Annual Progress Report for 2007

Monitoring the Effectiveness and Validating Response to the Road Related Mitigation Practices Implemented on the Pike's Peak Highway

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Executive Summary

Monitoring the Effectiveness and Validating Response to the Road Related Mitigation Practices Implemented on the Pike's Peak Highway

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This is the fifth annual report documenting the monitoring efforts on the Pike's Peak Highway as part of the Settlement Agreement between the Sierra Club and the United States Department of Agriculture – Forest Service in *Sierra Club v. Veneman*, Civil Action No. 98-M-662 (D. Colo.) (US Department of Justice 2002). The original study plan and subsequent amendments call for effectiveness monitoring, designed to determine how well the mitigation practices implemented contribute to meeting their objectives; and validation monitoring, designed to determine how the mitigation practices affect the riparian, wetland, and aquatic systems within the area of influence of the Pike's Peak Highway (USDA Forest Service 2002 and 2003).

Effectiveness monitoring focused on the 14 mile long, 300 foot wide highway corridor that starts at mile marker 7 and continues to the summit of Pike's Peak. The only resurfacing treatment used on the highway for mitigation purposes is asphalt paving. Approximately six miles of the highway have been paved since the onset of the mitigation project. Highway improvements continued in 2007 including paving 0.6 miles of highway, constructing new riprap weirs, and revegetating approximately 3 acres of land adjacent to the highway. In addition, 3,731 tons of gravel were added to the road surface, 455 tons of gravel were added to the road for slope repair and smoothing pot-holes, and 546 tons of gravel were added to rebuild rock weirs (personal communication with Jack Glavan, City of Colorado Springs Capital Projects Manager). Road surface data for untreated road segments were not collected during the 2007 field season due to the necessary time commitments for monitoring silt fences and a short working field season.

Although precipitation measurements from the three rain gauges and the Glen Cove snotel site did not indicate rainfall amounts greater than average for previous years, 2007 was a very active year for runoff and erosion. As a result, more time was allocated to cleaning out and repairing silt fences, which contained greater volumes of sediment than in the past and were more frequently breached or overtopped. The extra effort required to clean and maintain the silt fences resulted in reduced opportunity to monitor other sites. Silt fences from 13 cut slope and 29 fill slope sites were monitored in 2007. Sediment volume estimates from dates when the silt fences were breached may be inaccurate and are noted in the appendices and in the site summary. Changes in construction and placement of silt fences are proposed for 2008 to help mitigate the problems associated with high runoff observed in 2007 and expected in future years.

Eighteen of the original 20 drainage ditches were surveyed in 2007. Site 092DD was paved in 2005 and site 107DD was shot-creted in 2006 eliminating the need for further monitoring. Six of the 18 remaining drainage ditches are treated (lined with erosion control fabric), and 12 remain untreated. Three of the untreated drainage ditches are adjacent to road surfaces paved with recycled asphalt, but have no other treatment applied to the ditch.

Thirty of the original 115 conveyance channels were surveyed in 2007, including all of those surveyed in 2006. Five sites associated with newly constructed rock weirs and one additional untreated site were also surveyed for a total of 36 conveyance channel surveys. Thirteen of the 36 conveyance channels were measured in 2007 specifically to compare treated (7) and untreated (6) road sections. Since monitoring the full set of 115 conveyance channels is not feasible during each field season, the project will continue to survey a sub-sample of the channels each year.

Twenty-two of the 24 established rock weir/sediment trap sites were surveyed in 2007. All but one site, 236RW, were surveyed twice to monitor their effectiveness in trapping sediment from winter and summer runoff. In addition, 6 new rock weir sites were established in 2007; each of these was surveyed once on the day of establishment. Several rock weirs experienced breaching or failure, some multiple times during the season. Sediment volume estimates from dates when the rock weirs were breached may be inaccurate and are noted in the appendices and in the site summary.

The primary focus of the validation monitoring is to address the condition of the riparian, wetland, and aquatic systems along the Pike’s Peak Highway. Stream channel surveys were completed on Boehmer Creek, East Fork Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork Crystal Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork Beaver Creek in 2007. Monitoring was not completed on Oil Creek. In the past, stream channel surveys have included planview surveys, profile surveys, cross section surveys, bank erosion surveys, vegetation surveys, pebble counts, and grab samples. In 2007, stream channel surveys included only cross section surveys, thalweg surveys, vegetation surveys, pebble counts, and grab samples.

Included with the full report are two data DVDs containing all survey data (field and post processing) plus digital photographs (recommended viewing) for all sites for the 2007 season.

INTRODUCTION

The proposed actions presented in the Pike's Peak Highway Drainage, Erosion and Sediment Control Plan Environmental Assessment (Hydrosphere Resource Consultants, Inc. June 25, 1999) were designed to achieve the following goals:

- Stabilize road surface materials, cut slopes, and fill slopes
- Reduce runoff velocities and dissipate erosive energy
- Collect runoff in armored ditches and conveyance channels
- Reduce erosion and sediment deposition in drainage channels
- Retain sediment in traps and ponds to reduce downstream sedimentation.

In May 2001, a monitoring study plan was approved as part of the Settlement Agreement between the Sierra Club and the United States Department of Agriculture – Forest Service in *Sierra Club v. Venneman*, Civil Action No. 98-M-662 (D. Colo.) (US Department of Justice 2002). The study plan outlines appropriate procedures for monitoring and documenting the effectiveness of mitigation practices in achieving the above desired goals (USDA Forest Service 2002). The monitoring effort, which includes implementation monitoring, effectiveness monitoring, and validation monitoring, began in 2003.

Implementation monitoring is done to verify that mitigation practices are properly implemented. Staffs from both the city of Colorado Springs and the U.S. Forest Service are responsible for this aspect of the monitoring program. Since all parties assume that mitigation practices will be properly implemented, successes or failures in design or implementation will be addressed in the annual monitoring reports only to the extent that they impact subsequent monitoring.

Effectiveness monitoring is done to determine if the mitigation practice implemented was effective in achieving the desired goal(s) or purpose(s). Effectiveness monitoring is a cornerstone of the monitoring effort described in this report.

The final and perhaps more critical component in the monitoring program is validation monitoring, which is intended to document the degree to which the properly implemented and effective mitigation practices ultimately influence the resource of concern. In this report, validation monitoring addresses the condition of the riparian, wetland, and aquatic systems along Pikes Peak Highway.

Changes in the proposed action plan for road mitigation practices (Burke 2002) have required amendment to the original approved monitoring plan (USDA Forest Service 2003). Initially, a variety of highway surface stabilization practices were proposed for road mitigation. These have been reduced to a single surfacing procedure, asphalt pavement, thus eliminating any need for a monitoring design that incorporates multiple surface treatments.

In the revised highway mitigation plan, sediment ponds are constructed as rock weirs and are designed to collect or trap "all" the water and sediment exiting the road corridor from all events up to the magnitude of the design storm. Presumably, sediment will settle out in the pond with only the water percolating through a porous berm, thus eliminating the need to sample sediment concentrations in pond inflow or outflow. This change in mitigation design required a modification in monitoring how the sediment transport in surface waters is determined. In addition, revisions in the mitigation design direct road drainage from very long stretches of both pavement and ditch line (as much as 2 miles) into single culverts and conveyance channels, thus reducing the number of diversions off the highway and the number of proposed sampling sites.

Over time, the entire highway will be paved, rather than surfaced using a variety of treatments, which should significantly reduce or eliminate the potential for continued surface erosion to occur from the road surface. Current erosion rates from the gravel portion of the highway will continue to be monitored as called for in the approved monitoring plan, but once the reach or section of road is paved it will be assumed that post mitigation erosion from the road surface is zero. As noted above, sediment pond design has been altered but monitoring will still focus on quantifying total sediment exported in the discharge water and the effectiveness of the mitigation practices in reducing that export. This report includes a brief description of the current monitoring protocol for each metric of concern and documents any changes in the monitoring protocol that may have occurred since the previous annual report.

The Forest Service oversees monitoring of the streams draining the basins below the highway to validate that discharge management and reductions in sedimentation from the highway do in fact result in improvements in the channel and riparian environment. A suite of tributaries in the Pikes Peak Watershed has been identified as either impacted or non-impacted by the presence and maintenance of the Pikes Peak Highway. North Catamount, South Catamount, Oil, and Boehmer Creeks represent non-impacted streams. Ski, Severy, East Fork of Beaver, North Fork of Crystal, and West Fork of Beaver Creeks are all considered stream systems impacted by the highway. Depending on the magnitude of the reduction in the amount of sediment delivered to the stream system and changes in discharge energy, it may be possible to document changes in channel morphology and riparian condition that occur as a consequence of improved highway management.

Approximately six miles of the highway have been paved since the onset of the mitigation project. In 2007, the highway crew completed work on Basin 4, which included paving 0.6 miles of road, constructing new riprap weirs, and revegetating approximately 3 acres of land adjacent to the highway. In addition, 3731 tons of gravel were added to the road surface, 455 tons of gravel were added to the road for slope repair and smoothing pot-holes, and 546 tons of gravel were added to rebuild rock weirs (personal communication with Jack Glavan, City of Colorado Springs Capital Projects Manager).

Site Location and Identification

A 15 year study requires the unique identification of monitoring sites and the ability to relocate the sites on various dates. Each cut and fill slope, road cross section, conveyance channel and drainage ditch, rock weir/sediment trap, precipitation gauge, and stream channel reach has been uniquely identified and located. Each site is marked as a waypoint in a GIS platform with latitude, longitude, and altitude, as well as a unique code to distinguish it in the field. The coding convention used for effectiveness monitoring is a five character alpha-numeric code starting with three digits followed by two letters (e.g. 001RW, 007FS, etc.), where the numbers are sequential and the letters signify feature type (CS = Cut Slope, RX = Road Cross Section, etc.). The validation monitoring sites use a similar five character coding convention in which the first four letters identify the stream and the last digit signifies the reach (e.g. OILC1 = Oil Creek, Reach 1; SVRY2 = Severy Creek, Reach 2; etc.).

Every site has at least three temporary bench marks (TBMs) or control points for use as relative reference points to complete repeated, spatially similar, three dimensional surveys. The TBMs are three foot lengths of 0.5 inch rebar pounded into the ground, topped with plastic yellow caps, and tagged with aluminum nursery tags for identification. Sites close together may share TBMs, so that although every site may not have three unique control points, every site has at least three points with which to register the survey.

In 2007, six new rock weir waypoints were established, 238RW, 239RW, 240RW, 241RW, 242RW, and 243RW. Site names, locations, and feature descriptions can be found in Appendix A. Note that Appendix A provides a complete list of all waypoints established since the project began in 2003; not all of the sites listed were sampled during the 2007 monitoring season.

In 2008, in response to the dislodging of several temporary benchmarks during the 2007 season as the result of structural failure, the field crew will establish a permanent benchmark for each waypoint. This benchmark will be a designated immobile natural feature, such as a large boulder, that can be easily identified for the life of the project and will not be dislodged during storm events or snowmelt.

OBJECTIVE

The objective of this report is to document the data collected and progress made in the effectiveness and validation monitoring of the mitigation practices implemented on the Pikes Peak Highway during the 2007 field season. Each annual report beginning in 2007 will consist of a description of the protocol used to monitor each metric of concern and a summary of the data collected for that particular year. It should be realized that, by design, not all metrics or sampling locations will be monitored every year. As a result, some reports will contain data not presented in other reports. A full data set from all years is available in the data archive.

It should also be noted that it was not the intent of the settlement agreement to include analysis of the data beyond a QA/QC assessment in the monitoring effort. Therefore the annual report will state the intended purpose for collecting the data and present the data in a format useful for subsequent analysis.

EFFECTIVENESS MONITORING

The road mitigation practices implemented by the city of Colorado Springs are intended to control erosion and manage the erosive energy of surface water discharge from the Pikes Peak Highway. The following describes the metrics monitored and the data collected in order to document the effectiveness of mitigation. The standard protocol for identifying and numbering the various sample sites is presented up front, followed by a description of the monitoring sites and metrics.

Precipitation

Three tipping bucket rain gauges (Onset) equipped with event data loggers (HOBO) were installed at approximate elevations of 10,000, 11,500, and 13,000 feet to index precipitation over the elevation range of the monitored portion of the highway. Rain gauge 075RG is located just uphill from the Halfway Picnic Area near mile marker ten at an elevation of 10,109 feet. This is at the upper end of Priority Basin 2, in the subalpine zone. Rain gauge 076RG is located near the Elk Park Trailhead (No. 652) at the boundary between the subalpine and the alpine zones at 11,810 feet elevation. Rain gauge 077RG is located near the Devil's Playground and well into the alpine area at 13,069 feet elevation. Rain gauges installed for this study operate from early May, or as soon as the field crew starts for the season, until late September or early October when the crew finishes for the year. Data loggers record a date-time stamp for each tip of the rain gauge bucket (1 tip = 0.01 inches) from which volume, duration, and intensity (or rate) of each storm event can be determined.

Total seasonal precipitation (June – September, 2007) for the three sites is listed in Table 1. In 2007, seasonal totals varied between the three sites with the mid elevation receiving the most precipitation. This trend can be seen in the daily totals as well (Figure 1). Daily precipitation is presented in Appendix B while the basic rain gauge data (date-time stamp) is presented on the data DVDs accompanying the report.

In addition to the three sites established as part of this study, an NRCS Snotel site located at Glen Cove has precipitation data available for the entire year (data for Glen Cove site can be obtained from:

http://www.wcc.nrcs.usda.gov/snotel/snotel.pl?sitenum=1057&state=co).

The NRCS site is located between rain gauges 075RG and 076RG at an elevation of 11,469 feet.

Table 1. Location, total precipitation, and dates of operation for the 3 rain gauges on Pike's Peak 2007.

Gauge ID	Latitude (hddd˚mm.mmm)	Longitude (hddd˚mm.mmm)	Altitude (ft)	Total (in)	Dates of Operation - 2007
075RG	N38 53.797	W105 03.890	10,109	10.91	6/05-10/09
076RG	N38 52.582	W105 03.970	11,810	15.41	6/05-10/09
077RG	N38 51.783	W105 03.999	13,069	8.08	6/05-10/09

Highway Surface Stabilization

The historical highway maintenance practices consisting of the continuous addition of surfacing gravel, road grading, and ditch line maintenance were considered to provide a significant and chronic source for excessive sediment and uncontrolled discharges of water from the roadway to the fill slopes, drainage ditches, conveyance channels, and ultimately the adjacent riparian areas and stream channels. Initially, the highway mitigation plan called for implementation of a variety of measures to stabilize the road surface; to increase the strength, stiffness, and durability of that surface; and to reduce erosion. That mitigation plan has since been modified and now consists of a single surface or road bed treatment, asphalt pavement. The monitoring protocol, appropriate for estimating road erosion, has been significantly modified to reflect the changes in the road bed stabilization practices. Monitoring has been reduced to attempting to estimate the erosion from untreated road segments with the assumption that erosion from the paved segments will be zero.

Measuring erosion from an actively used gravel surfaced road subject to periodic maintenance is complex and costly. Road maintenance practices may move material from one place to another on the road or cast it onto the fill slope or into the ditch line. As a surrogate for estimating actual erosion rates, road surface elevation for selected road reaches is being monitored over time to document erosion rates from untreated road segments. Uniform road segments have been selected and survey cross sections permanently established at 5 intervals along each selected road segment (approximately one cross section per 20 meters of road). The segments are periodically surveyed to determine the degree of erosion or deposition occurring in the cross sections. Individual cross sections have been monumented by the placement of a 3-foot piece of rebar driven into the road surface at the upper edge of the fill slope. In addition, permanently monumented base line elevation points have been established for each road segment and are used as references for each cross section. Monitoring consists of surveying the surface elevation, relative to the benchmark, of the road bed cross section. The road surface survey includes a cross sectional survey of the interior ditch (the use for which will be discussed later). Averaging surface elevations from the 5 cross sections and multiplying by the length of the segment yields an estimate of the average surface elevation and area of the segment. Comparing changes in surface elevation and areas between repeated measurements, over time or between maintenance activities, yields an estimate of volumetric change in material volume and provides an estimate of what has been eroded (lost) or deposited in the road segment. It is critical that any addition of gravel or other material to the monitored road surfaces be documented and included in the mass balance. All maintenance activity in monitored road segments should also be documented and considered in evaluating changes. Ideally, sampling consists of two measurements of each cross-section, one measurement as soon after snowmelt as possible and the other at the end of tourist season. It is not necessary to sample every monumented road section every year. It is of value to take additional measurements on specific segments before and after planned maintenance, if crew time is available. This may be too imprecise a measure to warrant more frequent measurement, but over time it will index the loss of road surface material to side slopes and drainage ditches.

Road surface data were not gathered during the 2007 monitoring season due to the necessary time commitments for monitoring silt fences and a short working field season.

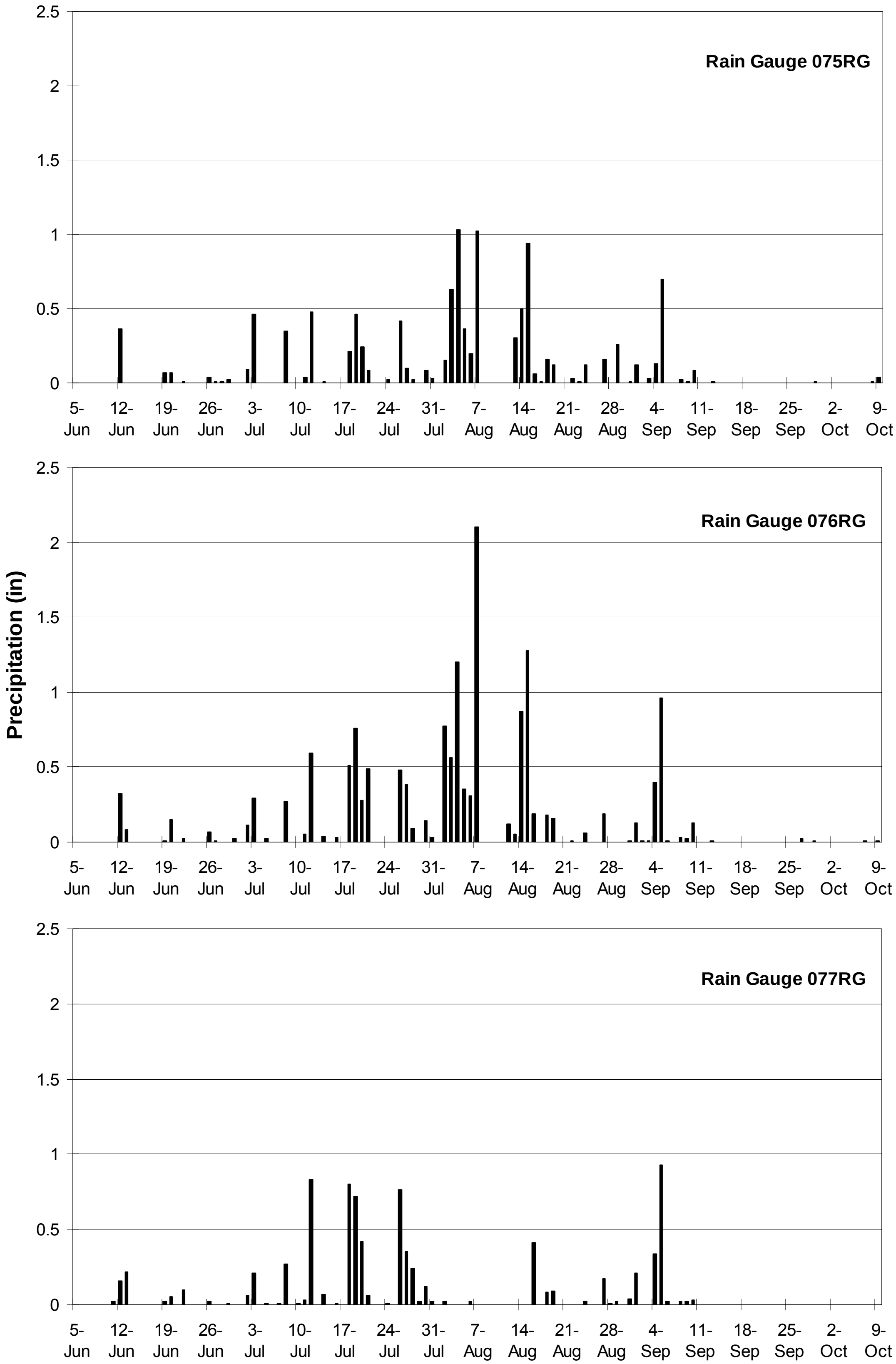

Figure 1. Daily precipitation for the 3 rain gauges on Pike's Peak 2007.

Stabilizing Cut and Fill Slopes

Cut and fill slopes associated with highway construction provide a potentially continuous source of sediment to wetland, riparian, and aquatic systems. However, it is expected that highway mitigation practices will reduce sediment movement. The degree to which the practices are effective in reducing sediment production from these slopes will be estimated by comparing differences in the amount and timing of sediment transport from treated and untreated cut and fill slopes. The basic monitoring protocol is the installation of a 30-foot silt fence at the base of the slope. Periodic measurements of the volume of material trapped behind the fence (e.g. after spring snowmelt and again after each large rainfall event) represents an index to the amount of material being eroded from the slope above the fence. Each silt fence is routinely visited to insure timely measurement and maintenance. Should the silt fence fill to the point of reduced efficiency or fail during the period between measurements, the fence will either be repaired, replaced, cleaned out, or relocated to a new monitoring site. Currently, accumulation of sediment behind the silt fence is determined by removing the accumulated material and measuring the amount removed by placing it in graduated containers for volumetric determination. A sub-sample of the material removed is collected for further laboratory analysis to determine total weight per unit volume and particle size distribution. Previously, the volume trapped was determined from a survey of the volume behind the fence before and after the sediment was removed.

Erosion from cut slopes is monitored in the following manner. First, a silt fence is placed across the base of the cut slope just above the ditch line. A second silt fence is placed on the upper edge of the cut slope to intercept and trap what is being delivered to the cut slope from the undisturbed hill slope above. This allows separation of the actual contribution of the cut slope to the road or ditch line from the contribution of the presumably undisturbed hill slope. Originally, the mitigation plan for the highway called for one of 5 stability practices or treatments to be applied to each of the cut slopes on the highway (no treatment, vegetation, netting, gunite, and retaining walls). The mitigation plan for the highway has since been modified to consist primarily of water management, drainage corridor stabilization, and road surface pavement, and no treatment options are planned for the cut slopes. The original monitoring plan has been modified to reflect the change. Twenty-six silt fences (13 pairs) have been installed to monitor cut slopes. However, rather than address the effectiveness of various slope stabilization practices, they are proportionally divided between the mitigated (paved) and untreated portions of the highway. The sampling design includes cut slopes located in road segments that will be mitigated at differing times in the future, thus ensuring a wide range in the variability of conditions sampled both before and after highway mitigation.

2007 was a very active year for runoff and erosion. As a result, the field crew had spent a large amount of time clearing sediment from each of the silt fences following precipitation events, and did complete weekly surveys at each site. Furthermore, eight of the 26 cut slope silt fences surveyed in 2007 were breached during the season; three of those were breached twice. Careful notes were taken in the field to indicate the condition of the silt fence during each site visit. In the site summary on the data DVDs, survey and site visit dates are annotated with the condition of the silt fence, any repairs or replacements that were done to maintain the silt fences and an indication if the fence was breached on the survey date. A summary of cut slope site visits, survey dates, and sediment accumulation in cut slope silt fences for the 2007 monitoring season can be found in Appendix C. All cut slope data and photographs for the 2007 season are available on the accompanying data DVDs. It is important to note that volume estimates from dates when the silt fence was breached may be inaccurate. Data from these dates are highlighted in yellow on the site summary on the data DVDs and marked in the tables in Appendix C with a ‡.

A similar design has been implemented for monitoring effectiveness of practices affecting erosion from fill slopes. The design includes the use of 2 silt fences per site, with the first fence placed at the base of the fill slope to trap what originated from the fill slope, and the second fence placed at the base of the hill slope on which the fill slope resides (or at the boundary of the 150 foot corridor associated with the road right-of-way, whichever is the shorter distance), offset from the first fence. This pattern allows for trapping the eroded material as it leaves the fill slope as well as trapping the sediment being delivered off-site or down slope. In this way, not only will the "on-site" effectiveness of the mitigation practice as it effects fill slope erosion be evaluated, but an estimate of the amount of eroded material attenuated down slope will also be obtained. A working design for monitoring fill slopes calls for a total of 58 silt fences on 29 sites. Again, the sites are distributed between treated and untreated sections of the highway. Determination of the volume of material trapped behind the fill slope silt fences is accomplished in the same manner as that for the cut slope fences.

The fill slope silt fences experienced the same high runoff and erosion activity as the cut slope fences, and 17 of the 58 silt fences were breached. Thirteen of those were breached more than once during the season. A summary of fill slope site visits, survey dates, and sediment accumulation in fill slope silt fences for the 2007 monitoring season can be found in Appendix D. All fill slope data and photographs for 2007 are available on the accompanying data DVDs. Possible data inaccuracies are noted in the same manner as the cut slope data, with yellow highlighting in the site summary on the data DVDs and with a ‡ in the appendix. Likewise, field notes are appended to the fill slope site summary to indicate the silt fence condition; repairs made, and breach dates.

Numerous sediment grab samples were collected from the cut slope and fill slope silt fences throughout the 2007 season. A sub-set of these was selected to be analyzed in the lab for particle size distribution. The balance of samples will be analyzed only if the variability in the particle size distribution of the sub-set of samples chosen for initial analysis warrants additional analysis. Since lab analyses were not complete at the time of this report, a supplemental report presenting the particle size distribution of the material trapped in the silt fences through 2007 will be sent out later in 2008.

Initially, the monitoring plan anticipated taking measurements of the accumulation behind all silt fences 2 - 3 times per year. The actual number of measurements taken is dependent on winter snowpack, soil moisture, number of rainfall events, and availability of crew members to clean out silt fences while completing other tasks. The estimates of erosion and sediment delivery (from cut slope, fill slope, and silt fences located down slope near the streamside or boundary of the 150 foot corridor), as well as estimates of "natural movement" estimated from what is trapped in the silt fencing placed above cut slopes, will allow separation of natural hill slope movement, erosion and transport from cut and fill slopes, transport down slope and the effect of intervention practices and other BMPs.

Using silt fences to monitor sediment transport has proven to be difficult as indicated by the breaching that has occurred over the course of the monitoring. The primary cause of silt fence failure has been the inability to reliably fasten the fence material to the frequently present rock surfaces, particularly on cut slopes. As a corrective measure, the sampling protocol has been revised to avoid placement of silt fences at locations that contain rock surfaces. Current fences that cross rock surfaces will gradually be moved to one side or the other to avoid the rock. In the case of the cut slope, it will also be necessary to move and re-align the fence at the top of the cut slope. Hopefully this will reduce the incidence of failure. Since one would expect little erosion to occur on the rock surface itself, the decision to avoid them should not significantly bias the estimate of erosion. In addition, a heavier, more wind resistant, fencing material is being used to construct the fences and also reduce the risk of failure.

Armoring Drainage Channels

Drainage channels, which include both ditches along roads and conveyance channels below culverts, were to be lined (armored) with riprap or concrete to control further erosion and deposition of sediment. However, instead of armoring roadside drainage ditches, all reaches except those meeting the criteria stated in the latest Forest Service Design Review (Burke 2002) are or will be either lined with shot-crete or erosion control fabric or left untreated. Effectiveness monitoring consists of selecting a sample of the fabric lined and unlined drainage ditches, establishing cross sections in the channels to be periodically surveyed, and using measured changes in cross sectional area to determine if erosion or deposition is reduced or increased in armored channels relative to unarmored channels. Drainage ditches that have been shot-creted will not be surveyed unless visual inspection provides evidence of failure, in which case cross sections will be established to document change. Conveyance channels are those features that drain water away from the road system. For the most part they are not physically treated, although road management practices may greatly alter discharge. Although the monitoring technique will be similar for both ditches and conveyance channels, the sample size differs.

Drainage Ditches

Many of the drainage ditches selected for monitoring align with the road sections selected for monitoring. Additional ditches were selected independently of the road cross sections as needed to complete the road slope/contributing area/armoring material matrix. As with the road surface erosion transects, 5 cross sectional transects (labeled A-E except for site 188DD, which has 8 cross sections labeled A-H) per segment of drainage channel (lined, not lined) were established. For each cross section, a reference pin was located at the base of the cut slope on the inside of the ditch; a second pin was located on the edge of the road surface when possible. By anticipating the order in which ditches will be lined in future years, the effectiveness of the lining methods in reducing erosion and deposition can be better defined by obtaining cross section information at control sites for several years prior to treatment.

Eighteen of the original 20 drainage ditches selected were surveyed in 2007. Ditch 092DD was paved in 2005, and ditch 107DD was shot-creted in 2006, eliminating the need for further surveys on those sites. Six of the surveyed drainage ditches are treated (lined with erosion control fabric), and 12 remain untreated. Drainage ditch survey cross sections that correspond to the survey dates presented in Table 2 can be found in Appendix E. Drainage ditch survey data and photographs for 2007 are available on the accompanying data DVDs.

Conveyance Channels

Monitoring the effectiveness of mitigation practices (armoring) on conveyance channels also represents a critical component in the monitoring program. These channels are eroding into gullies, and may contribute most significantly to the future sediment load in the adjacent wetland, riparian, and aquatic systems. One hundred fifteen conveyance channels were identified and surveyed during the first 3 years of this monitoring effort. Surveying all 115 channels each year is prohibitive. Instead, as many channels as possible are surveyed each year according to time availability. Each channel is surveyed using a series of three cross sections (labeled A-C) located within the 150 foot boundary of the highway corridor.

Thirty-six of the 115 conveyance channels were surveyed in 2007 (Table 3). All of the conveyance channels surveyed in 2006 were surveyed in 2007, including 17 located below established rock weirs and one below a sediment pond. In addition, five conveyance channels were surveyed in 2007 (99CC, 108CC, 111CC, 114CC, and 119CC) that are located below the newly located rock weirs (238RW, 239RW, 240RW, 241RW, and 243RW). Conveyance channel 118CC located below the new rock weir 242RW was not surveyed. Thirteen conveyance channels were measured in 2007 specifically to compare treated (7) and untreated (6) road sections. Cross sections for the channels listed in Table 3 can be found in Appendix F. Conveyance channel survey data and photographs for 2007 are available on the accompanying data DVDs.

Sediment Ponds and Traps

Originally, the mitigation plan called for building sediment ponds designed to trap sediment while allowing water to exit the pond as a stream. Proposed monitoring consisted of surveying the ponds to determine sediment accumulations as well as measuring the suspended sediment concentrations entering and exiting the pond in concentrated discharge. The combination of sediment accumulation in the pond plus the sediment exiting the pond in the outflow was considered to provide an estimate of total sediment transport. However, in the revised mitigation design for sediment ponds, the ponds are now designed as rock weirs capable of detaining "all" the water and sediment discharged from the road segment. The new monitoring strategy assumes that the ponds retain all the discharge long enough for the sediment to settle out, so that only water will percolate out of the pond through the porous berm. Therefore, measuring sediment accumulation in the pond will estimate total sediment movement. In the event the pond cannot retain all the storm flow delivered to it (actual discharge exceeds the "design" discharge or the weirs fail to function properly), silt fences have been installed on the downhill side of the ponds to measure sediment carried in surface discharge passing over or through the berm. A silt fence is preferred because any over flow or through flow that

Table 2. Description of road treatments above drainage ditches, treatments for drainage ditches, and drainage ditch survey dates on Pike's Peak 2007.

Site ID	Basin #	Road Treatment	Ditch Treatment	Survey Date 2007
005DD	1	Asphalt	Fabric	6/6
010DD	1	Asphalt	Fabric	7/25
042DD	7	Gravel	Untreated	8/7
046DD	7	Gravel	Untreated	8/7
051DD	7	Gravel	Untreated	8/7
057DD	7	Gravel	Untreated	8/7
061DD	7	Gravel	Untreated	8/3
071DD	7	Gravel	Untreated	8/3
080DD	7	Gravel, Recycled Asphalt	Untreated	8/3
082DD	7	Gravel, Recycled Asphalt	Untreated	8/3
085DD	7	Gravel, Recycled Asphalt	Untreated	8/2
155DD	6	Gravel	Untreated	8/2
157DD	6	Gravel	Untreated	8/2
159DD	6	Gravel	Untreated	8/2
182DD	2	Asphalt	Fabric	7/6
188DD	2	Asphalt	Fabric	7/10
195DD	2	Asphalt	Fabric	7/6
205DD	2	Asphalt	Fabric	7/10

occurs is most likely to be diffuse and not concentrated. The measurement protocol for these silt fences is the same as that employed for the cut/fill slope analysis.

The pond surveys require the establishment of a permanently defined area that can be revisited and resurveyed as a means of defining the surface elevation of the pond floor. Incremental changes in the elevation of that surface over time represent a measure of the change in the depth of sediment retained. The change in depth multiplied by the fixed pond area represents an estimate of the change in sediment volume. Surveys should be completed after spring snowmelt and again after significant rainfall events, perhaps a total of 4-times per year. In addition, surveys taken before and after pond cleaning can be used to estimate the total volume or amount of material removed and this cumulative estimate can be used to verify appropriateness of the incremental surveys.

In those few cases where there is a defined inflow and outflow to a pond, water samples to estimate trap efficiency can be "grab sampled" from the inlet and outlet of the ponds as originally planned.

As noted above, any conveyance channels that appear to be present below the rock weirs are monitored. If the weirs fail, as some did in 2007, any changes in the conveyance channel geometry will be documented. If the weirs are effective in reducing the erosive energy of the discharge, the reduction in erosion in the conveyance channels can be documented by comparing response in channels draining treated and untreated road segments.

Table 3. Description of road treatments above conveyance channels, treatments for conveyance channels, and conveyance channel survey dates on Pike's Peak 2007.

Site ID	Basin #	Road Treatment	Channel Treatment†	Survey Date
016CC	2	Asphalt	Culvert Plugged	7/31
021CC	2	Asphalt, Shot Crete Ditch		7/31
030CC	2	Asphalt, Fabric Ditch	Rock Weir	7/10
031CC	2	Asphalt, Fabric Ditch	Rock Weir	7/10
035CC	2	Asphalt		7/18
037CC	3	Gravel		7/18
040CC	1	Asphalt, Curb		7/24
058CC	7	Gravel		7/12
063CC	7	Gravel		7/12
070CC	7	Gravel		7/11
089CC	7	Asphalt	Rock Weir	7/5
094CC	7	Asphalt		7/11
099CC	7	Asphalt	Rock Weir	7/25
104CC	6	Gravel		7/11
108CC	5	Asphalt, Shot Crete Ditch	Rock Weir	7/26
111CC	5	Asphalt, Shot Crete Ditch	Rock Weir	7/31
114CC	5	Asphalt, Shot Crete Ditch	Rock Weir	7/31
119CC	5	Asphalt, Shot Crete Ditch	Rock Weir	7/31
127CC	6	Gravel		7/25
129CC	6	Gravel		7/25
175CC	1	Asphalt, Curb	Rock Weir	7/24
184CC	2	Recycled Asphalt, Gravel, Shot Crete Ditch	Sediment Pond, Shot Crete	7/5
211CC	2	Asphalt, Shot Crete Ditch		7/11
216CC	1	Asphalt, Curb	Rock Weir	6/14
217CC	1	Asphalt, Curb	Rock Weir	6/13
220CC	1	Asphalt	Rock Weir	6/6
221CC	1	Asphalt	Rock Weir	6/14
222CC	1	Asphalt	Rock Weir	6/14
223CC	1	Asphalt	Rock Weir	6/6
224CC	2	Asphalt, Asphalt Ditch	Rock Weir	6/19
225CC	2	Asphalt, Fabric Ditch	Rock Weir	7/24
226CC	2	Asphalt, Curb	Rock Weir	6/19
228CC	2	Asphalt	Rock Weir	6/14
229CC	2	Asphalt	Rock Weir	7/18
230CC	2	Asphalt	Rock Weir	7/3
235CC	5	Asphalt, Shot Crete Ditch	Rock Weir	7/5

†Information on channel treatment unavailable for some sites at time of 2007 report.

Twenty eight sites were monitored in 2007, twenty established rock weirs, 6 new rock weirs, and 2 sediment ponds. At these sites, the rock weir ponds were surveyed, and sediment volume was measured in the silt fences located down slope of the rock weirs. Of the 28 sites, 20 demonstrated some degree of failure, where water and sediment were seen piping under or through the weir, the weir was overtopped, or the weir was breached. In addition, seven of the sediment fences were breached. As noted earlier for silt fences on the cut and fill slopes, the data from the breached weirs or sediment fences may be an inaccurate estimate of total erosion. A summary of rock weir and sediment pond site visits, survey dates, and sediment accumulation in sediment pond silt fences for the 2007 monitoring season, as well as sediment pond cross sections from 2007 can be found in Appendix G. Rock weir and sediment trap data and photographs for 2007 are available on the accompanying data DVDs. The data presented from dates where the weir or fence were breached are highlighted in yellow in the site summary and marked with a ‡ in Appendix G.

Beginning in 2008, a modification in the way in which the rock weirs are surveyed will be implemented. Although the same sites were surveyed each time up to present, the area actually surveyed has not been fixed but rather somewhat variable. The survey data is then overlaid on a previous survey and the common area, or data, clipped for subsequent comparison. In 2008, 4 or more permanent markers will be installed to monument a discrete survey area for each weir pond. Rock weir surveys beginning in 2008 will focus on this area and exclude all extraneous area. The fixed area will be designed such that it can be encompassed by all previous surveys and that data will be clipped to represent the common fixed area. The primary reason for doing this is to reduce reliability on a single surveying instrument and complex analytical package and allow greater flexibility in the choice of tools used for the survey and in the technical expertise of the personnel conducting the surveys
.

Grab samples of the sediment detained in both the weir ponds and silt fences below the ponds were collected each time the ponds were surveyed or the fences cleaned. As noted earlier, a sub-set of these grab samples was chosen for analysis of particle size distribution and a supplemental report will be sent out when the lab analyses are complete. In addition, water samples to determine suspended sediment were collected from the inflow and out flow of the major sediment pond when possible and these data will also be made available.

Because of the repeated failures in several of the rock weirs, a field trip to assess the needed remediation for the structures was held on August 29, 2007. Several alternatives were discussed to mitigate the erosive potential of storm runoff and eliminate weir failure. One alternative that would allow continued use of the rock weir structures is to increase the size and capacity of the weir pond and fit the rock weirs with an overflow pipe to allow any excess runoff to drain before the weirs fail or are overtopped. Two other alternatives included 1) simply reconstructing the weirs in a fashion that would ensure their structural integrity if overtopped without altering capacity and 2) breach the weirs completely and armor the conveyance channels and install energy dissipaters in the channel below as originally planned. At the time of this report, factors such as construction techniques, storm design, and pond sizing are being re-evaluated to further assess the appropriateness of the use of rock weirs to detain water and sediment. This assessment will provide insight to selecting the most appropriate alternative in solving the problem. The outcome of the review and the implications on the monitoring procedures will be addressed in the 2008 report.

VALIDATION MONITORING

Validating the effect of road restoration practices on aquatic, wetland, and riparian conditions is much more difficult than determining the effectiveness of mitigation practices in reducing erosion and sedimentation on-site, or close to the highway. On-site response to the mitigation practices should be direct, dramatic, and occur in real time. Off-site response is likely to be much more diffused, less dramatic, cumulative in nature, and subject to offsetting degradation from elsewhere in the watershed, all of which make validation of response to mitigation difficult. The watersheds of concern have been subject to road related impacts that have been ongoing for over 80 years. The existing degradation is the aggregate result of long-term road related discharge and sediment pulses. The interruption of those pulses as a result of road rehabilitation might be too insignificant to be detectable in the near term, thus creating a challenge in selecting the most appropriate indicator metric.

The scale chosen for validation monitoring is that of the "channel reach." Within each reach selected, channel morphology, bed and bank particle size distribution, bank erosion, and vegetation diversity is monitored and characterized. Ideally, two reaches have been selected in each of the nine streams identified earlier, and periodic monitoring will be conducted in each stream reach for the entire 15-year study period. Oil Creek has only one reach as upper sites of the stream are on private land. Glen Cove Creek also has only one reach as it is a tributary of South Catamount Creek which has 3 reaches. This will result in more pre-treatment data for some stream reaches and more post-treatment data in others, depending on the timing of road mitigation in the watersheds contributing to each of the streams. It is not necessary that all streams be measured every year; therefore measurements will be taken only once annually but at a frequency dependant on crew availability and work load. The monitoring design assumes that stream channel adjustments that occurred following road mitigation practices in the impaired watersheds will not be observed to have occurred on the reference watersheds (i.e., those not influenced by the highway or subsequent mitigation practices). However, this does not imply that differences between the four reference and the five impaired stream systems that may have existed at the start of monitoring program were the result of road related impacts. Rather, any long-term trends in convergence or divergence in the comparison of conditions in the impacted and the control streams following road mitigation will be evaluated as an indicator of mitigation response. The techniques proposed by Harrelson et al. (1994) are used to establish the stream channel reference sites. Selected stream reaches are at least one hundred meters in length and contain several meander lengths or riffle-pool-riffle complexes when present. In 2005, two additional sites were established in response to the diversion wall built on Ski Creek to divert all alpine runoff into Glen Cove Creek. Glen Cove Creek is a tributary to South Catamount Creek, and enters upstream from the two "reference" reaches on South Catamount Creek. The diversion on Ski Creek will increase discharges into both Glen Cove and South Catamount creeks. The additional monitoring sites are located just above the confluence on each of the streams and are named GLEN1 and SCAT3, respectively and are intended to characterize the impact of the diverted water.

Stream Channel Cross Sections

Five channel cross-sections have been located and permanently referenced in each of the study reaches for each stream, following the selection and installation criteria in Harrelson et al. (1994). The purpose for the cross sections is to document changes in channel cross sectional geometry that may occur over time. Five cross-sections in a100 m reach should be adequate to provide an indication of change in channel cross section geometry, should it occur naturally or as the consequence of mitigation. In addition to the cross sections, longitudinal surveys of the channel thalweg through the reach are conducted to document surface water and thalweg slope and location (Harrelson et al. 1994). Over time, changes in geometry such as width to depth ratios in the cross sections, thalweg elevation and location in the floodplain, longitudinal profile, or channel gradient may reflect a response to road mitigation impacts on sediment supply or discharge energy when compared to responses in the control reaches. If possible, cross-sections should be surveyed each fall so that changes in channel geometry can be documented on an annual basis. However, it can be expected that channel responses to the road mitigation practices will not be as robust as other response metrics, thus, although desirable, it is not critical that each stream be surveyed each year.

Stream survey cross sections were completed on Boehmer Creek, East Fork Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork Crystal Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork Beaver Creek. Monitoring was not completed on Oil Creek. The stream surveys did not include bank erosion surveys, plan view surveys, or profile surveys. Stream channel cross sections from the 2007 monitoring season can be found in Appendix H. Stream channel cross section and thalweg survey data for 2007 are available on the accompanying data DVDs.

Survey data for the stream cross sections are routinely corrected to adhere to a straight line running directly across the full floodplain. Because of the extended width of the floodplain, and corresponding length of the survey line, there is room for deviation from the intended cross sectional survey. To remedy some of the potential error in surveying, permanent pins will be installed at intervals across each of the stream floodplains in 2008. This will assist field crews in attaining a more accurate and repeatable survey at each stream reach.

Bank Erosion

The occurrence of bank erosion is being documented through the channel cross-section surveys. If the channel is actively down cutting or migrating laterally, the change is an index of bank erosion. Additional bed and bank features are also displayed in a map of the reach (Harrelson et al., 1994) and through the use of permanent photo points. In each reach, measuring and comparing the lengths of bank that are stable versus lengths of bank that are actively eroding also provides an index of the proportion of eroding banks. If the study reach contains areas of significant bank erosion, bank pins will be installed to measure the lateral rate of erosion. Installation of such pins is only warranted if erosion appears to be active and severe in certain locations within the reach or if the onset of bank erosion begins to occur during the monitoring period. Over the long term, the five cross-sections located within a 100-meter reach should index channel and bank stability by documenting changes in channel geometry and location. Secondary measures such as thalweg surveys and bank erosion monitoring should help document any further change.

Bank erosion data beyond channel cross section surveys (Appendix H) were not collected during the 2007 monitoring season.

Particle Size Distribution

Pebble Counts

Assuming the road mitigation practices are effective in reducing the discharge energy and sediment delivery to the channel system and no offsetting responses occur, the percentage of fine particles in the stream channel bed can be expected to change over time. A greater percentage of the stream bed is likely to be comprised of larger particles as the fine particles are winnowed out and not replaced. Pebble counts in each reach are conducted and particle size distribution determined each time the reach is surveyed using the Bevenger and King Pebble Count Procedure (Bevenger and King, 1995). The procedure calls for a zigzag sampling pattern that passes through the reach, crossing from bank to bank. Three hundred particles are sampled in each survey and one survey is completed in each of the two reaches per stream. To help support this aspect of the validation monitoring, the particle size distribution of the material caught in silt fences and in the rock weir sediment traps is available for comparison to the bed material in the streams.

Stream pebble counts were completed on Boehmer Creek, East Fork Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork Crystal Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork Beaver Creek. Monitoring was not completed on Oil Creek. Stream pebble counts and particle size distributions from the 2007 monitoring season can be found in Appendix I and on the accompanying data DVDs.

Grab Samples

Sediment grab samples were collected from bars at Boehmer Creek, East Fork Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork Crystal Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork Beaver Creek. Monitoring was not completed on Oil Creek. Comparing the distribution of material captured in traps near the highway to sediment deposits (bars) in the streams should validate response to highway mitigation practices.

Since laboratory analyses for particle size distribution were not completed at the time of this report, a supplemental report presenting the particle size distribution through 2007 will be sent out later in 2008.

Vegetation

Vegetation photo points established at the top of the left and right banks at each cross section have been monumented and are intended to document changes in species composition, density and percent cover over time as riparian and wetland areas recover (Hall 2002). Vegetation is grouped into general categories of moss, grass, sedge, forbs, or shrub to document species presence. Percent cover is estimated for the top of bank area 1.5 feet on either side of the center line of the cross section. This monitoring is not intended to determine the degree of departure that current conditions might reflect relative to a reference value. Monitoring will document the evolution or transition that occurs as the disturbed streams respond to the effects of road mitigation and will allow for comparison of any trends to those that occur in the control reaches.

The riparian vegetation summary from the 2007 monitoring season can be found in Appendix J. Vegetation data and photographs from 2007 are available on the accompanying data DVDs.

SUMMARY

The 2007 monitoring season was somewhat unique relative to the previous four years. The precipitation in 2007 does not appear to be unlike that observed in the past yet far more “meaningful” events seemed to have occurred. Silt fences trapped more sediment and required cleaning more frequently than in past years. Rock weirs also trapped more sediment and, unfortunately in some cases, exhibited a greater degree of failure than in previous years. In some cases it appears that a design modification is warranted and in those cases has or is being identified to address perceived deficiencies. Subsequent analysis of the data will indicate if rainfall events were larger, more intense, and more frequent and also contributed to observed problems.

Perhaps more important is the fact that during the 2007 monitoring year protocols and practices were truly tested. The positives of the sampling year far exceeded the negatives. Most protocols worked extremely well and a massive data set describing response in all monitored metrics was accumulated relative to previous years.

Acknowledgements

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REFERENCES

Bevenger, Gregory S. and Rudy M. King. 1995 A Pebble Count Procedure for Assessing Watershed Cumulative Effects. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Paper RM-RP-319. Fort Collins, CO 17pp.

Burke, M. 2002. Pikes Peak Highway drainage, erosion, and sediment control plan. USDA Forest Service. Phase 2 Report version 1.4. 18pp.

Hall, F.C. 2002. Photo point monitoring handbook: Part A-Field procedures. USDA Forest Service, Pacific Northwest Research Station, PNW-GTR-526. Portland, OR 48pp.

Harrelson, C.C., Rawlins, C. L., and J.P. Potyondy. 1994. Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61pp.

Hydrosphere Resource Consultants. 1999. Pike's Peak Highway Drainage, Erosion and Sediment Control Plan Environmental Assessment. Boulder, CO.

Nankervis, J.M. 2004. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pike's Peak Highway. Blue Mountain Consultants, Berthoud, CO. Unpublished Report 22 pp plus Appendices.

Nankervis, J.M. 2005. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pike's Peak Highway. Blue Mountain Consultants, Berthoud, CO. Unpublished Report 29 pp plus Appendices.

Nankervis, J.M. 2006. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pike's Peak Highway. Blue Mountain Consultants, Berthoud, CO. Unpublished Report 21 pp plus Appendices.

Nankervis, J.M. 2007. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pike's Peak Highway. Blue Mountain Consultants, Berthoud, CO. Unpublished Report 19 pp plus Appendices.

USDA Forest Service. 2000. Decision notice and finding of no significant impact – Pikes Peak Highway drainage, erosion, and sediment control plan. Pike and San Isabel National Forests and Cimarron Comanche National Grassland. Pueblo, Colorado. 16 pp.

USDA Forest Service. 2002. Monitoring the effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished monitoring plan. 16pp.

USDA Forest Service. 2003. Amendment #1 to Monitoring the effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. 2pp.

US Department of Justice. 2002. Settlement Agreement Between the Forest Service and the Sierra Club. Denver, CO. 15pp.

Appendix A

Site Locations for
Effectiveness and Validation Monitoring

2007

Site Locations for Effectiveness and Validation Monitoring 2007†

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
001FS	N38 55.211	W105 02.238	9410	Fill Slope
002RW	N38 55.224	W105 02.264	9410	Rock Weir/Apron
003RW	N38 55.200	W105 02.258	9416	Rock Weir/Apron
004CC	N38 55.132	W105 02.278	9431	Conveyance Channel
005DD	N38 55.087	W105 02.415	9447	Drainage Ditch
006RW	N38 55.109	W105 02.482	9415	Rock Weir/Apron
007FS	N38 55.094	W105 02.520	9414	Fill Slope
008RW	N38 55.075	W105 02.554	9417	Rock Weir/Apron
009RA	N38 55.046	W105 02.655	9443	Rock Weir/Apron
010DD	N38 54.907	W105 02.734	9457	Drainage Ditch
011CS	N38 54.909	W105 02.730	9459	Cut Slope
012CC	N38 54.748	W105 03.060	9528	Conveyance Channel
013CC	N38 54.730	W105 03.068	9525	Conveyance Channel
014CC	N38 54.691	W105 03.089	9519	Conveyance Channel
015CC	N38 54.603	W105 03.174	9547	Conveyance Channel
016CC	N38 54.602	W105 03.111	9525	Conveyance Channel
017CC	N38 54.510	W105 03.246	9565	Conveyance Channel
018CC	N38 54.472	W105 03.298	9576	Conveyance Channel
019CC	N38 54.457	W105 03.384	9599	Conveyance Channel
020CC	N38 54.345	W105 03.383	9637	Conveyance Channel
021CC	N38 54.299	W105 03.461	9668	Conveyance Channel
022CC	N38 54.288	W105 03.552	9692	Conveyance Channel
023CC	N38 54.272	W105 03.583	9701	Conveyance Channel
024CC	N38 54.289	W105 03.638	9715	Conveyance Channel
025CC	N38 54.258	W105 03.697	9744	Conveyance Channel
026CC	N38 54.232	W105 03.643	9752	Conveyance Channel
027CC	N38 54.183	W105 03.652	9771	Conveyance Channel
028CC	N38 54.149	W105 03.714	9818	Conveyance Channel
029CC	N38 54.145	W105 03.816	9856	Conveyance Channel
030CC	N38 54.134	W105 03.828	9855	Conveyance Channel
031CC	N38 54.130	W105 03.829	9861	Conveyance Channel
032CC	N38 54.159	W105 03.836	9858	Conveyance Channel
033CC	N38 54.106	W105 03.854	9886	Conveyance Channel
034CC	N38 54.037	W105 03.896	9940	Conveyance Channel
035CC	N38 53.909	W105 04.000	10060	Conveyance Channel
036CC	N38 53.866	W105 03.875	10126	Conveyance Channel
037CC	N38 53.821	W105 03.855	10217	Conveyance Channel
038CC	N38 53.759	W105 03.787	10254	Conveyance Channel
039FS	N38 54.910	W105 02.812	9455	Fill Slope
040CC	N38 54.914	W105 02.789	9464	Conveyance Channel
041CP	N38 53.807	W105 03.893	10072	Road Survey Control Point
042DD	N38 53.719	W105 03.746	10161	Drainage Ditch
043FS	N38 53.726	W105 03.764	10180	Fill Slope
044RX	N38 53.726	W105 03.763	10183	Road Cross Section

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
045CS	N38 53.657	W105 03.868	10266	Cut Slope
046DD	N38 53.658	W105 03.868	10268	Drainage Ditch
047RX	N38 53.658	W105 03.868	10268	Road Cross Section
048FS	N38 53.651	W105 03.880	10275	Fill Slope
049CS	N38 53.592	W105 04.020	10406	Cut Slope
050RX	N38 53.593	W105 04.020	10404	Road Cross Section
051DD	N38 53.593	W105 04.021	10397	Drainage Ditch
052FS	N38 53.593	W105 04.021	10401	Fill Slope
053CC	N38 53.560	W105 04.127	10478	Conveyance Channel
054CC	N38 53.579	W105 04.148	10448	Conveyance Channel
055FS	N38 53.612	W105 04.095	10445	Fill Slope
056RX	N38 53.614	W105 04.096	10442	Road Cross Section
057DD	N38 53.613	W105 04.095	10445	Drainage Ditch
058CC	N38 53.513	W105 04.057	10512	Conveyance Channel
059CS	N38 53.353	W105 04.222	10697	Cut Slope
060RX	N38 53.354	W105 04.219	10691	Road Cross Section
061DD	N38 53.221	W105 04.381	10808	Drainage Ditch
062RX	N38 53.216	W105 04.381	10805	Road Cross Section
063CC	N38 53.223	W105 04.394	10803	Conveyance Channel
064CC	N38 53.448	W105 04.155	10634	Conveyance Channel
065CC	N38 53.382	W105 04.192	10679	Conveyance Channel
066CC	N38 53.336	W105 04.243	10701	Conveyance Channel
067CC	N38 53.297	W105 04.299	10736	Conveyance Channel
068CC	N38 53.251	W105 04.305	10841	Conveyance Channel
069CC	N38 53.019	W105 04.287	10989	Conveyance Channel
070CC	N38 52.956	W105 04.276	11028	Conveyance Channel
071DD	N38 52.972	W105 04.285	11017	Drainage Ditch
072RX	N38 52.972	W105 04.285	11015	Road Cross Section
073ST	N38 52.879	W105 04.311	11062	Sediment Trap
074FS	N38 52.927	W105 04.272	11053	Fill Slope
075RG	N38 53.797	W105 03.890	10109	Precipitation Gauge
076RG	N38 52.582	W105 03.970	11810	Precipitation Gauge
077RG	N38 51.783	W105 03.999	13069	Precipitation Gauge
078CS	N38 53.331	W105 04.275	10478	Cut Slope
079FS	N38 52.882	W105 04.382	11254	Fill Slope
080DD	N38 52.865	W105 04.391	11256	Drainage Ditch
081CC	N38 52.943	W105 04.415	11194	Conveyance Channel
082DD	N38 52.787	W105 04.376	11284	Drainage Ditch
083FS	N38 52.777	W105 04.362	11288	Fill Slope
084CC	N38 52.796	W105 04.471	11360	Conveyance Channel
085DD	N38 52.786	W105 04.410	11313	Drainage Ditch
086FS	N38 52.602	W105 04.390	11447	Fill Slope
087CS	N38 52.435	W105 04.432	11542	Cut Slope
088FS	N38 52.388	W105 04.549	11590	Fill Slope
089CC	N38 52.391	W105 04.555	11580	Conveyance Channel
090CS	N38 52.366	W105 04.540	11604	Cut Slope

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
091CC	N38 52.402	W105 04.414	11643	Conveyance Channel
092DD	N38 52.432	W105 04.204	11781	Drainage Ditch
093FS	N38 52.399	W105 04.401	11642	Fill Slope
094CC	N38 52.540	W105 04.069	11873	Conveyance Channel
095CC	N38 52.452	W105 04.205	11787	Conveyance Channel
096CC	N38 52.379	W105 04.217	11746	Conveyance Channel
097CC	N38 52.381	W105 04.310	11678	Conveyance Channel
098FS	N38 52.265	W105 03.995	12242	Fill Slope
099CC	N38 52.131	W105 04.046	12319	Conveyance Channel
100CC	N38 52.133	W105 03.936	12353	Conveyance Channel
101FS	N38 52.097	W105 03.875	12390	Fill Slope
102CS	N38 51.641	W105 04.063	12963	Cut Slope
103FS	N38 51.491	W105 04.021	12950	Fill Slope
104CC	N38 51.444	W105 03.894	12923	Conveyance Channel
105FS	N38 51.062	W105 03.694	13083	Fill Slope
106CC	N38 52.082	W105 03.858	12251	Conveyance Channel
107DD	N38 52.044	W105 03.824	12312	Drainage Ditch
108CC	N38 51.994	W105 03.769	12362	Conveyance Channel
109CC	N38 52.027	W105 03.825	12393	Conveyance Channel
110CC	N38 52.062	W105 03.914	12448	Conveyance Channel
111CC	N38 52.051	W105 03.992	12511	Conveyance Channel
112CC	N38 52.049	W105 03.933	12531	Conveyance Channel
113CC	N38 52.002	W105 03.873	12577	Conveyance Channel
114CC	N38 51.956	W105 03.840	12601	Conveyance Channel
115CC	N38 51.977	W105 03.995	12692	Conveyance Channel
116CC	N38 51.940	W105 04.080	12736	Conveyance Channel
117CC	N38 51.925	W105 04.141	12777	Conveyance Channel
118CC	N38 51.912	W105 04.177	12797	Conveyance Channel
119CC	N38 51.914	W105 04.032	12850	Conveyance Channel
120CC	N38 51.823	W105 04.090	12876	Conveyance Channel
121CC	N38 51.439	W105 03.804	12877	Conveyance Channel
122CC	N38 51.347	W105 03.789	12920	Conveyance Channel
123CS	N38 51.361	W105 03.782	12920	Cut Slope
124FS	N38 51.362	W105 03.788	12931	Fill Slope
125CC	N38 51.238	W105 03.806	12986	Conveyance Channel
126CC	N38 51.158	W105 03.789	13031	Conveyance Channel
127CC	N38 51.032	W105 03.697	13064	Conveyance Channel
128FS	N38 50.930	W105 03.732	13072	Fill Slope
129CC	N38 50.897	W105 03.662	13068	Conveyance Channel
130CC	N38 50.900	W105 03.177	13183	Conveyance Channel
131CC	N38 50.940	W105 03.382	13088	Conveyance Channel
132CC	N38 50.840	W105 03.274	13217	Conveyance Channel
133CC	N38 50.768	W105 03.213	13282	Conveyance Channel
134CC	N38 50.671	W105 03.035	13401	Conveyance Channel
135CC	N38 50.285	W105 02.872	13677	Conveyance Channel
136CC	N38 50.299	W105 02.931	13624	Conveyance Channel

