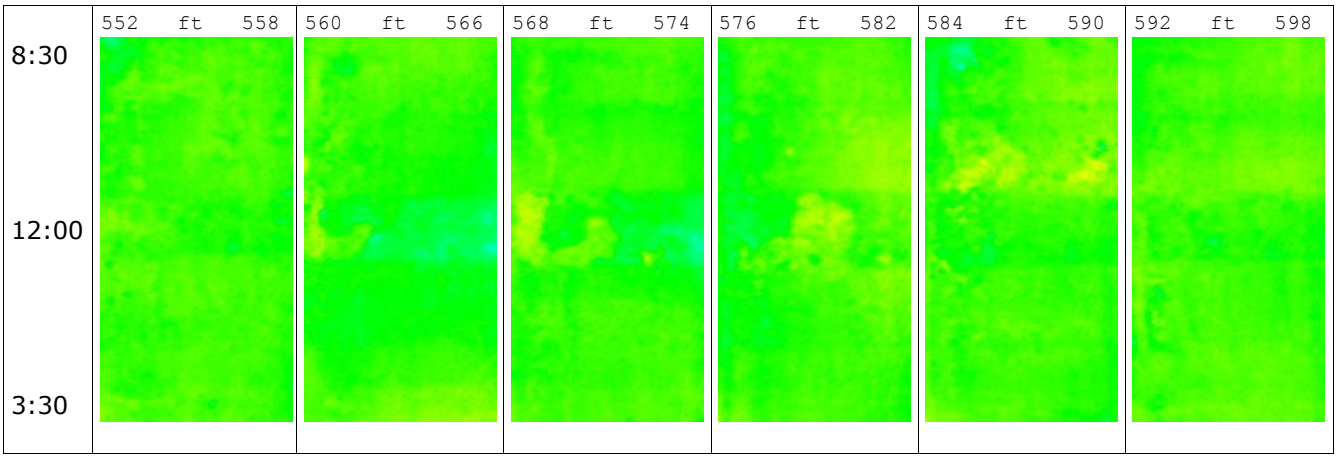

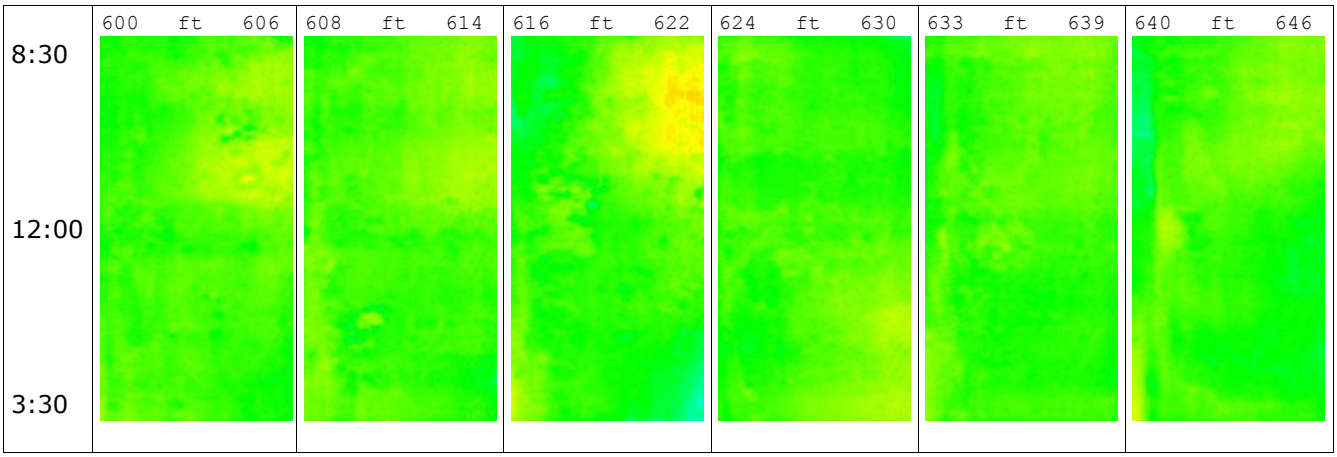

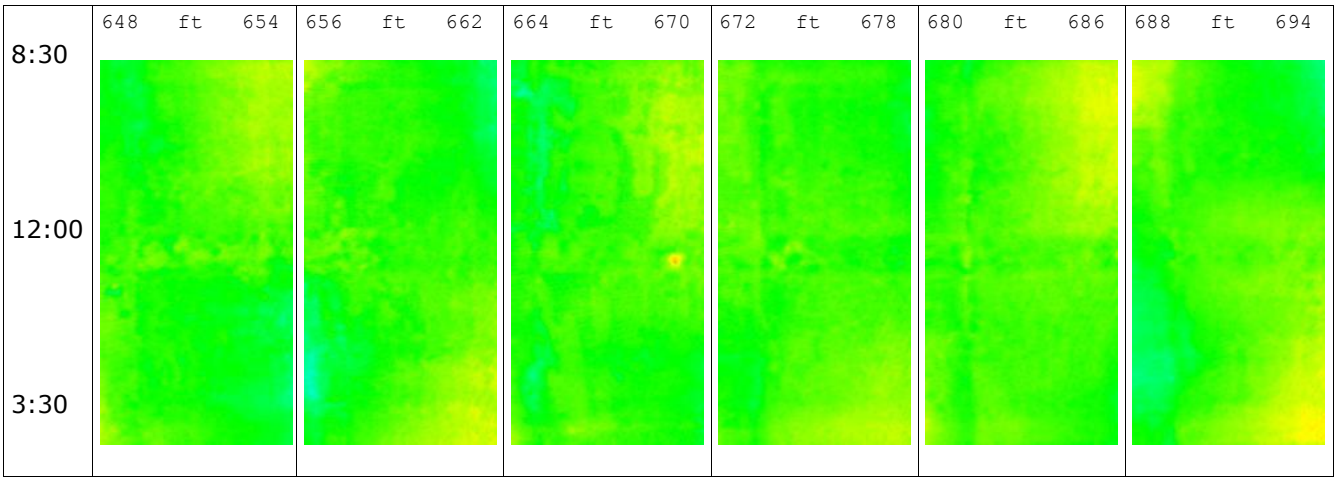

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12:00
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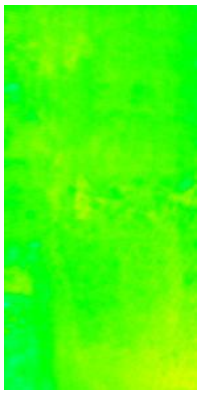
696 ft 702

704 ft 710



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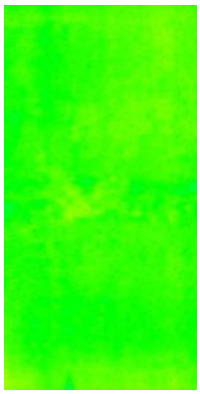

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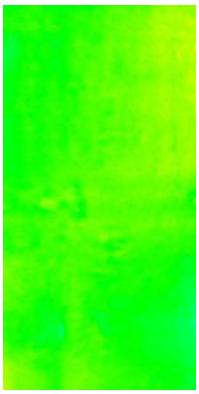

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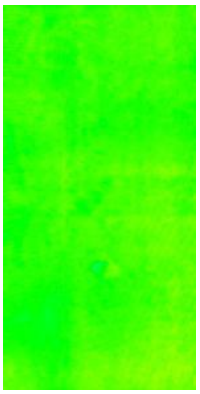

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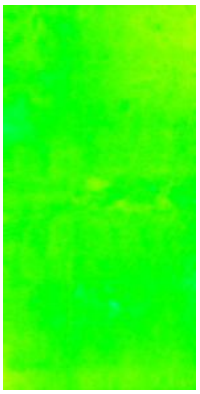

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744 ft 750

752 ft 758

760 ft 766

768 ft 774

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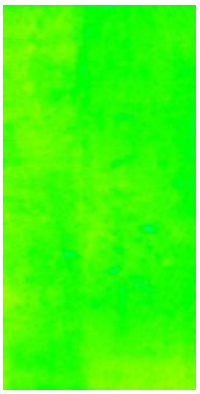

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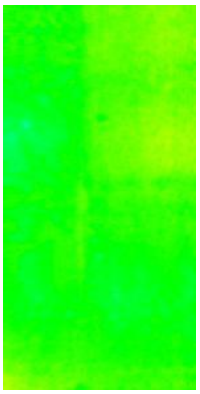

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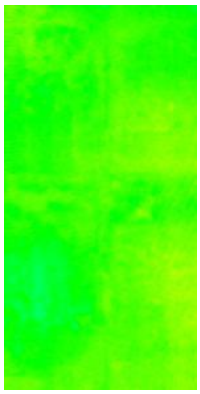

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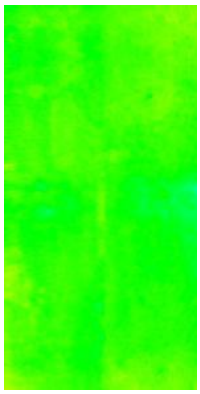

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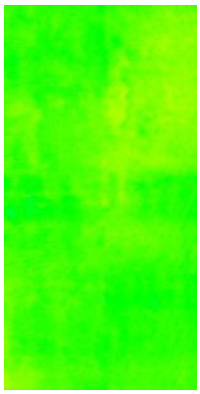

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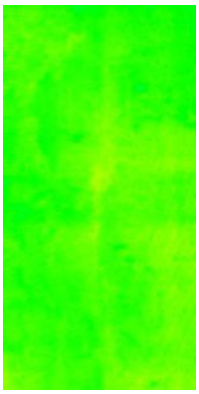
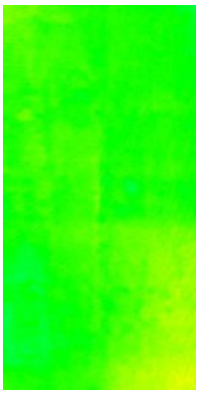


