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May 1, 2012

Young S. Chang
Remedial Project Manager
New York Remediation Branch
USEPA, Region 2
290 Broadway
New York, New York 10007-1866

Re: Richardson Hill Landfill Site – Final Stream Restoration Monitoring Report
June, September, and October 2011 Inspection Events

File: 1153.007.004

Dear Ms. Chang:

On behalf of the respondents, we are pleased to submit the Herrick Hollow Creek Stream Restoration Monitoring Report for inspection events conducted in June, September, and October of 2011.

This report represents the final Stream Restoration Monitoring report as outlined in the Post-Construction Monitoring Plan, as submitted and approved in June 2008 by NYCDEP, NYSDEC, and USEPA (with consultation from USFWS). Per the Monitoring Plan, stream monitoring was conducted over the three year period following completion of stream restoration construction in 2008. Stream Monitoring Reports detailing inspection events conducted in 2009 and 2010 were previously submitted to the agencies subsequent to those events for each of those years. With the exception of two additional wetland monitoring events to be conducted in 2012 and 2013, the respondents have complied with all stream monitoring requirements detailed in the final Post-Construction Monitoring Plan.

Please feel free to contact me at any time at (315) 457-5200 should you have questions regarding these responses.

Very truly yours,

BARTON & LOGUIDICE, P.C.

John J. Condino
Senior Project Manager

JJC/akg
Attachment
cc: Rich Galloway, Honeywell
Sam Waldo, Amphenol
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James Mickam, JTM
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Herrick Hollow Creek

Delaware County, New York

Final Stream Restoration Monitoring Report: June, September, & October 2011 Inspection Events

April 2012

Herrick Hollow Creek

Delaware County, New York

Final Stream Restoration Monitoring Report
June & October 2011 Inspection Events

April 2012

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1.0 Introduction

1.1 Stream Restoration and Monitoring History

As a component of Remedial Work Element 1 for the Richardson Hill Road Landfill (RHRL) site, sediments containing greater than 1 part per million (ppm) total PCBs in the Herrick Hollow Creek (HHC) channel and floodplain, from south Pond south to Richardson Hill Road, were excavated and removed in the summer of 2004. These materials were disposed of in a TSCA cell constructed within the former landfill.

The excavated areas along the HHC corridor were backfilled using unclassified soil from approved off-site sources and imported topsoil. The topsoil was seeded with a wetland seed mix and covered with a biodegradable erosion control blanket in areas immediately adjacent to the creek. A sand and gravel substrate was placed in the HHC channel. Clusters of live black willow, alder and cottonwood whips were installed in several areas along the creek.

Shortly after completion of the backfilling activity, the passing Tropical Storm Ivan in late September 2004 resulted in severe degrading of the HHC channel. Another storm event in April 2005 caused additional damage.

To address the damage caused by the September 2004 and April 2005 storm events, Barton & Loguidice and Bioengineering Group prepared a work plan that called for short-tern interim measures and the study efforts necessary to establish design criteria for a stable channel morphology.

In October 2005, project stakeholders including the PRP (Amphenol Corporation), NYCDEP, USEPA, and USFWS met in Albany, NY for the purpose of finding a mutual consensus regarding defined goals and objectives to be achieved by the project. The meeting resulted in the identification of generalized goals for the project, in addition to thirteen specific objectives to be achieved through implementation of the restoration design. These goals and objectives, developed and agreed to by the regulatory stakeholders, comprised the guidance by which the restoration design was developed.

Development of the restoration design included preparation of a conceptual design approach, which was submitted to, reviewed, and approved by NYCDEP, NYSDEC, and USEPA in January 2007. The draft final design, including a detailed post-construction monitoring plan, to be implemented over the three year period following completion of construction, was submitted to these agencies for review in March 2008. After multiple iterations of review and edit, the final restoration design and post-construction monitoring plan was approved by NYCDEP, NYSDEC, and USEPA (with consultation from USFWS) in June 2008.

Construction of the restored stream channel was begun in July 2008 and completed in late September 2008. NYCDEP conducted multiple field inspections of the site during the course of the construction period. An as-built survey of the completed project was finished in October 2008 and served as the baseline standard for comparison of data collected during subsequent post-construction monitoring efforts.

As per the agency-approved plan, post-construction monitoring was conducted in April and August 2009, April and September 2010, and October 2011. Additional monitoring was conducted in June 2011 in response to a bankfull-exceeding flood in May 2011.

1.2 2011 Monitoring Efforts

In 2011, B&L staff conducted three visits to Herrick Hollow Creek for the purpose of evaluating the impacts of multiple high-intensity storm events upon the restored portion of the stream. In addition to the routine monitoring effort scheduled for October 10, B&L also conducted post-construction monitoring of the project on June 28 and 29 in response to a storm on May 19, 2011 which resulted in approximately 3.9 inches of rain at the site within a twelve-hour period. Stream flows associated with this storm exceeded the bankfull discharge of the restored stream channel.

B&L staff also visited the site on September 11, 2011 to conduct a cursory visual assessment of stream conditions following flooding associated with Hurricane Irene and Tropical Storm Lee. Observations from this visit, outlined in a memorandum to Amphenol Corporation dated September 12, 2011, are included as Appendix E to this report.

Weather conditions at the time of the two monitoring efforts were typical of seasonal conditions. Conditions June 28 and 29 were warm and clear. Stream flows had returned to moderate levels typical of early summer. Evidence of the bankfull event that occurred four weeks earlier was still evident, mainly in the form of laid-over vegetation in the immediate near-bank areas and formation of a rack line delineating the outer limits of the out-of-bank flood event. Weather conditions October 10 and 11 were clear and cool, with streamflow levels slightly above normal for early fall due to recent precipitation in the days prior to the monitoring visit.

The objective of this monitoring report is threefold; describe the condition of the stream corridor (channel and adjacent streambank and wetland areas) following the bankfull flood of May 2011; evaluate the performance and condition of the stream corridor following the flooding associated with Hurricane Irene and Tropical Storm Lee in late August / early September 2011 and characterize the condition of the restored channel at the completion of the regulatory-required post-construction monitoring period (based on the condition of the stream corridor as of monitoring on October 10 and 11, 2011). The following report addresses each component of the stream channel routinely evaluated during post-construction monitoring and describes the condition of each chronologically through the multiple flood events of 2011.

2.0 Data Collection and Analysis

2.1 Pebble Counts and Evaluation of Channel Bed Conditions

During the monitoring events of June and October 2011, pebble counts were conducted at eight locations through the restored reach of Herrick Hollow Creek, replicating those previously conducted in October 2008, April 2009, August 2009, April 2010, and September 2010. Cumulative substrate particle distributions from each event were developed for each stream segment (I, II, and III) and compared to those developed from the previously-collected data to evaluate changes in substrate character. These cumulative distributions are provided in Table 1. Results of the eight individual pebble counts conducted during each monitoring effort are included as Appendix A of this report.

Review of pebble count data from June and from October 2011 reflect anticipated temporary adjustment in particle size distributions as a result of the storm events which preceded each of these monitoring visits. Generally, particle size classes, particularly D_{50} (median particle size) and D_{84} (largest mobile particle at bankfull discharge) remained unchanged as a result of the bankfull flood event of May 2011. This unchanged condition indicates stable channel function and balanced sediment transport through the restored reach, as significant disruption of particle distribution did not occur as a result of the flood. Data collected in October 2011 reflects an overall reduction in particle sizes for each distribution class, reflecting input of finer sediments to the system as a result of the heavy flooding associated with Hurricane Irene and Tropical Storm Lee in early September 2011.

Comparative analysis of the summary pebble count data indicates a reduction in particle sizes across all three segments of the restored channel. Because field data show that the influence of smaller particles (medium gravel and finer) upon overall particle size distribution is not a factor (very few particles in that size range were documented during the pebble counts), the observed reduction in particle sizes is most likely attributed to a preponderance of coarse gravel in the substrate. In the short-term following channel restoration in 2008, particles in this size class were regularly mobilized from Segments I & II and either deposited through the lower reaches of Segment III or transported downstream beyond the limits of the restored reach. Currently, however, the channel is now mobilizing and redistributing smaller sediment particles when subjected to a bankfull flood event such as that associated with the May 19, 2011 storm, indicating that channel conditions have stabilized to the point where the stable channel morphology exhibited by the stream now allows for sufficient energy dissipation, preventing the mobilization of a wider range of larger particles (such as coarse gravel), as was previously the case. This reduction in mobilized bedload indicates that the stream continues to exhibit stable morphological features and a balanced sediment transport regime.

Undercutting of the stream bank is still present in some areas; however, no lengthening or deepening of these features has been observed since previously evaluated in 2010. Supported by vigorous stands of herbaceous and woody vegetation overhead, these areas are stable and provide a necessary and valuable habitat element within the stream channel, reflective of habitats found at the reference reach.

3.0 Cross-Sections and Evaluation of Channel Geometry

3.1 Segment I

In June and October 2011, permanent cross-sections were surveyed at previously established locations at stations 4+63 and 6+92 (See Figure 2). Comparison of cross-section geometry at each of these locations is outlined in Tables 4 and 5.

The cross-section geometry through Segment I exhibit stable characteristics, maintaining values well within the range of acceptable design values with little deviation from the design form. Based on comparison with past data, there is no evidence of any trend affecting the bankfull geometry of the channel that might potentially lead to future deviation from the configuration or intent of the restoration design, or lead to impaired function of the restored channel. These cross-sections remain relatively unchanged following the flood events of May and September 2011, and in fact have changed little over the course of the post-construction monitoring period

3.2 Segment II

In June and October 2011, permanent cross-sections were surveyed within Segment II at stations 12+71, 15+19, and 20+04 (See Figure 2). Comparison of cross-section geometry at each of these locations is outlined in Tables 6 thru 8.

Comparison of surveyed cross-sections at XS #3 suggests that the adaptive maintenance efforts implemented in 2009 continue to support the desired bankfull channel geometry. The storm events of May and September 2011 have had little effect upon the dimension of this cross-section, as channel geometry has deviated little from the previous survey in September 2010.

Evaluation of the cross-sections surveyed at XS #4 and XS #5 indicate further adjustment to the adaptive maintenance measures implemented in 2009. Increased channel roughness and substrate particle size has returned this stream segment to a stable form. This reach of Segment II had previously showed evidence of channel incision and a reduced width to depth ratio that was outside the limits established for the stream. In response to the adaptive measures implemented in 2009 and channel-forming floods of May and September 2011, the reach has reestablished and now maintains cross-section geometry consistent with design parameters. Channel form remains relatively unchanged from the previous survey of these cross-section surveys in September 2010.

3.3 Segment III

In June and October 2011, permanent cross-sections were surveyed within Segment III at stations 22+18, 28+25, and 32+76 (See Figure 2). Comparison of cross-section geometry at each of these locations is outlined in Tables 9 thru 11.

At cross section #6, comparison of previous surveys with those collected in 2011 reflects little change in channel geometry within this area of slope transition. Due to the stable nature of Segment II upstream and subsequent reduction in bedload moving from Segment II to Segment III, the channel aggrading anticipated in this area as a result of the flood events of May and September 2011 was not observed. This observed condition once again reflects the ability of the channel to mobilize and transport sediment through all three segments of the restored reach effectively, without formation of areas of excessive sediment deposition or scour.

Review of surveyed cross sections at XS# 7 and XS# 8 show that bankfull geometry continues to remain unchanged from the constructed design form at these locations. These observations reflect the continued stable character of the furthest downstream portion of the restored channel.

4.0 Longitudinal Profile

As with previous surveys, analysis of longitudinal survey data from Segments I, II, and III of Herrick Hollow Creek reflects little change in streambed profile through Segment I, continued development of minor frequent grade control and maintenance of isolated, stable undercut banks through Segment II, and maintenance of a well-defined riffle/pool sequence through Segment III.

The restored stream channel continues to follow the constructed centerline. Evidence of lateral movement across the landscape is limited to those small, isolated areas where undercut banks have formed, primarily through Segment III. Development of undercut banks has not been nearly extensive enough to disrupt design plan form dimensions of the channel. Sinuosity, channel length, bankfull slopes (2.4%, 4.97%, and 1.6% for Segments I, II, and III, respectively), and average bed slopes (2.5%, 4.4%, and 1.6%, respectively) remain consistent with the design/constructed slopes.

5.0 Structures

The post-construction monitoring visits in June and October 2011 included an inspection of each instream structure to identify any deviations from the as-built state or any indications of structure failure or sub-standard performance.

5.1 Cross Vanes

Cross vanes were inspected to identify any fissures between rocks, slumping or failing of rocks, side-scouring of cross vane arms, undermining of footer rocks, and any other issues that might potentially affect the integrity and performance of the structure. Several of the cross vanes located in Segment II continue to be gradually replaced with cascade-riffle complexes. These cascade riffle sections are maintaining the stream form dictated by the cross-vane while achieving the grade control previously supplied by the cross vane. The development of these cascade-riffle sequences was anticipated and is the development of natural morphological features by the stream.

As a result of the flooding experienced in September 2011, portions of the vane arms cross vane constructed at station 13+58 (CV-21) have become undermined, potentially leaving the structure at risk of being displaced if exposed to future flood events that exceed design-storm intensity. In its current condition, the structure continues to provide the intended function of providing grade control at this location. Continued deposition of larger substrate material around the footprint of the cross vane may eventually displace the function of this structure over time, replacing the cross vane with sufficient larger bed material to establish and maintain minor frequent grade control at this location.

5.2 Cascades

As observed during previous monitoring visits, fewer of these structures were visually observed during field inspections in June and October of 2011, as constructed cascades continually are incorporated into the natural formation of minor, frequent grade control features along the entire length of the restored channel. The stream is continuing to incorporate these structures into longer sequences of natural cascades and riffles, providing stable intermittent grade control between cross vane locations.

5.3 Log Vanes

During monitoring in June and October 2011, all log vanes were inspected to identify any issues that may be affecting their stability or performance. All appear to be functioning well, without defect or threat of potential failure. Log vanes continue to support the maintenance of distinct riffle, run, pool, and glide features that have naturally developed through Segment III since construction of the restored channel. This variability of bed features greatly enhances the quality and abundance of instream habitats.

5.4 Dimatos Crossing

As identified in the previous reports, sediment continues to be deposited along the length of the crossing. This deposition was not observed to be creating unstable conditions at the transition from this feature to adjacent downstream reaches of the stream (Segment II). As of June 2011, vigorous establishment of native vegetation within the ingress and egress areas of the crossing has helped to better integrate the crossing into the surrounding landscape.

6.0 Vegetative Condition

Examination of vegetative conditions at the site indicates excellent establishment, growth, and vigor of all seeded/planted areas. Hydroseeded areas within the stream corridor and restored wetland areas continue to provide excellent ground cover for wildlife, with planted species being augmented by a variety of volunteer species from adjacent vegetated areas outside of the work area. The herbaceous community continues to increase in both density and in species diversity. As noted earlier, along many portions of the stream live stakes have grown to the point where they now provide substantial riparian cover along the stream banks. Root masses on the live stakes continue to grow, promoting additional sprouting and woody growth and providing additional stability to the stream banks. Increase in sprouting and woody mass is already providing valuable shade to the stream during summer months.

7.0 Temperature

Water temperatures were recorded on June 28, 2011. Stream temperatures were 66°F in the morning and 70°F in the afternoon. At this time of the year, warm water temperatures are dictated by the release of surface water from South Pond and the reconstructed stormwater basin, and are exacerbated by the limited shade provided by riparian vegetation along some portions of the stream. Both South Pond and the reconstructed stormwater basin are relatively void of canopy cover, resulting in an increase in water temperature. As the riparian vegetation and canopy over the restored stream bed continue to become more established, summer water temperatures of the stream are expected to decrease.

Water temperatures of 47°F and 49°F were recorded in the morning and afternoon of October 11, respectively.