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
137CC	N38 50.260	W105 02.755	13733	Conveyance Channel
138CC	N38 50.221	W105 02.605	13805	Conveyance Channel
139CC	N38 50.774	W105 03.110	13370	Conveyance Channel
140CC	N38 50.730	W105 03.195	13327	Conveyance Channel
141CS	N38 51.043	W105 03.690	13103	Cut Slope
152RW	N38 54.912	W105 02.837	9444	Rock Weir/Apron
153RW	N38 54.741	W105 03.066	9457	Rock Weir/Apron
154RX	N38 52.040	W105 03.817	12112	Road Cross Section
155DD	N38 51.245	W105 03.803	12917	Drainage Ditch
156RX	N38 51.244	W105 03.799	12922	Road Cross Section
157DD	N38 51.074	W105 03.684	13100	Drainage Ditch
158RX	N38 51.074	W105 03.683	13099	Road Cross Section
159DD	N38 51.610	W105 04.072	13091	Drainage Ditch
160RX	N38 51.611	W105 04.072	13066	Road Cross Section
161RW	N38 54.720	W105 03.055	9516	Rock Weir/Apron
162RW	N38 54.887	W105 02.854	9518	Rock Weir/Apron
163RA	N38 54.665	W105 03.115	9528	Rock Weir/Apron
175CC	N38 55.104	W105 02.532	9437	Conveyance Channel
176RW	N38 54.146	W105 03.795	9838	Rock Weir
177FS	N38 55.302	W105 02.224	9323	Fill Slope
178RW	N38 54.142	W105 03.821	9839	Rock Weir
179RW	N38 54.127	W105 03.852	9851	Rock Weir
180RW	N38 54.055	W105 03.903	9906	Rock Weir
181RW	N38 54.025	W105 03.918	9919	Rock Weir
182DD	N38 54.895	W105 02.860	9430	Drainage Ditch
183FS	N38 54.675	W105 03.109	9453	Fill Slope
184CC	N38 54.708	W105 03.363	9308	Conveyance Channel
185CS	N38 54.536	W105 03.246	9532	Cut Slope
186FS	N38 54.524	W105 03.242	9538	Fill Slope
187FS	N38 54.281	W105 03.658	9711	Fill Slope
188DD	N38 54.075	W105 03.892	9894	Drainage Ditch
189CC	N38 54.073	W105 03.886	9887	Conveyance Channel
190CC	N38 54.095	W105 03.869	9871	Conveyance Channel
191CC	N38 54.117	W105 03.854	9855	Conveyance Channel
192CS	N38 54.183	W105 03.677	9786	Cut Slope
193FS	N38 54.821	W105 02.983	9507	Fill Slope
194FS	N38 54.811	W105 03.004	9506	Fill Slope
195DD	N38 54.827	W105 02.983	9505	Drainage Ditch
196FS	N38 54.872	W105 02.900	9497	Fill Slope
197CS	N38 54.364	W105 03.383	9640	Cut Slope
198FS	N38 54.497	W105 03.254	9560	Fill Slope
199RW	N38 54.688	W105 03.389	9326	Sediment Pond
200RW	N38 55.261	W105 02.246	9418	Rock Weir
201RW	N38 54.805	W105 03.021	9522	Rock Weir
202RW	N38 54.619	W105 03.132	9450	Rock Weir
203FS	N38 54.603	W105 03.139	9517	Fill Slope

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
204FS	N38 54.273	W105 03.572	9707	Fill Slope
205DD	N38 54.022	W105 03.927	9983	Drainage Ditch
206CC	N38 54.689	W105 03.097	9506	Conveyance Channel
207CC	N38 51.664	W105 04.062	12962	Conveyance Channel
208CC	N38 52.754	W105 04.445	11172	Conveyance Channel
209CC	N38 52.647	W105 04.411	11365	Conveyance Channel
210CC	N38 54.059	W105 03.916	9849	Conveyance Channel
211CC	N38 54.130	W105 03.844	9853	Conveyance Channel
212CC	N38 53.149	W105 04.311	10893	Conveyance Channel
213CC	N38 50.964	W105 03.391	13046	Conveyance Channel
214CC	N38 50.234	W105 02.661	13198	Conveyance Channel
215CC	N38 50.356	W105 02.792	13375	Conveyance Channel
216CC	N38 55.263	W105 02.236	9289	Conveyance Channel
217CC	N38 55.255	W105 02.232	9284	Conveyance Channel
218CC	N38 55.226	W105 02.268	9359	Conveyance Channel
219CC	N38 55.202	W105 02.262	9371	Conveyance Channel
220CC	N38 55.108	W105 02.482	9411	Conveyance Channel
221CC	N38 55.107	W105 02.482	9305	Conveyance Channel
222CC	N38 55.070	W105 02.554	9319	Conveyance Channel
223CC	N38 55.048	W105 02.657	9394	Conveyance Channel
224CC	N38 54.878	W105 02.852	9493	Conveyance Channel
225CC	N38 54.917	W105 02.840	9441	Conveyance Channel
226CC	N38 54.796	W105 03.010	9431	Conveyance Channel
227CC	N38 54.706	W105 03.053	9480	Conveyance Channel
228CC	N38 54.746	W105 03.078	9431	Conveyance Channel
229CC	N38 54.140	W105 03.788	9774	Conveyance Channel
230CC	N38 54.028	W105 03.912	9902	Conveyance Channel
231CC	N38 54.050	W105 03.908	9910	Conveyance Channel
232CC	N38 52.583	W105 04.557	11399	Conveyance Channel
233RW	N38 52.383	W105 04.560	11074	Rock Weir
234RW	N38 52.502	W105 03.924	11915	Rock Weir
235CC	N38 52.504	W105 03.920	11928	Conveyance Channel
236RW	N38 52.185	W105 04.066	12177	Rock Weir
237RW	N38 52.398	W105 04.393	11219	Rock Weir
238RW*	N38 52.131	W105 04.048	12340	Rock Weir
239RW*	N38 52.008	W105 03.774	12517	Rock Weir
240RW*	N38 52.048	W105 03.990	12644	Rock Weir
241RW*	N38 51.976	W105 03.834	12686	Rock Weir
242RW*	N38 51.903	W105 04.176	12851	Rock Weir
243RW*	N38 51.919	W105 04.043	12900	Rock Weir
BHMR1	N38 48.951	W105 03.040	11885	Boehmer Creek 1
BHMR2	N38 49.061	W105 03.027	11995	Boehmer Creek 2
EBVR1	N38 49.832	W105 03.612	12156	East Fork Beaver Creek 1
EBVR2	N38 49.907	W105 03.598	12190	East Fork Beaver Creek 2
GLEN1	N38 54.457	W105 04.690	9519	Glen Cove Creek 1
NCAT1	N38 54.746	W105 05.994	9415	North Catamount Creek 1

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
NCAT2	N38 54.402	W105 06.106	9519	North Catamount Creek 2
NCRY1∞	N38 54.418	W105 03.199	9453	North Fork Crystal Creek 1 & 2
OILC1	N38 48.449	W105 06.511	10505	Oil Creek 1
SCAT1	N38 55.035	W105 04.112	9368	South Catamount Creek 1
SCAT2	N38 54.974	W105 04.181	9345	South Catamount Creek 2
SCAT3	N38 54.316	W105 04.899	9412	South Catamount Creek 3
SKIC1	N38 54.975	W105 04.078	9418	Ski Creek 1
SKIC2	N38 53.767	W105 03.987	10035	Ski Creek 2
SVRY1	N38 52.467	W105 03.039	10732	Severy Creek 1
SVRY2	N38 52.472	W105 03.339	10926	Severy Creek 2
WBVR1	N38 48.181	W105 05.710	10726	West Fork Beaver Creek 1
WBVR2	N38 48.349	W105 05.591	10698	West Fork Beaver Creek 2

† Not all sites were sampled during the 2007 season.

∞ North Fork Crystal Creek 2 (NCRY2) is located 200 ft upstream from NCRY1.

Appendix B

Daily Precipitation

2007

Daily precipitation for the 3 rain gauges on Pike's Peak 2007

Date	075RG (Altitude 10,109') Precipitation (in)	076RG (Altitude 11,810') Precipitation (in)	077RG (Altitude 13,069') Precipitation (in)
6/5/2007	0	0	0
6/6/2007	0	0	0
6/7/2007	0	0	0
6/8/2007	0	0	0
6/9/2007	0	0	0
6/10/2007	0	0	0
6/11/2007	0	0	0.02
6/12/2007	0.36	0.32	0.16
6/13/2007	0	0.08	0.22
6/14/2007	0	0	0
6/15/2007	0	0	0
6/16/2007	0	0	0
6/17/2007	0	0	0
6/18/2007	0	0	0
6/19/2007	0.07	0.01	0.02
6/20/2007	0.07	0.15	0.05
6/21/2007	0	0	0
6/22/2007	0.01	0.02	0.1
6/23/2007	0	0	0
6/24/2007	0	0	0
6/25/2007	0	0	0
6/26/2007	0.04	0.07	0.02
6/27/2007	0.01	0.01	0
6/28/2007	0.01	0	0
6/29/2007	0.02	0	0.01
6/30/2007	0	0.02	0
7/1/2007	0	0	0
7/2/2007	0.09	0.11	0.06
7/3/2007	0.46	0.29	0.21
7/4/2007	0	0	0
7/5/2007	0	0.02	0.01
7/6/2007	0	0	0
7/7/2007	0	0	0.01
7/8/2007	0.35	0.27	0.27
7/9/2007	0	0	0
7/10/2007	0	0	0.01
7/11/2007	0.04	0.05	0.03
7/12/2007	0.48	0.59	0.83
7/13/2007	0	0	0
7/14/2007	0.01	0.04	0.07
7/15/2007	0	0	0
7/16/2007	0	0.03	0.01
7/17/2007	0	0	0

Date	075RG (Altitude 10,109') Precipitation (in)	076RG (Altitude 11,810') Precipitation (in)	077RG (Altitude 13,069') Precipitation (in)
7/18/2007	0.21	0.51	0.8
7/19/2007	0.46	0.76	0.72
7/20/2007	0.24	0.28	0.42
7/21/2007	0.08	0.49	0.06
7/22/2007	0	0	0
7/23/2007	0	0	0
7/24/2007	0.02	0	0.01
7/25/2007	0	0	0
7/26/2007	0.42	0.48	0.76
7/27/2007	0.1	0.38	0.35
7/28/2007	0.02	0.09	0.24
7/29/2007	0	0	0.02
7/30/2007	0.08	0.14	0.12
7/31/2007	0.03	0.03	0.02
8/1/2007	0	0	0
8/2/2007	0.15	0.77	0.02
8/3/2007	0.63	0.56	0
8/4/2007	1.03	1.2	0
8/5/2007	0.36	0.35	0
8/6/2007	0.2	0.31	0.02
8/7/2007	1.02	2.1	0
8/8/2007	0	0	0
8/9/2007	0	0	0
8/10/2007	0	0	0
8/11/2007	0	0	0
8/12/2007	0	0.12	0
8/13/2007	0.3	0.05	0
8/14/2007	0.5	0.87	0
8/15/2007	0.94	1.28	0
8/16/2007	0.06	0.19	0.41
8/17/2007	0.01	0	0
8/18/2007	0.16	0.18	0.08
8/19/2007	0.12	0.16	0.09
8/20/2007	0	0	0
8/21/2007	0	0	0
8/22/2007	0.03	0.01	0
8/23/2007	0.01	0	0
8/24/2007	0.12	0.06	0.02
8/25/2007	0	0	0
8/26/2007	0	0	0
8/27/2007	0.16	0.19	0.17
8/28/2007	0	0	0.01
8/29/2007	0.26	0	0.02
8/30/2007	0	0	0
8/31/2007	0.01	0.01	0.04

Date	075RG (Altitude 10,109') Precipitation (in)	076RG (Altitude 11,810') Precipitation (in)	077RG (Altitude 13,069') Precipitation (in)
9/1/2007	0.12	0.13	0.21
9/2/2007	0	0.01	0
9/3/2007	0.03	0.01	0
9/4/2007	0.13	0.4	0.34
9/5/2007	0.7	0.96	0.93
9/6/2007	0	0.01	0.02
9/7/2007	0	0	0
9/8/2007	0.02	0.03	0.02
9/9/2007	0.01	0.02	0.02
9/10/2007	0.08	0.13	0.03
9/11/2007	0	0	0
9/12/2007	0	0	0
9/13/2007	0.01	0.01	0
9/14/2007	0	0	0
9/15/2007	0	0	0
9/16/2007	0	0	0
9/17/2007	0	0	0
9/18/2007	0	0	0
9/19/2007	0	0	0
9/20/2007	0	0	0
9/21/2007	0	0	0
9/22/2007	0	0	0
9/23/2007	0	0	0
9/24/2007	0	0	0
9/25/2007	0	0	0
9/26/2007	0	0	0
9/27/2007	0	0.02	0
9/28/2007	0	0	0
9/29/2007	0.01	0.01	0
9/30/2007	0	0	0
10/1/2007	0	0	0
10/2/2007	0	0	0
10/3/2007	0	0	0
10/4/2007	0	0	0
10/5/2007	0	0	0
10/6/2007	0	0	0
10/7/2007	0	0.01	0
10/8/2007	0.01	0	0
10/9/2007	0.04	0.01	0
Total	10.91	15.41	8.08

Appendix C

Cut Slope

Site Visit and Survey Dates
and
Sediment Accumulation

2007

Site Visits and Survey Dates of Cut Slope Silt Fences on Pike's Peak 2007

Site ID	Date - 2007						
011CS	6/6	7/2	8/18				
045CS	6/15	6/28	8/18	9/19			
049CS	6/15	7/2	8/21	9/19			
059CS	6/21	8/21	9/19				
078CS	6/20	8/21	9/19				
087CS	6/20	8/22					
090CS	6/20	8/22	8/29				
102CS	6/27	7/17	8/10				
123CS	6/28	7/12	7/17	8/10			
141CS	6/26	8/2	8/9	8/22	8/24	8/31	9/13
185CS	6/28	7/17	8/13	9/18	9/19		
192CS	6/27	8/16					
197CS	6/26	8/1	8/14	8/17			

Sediment Accumulation in Cut Slope Silt Fences on Pike's Peak 2007

Site ID	Location	Date	Volume (ft^3)	Grab Sample
011CS	Lower Fence	6/6/07	0.50	Yes
011CS	Upper Fence	6/6/07	0.04	Yes
011CS	Lower Fence	8/18/07	2.69	Yes
045CS	Lower Fence	8/18/07	0.40	Yes
045CS	Upper Fence	8/18/07	0.27	Yes
045CS	Lower Fence	9/19/07	0.34	Yes
049CS	Lower Fence	8/21/07	4.04‡	Yes
049CS	Lower Fence	9/19/07	0.40	Yes
059CS	Lower Fence	6/21/07	1.51	Yes
059CS	Lower Fence	8/21/07	0.54	Yes
059CS	Lower Fence	9/19/07	0.27	Yes
078CS	Upper Fence	6/20/07	0.20	No
078CS	Lower Fence	6/20/07	0.81	Yes
078CS	Lower Fence	8/21/07	0.81	Yes
078CS	Lower Fence	9/19/07	0.47	Yes
078CS	Upper Fence	9/19/07	0.07	Yes
087CS	Lower Fence	6/20/07	0.94	Yes
087CS	Upper Fence	6/20/07	0.34	Yes
087CS	Lower Fence	8/22/07	4.71	Yes
087CS	Upper Fence	8/22/07	0.40	Yes
090CS	Lower Fence	6/20/07	0.54	Yes
090CS	Upper Fence	8/22/07	1.28	Yes
102CS	Upper Fence	6/27/07	0.03‡	Yes
102CS	Lower Fence	6/27/07	1.95‡	Yes
102CS	Lower Fence	8/10/07	0.81	Yes
123CS	Lower Fence	6/28/07	0.94‡	Yes
123CS	Upper Fence	6/28/07	0.87	Yes
123CS	Upper Fence	8/10/07	4.71‡	Yes
123CS	Lower Fence	8/10/07	1.35	Yes
141CS	Lower Fence	6/26/07	1.62	Yes
141CS	Upper Fence	6/26/07	0.27	Yes
141CS	Lower Fence	8/9/07	24.23	Yes
141CS	Upper Fence	8/9/07	4.98	Yes
141CS	Lower Fence	8/22/07	4.44	Yes
141CS	Upper Fence	8/22/07	1.75	Yes
141CS	Upper Fence	9/13/07	0.02	Yes
141CS	Lower Fence	9/13/07	0.40	Yes

Site ID	Location	Date	Volume (ft^3)	Grab Sample
185CS	Lower Fence	6/28/07	1.01	Yes
185CS	Upper Fence	6/28/07	0.54‡	Yes
185CS	Lower Fence	8/13/07	0.54	Yes
185CS	Upper Fence	9/19/07	0.67	Yes
185CS	Lower Fence	9/19/07	0.34	Yes
192CS	Upper Fence	6/27/07	0.20	Yes
192CS	Lower Fence	6/27/07	0.57	Yes
192CS	Lower Fence	8/16/07	2.02‡	Yes
197CS	Upper Fence	6/26/07	0.20	Yes
197CS	Lower Fence	6/26/07	0.40	Yes
197CS	Lower Fence	8/14/07	4.58‡	Yes
197CS	Upper Fence	8/14/07	1.14	Yes
197CS	Lower Fence	8/17/07	2.69	Yes
197CS	Upper Fence	8/17/07	0.67	Yes

‡ Indicates possible data inaccuracy due to breached silt fence

Appendix D

Fill Slopes

Site Visits and Survey Dates
and
Sediment Accumulation

2007

Site Visits and Survey Dates of Fill Slope Silt Fences on Pike's Peak 2007

Site ID	Date - 2007					
001FS	6/13	7/17	8/1	8/17	8/28	
007FS	7/2	8/16				
039FS	6/26	8/1	8/17			
043FS	6/21	8/18	9/19			
048FS	6/21	8/1	8/18	9/19		
052FS	6/21	7/17	8/1	8/21		
055FS	6/21	8/21	9/19			
074FS	6/20	7/16	8/16	9/19		
079FS	6/20	8/22	9/19			
083FS	6/20	8/1	8/8	9/19		
086FS	6/20	8/1	8/8			
088FS	6/20	7/2	7/17	8/1	8/8	9/18
093FS	6/20	7/17	8/1	8/22		
098FS	7/2	8/22	9/14			
101FS	6/29	7/17	8/28	9/14		
103FS	6/29	7/17	8/10			
105FS	6/27	7/17	8/2	8/10	9/18	
124FS	6/28	7/17	8/1	8/10		
128FS	6/26	9/13	9/18			
177FS	7/2	8/16				
183FS	7/3	8/16				
186FS	6/12	8/1	8/14	9/6	9/19	
187FS	6/27	8/16				
193FS	6/28	8/1	8/17			
194FS	6/19	8/1	8/17			
196FS	6/28	7/9	7/17	8/17		
198FS	6/28	8/16	9/19			
203FS	6/12	8/1	8/16			
204FS	6/15	8/1	8/16			

Sediment Accumulation in Fill Slope Fences on Pike's Peak 2007

Site ID	Location	Date	Volume (ft^3)	Grab Sample
001FS	Lower Fence	6/13/07	0.07	Yes
001FS	Upper Fence	6/13/07	0.61‡	Yes
001FS	Upper Fence	8/17/07	6.06	Yes
001FS	Upper Fence	8/28/07	0.47	Yes
007FS	Upper Fence	7/2/07	0.47	Yes
007FS	Lower Fence	7/2/07	0.34	Yes
039FS	Upper Fence	6/26/07	1.75	Yes
039FS	Lower Fence	6/26/07	1.28	Yes
039FS	Upper Fence	8/17/07	14.13	Yes
043FS	Upper Fence	6/21/07	1.75	Yes
043FS	Upper Fence	8/18/07	32.30‡	Yes
043FS	Lower Fence	8/18/07	3.77	Yes
043FS	Upper Fence	9/19/07	3.90	Yes
043FS	Lower Fence	9/19/07	0.20	Yes
048FS	Upper Fence	6/21/07	3.90	Yes
048FS	Lower Fence	6/21/07	0.07	Yes
048FS	Upper Fence	8/18/07	23.69	Yes
048FS	Lower Fence	8/18/07	0.01	Yes
048FS	Upper Fence	9/19/07	4.85	Yes
052FS	Upper Fence	6/21/07	3.50‡	Yes
052FS	Upper Fence	8/21/07	5.38	Yes
052FS	Lower Fence	8/21/07	1.21	Yes
055FS	Upper Fence	6/21/07	5.25	Yes
055FS	Upper Fence	8/21/07	32.30‡	Yes
055FS	Upper Fence	9/19/07	1.88	Yes
074FS	Upper Fence	6/20/07	2.69‡	Yes
074FS	Lower Fence	6/20/07	0.27	Yes
074FS	Upper Fence	8/16/07	14.54‡	Yes
074FS	Upper Fence	9/19/07	1.75	Yes
074FS	Lower Fence	9/19/07	0.13	Yes
079FS	Upper Fence	6/20/07	2.15	Yes
079FS	Upper Fence	8/22/07	16.96	Yes
079FS	Upper Fence	9/19/07	2.69	Yes
083FS	Upper Fence	6/20/07	7.40	Yes
083FS	Lower Fence	6/20/07	0.13	Yes
083FS	Upper Fence	8/8/07	22.88‡	Yes
083FS	Upper Fence	9/19/07	13.46	Yes
086FS	Upper Fence	6/20/07	5.45	Yes
086FS	Upper Fence	8/8/07	7.40‡	Yes
088FS	Upper Fence	7/2/07	11.31‡	Yes
088FS	Lower Fence	7/2/07	2.09	Yes
088FS	Upper Fence	8/8/07	10.77‡	Yes
088FS	Upper Fence	9/18/07	1.75	Yes
088FS	Lower Fence	9/18/07	0.47	Yes

Site ID	Location	Date	Volume (ft^3)	Grab Sample
093FS	Upper Fence	6/20/07	5.72‡	Yes
093FS	Lower Fence	6/20/07	0.13	Yes
098FS	Upper Fence	7/2/07	8.95	Yes
098FS	Upper Fence	8/22/07	0.54	Yes
098FS	Upper Fence	9/14/07	0.20	Yes
101FS	Upper Fence	6/29/07	19.38‡	Yes
101FS	Lower Fence	6/29/07	4.64‡	Yes
101FS	Upper Fence	9/14/07	3.10	Yes
101FS	Lower Fence	9/14/07	0.27	Yes
103FS	Upper Fence	6/29/07	2.69‡	Yes
103FS	Lower Fence	6/29/07	0.10	Yes
105FS	Upper Fence	6/27/07	5.11‡	Yes
105FS	Lower Fence	6/27/07	0.07‡	Yes
105FS	Upper Fence	8/2/07	11.17‡	Yes
105FS	Upper Fence	8/10/07	24.76	Yes
124FS	Upper Fence	6/28/07	1.14‡	Yes
124FS	Lower Fence	6/28/07	0.20	Yes
124FS	Upper Fence	8/10/07	23.69	Yes
128FS	Upper Fence	6/26/07	2.56	Yes
128FS	Lower Fence	6/26/07	0.20	Yes
128FS	Upper Fence	9/18/07	0.67	Yes
128FS	Lower Fence	9/18/07	0.07	Yes
177FS	Upper Fence	7/2/07	0.67	Yes
183FS	Upper Fence	7/3/07	0.47	Yes
186FS	Upper Fence	6/12/07	0.67	Yes
186FS	Lower Fence	8/14/07	12.92	Yes
186FS	Upper Fence	8/14/07	8.61	Yes
186FS	Upper Fence	9/19/07	9.15	Yes
186FS	Lower Fence	9/19/07	13.73	Yes
187FS	Upper Fence	6/27/07	1.04	Yes
193FS	Upper Fence	6/28/07	0.77	Yes
193FS	Upper Fence	8/17/07	6.73	Yes
194FS	Upper Fence	8/17/07	3.10	Yes
196FS	Upper Fence	6/28/07	7.64	Yes
196FS	Upper Fence	7/9/07	12.79‡	Yes
196FS	Upper Fence	8/17/07	54.10‡	Yes
196FS	Lower Fence	8/17/07	21.53‡	Yes
198FS	Upper Fence	6/28/07	0.47	Yes
198FS	Lower Fence	6/28/07	0.27	Yes
198FS	Upper Fence	9/19/07	2.76	Yes
198FS	Lower Fence	9/19/07	0.20	Yes
203FS	Upper Fence	6/12/07	3.50	Yes
203FS	Upper Fence	8/16/07	12.38‡	Yes
204FS	Upper Fence	8/16/07	5.11	Yes

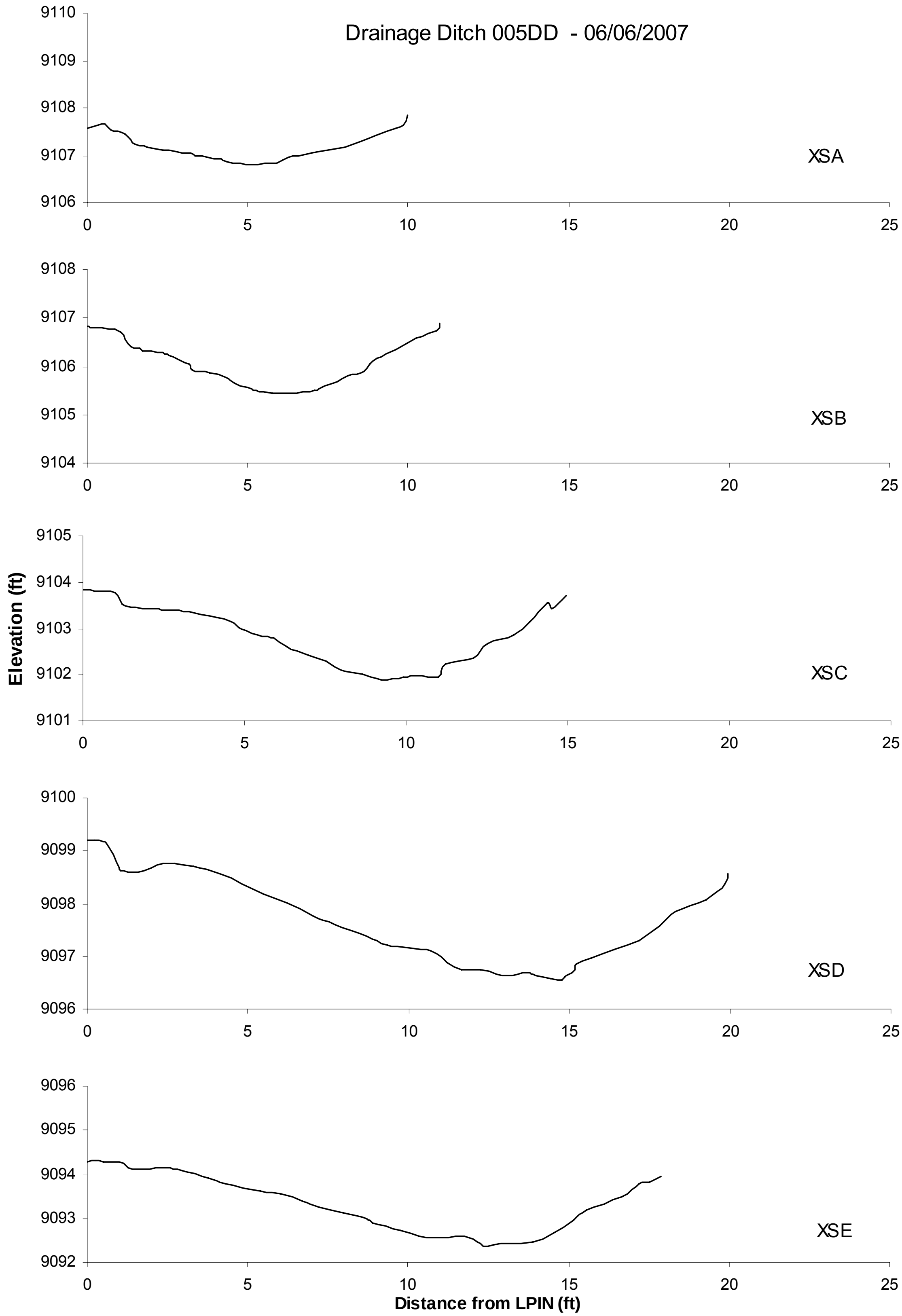
‡ Indicates possible data inaccuracy due to breached silt fence

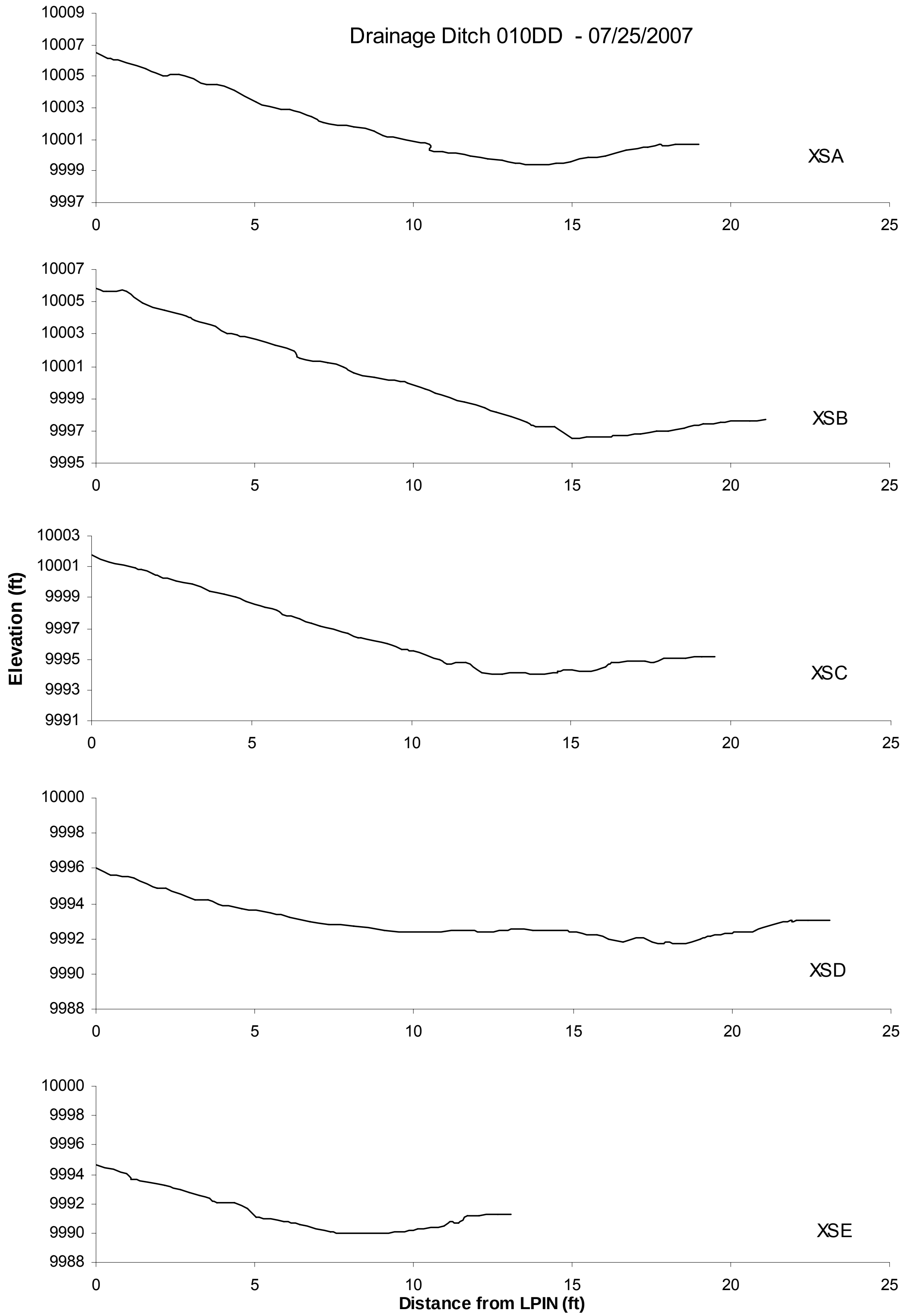
Appendix E

Drainage Ditch

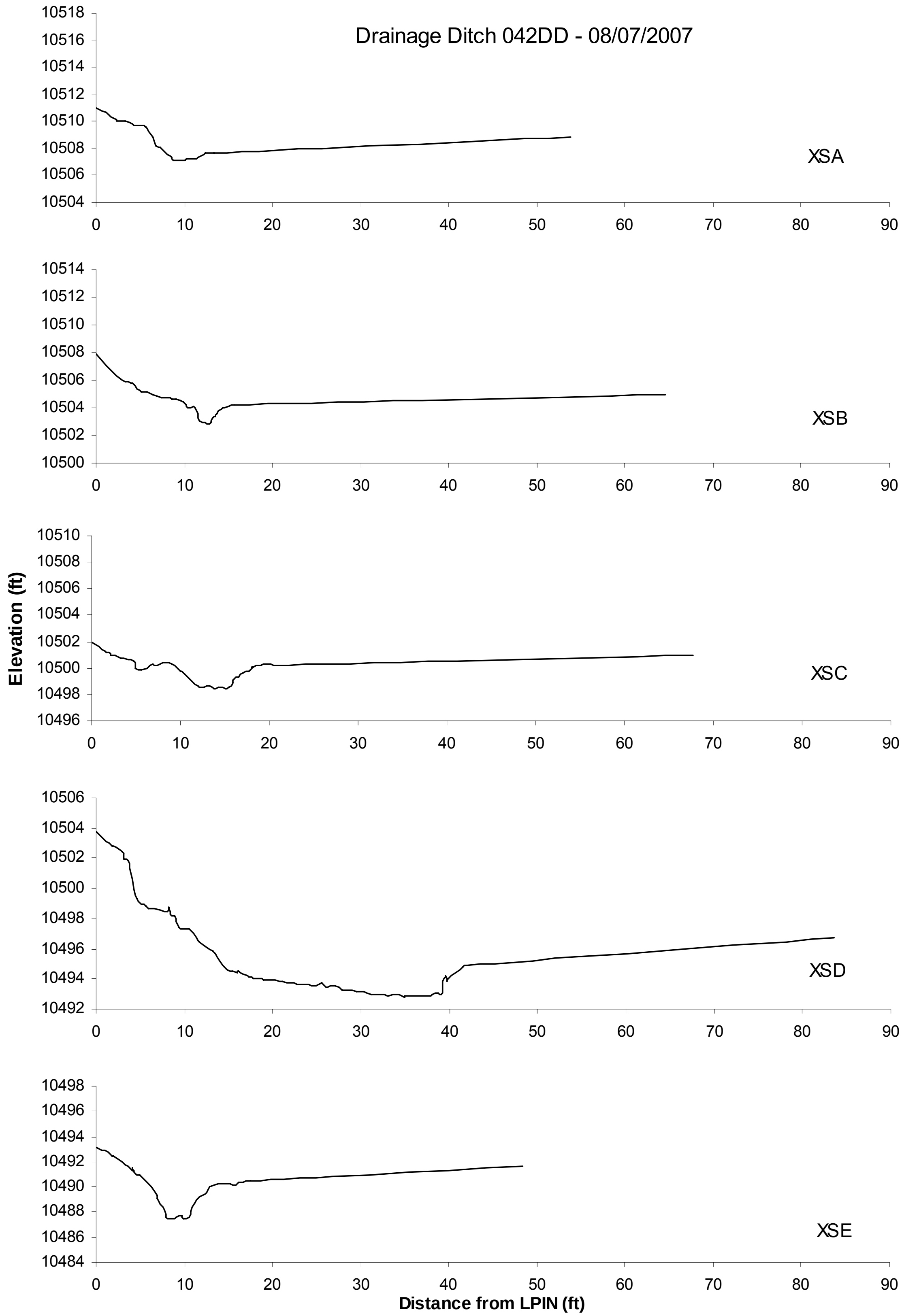
Cross Section Graphs

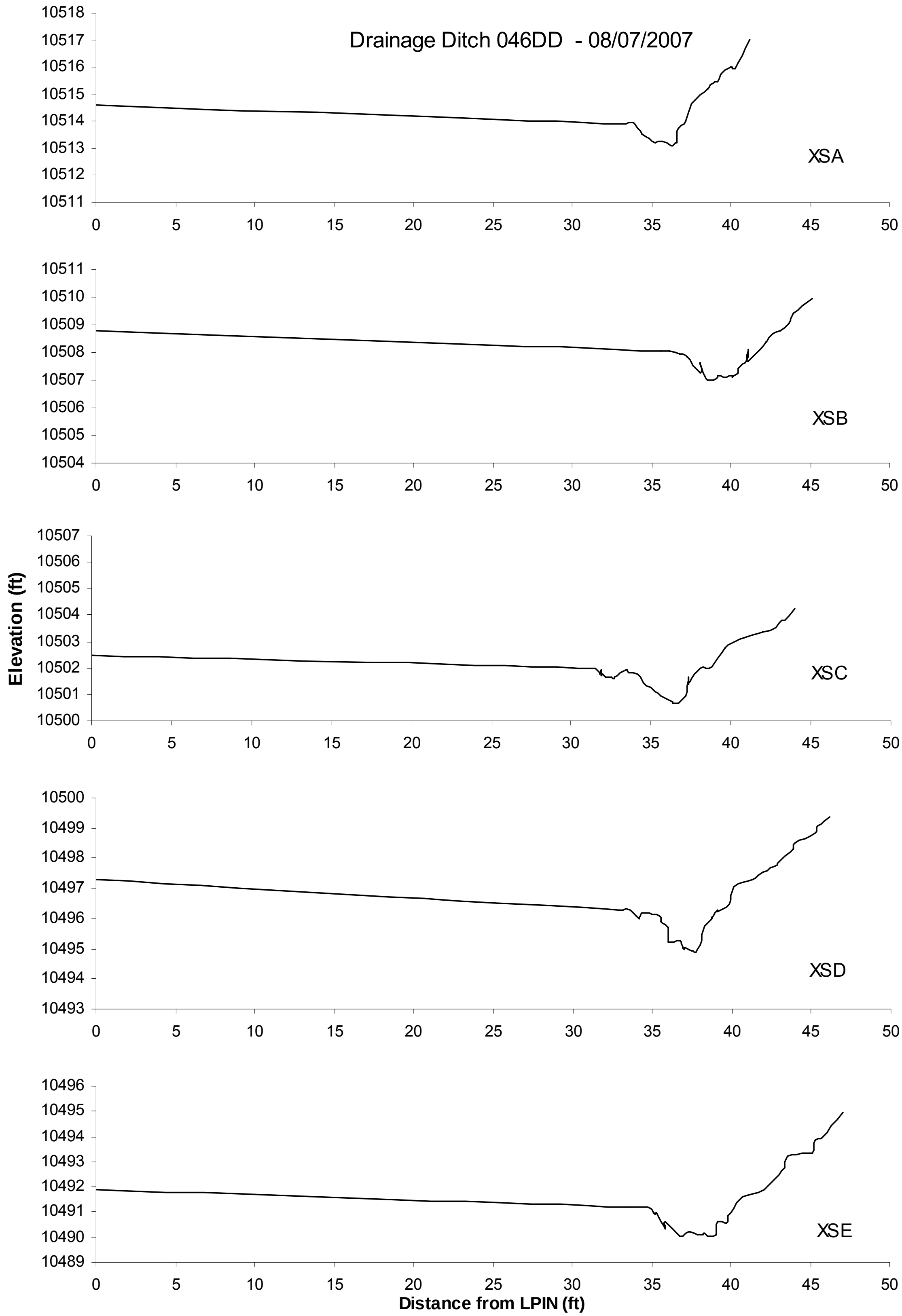
2007


Drainage Ditch 005DD - 06/06/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9110
9109
9108
9107
9106
9105
9104
9103
9102
9101
9100
9099
9098
9097
9096
9095
9094
9093
9092
0
5
10
15
20
25

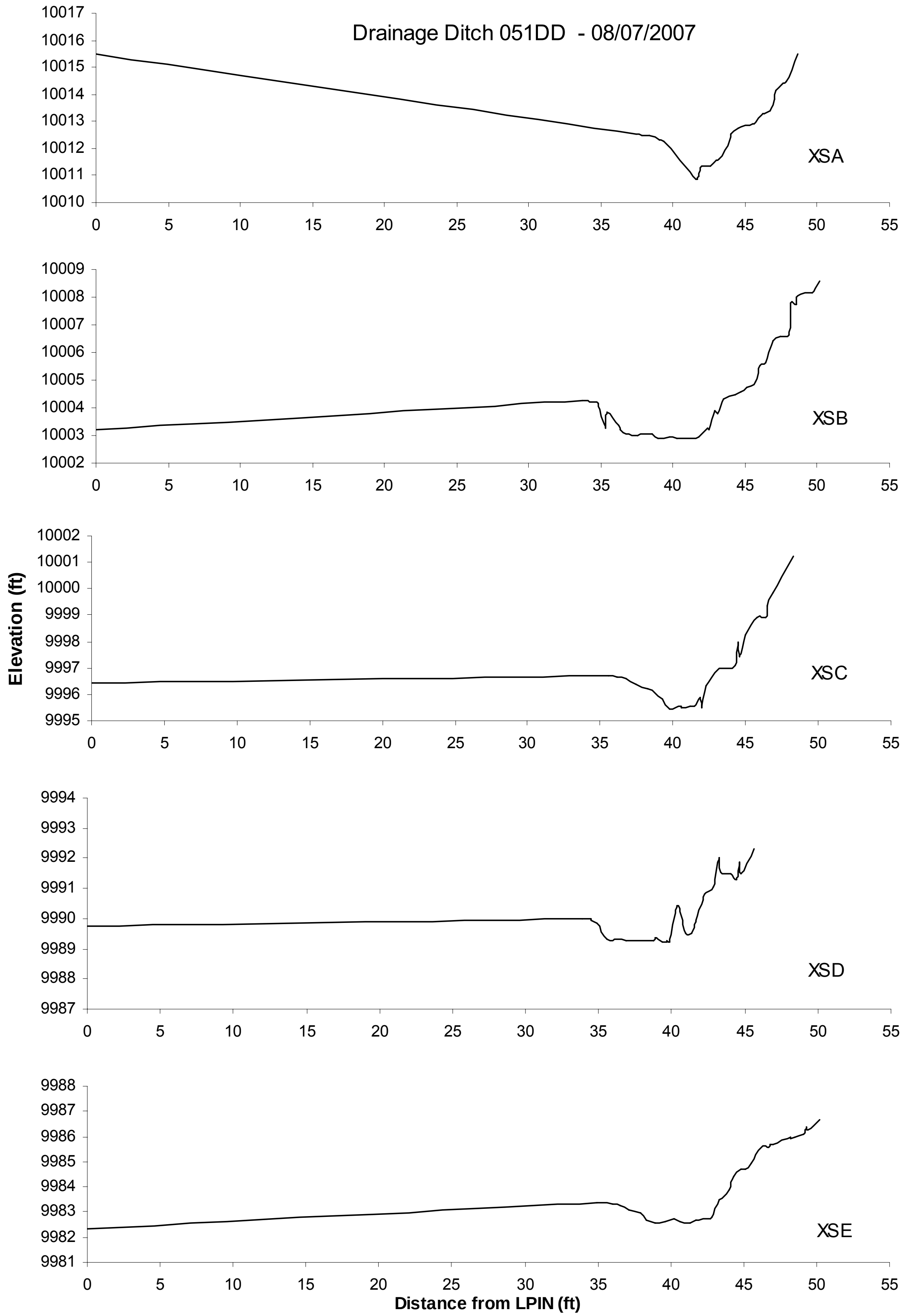


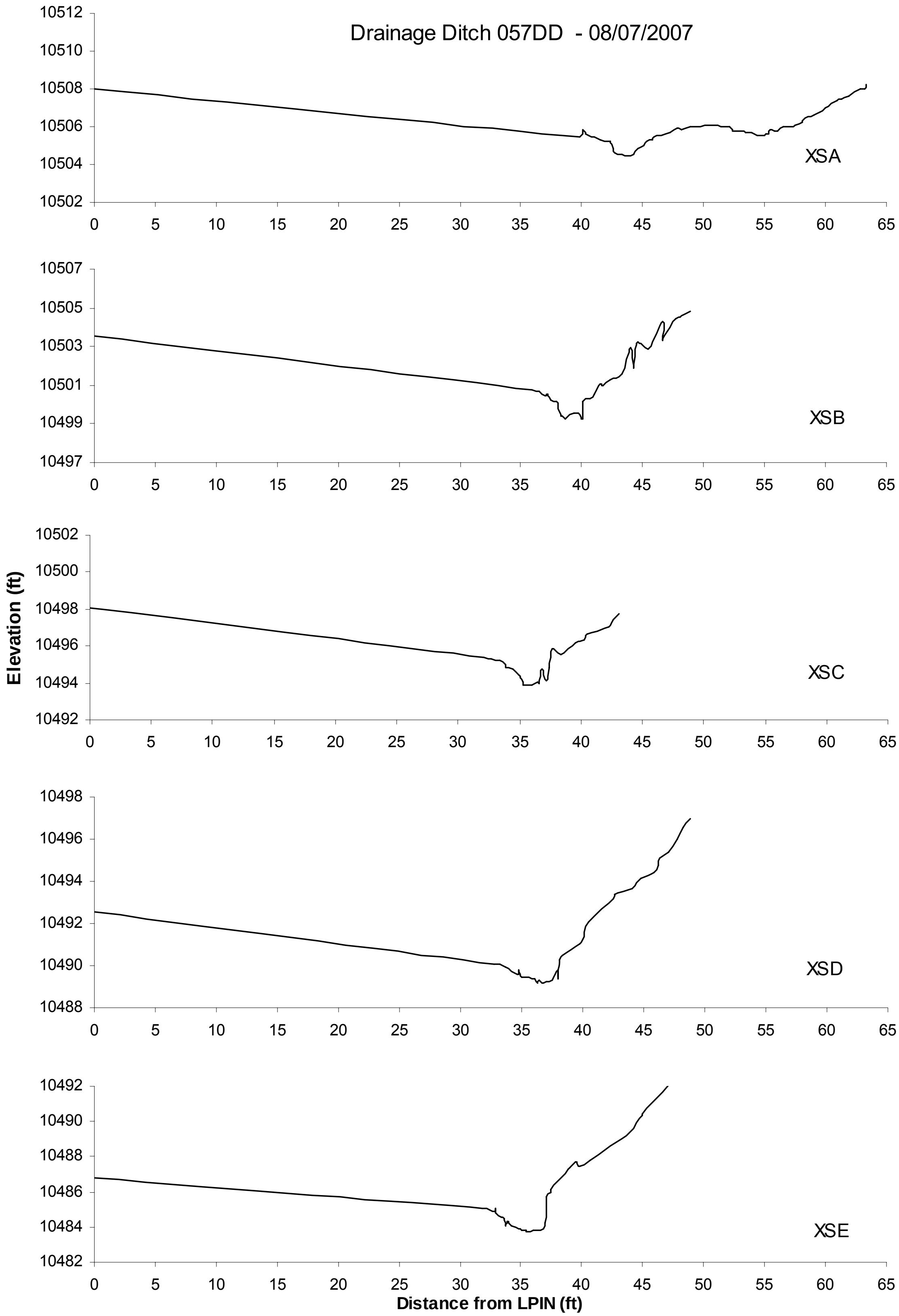
Drainage Ditch 010DD - 07/25/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10009
10007
10005
10003
10001
9999
9997
9995
9993
9991
10000
9998
9996
9994
9992
9990
9988
0
5
10
15
20
25


Drainage Ditch 042DD - 08/07/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10518
10516
10514
10512
10510
10508
10506
10504
10500
10502
10498
10496
10494
10492
10490
10488
10486
10484
0
10
20
30
40
50
60
70
80
90



Drainage Ditch 046DD - 08/07/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Drainage Ditch 051DD - 08/07/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
10017
10016
10015
10014
10013
10012
10011
10010
10009
10008
10007
10006
10005
10004
10003
10002
10001
10000
9999
9998
9997
9996
9995
9994
9993
9992
9991
9990
9989
9988
9987
9986
9985
9984
9983
9982
9981
0
5
10
15
20
25
30
35
40
45
50
55