824 ft 830



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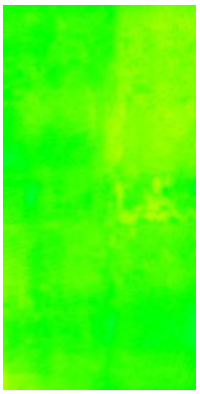

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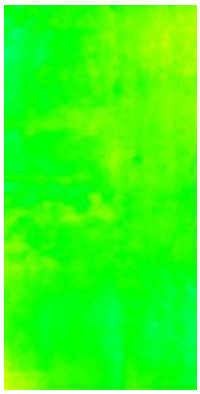
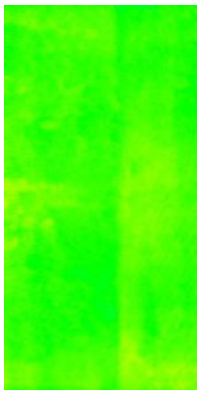
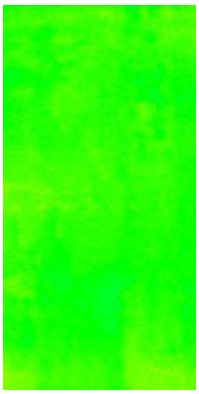
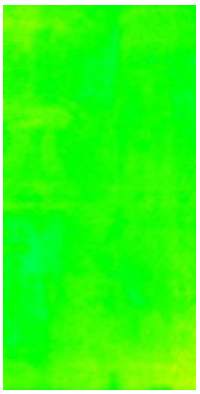
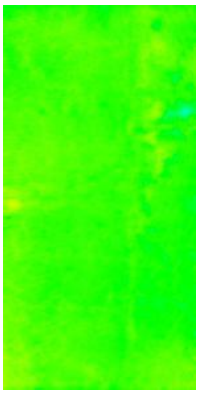
8:30						
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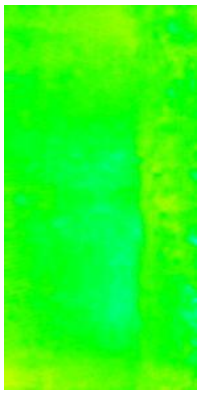
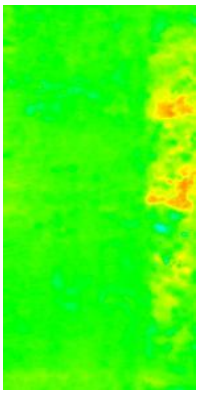
	888 ft 894	896 ft 902				
8:30						
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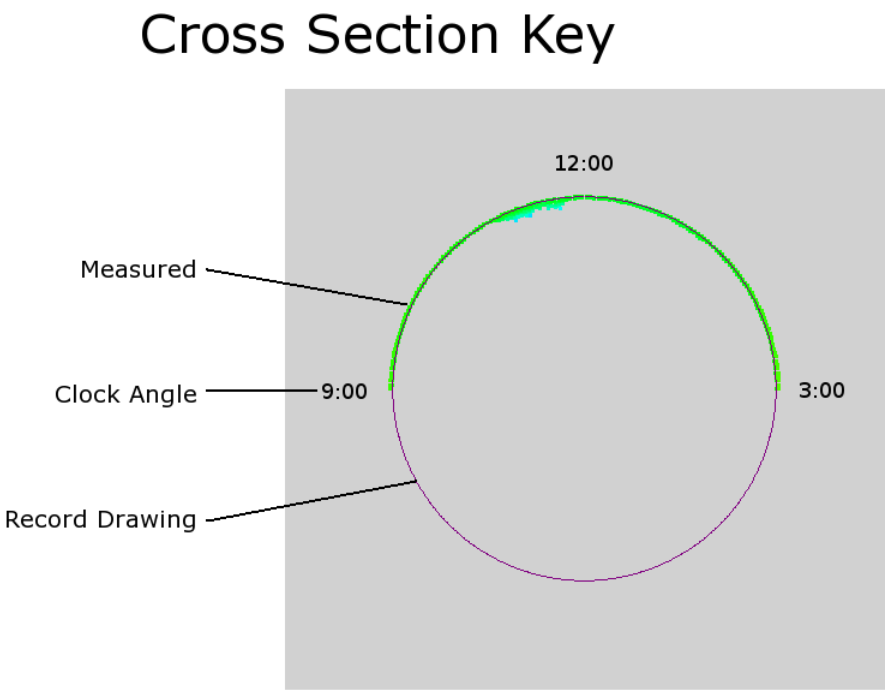
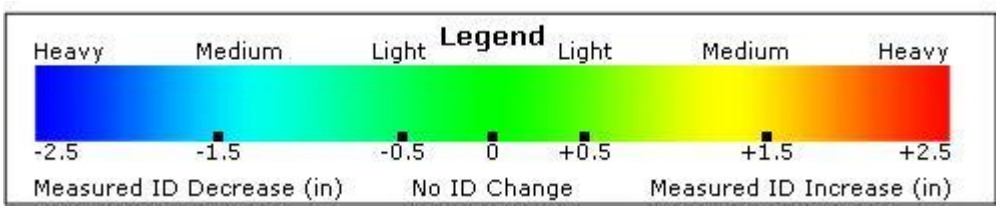
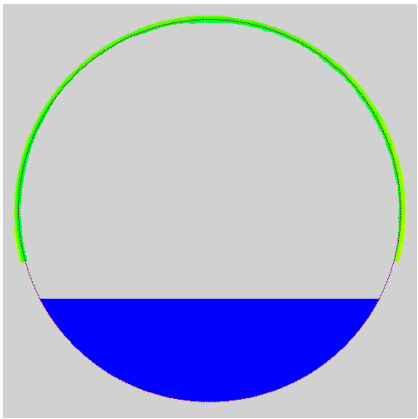
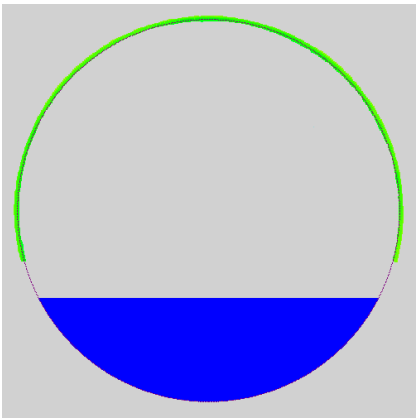
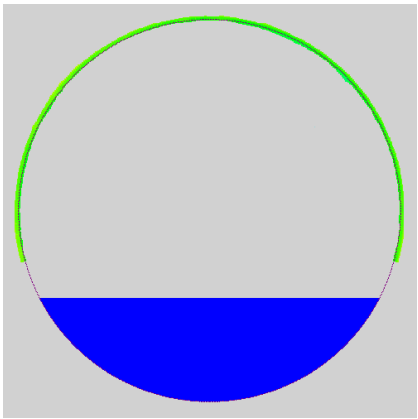
6.2 Cross Sections





24ft	32ft	40ft
		

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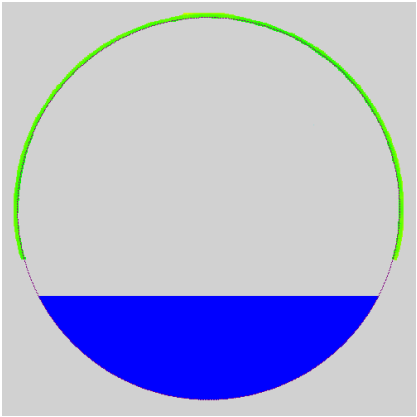

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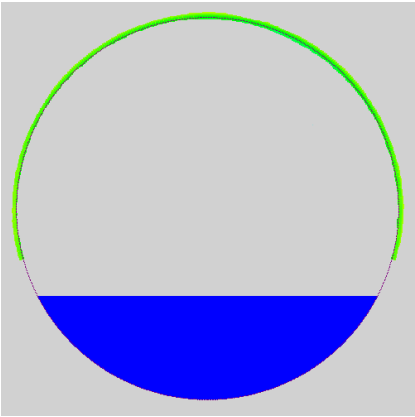

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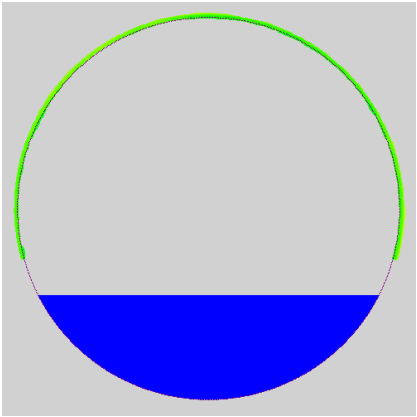

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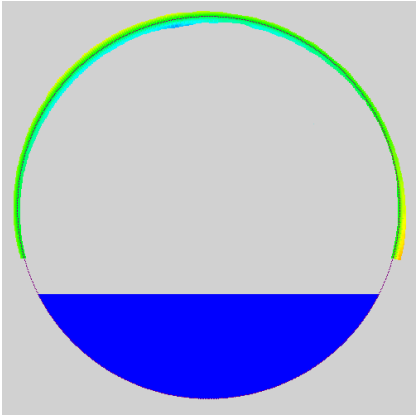