8.0 Wildlife Observations

During June and October 2011 monitoring events, American crows (*Corvus brachyrhyncos*), red-bellied woodpecker (*Melanerpes carolinus*), American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), common yellowthroat (*Geothlypis trichas*), and various sparrow species were observed using the stream corridor. Ruffed grouse (*Bonasa umbellus*) were flushed along the western bank of Segment II. Evidence of whitetail deer, cottontail rabbits, striped skunk, and raccoons was observed along the stream corridor as well.

As observed in previous years, utilization of the site by herpetofauna continues to be very high. Green frogs (*Rana clamitans*), northern leopard frogs (*Rana pipiens*), and bullfrogs (*Rana catesbeiana*) were either visually observed or heard along the entire stream corridor. Red spotted newts (*Notophthalmus viridescens*) were observed within the created vernal pools on either side of the restored stream, as well as the reconstructed stormwater pond near the beginning of Segment I. Both Eastern Garter Snake (*Thamnophis sirtalis*) and Northern Water Snake (*Nerodia sipedon*) were observed in areas adjacent to the stream corridor.

The macroinvertebrate population of the stream continues to become well established, and most rocks turned over revealed a range of aquatic insects. The most commonly observed taxa were Psephenidae (water penny beetles), Philopotamidae (free-living caddis), Hydropsychidae (net-spinning caddis), and Simuliidae (black fly) larvae. Larger, clinging mayfly nymphs (Heptageniidae) were also seen in some abundance, and both nymph and adult forms of damselflies (Coenagrionidae) are very common along the lower portions of the restored stream channel.

9.0 Summary and Discussion

Over the term of the three-year post-construction monitoring period, the restored portion of Herrick Hollow Creek has continually evolved toward the current state of stability that is now evident. As anticipated, and integral to any stream restoration project of this nature, adaptive maintenance was utilized at times in the short-term to rectify and improve upon isolated aspects of the project that required improvement. As time has progressed, these maintained areas have not only restored stable form and function to the portions of the stream channel where implemented, but have accelerated the development of stable channel morphology through adjacent downstream areas.

Although very significant in their intensity and disruptive force, the flood events of May and September 2011 have effected little change to the physical form or the performance of the restored stream channel. The stream continues to perform as intended and continues to modify itself into a more stable condition. Establishment of healthy, vigorous stands of riparian vegetation, both in the form of planted/seeded materials and recruitment of specimens from pre-existing vegetated areas adjacent to the project site, has contributed greatly to the overall stability of the stream corridor, and specifically, has greatly aided the stream channel in maintaining its intended physical form in response to these and other intense flood events. Vegetation is now well established in all areas disturbed as part of the restoration effort, and generally exhibits 95% or greater coverage. Approximately 70% of the planted Root Propagation Method (RPM) shrubs are in excellent condition and continue to add stabilization to the stream banks. Installed live stakes along the stream corridor once again exhibit good vigor and rapid growth. Along several portions of the stream banks within Segment II, willow stakes are already completely grown over the channel, completely shading these reaches of the channel. Root masses are well established, greatly adding to the stability of the stream banks and allowing for continued investment of energy into woody growth and sprouting.

Adaptive measures constructed within Segment II in 2009 continue to function as designed, and these areas of the stream now exhibit stable channel morphology and quality instream habitat. Throughout the length of the restored stream, the channel continues to exhibit no evidence of extensive head-cutting, lateral migration, or degrading of the streambed. Just as in nature, small isolated areas of bed aggradation occur where localized reductions in channel slope exist. Overall the channel continues to maintain the stable cross-section, profile, and planform, even after exposure to multiple bankfull and greater flood events since construction was completed in 2008.

The data and observations derived from the field monitoring visits of June and October 2011 reflect the stable form and function of the restored stream corridor. All three stream segments exhibit a balanced sediment transport regime, as evidenced by reduced transport of larger bed material and increased flood energy dissipation along the floodplain areas adjacent to the channel. Again, these observations support the evident stability of the restored reach.

The stream continues to maintain naturally-formed, gradual elevation changes in the way of intermediate natural cascade/riffle sequences (minor, frequent grade control). These features are reflective of the conditions present at the reference reaches used to develop the design of this project. As evidenced by the findings of post-construction monitoring in June and October 2011, the stream continues experience bankfull- and greater flood events without impact to stable stream form or function. The establishment of woody and herbaceous species on the stream banks provides additional stability to the streambanks and protects against lateral migration of the stream channel and associated bank erosion.

The stream continues to be compliant with the design criteria, and in most instances has deviated little from the constructed form, despite exposure to multiple channel-forming floods that have caused extensive damage to other streams in the area. At the end of the three-year monitoring period, the project is meeting the goals and objectives established at the beginning of the design process. Over time, it is anticipated that continued minor changes in stream form and performance will occur, as all streams by their nature exist in a state of quasi-, or dynamic equilibrium. However, at the present time there is no need for any corrective measures within the restored stream. In light of the intensity of the storm events experienced in May and September 2011, the data collected from the most recent post-construction monitoring efforts in June and October 2011 indicate that the stream has moved toward a state of long-term self-maintenance.

Tables

Table 1. Comparison of Cumulative Sediment Particle Distribution: Segment I, Herrick Hollow Creek; October 2008 thru October 2011							
(mm)	**10/2008**	**4/2009**	**8/2009**	**4/2010**	**9/2010**	**6/2011**	**10/2011**
D_{16}	6.5	28	21	29	34	25	26
D_{35}	23	37	33	38	43	35	36
D_{50}	33	43	40	44	51	43	42
D_{65}	40	51	48	53	61	52	50
D_{84}	55	65	62	68	84	68	68
D_{95}	73	88	90	94	120	110	88

Table 2. Comparison of Cumulative Sediment Particle Distribution: Segment II, Herrick Hollow Creek; October 2008 thru October 2011							
(mm)	**10/2008**	**4/2009**	**8/2009**	**4/2010**	**9/2010**	**6/2011**	**10/2011**
D_{16}	5.3	16	15	42	36	18	33
D_{35}	38	37	44	56	56	34	46
D_{50}	54	48	55	67	69	48	55
D_{65}	67	58	68	78	84	57	66
D_{84}	90	76	99	100	120	78	87
D_{95}	130	100	140	120	170	110	120

Table 3. Comparison of Cumulative Sediment Particle Distribution: Segment III, Herrick Hollow Creek; October 2008 thru October 2011							
(mm)	**10/2008**	**4/2009**	**8/2009**	**4/2010**	**9/2010**	**6/2011**	**10/2011**
D_{16}	5.5	9.3	16	30	36	36	19
D_{35}	16	33	42	48	54	54	42
D_{50}	44	48	52	55	67	67	53
D_{65}	59	58	60	64	80	80	64
D_{84}	78	78	80	84	110	110	84
D_{95}	96	100	110	110	140	140	110

Table 4. Cross-Section Geometry: XS #1 (4+63), Herrick Hollow Creek- Segment I; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	2.6	2.1	2.2	1.9	1.8	1.9	1.8
width (ft)	5.2	4.5	4.4	4.4	4.2	4.0	4.3
mean depth (ft)	0.5	0.5	0.5	0.4	0.4	0.5	0.4
max depth (ft)	0.9	0.7	0.8	0.7	0.7	0.7	1.0
wetted perimeter (ft)	5.5	4.9	4.8	4.7	4.5	4.4	4.6
hydraulic radius (ft)	0.5	0.4	0.5	0.4	0.4	0.4	0.4
width/depth ratio	10.4	9.0	8.8	10.2	9.8	8.7	10.2

Table 5. Cross-Section Geometry: XS #2 (6+92), Herrick Hollow Creek- Segment I; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	2.3	2.6	1.9	1.6	1.8	2.6	2.0
width (ft)	6.3	6.5	5.0	4.2	4.6	5.1	4.4
mean depth (ft)	0.4	0.4	0.4	0.4	0.4	0.5	0.4
max depth (ft)	0.7	0.8	0.7	0.6	0.6	0.8	0.7
wetted perimeter (ft)	6.5	6.8	5.3	4.4	4.9	5.5	4.8
hydraulic radius (ft)	0.4	0.4	0.4	0.4	0.4	0.5	0.4
width/depth ratio	15.8	16.3	12.5	10.8	12.1	10.3	9.9

Table 6. Cross-Section Geometry: XS #3 (12+75), Herrick Hollow Creek- Segment II; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	3.1	3.6	0.1	1.8	1.5	1.8	1.5
width (ft)	5.9	5.6	2.3	6.0	6.2	6.9	6.0
mean depth (ft)	0.5	0.6	0.1	0.3	0.2	0.3	0.3
max depth (ft)	0.8	0.9	0.1	0.5	0.5	0.4	0.5
wetted perimeter (ft)	6.2	6.2	2.3	6.1	6.4	7.0	6.2
hydraulic radius (ft)	0.5	0.6	0.1	0.3	0.2	0.3	0.2
width/depth ratio	11.8	9.3	23.0	19.9	25.0	26.4	23.9

Table 7. Cross-Section Geometry: XS #4 (15+19), Herrick Hollow Creek- Segment II; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	3.0	3.1	5.3	3.1	4.1	3.9	4.0
width (ft)	5.1	5.3	5.9	5.3	5.5	6.6	5.6
mean depth (ft)	0.6	0.6	0.9	0.6	0.7	0.6	0.7
max depth (ft)	1.0	0.8	1.4	1.1	1.2	1.3	1.3
wetted perimeter (ft)	5.5	5.8	7.3	5.8	6.6	8.4	6.8
hydraulic radius (ft)	0.5	0.5	0.7	0.5	0.6	0.5	0.6
width/depth ratio	8.5	8.8	6.6	9.2	7.5	11.2	7.9

Table 8. Cross-Section Geometry: XS #5 (20+04), Herrick Hollow Creek- Segment II; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	3.9	4.1	4.7	5.5	5.6	5.5	5.8
width (ft)	5.3	5.7	7.7	5.7	5.9	6.2	6.0
mean depth (ft)	0.7	0.7	0.6	1.0	0.9	0.9	1.0
max depth (ft)	1.2	1.2	1.3	1.3	1.5	1.2	1.5
wetted perimeter (ft)	6.1	6.3	9.5	7.1	8.1	8.8	7.8
hydraulic radius (ft)	0.8	0.7	0.5	0.8	0.7	0.6	0.7
width/depth ratio	7.6	8.1	12.6	6.0	6.3	7.0	6.3

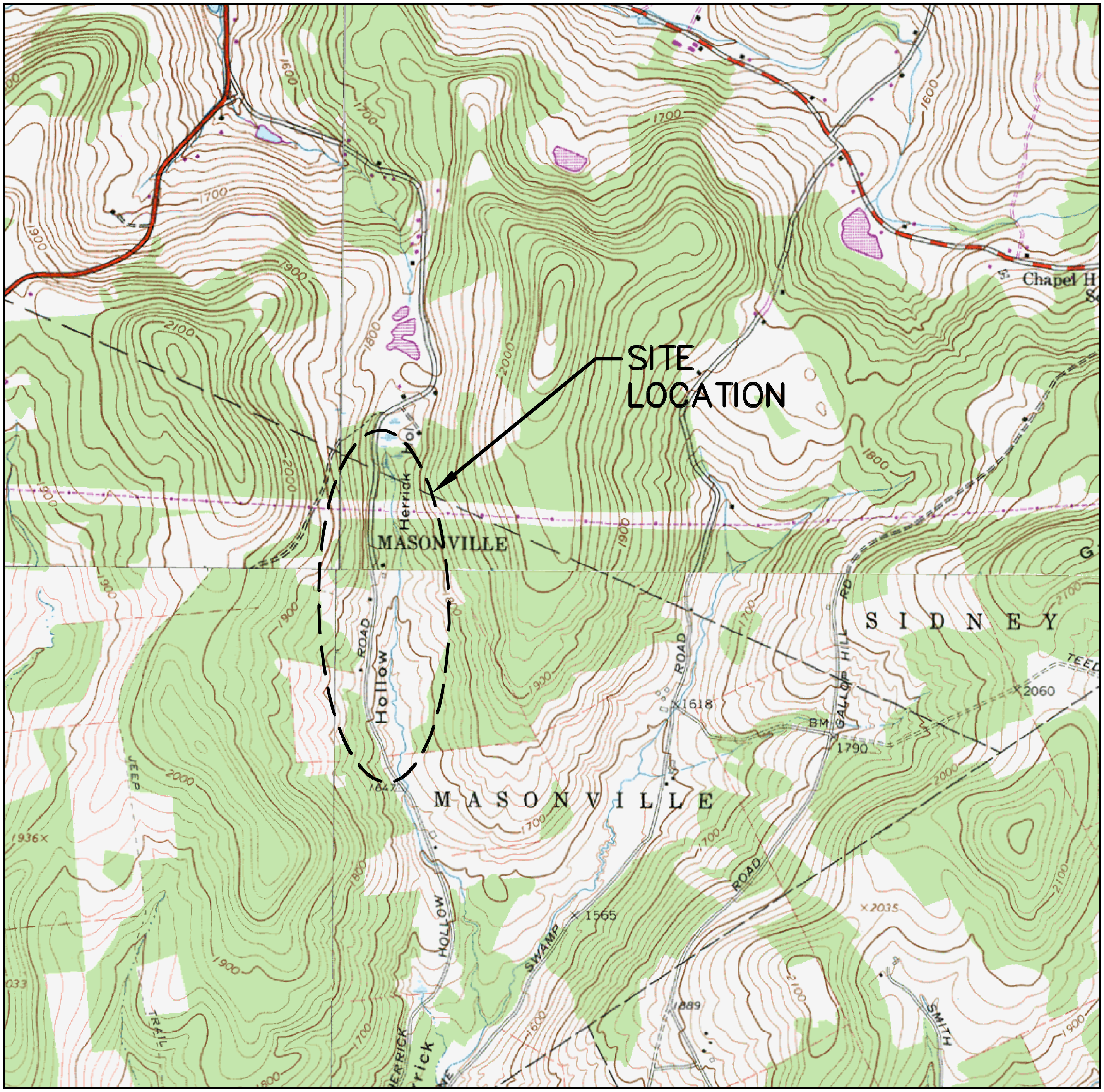
Table 9. Cross-Section Geometry: XS #6 (22+18), Herrick Hollow Creek- Segment III; October 2008 thru October 2011

	10/2008	4/2009	8/2009	4/2010	9/2010	6/2011	10/2011
xs area (ft^2)	6.1	5.2	1.7	1.9	1.9	3.4	1.8
width (ft)	9.2	8.9	8.7	7.0	7.7	12.8	7.8
mean depth (ft)	0.7	0.6	0.2	0.3	0.2	0.3	0.2
max depth (ft)	0.9	0.8	0.3	0.6	0.6	0.8	0.6
wetted perimeter (ft)	9.5	9.2	8.8	7.1	7.8	13.0	8.0
hydraulic radius (ft)	0.6	0.6	0.2	0.3	0.2	0.3	0.2
width/depth ratio	13.1	14.8	43.5	25.7	31.6	48.1	33.3

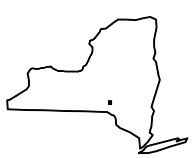
Table 10. Cross-Section Geometry: XS #7 (28+25), Herrick Hollow Creek- Segment III; October 2008 thru October 2011							
	10/2008	**4/2009**	**8/2009**	**4/2010**	**9/2010**	**6/2011**	**10/2011**
xs area (ft^2)	7.0	6.7	9.6	5.9	7.9	8.0	7.9
width (ft)	9.2	8.9	10.0	9.1	9.3	9.5	9.3
mean depth (ft)	0.8	0.8	1.0	0.6	0.9	0.8	0.9
max depth (ft)	0.9	1.0	1.6	1.0	1.3	1.5	1.3
wetted perimeter (ft)	9.7	9.5	11.4	9.9	10.3	10.4	10.6
hydraulic radius (ft)	0.7	0.7	0.8	0.6	0.8	0.8	0.7
width/depth ratio	11.5	11.1	10.0	14.3	10.9	11.3	10.9