Drainage Ditch 057DD - 08/07/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10512
10510
10508
10506
10504
10502
10507
10505
10503
10501
10499
10497
10502
10500
10498
10496
10494
10492
10498
10496
10494
10492
10490
10488
10492
10490
10488
10486
10484
10482
0
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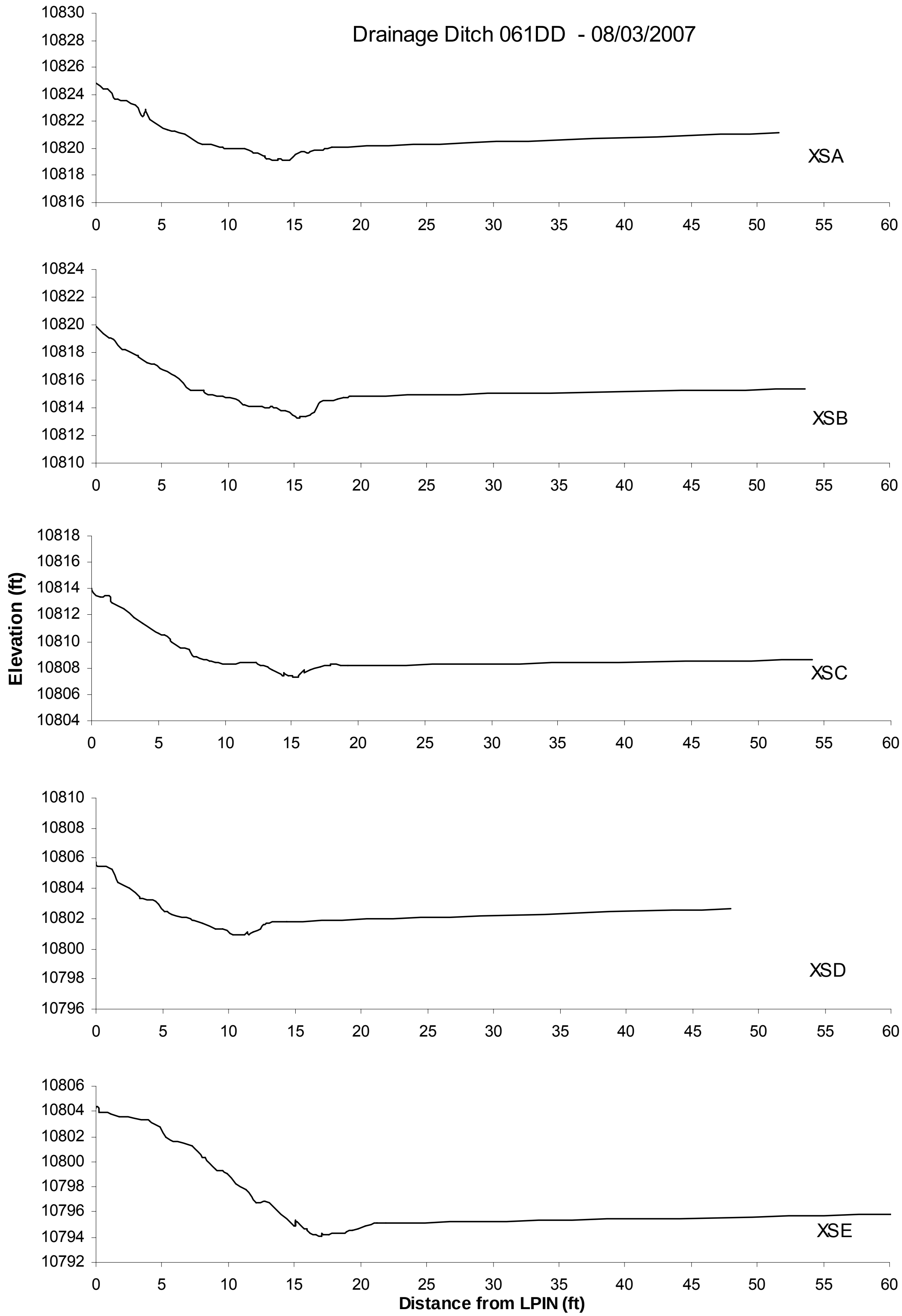
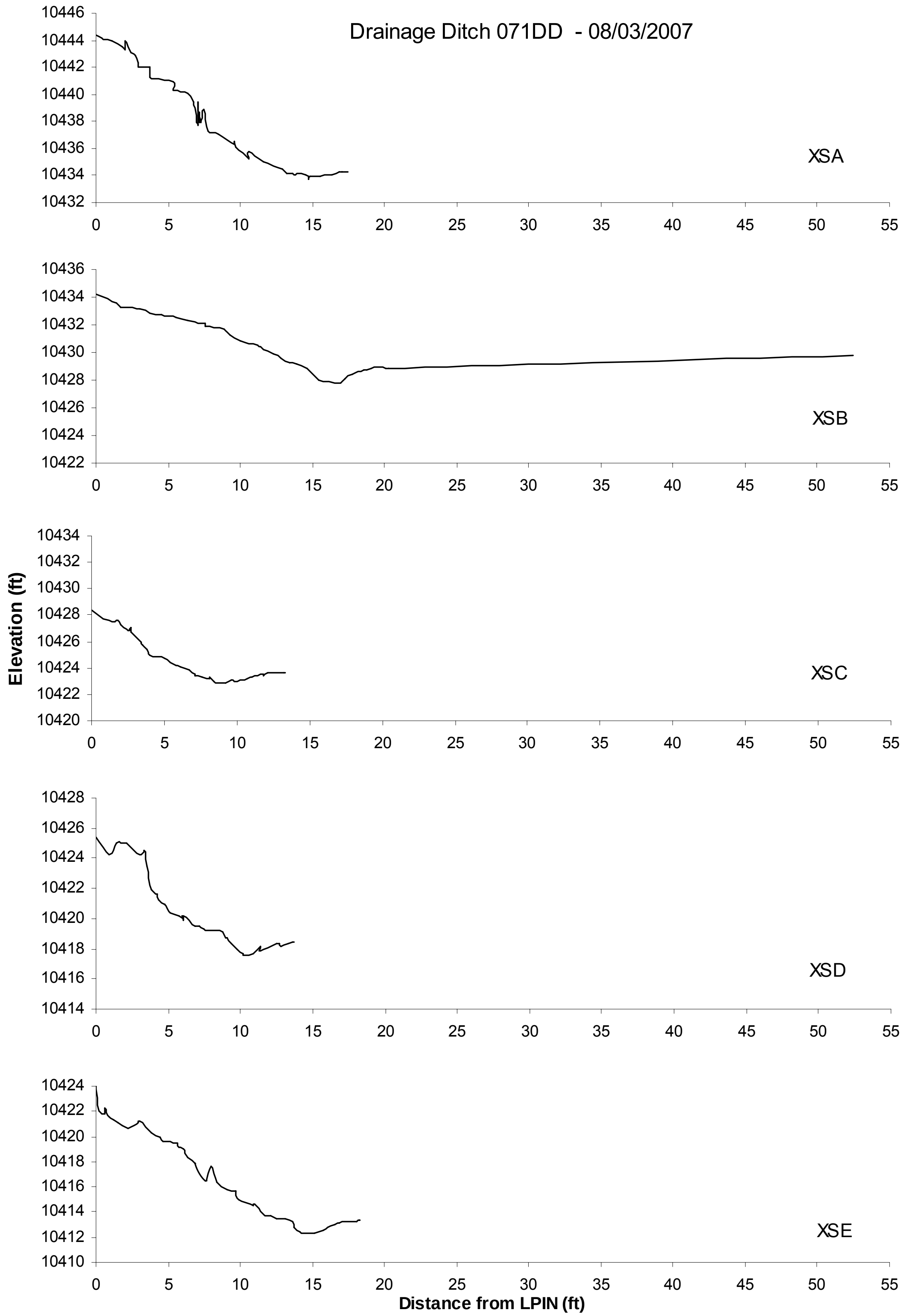
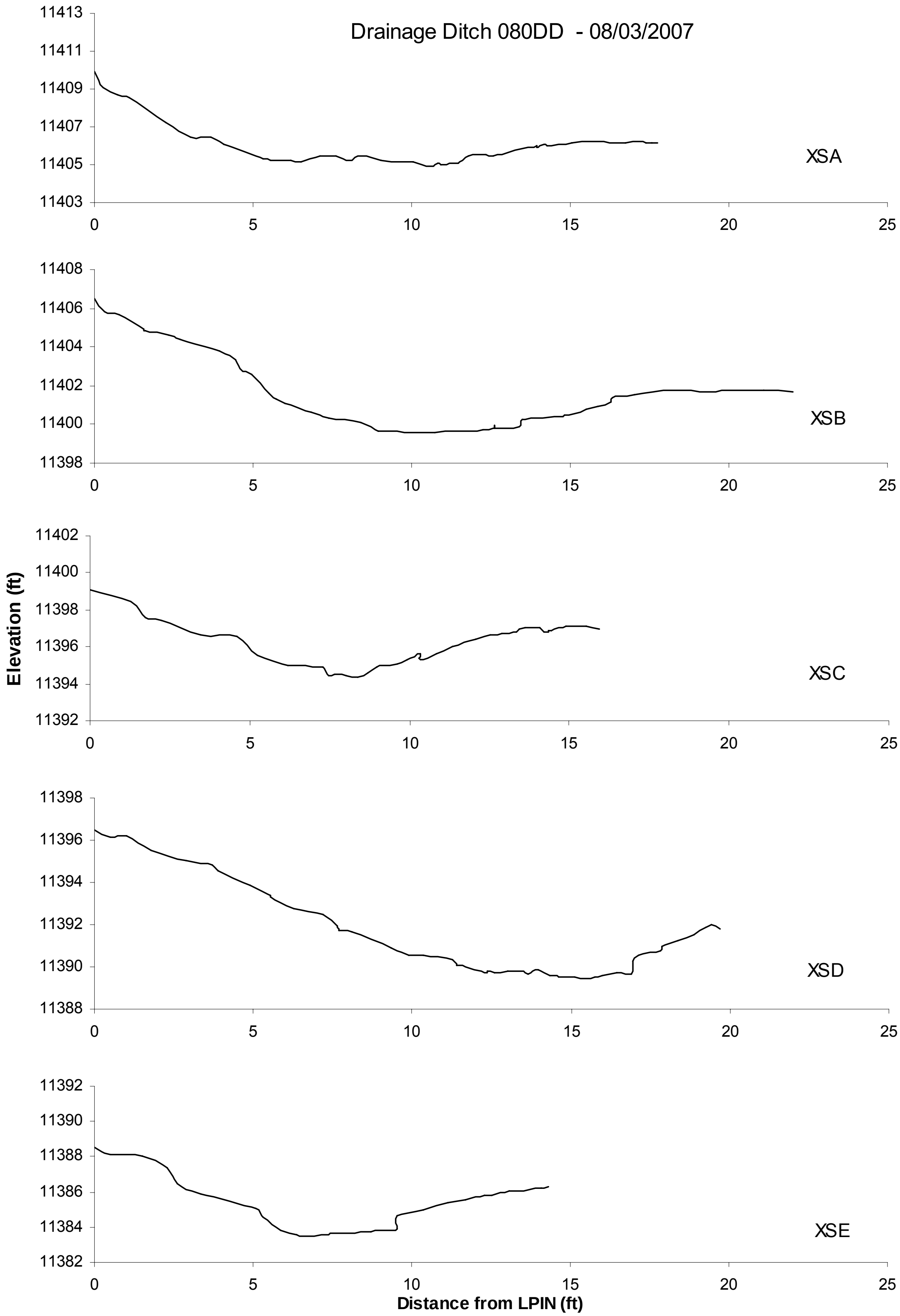
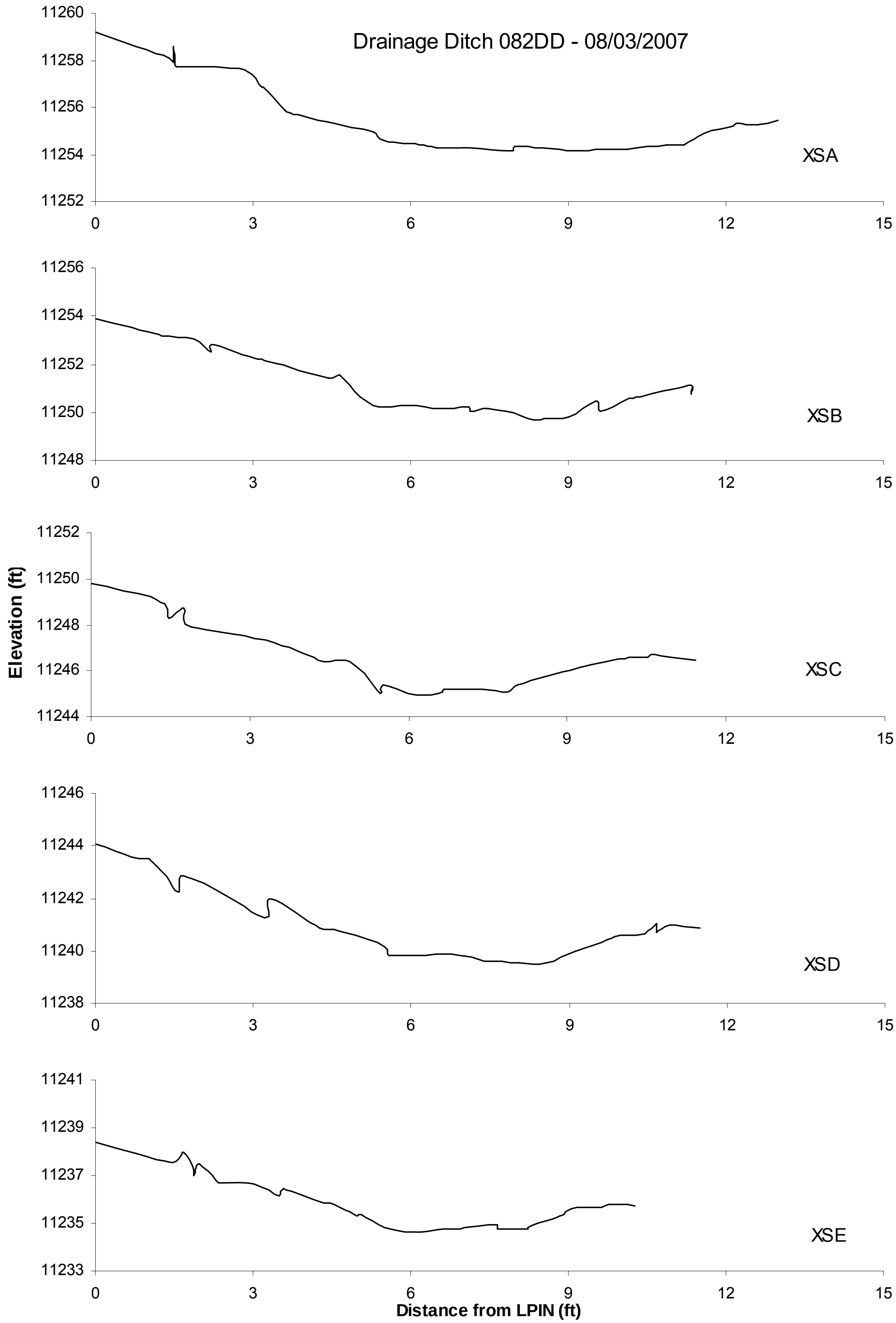
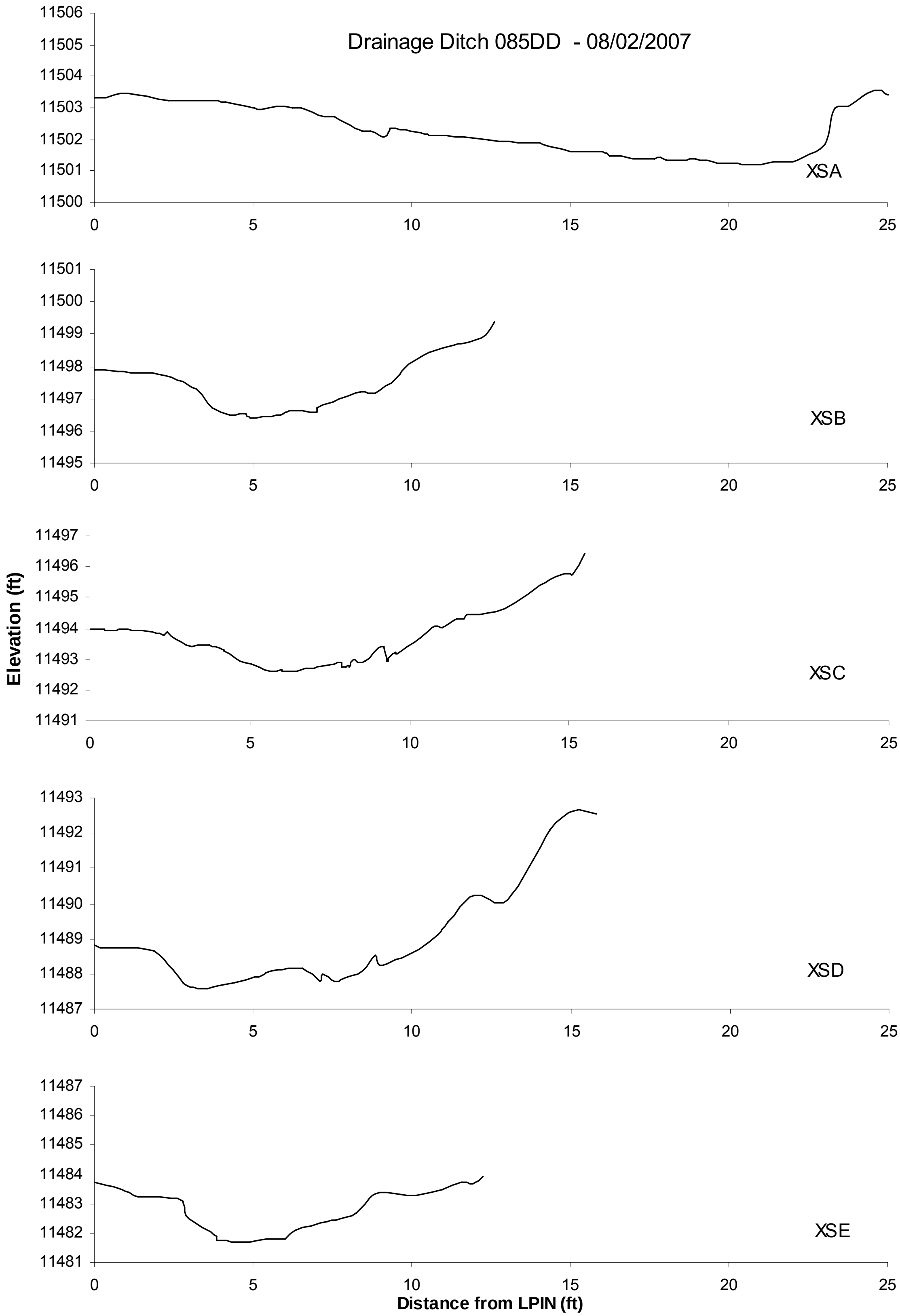
10
15
20
25
30
35
40
45
50
55
60
65

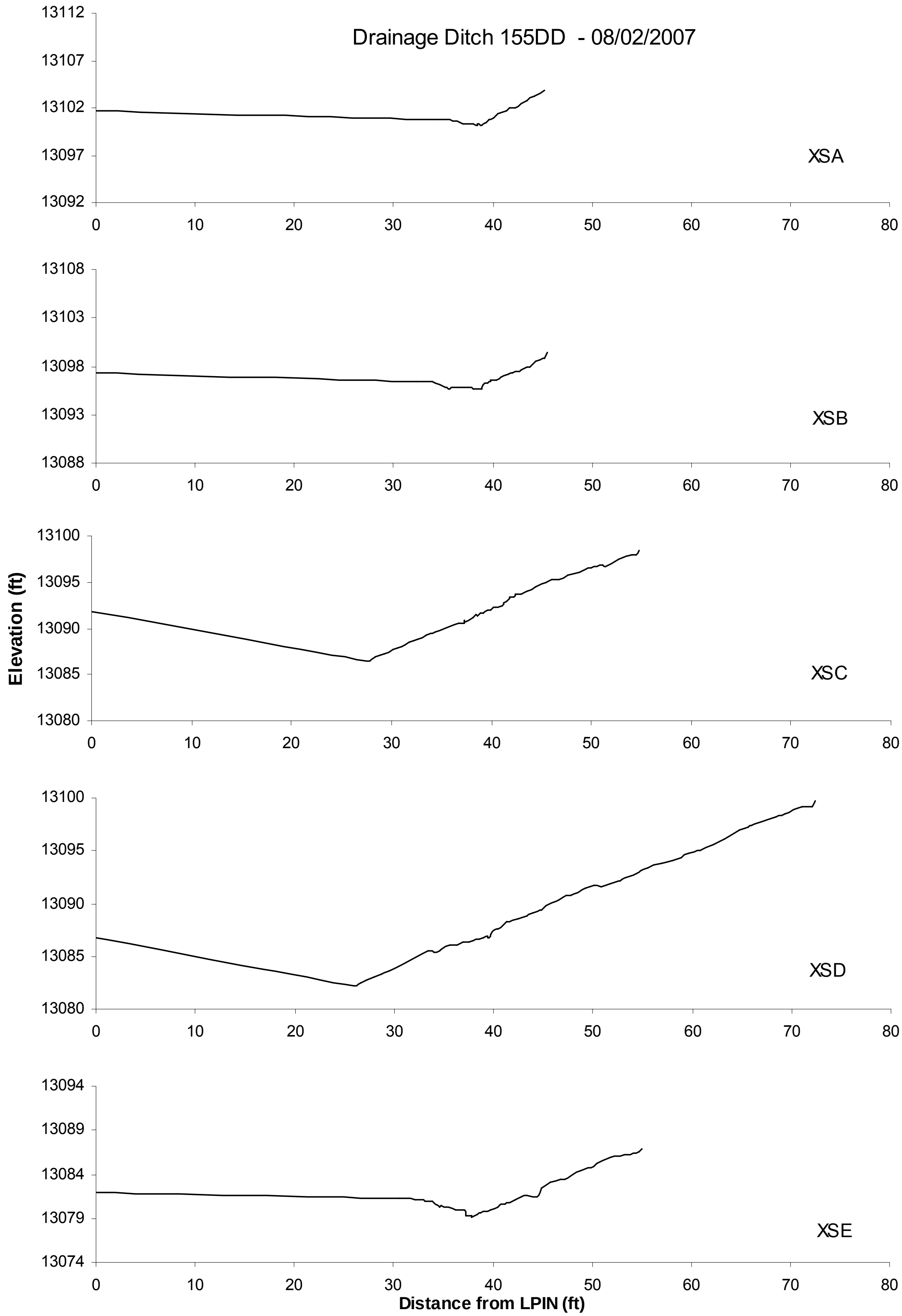

Drainage Ditch 061DD - 08/03/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Drainage Ditch 071DD - 08/03/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

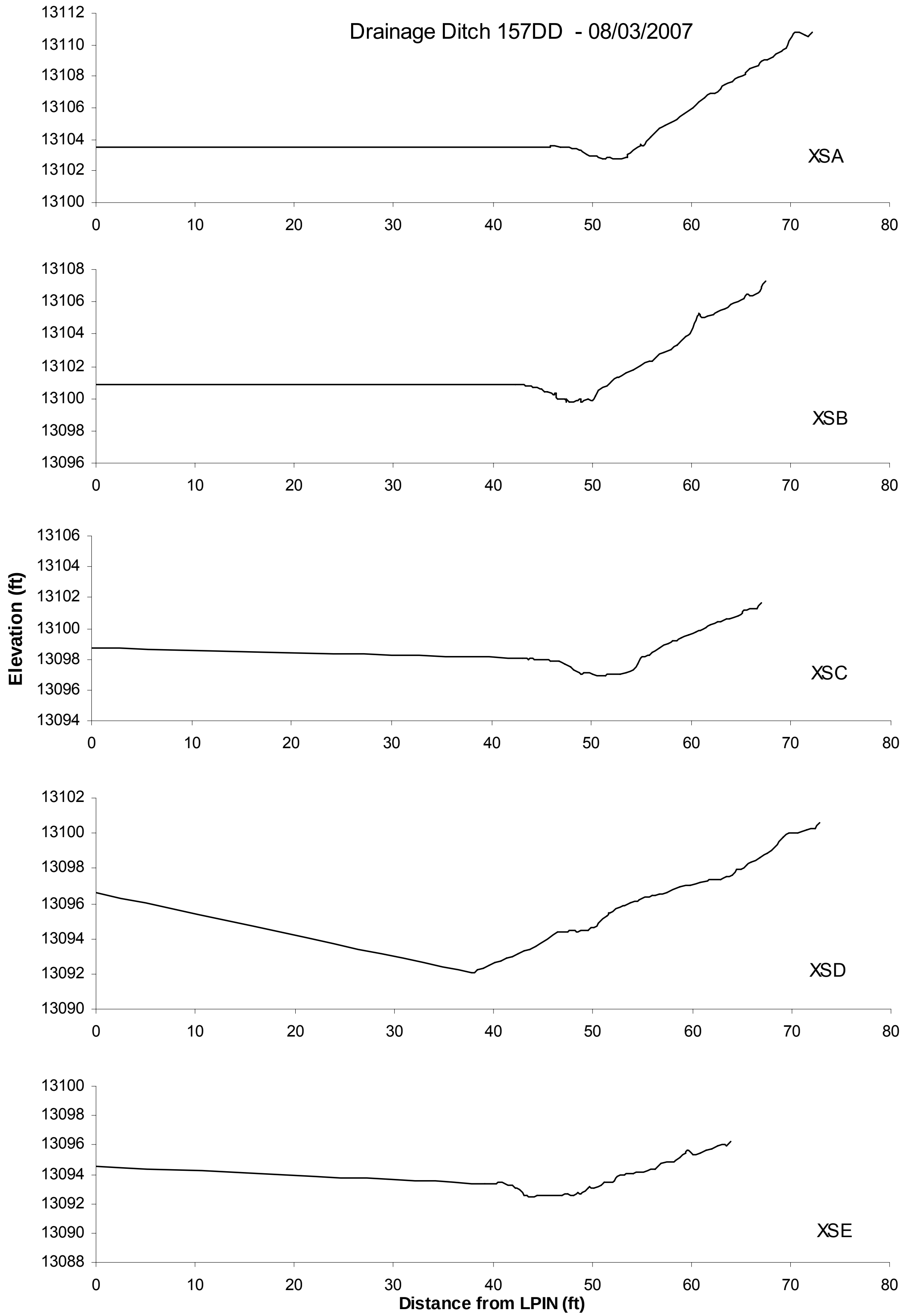

Drainage Ditch 080DD - 08/03/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11413
11411
11409
11407
11405
11403
11408
11406
11404
11402
11400
11398
11402
11400
11398
11396
11394
11392
11398
11396
11394
11392
11390
11388
11392
11390
11388
11386
11384
11382
0
5
10
15
20
25


Drainage Ditch 082DD - 08/03/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11260
11258
11256
11254
11252
11248
11250
11246
11244
11242
11240
11238
11241
11239
11237
11235
11233
0
3
6
9
12
15

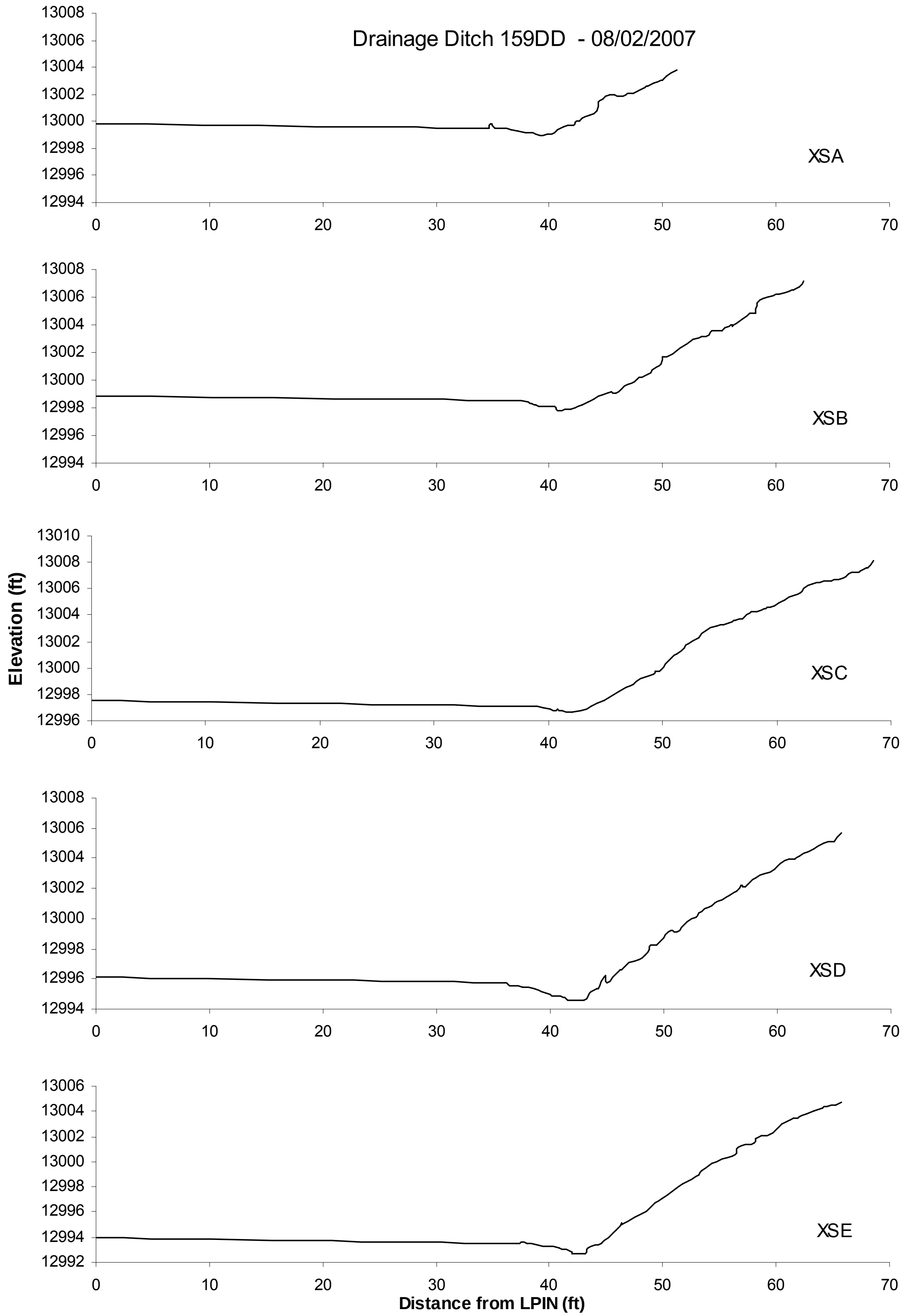

Drainage Ditch 085DD - 08/02/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

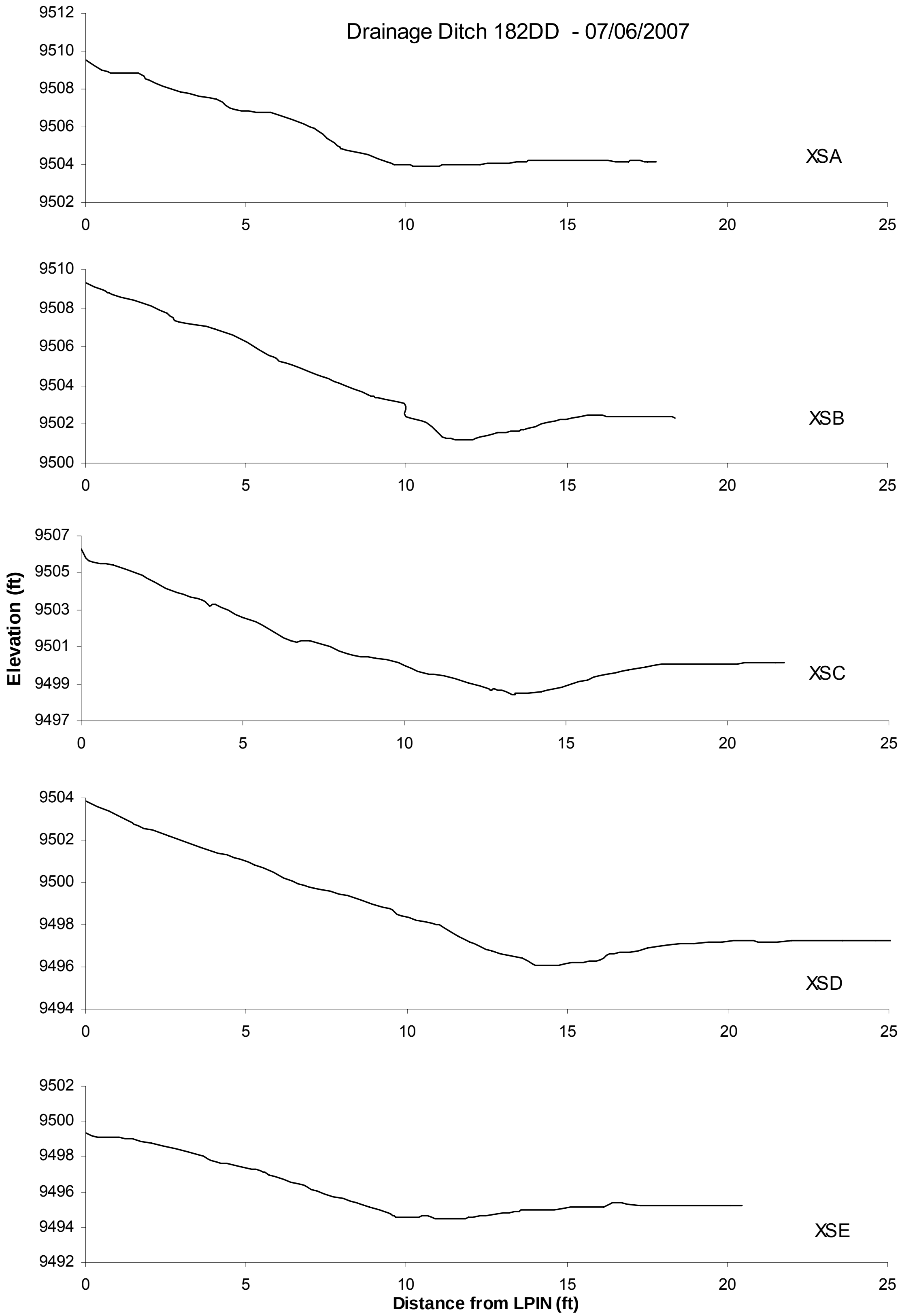


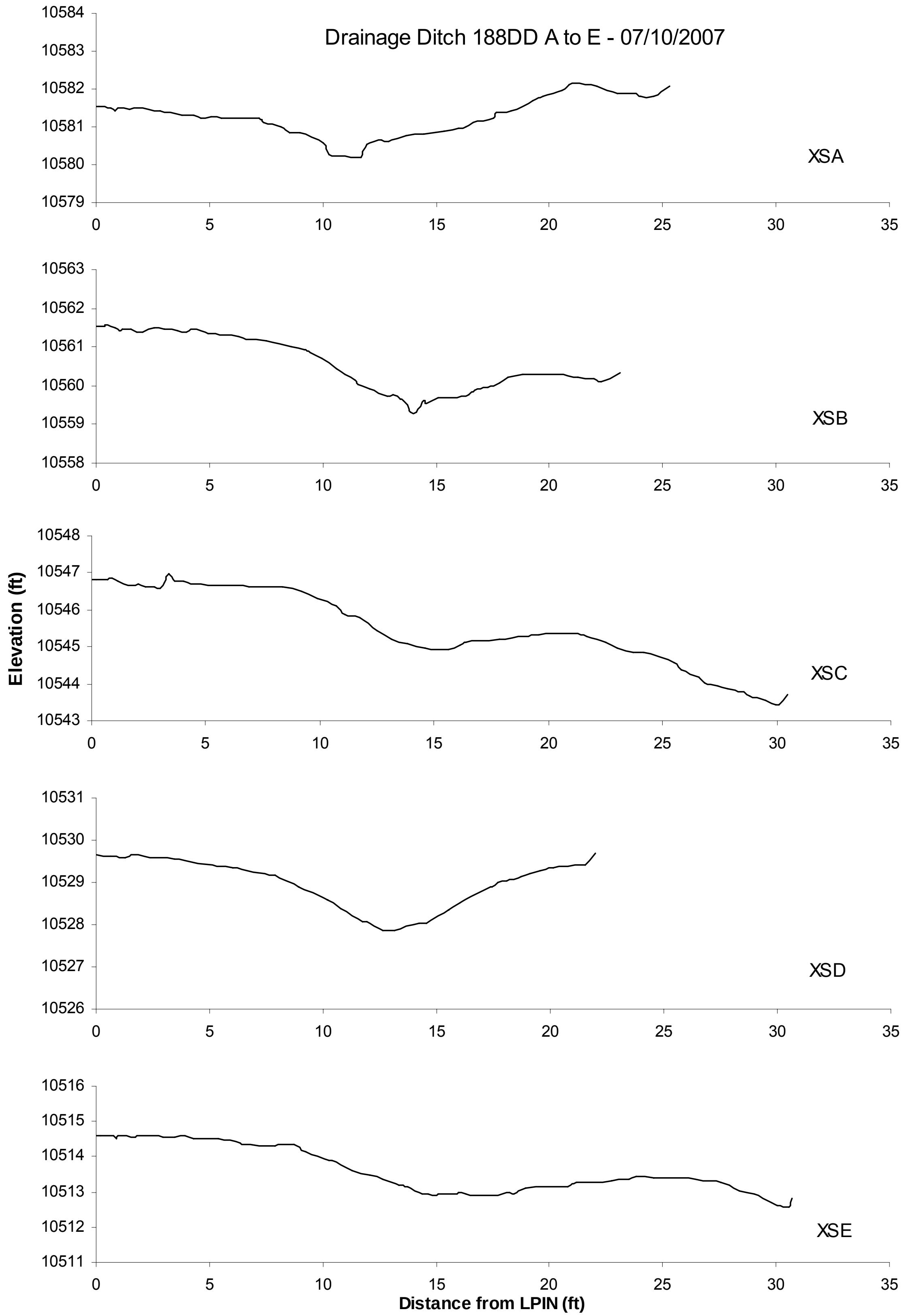
Drainage Ditch 155DD - 08/02/2007
13112
13107
13102
13097
13092
0
10
20
30
40
50
60
70
80
XSA
13108
13103
13098
13093
13088
XSB
13100
13095
13090
13085
13080
XSC
Elevation (ft)
XSD
13094
13089
13084
13079
13074
XSE
Distance from LPIN (ft)

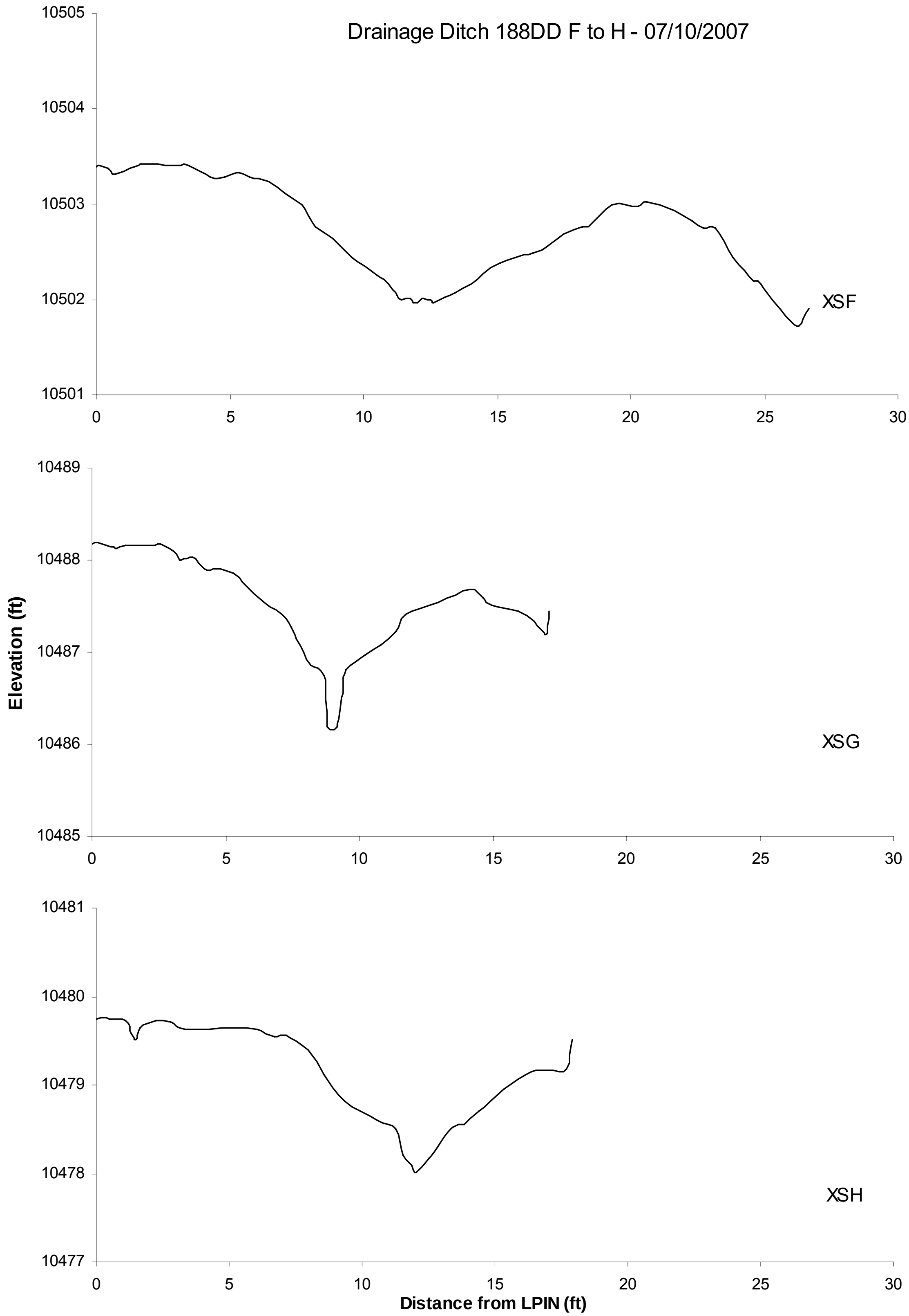


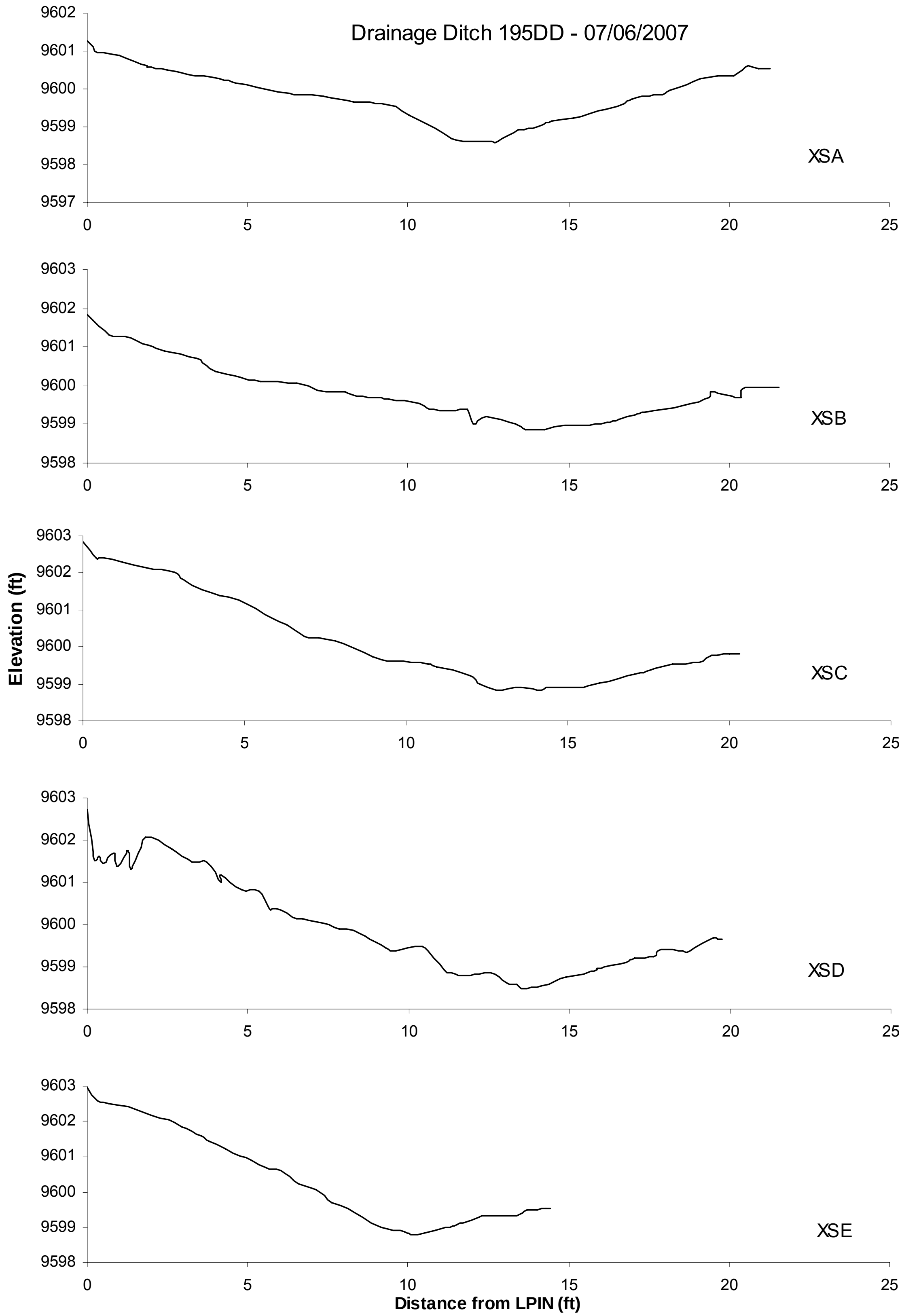
Drainage Ditch 157DD - 08/03/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

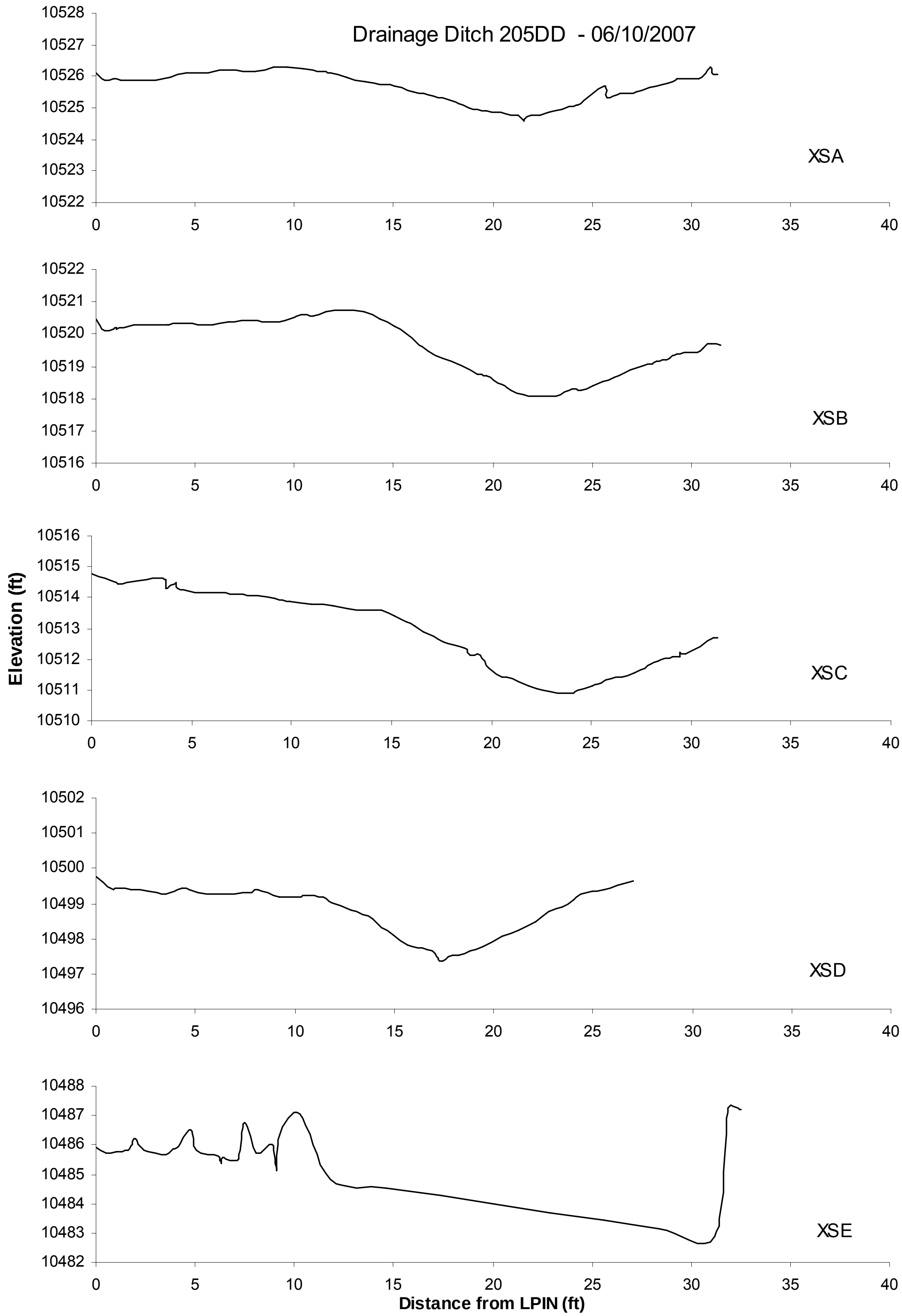

Drainage Ditch 159DD - 08/02/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Drainage Ditch 182DD - 07/06/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9512
9510
9508
9506
9504
9502
9500
9507
9505
9503
9501
9499
9497
9498
9496
9494
9492
0
5
10
15
20
25


Drainage Ditch 188DD A to E - 07/10/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
10584
10583
10582
10581
10580
10579
10563
10562
10561
10560
10559
10558
10548
10547
10546
10545
10544
10543
10531
10530
10529
10528
10527
10526
10516
10515
10514
10513
10512
10511
0
5
10
15
20
25
30
35


Drainage Ditch 188DD F to H - 07/10/2007
Elevation (ft)
Distance from LPIN (ft)
XSF
XSG
XSH
10505
10504
10503
10502
10501
10489
10488
10487
10486
10485
10481
10480
10479
10478
10477
0
5
10
15
20
25
30


Drainage Ditch 195DD - 07/06/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9597
9598
9599
9600
9601
9602
9603
0
5
10
15
20
25

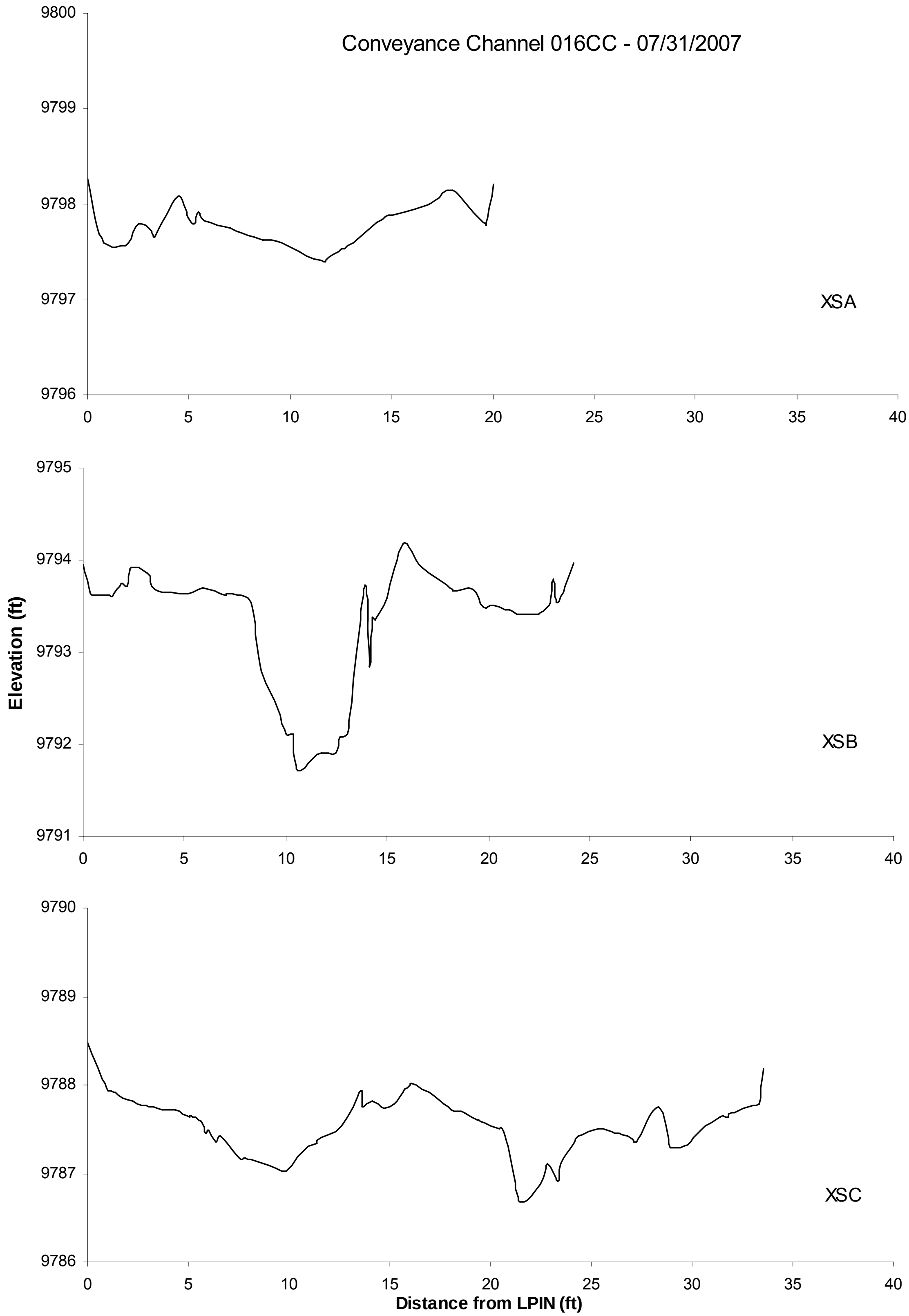

Drainage Ditch 205DD - 06/10/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
10528
10527
10526
10525
10524
10523
10522
10521
10520
10519
10518
10517
10516
10515
10514
10513
10512
10511
10510
10502
10501
10500
10499
10498
10497
10496
10488
10487
10486
10485
10484
10483
10482
0
5
10
15
20
25
30
35
40

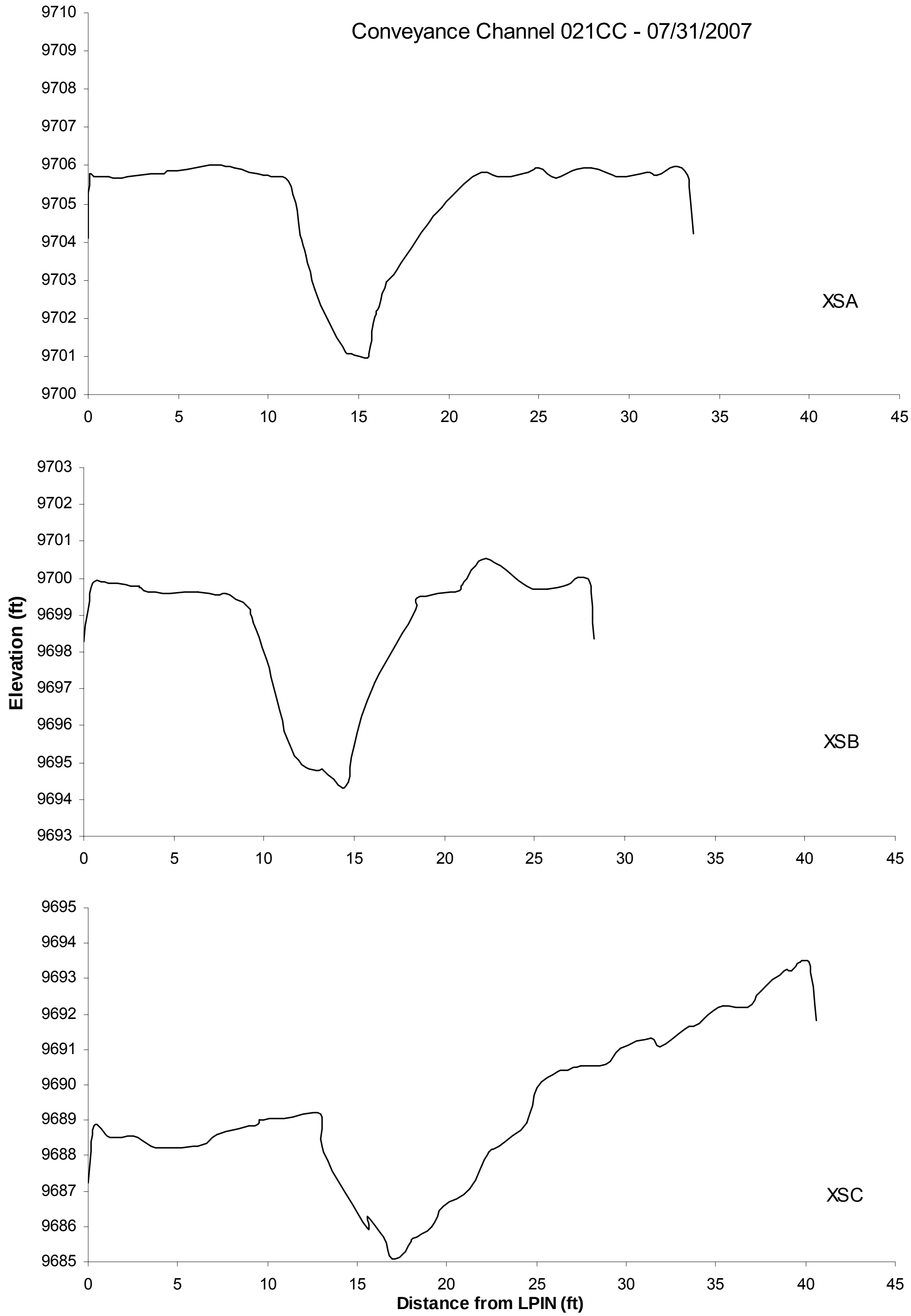
Appendix F

Conveyance Channels

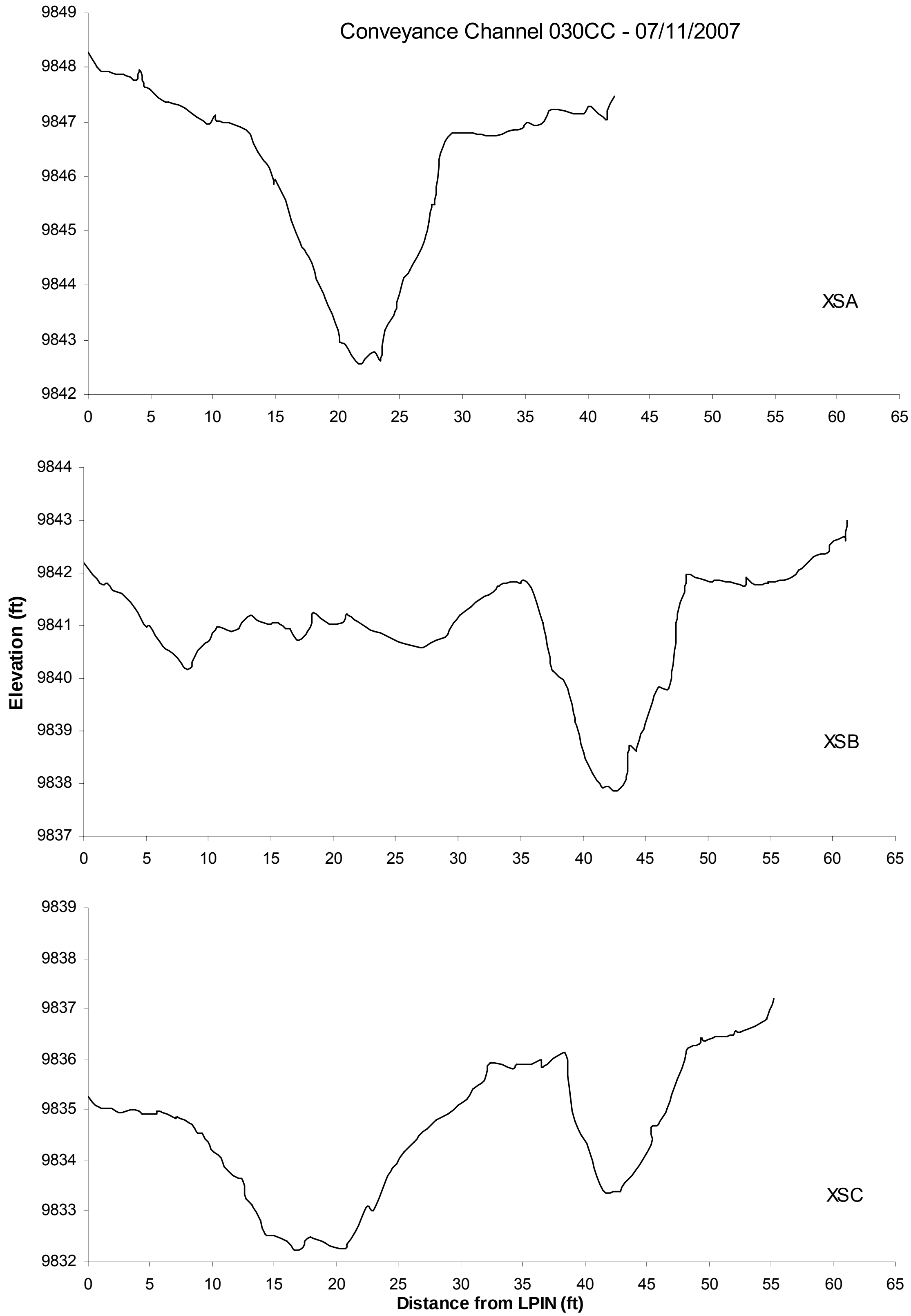
Cross Section Graphs

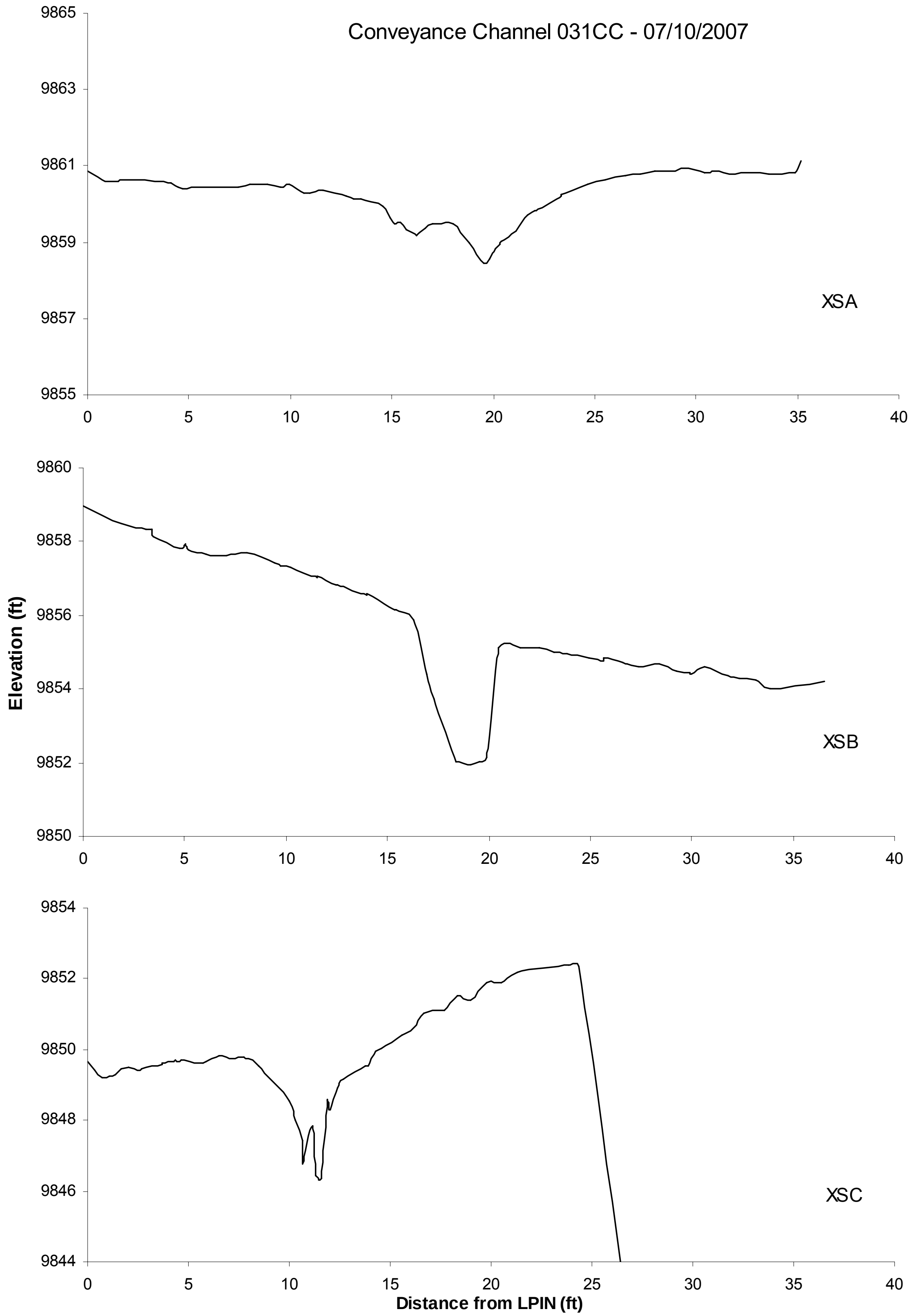
2007

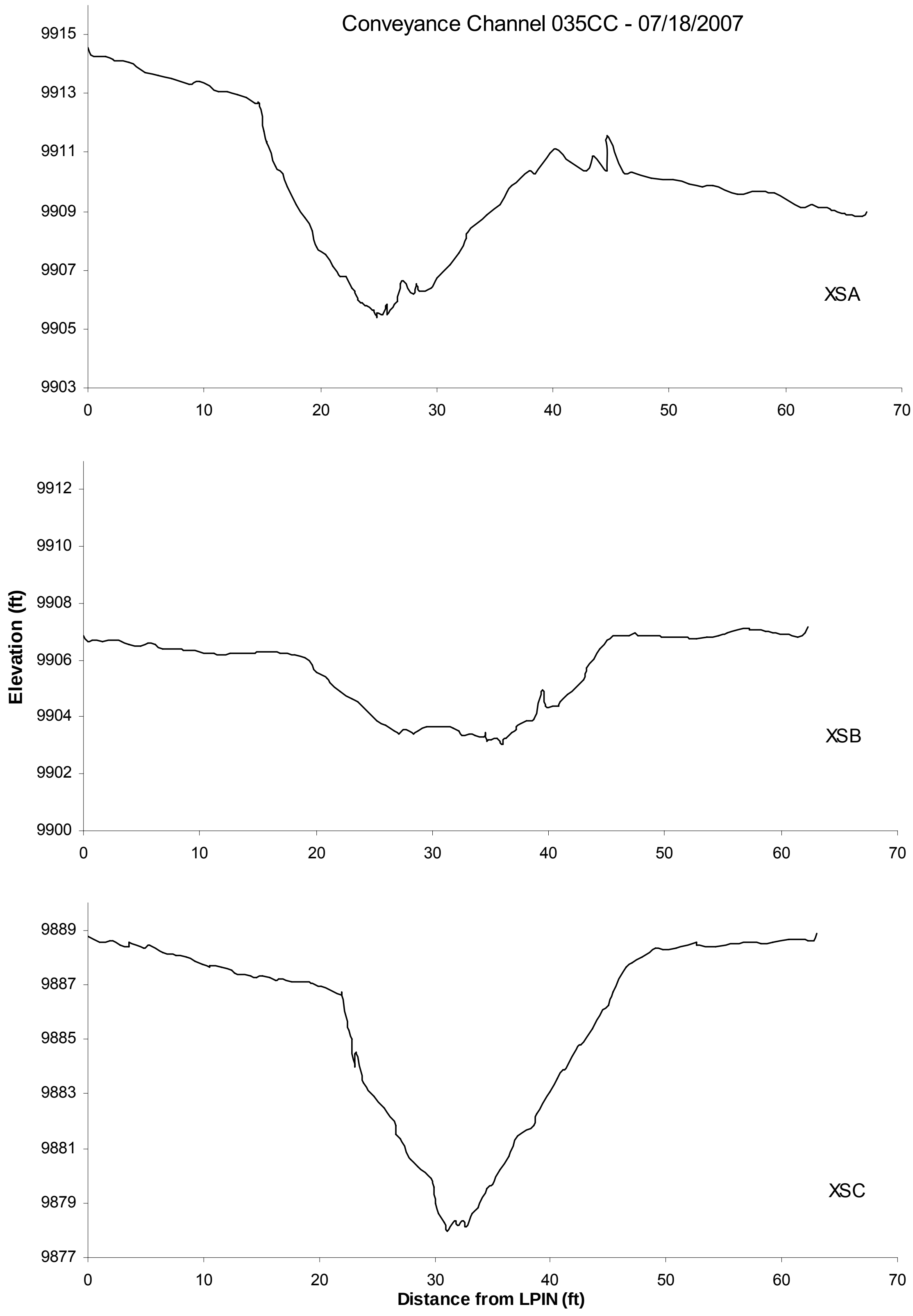

Conveyance Channel 016CC - 07/31/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9800
9799
9798
9797
9796
9795
9794
9793
9792
9791
9790
9789
9788
9787
9786
0
5
10
15
20
25
30
35
40