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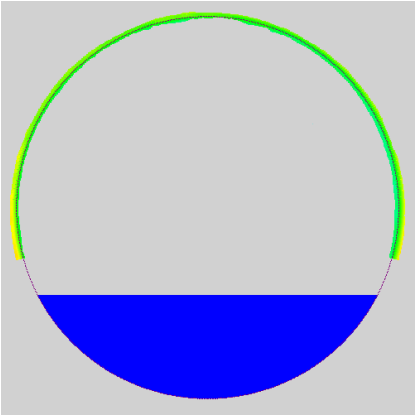

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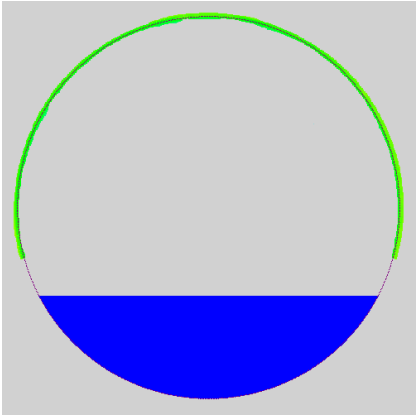

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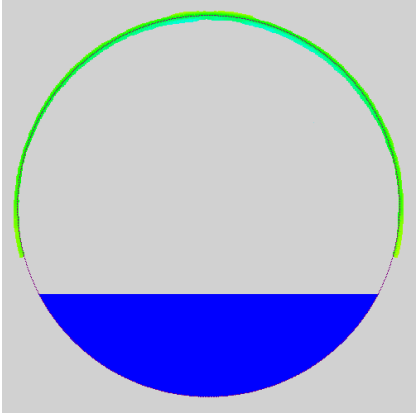

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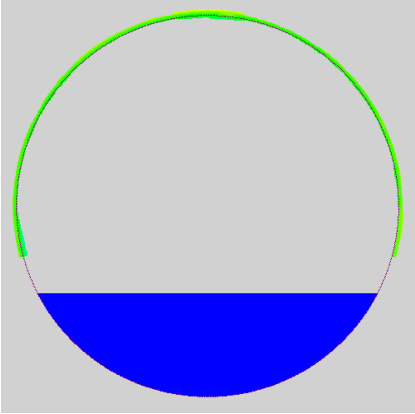

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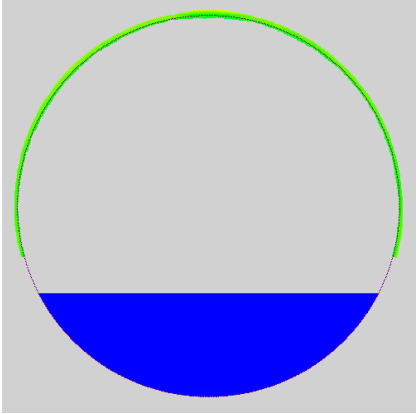

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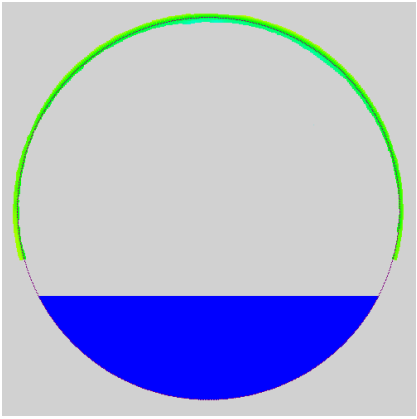

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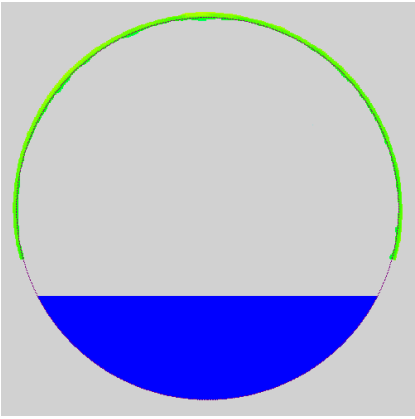

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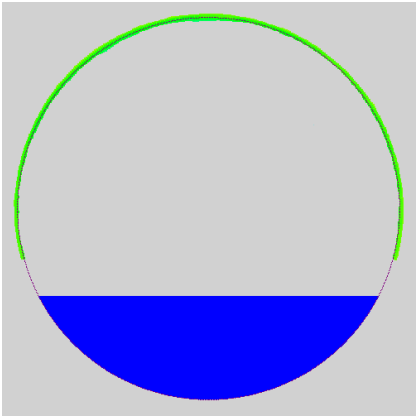

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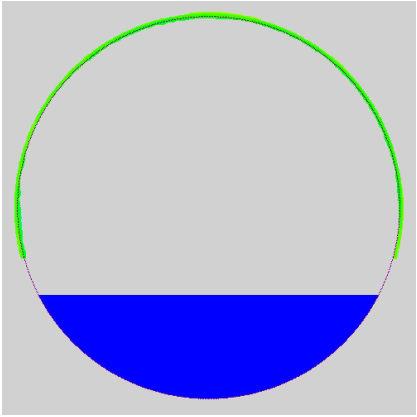

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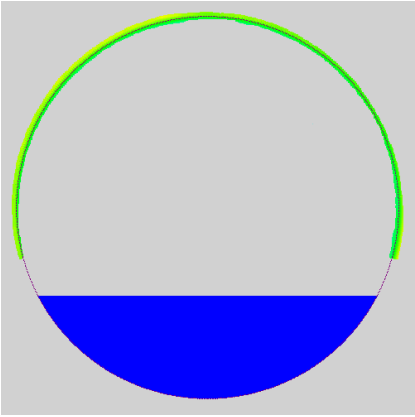

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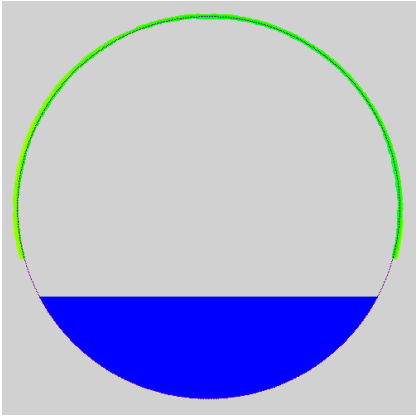

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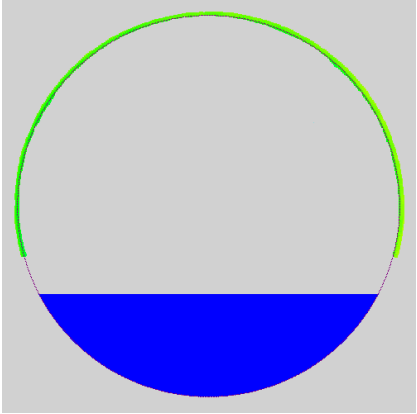

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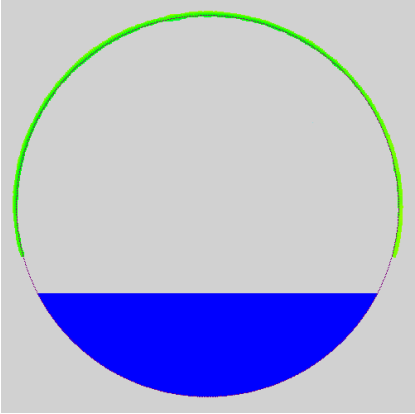

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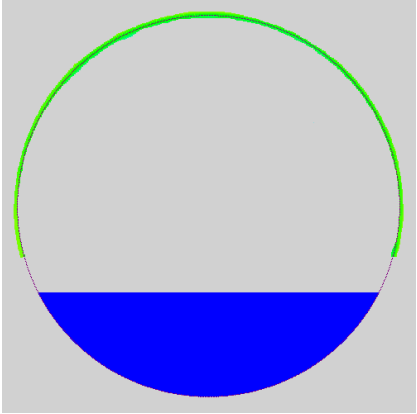

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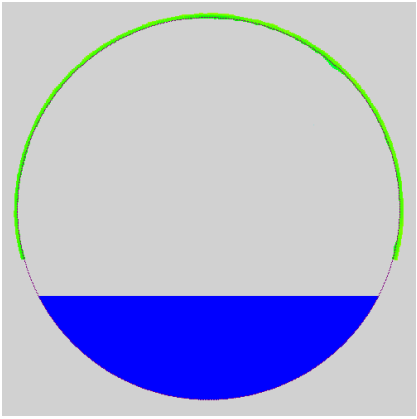

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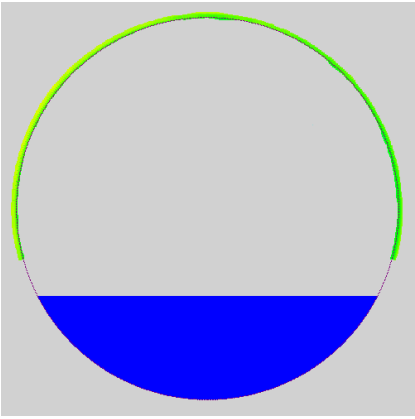

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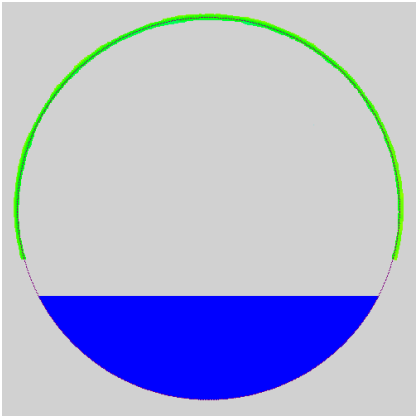