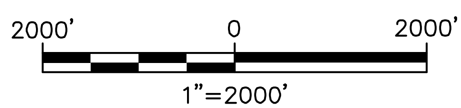
Table 11. Cross-Section Geometry: XS #8 (32+76), Herrick Hollow Creek- Segment III; October 2008 thru October 2011							
	10/2008	**4/2009**	**8/2009**	**4/2010**	**9/2010**	**6/2011**	**10/2011**
xs area (ft^2)	5.2	5.2	5.2	5.2	4.6	3.9	4.5
width (ft)	9.4	9.5	9.2	9.3	8.8	7.7	8.6
mean depth (ft)	0.6	0.5	0.6	0.6	0.5	0.5	0.5
max depth (ft)	0.9	0.9	0.9	0.9	0.9	0.7	0.8
wetted perimeter (ft)	9.6	9.6	9.5	9.6	9.0	8.0	9.0
hydraulic radius (ft)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
width/depth ratio	15.7	15.7	15.3	16.7	16.5	15.0	16.2

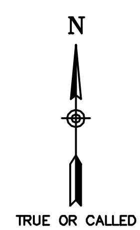
Figures



SOURCE: NEW YORK U.S.G.S. QUADRANGLE MAPS, RESTON VIRGINA, 1983



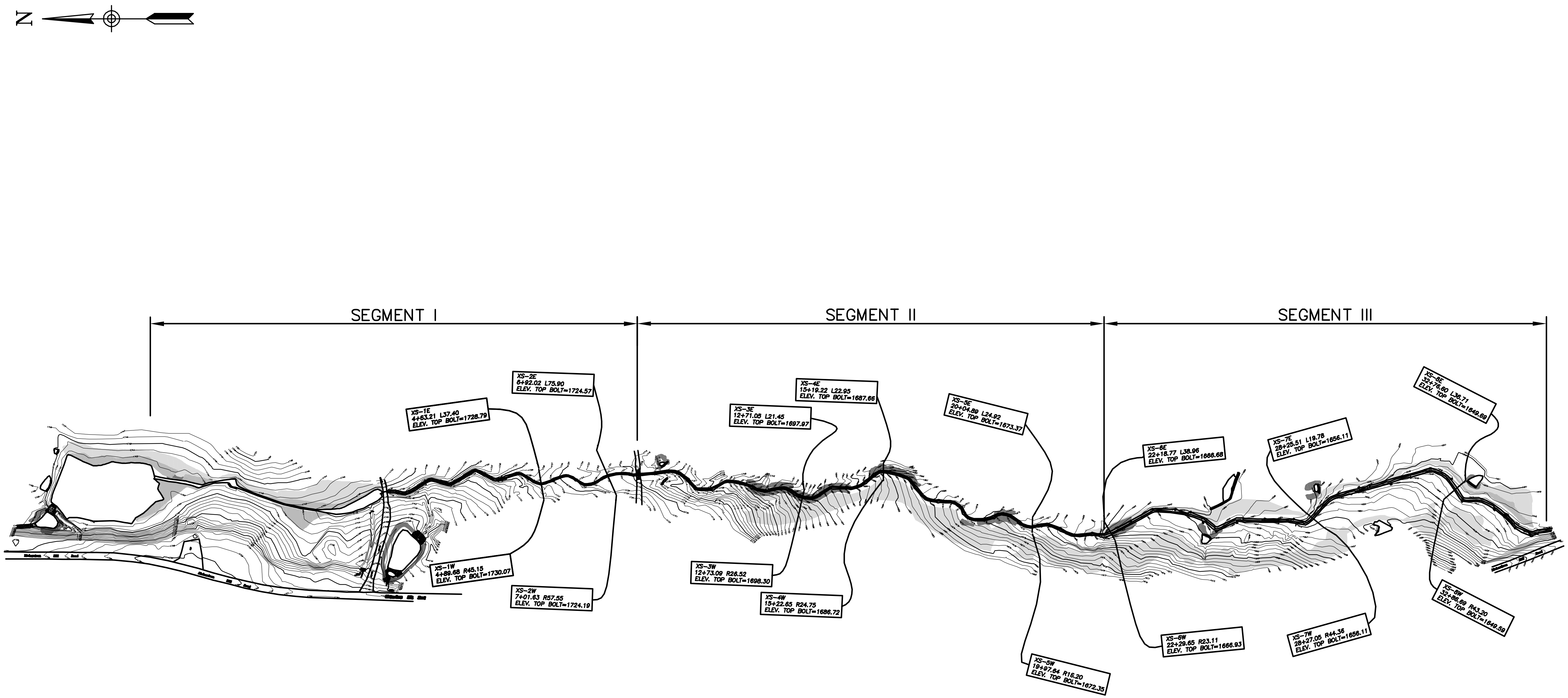




Barton & Loguidice, P.C.

Barton & Loguidice, P.C.		AMPHENOL CORPORATION HERRICK HOLLOW CREEK RESTORATION ANNUAL STREAM MONITORING SITE LOCATION MAP	Figure Number 1
Date AUGUST, 2010	Scale 1" = 2000'	TOWN OF SIDNEY AND MASONVILLE — DELAWARE COUNTY, NEW YORK	Project Number 1153.001

Plotted: Aug 16, 2010 – 11:20AM SYR By: jgs
I:\Shared\800\824006\824006_FIG01.dwg



AMPHENOL CORPORATION
HERRICK HOLLOW CREEK RESTORATION
ANNUAL STREAM MONITORING

PROJECT LIMITS AND CROSS SECTION LOCATIONS

TOWN OF SIDNEY AND MASONVILLE
DELAWARE COUNTY, NEW YORK

Barton & Loguidice, P.C.

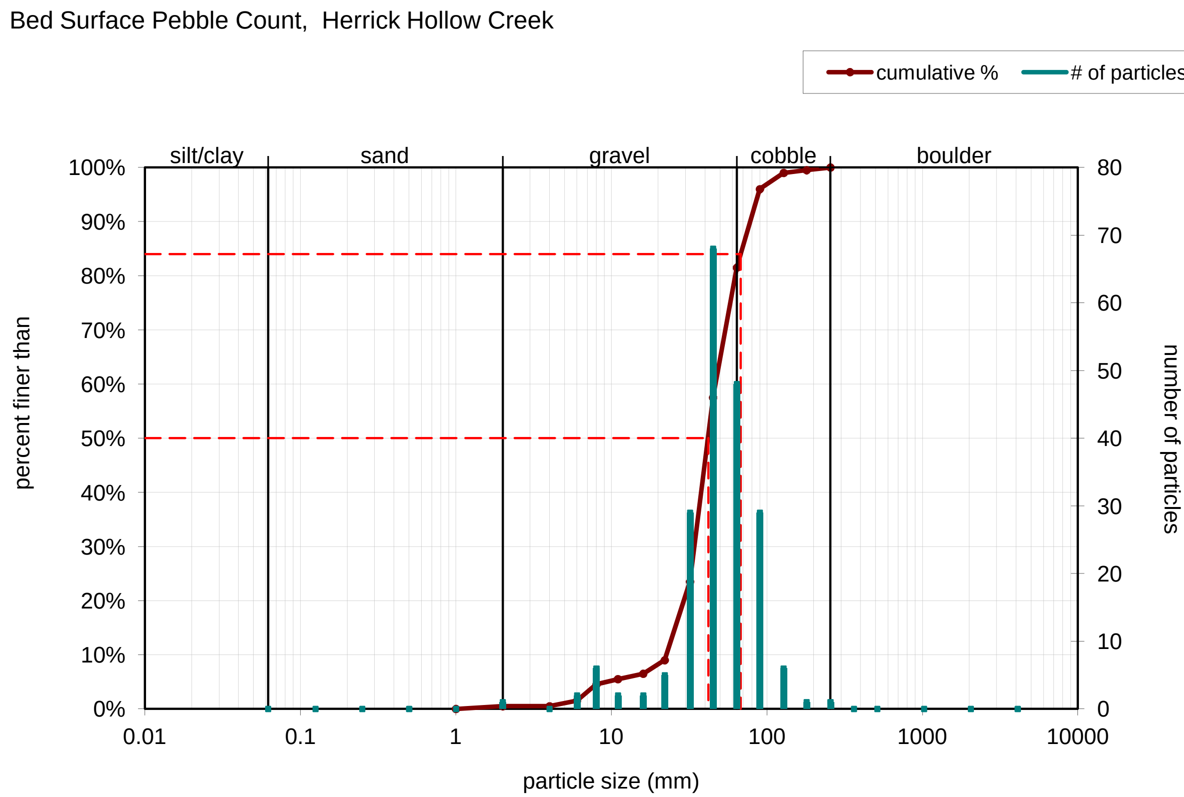
Date	AUGUST, 2010
Scale	1" = 300'
Figure Number	2
Project Number	1153.001

Plotted: Aug 16, 2010 – 11:20AM SYR By: jgs
I:\Shared\800\824006\AS-BUILTS_11X17 FIG 2.dwg

Appendices

Appendix A

Bed Material Particle Distribution, October 2011 – Herrick Hollow Creek



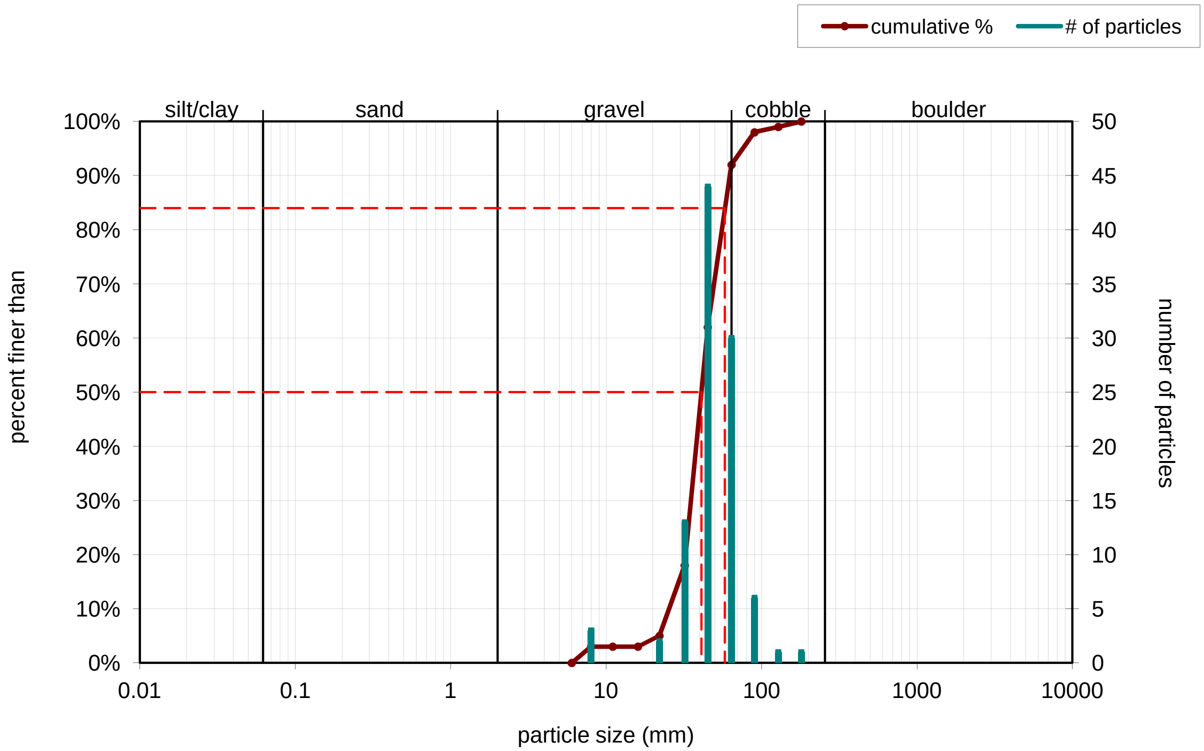
Size (mm)	
D16	26
D35	36
D50	42
D65	50
D84	68
D95	88

Size Distribution	
mean	42.0
dispersion	1.6
skewness	0.00

Type	
silt/clay	0%
sand	1%
gravel	81%
cobble	19%
boulder	0%

A-1. Cumulative weighted bed particle distribution - Segment I (0+00 to 7+00), Herrick Hollow Creek (October 2011)

Bed Surface Pebble Count, Herrick Hollow Creek



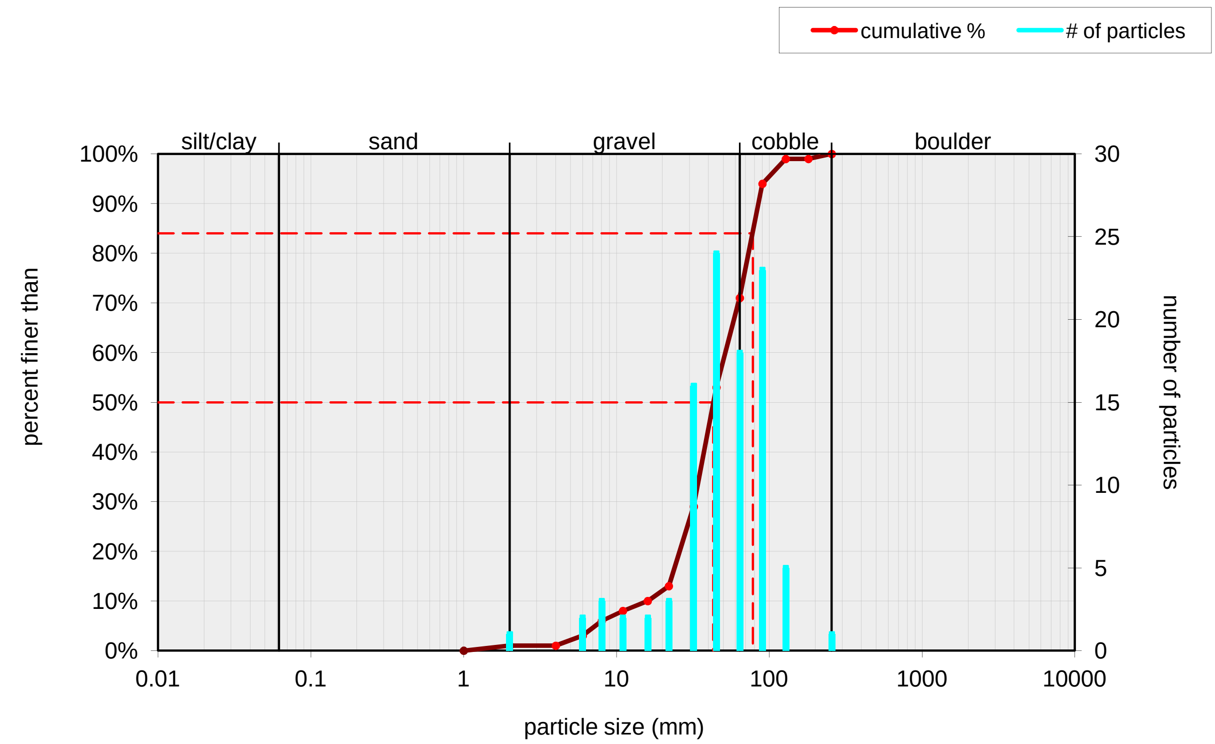
Size (mm)	
D16	30
D35	37
D50	41
D65	47
D84	58
D95	76

Size Distribution	
mean	41.7
dispersion	1.4
skewness	0.01

Type	
silt/clay	0%
sand	0%
gravel	92%
cobble	8%
boulder	0%

A-2. Bed particle distribution at station 2+50 (riffle/run/pool) - Segment I, Herrick Hollow Creek (October 2011)