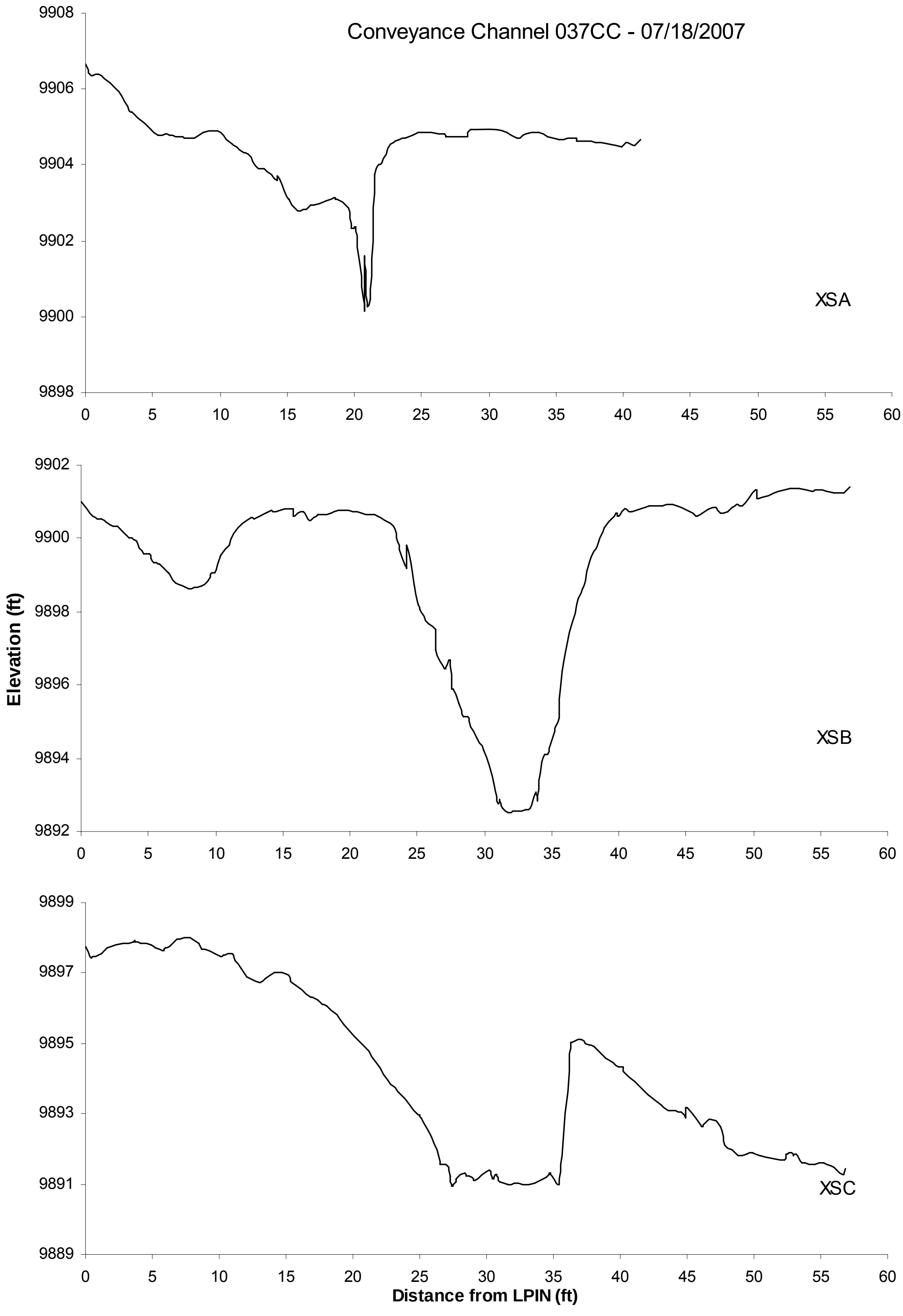
Conveyance Channel 021CC - 07/31/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9710
9709
9708
9707
9706
9705
9704
9703
9702
9701
9700
9703
9702
9701
9700
9699
9698
9697
9696
9695
9694
9693
9695
9694
9693
9692
9691
9690
9689
9688
9687
9686
9685
0
5
10
15
20
25
30
35
40
45


Conveyance Channel 030CC - 07/11/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9849
9848
9847
9846
9845
9844
9843
9842
9844
9843
9842
9841
9840
9839
9838
9837
9839
9838
9837
9836
9835
9834
9833
9832
0
5
10
15
20
25
30
35
40
45
50
55
60
65

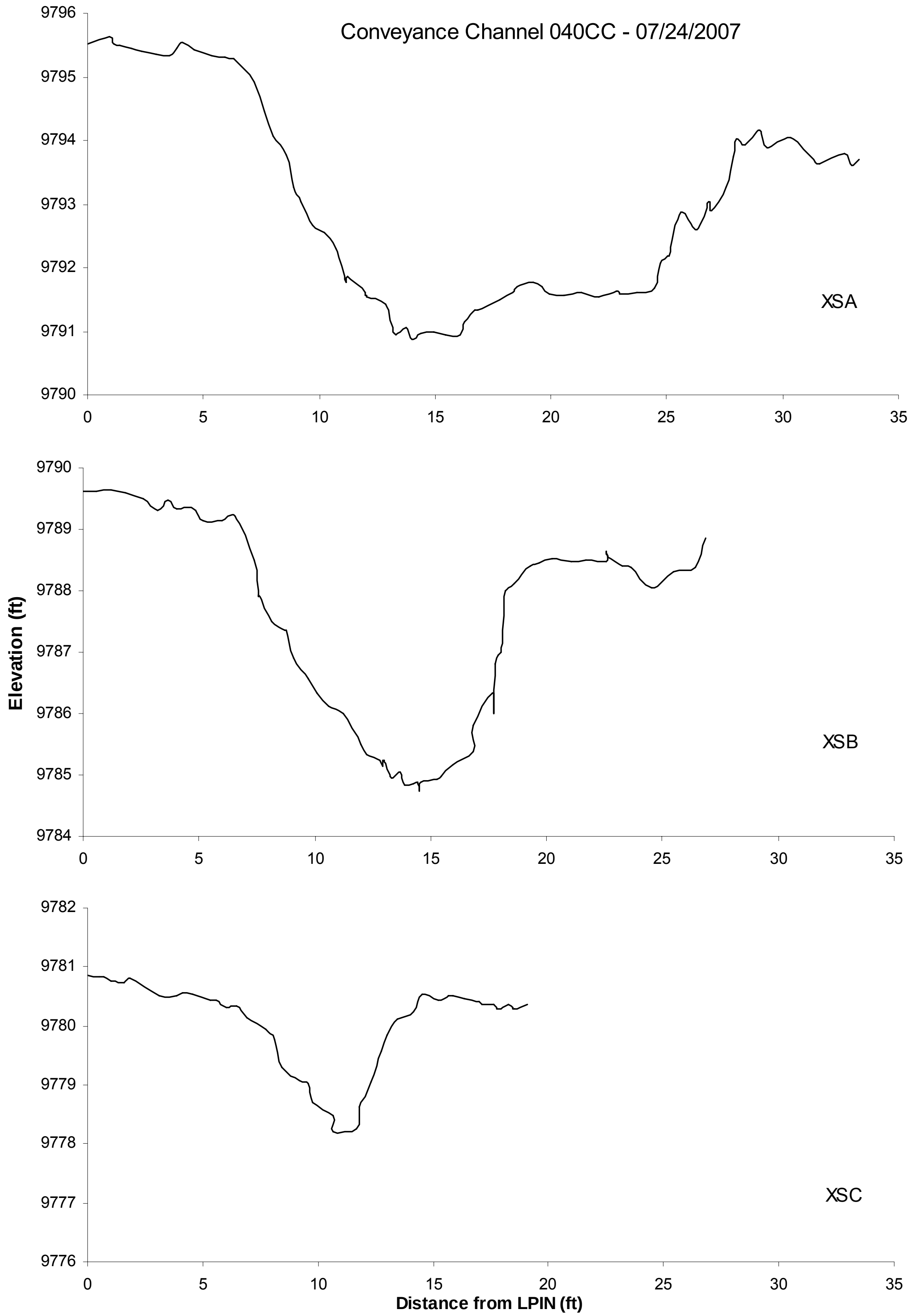

Conveyance Channel 031CC - 07/10/2007
9865
9863
9861
9859
9857
9855
0
5
10
15
20
25
30
35
40
XSA
9860
9858
9856
9854
9852
9850
XSB
Elevation (ft)
9854
9852
9850
9848
9846
9844
XSC
Distance from LPIN (ft)



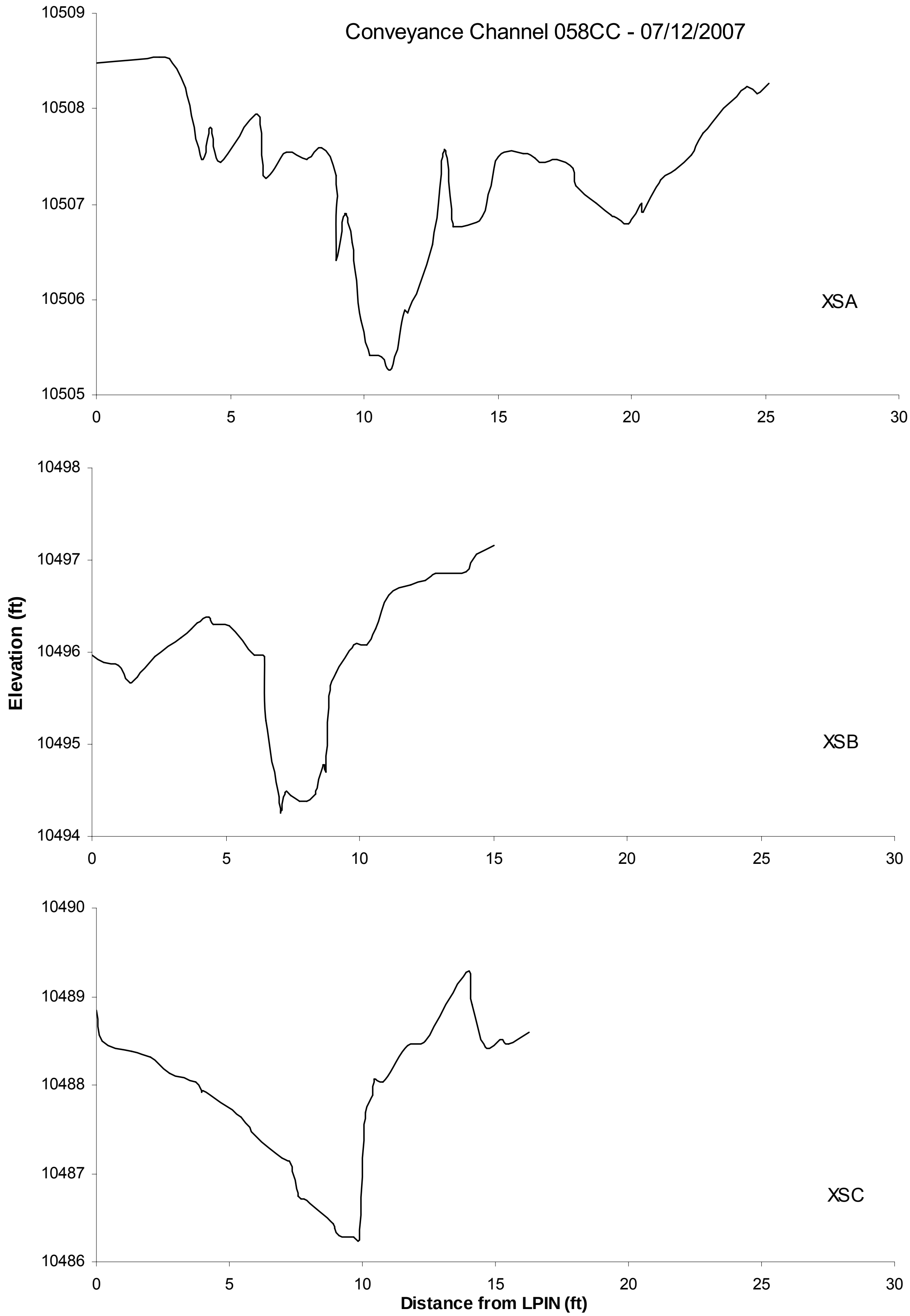
Conveyance Channel 035CC - 07/18/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9915
9913
9911
9909
9907
9905
9903
9912
9910
9908
9906
9904
9902
9900
9889
9887
9885
9883
9881
9879
9877
0
10
20
30
40
50
60
70

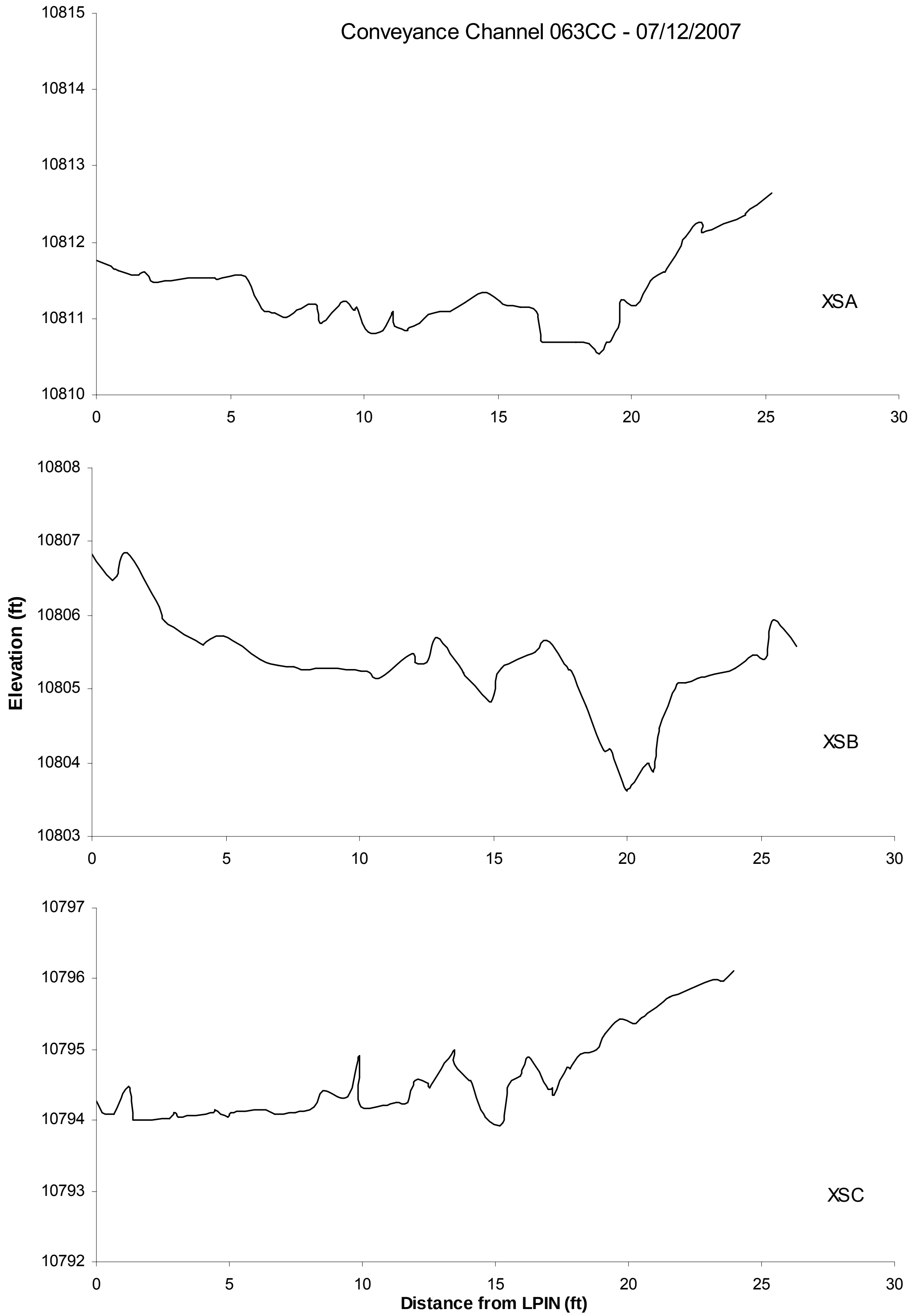


Conveyance Channel 037CC - 07/18/2007
9908
9906
9904
9902
9900
9898
0
5
10
15
20
25
30
35
40
45
50
55
60
XSA
9902
9900
9898
9896
9894
9892
XSB
9899
9897
9895
9893
9891
9889
XSC
Elevation (ft)
Distance from LPIN (ft)

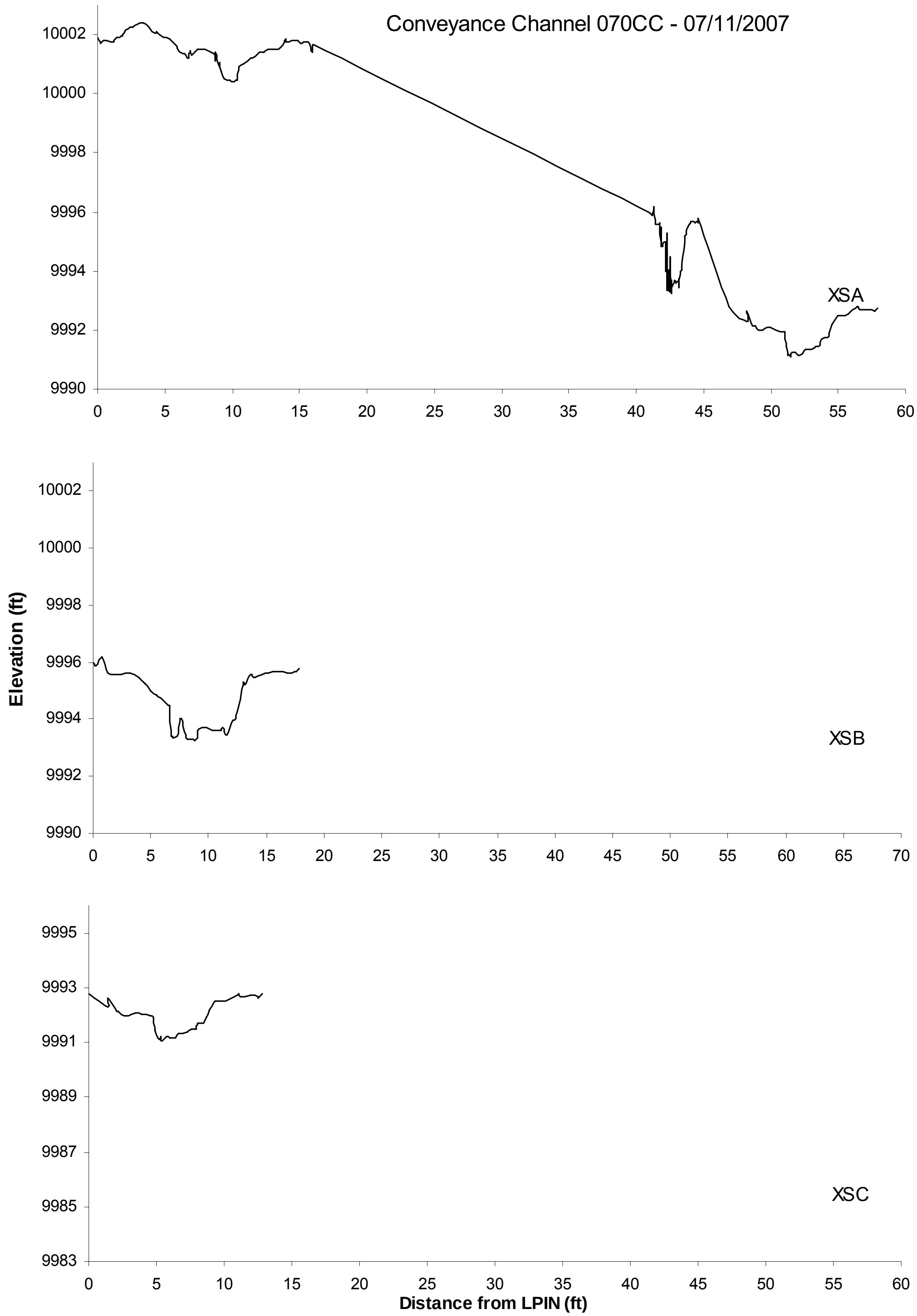


Conveyance Channel 040CC - 07/24/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9796
9795
9794
9793
9792
9791
9790
9789
9788
9787
9786
9785
9784
9782
9781
9780
9779
9778
9777
9776
0
5
10
15
20
25
30
35

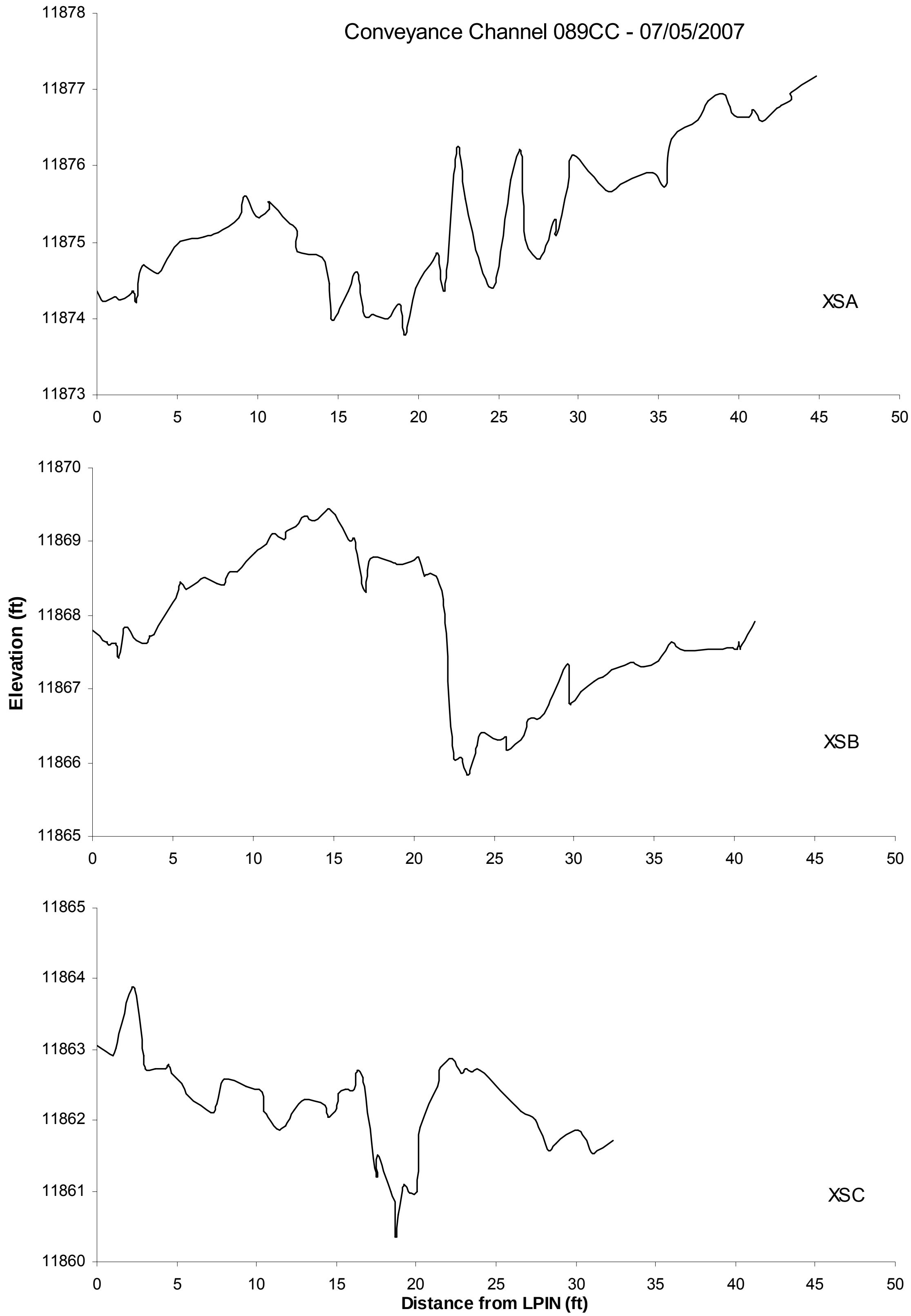

Conveyance Channel 058CC - 07/12/2007
10509
10508
10507
10506
10505
0
5
10
15
20
25
30
XSA
10498
10497
10496
10495
10494
XSB
10490
10489
10488
10487
10486
XSC
Elevation (ft)
Distance from LPIN (ft)

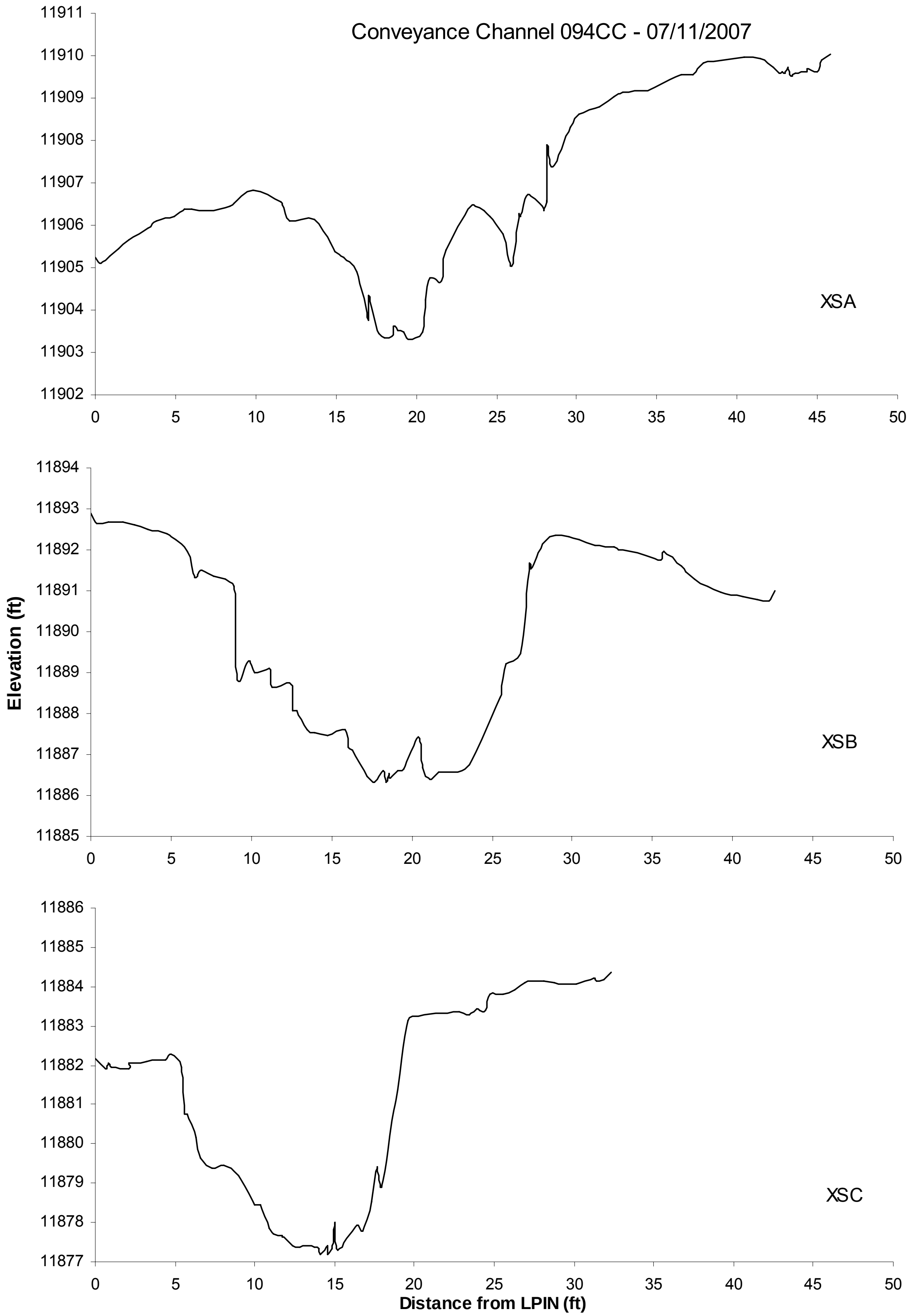


Conveyance Channel 063CC - 07/12/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
10815
10814
10813
10812
10811
10810
10808
10807
10806
10805
10804
10803
10797
10796
10795
10794
10793
10792
0
5
10
15
20
25
30

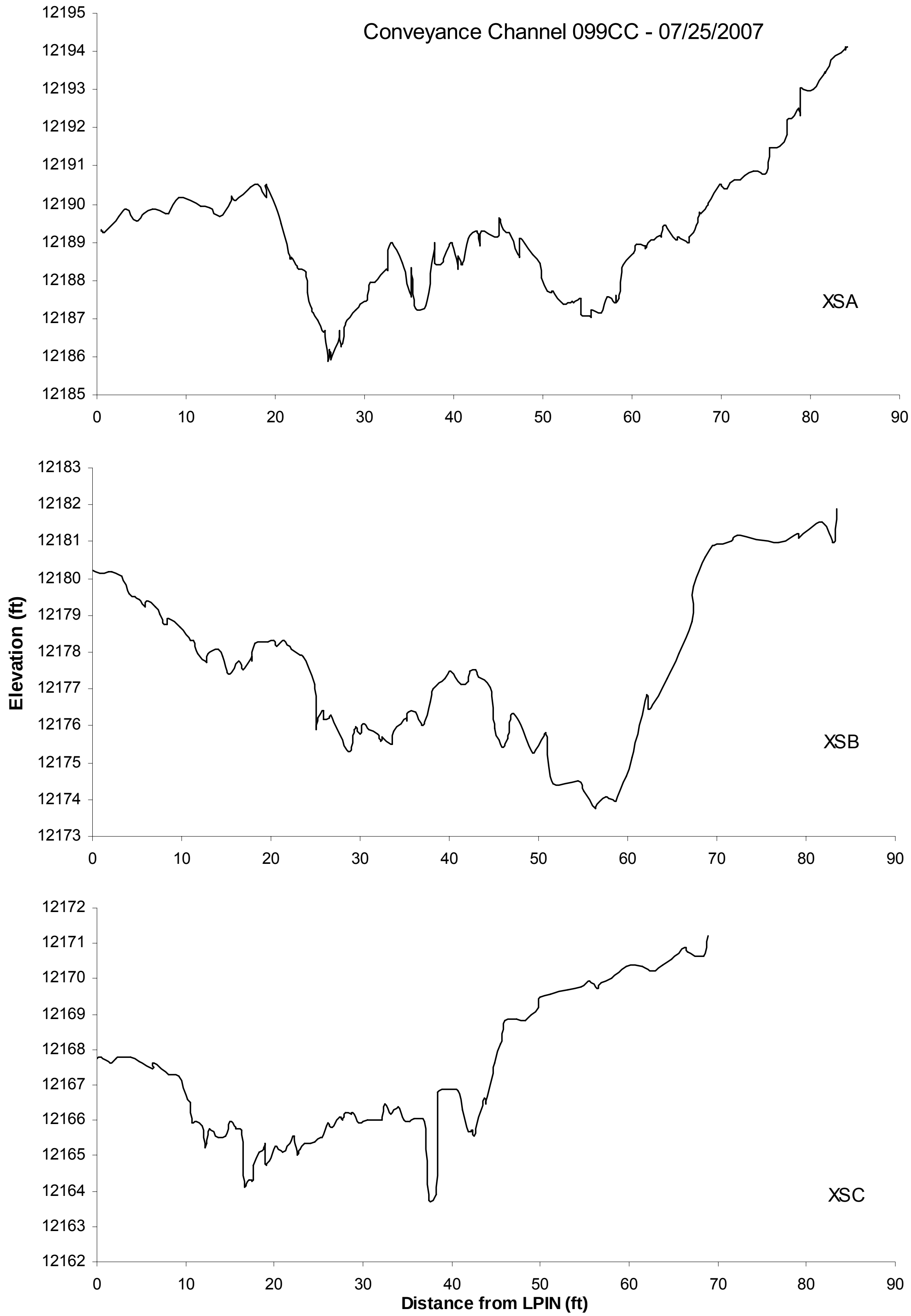


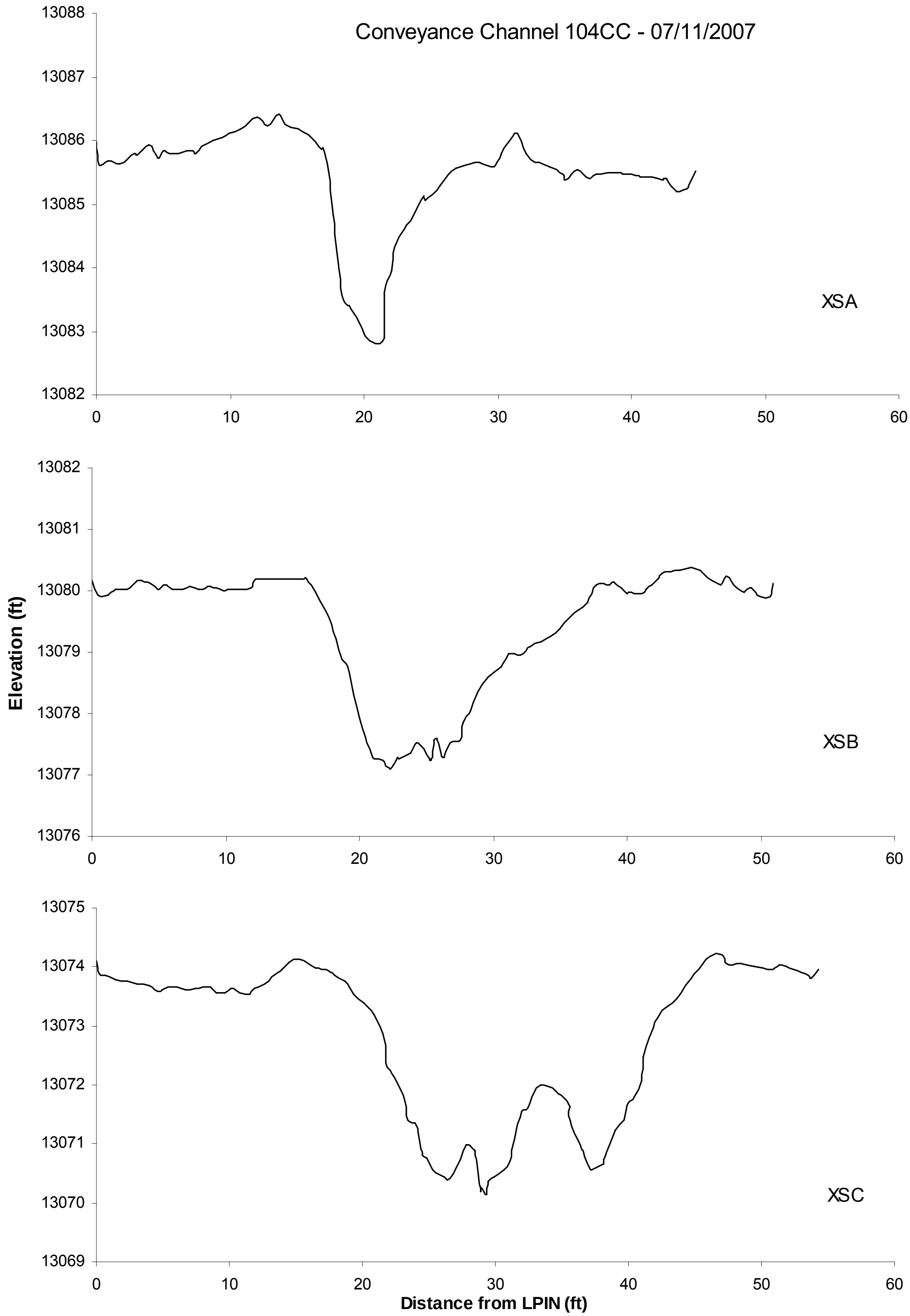
Conveyance Channel 070CC - 07/11/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)

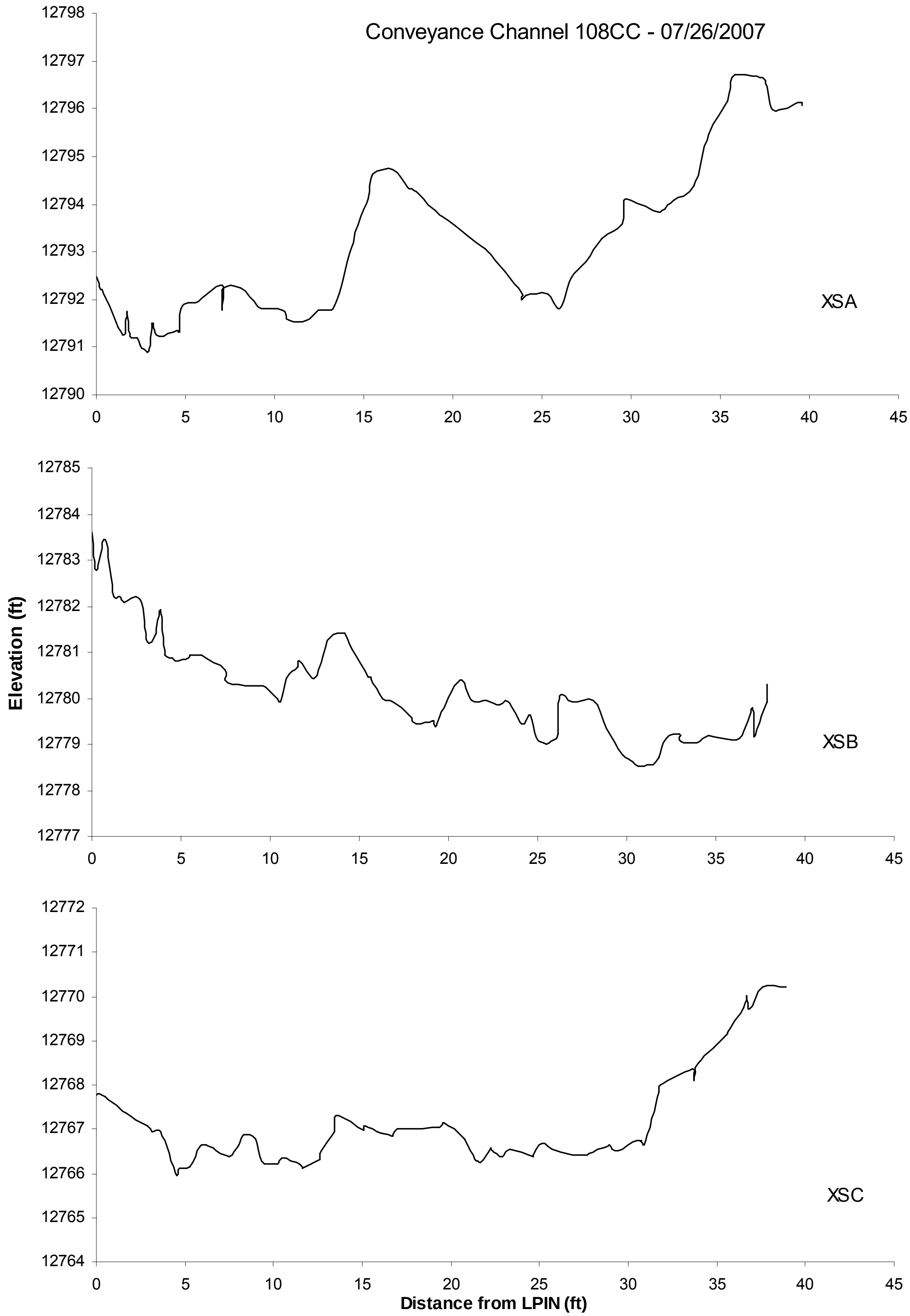

Conveyance Channel 089CC - 07/05/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
11878
11877
11876
11875
11874
11873
11870
11869
11868
11867
11866
11865
11864
11863
11862
11861
11860
0
5
10
15
20
25
30
35
40
45
50

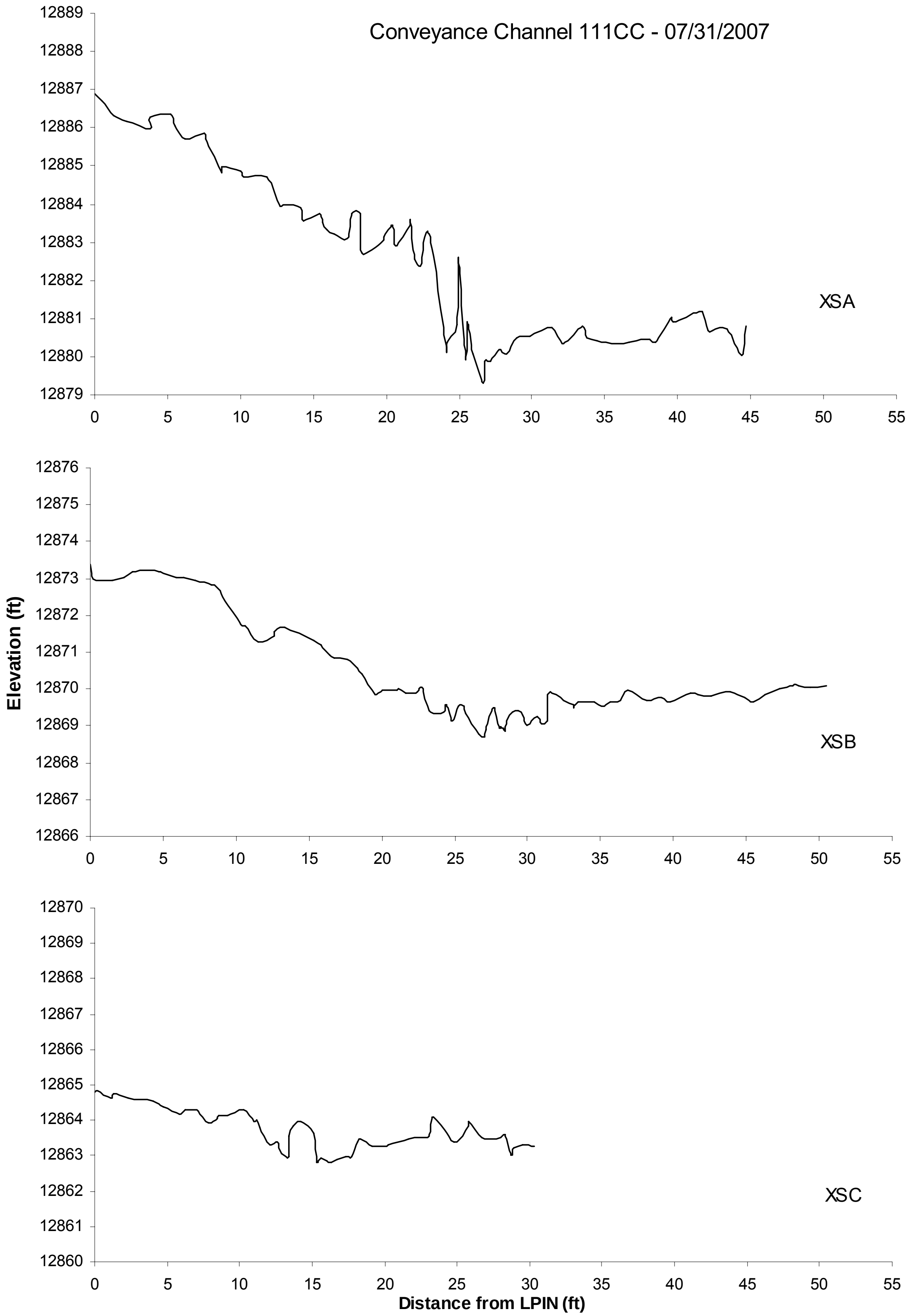


Conveyance Channel 094CC - 07/11/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)

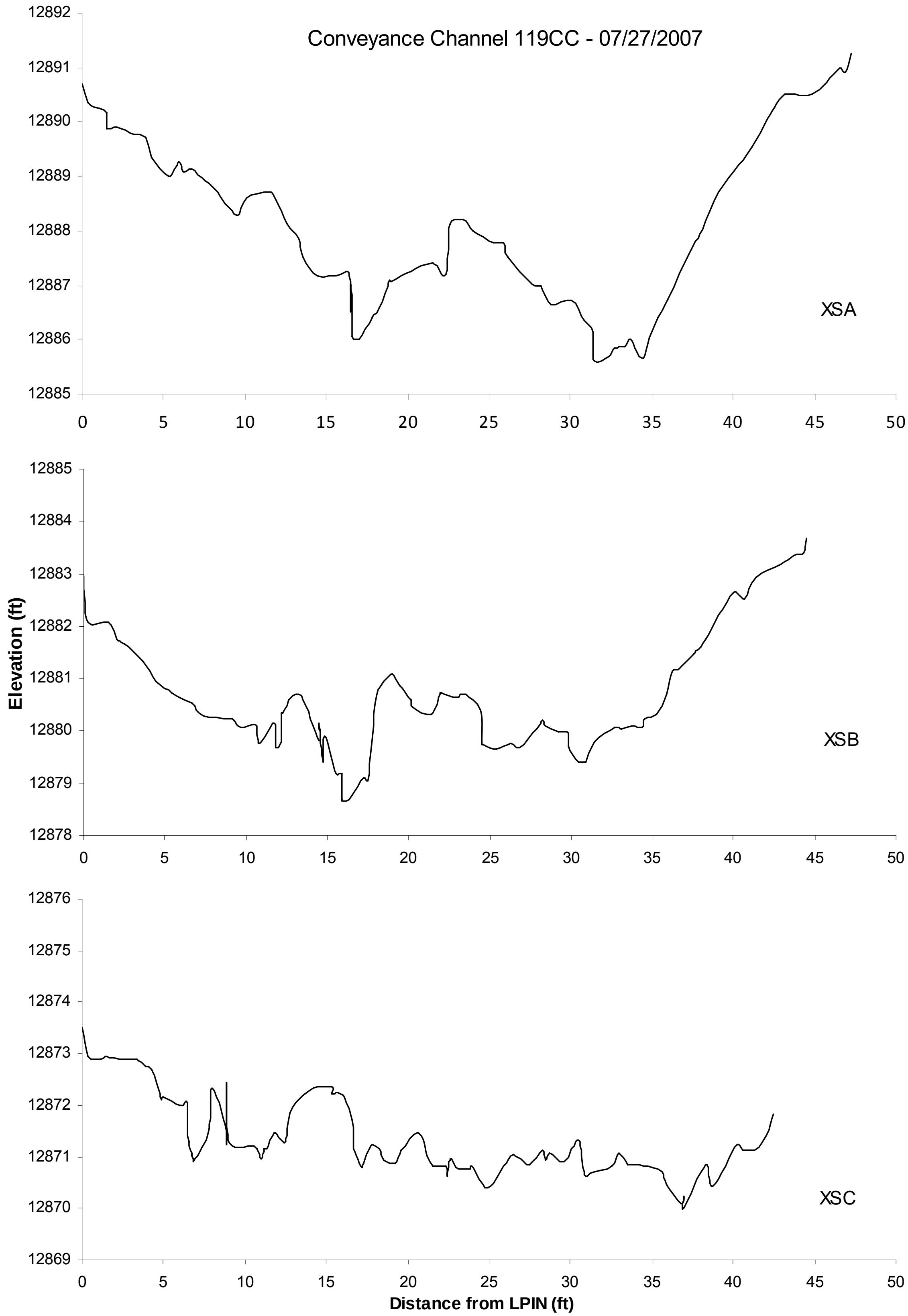

Conveyance Channel 099CC - 07/25/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12195
12194
12193
12192
12191
12190
12189
12188
12187
12186
12185
12183
12182
12181
12180
12179
12178
12177
12176
12175
12174
12173
12172
12171
12170
12169
12168
12167
12166
12165
12164
12163
12162
0
10
20
30
40
50
60
70
80
90

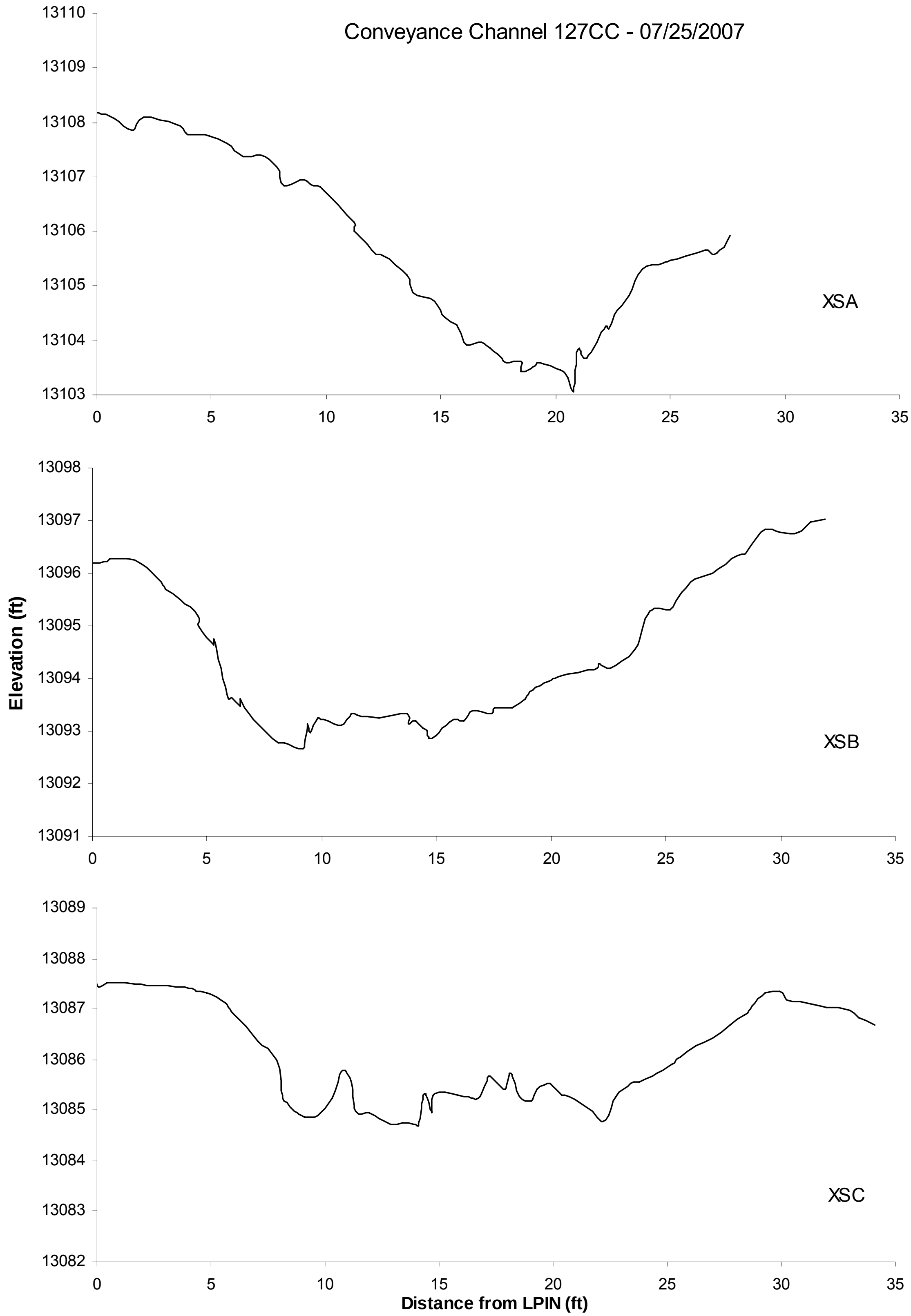

Conveyance Channel 104CC - 07/11/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13088
13087
13086
13085
13084
13083
13082
13081
13080
13079
13078
13077
13076
13075
13074
13073
13072
13071
13070
13069
0
10
20
30
40
50
60


Conveyance Channel 108CC - 07/26/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
12798
12797
12796
12795
12794
12793
12792
12791
12790
12785
12784
12783
12782
12781
12780
12779
12778
12777
12772
12771
12770
12769
12768
12767
12766
12765
12764
0
5
10
15
20
25
30
35
40
45

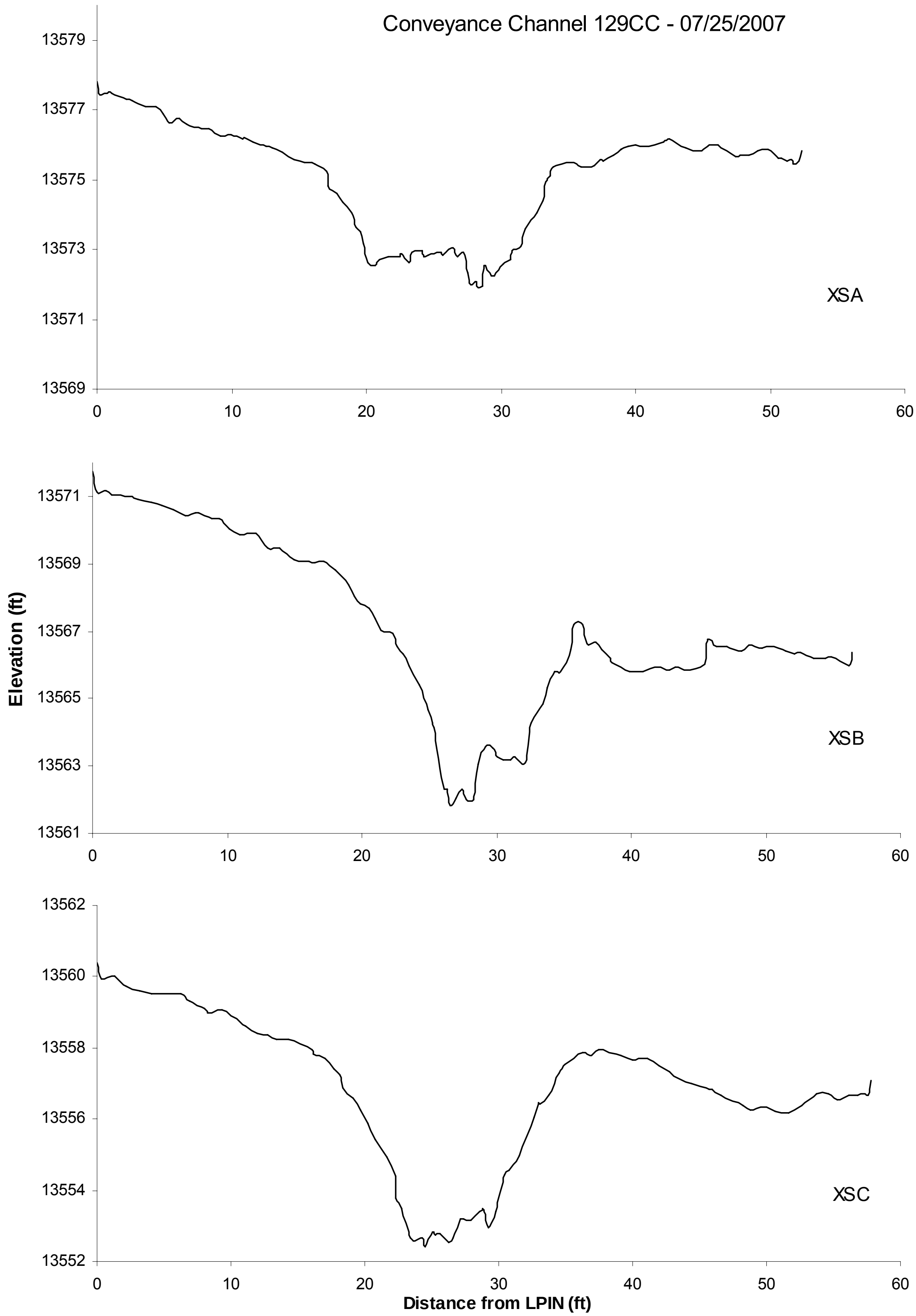

Conveyance Channel 111CC - 07/31/2007
12889
12888
12887
12886
12885
12884
12883
12882
12881
12880
12879
0 5 10 15 20 25 30 35 40 45 50 55
XSA
12876
12875
12874
12873
12872
12871
12870
12869
12868
12867
12866
0 5 10 15 20 25 30 35 40 45 50 55
XSB
12870
12869
12868
12867
12866
12865
12864
12863
12862
12861
12860
0 5 10 15 20 25 30 35 40 45 50 55
XSC
Elevation (ft)
Distance from LPIN (ft)