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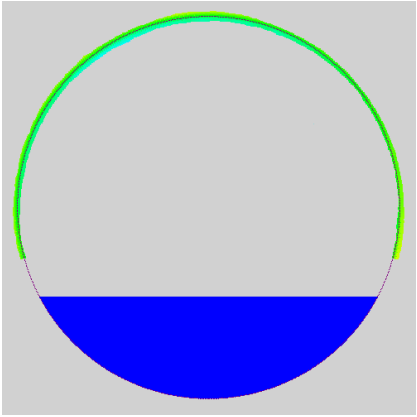

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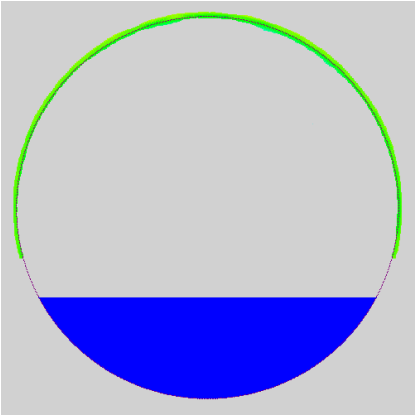

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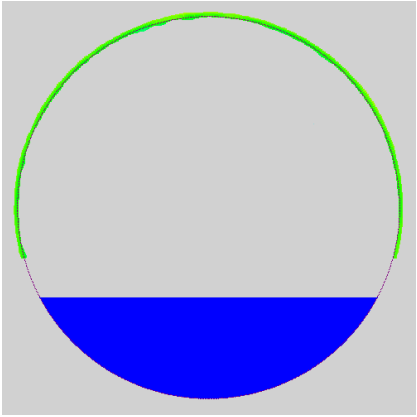

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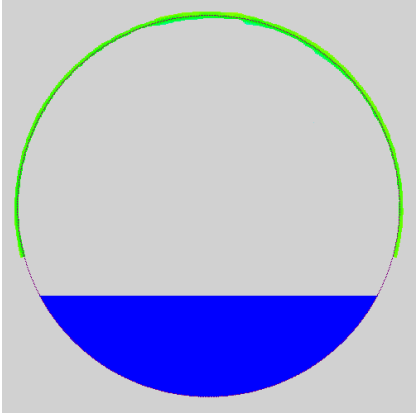

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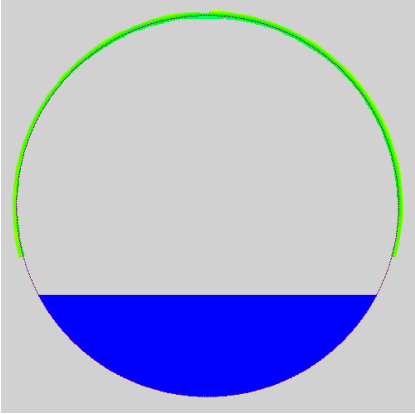

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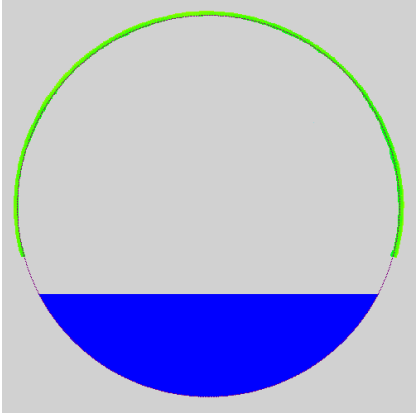

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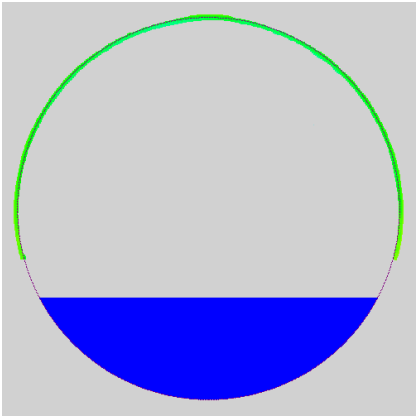

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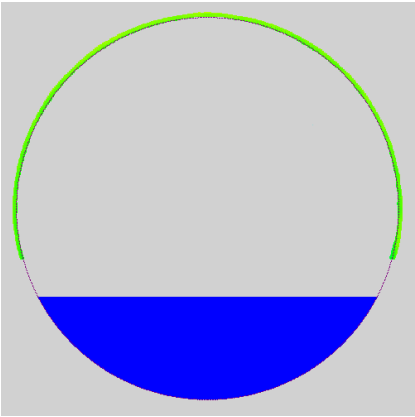

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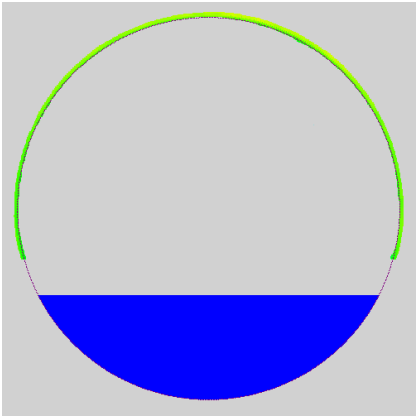

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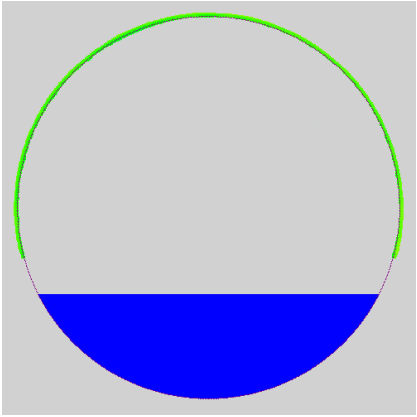

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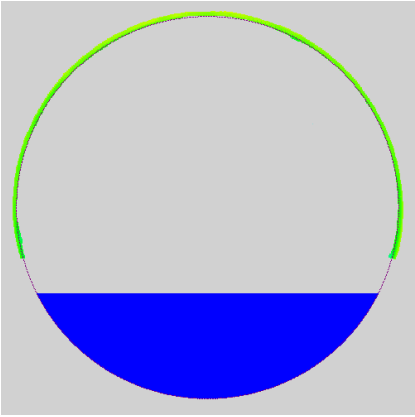

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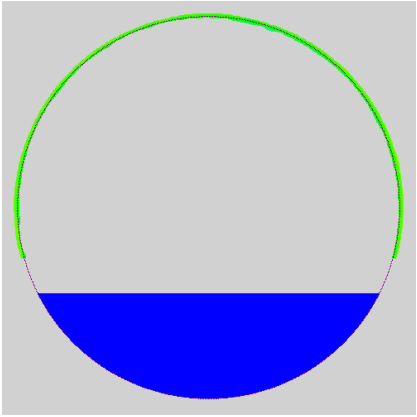

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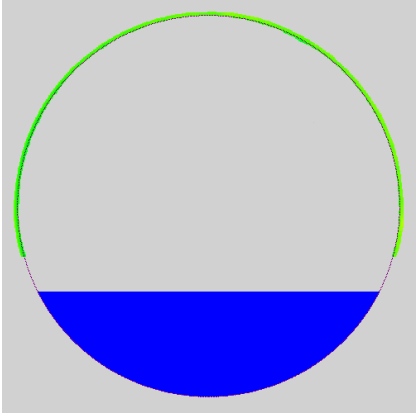

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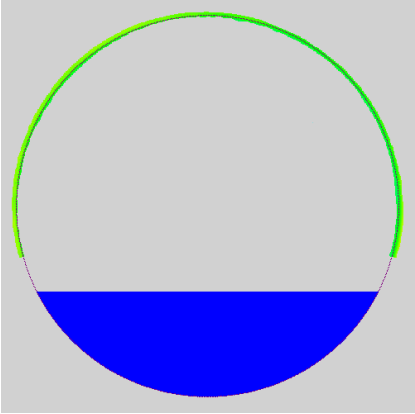

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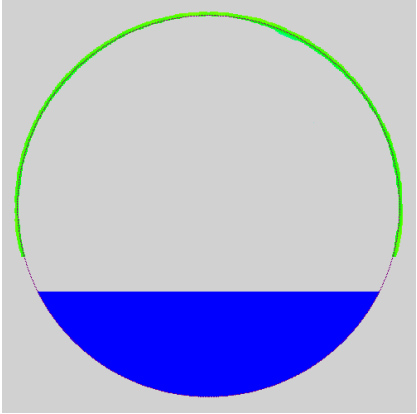

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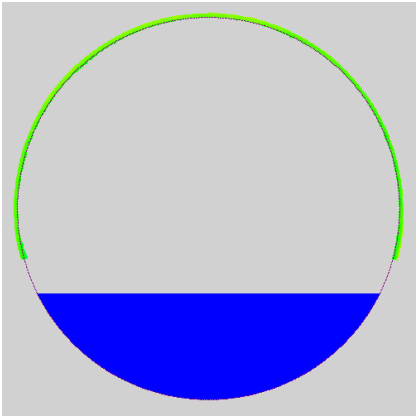

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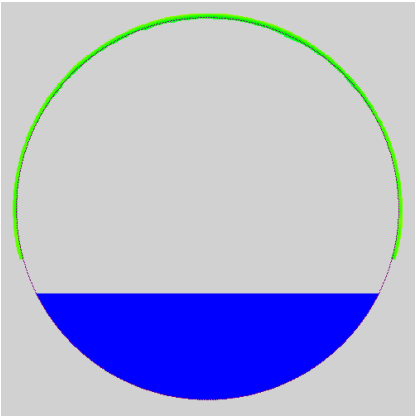

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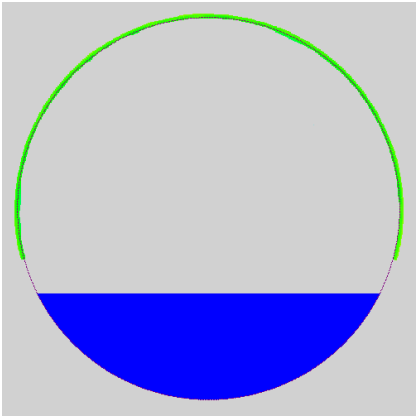