Bed Surface Pebble Count, Herrick Hollow Creek

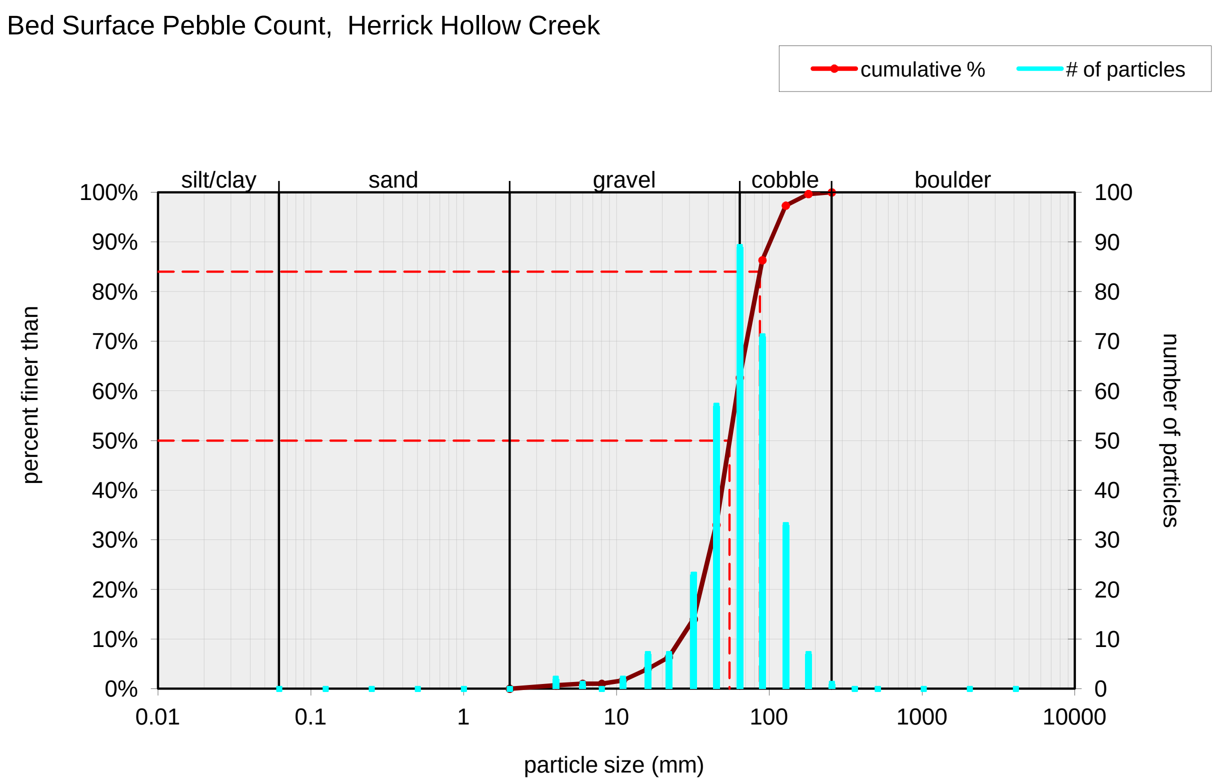


Size (mm)		
D16	24	3.4
D35	35	12
D50	43	17
D65	57	20
D84	78	29
D95	97	39

Size Distribution	
mean	43.3
dispersion	1.8
skewness	0.00

Type	
silt/clay	0%
sand	1%
gravel	70%
cobble	29%
boulder	0%

A-3. Bed particle distribution at station 5+50 (riffle/run/pool) - Segment I, Herrick Hollow Creek (October 2011)

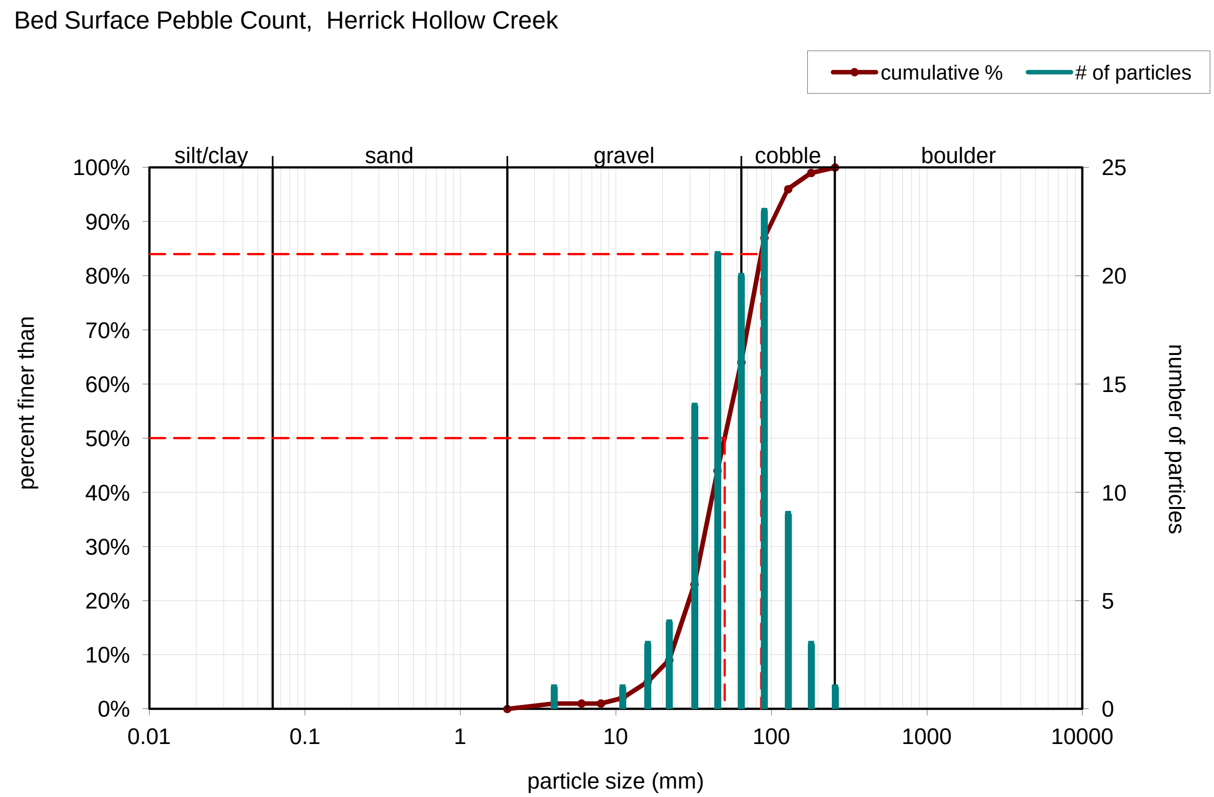


Size (mm)		
D16	33	3.4
D35	46	12
D50	55	17
D65	66	20
D84	87	29
D95	120	39

Size Distribution	
mean	53.6
dispersion	1.6
skewness	-0.02

Type	
silt/clay	0%
sand	0%
gravel	63%
cobble	37%
boulder	0%

A-4. Cumulative weighted bed particle distribution - Segment II (7+00 to 22+00), Herrick Hollow Creek (October 2011)



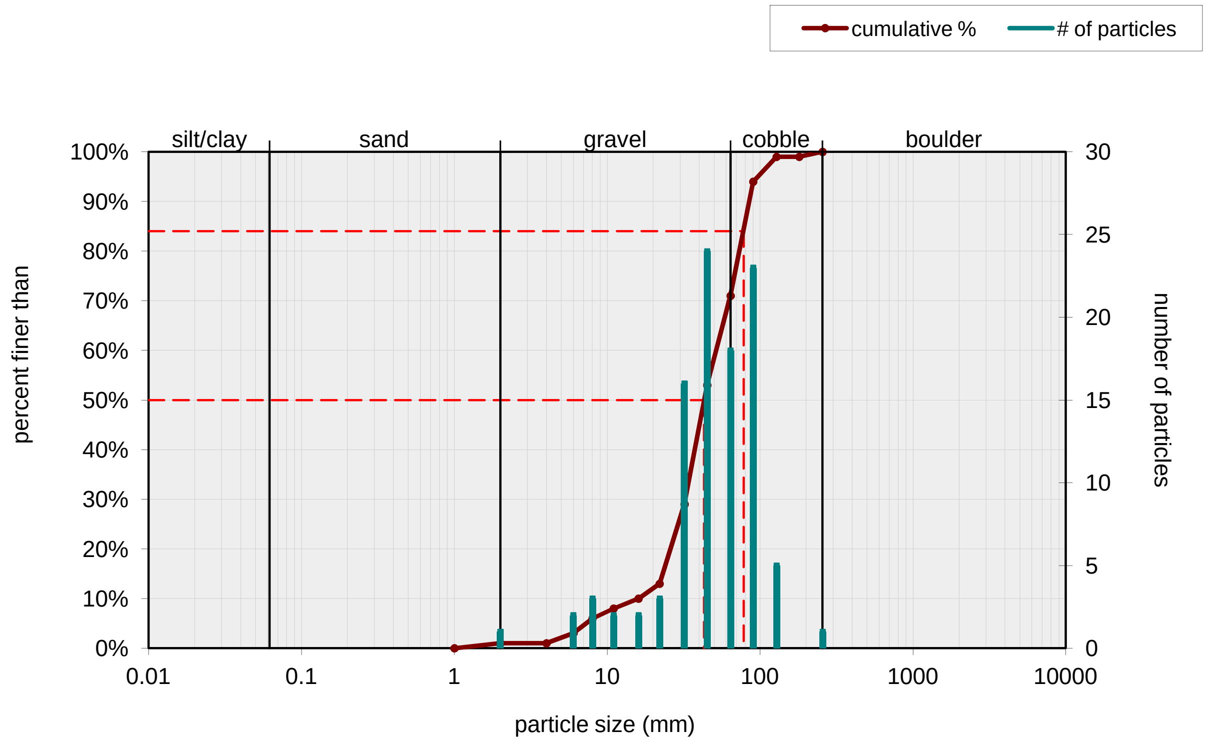
Size (mm)	
D16	27
D35	39
D50	50
D65	65
D84	86
D95	120

Size Distribution	
mean	48.2
dispersion	1.8
skewness	-0.02

Type	
silt/clay	0%
sand	0%
gravel	64%
cobble	36%
boulder	0%

A-5. Bed particle distribution at station 9+00 (riffle/run/pool) - Segment II, Herrick Hollow Creek (October 2011)

Bed Surface Pebble Count, Herrick Hollow Creek

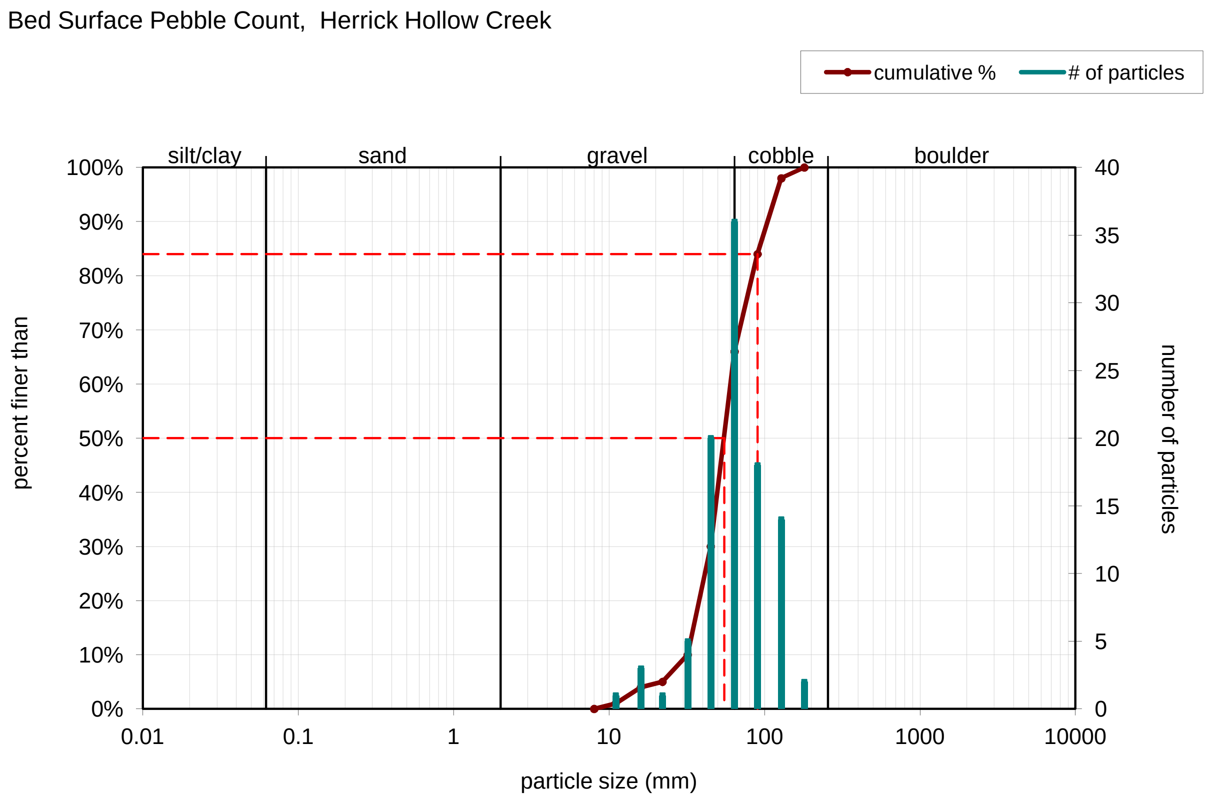


Size (mm)		
D16	24	3.4
D35	35	12
D50	43	17
D65	57	20
D84	78	29
D95	97	39

Size Distribution	
mean	43.3
dispersion	1.8
skewness	0.00

Type	
silt/clay	0%
sand	1%
gravel	70%
cobble	29%
boulder	0%

A-6. Bed particle distribution at station 15+50 (riffle/run/pool) - Segment II, Herrick Hollow Creek (October 2011)

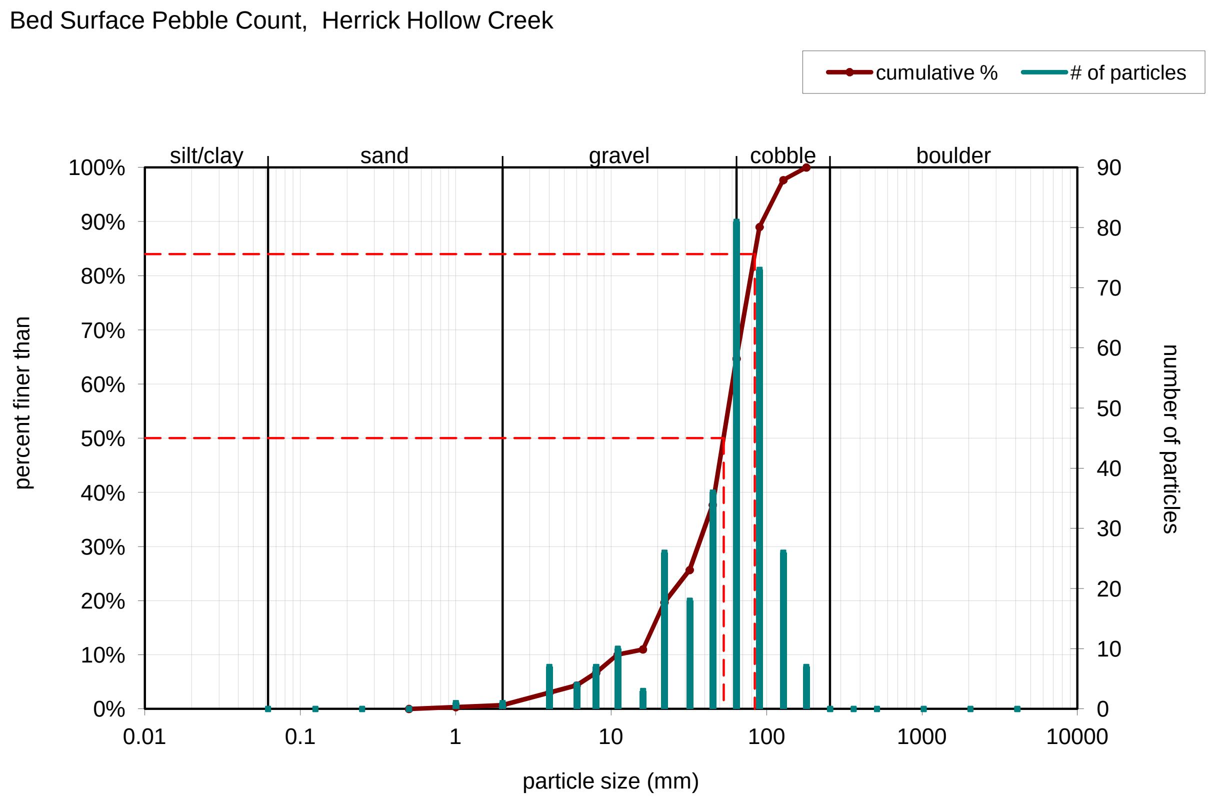


Size (mm)	
D16	35
D35	47
D50	55
D65	63
D84	90
D95	120

Size Distribution	
mean	56.1
dispersion	1.6
skewness	0.01

Type	
silt/clay	0%
sand	0%
gravel	66%
cobble	34%
boulder	0%

A-7. Bed particle distribution at station 19+00 (riffle/run/pool) - Segment II, Herrick Hollow Creek (October 2011)