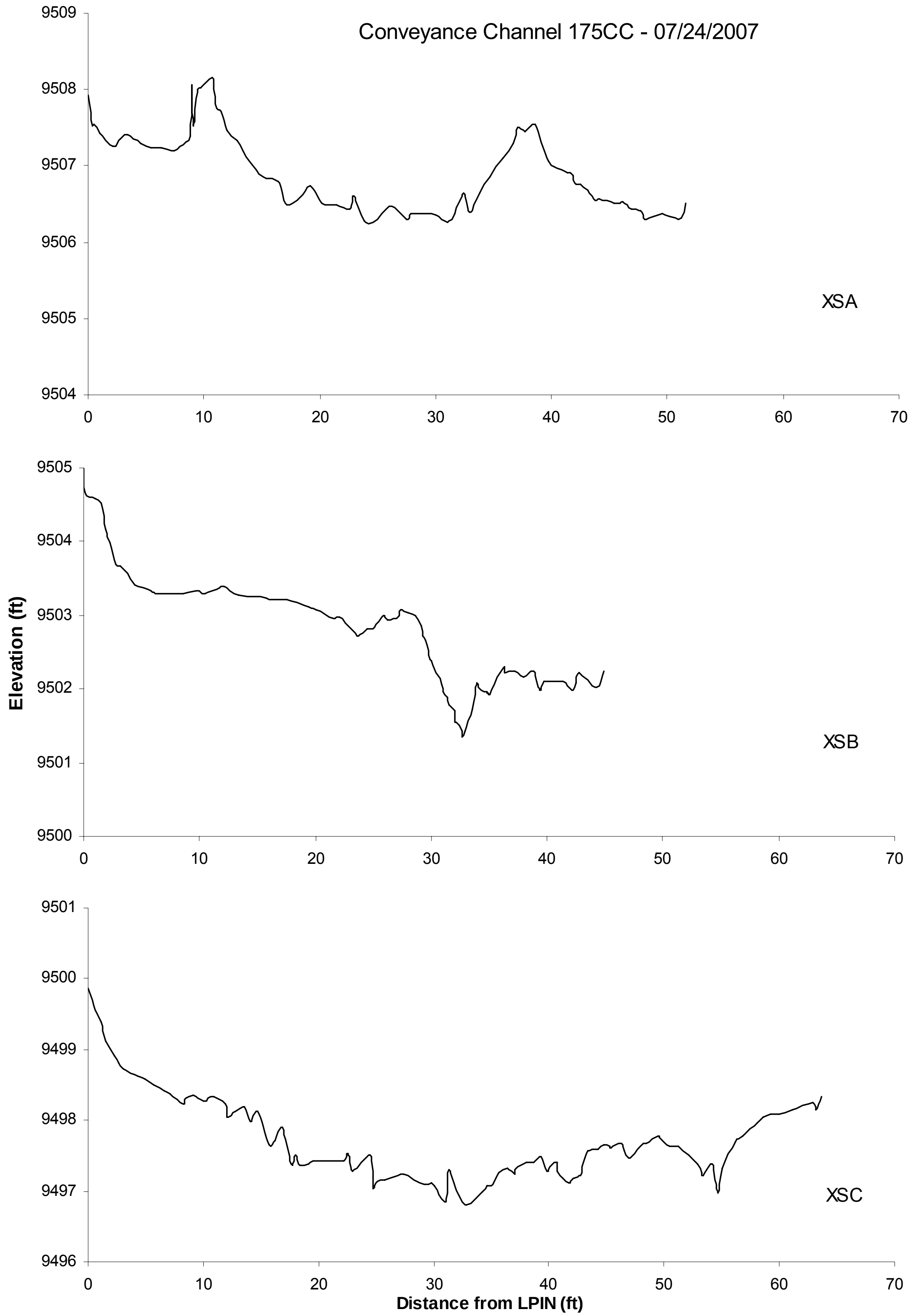

Conveyance Channel 114CC - 07/31/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12552
12551
12550
12549
12548
12547
12546
12545
12544
12538
12537
12536
12535
12534
12533
12532
12531
12530
12528
12527
12526
12525
12524
12523
12522
12521
12520
0
5
10
15
20
25
30
35
40
45
50
55

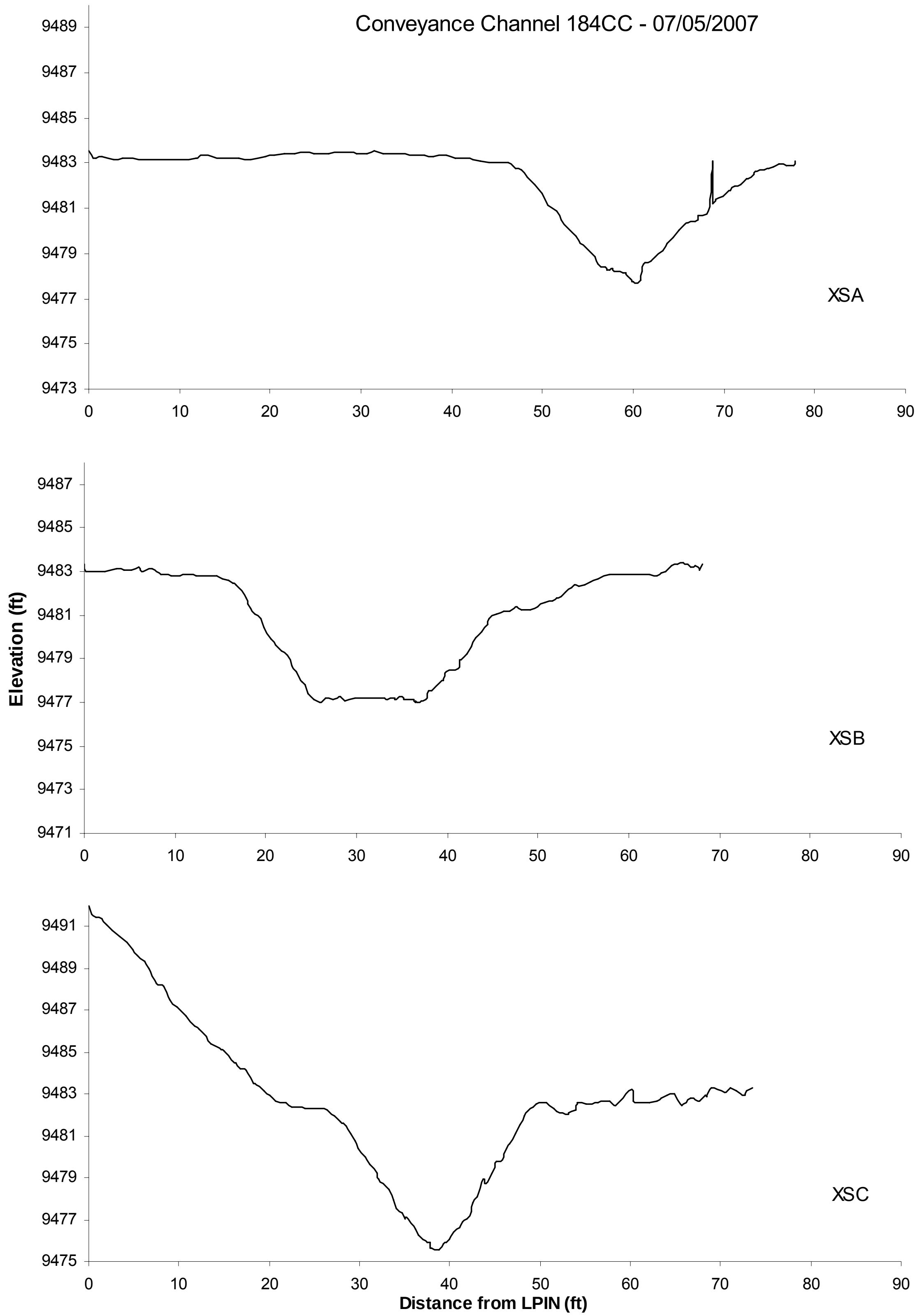

Conveyance Channel 119CC - 07/27/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12892
12891
12890
12889
12888
12887
12886
12885
12884
12883
12882
12881
12880
12879
12878
12876
12875
12874
12873
12872
12871
12870
12869
0
5
10
15
20
25
30
35
40
45
50

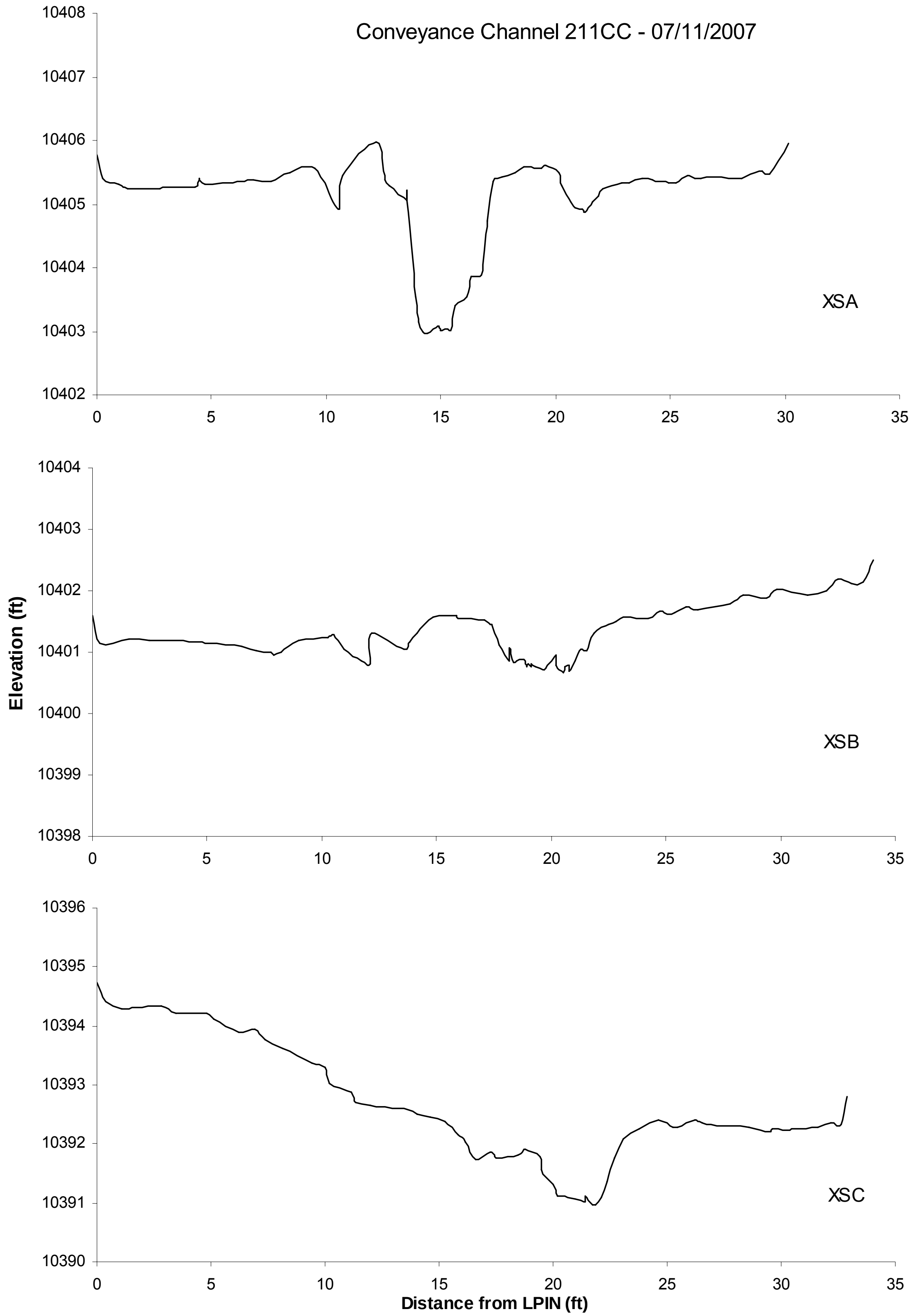


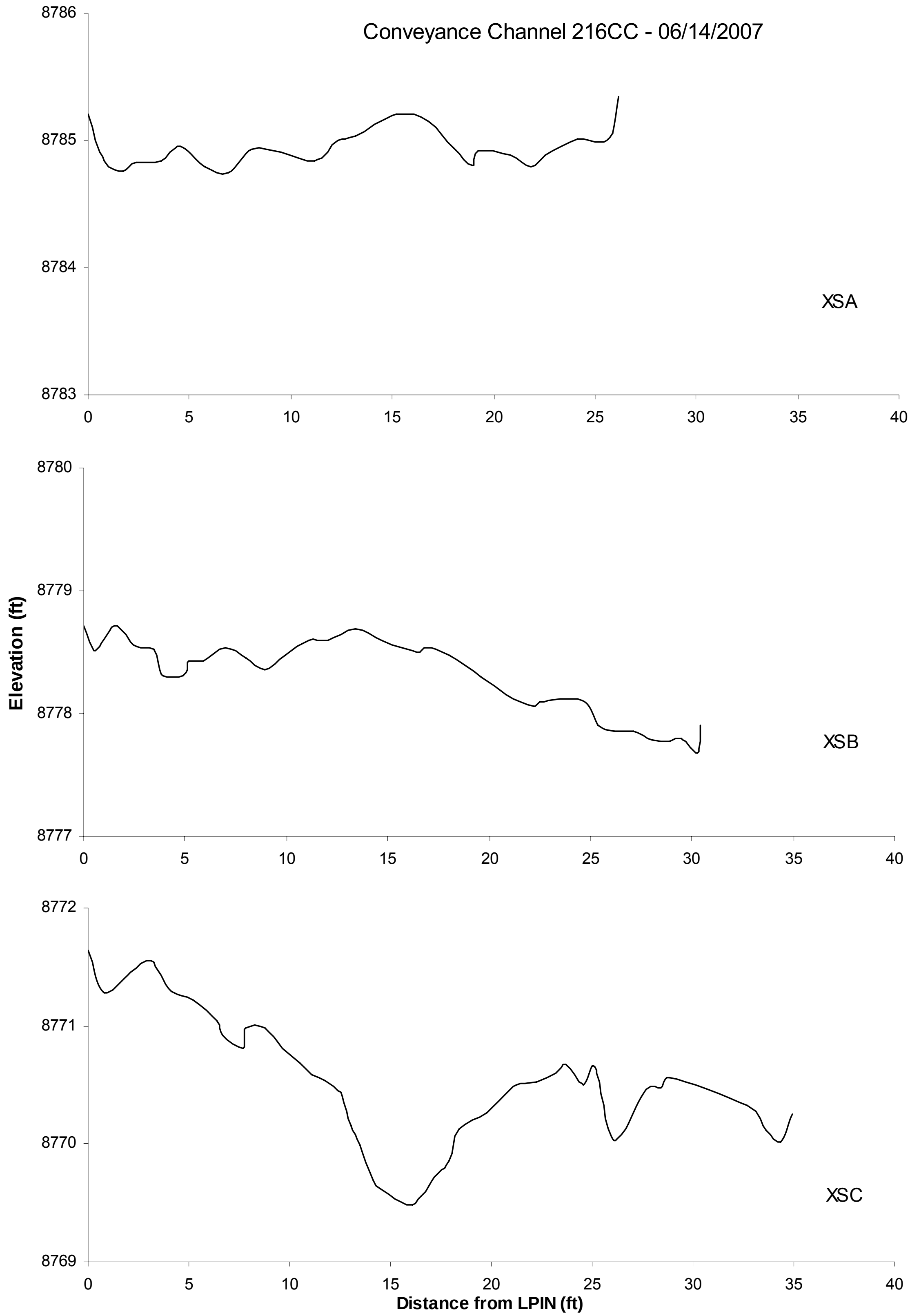
Conveyance Channel 127CC - 07/25/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13110
13109
13108
13107
13106
13105
13104
13103
13098
13097
13096
13095
13094
13093
13092
13091
13089
13088
13087
13086
13085
13084
13083
13082
0
5
10
15
20
25
30
35


Conveyance Channel 129CC - 07/25/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13579
13577
13575
13573
13571
13569
13567
13565
13563
13561
13562
13560
13558
13556
13554
13552
0
10
20
30
40
50
60

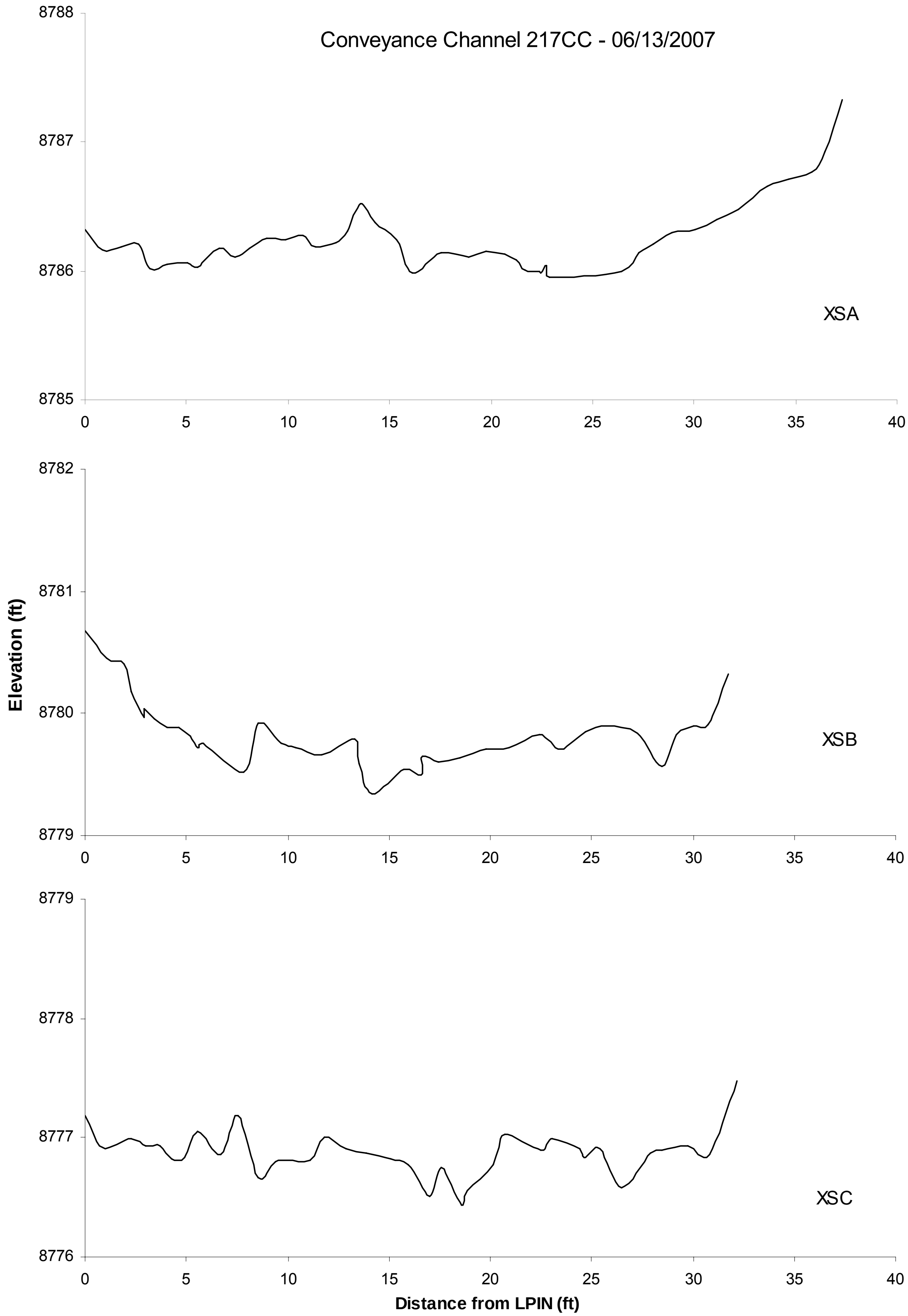

Conveyance Channel 175CC - 07/24/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9509
9508
9507
9506
9505
9504
9503
9502
9501
9500
9499
9498
9497
9496
0
10
20
30
40
50
60
70


Conveyance Channel 184CC - 07/05/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9489
9487
9485
9483
9481
9479
9477
9475
9473
9471
9491
0
10
20
30
40
50
60
70
80
90

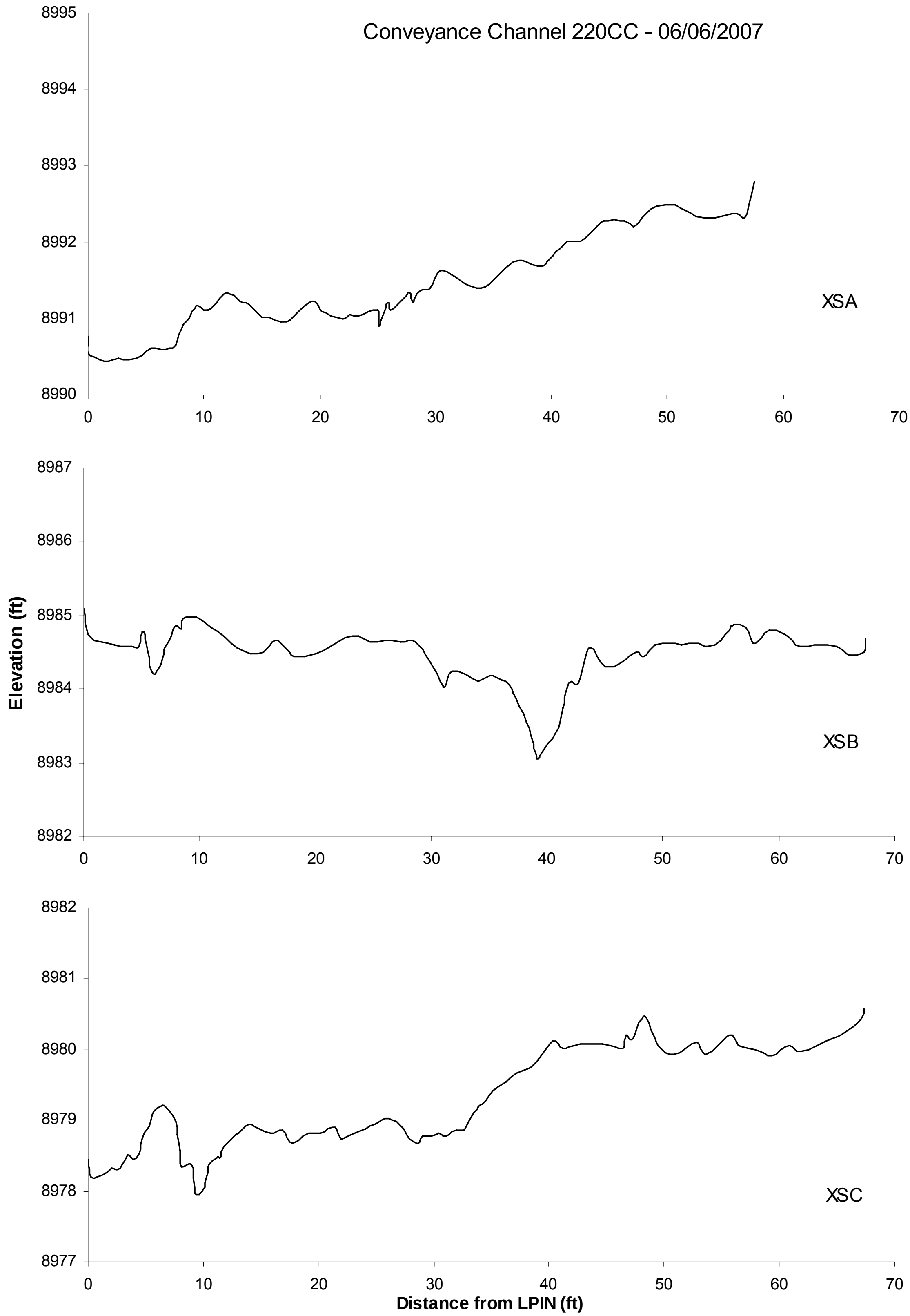

Conveyance Channel 211CC - 07/11/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
10408
10407
10406
10405
10404
10403
10402
10404
10403
10402
10401
10400
10399
10398
10396
10395
10394
10393
10392
10391
10390
0
5
10
15
20
25
30
35



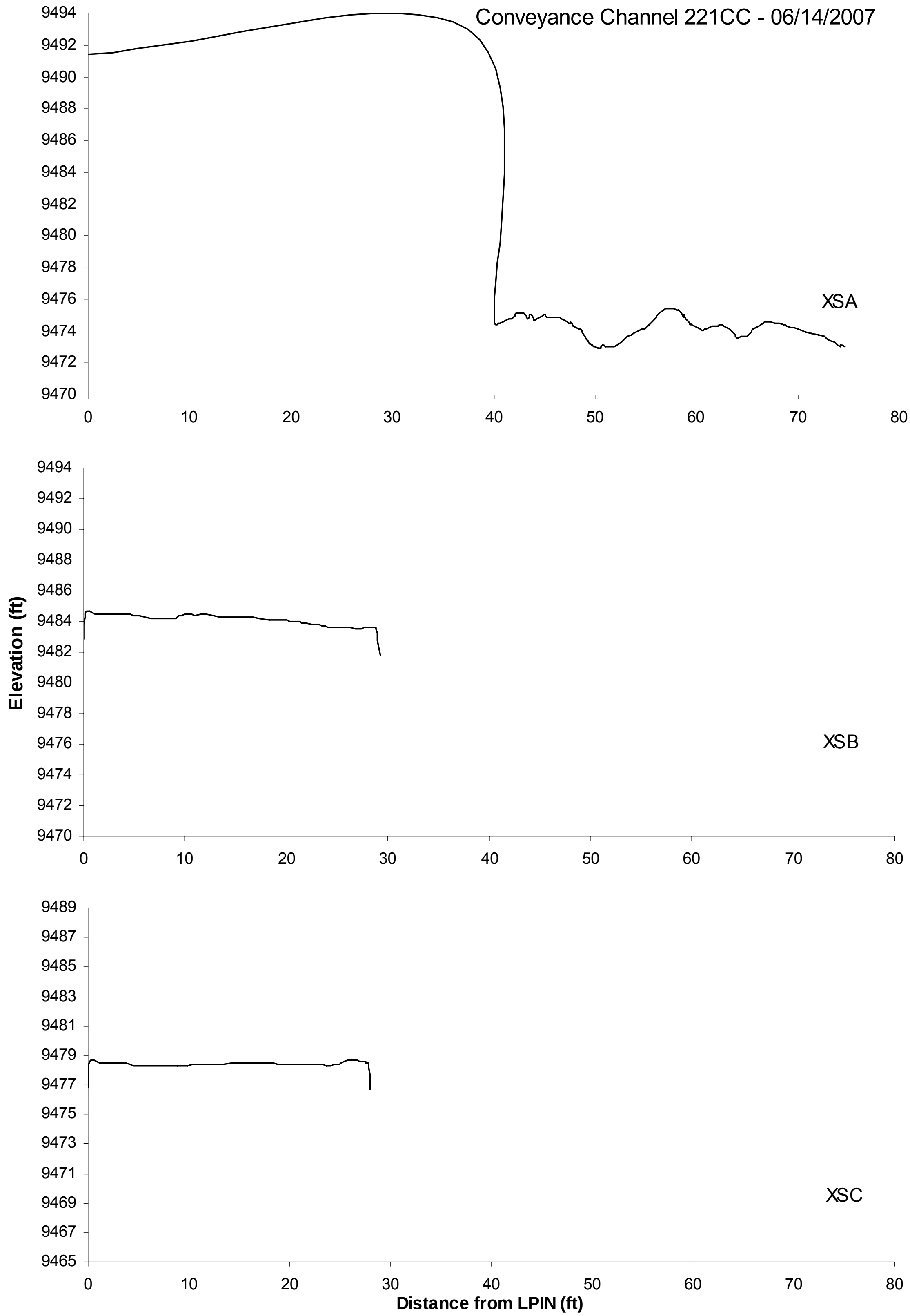
Conveyance Channel 216CC - 06/14/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
8786
8785
8784
8783
8780
8779
8778
8777
8772
8771
8770
8769
0
5
10
15
20
25
30
35
40



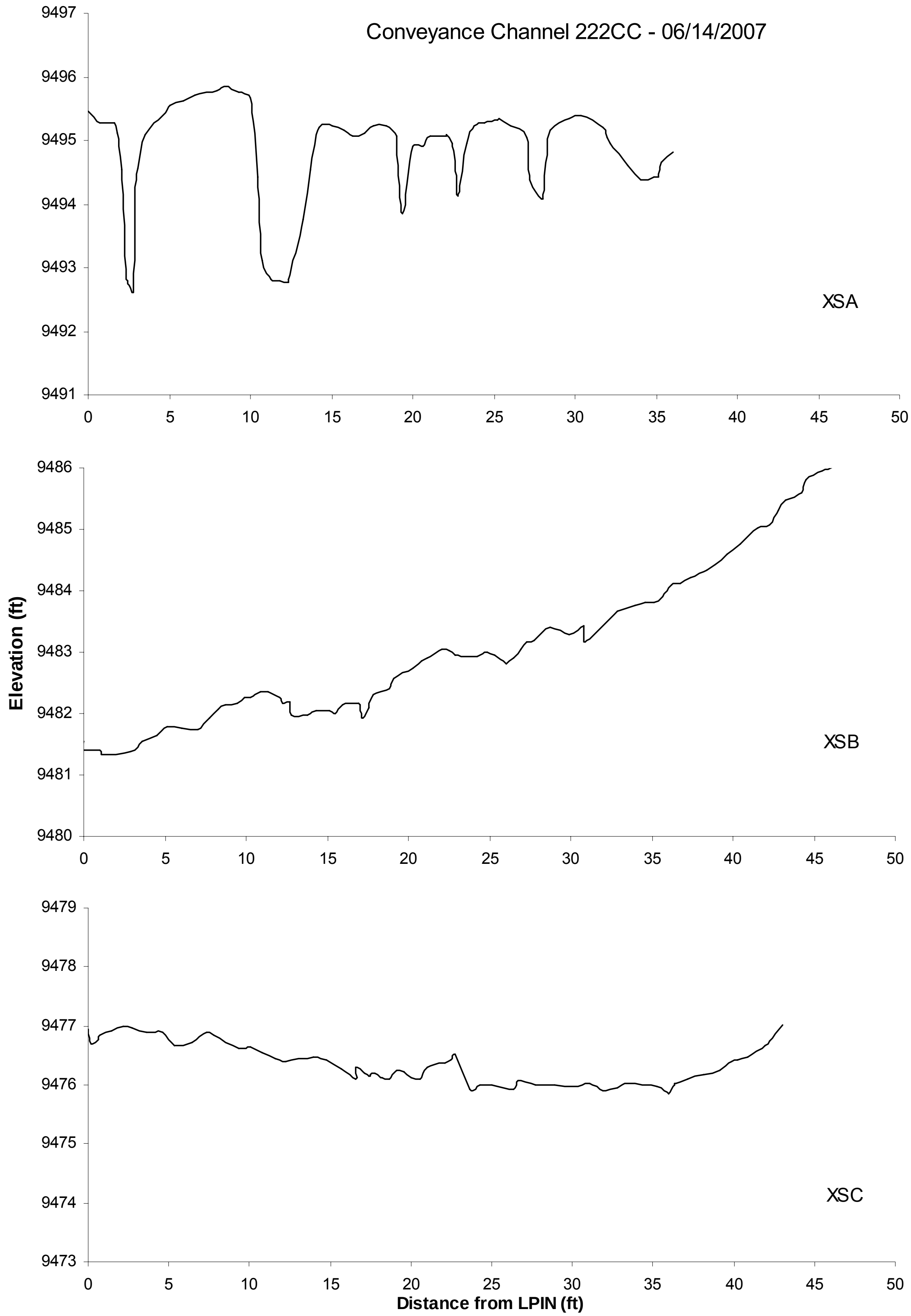
Conveyance Channel 217CC - 06/13/2007
8788
8787
8786
8785
XSA
8782
8781
8780
8779
XSB
8779
8778
8777
8776
XSC
0
5
10
15
20
25
30
35
40
Elevation (ft)
Distance from LPIN (ft)



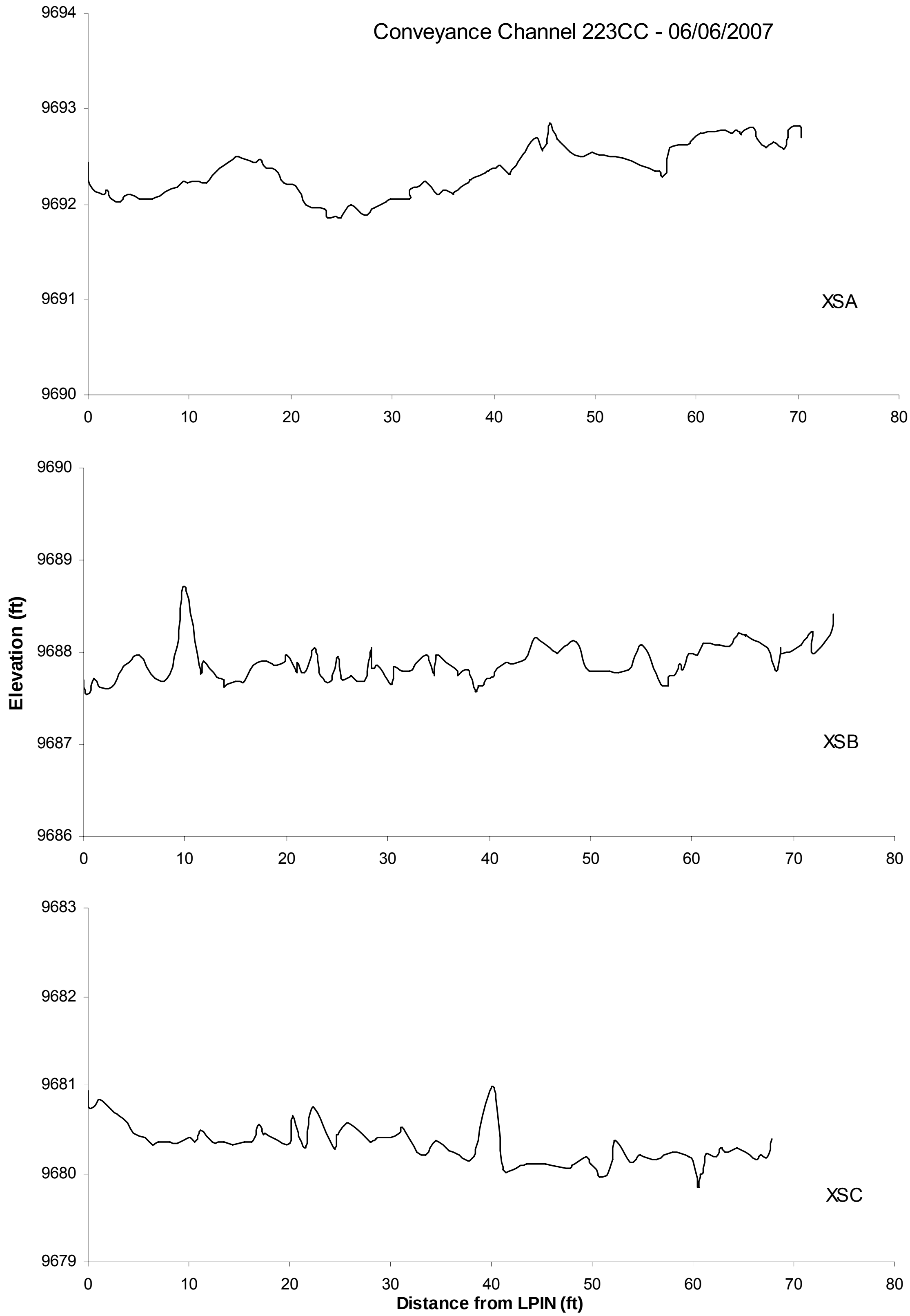
Conveyance Channel 220CC - 06/06/2007
8995
8994
8993
8992
8991
8990
0
10
20
30
40
50
60
70
XSA
8987
8986
8985
8984
8983
8982
XSB
Elevation (ft)
8982
8981
8980
8979
8978
8977
XSC
Distance from LPIN (ft)

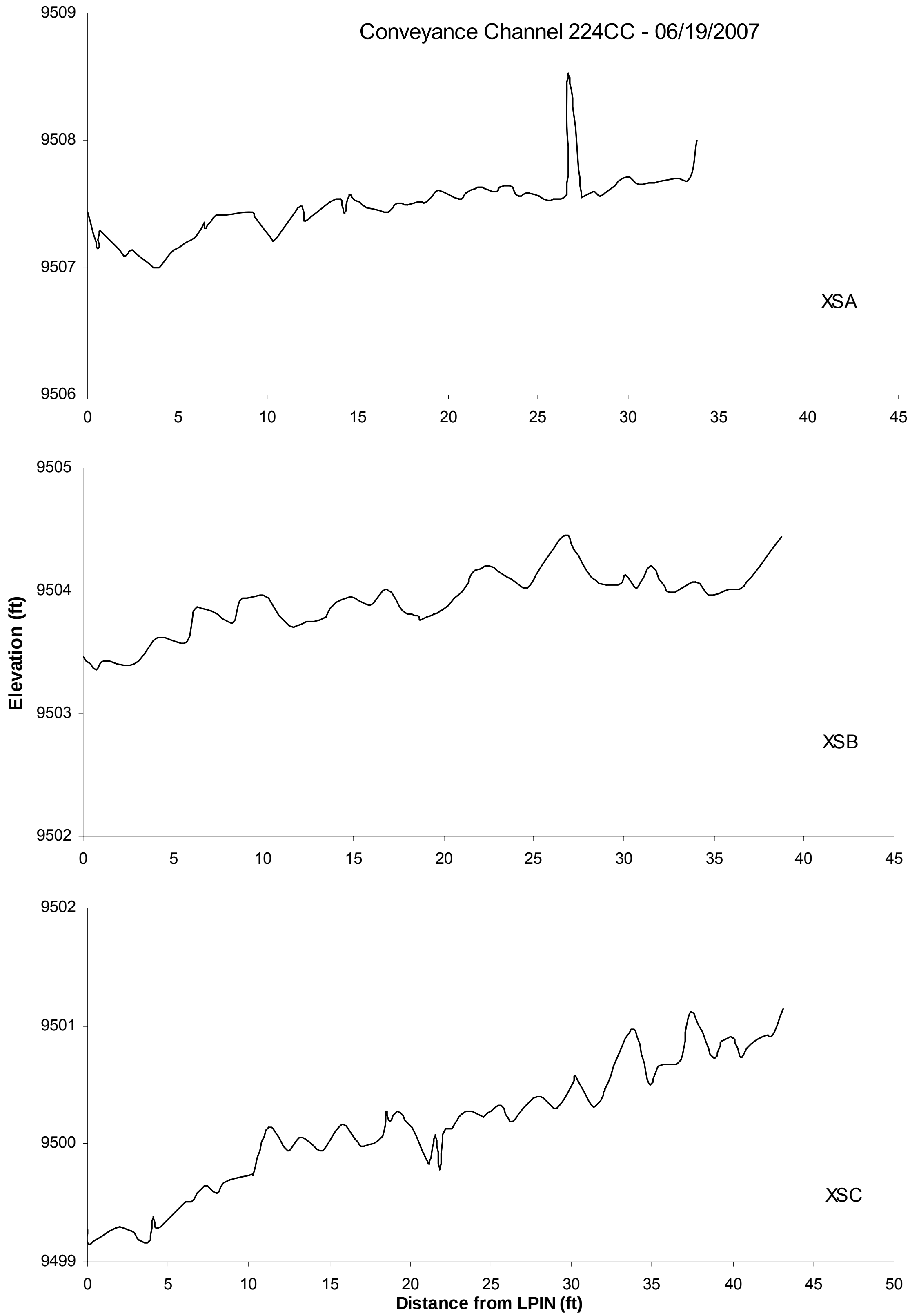


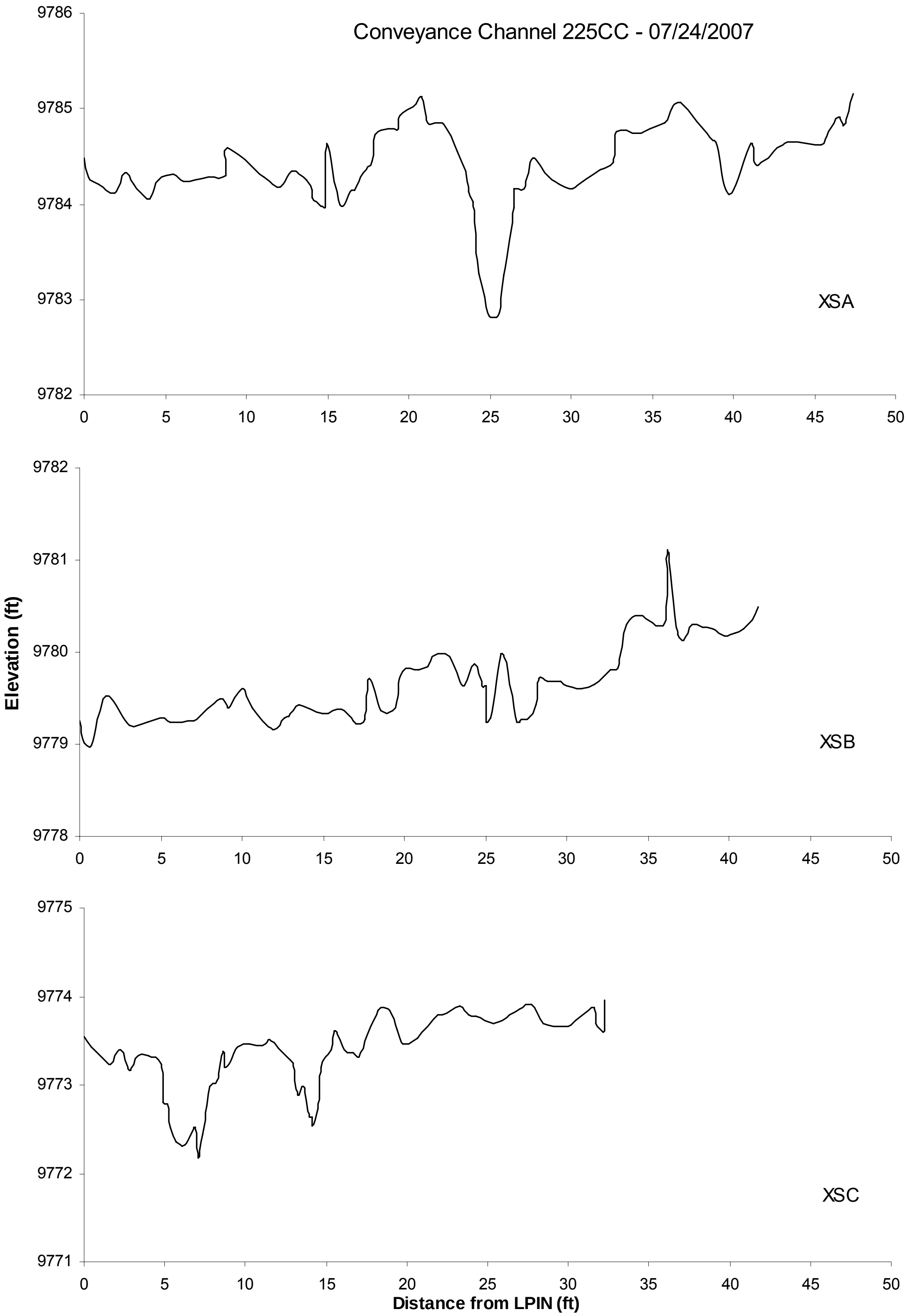
Conveyance Channel 221CC - 06/14/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9494
9492
9490
9488
9486
9484
9482
9480
9478
9476
9474
9472
9470
9489
9487
9485
9483
9481
9479
9477
9475
9473
9471
9469
9467
9465
0
10
20
30
40
50
60
70
80

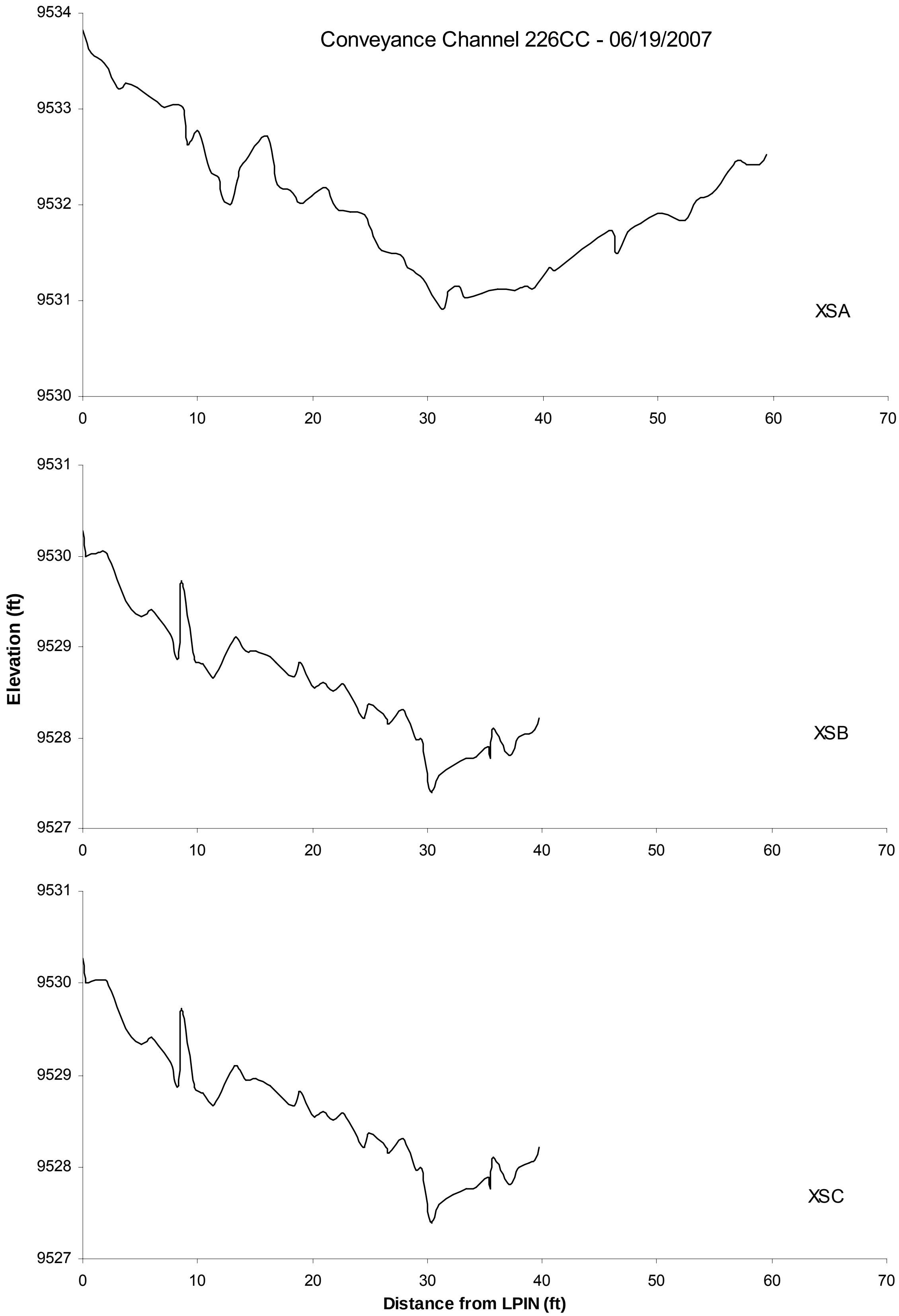


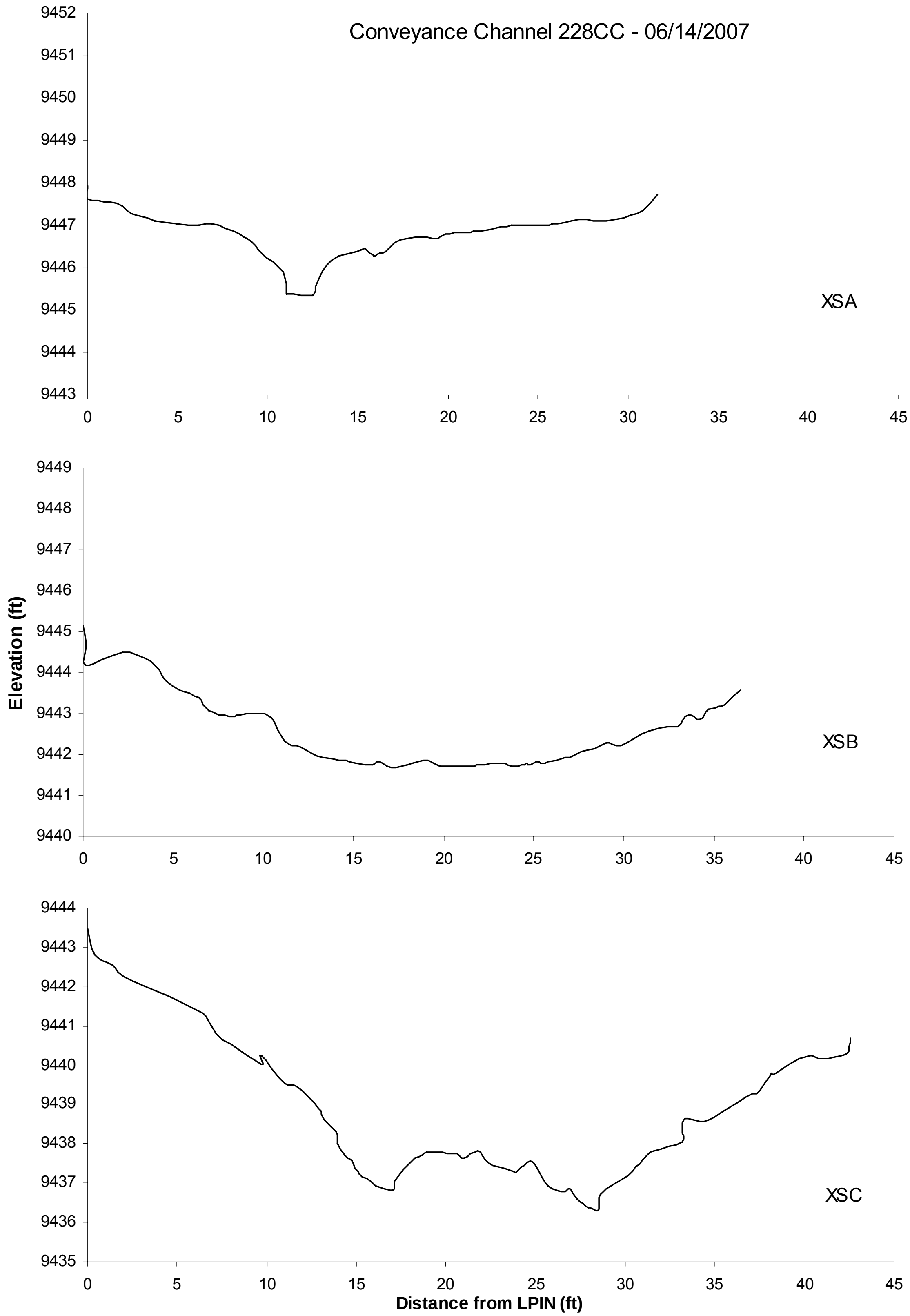
Conveyance Channel 222CC - 06/14/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9497
9496
9495
9494
9493
9492
9491
9486
9485
9484
9483
9482
9481
9480
9479
9478
9477
9476
9475
9474
9473
0
5
10
15
20
25
30
35
40
45
50

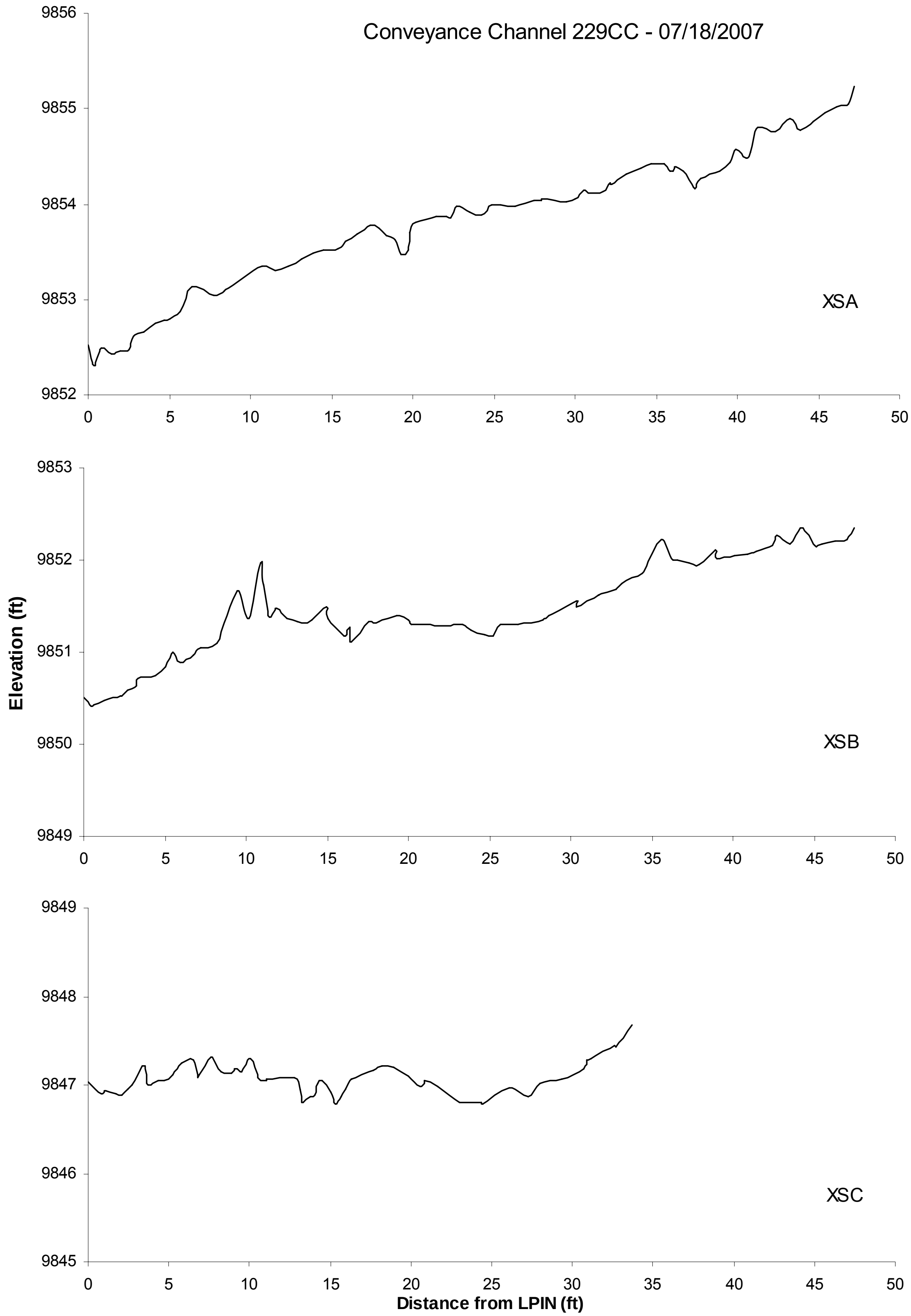

Conveyance Channel 223CC - 06/06/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9694
9693
9692
9691
9690
9689
9688
9687
9686
9683
9682
9681
9680
9679
0
10
20
30
40
50
60
70
80


Conveyance Channel 224CC - 06/19/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9509
9508
9507
9506
9505
9504
9503
9502
9501
9500
9499
0
5
10
15
20
25
30
35
40
45
50