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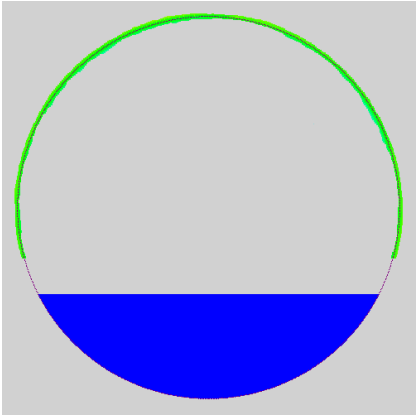

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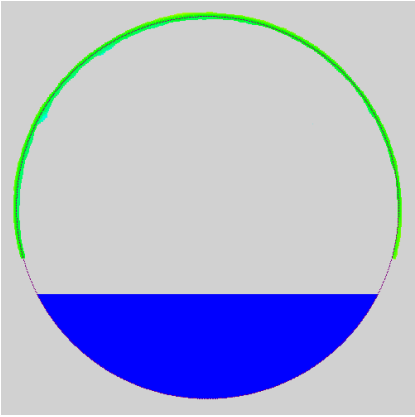

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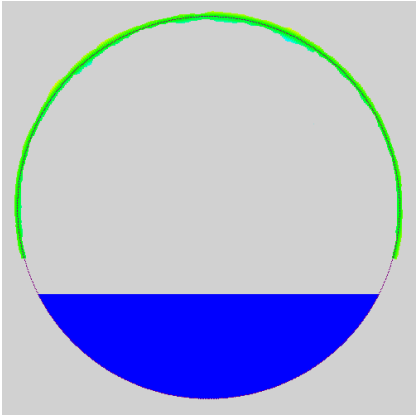

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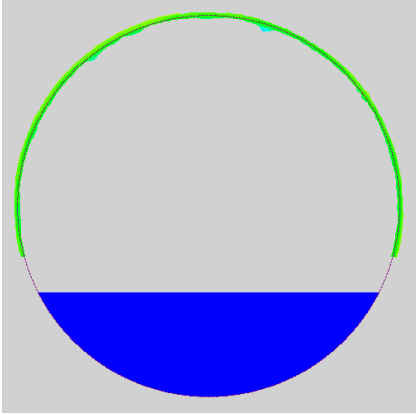

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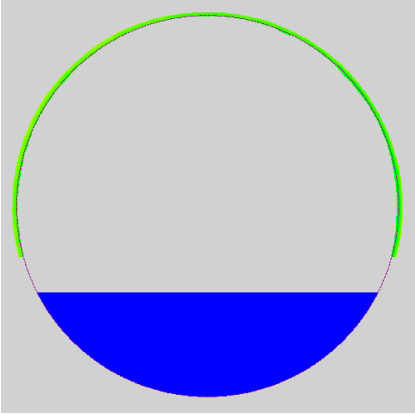

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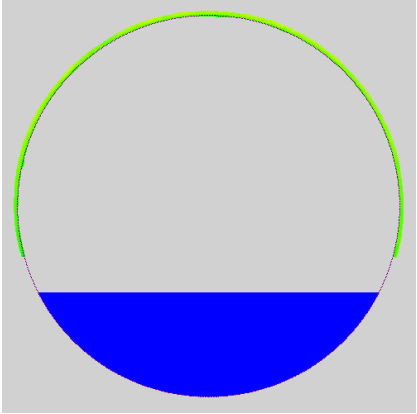

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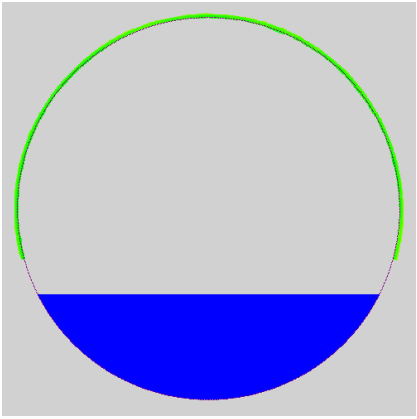

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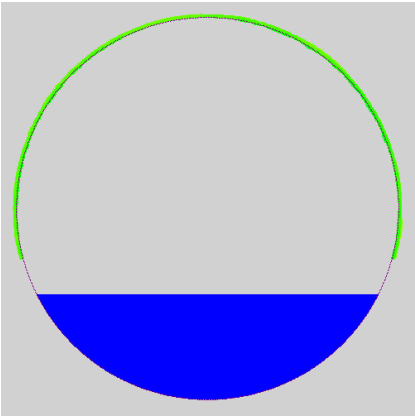

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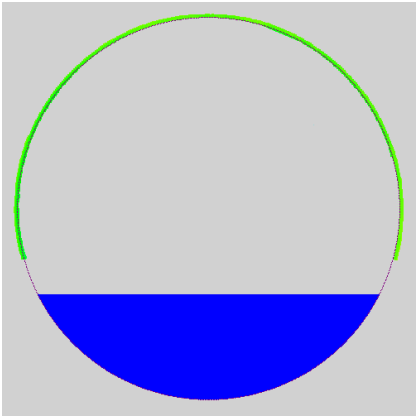

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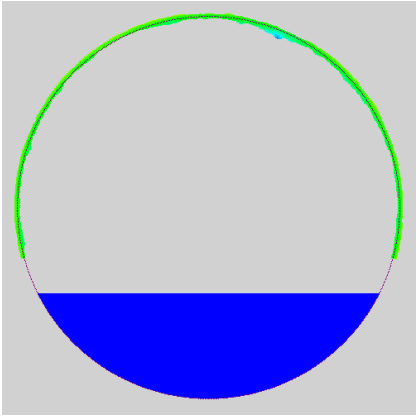

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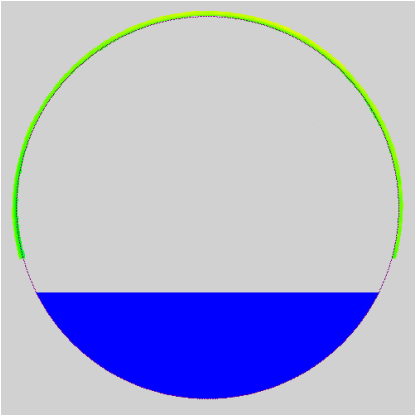

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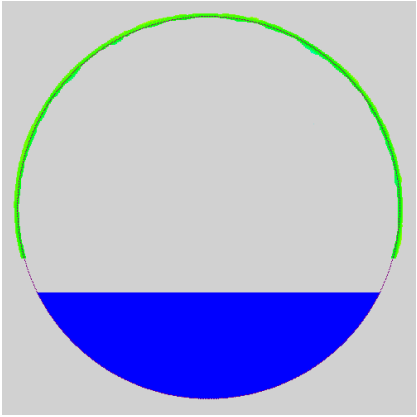

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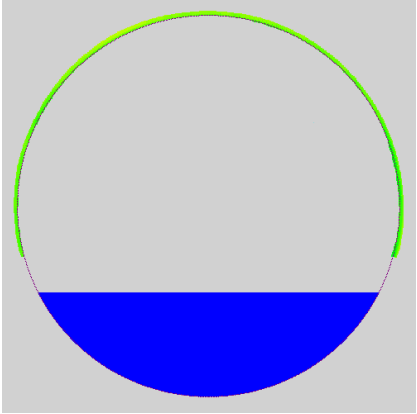

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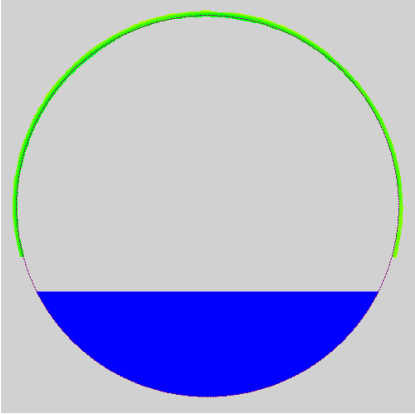

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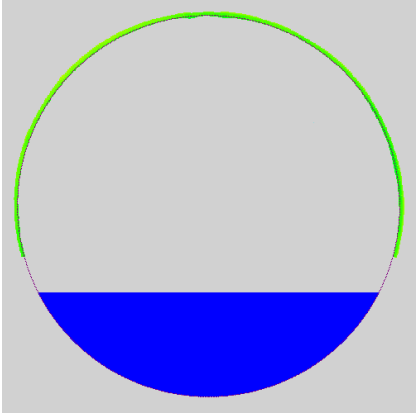

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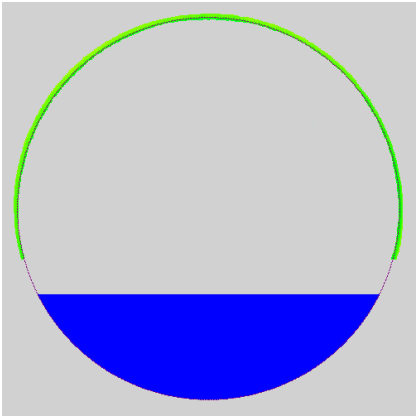

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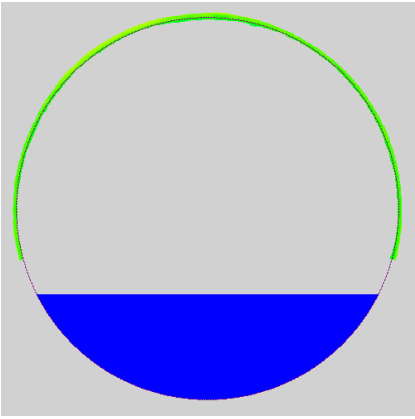