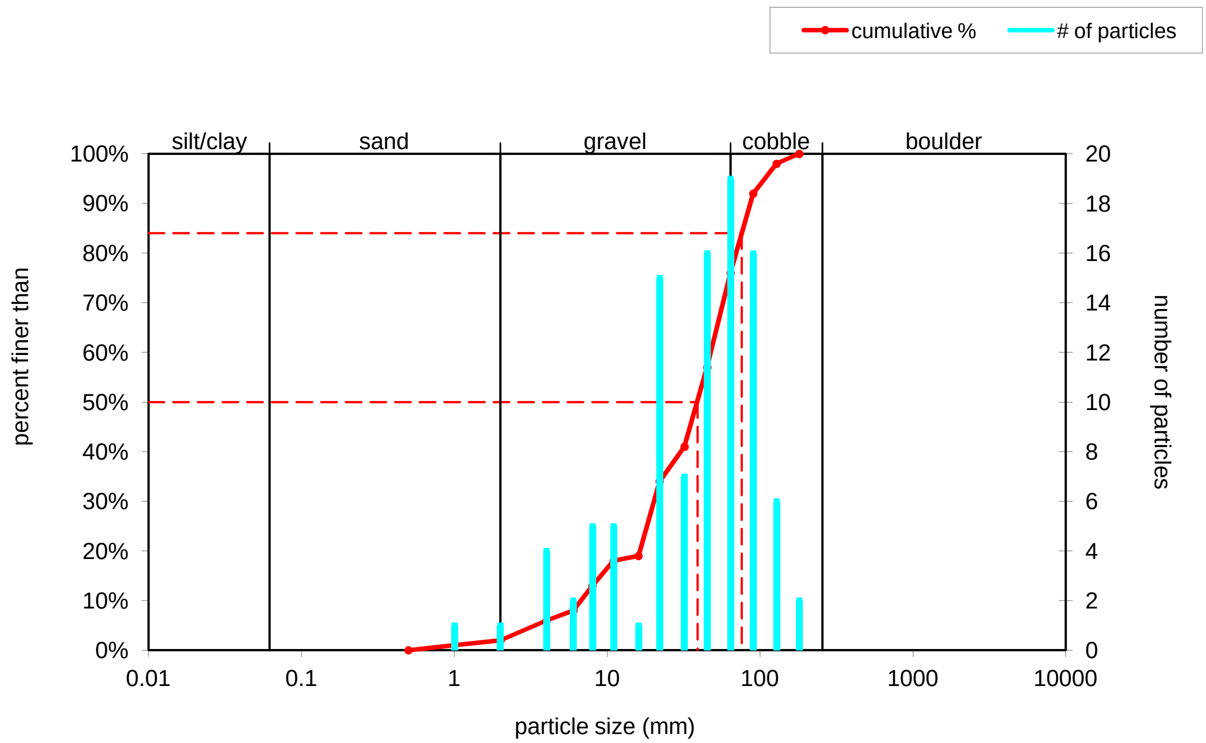


Size (mm)	
D16	19
D35	42
D50	53
D65	64
D84	84
D95	110

Size Distribution	
mean	39.9
dispersion	2.2
skewness	-0.15

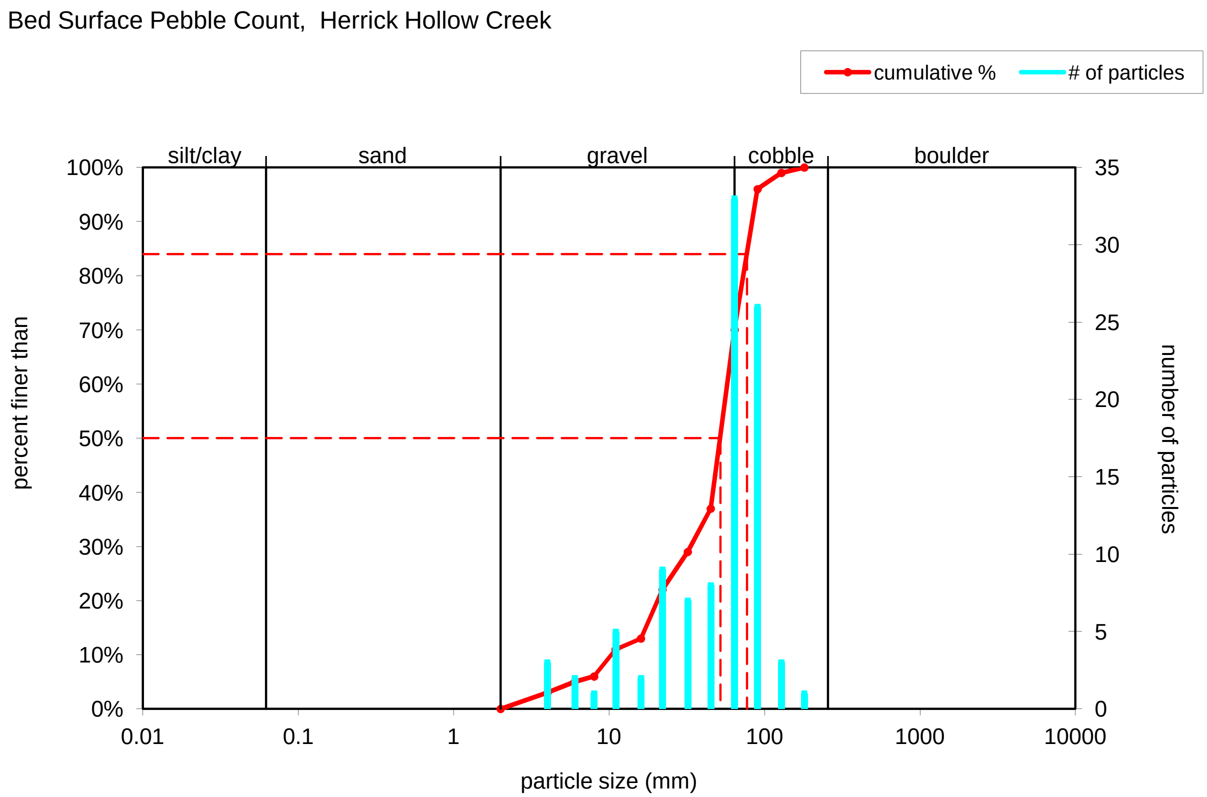
Type	
silt/clay	0%
sand	1%
gravel	64%
cobble	35%
boulder	0%

A-8. Cumulative weighted bed particle distribution - Segment III (22+00 to 35+00), Herrick Hollow Creek (October 2011)



Size (mm)			Size Distribution		Type	
D16	9.7	3.4	mean	27.2	silt/clay	0%
D35	23	12	dispersion	3.0	sand	2%
D50	39	17	skewness	-0.17	gravel	74%
D65	52	20			cobble	24%
D84	76	29			boulder	0%
D95	110	39				

A-9. Bed particle distribution at station 22+00 (riffle/run/pool) - Segment III, Herrick Hollow Creek (October 2011)



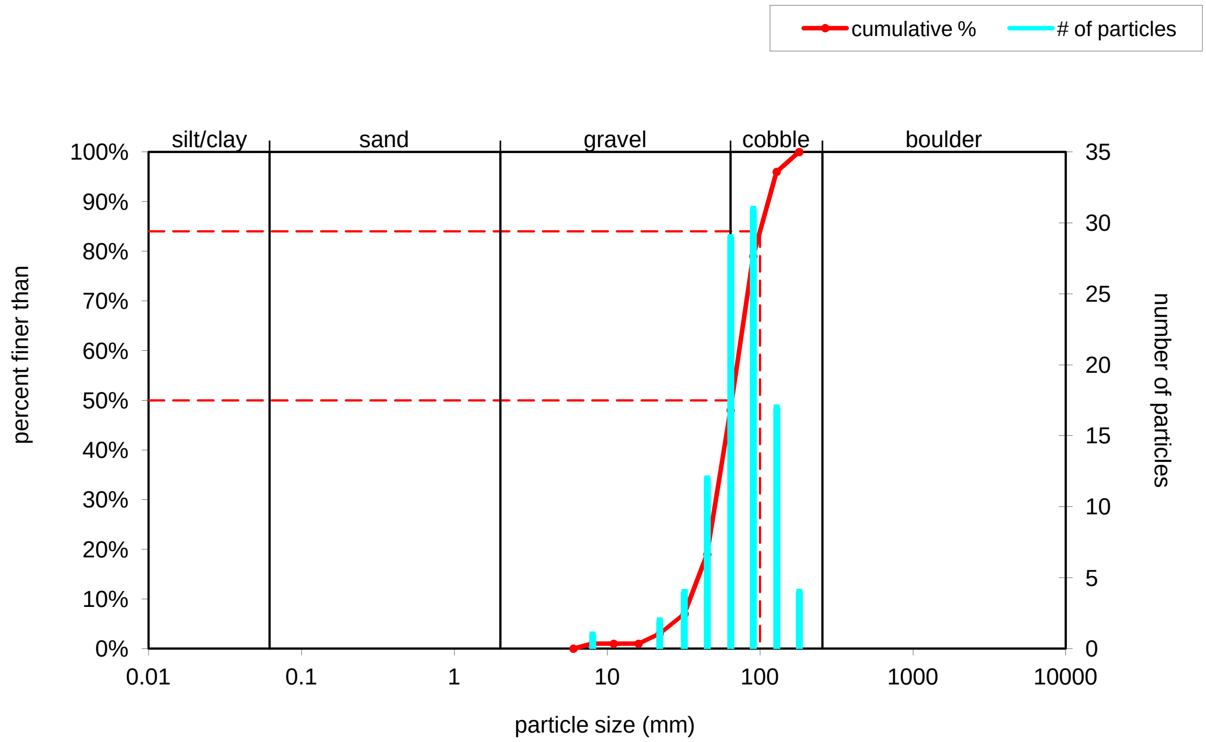
Size (mm)	
D16	18
D35	41
D50	52
D65	61
D84	77
D95	89

Size Distribution	
mean	37.2
dispersion	2.2
skewness	-0.18

Type	
silt/clay	0%
sand	0%
gravel	70%
cobble	30%
boulder	0%

A-10. Bed particle distribution at station 24+50 (riffle/run/pool) - Segment III, Herrick Hollow Creek (October 2011)

Bed Surface Pebble Count, Herrick Hollow Creek



Size (mm)		
D16	41	3.4
D35	55	12
D50	65	17
D65	77	20
D84	100	29
D95	130	39

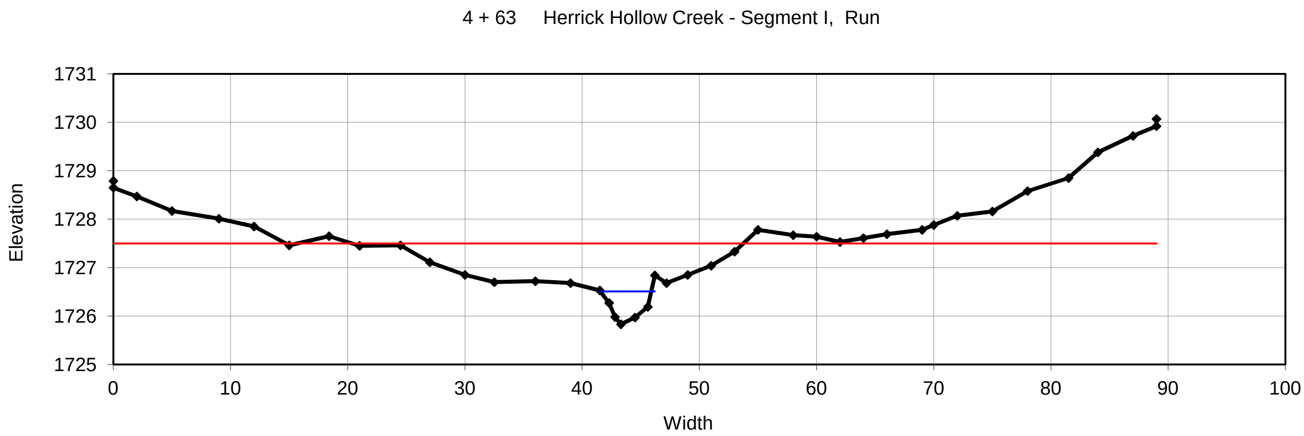
Size Distribution	
mean	64.0
dispersion	1.6
skewness	-0.01

Type	
silt/clay	0%
sand	0%
gravel	48%
cobble	52%
boulder	0%

A-11. Bed particle distribution at station 30+00 (riffle/run/pool) - Segment III, Herrick Hollow Creek (October 2011)

Appendix B

Cross-Section Surveys, October 2011 – Herrick Hollow Creek



Bankfull Dimensions	
1.8	x-section area (ft.sq.)
4.3	width (ft)
0.4	mean depth (ft)
1.0	max depth (ft)
6.0	wetted parimeter (ft)
0.3	hyd radi (ft)
10.2	width-depth ratio

Flood Dimensions	
---	W flood prone area (ft)
---	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