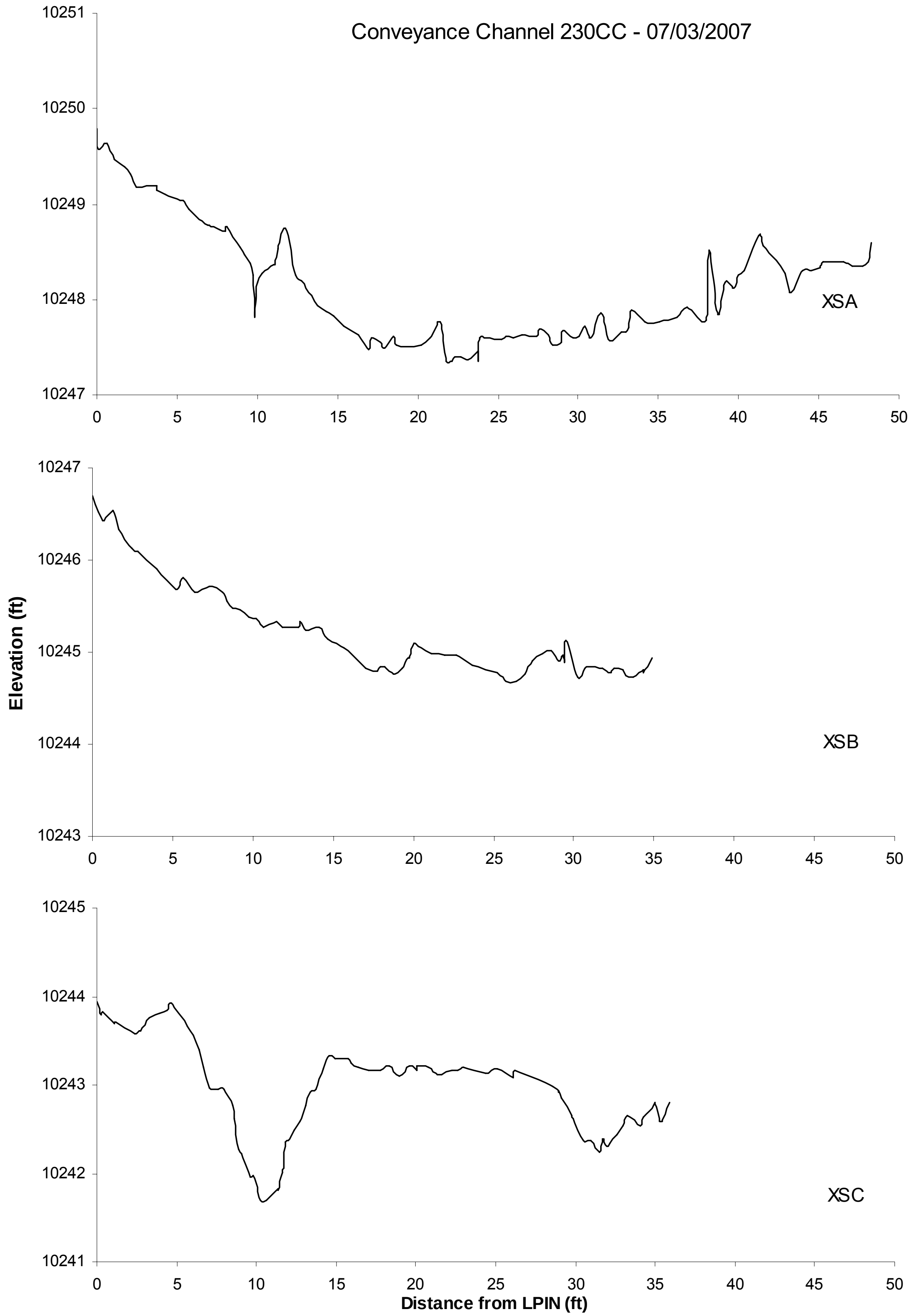

Conveyance Channel 225CC - 07/24/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9786
9785
9784
9783
9782
9782
9781
9780
9779
9778
9775
9774
9773
9772
9771
0
5
10
15
20
25
30
35
40
45
50

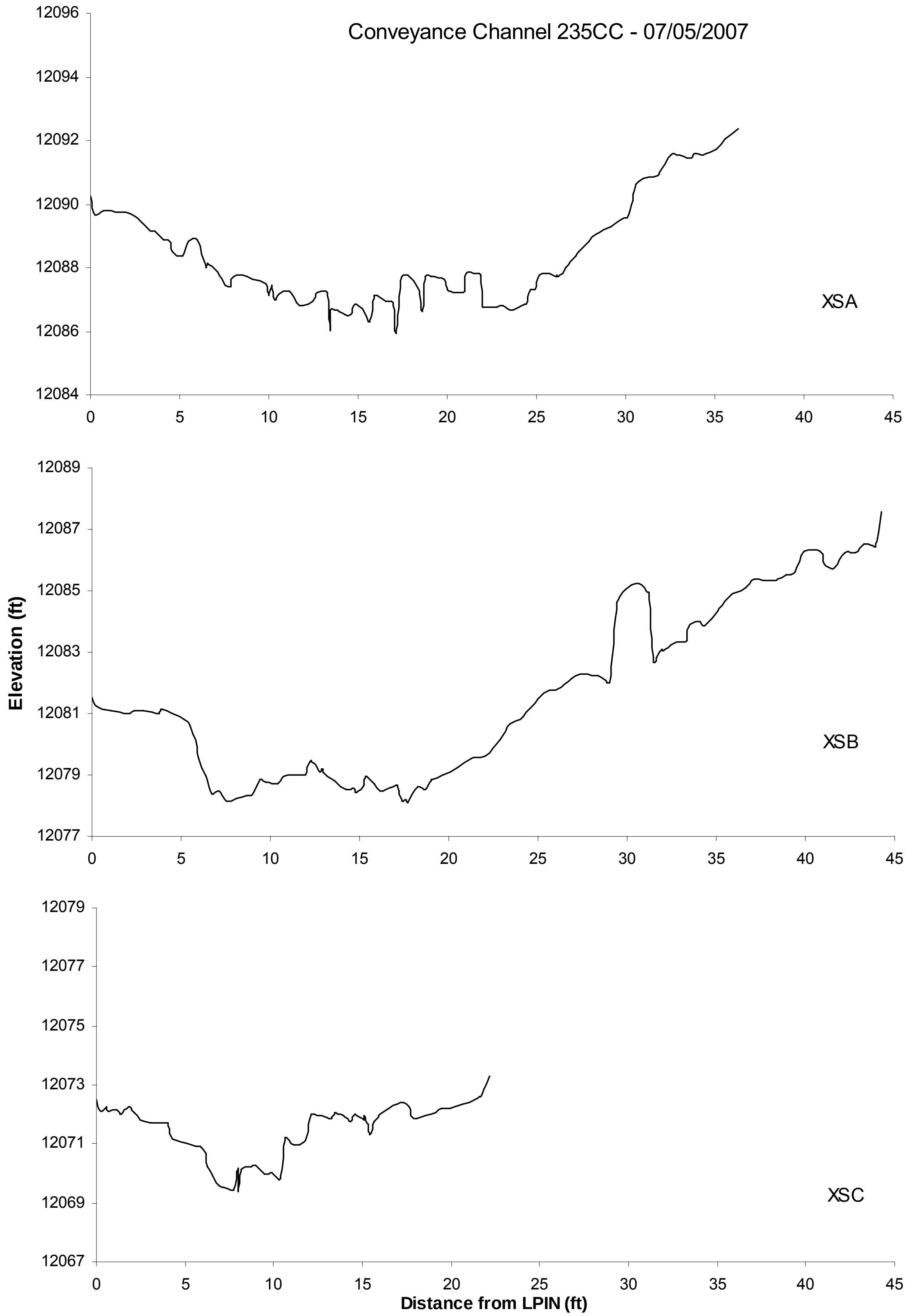

Conveyance Channel 226CC - 06/19/2007
9534
9533
9532
9531
9530
0
10
20
30
40
50
60
70
XSA
9531
9530
9529
9528
9527
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)


Conveyance Channel 228CC - 06/14/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9452
9451
9450
9449
9448
9447
9446
9445
9444
9443
9442
9441
9440
9439
9438
9437
9436
9435
0
5
10
15
20
25
30
35
40
45



Conveyance Channel 229CC - 07/18/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9856
9855
9854
9853
9852
9851
9850
9849
9848
9847
9846
9845
0
5
10
15
20
25
30
35
40
45
50


Conveyance Channel 230CC - 07/03/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10251
10250
10249
10248
10247
10246
10245
10244
10243
10242
10241
0
5
10
15
20
25
30
35
40
45
50


Conveyance Channel 235CC - 07/05/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12096
12094
12092
12090
12088
12086
12084
12089
12087
12085
12083
12081
12079
12077
12079
12077
12075
12073
12071
12069
12067
0
5
10
15
20
25
30
35
40
45

Appendix G

Rock Weir and Sediment Pond

Site Visits and Survey Dates,
Sediment Accumulation,
and
Sediment Pond Cross Section Graphs

2007

Site Visits and Survey Dates of Rock Weir (Sediment Trap) Silt Fences on Pike's Peak 2007

Site ID	Date - 2007						
002RW	6/13	8/1	8/28				
003RW	6/13	8/28					
006RW	6/5	8/1					
008RW	6/14	8/23					
009RA	6/6	8/1	8/23				
152RW	6/26	8/30					
153RW	6/14	8/30					
161RW	6/14	8/30					
162RW	6/19	7/12	8/30				
176RW	7/4	7/12	8/1	8/28			
178RW	7/3	8/6	8/23				
179RW	7/3	8/6	8/23				
180RW	7/3	8/6	8/23				
181RW	7/3	8/6	8/28				
199RW	7/6	7/12	9/26	10/05			
200RW	6/13	8/1	8/31				
201RW	6/19	8/1	8/17	9/6			
202RW	6/19	8/30					
233RW	7/5	7/12	8/6	8/8	8/29	8/30	9/18
234RW	7/5	7/12	8/6	8/8	9/19		
236RW	7/12	7/31	8/6	8/7	8/8		
237RW	7/5	8/6	8/8	9/26	10/5		
238RW	7/25	8/6	8/7	8/8			
239RW	7/26	8/6	8/8				
240RW	7/27	8/6	9/14				
241RW	7/27	8/8	9/18	9/26	10/9		
242RW	7/27	8/6	9/14	9/18	9/19		
243RW	7/27	8/6	8/8	8/28	9/18		

Sediment Accumulation in Rock Weir (Sediment Trap) Silt Fences on Pike's Peak 2007

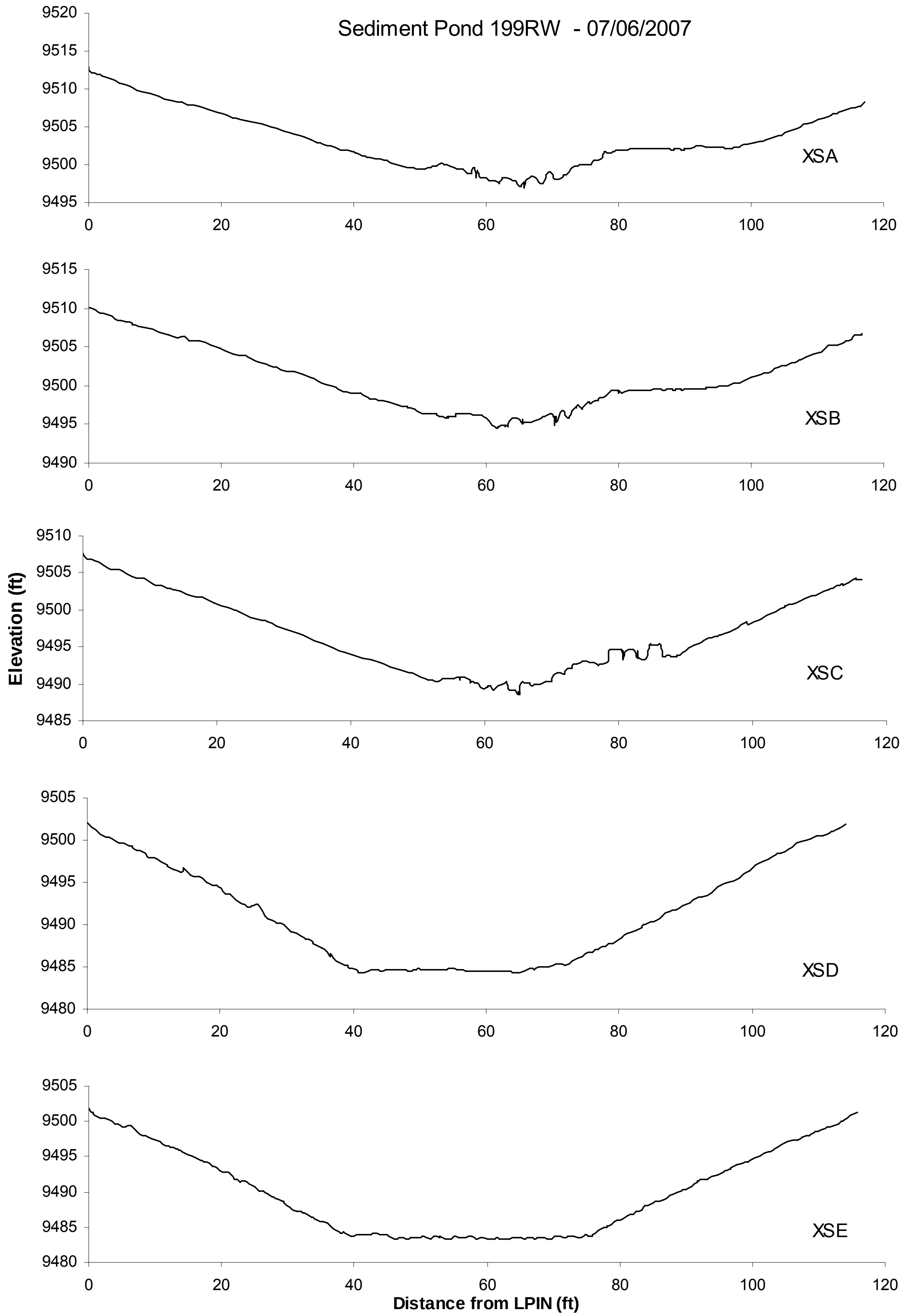
Site ID	Location	Date	Volume (ft^3)	Grab Sample
002RW	Silt Fence	061307	0.07	Yes
003RW	Silt Fence	082807	0.03	Yes
008RW	Silt Fence	061407	0.07	Yes
009RA	Silt Fence	060607	0.03	Yes
009RA	Silt Fence	082307	0.40	Yes
152RW	Silt Fence	062607	0.10	Yes
161RW	Silt Fence	061407	0.13	Yes
162RW	Silt Fence	061907	0.20‡	No
162RW	Silt Fence	083007	2.69‡	Yes
176RW	Silt Fence	070407	0.34‡	Yes
176RW	Silt Fence	082807	0.40	Yes
178RW	Silt Fence	070307	1.21‡	Yes
178RW	Silt Fence	082307	0.54	Yes
179RW	Silt Fence	070307	0.03‡	Yes
179RW	Silt Fence	082307	0.07	Yes
180RW	Silt Fence	070307	0.47‡	Yes
180RW	Silt Fence	082307	0.34	Yes
181RW	Silt Fence	070307	0.13‡	Yes
181RW	Silt Fence	082807	0.67	Yes
200RW	Silt Fence	061307	0.20	Yes
201RW	Silt Fence	061907	0.13	No
201RW	Silt Fence	090607	0.07‡	Yes
202RW	Silt Fence	061907	0.27	Yes
202RW	Silt Fence	083007	0.54	Yes

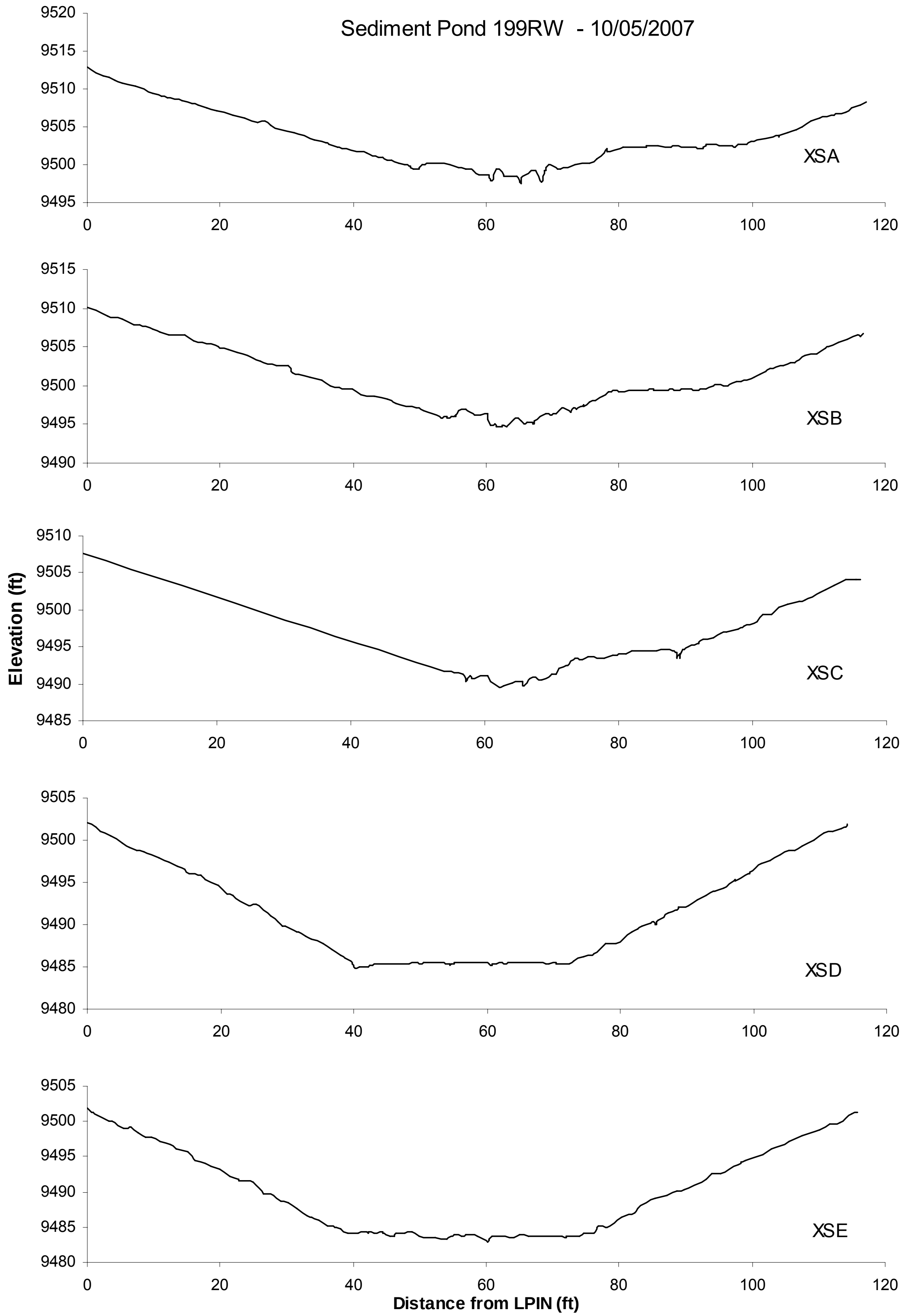
‡ Indicates possible data inaccuracy due to breached silt fence

Rock Weir Cut/Fill Sediment Accumulation Values Based on 2006 and 2007 Survey Data
Cut (negative values) and Fill Values in Cubic Feet on
Pike's Peak

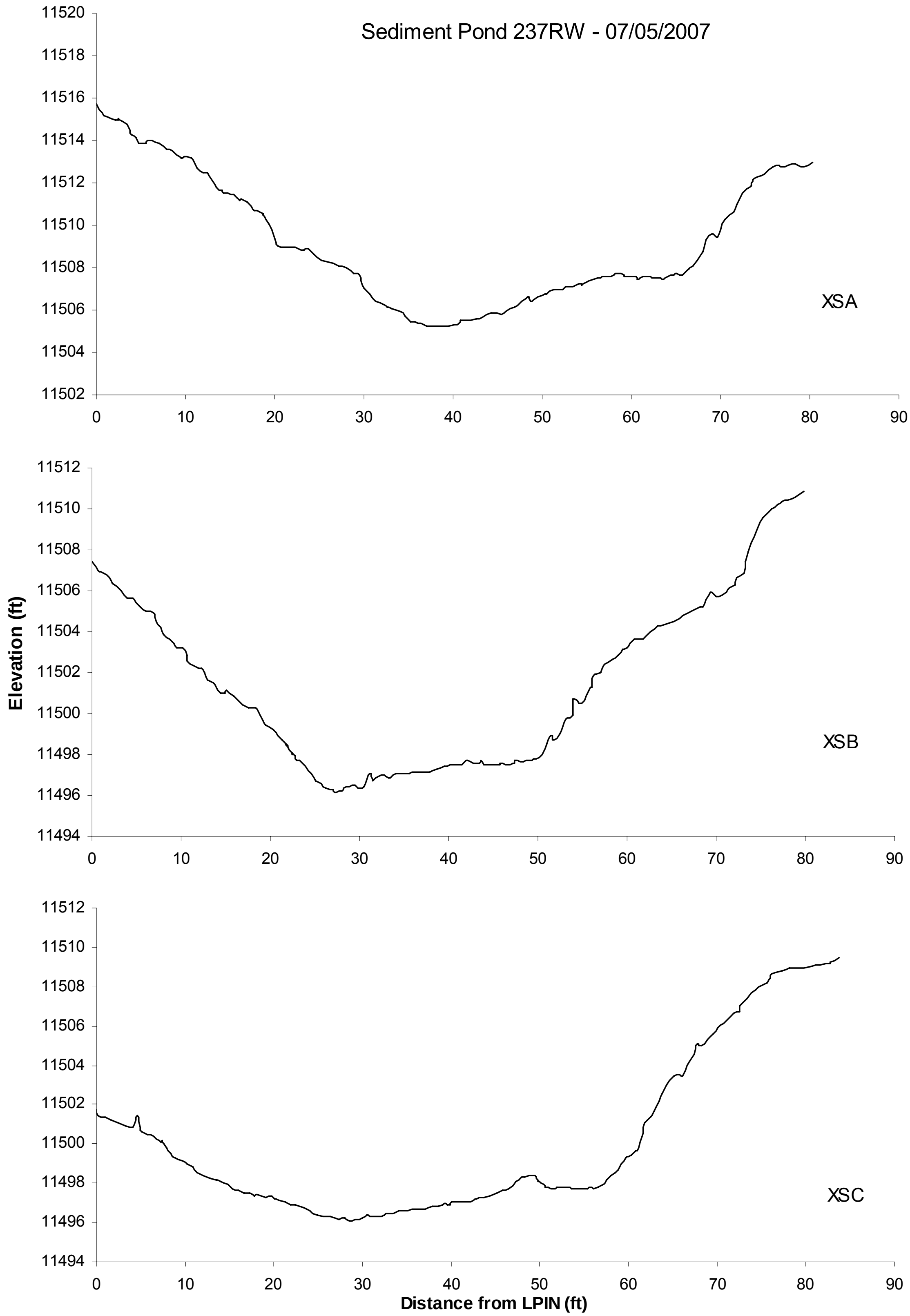
Site ID	Date#1		Date#2		Date#3		Date#4		Date#5		Date#6
	Date	Volume (ft^3)	Date	Volume (ft^3)	Date	Volume (ft^3)	Date	Volume (ft^3)	Date	Volume (ft^3)	Date
002RW	9/24/2005	-80.0	5/26/2006	-21.4	9/14/2006	4.4	6/13/2007	99.9	8/28/2007‡		
003RW	9/22/2005	-48.9	5/10/2006	6.1	9/01/2006	4.7	6/13/2007	34.4	8/28/2007‡		
006RW	9/22/2005	-57.1	5/02/2006	5.2	9/11/2006	2.1	6/05/2007	-11.2	8/01/2007		
008RW	9/22/2005	-64.8	5/06/2006	3.7	9/05/2006	-4.1	6/14/2007	-37.6	8/23/2207		
009RA	9/22/2005	-43.3	5/06/2006	-2.7	8/30/2006	-3.7	9/03/2006	0.3	6/06/2007	1.4	8/23/2007‡
152RW	9/27/2005	-11.6	5/10/2006	0.4	9/13/2006	6.6	6/26/2007	13.7	8/30/2007‡		
153RW	9/24/2005	-37.0	5/30/2006	-2.1	9/14/2006	10.1	6/14/2007	117.3	8/30/2007‡		
161RW	9/23/2005	-0.3	5/24/2006	-0.2	9/13/2006	-0.5	6/14/2007	2.2	8/30/2007‡		
162RW	9/19/2005	-16.0	5/10/2006	2.6	9/06/2006	3.9	6/19/2007	9.5	8/30/2007‡		
176RW	9/23/2005	-22.6	5/24/2006	2.0	9/05/2006	3.2	7/04/2007	2.0	8/28/2007		
178RW	9/23/2005	-33.1	5/24/2006	6.0	9/19/2006	6.7	7/03/2007	7.6	8/23/2007‡		
179RW	9/23/2005	8.2	5/24/2006	-1.3	9/11/2006	-23.5	7/03/2007	-29.1	8/23/2007		
180RW	9/22/2005	4.0	5/11/2006	62.9	9/06/2006	-29.3	7/03/2007	2.9	8/23/2007‡		
181RW	9/22/2005	19.7	5/11/2006	67.9	7/03/2007	-1.5	8/28/2007‡				
199RW*	9/28/2005		5/31/2006		9/27/2006		7/06/2007		10/05/2007		
200RW	9/20/2005	-37.3	5/04/2006	13.8	9/03/2006	12.8	6/13/2007	3.8	8/31/2007		
201RW	9/23/2005	-2.1	5/23/2006	1.4	9/13/2006	1.6	6/19/2007	3.8	9/06/2007‡		
202RW	9/20/2005	6.1	5/24/2006	5.3	9/11/2006	4.1	6/19/2007	15.4	8/30/2007‡		
233RW	8/31/2005	6.0	5/26/2006	22.4	7/05/2007	0.1	8/29/2007‡				
234RW	9/01/2005	31.7	5/31/2006	122.7	7/05/2007	-35.0	9/19/2007‡				
236RW	9/01/2005	30.1	5/31/2006	382.8	7/31/2007‡						
237RW*	9/27/2005		5/31/2006		7/05/2007		10/05/2007				
240RW	7/27/2007	-43.0	9/14/2007‡								

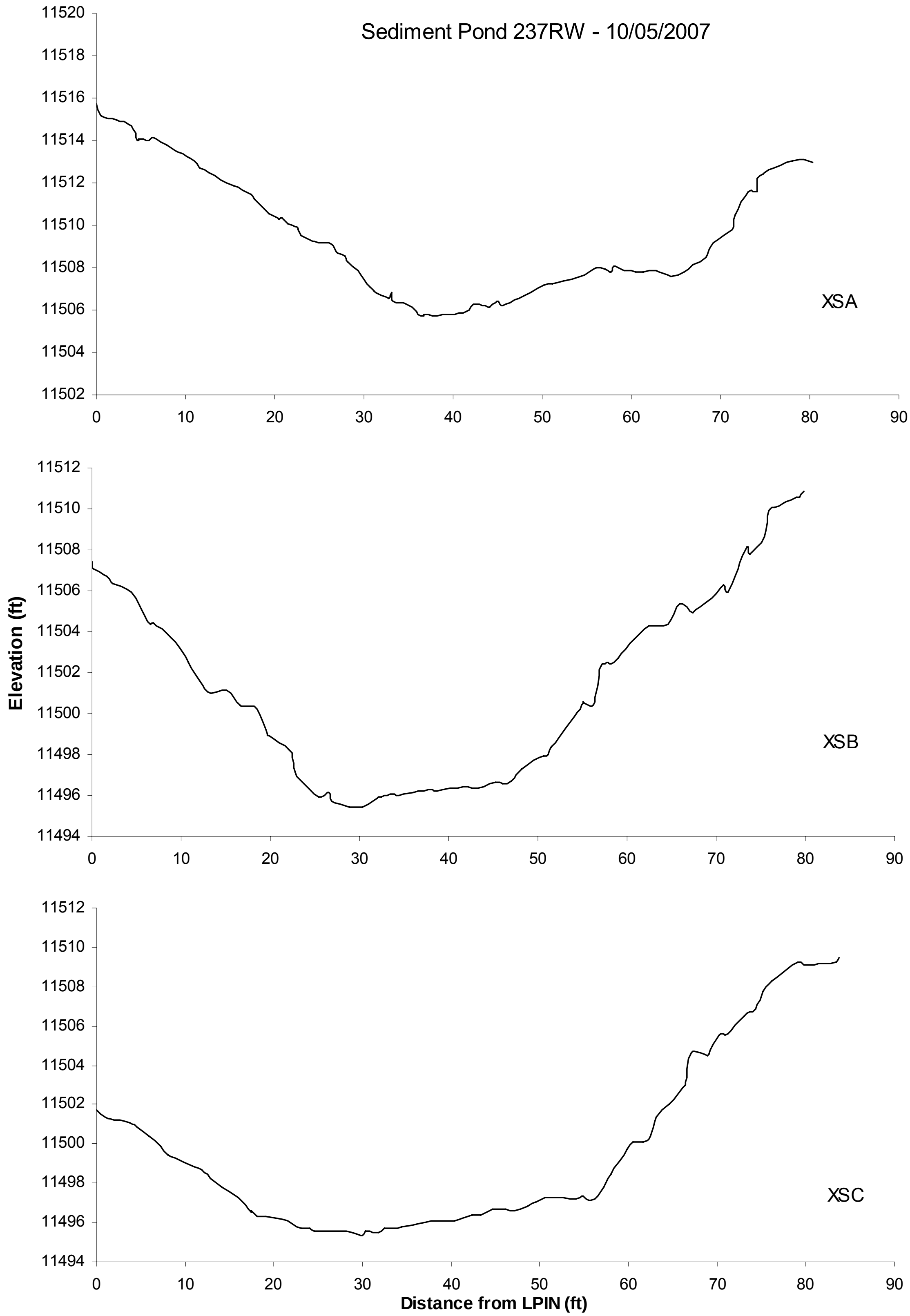
* Sediment Pond - Cross Sections Only - No Fill Calculated
‡ Indicates a date when water was flowing under or over the rock weir, or the rock weir was breached


Sediment Pond 199RW - 07/06/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9520
9515
9510
9505
9500
9495
9490
9485
9480
0
20
40
60
80
100
120



Sediment Pond 199RW - 10/05/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Sediment Pond 237RW - 07/05/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
11520
11518
11516
11514
11512
11510
11508
11506
11504
11502
11512
11510
11508
11506
11504
11502
11500
11498
11496
11494
0
10
20
30
40
50
60
70
80
90

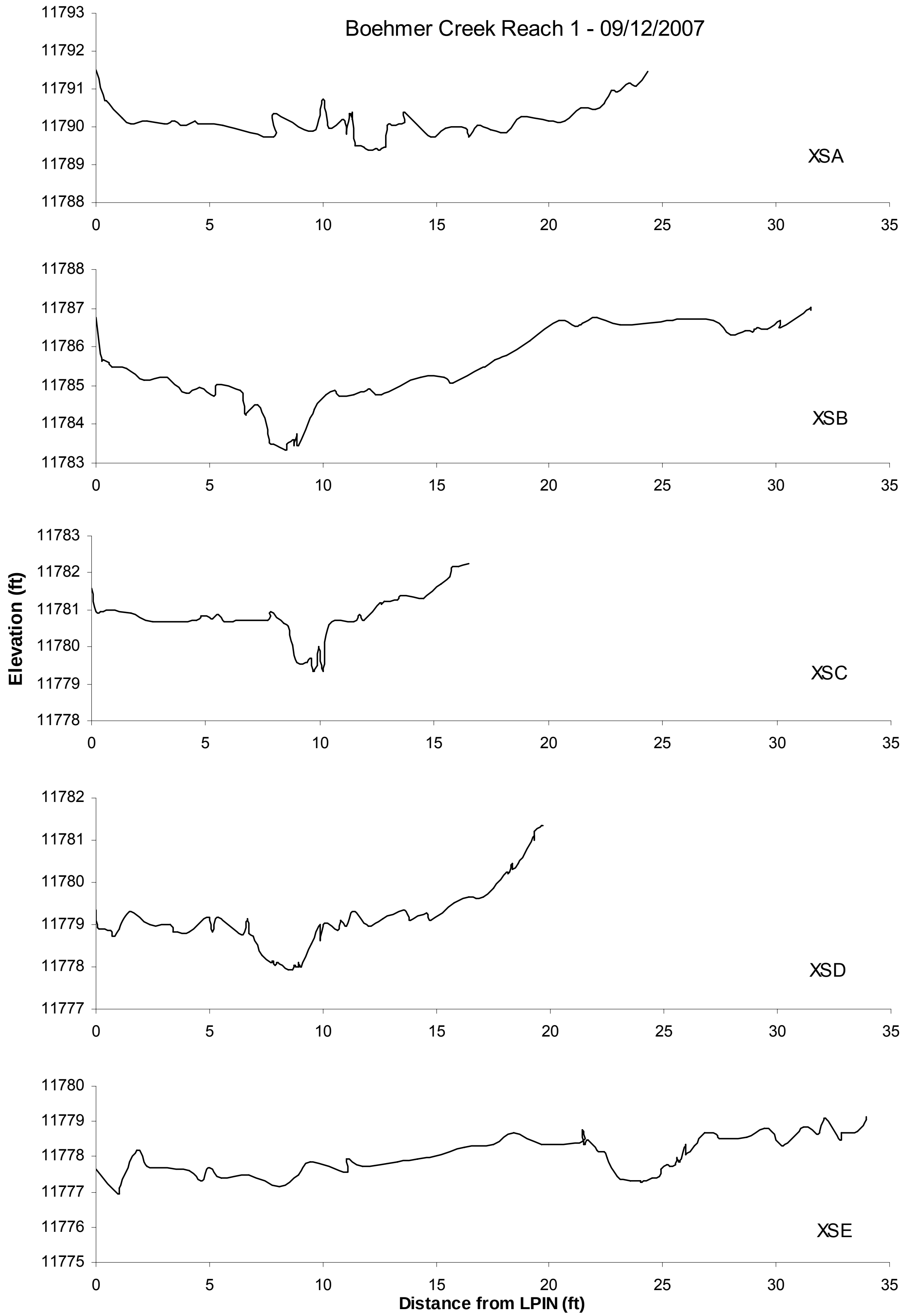


Sediment Pond 237RW - 10/05/2007
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
11520
11518
11516
11514
11512
11510
11508
11506
11504
11502
11512
11510
11508
11506
11504
11502
11500
11498
11496
11494
0
10
20
30
40
50
60
70
80
90

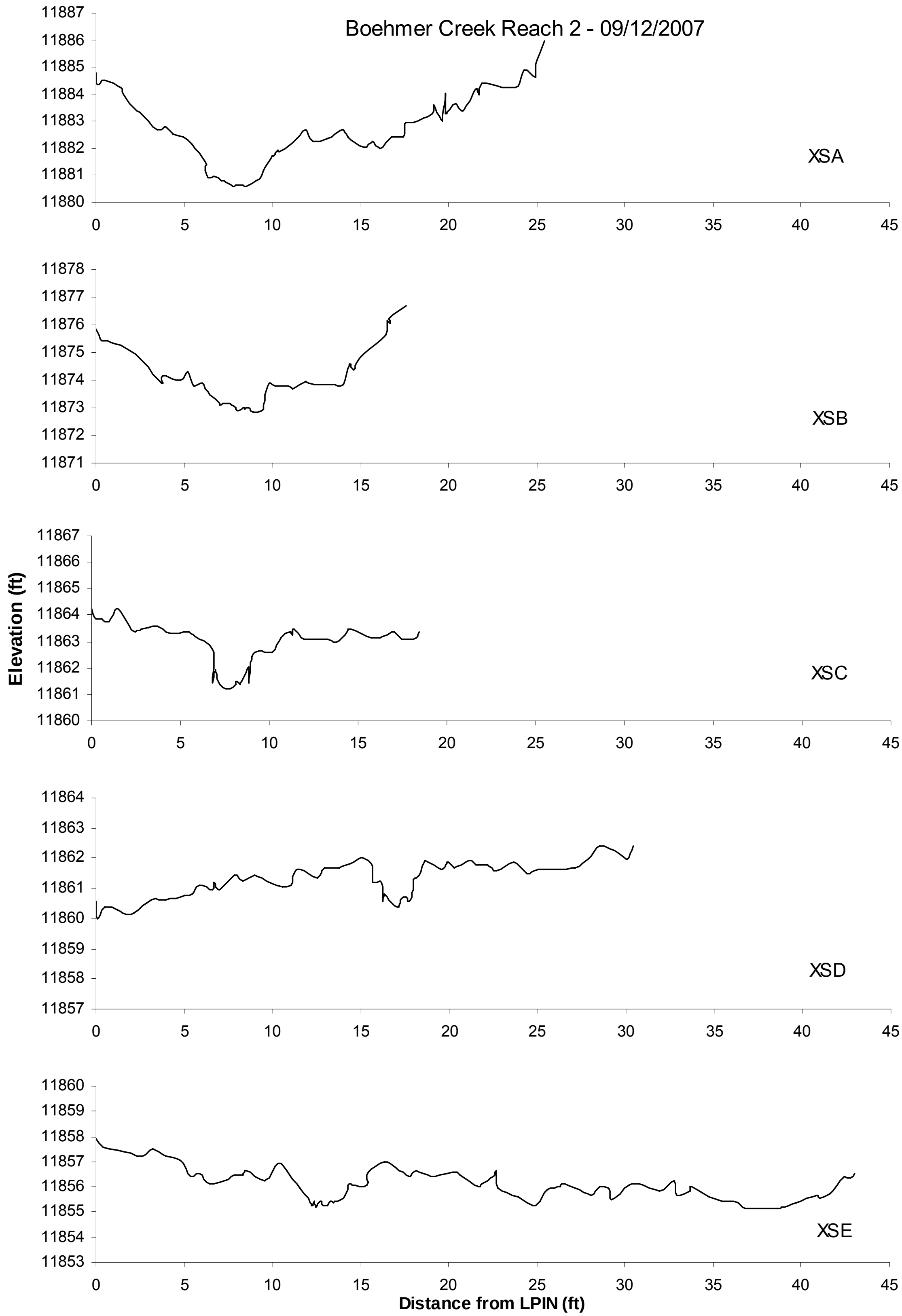
Appendix H

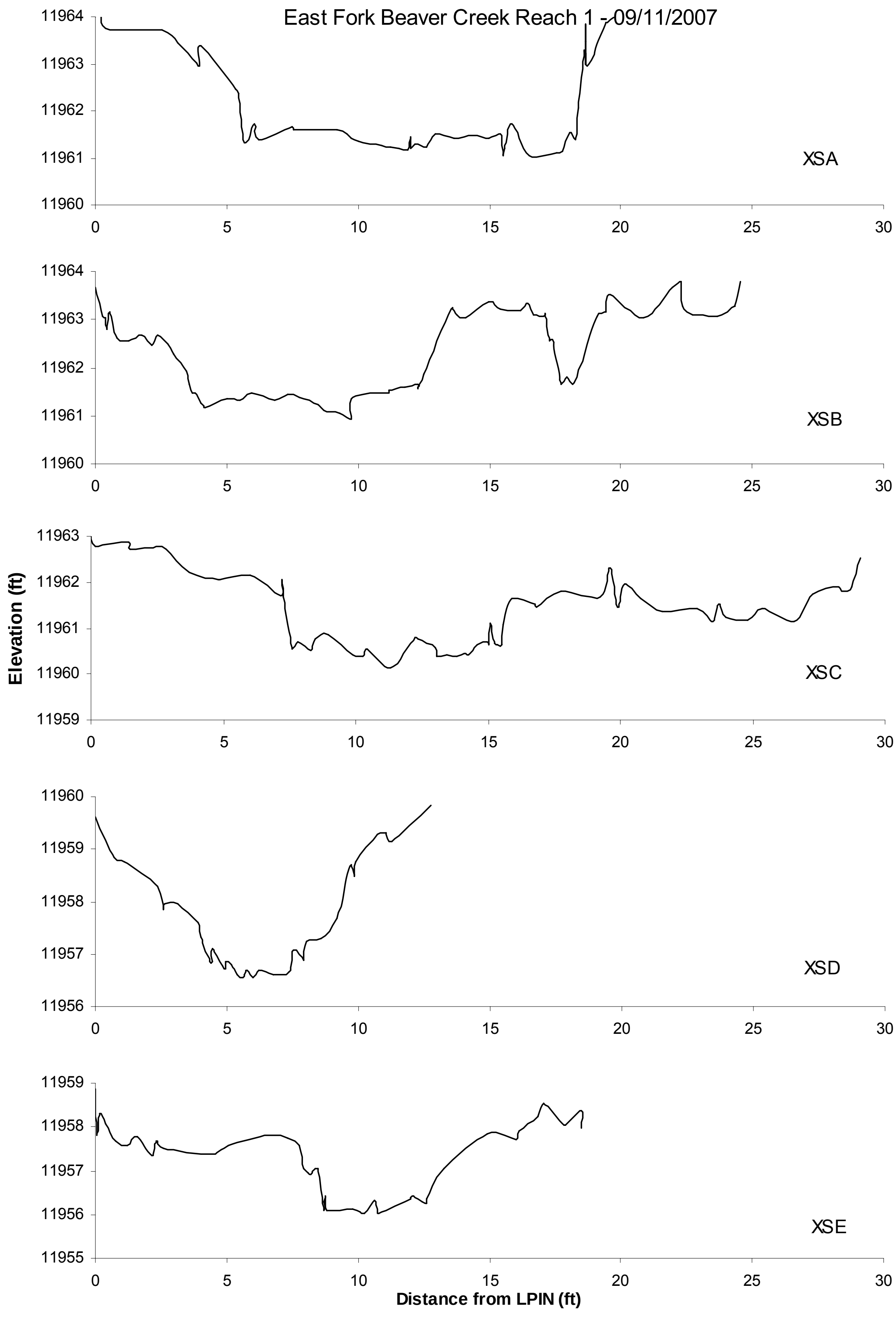
Stream Channel
Cross Section Graphs

2007

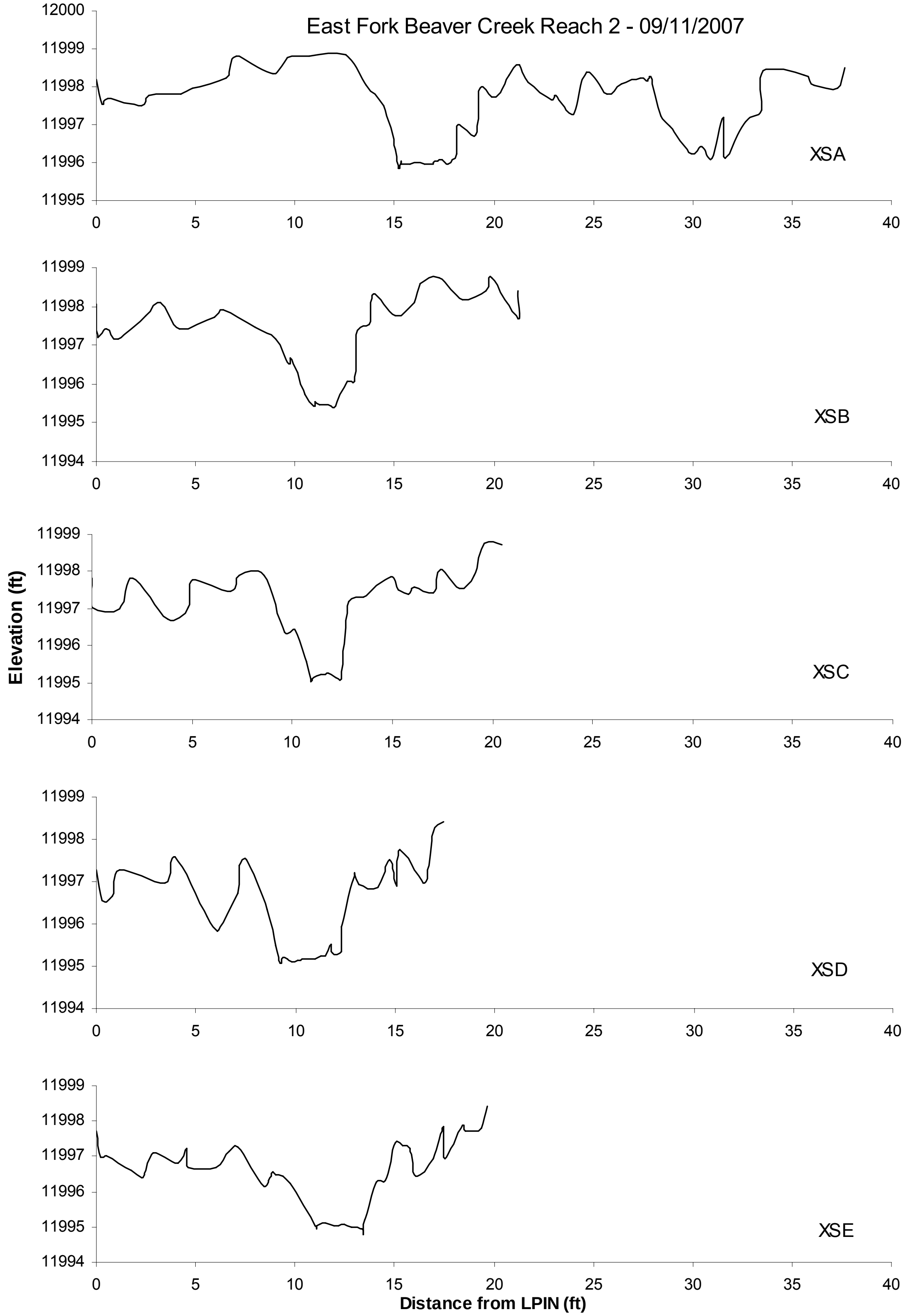


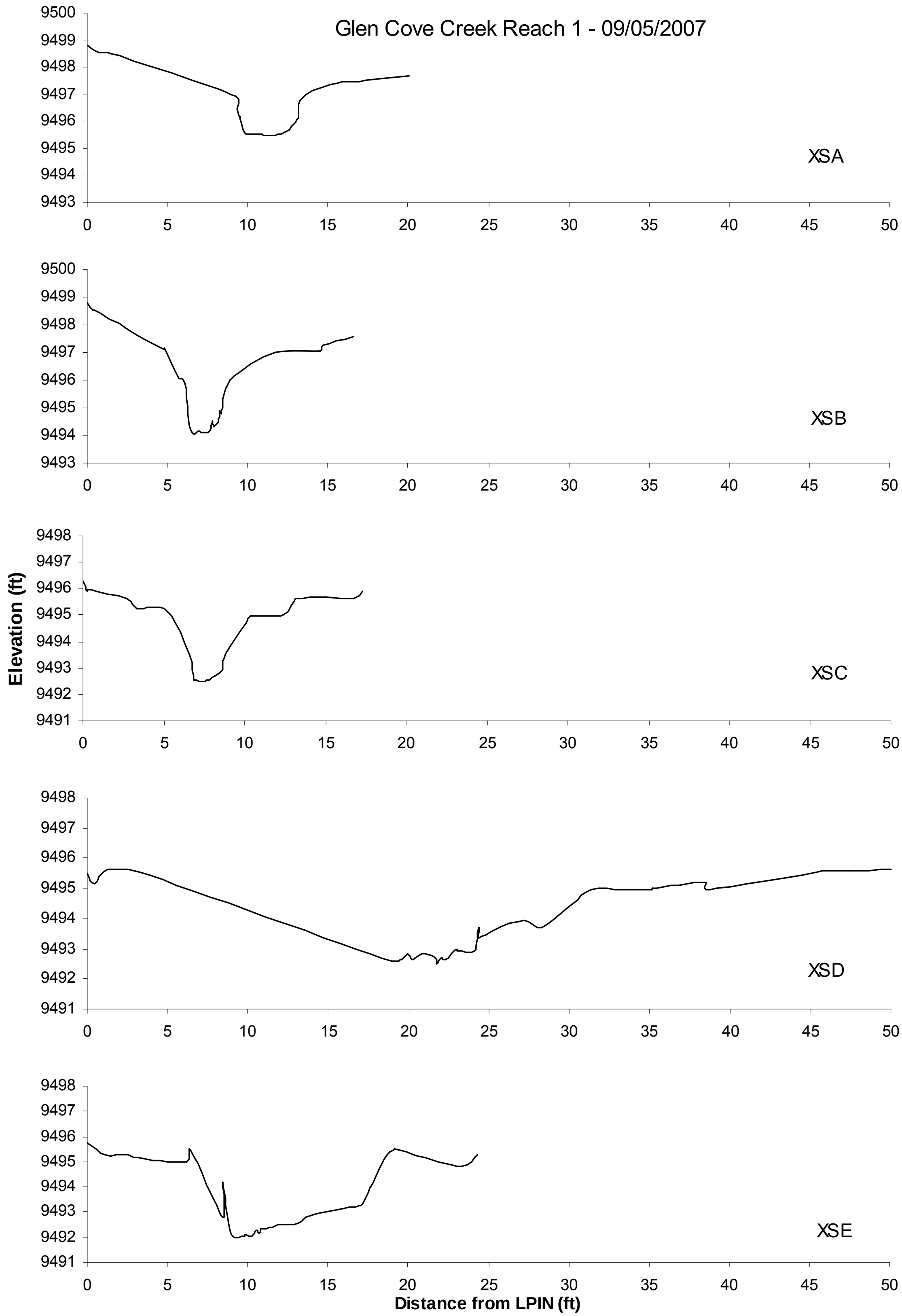
Boehmer Creek Reach 1 - 09/12/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

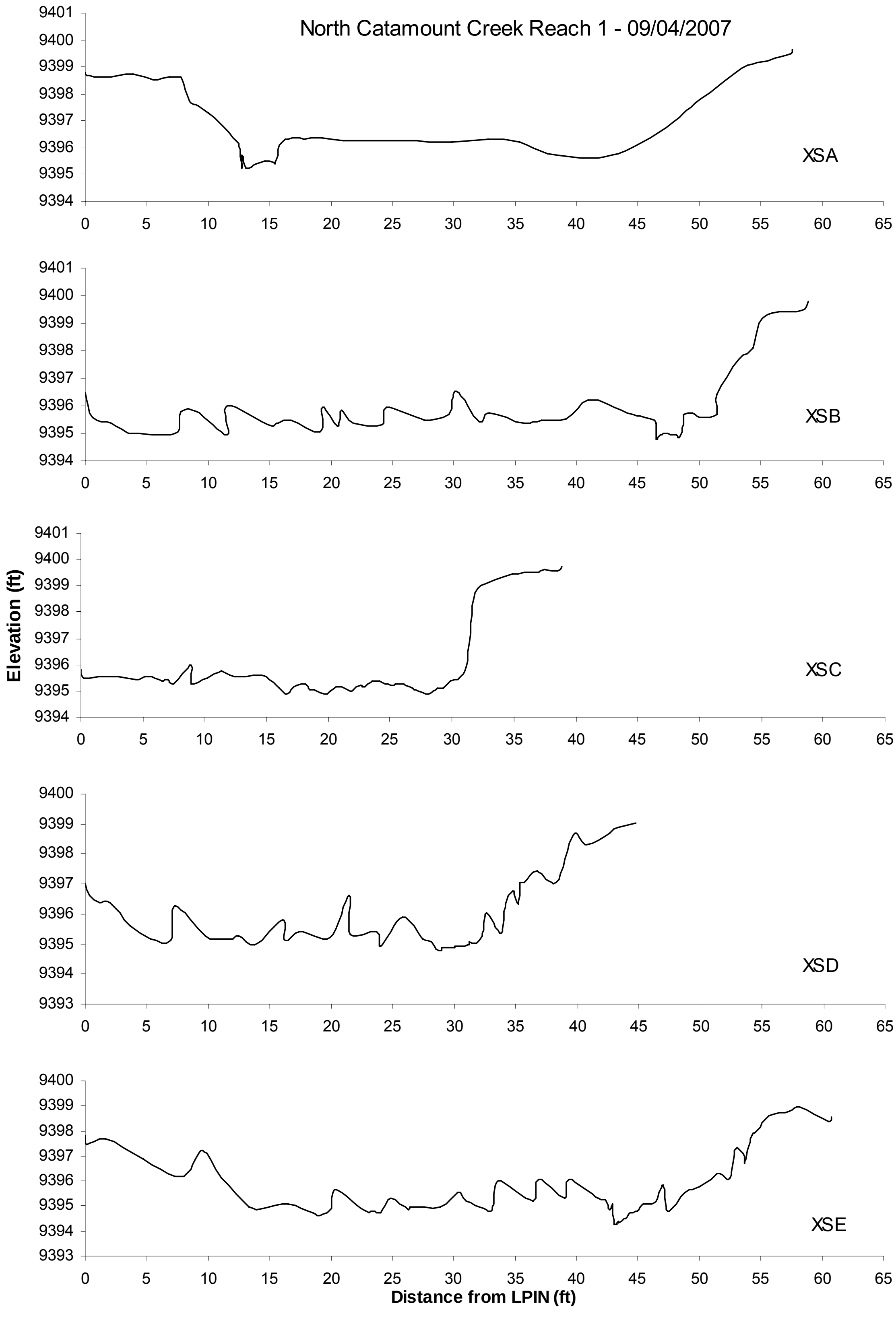

Boehmer Creek Reach 2 - 09/12/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
11887
11886
11885
11884
11883
11882
11881
11880
11878
11877
11876
11875
11874
11873
11872
11871
11867
11866
11865
11864
11863
11862
11861
11860
11864
11863
11862
11861
11860
11859
11858
11857
11860
11859
11858
11857
11856
11855
11854
11853
0
5
10
15
20
25
30
35
40
45

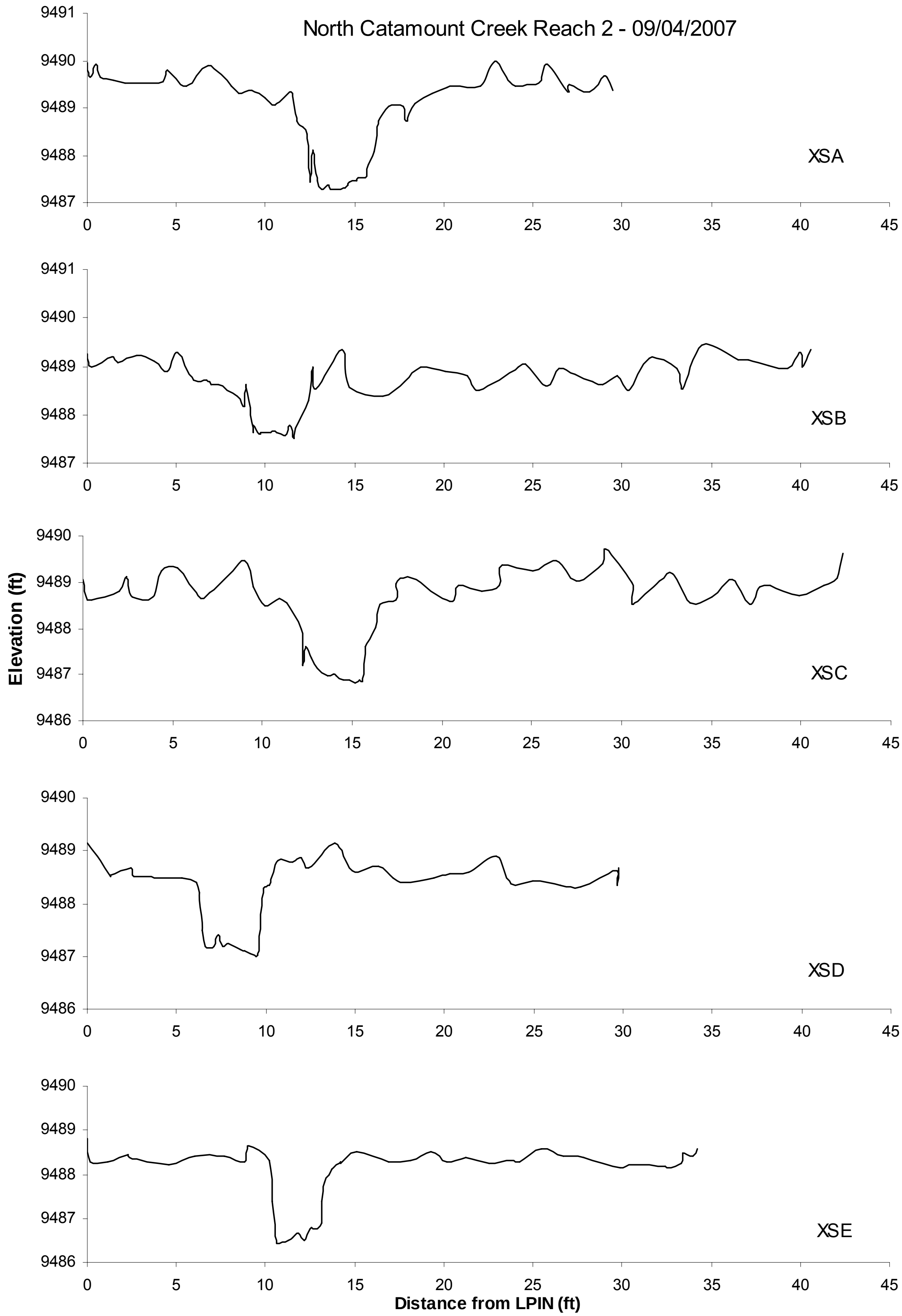


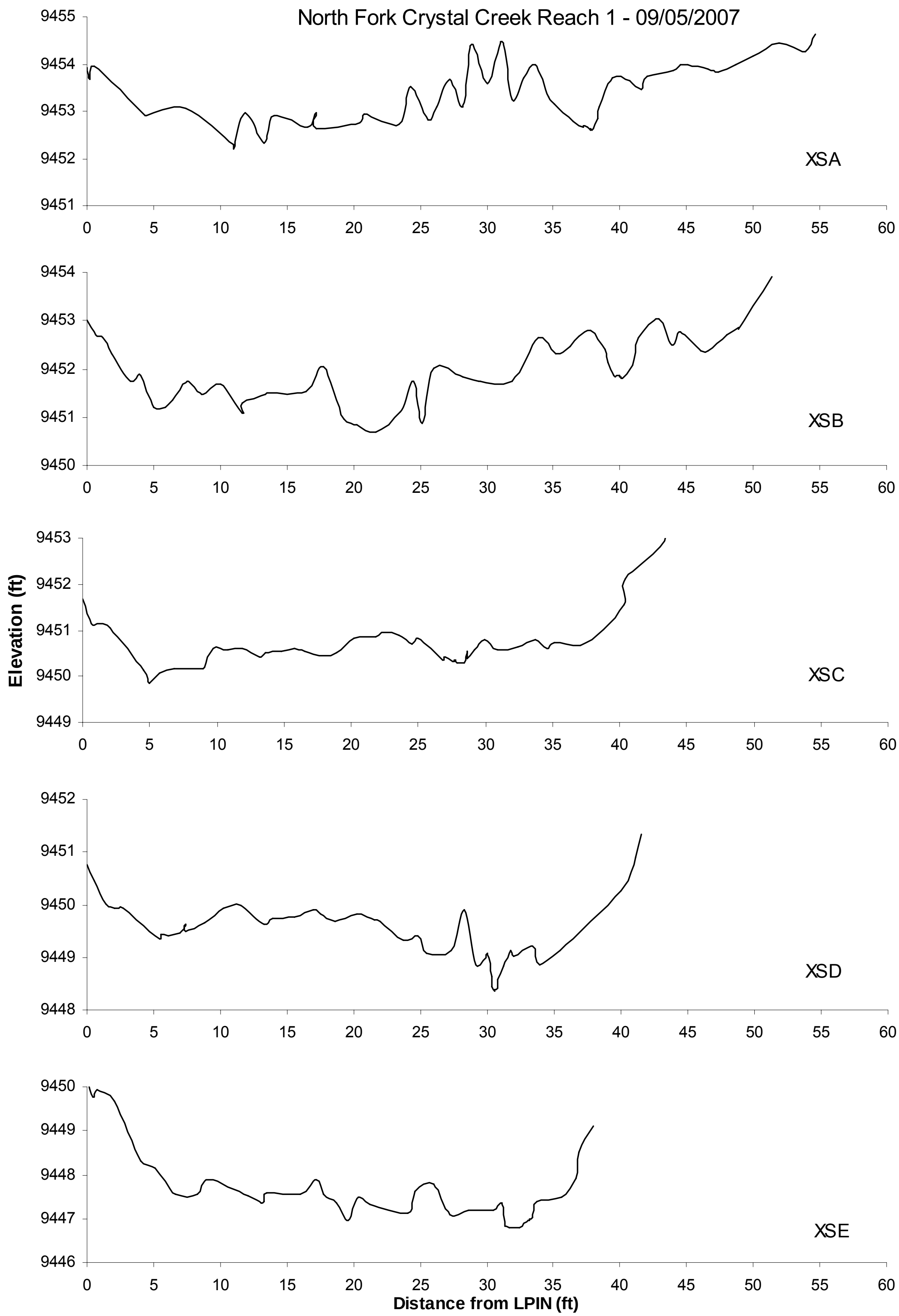
East Fork Beaver Creek Reach 1 - 09/11/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