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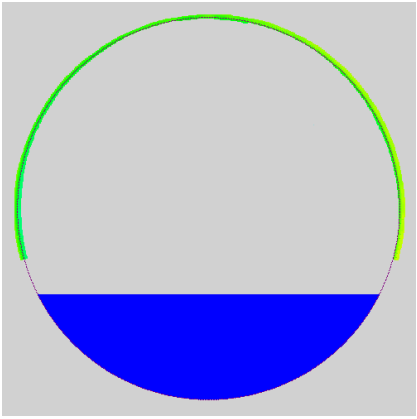

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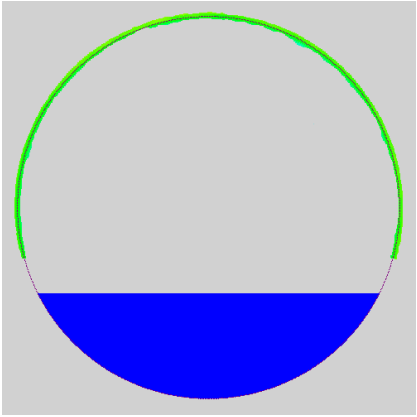

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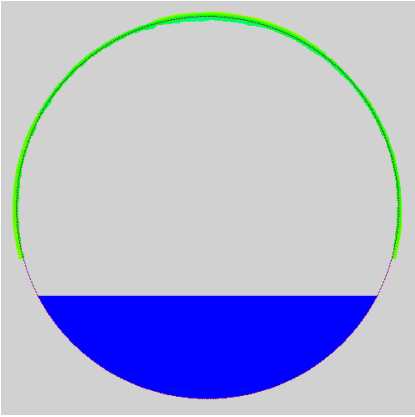

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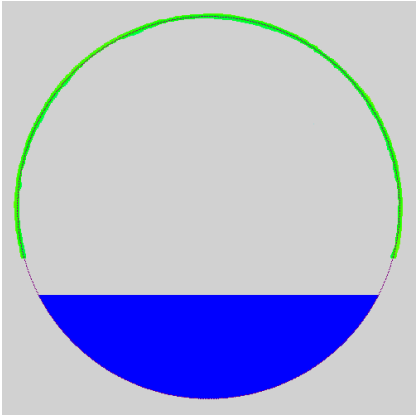

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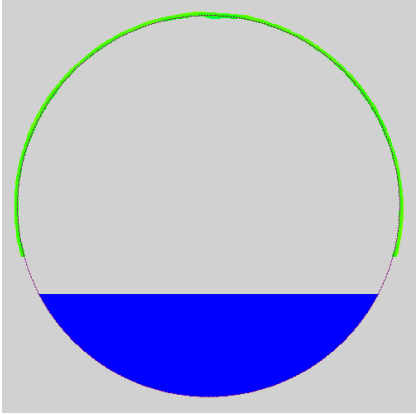

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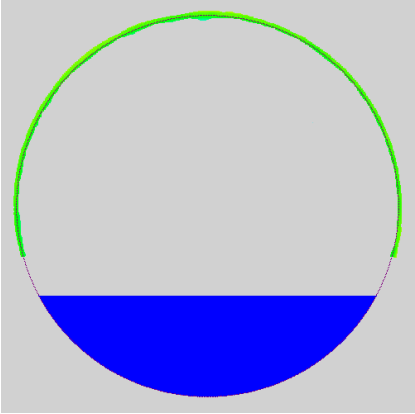

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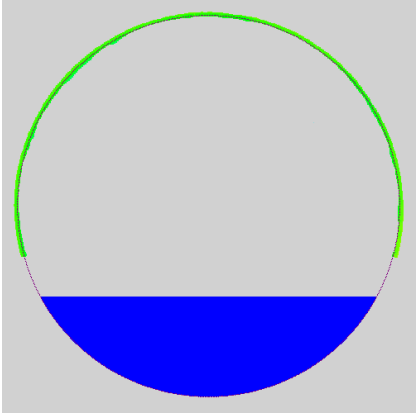

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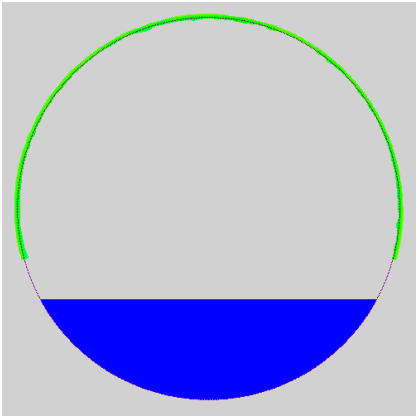

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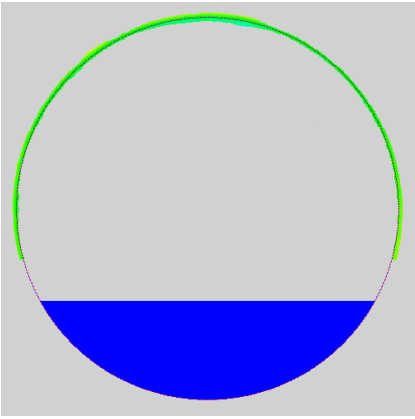

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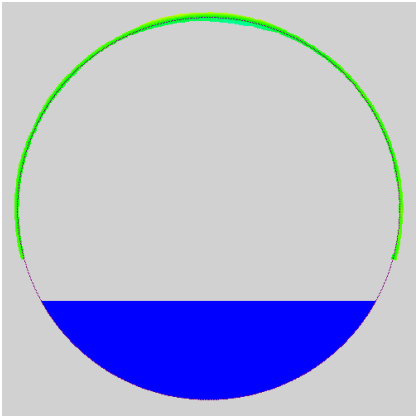

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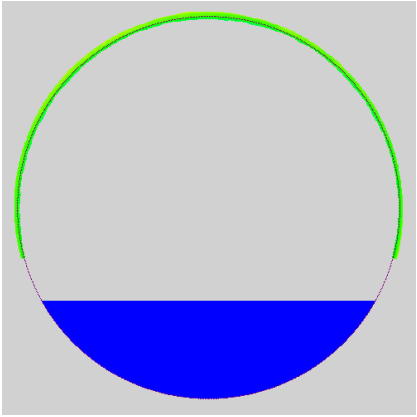

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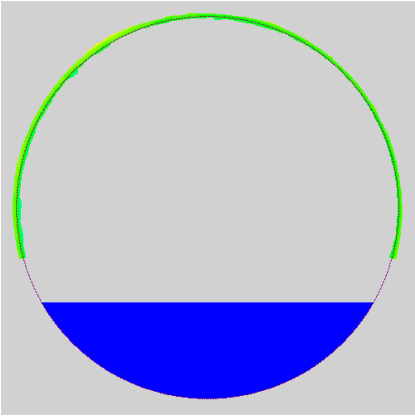

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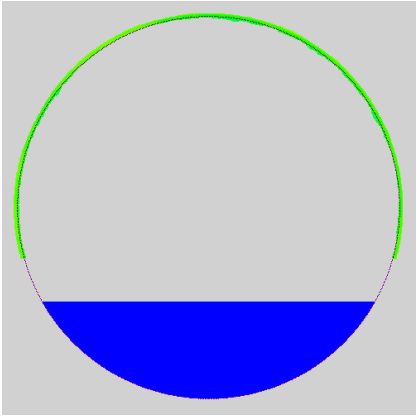

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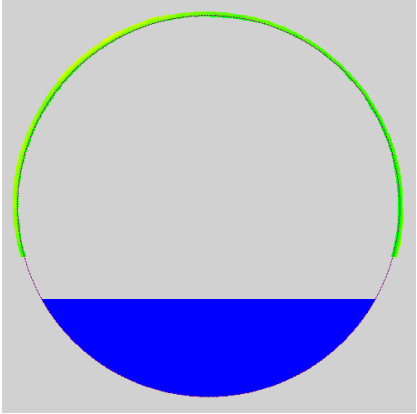

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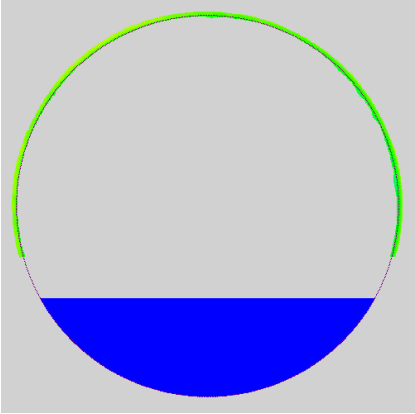

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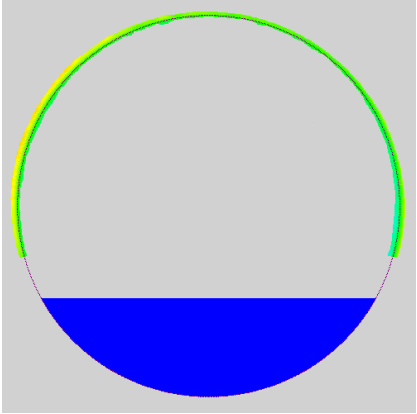

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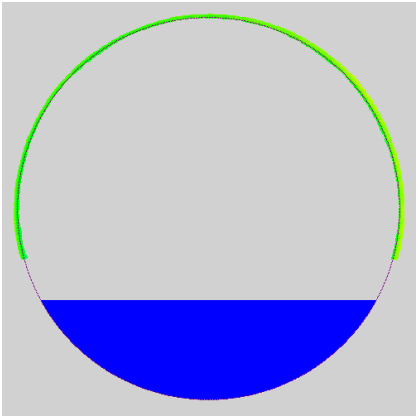