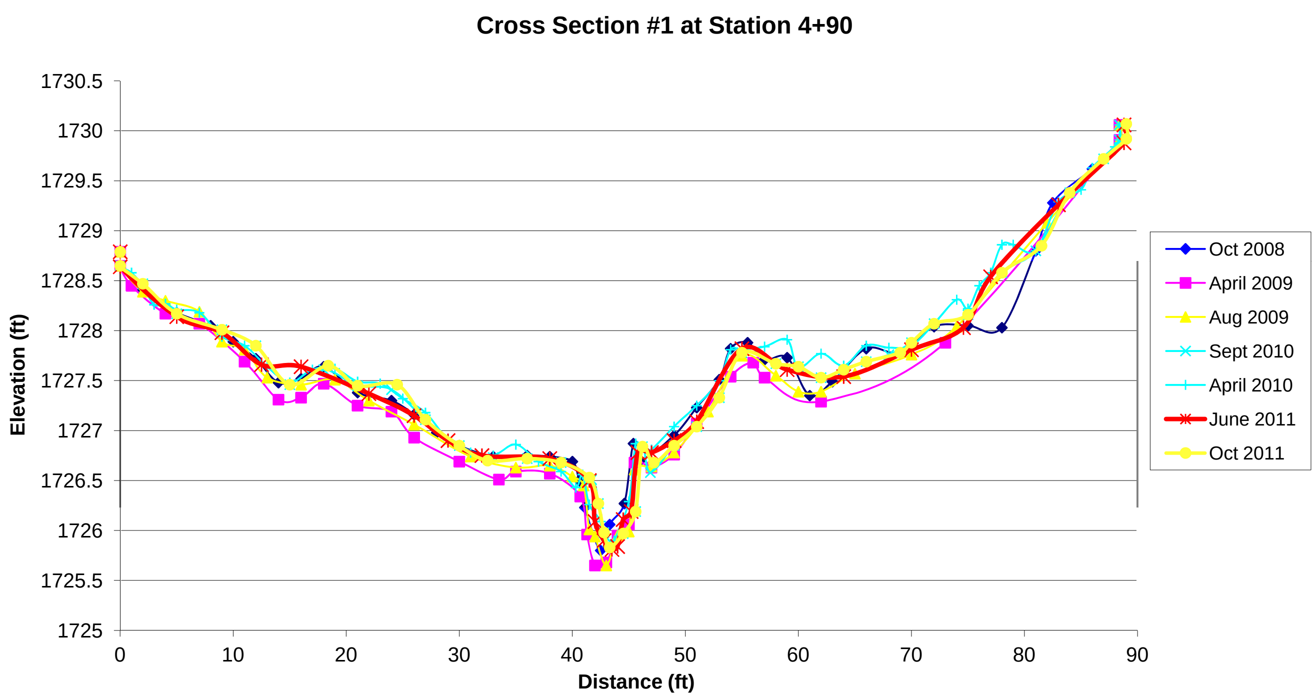
Materials	
51	D50 Bed (mm)
80	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

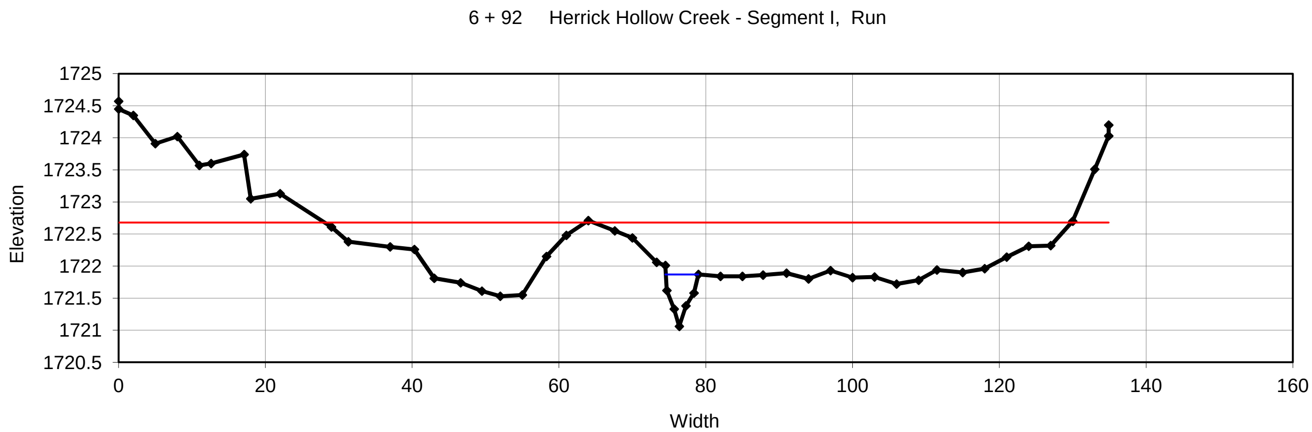
Flow Resistance	
0.051	Manning's roughness
0.46	D'Arcy-Weisbach fric.
4.2	resistance factor u/u*
1.6	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-1. XS #1 at station 4+63 (run) - Segment I, Herrick Hollow Creek (October 2011)



B-2. Comparison of cross-section surveys at XS #1 (4+63) - October 2008 to October 2011



Bankfull Dimensions	
2.0	x-section area (ft.sq.)
4.4	width (ft)
0.4	mean depth (ft)
0.8	max depth (ft)
4.8	wetted parimeter (ft)
0.4	hyd radi (ft)
9.9	width-depth ratio

Flood Dimensions	
100.7	W flood prone area (ft)
22.7	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

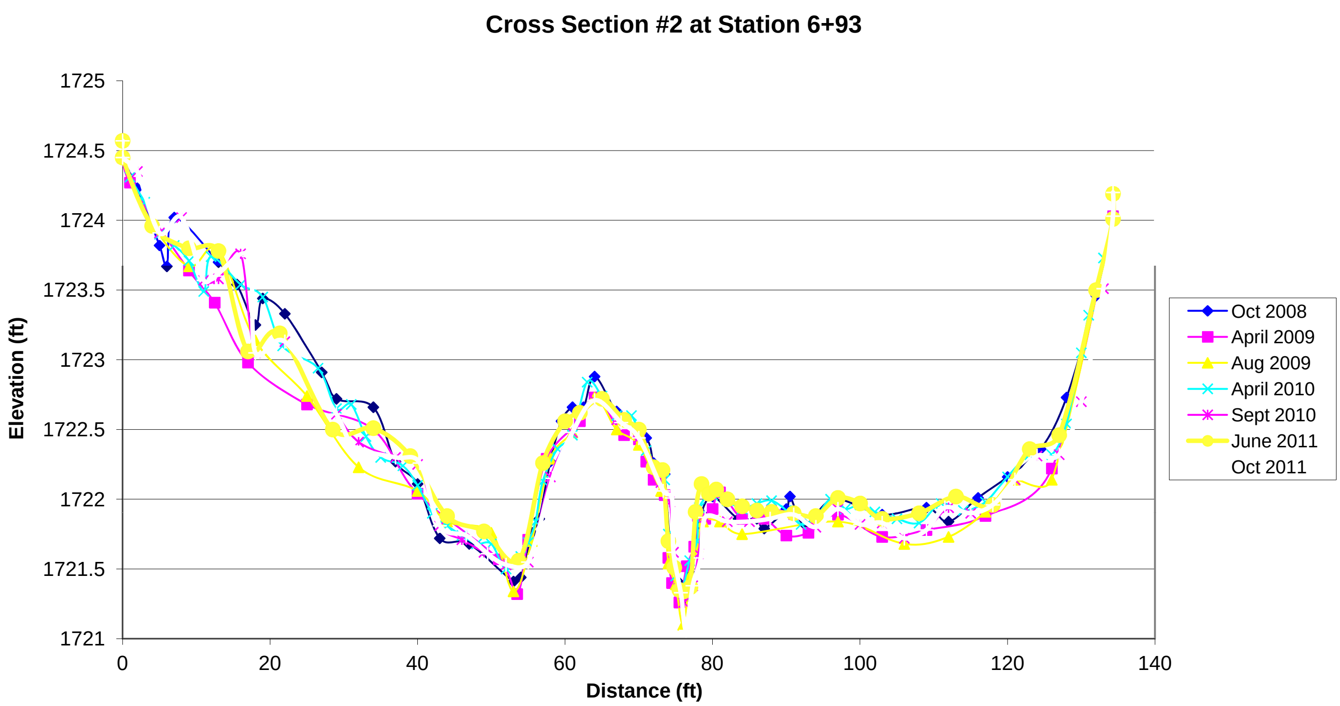
Materials	
51	D50 Bed (mm)
80	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

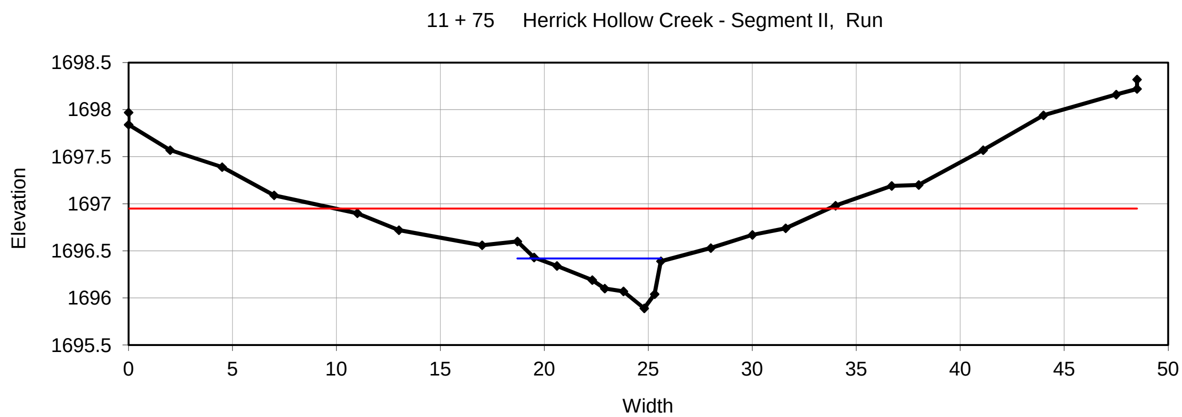
Flow Resistance	
0.050	Manning's roughness
0.39	D'Arcy-Weisbach fric.
4.5	resistance factor u/u*
1.7	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-3. XS #2 at station 6+92 (riffle) - Segment I, Herrick Hollow Creek (October 2011)



B-4. Comparison of cross-section surveys at XS #2 (6+92) - October 2008 to October 2011



Bankfull Dimensions	
1.5	x-section area (ft.sq.)
6.0	width (ft)
0.3	mean depth (ft)
0.5	max depth (ft)
6.2	wetted parimeter (ft)
0.2	hyd radi (ft)
23.9	width-depth ratio

Flood Dimensions	
24.0	W flood prone area (ft)
4.0	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

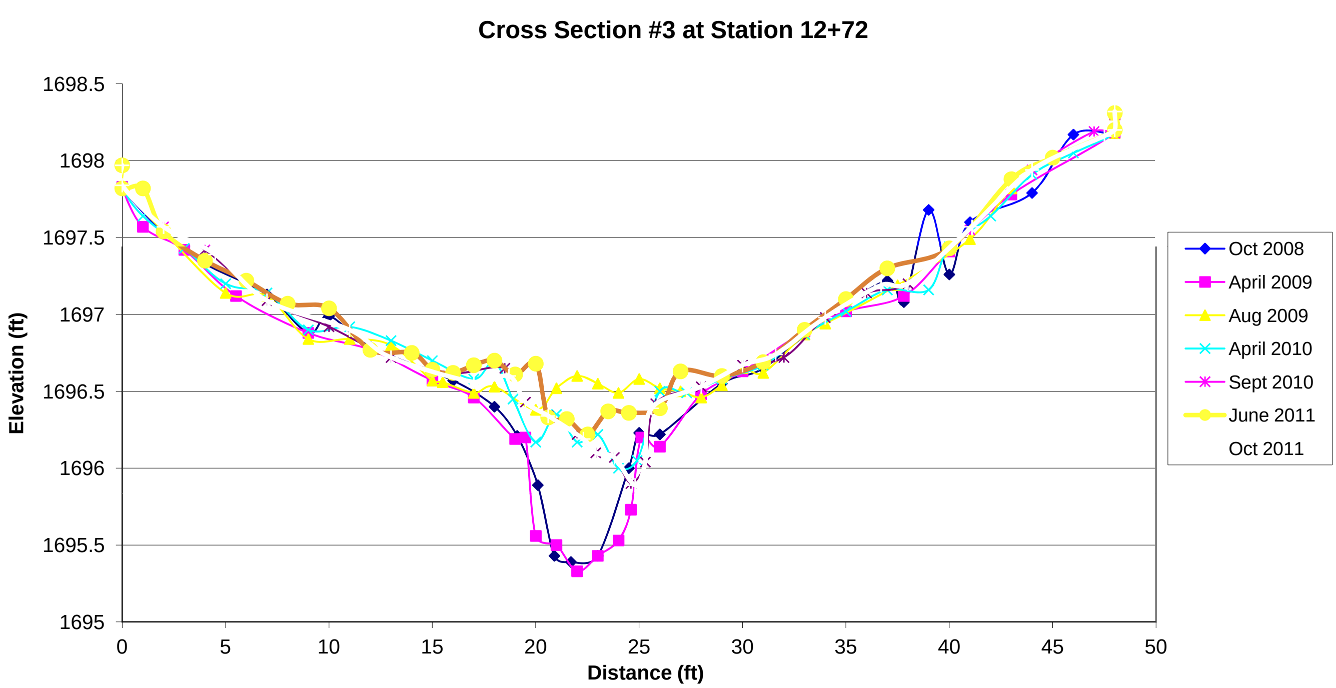
Materials	
81	D50 Bed (mm)
130	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

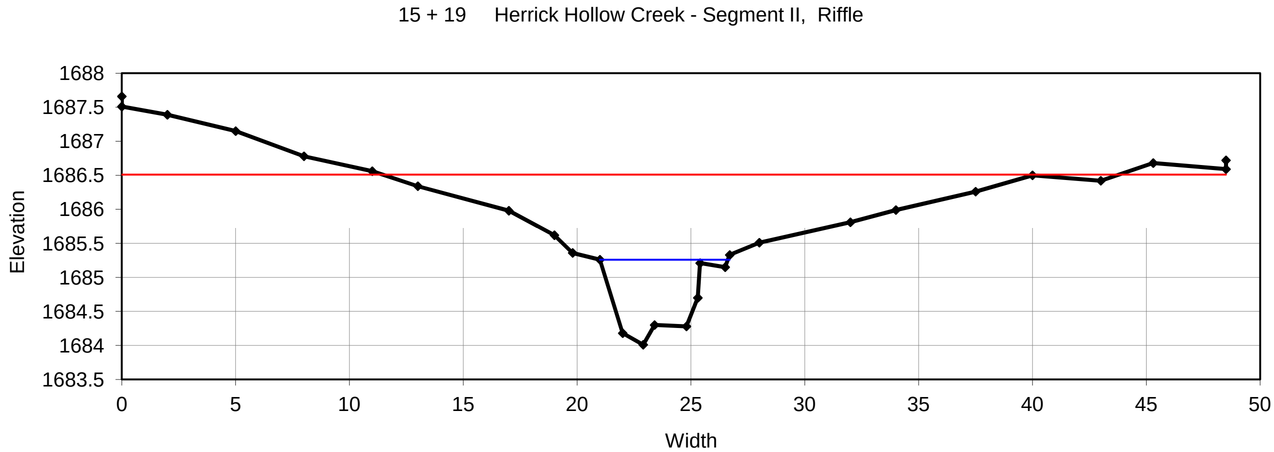
Flow Resistance	
0.100	Manning's roughness
1.37	D'Arcy-Weisbach fric.
2.1	resistance factor u/u*
0.6	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-5. XS #3 at station 11+75 (run) - Segment II, Herrick Hollow Creek (October 2011)



B-6. Comparison of cross-section surveys at XS #3 (11+75) - October 2008 to October 2011



Bankfull Dimensions	
4.0	x-section area (ft.sq.)
5.6	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
6.8	wetted parimeter (ft)
0.6	hyd radi (ft)
7.9	width-depth ratio

Flood Dimensions	
29.0	W flood prone area (ft)
5.2	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