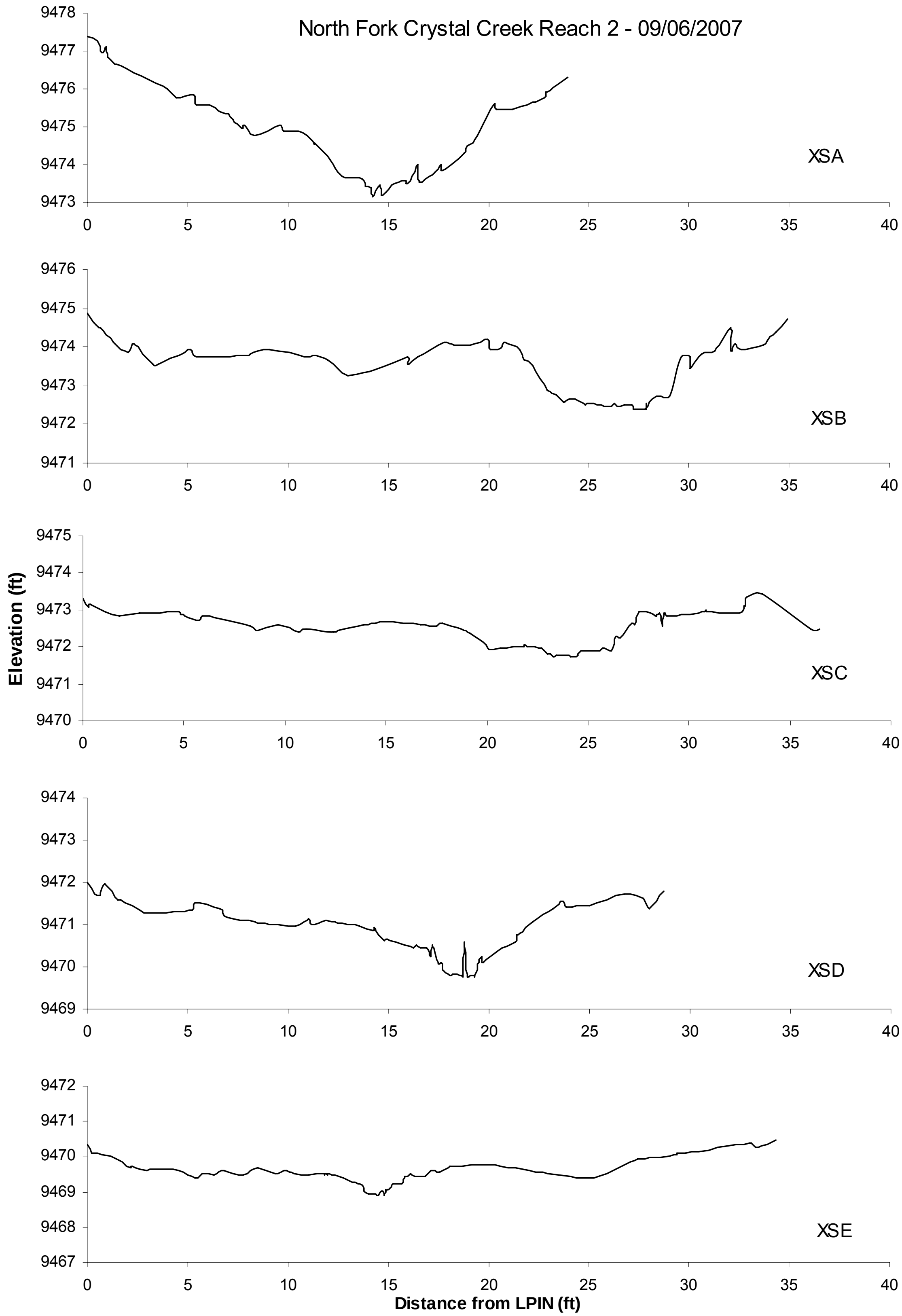

East Fork Beaver Creek Reach 2 - 09/11/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
12000
11999
11998
11997
11996
11995
11994
0
5
10
15
20
25
30
35
40


Glen Cove Creek Reach 1 - 09/05/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9500
9499
9498
9497
9496
9495
9494
9493
9492
9491
0
5
10
15
20
25
30
35
40
45
50

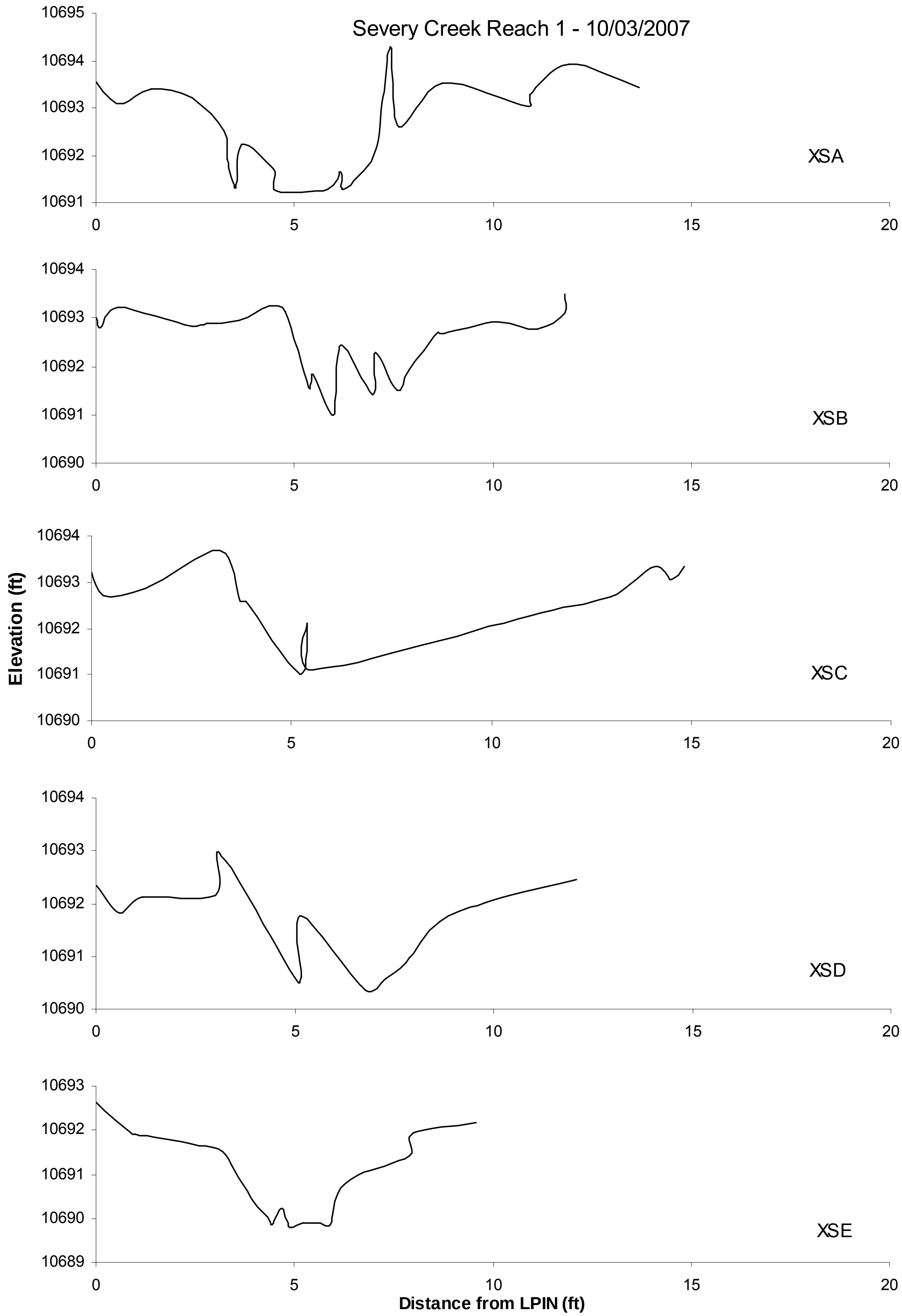

North Catamount Creek Reach 1 - 09/04/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9401
9400
9399
9398
9397
9396
9395
9394
9393
0
5
10
15
20
25
30
35
40
45
50
55
60
65


North Catamount Creek Reach 2 - 09/04/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9491
9490
9489
9488
9487
9486
0
5
10
15
20
25
30
35
40
45

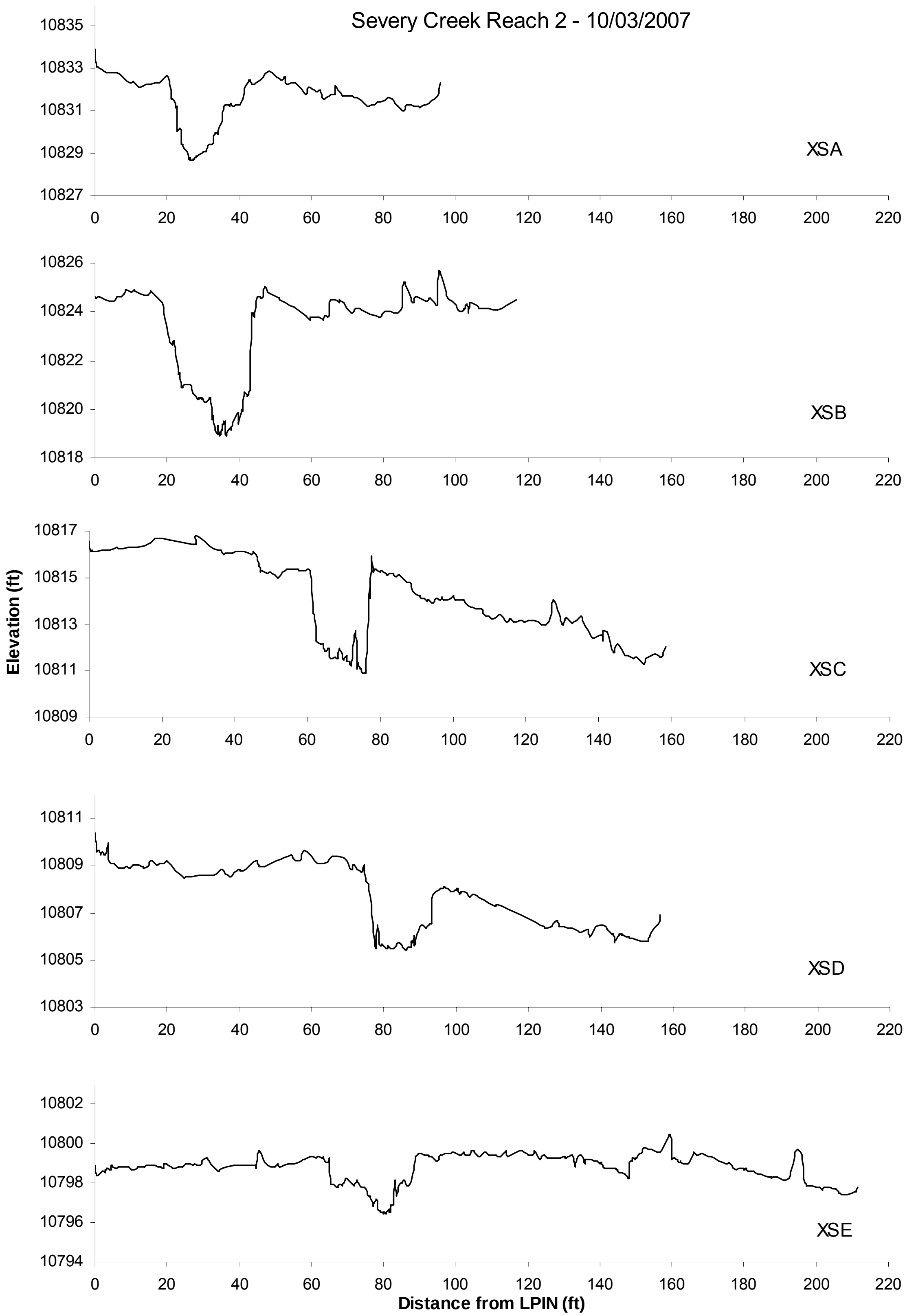

North Fork Crystal Creek Reach 1 - 09/05/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9455
9454
9453
9452
9451
9450
9449
9448
9447
9446
0
5
10
15
20
25
30
35
40
45
50
55
60

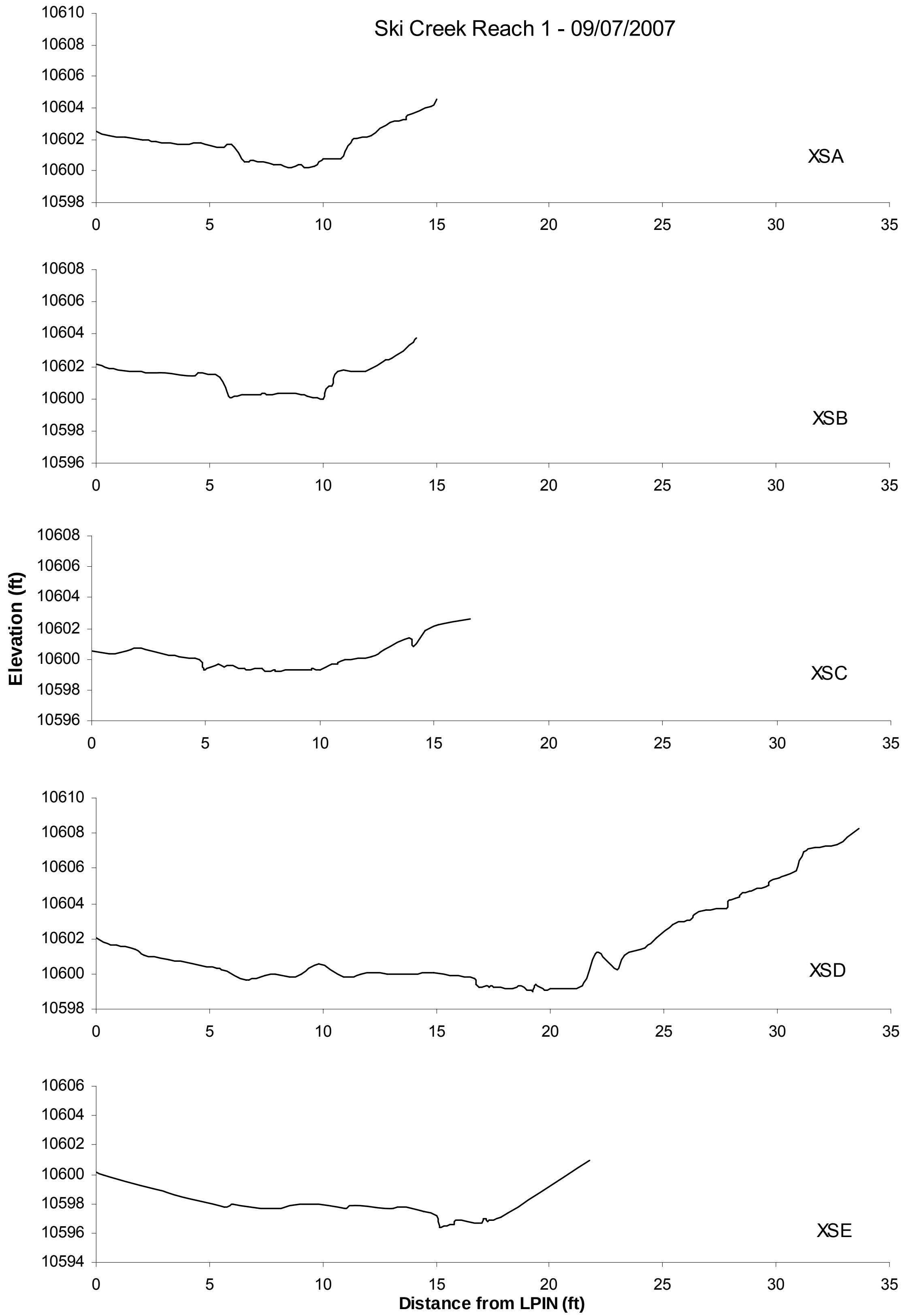


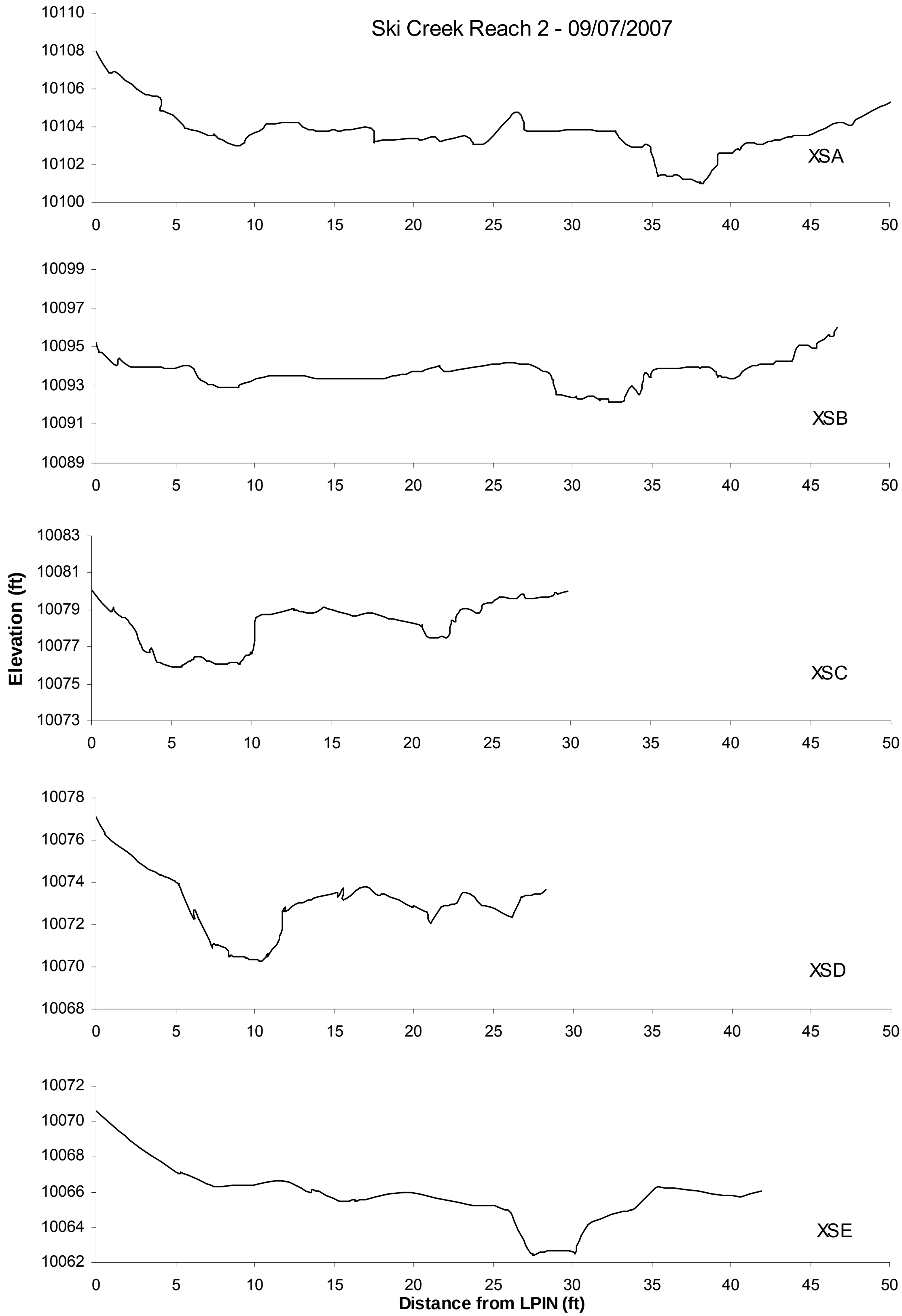
North Fork Crystal Creek Reach 2 - 09/06/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9478
9477
9476
9475
9474
9473
9472
9471
9470
9469
9468
9467
0
5
10
15
20
25
30
35
40



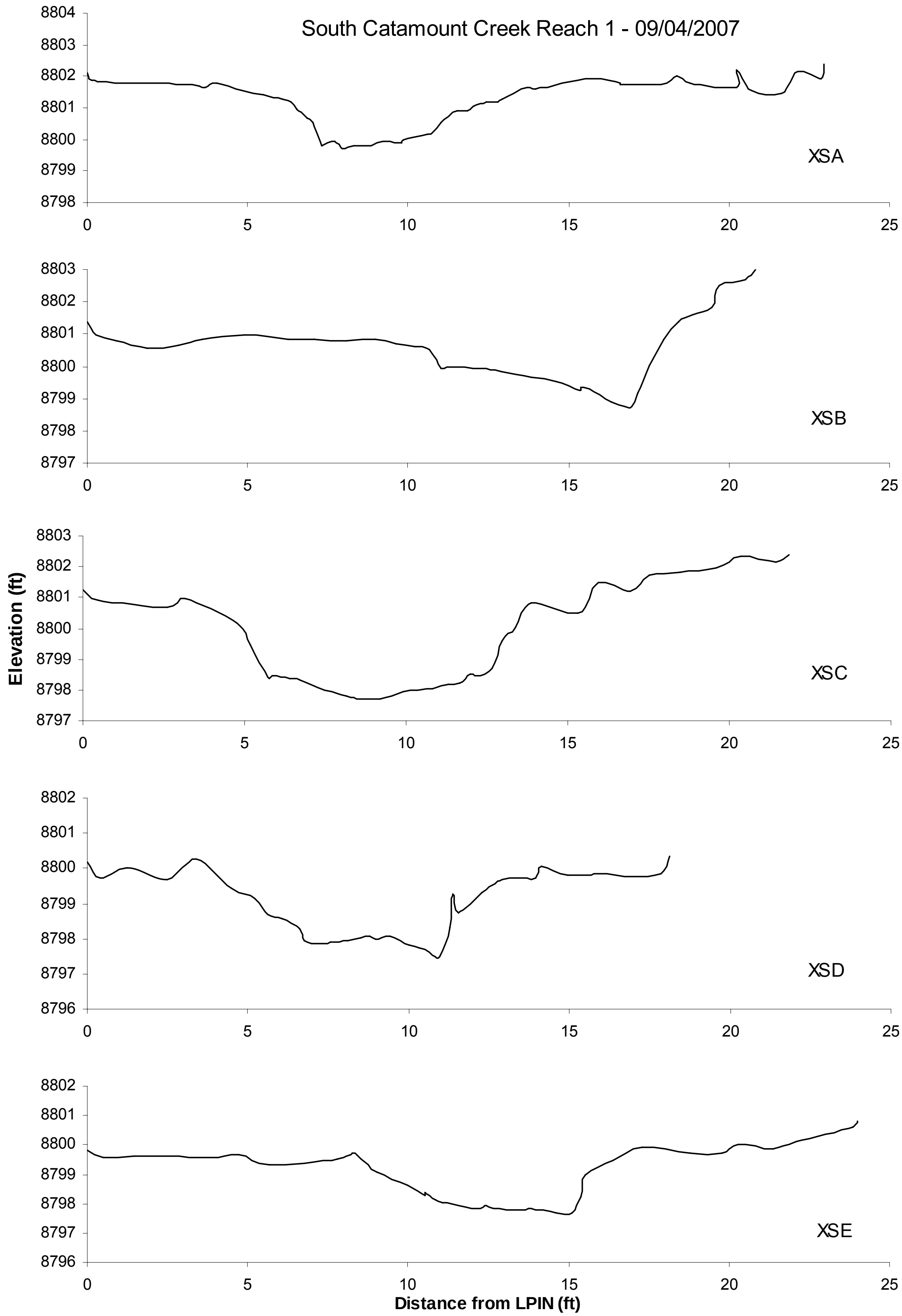
Severy Creek Reach 1 - 10/03/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10695
10694
10693
10692
10691
10690
10689
0
5
10
15
20

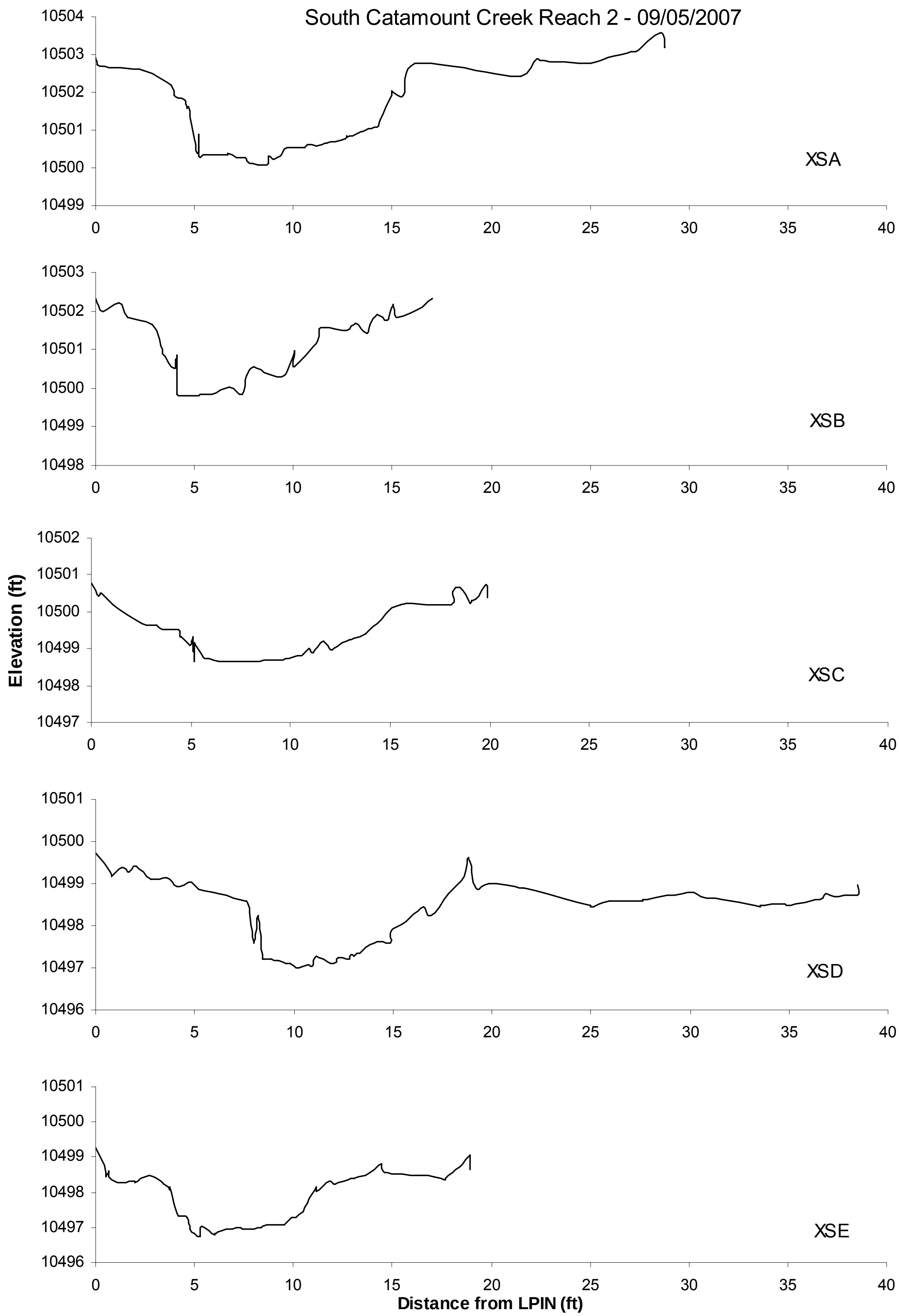

Severy Creek Reach 2 - 10/03/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

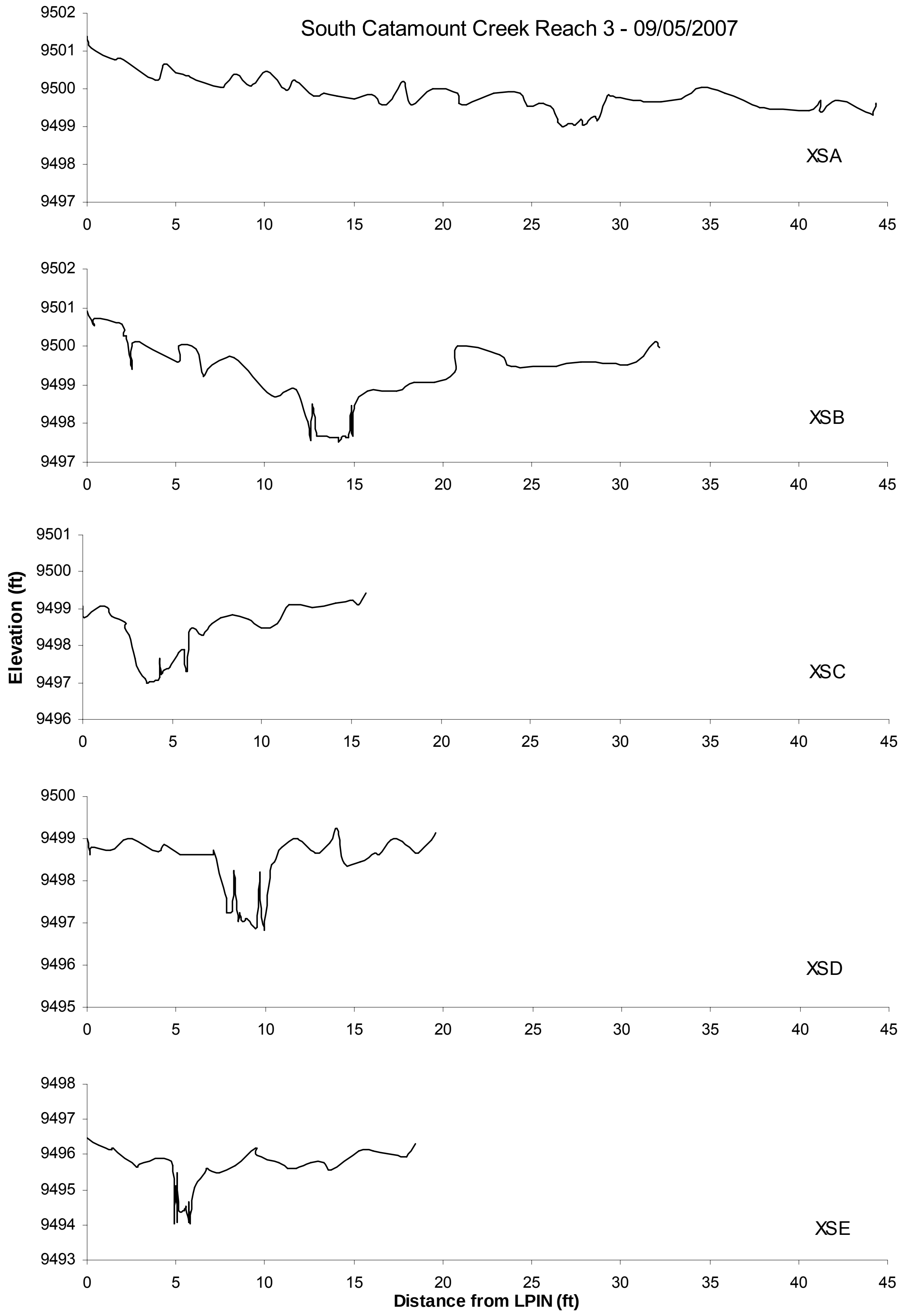

Ski Creek Reach 1 - 09/07/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
10610
10608
10606
10604
10602
10600
10598
10596
10594
0
5
10
15
20
25
30
35

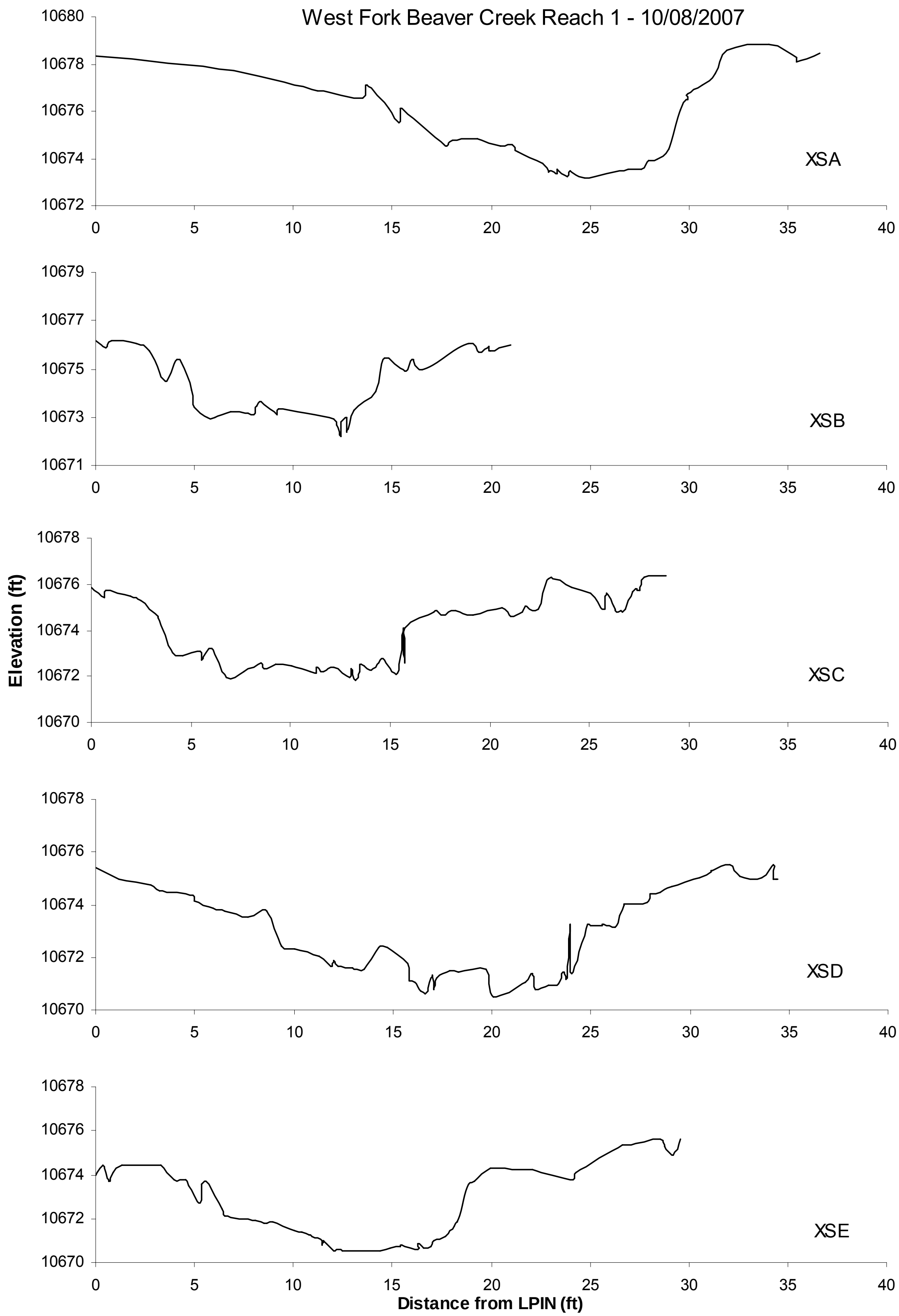


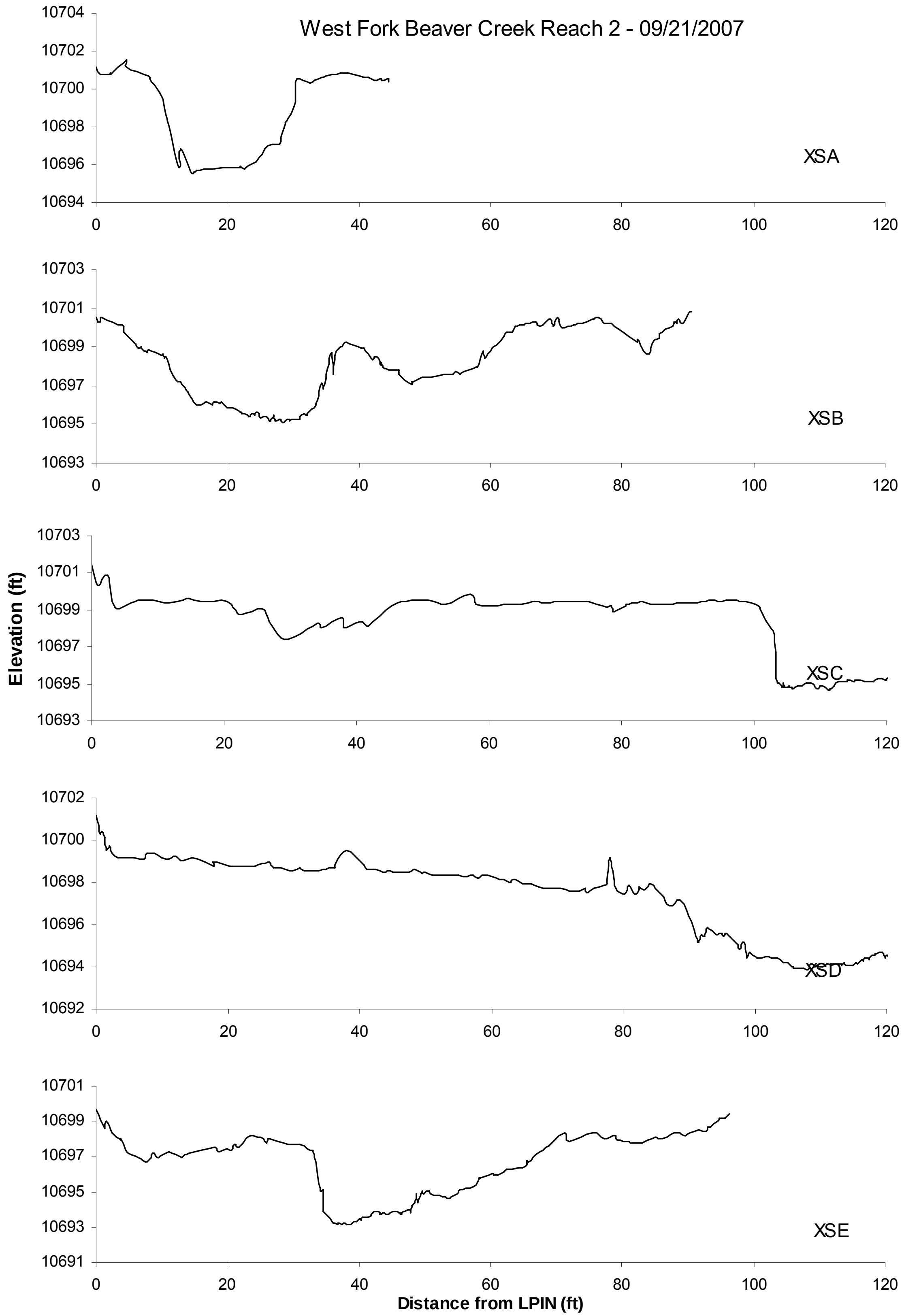
Ski Creek Reach 2 - 09/07/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


South Catamount Creek Reach 1 - 09/04/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


South Catamount Creek Reach 2 - 09/05/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10504
10503
10502
10501
10500
10499
10498
10497
10496
0
5
10
15
20
25
30
35
40


South Catamount Creek Reach 3 - 09/05/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9502
9501
9500
9499
9498
9497
9496
9495
9494
9493
0
5
10
15
20
25
30
35
40
45


West Fork Beaver Creek Reach 1 - 10/08/2007
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10680
10678
10676
10674
10672
10679
10677
10675
10673
10671
10670
0
5
10
15
20
25
30
35
40


West Fork Beaver Creek Reach 2 - 09/21/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
10704
10702
10700
10698
10696
10694
10703
10701
10699
10697
10695
10693
10692
10691
0
20
40
60
80
100
120

Appendix I

Stream Pebble Counts

and

Particle Size Distribution

2007

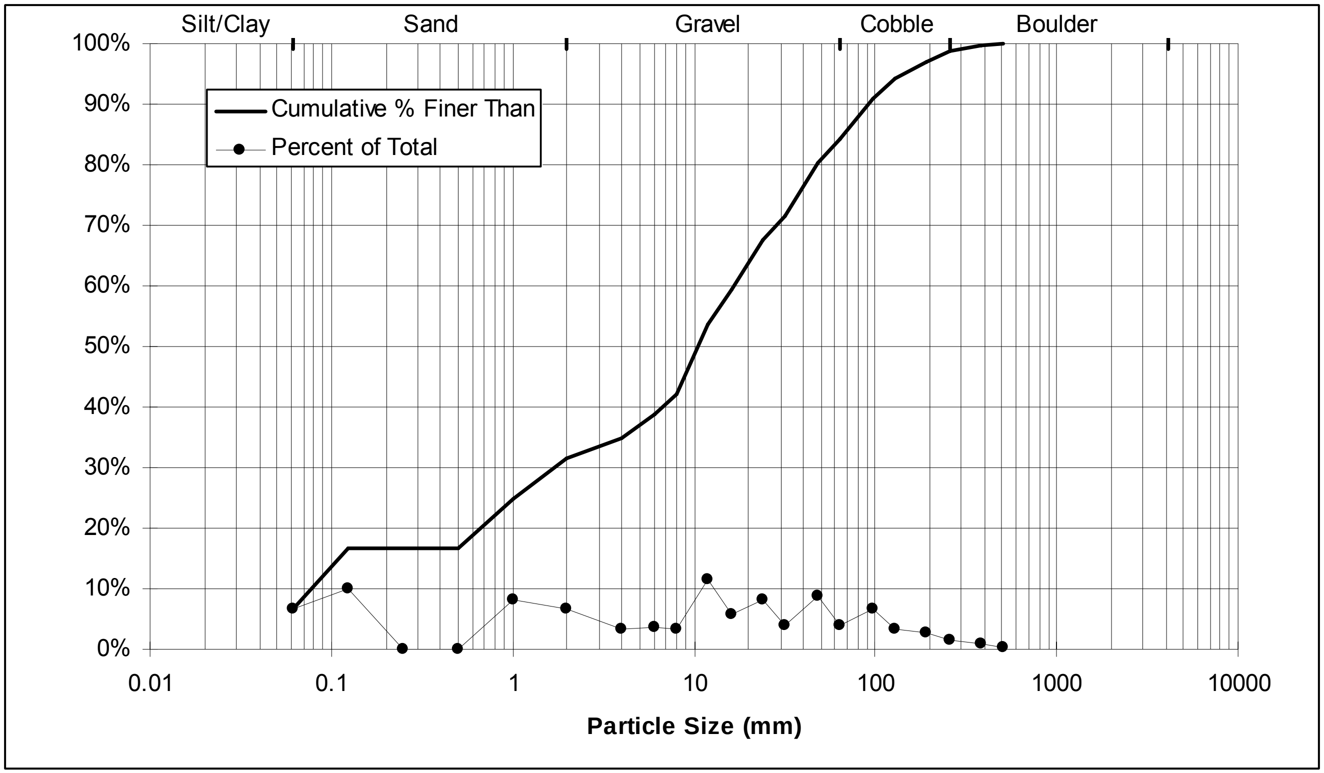
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	7%	20
0.062 - 0.125	17%	30
0.126 - 0.24	17%	0
0.25 - .49	17%	0
0.5 - .99	25%	25
1 - 2	32%	20
3 - 4	35%	10
5 - 6	39%	11
7 - 8	42%	10
9 - 12	54%	35
13 - 16	59%	17
17 - 24	68%	25
25 - 32	72%	12
33 - 48	80%	26
49 - 64	84%	12
65 - 96	91%	20
97 - 128	94%	10
129 - 192	97%	8
193 - 256	99%	5
257 - 384	100%	3
385 - 512	100%	1
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken just below XSE

STREAM NAME: Boehmer Creek
ID NUMBER: BHMR1
DATE: 9/12/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	0.1	4.0	10.6	62.5	141.7



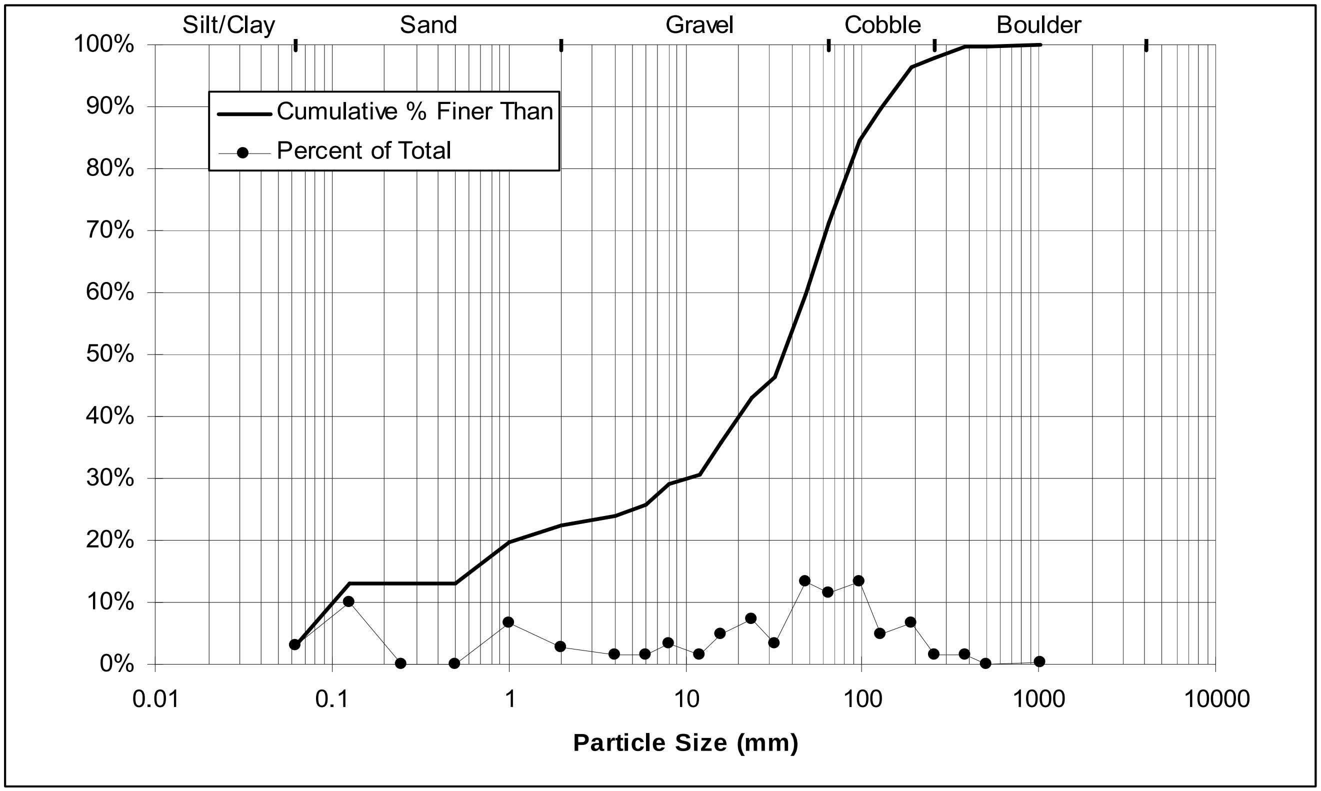
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	3%	9
0.062 - 0.125	13%	30
0.126 - .24	13%	0
0.25 - .49	13%	0
0.5 - .99	20%	20
1 - 2	22%	8
3 - 4	24%	5
5 - 6	26%	5
7 - 8	29%	10
9 - 12	31%	5
13 - 16	36%	15
17 - 24	43%	22
25 - 32	46%	10
33 - 48	60%	40
49 - 64	71%	35
65 - 96	85%	40
97 - 128	90%	15
129 - 192	96%	20
193 - 256	98%	5
257 - 384	100%	5
385 - 512	100%	0
513 - 1024	100%	1
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken 18' upstream from XSB

STREAM NAME: Boehmer Creek
ID NUMBER: BHMR2
DATE: 9/12/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	0.6	**15.4**	**35.8**	**94.1**	**177.0**



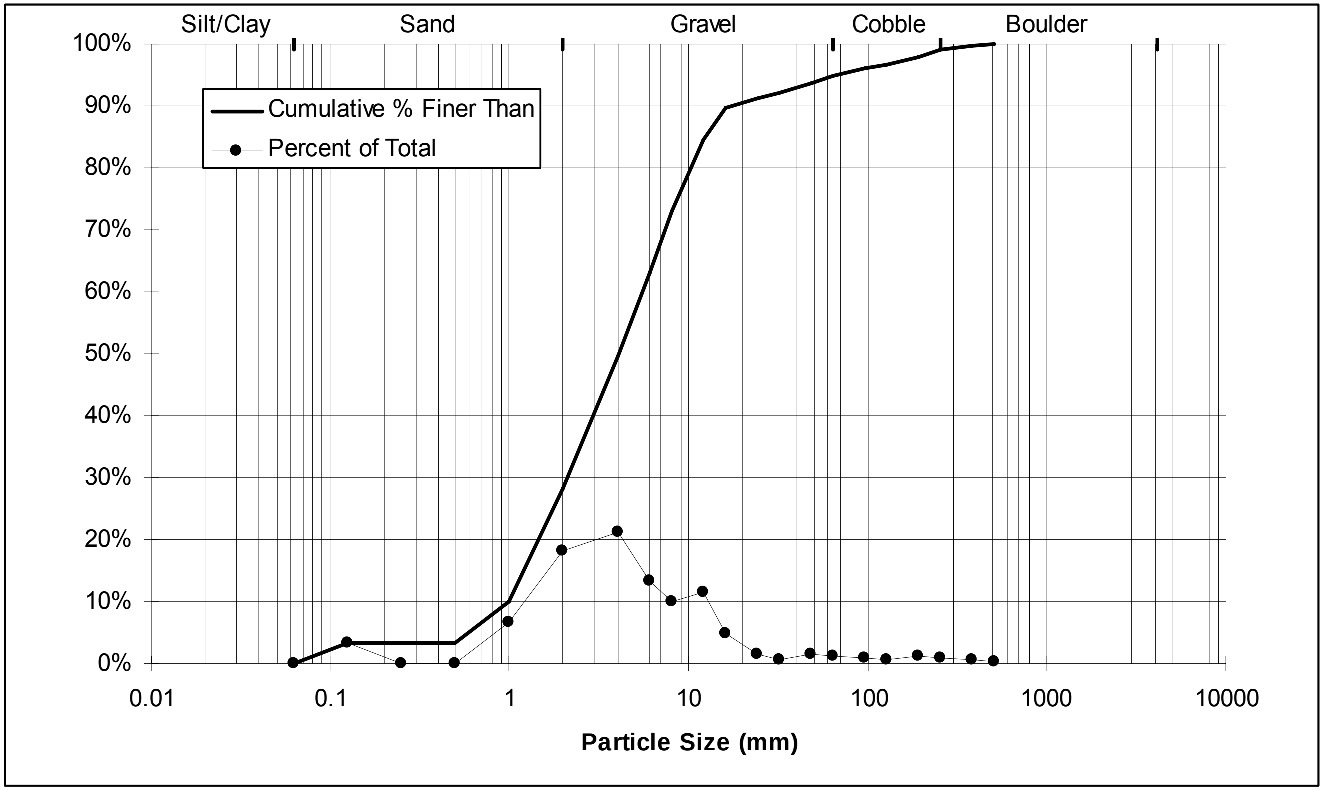
Pebble Count Worksheet

COMMENTS: Bar sample taken just below XSB

Particle Size (mm)	% finer than	Total Count
<0.062	0%	0
0.062 - 0.125	3%	10
0.126 - .24	3%	0
0.25 - .49	3%	0
0.5 - .99	10%	20
1 - 2	28%	55
3 - 4	50%	64
5 - 6	63%	40
7 - 8	73%	30
9 - 12	85%	35
13 - 16	90%	15
17 - 24	91%	5
25 - 32	92%	2
33 - 48	94%	5
49 - 64	95%	4
65 - 96	96%	3
97 - 128	97%	2
129 - 192	98%	4
193 - 256	99%	3
257 - 384	100%	2
385 - 512	100%	1
513 - 1024		
1025 - 2048		
2049 - 4096		

STREAM NAME: East Fork Beaver Creek
ID NUMBER: EBVR1
DATE: 9/11/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	1.2	2.5	4.0	11.7	64.0



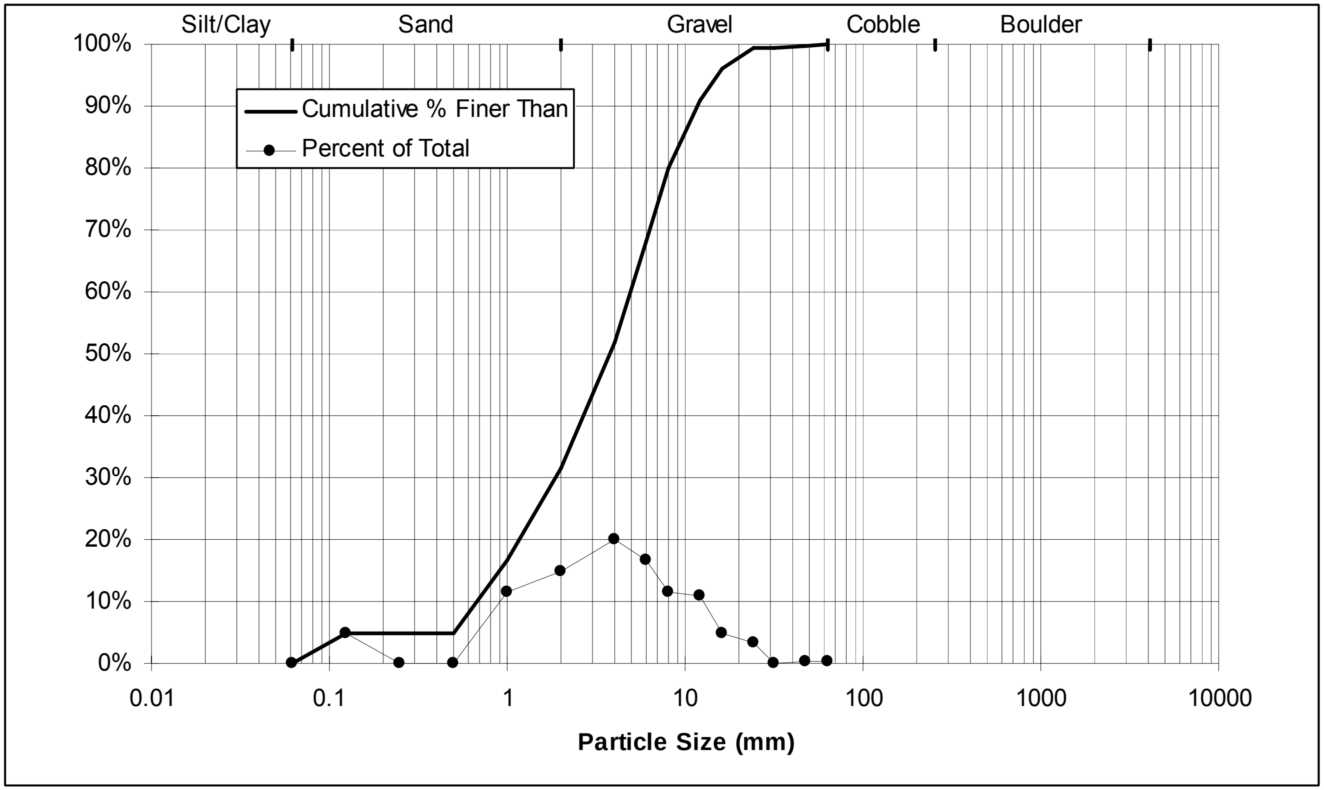
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	0%	0
0.062 - 0.125	5%	15
0.126 - .24	5%	0
0.25 - .49	5%	0
0.5 - .99	17%	35
1 - 2	32%	45
3 - 4	52%	60
5 - 6	68%	50
7 - 8	80%	35
9 - 12	91%	33
13 - 16	96%	15
17 - 24	99%	10
25 - 32	99%	0
33 - 48	100%	1
49 - 64	100%	1
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken 6' bove XSE