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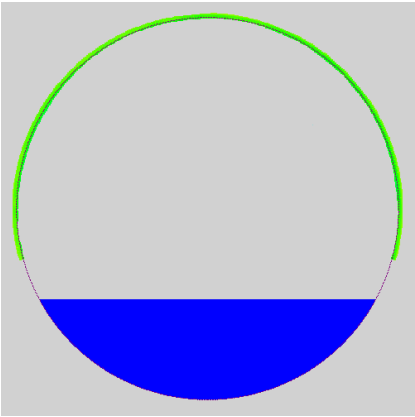

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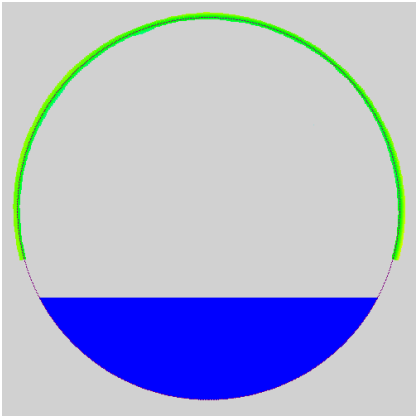

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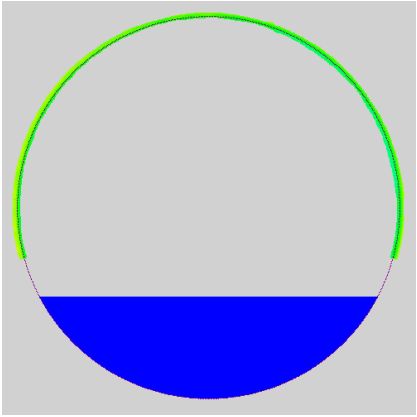

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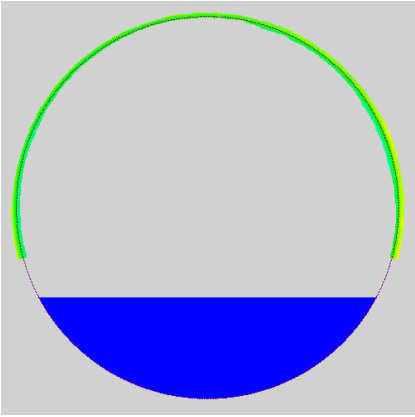

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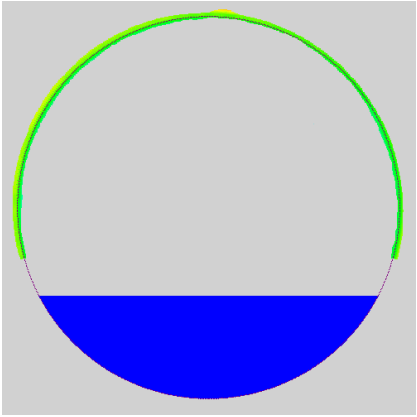

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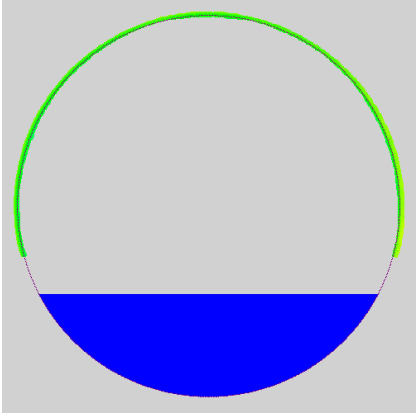

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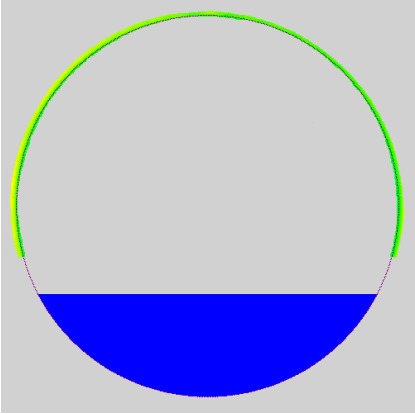

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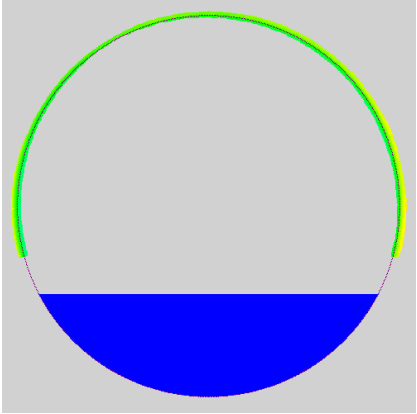

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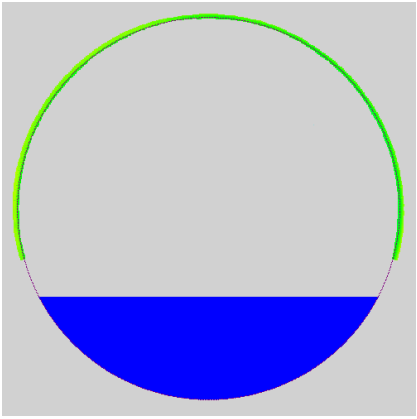

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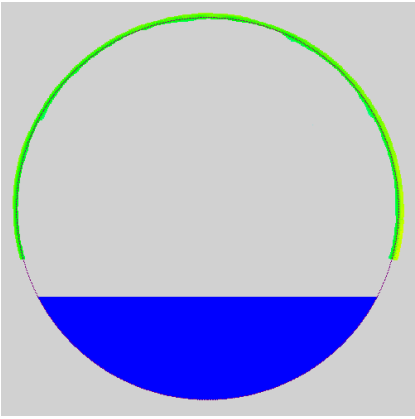

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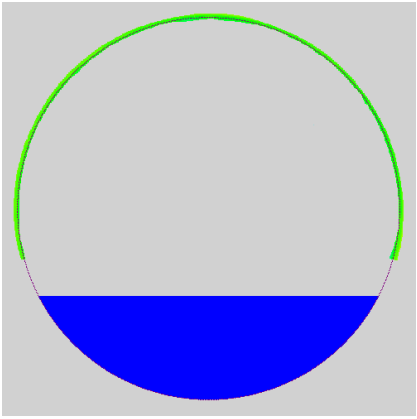

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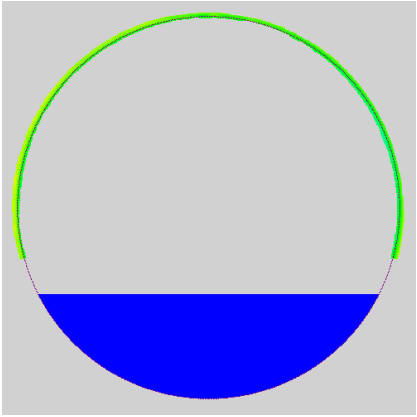

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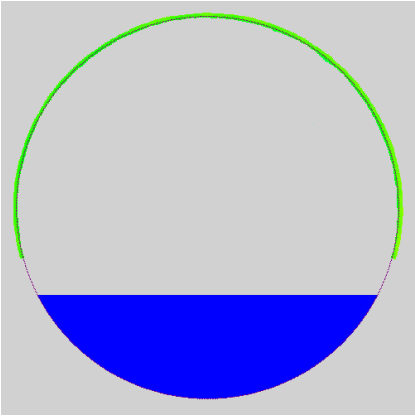

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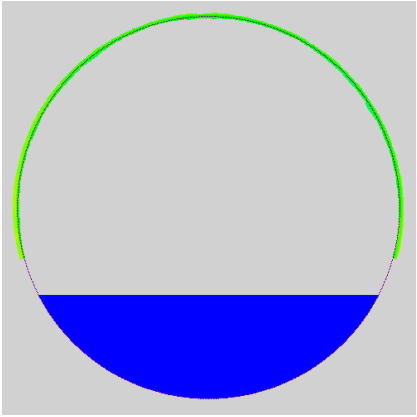

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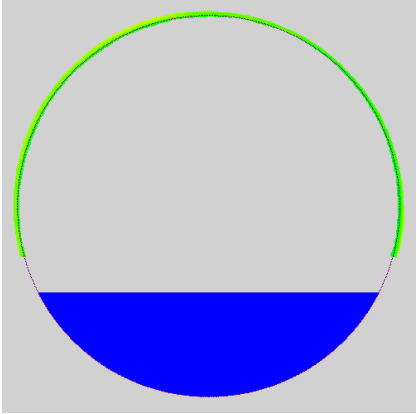

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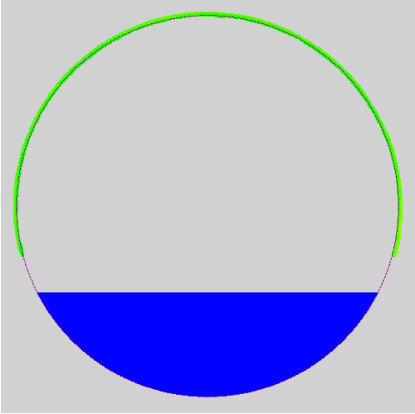

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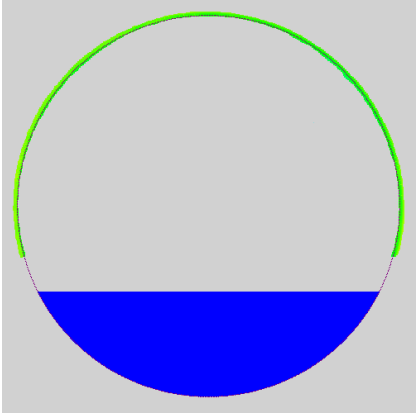