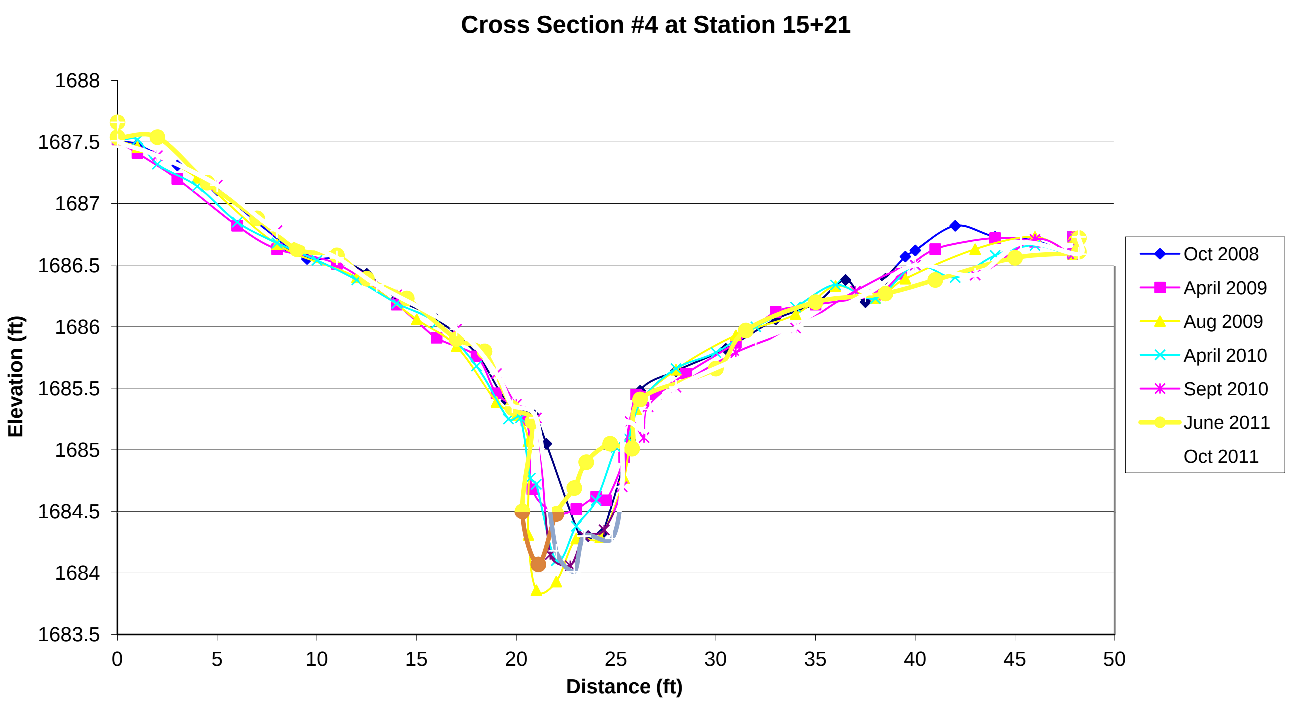
Materials	
81	D50 Bed (mm)
130	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

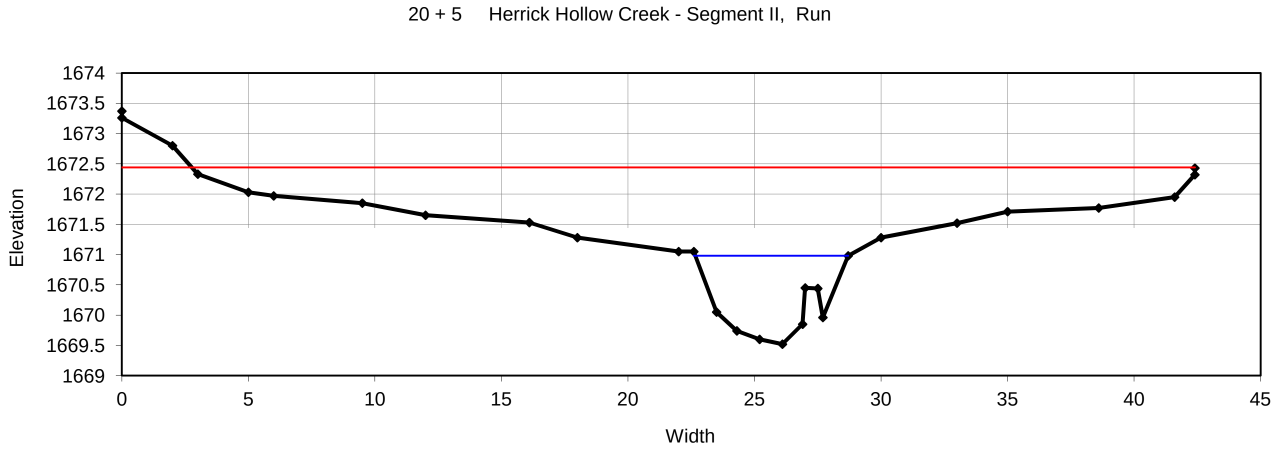
Flow Resistance	
0.056	Manning's roughness
0.44	D'Arcy-Weisbach fric.
4.3	resistance factor u/u*
1.7	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-7. XS #4 at station 15+19 (riffle) - Segment II, Herrick Hollow Creek (October 2011)



B-8. Comparison of cross-section surveys at XS #4 (15+19) - October 2008 to October 2011



Bankfull Dimensions	
5.8	x-section area (ft.sq.)
6.0	width (ft)
1.0	mean depth (ft)
1.5	max depth (ft)
7.8	wetted parimeter (ft)
0.7	hyd radi (ft)
6.3	width-depth ratio

Flood Dimensions	
40.4	W flood prone area (ft)
6.7	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

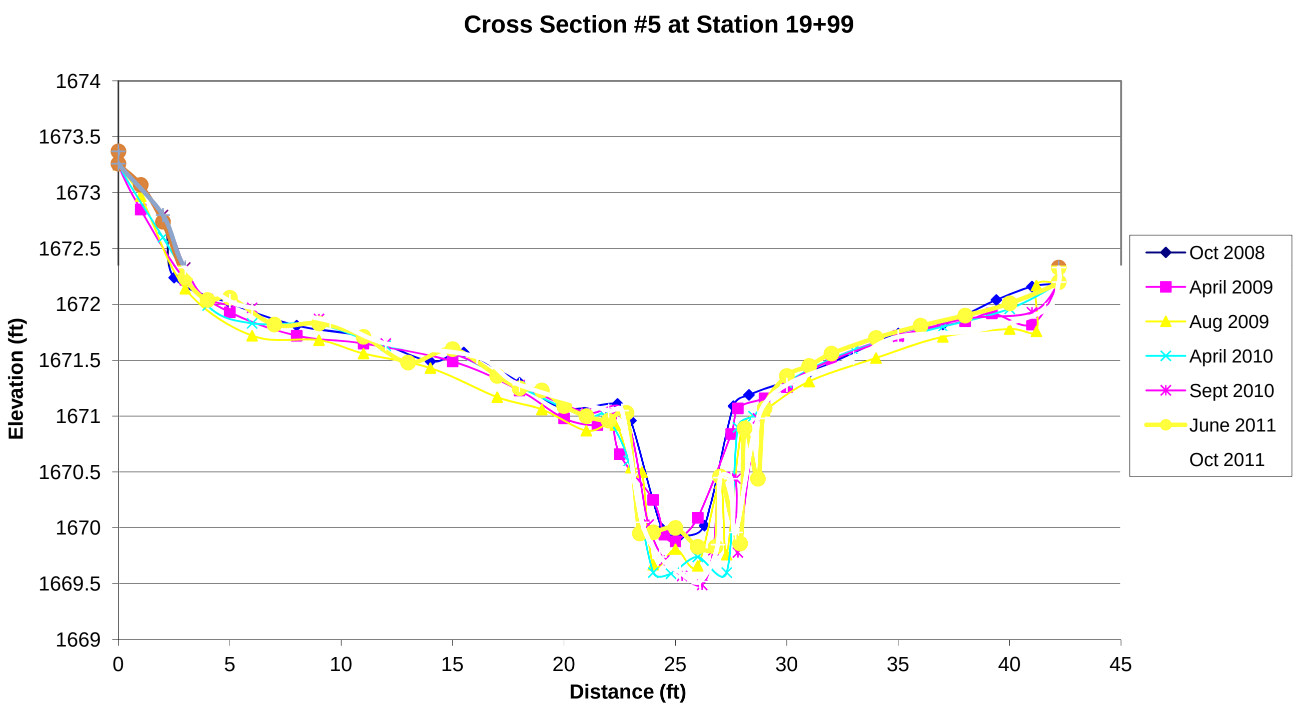
Materials	
81	D50 Bed (mm)
130	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

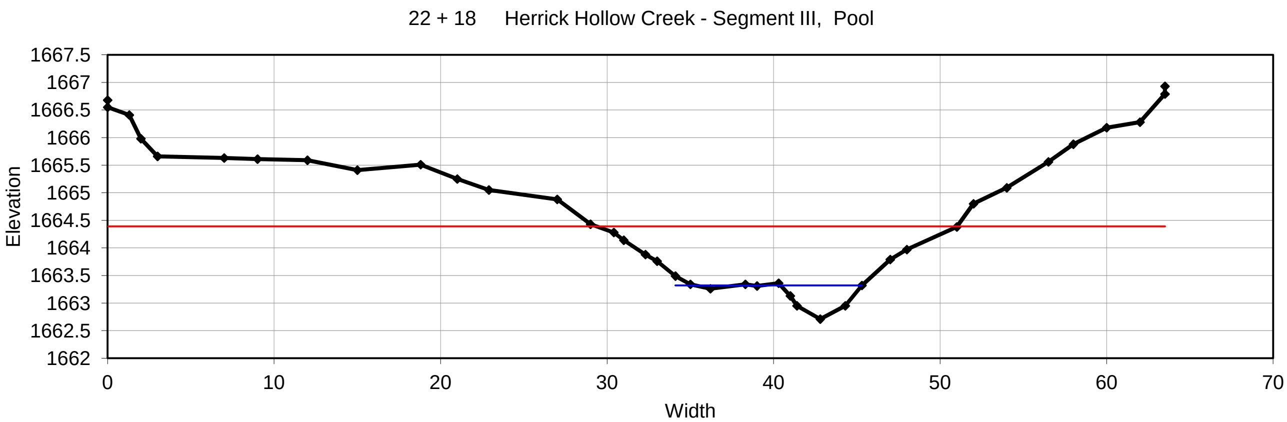
Flow Resistance	
0.052	Manning's roughness
0.35	D'Arcy-Weisbach fric.
4.8	resistance factor u/u*
2.2	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-9. XS #5 at station 20+05 (run) - Segment II, Herrick Hollow Creek (October 2011)



B-10. Comparison of cross-section surveys at XS #5 (20+05) - October 2008 to October 2011



Bankfull Dimensions	
1.8	x-section area (ft.sq.)
7.8	width (ft)
0.2	mean depth (ft)
0.6	max depth (ft)
8.0	wetted parimeter (ft)
0.2	hyd radi (ft)
33.3	width-depth ratio

Flood Dimensions	
16.0	W flood prone area (ft)
2.0	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

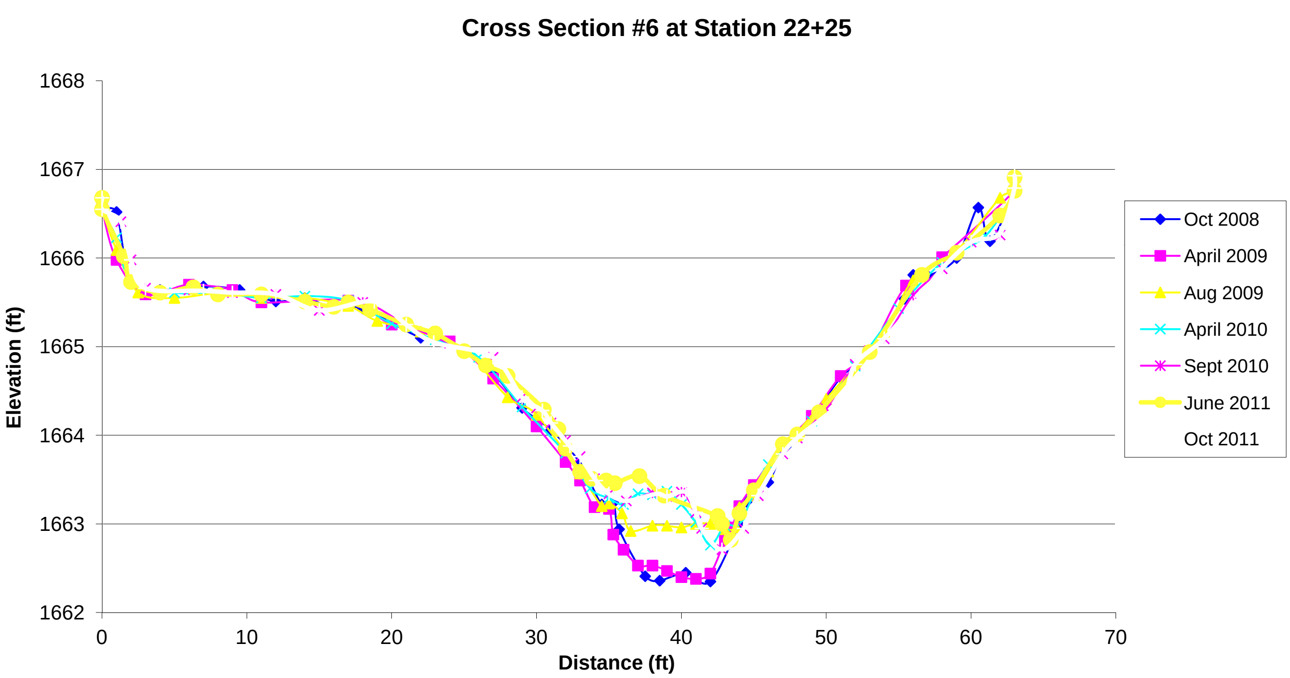
Materials	
69	D50 Bed (mm)
110	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

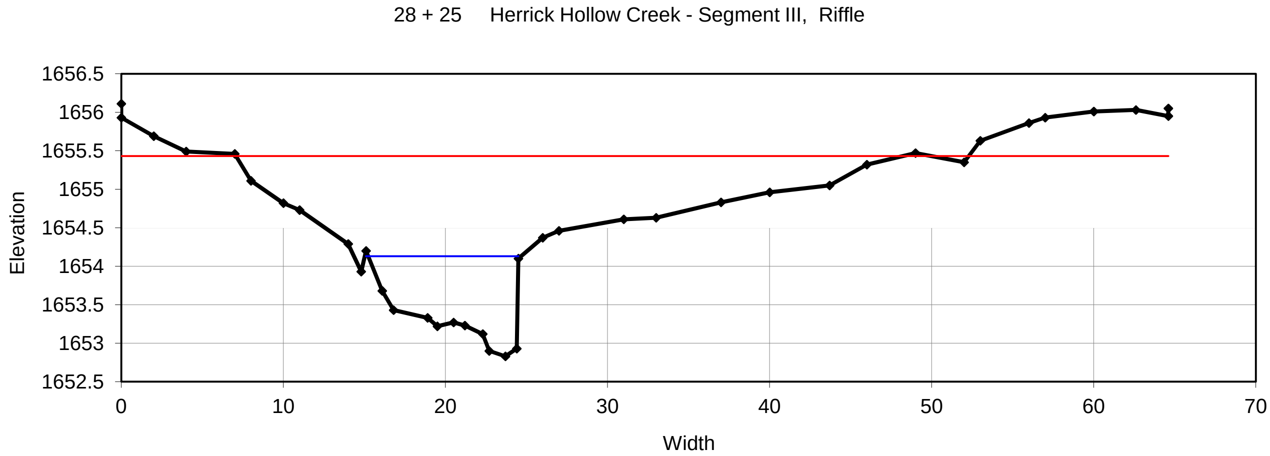
Flow Resistance	
0.082	Manning's roughness
1.15	D'Arcy-Weisbach fric.
2.5	resistance factor u/u*
0.7	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-11. XS #6 at station 22+18 (pool) - Segment III, Herrick Hollow Creek (October 2011)



B-12. Comparison of cross-section surveys at XS #6 (21+18) - October 2008 to October 2011



Bankfull Dimensions	
7.9	x-section area (ft.sq.)
9.3	width (ft)
0.9	mean depth (ft)
1.3	max depth (ft)
10.6	wetted parimeter (ft)
0.7	hyd radi (ft)
10.9	width-depth ratio