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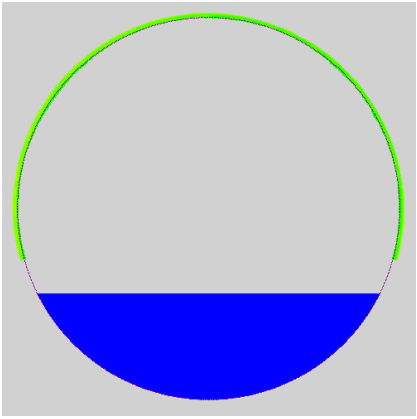

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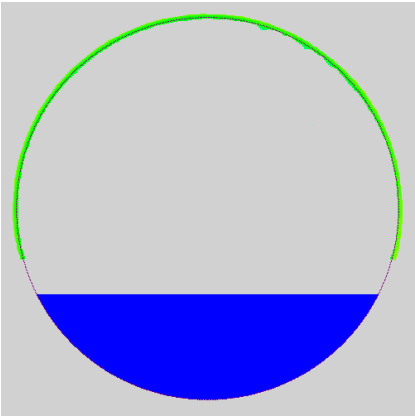

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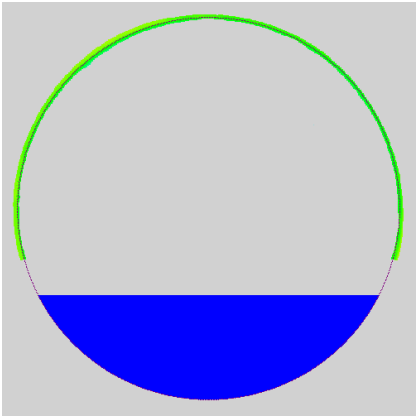

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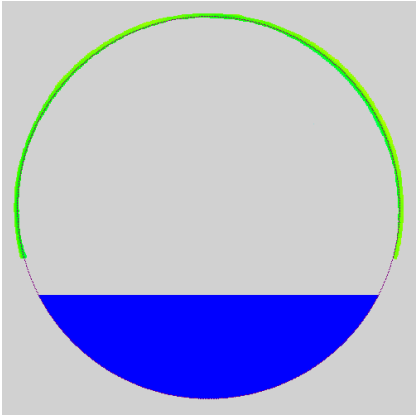

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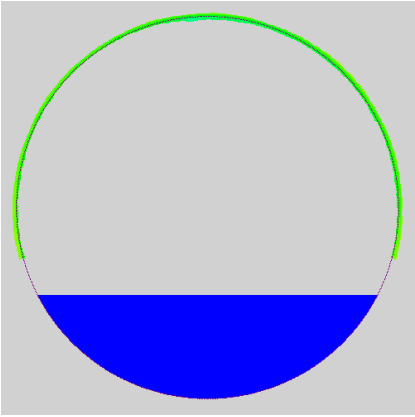

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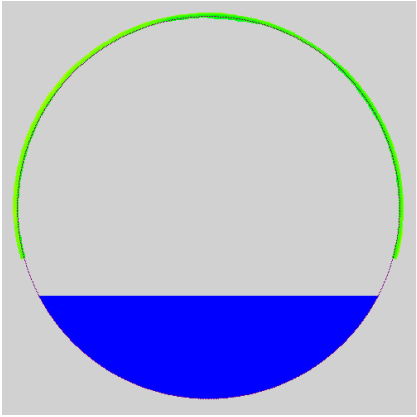

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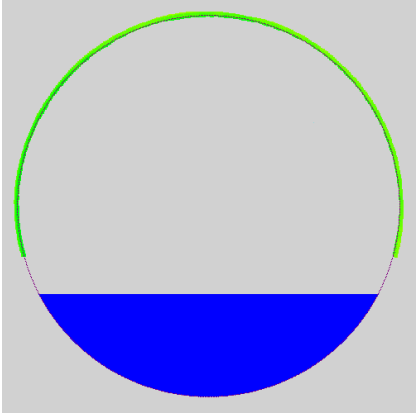

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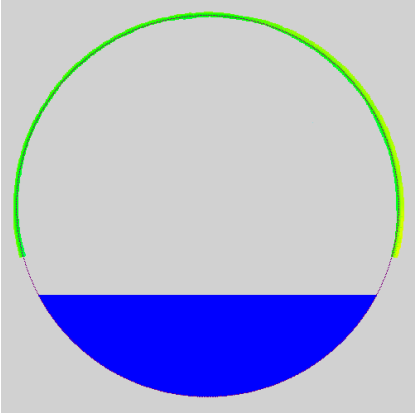

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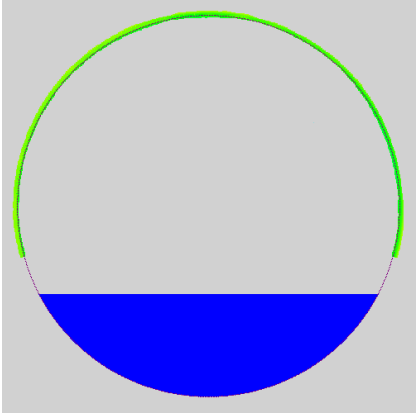

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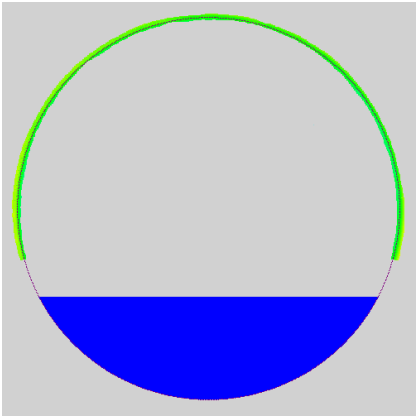

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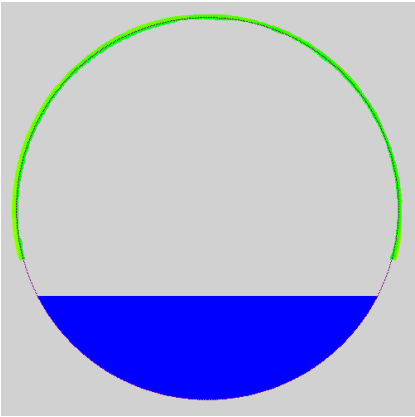

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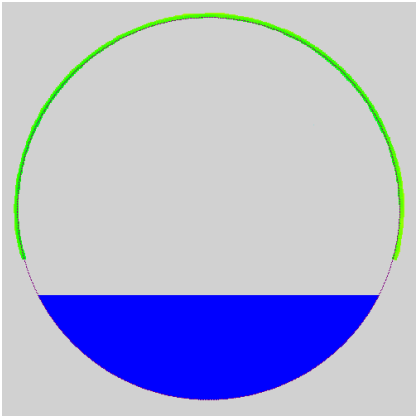

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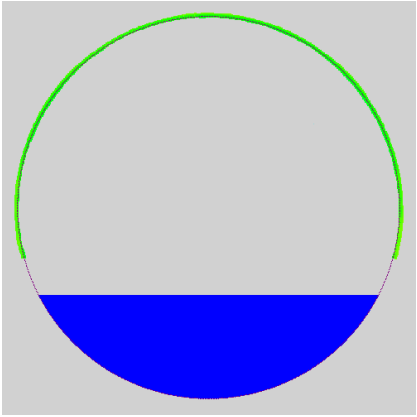

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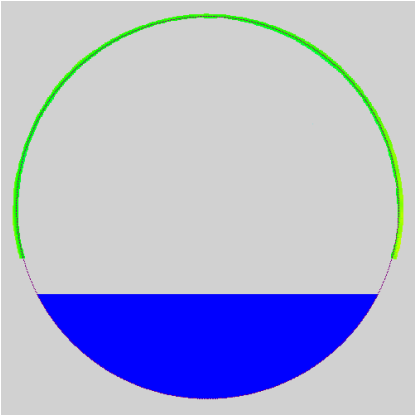

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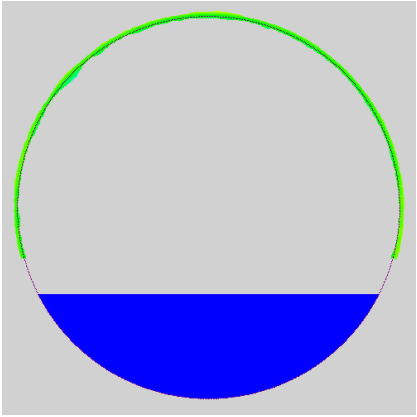

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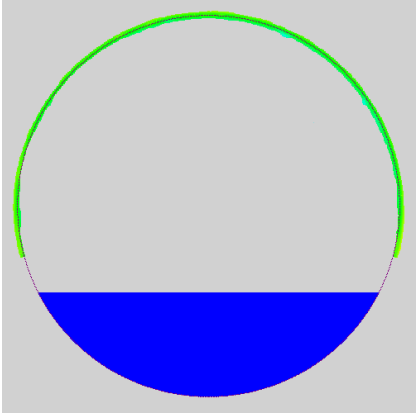

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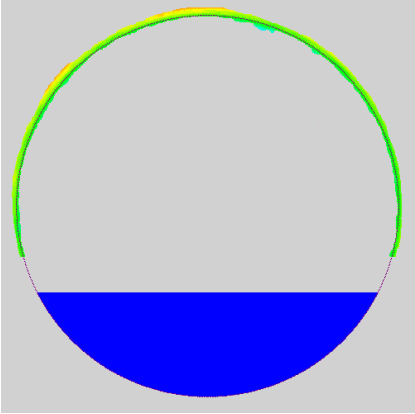

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