Flood Dimensions	
49.0	W flood prone area (ft)
5.3	entrenchment ratio
---	low bank height (ft)
---	low bank height ratio

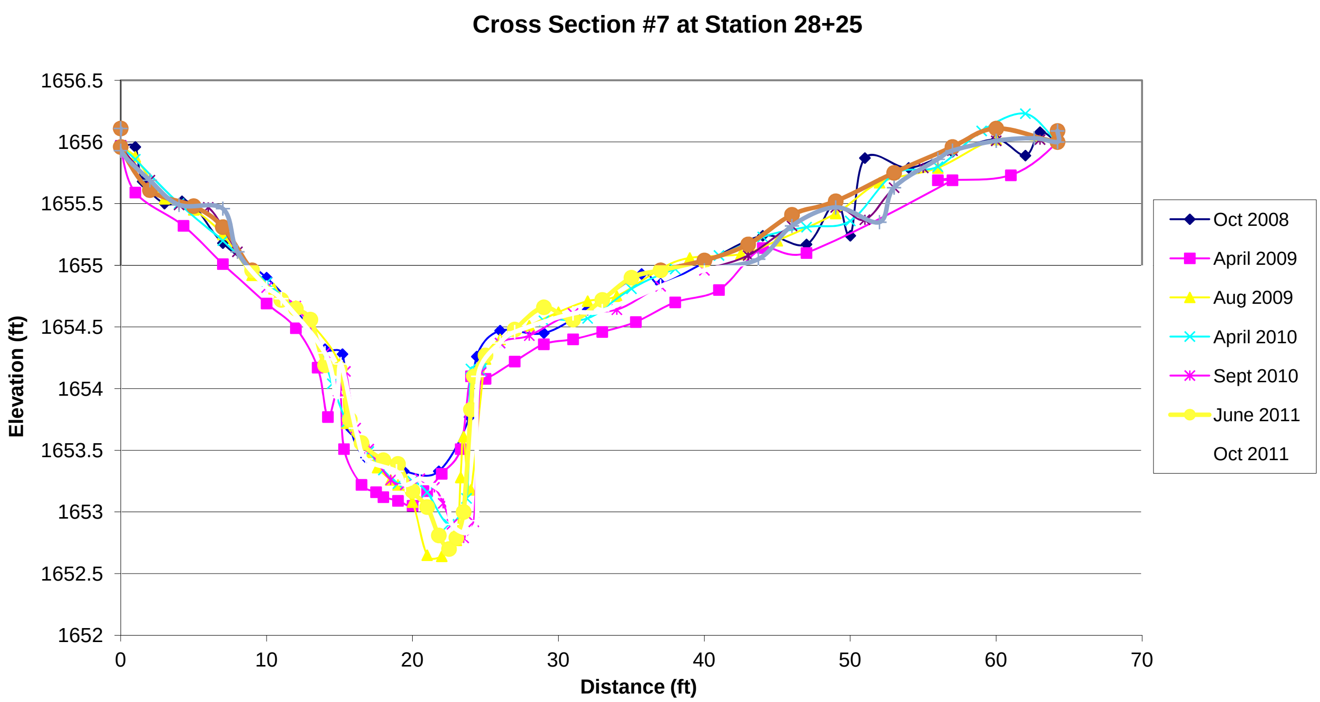
Materials	
69	D50 Bed (mm)
110	D84 Bed (mm)
---	threshold grain size (mm):

Bankfull Flow	
---	velocity (ft/s)
---	discharge rate (cfs)
---	Froude number

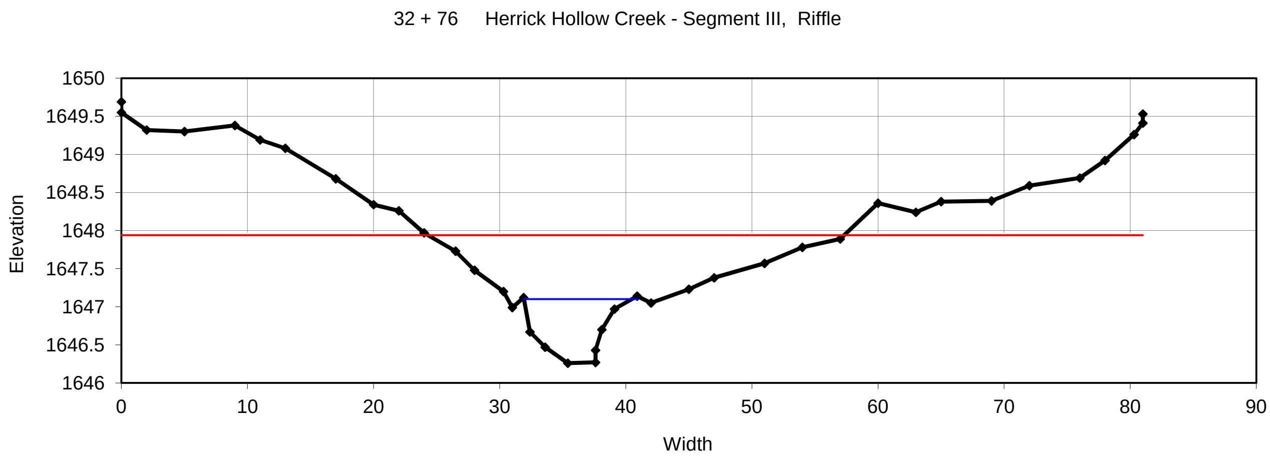
Flow Resistance	
0.049	Manning's roughness
0.30	D'Arcy-Weisbach fric.
5.1	resistance factor u/u*
2.4	relative roughness

Forces & Power	
---	channel slope (%)
---	shear stress (lb/sq.ft.)
---	shear velocity (ft/s)
---	unit strm power (lb/ft/s)

B-13. XS #7 at station 28+25 (riffle) - Segment III, Herrick Hollow Creek (October 2011)



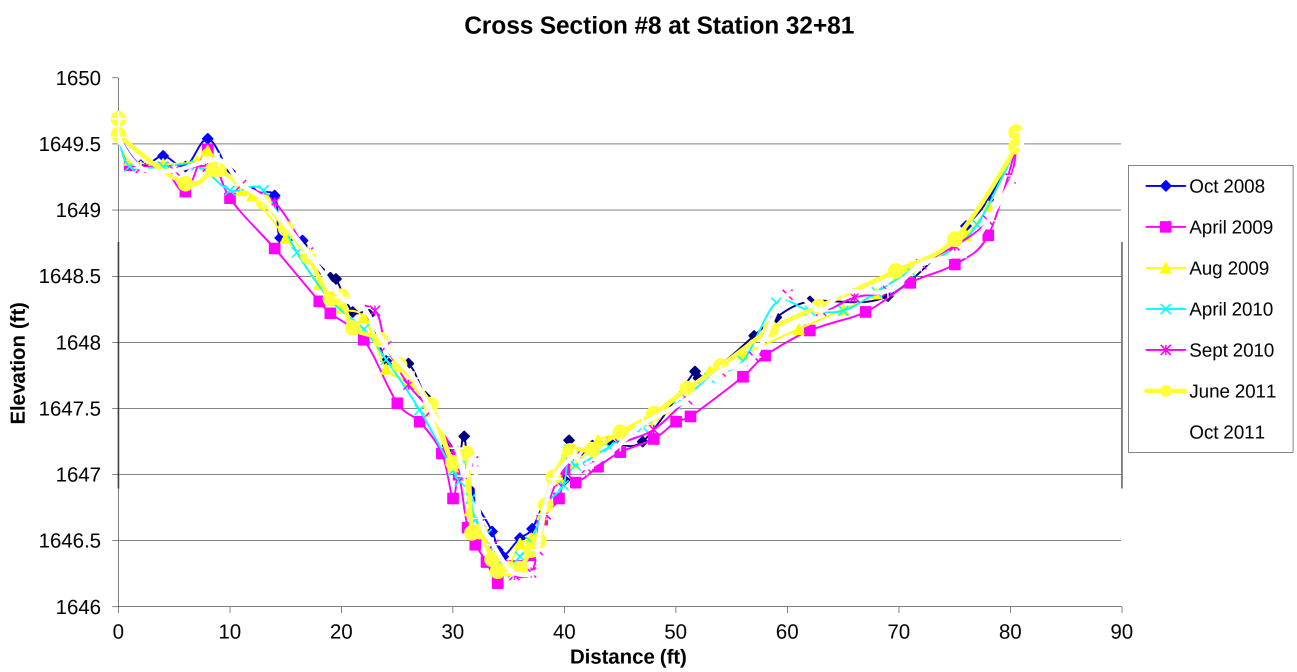
B-14. Comparison of cross-section surveys at XS #7 (28+25) - October 2008 to October 2011



Bankfull Dimensions		Flood Dimensions		Materials	
4.5	x-section area (ft.sq.)	33.0	W flood prone area (ft)	69	D50 Bed (mm)
8.6	width (ft)	3.9	entrenchment ratio	110	D84 Bed (mm)
0.5	mean depth (ft)	---	low bank height (ft)	---	threshold grain size (mm):
0.8	max depth (ft)	---	low bank height ratio		
9.0	wetted parimeter (ft)				
0.5	hyd radi (ft)				
16.2	width-depth ratio				

Bankfull Flow		Flow Resistance		Forces & Power	
---	velocity (ft/s)	0.057	Manning's roughness	---	channel slope (%)
---	discharge rate (cfs)	0.48	D'Arcy-Weisbach fric.	---	shear stress (lb/sq.ft.)
---	Froude number	4.1	resistance factor u/u*	---	shear velocity (ft/s)
		1.5	relative roughness	---	unit strm power (lb/ft/s)

B-15. XS #8 at station 2+76 (riffle) - Segment III, Herrick Hollow Creek (October 2011)



B-16. Comparison of cross-section surveys at XS #8 (32+76) - October 2008 to October 2011

Appendix C

Post-Construction Monitoring Checklist
October 2011

CHECKLIST
POST CONSTRUCTION MONITORING OF HERRICK HOLLOW CREEK

ITEM I - SURVEY OF MONUMENTED CROSS-SECTIONS **October 10 - 11 2011 - SPM / TJP**

Survey the following features…

	4+90	6+93	12+72	15+21	19+99	22+25	28+25	32+81
Top of left pin	X	X	X	X	X	X	X	X
Base of left pin	X	X	X	X	X	X	X	X
Changes in floodplain grade at 1 ft interval or less	X	X	X	X	X	X	X	X
Left terrance or bench (if present)		X	X		X		X	
Left top of bank	X	X	X	X	X	X	X	X
Left bankfull	X	X	X	X	X	X	X	X
Left edge of water	X	X	X	X	X	X	X	X
Left toe of bank	X	X	X	X	X	X	X	X
Changes in bed grade at 1 ft interval or less	X	X	X	X	X	X	X	X
Thalweg	X	X	X	X	X	X	X	X
Right toe of bank	X	X	X	X	X	X	X	X
Right edge of water	X	X	X	X	X	X	X	X
Right bankfull	X	X	X	X	X	X	X	X
Right top of bank	X	X	X	X	X	X	X	X
Right terrance or bench (if present)	X		X	X				
Changes in floodplain grade at 1 ft interval or less	X	X	X	X	X	X	X	X
Base of right pin	X	X	X	X	X	X	X	X
Top of right pin	X	X	X	X	X	X	X	X

GENERAL CHANNEL DIMENSION CONDITIONS

Document evidence of a decrease (bed aggrading) or increase (channel incision)	Localized downcutting of the channel evidenced through formation of scour holes immediately downstream of cross vanes, and in localized areas of stream bank undercutting.
Document any loss of bank stability due to toe erosion or undercutting	Undercutting of banks in various locations. Vigorous growth of herbaceous and woody vegetation in the immediate bank area has help stabilize the banks in and around areas where short sections of bank undercutting has occurred.

ITEM II - SURVEY OF LONGITUDINAL PROFILE

Survey the following features…	
Thalweg at changes in bed slope at 25 ft interval or less	X
Thalweg at head, max, and tail of each bed feature	X
Thalweg at throat of cross vane	X
Thalweg at throat of cascade	X
Thalweg at throat of log vane	X
Cross vane arm at butt rocks (interface with bank) - both arms	X
Cascade at butt rock (interface with bank)	X
Log vane arm at butt rock (interface with bank)	X
Thalweg at cross vane scour hole	X
Thalweg at cascade scour hole	X
Thalweg at log vane scour hole	X
Bankfull elevation at each thalweg station surveyed	X
Left edge of water at each thalweg station surveyed	X
Water depth at each thalweg station surveyed	X
Note feature type at each shot	X
Note relevant bed or bank condition (if present)	X

ITEM III - INSPECTION OF INSTREAM STRUCTURES

Inspect the following…	Yes	No
Have cross vane arms, throat, or footers moved resulting in functional loss (scour, throat abandonment, toppling, bank erosion, opening of seams or gaps, etc.)?		X
Notes describing condition: Movement of vane arms at CV #21 has not impacted performance, and cross vane remains functional.		
Have cascade rocks moved, leading to functional loss (scour, throat abandonment, toppling, bank erosion, opening of seams or gaps, etc.)?		X
Notes describing condition: Cascades have for the most part been incorporated into minor grade control features throughout the channel.		
Have log vanes or footers moved, leading to performance issues (scour, throat abandonment, bank erosion, opening of seams or gaps, etc.)?		X
Notes describing condition: No movement of logs observed.		
Does structure show evidence of sediment deposition or scour at, above, or below structure	X	
Notes describing condition: Formation of riffle features at many cross vane locations, and scour holes below CV and logs.		
Does structure show evidence of side-washing, bank scour, or other evidence of functional loss?		X
Are structures still firmly keyed to bed and banks? All structures are still firmly keyed to banks		
Note any other conditions affecting structure function: None		
Note condition and functionality of Dimatos Crossing: Limited use of crossing has allowed for extensive vegetative growth in this area		

GENERAL CHANNEL PROFILE CONDITIONS

Document evidence of headcutting	Headcutting limited to areas just downstream of cross vanes, and is associated with expected formation of scour holes immediately downstream of these structures.
Document instances of subsurface flow during greater than baseflow conditions	All portions of channel were at greater-than-baseflow discharge, and no subsurface flow was observed.
Document building or changes in naturally-formed bed features	Prominent material shifting and stacking through Segments I and II, resulting in pronounced formation of natural cascades to act as minor frequent grade control. Movement of bed material in Segment III sufficient enough to continue maintenance of stable riffle / pool sequence.

ITEM IV - PEBBLE COUNTS

At each sample location…

Ensure weighted sample matches feature distribution through each stream segment	**X**	Ensure methodology is consistent with Wolman protocol	**X**
Ensure sample transects include entire bankfull channel	**X**	Ensure particle selection is unbiased	**X**
Ensure a minimum of 100 particles are measured at each sample location	**X**		

ITEM V - PHOTOGRAPHS

Take photos of each instream structure	**X**
Take photos of valley facing upstream and downstream at each left bank pin (XS monuments)	**X**
Take photos of Dimatos Crossing, channel blocks, and other noteable features of the stream corridor	**X**

Appendix D

Photographs
October 2011

Figure 1. Typical stable riffle/pool sequence through Segment III

Figure 2. Natural establishment and maintenance of minor, frequent grade control through Segment II

Figure 3. Typical undercut bank feature within Segment II

Figure 4. Shading of the stream corridor in Segment II by willows started from live stakes

Figure 5. Sliding of left vane arm at Cross Vane #21, Station 13+58 (Segment II)

Figure 6. Establishment of healthy, vegetated riparian corridor just downstream of Dimatos Crossing (Segment II)

Figure 7. View facing upstream showing deposition of bed material at Dimatos Crossing

Figure 8. Typical cross vane and channel condition, Segment I

Figure 9. Constructed cascades augment the development of minor, frequent grade control through Segment II

Figure 10. Damselfly (Calopterygidae) nymphs and adults are common inhabitants of the restored stream corridor