STREAM NAME: East Fork Beaver Creek
ID NUMBER: EBVR2
DATE: 9/11/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	0.9	**2.2**	**3.8**	**9.3**	**15.1**



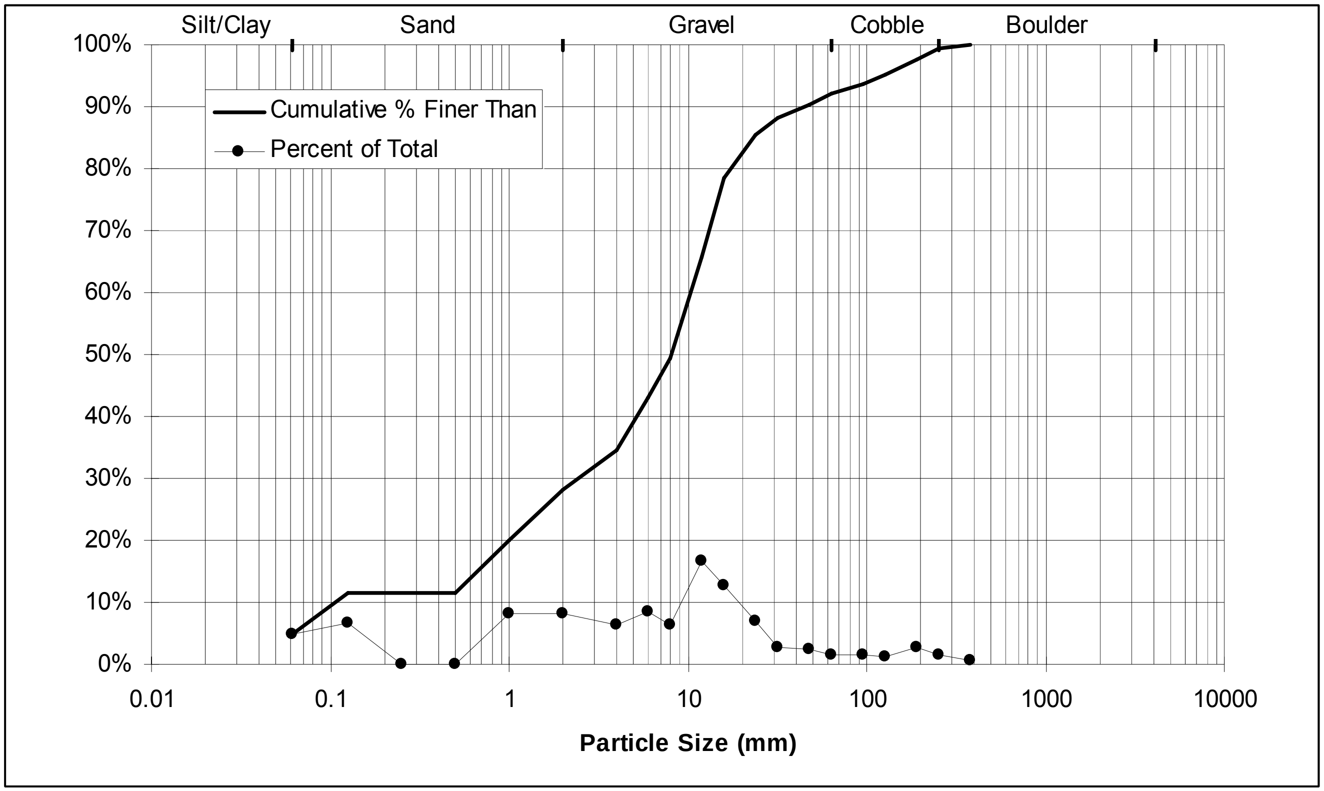
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	5%	15
0.062 - 0.125	12%	20
0.126 - .24	12%	0
0.25 - .49	12%	0
0.5 - .99	20%	25
1 - 2	28%	25
3 - 4	34%	19
5 - 6	43%	26
7 - 8	49%	19
9 - 12	66%	50
13 - 16	78%	38
17 - 24	85%	21
25 - 32	88%	8
33 - 48	90%	7
49 - 64	92%	5
65 - 96	94%	5
97 - 128	95%	4
129 - 192	98%	8
193 - 256	99%	5
257 - 384	100%	2
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken at XSE

STREAM NAME: Glen Cove Creek
ID NUMBER: GLEN1
DATE: 9/5/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	0.7	**4.1**	**8.1**	**22.1**	**127.1**



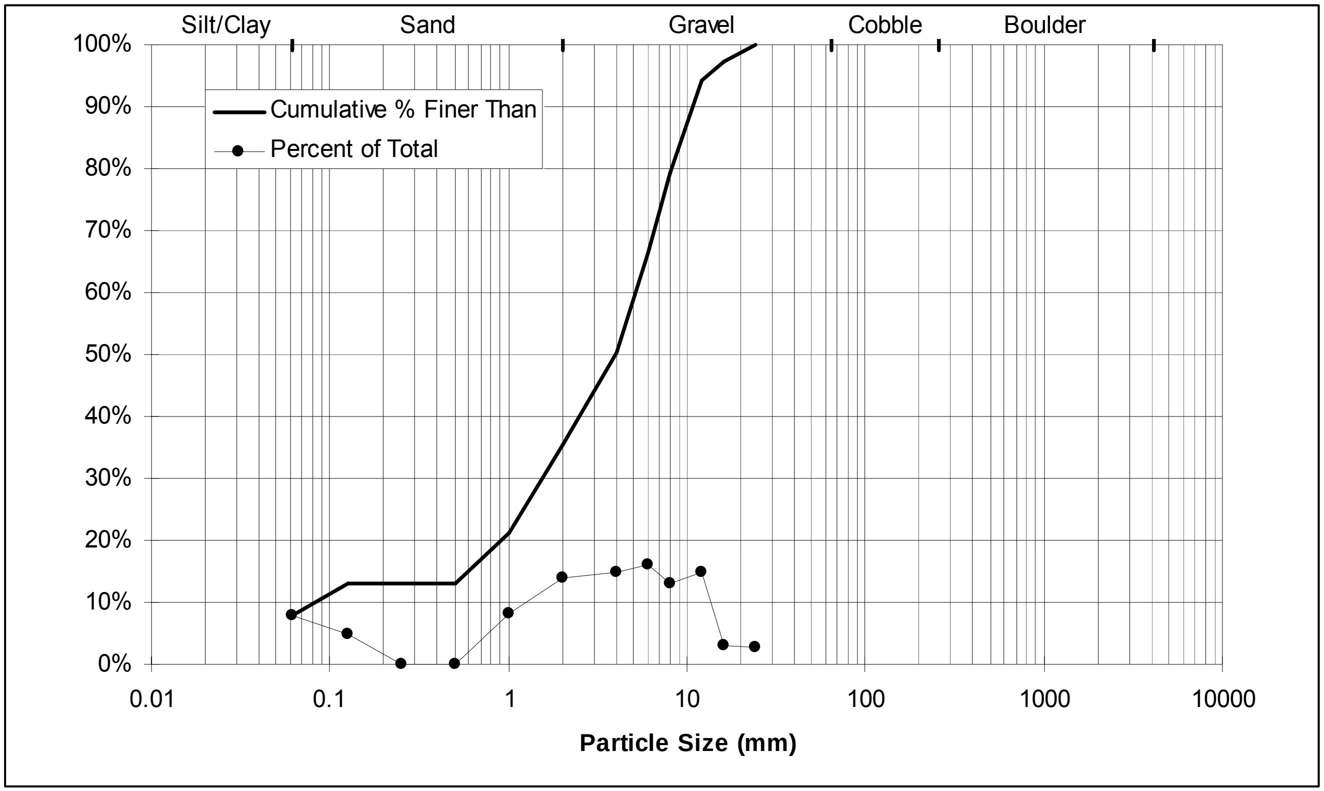
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	8%	24
0.062 - 0.125	13%	15
0.126 - 0.25	13%	0
0.26 - 0.49	13%	0
0.5 - 1.0	21%	25
1 - 2	35%	42
3 - 4	50%	45
5 - 6	66%	48
7 - 8	79%	39
9 - 12	94%	45
13 - 16	97%	9
17 - 24	100%	8
25 - 32		
33 - 48		
49 - 64		
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken at XSB

STREAM NAME: North Catamount Creek
ID NUMBER: NCAT1
DATE: 9/4/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	0.6	**2.0**	**3.9**	**9.1**	**12.8**



Pebble Count Worksheet

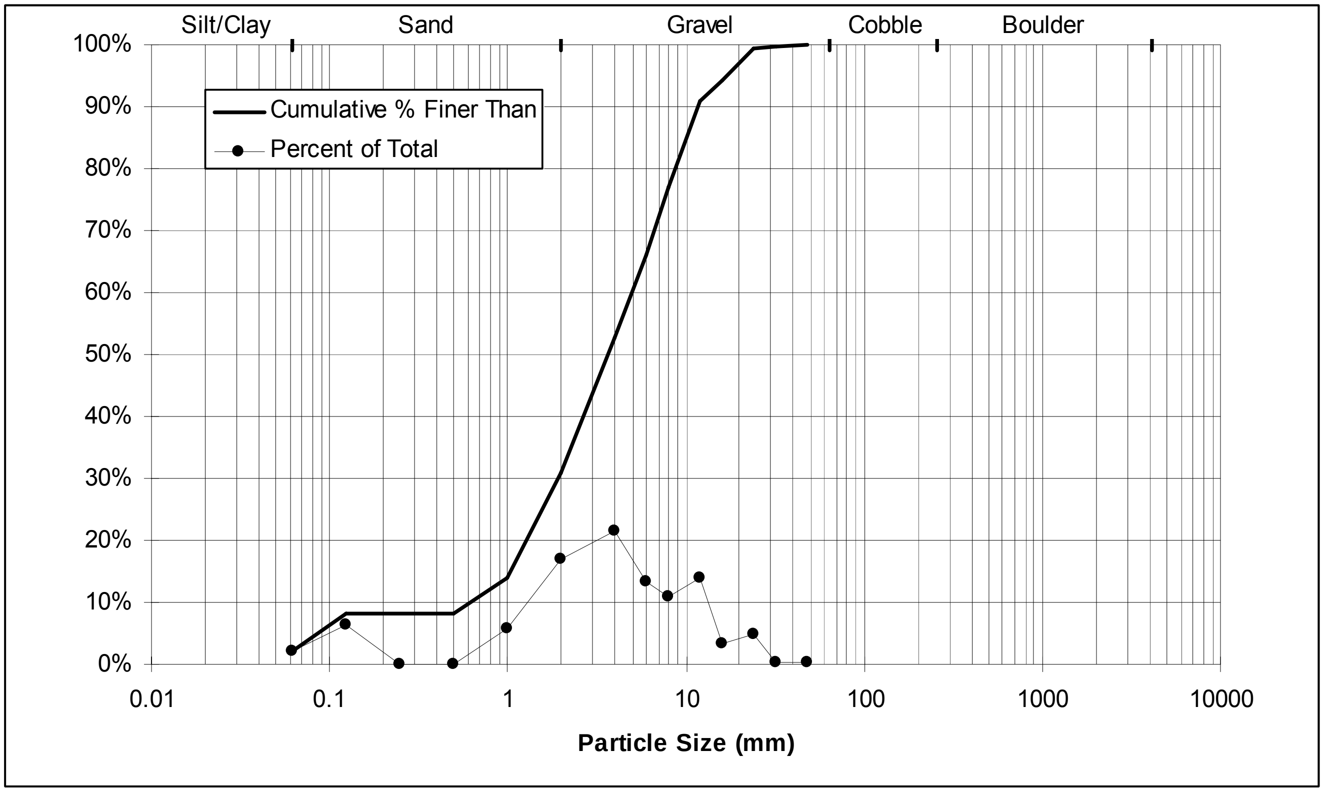
COMMENTS: Bar sample taken 3' DS from XSB

Particle Size (mm)	% finer than	Total Count
<0.062	2%	6
0.062 - 0.125	8%	19
0.126 - 0.25	8%	0
0.26 - .49	8%	0
0.5 - .99	14%	17
1 - 2	31%	51
3 - 4	53%	65
5 - 6	66%	40
7 - 8	77%	33
9 - 12	91%	42
13 - 16	94%	10
17 - 24	99%	15
25 - 32	100%	1
33 - 48	100%	1
49 - 64		
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

STREAM NAME: North Catamount Creek
ID NUMBER: NCAT2
DATE: 9/4/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)

D15	D35	D50	D84	D95
1.0	2.3	3.7	9.8	16.9



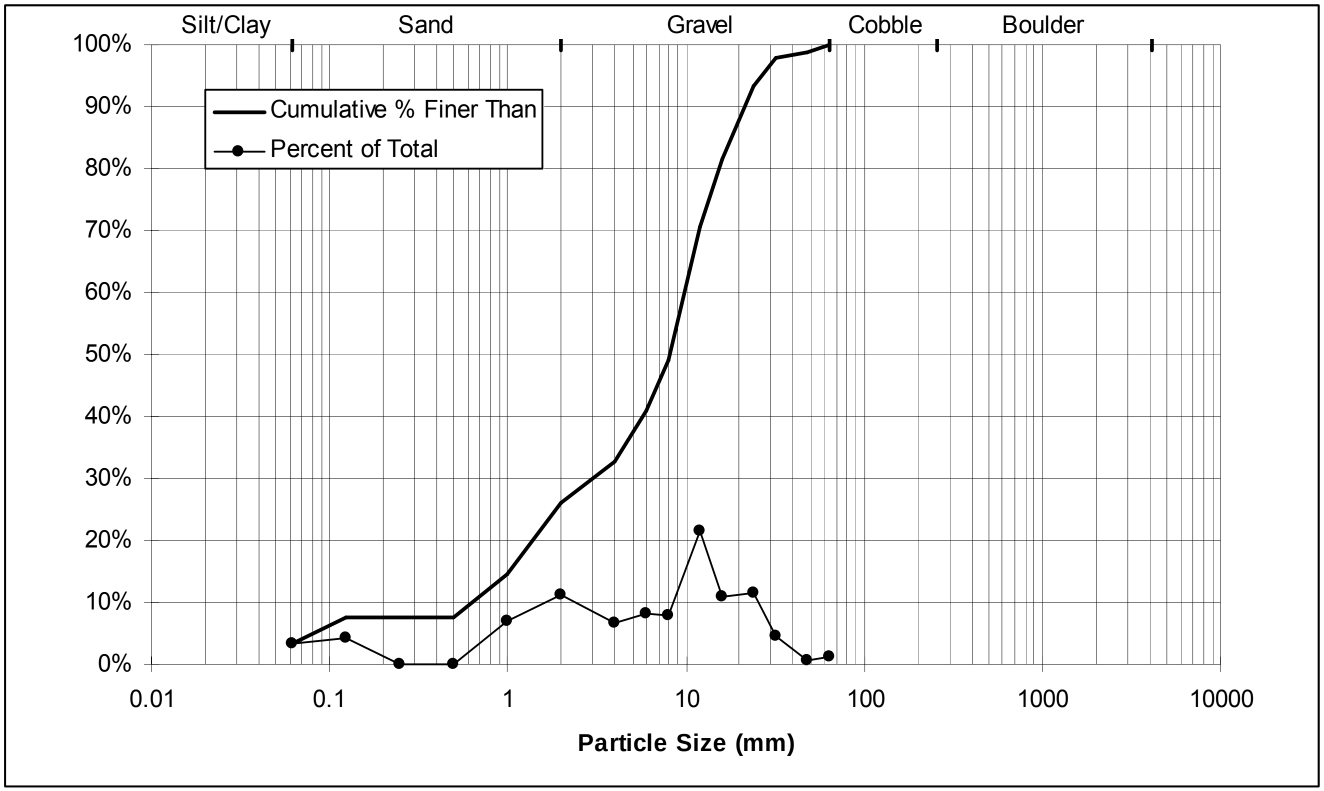
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	3%	10
0.062 - 0.125	8%	13
0.126 - 0.24	8%	0
0.25 - 0.49	8%	0
0.5 - .99	15%	21
1 - 2	26%	34
3 - 4	33%	20
5 - 6	41%	25
7 - 8	49%	24
9 - 12	71%	65
13 - 16	82%	33
17 - 24	93%	35
25 - 32	98%	14
33 - 48	99%	2
49 - 64	100%	4
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken at XSA

STREAM NAME: North Fork Crystal Creek
ID NUMBER: NCRY1
DATE: 9/5/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	1.0	**4.5**	**8.2**	**17.4**	**26.6**



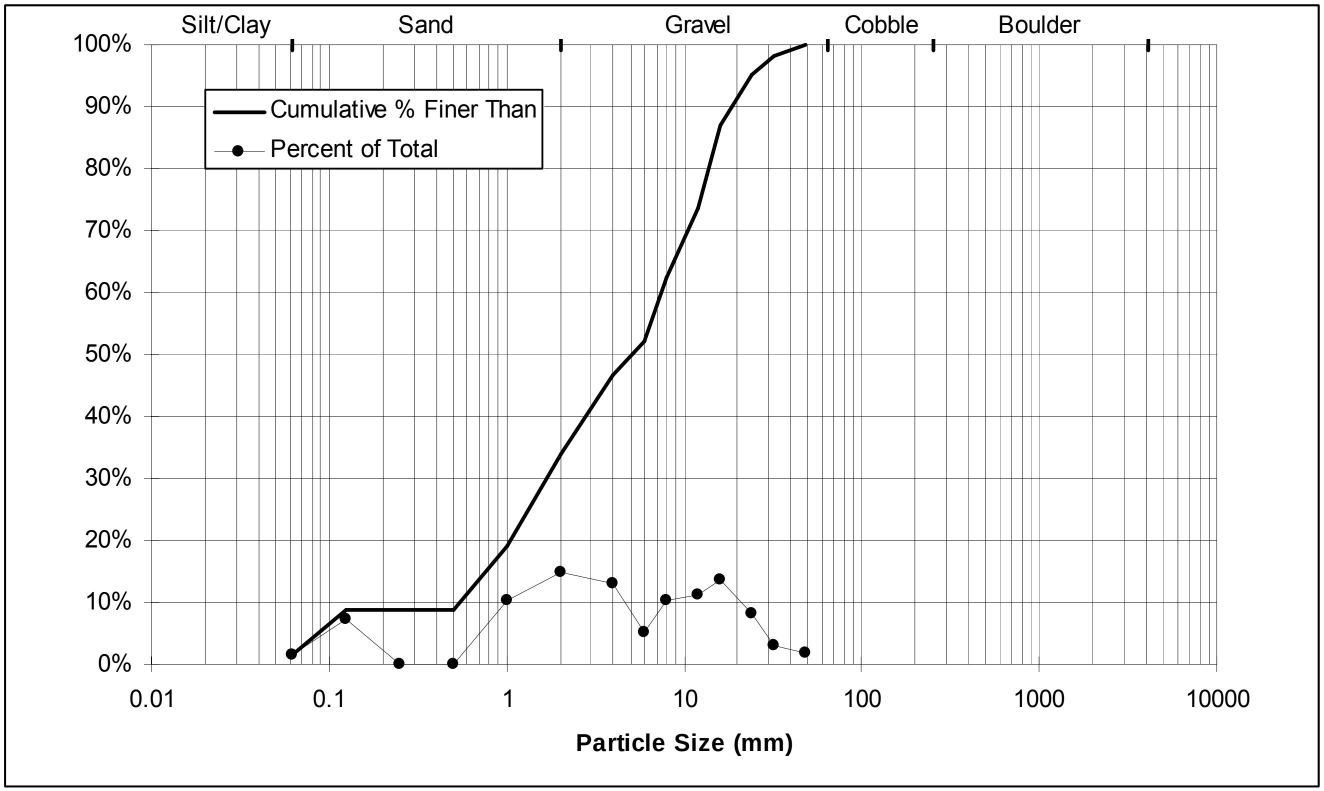
Pebble Count Worksheet

COMMENTS: Bar sample taken just above XSE

Particle Size (mm)	% finer than	Total Count
<0.062	1%	5
0.062 - 0.125	9%	25
0.126 - 0.24	9%	0
0.25 - .49	9%	0
0.5 - .99	19%	35
1 - 2	34%	50
3 - 4	47%	44
5 - 6	52%	18
7 - 8	62%	35
9 - 12	74%	38
13 - 16	87%	46
17 - 24	95%	28
25 - 32	98%	10
33 - 48	100%	6
49 - 64		
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

STREAM NAME: North Fork Crystal Creek
ID NUMBER: NCRY2
DATE: 9/6/2007
CREW:

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	0.8	2.1	5.1	15.0	23.7



Pebble Count Worksheet

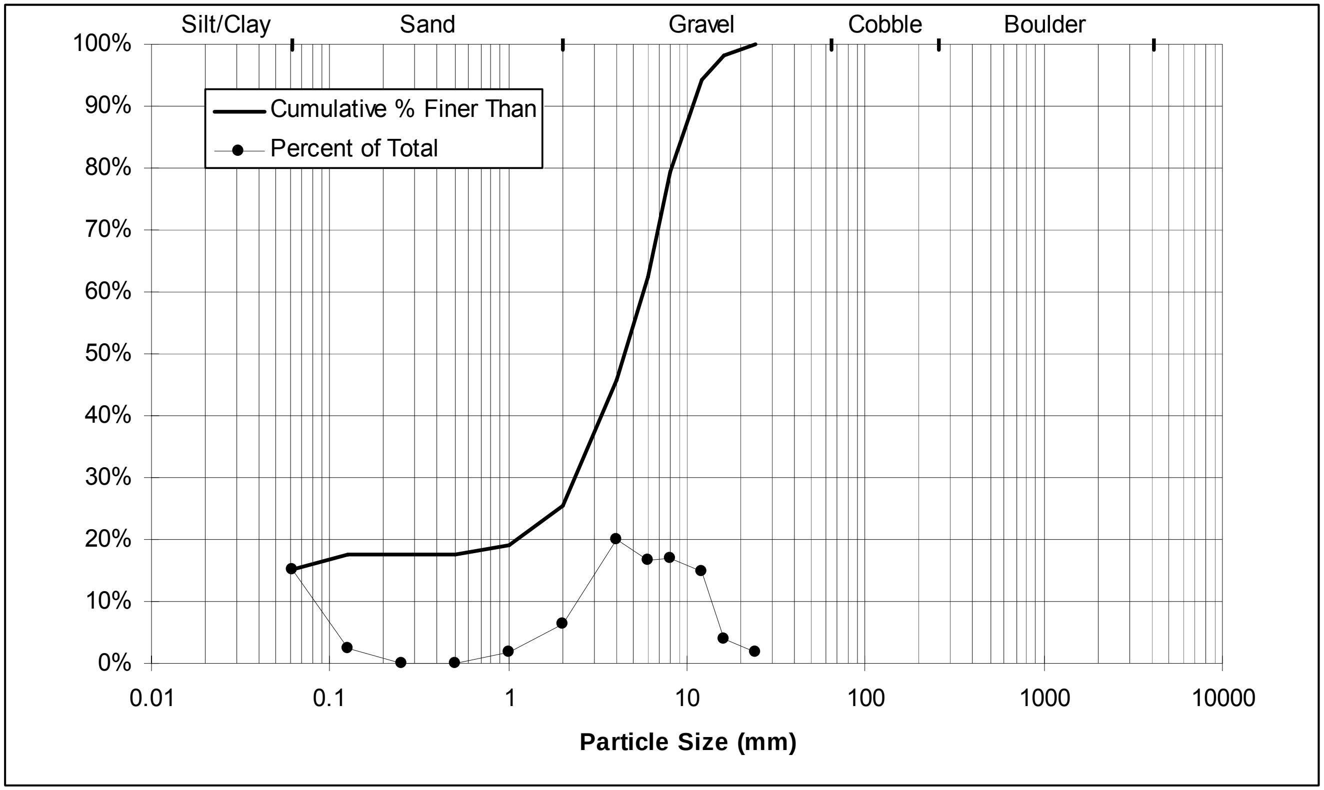
Particle Size (mm)	% finer than	Total Count
<0.062	15%	45
0.062 - 0.125	17%	7
0.126 - .24	17%	0
0.25 - .49	17%	0
0.5 - .99	19%	5
1 - 2	26%	19
3 - 4	46%	60
5 - 6	62%	50
7 - 8	80%	51
9 - 12	94%	44
13 - 16	98%	12
17 - 24	100%	5
25 - 32		
33 - 48		
49 - 64		
65 - 96		
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken at XSA

STREAM NAME: Severy Creek
ID NUMBER: SVRY1
DATE: 10/3/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)

D15	D35	D50	D84	D95
	2.8	4.4	9.0	12.6



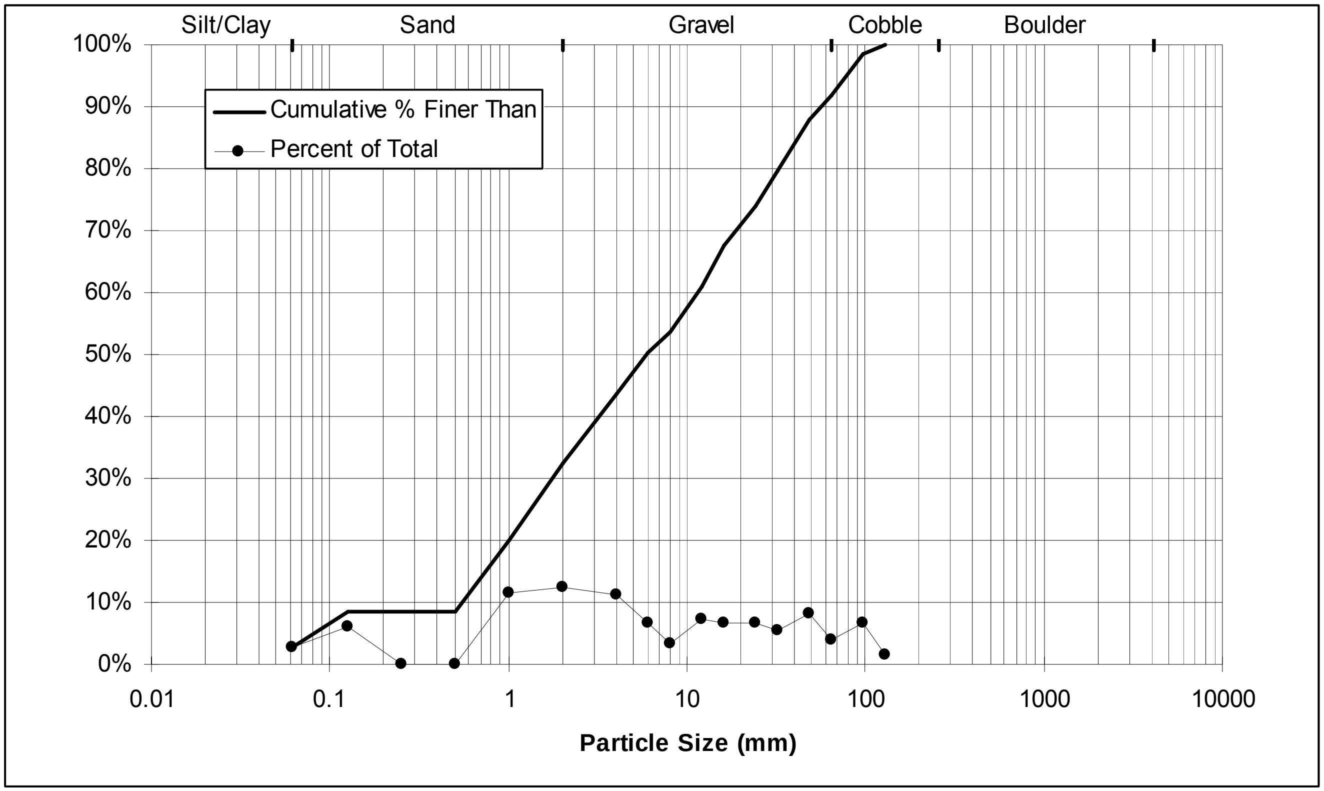
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	3%	8
0.062 - 0.125	9%	18
0.126 - 0.25	9%	0
0.26 - .49	9%	0
0.5 - .99	20%	35
1 - 2	33%	38
3 - 4	44%	34
5 - 6	50%	20
7 - 8	54%	10
9 - 12	61%	22
13 - 16	67%	20
17 - 24	74%	20
25 - 32	80%	17
33 - 48	88%	25
49 - 64	92%	12
65 - 96	98%	20
97 - 128	100%	5
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken just below XSE

STREAM NAME: Severy Creek
ID NUMBER: SVRY2
DATE: 10/3/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	0.7	**2.3**	**5.9**	**39.7**	**78.1**



Pebble Count Worksheet

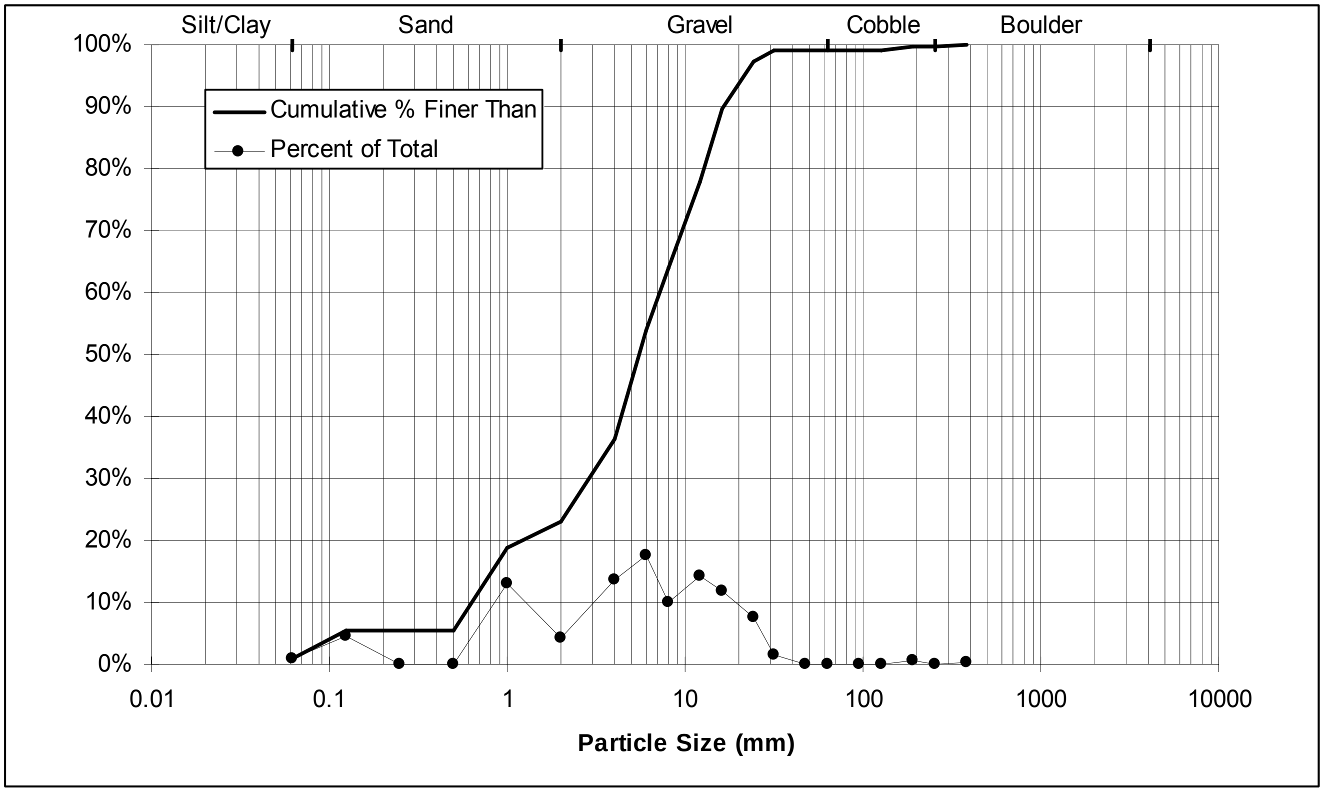
Particle Size (mm)	% finer than	Total Count
<0.062	1%	3
0.062 - 0.125	6%	14
0.126 - 0.24	6%	0
0.25 - .49	6%	0
0.5 - .99	19%	40
1 - 2	23%	13
3 - 4	37%	41
5 - 6	54%	53
7 - 8	64%	30
9 - 12	78%	43
13 - 16	90%	36
17 - 24	97%	23
25 - 32	99%	5
33 - 48	99%	0
49 - 64	99%	0
65 - 96	99%	0
97 - 128	99%	0
129 - 192	100%	2
193 - 256	100%	0
257 - 384	100%	1
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken 10' downstream from XSD

STREAM NAME: Ski Creek
ID NUMBER: SKIC1
DATE: 9/7/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)

D15	D35	D50	D84	D95
0.8	3.7	5.5	13.9	21.1



Pebble Count Worksheet

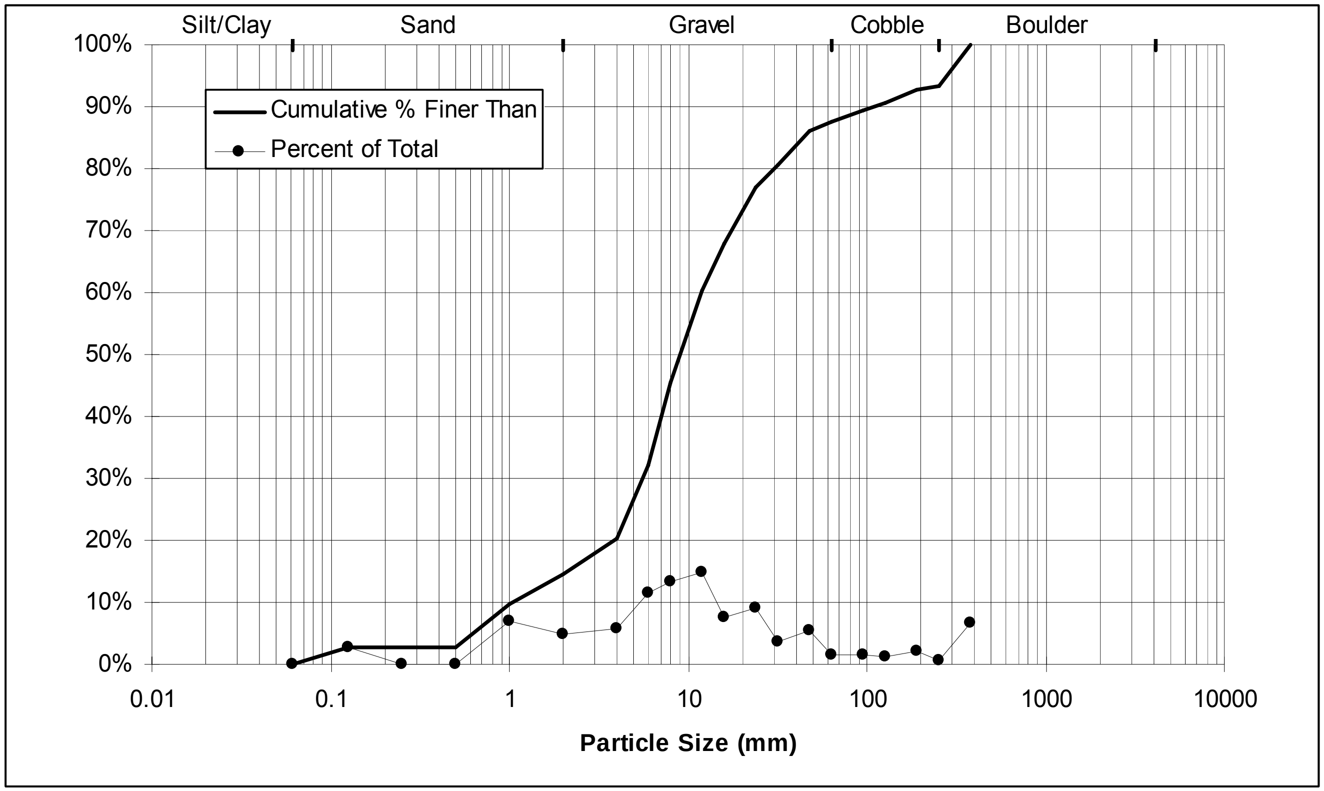
Particle Size (mm)	% finer than	Total Count
<0.062	0%	0
0.062 - 0.125	3%	8
0.126 - 0.24	3%	0
0.25 - .49	3%	0
0.5 - .99	10%	21
1 - 2	15%	15
3 - 4	20%	17
5 - 6	32%	35
7 - 8	45%	40
9 - 12	60%	45
13 - 16	68%	23
17 - 24	77%	27
25 - 32	81%	11
33 - 48	86%	16
49 - 64	88%	5
65 - 96	89%	5
97 - 128	91%	4
129 - 192	93%	6
193 - 256	93%	2
257 - 384	100%	20
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken 6' upstream from XSB

STREAM NAME: Ski Creek
ID NUMBER: SKIC2
DATE: 9/7/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)

D15	D35	D50	D84	D95
2.1	6.4	9.1	41.2	283.3



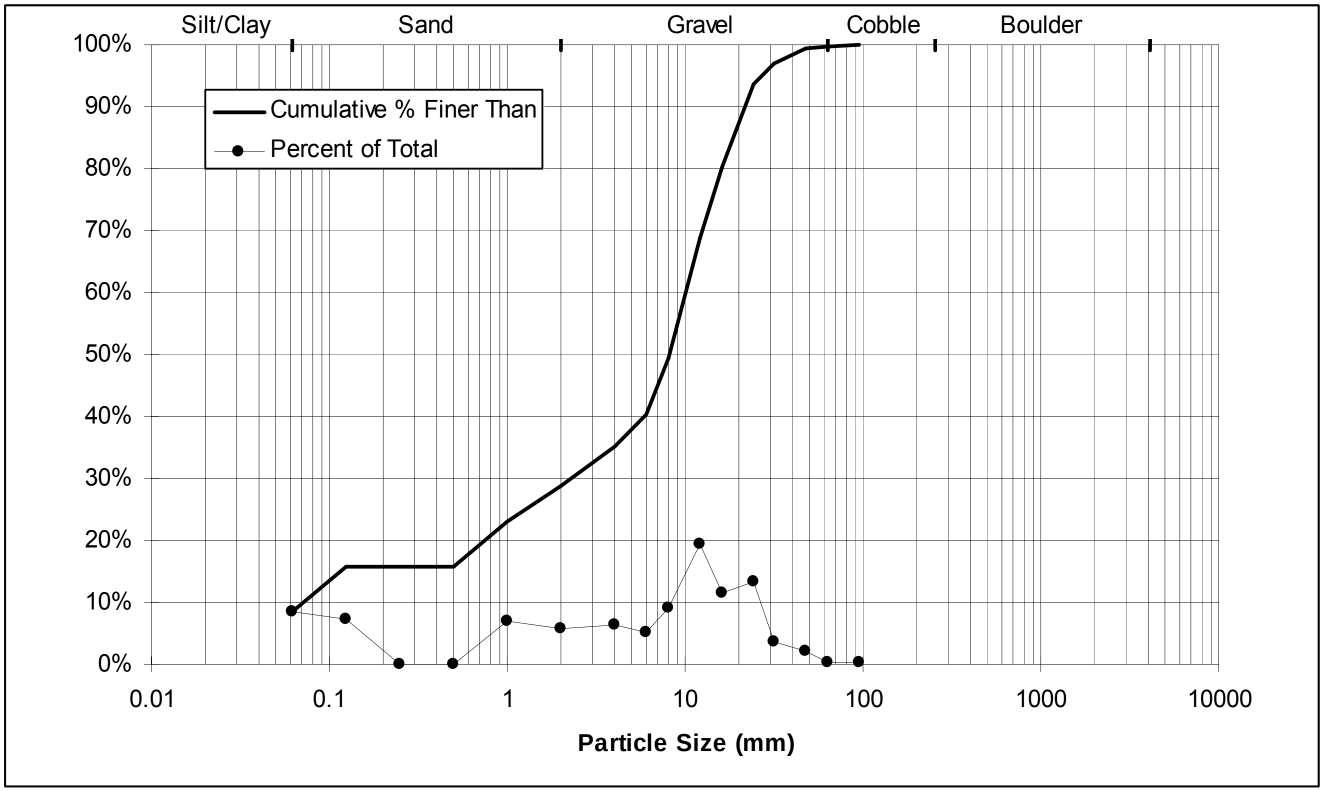
Pebble Count Worksheet

COMMENTS: Bar sample taken 40' DS from XSA

Particle Size (mm)	% finer than	Total Count
<0.062	8%	26
0.062 - 0.125	16%	23
0.126 - 0.25	16%	0
0.26 - 0.49	16%	0
0.5 - .99	23%	22
1 - 2	29%	18
3 - 4	35%	20
5 - 6	40%	16
7 - 8	49%	28
9 - 12	69%	60
13 - 16	80%	36
17 - 24	94%	41
25 - 32	97%	11
33 - 48	99%	7
49 - 64	100%	1
65 - 96	100%	1
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

STREAM NAME: South Catamount Creek
ID NUMBER: SCAT1
DATE: 9/4/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95
	0.1	3.9	8.1	17.9	27.0



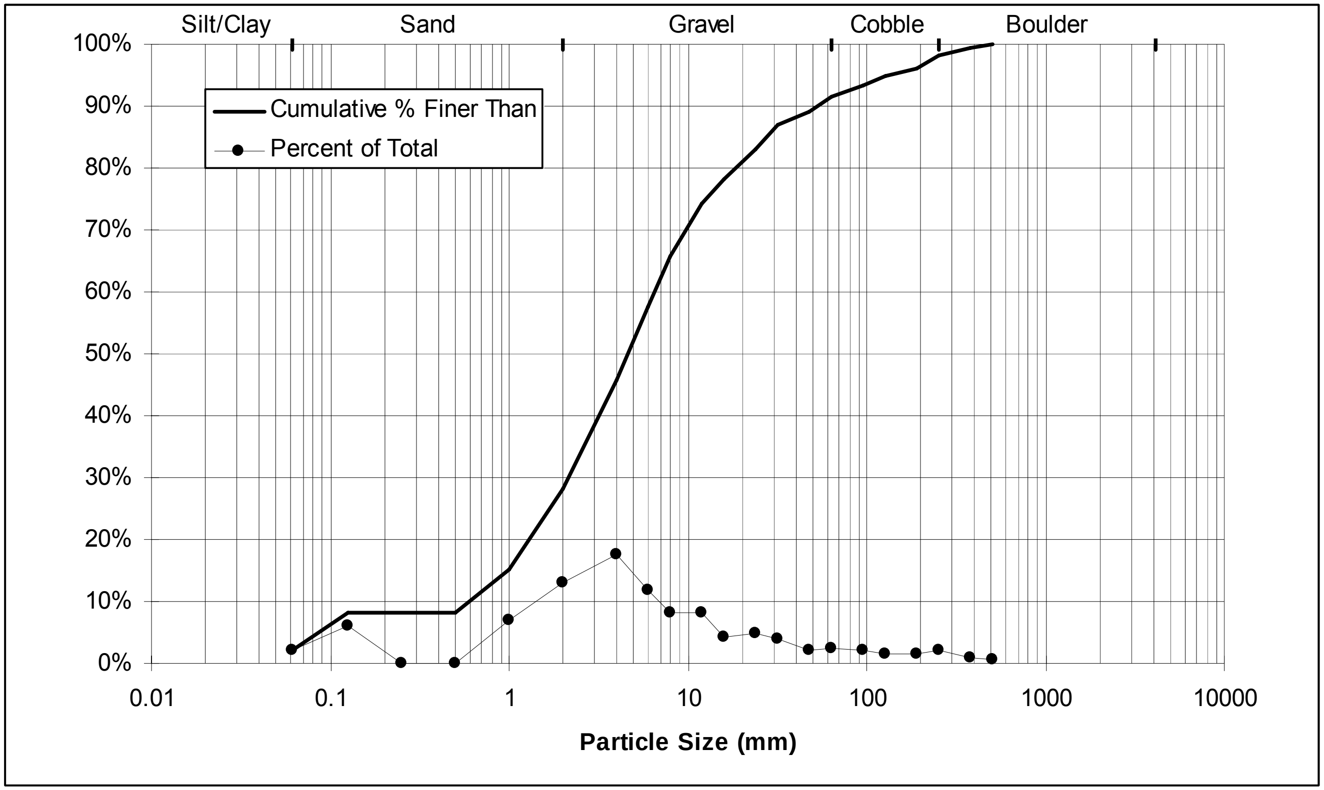
Pebble Count Worksheet

COMMENTS: Bar sample taken 15' upstream from XSE

Particle Size (mm)	% finer than	Total Count
<0.062	2%	6
0.062 - 0.125	8%	18
0.126 - 0.25	8%	0
0.26 - .49	8%	0
0.5 - .99	15%	20
1 - 2	28%	38
3 - 4	46%	51
5 - 6	58%	34
7 - 8	66%	24
9 - 12	74%	24
13 - 16	78%	12
17 - 24	83%	14
25 - 32	87%	11
33 - 48	89%	6
49 - 64	91%	7
65 - 96	93%	6
97 - 128	95%	4
129 - 192	96%	4
193 - 256	98%	6
257 - 384	99%	3
385 - 512	100%	2
513 - 1024		
1025 - 2048		
2049 - 4096		

STREAM NAME: South Catamount Creek
ID NUMBER: SCAT2
DATE: 9/5/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	1.0	**2.6**	**4.6**	**25.7**	**134.7**



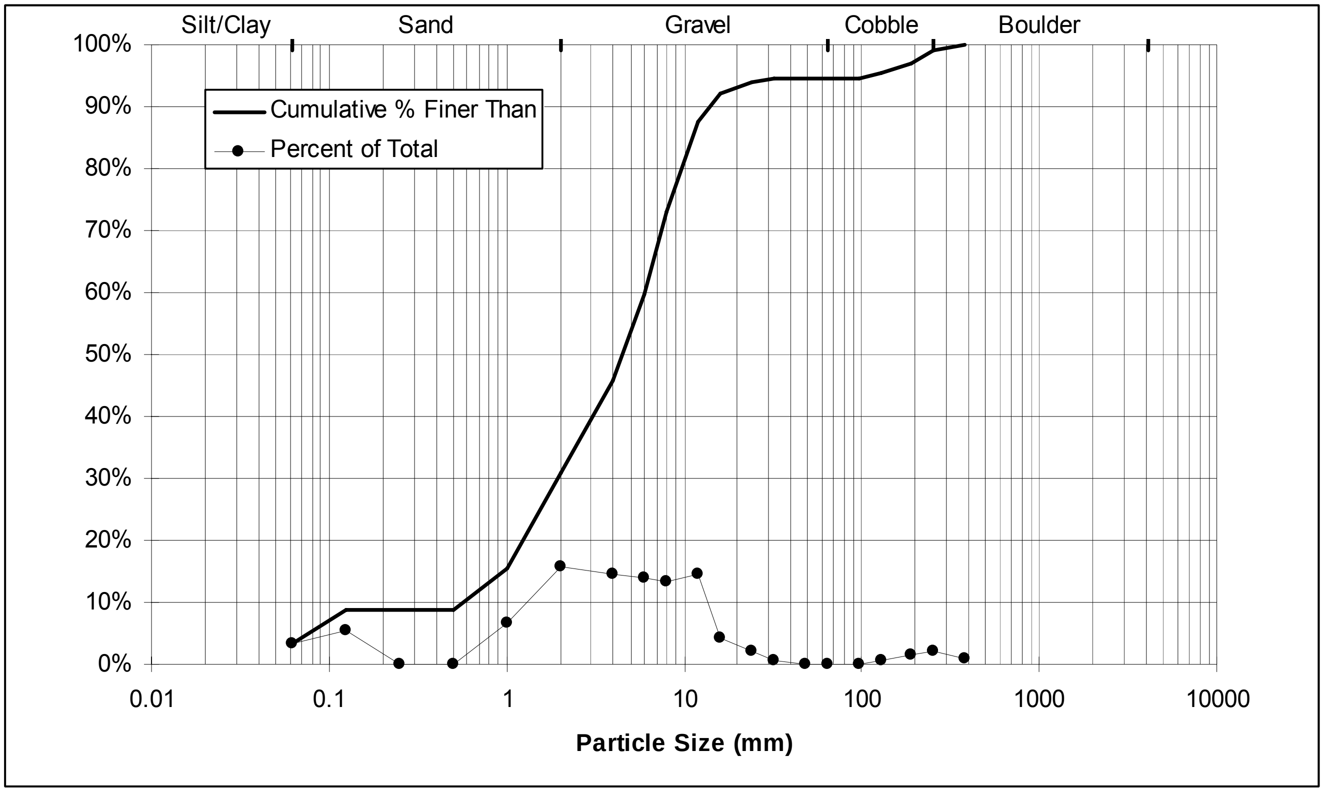
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	3%	10
0.062 - 0.125	9%	16
0.126 - 0.24	9%	0
0.25 - .49	9%	0
0.5 - .99	15%	20
1 - 2	31%	47
3 - 4	46%	44
5 - 6	60%	42
7 - 8	73%	40
9 - 12	88%	44
13 - 16	92%	13
17 - 24	94%	6
25 - 32	95%	2
33 - 48	95%	0
49 - 64	95%	0
65 - 96	95%	0
97 - 128	95%	2
129 - 192	97%	5
193 - 256	99%	6
257 - 384	100%	3
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken between XSD and XSE

STREAM NAME: South Catamount Creek
ID NUMBER: SCAT3
DATE: 9/5/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	1.0	**2.4**	**4.5**	**10.8**	**110.9**



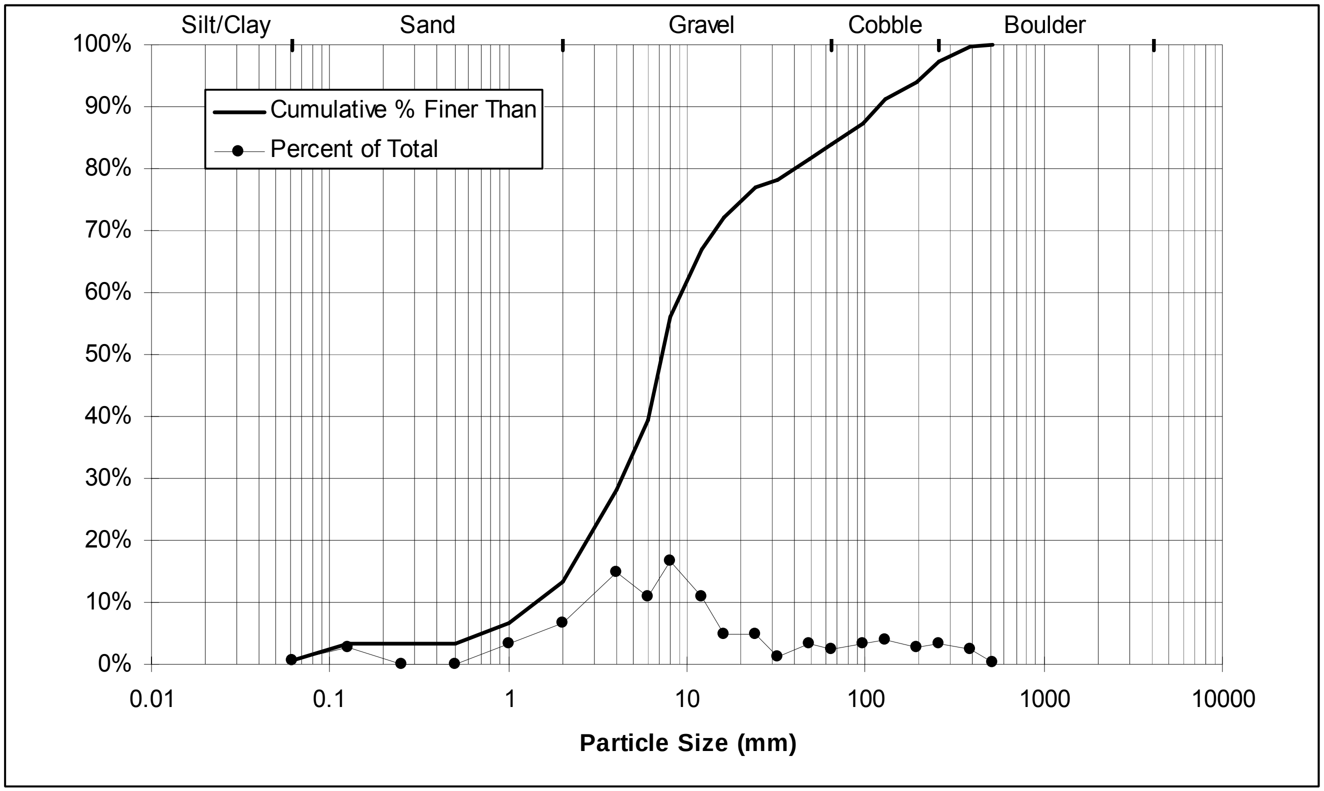
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	1%	2
0.062 - 0.125	3%	8
0.126 - .24	3%	0
0.25 - .49	3%	0
0.5 - .99	7%	10
1 - 2	13%	20
3 - 4	28%	45
5 - 6	39%	33
7 - 8	56%	50
9 - 12	67%	33
13 - 16	72%	15
17 - 24	77%	15
25 - 32	78%	4
33 - 48	82%	10
49 - 64	84%	7
65 - 96	87%	10
97 - 128	91%	12
129 - 192	94%	8
193 - 256	97%	10
257 - 384	100%	7
385 - 512	100%	1
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken Between XSD and XSE

STREAM NAME: West Fork Beaver Creek
ID NUMBER: WBVR1
DATE: 9/21/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	2.2	**5.1**	**7.2**	**64.0**	**209.3**



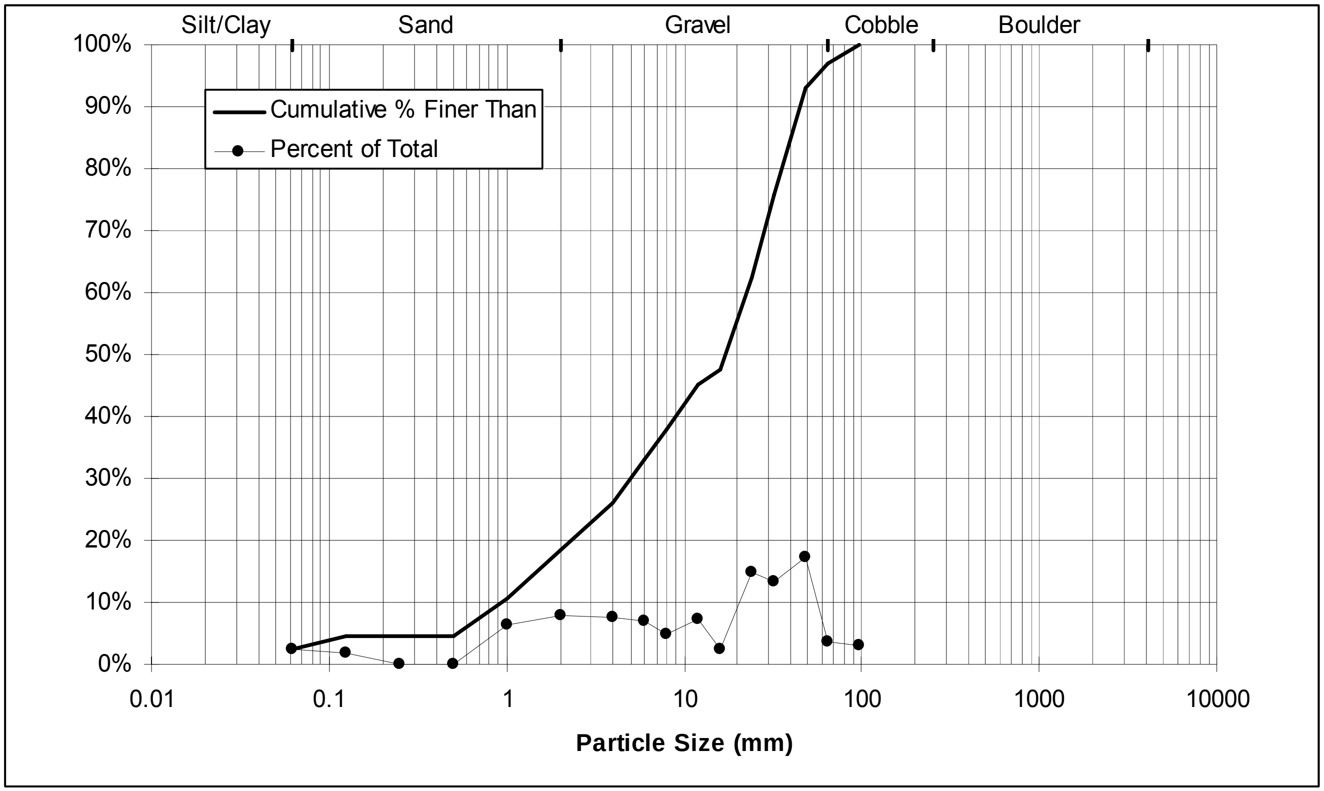
Pebble Count Worksheet

Particle Size (mm)	% finer than	Total Count
<0.062	3%	8
0.062 - 0.125	4%	6
0.126 - .24	4%	0
0.25 - .49	4%	0
0.5 - .99	11%	20
1 - 2	19%	25
3 - 4	26%	24
5 - 6	33%	22
7 - 8	38%	15
9 - 12	45%	23
13 - 16	48%	8
17 - 24	62%	47
25 - 32	76%	42
33 - 48	93%	55
49 - 64	97%	12
65 - 96	100%	10
97 - 128		
129 - 192		
193 - 256		
257 - 384		
385 - 512		
513 - 1024		
1025 - 2048		
2049 - 4096		

COMMENTS: Bar sample taken between XSB and XSC

STREAM NAME: West Fork Beaver Creek
ID NUMBER: WBVR2
DATE: 9/21/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**
	1.5	**6.7**	**17.1**	**38.8**	**55.6**



Appendix J

Riparian Vegetation Summary

2007

Riparian Vegetation Summary

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
BHMR1	9/12/07	Olympus Stylus 400	A (24.36)	Downstream from XSE	Left	13.4	10.5	70	sedge, grass, forb
BHMR1		Olympus Stylus 400	A		Right	11.2	14.0	85	sedge, grass, forb
BHMR1		Olympus Stylus 400	B (31.95)		Left	6.5	10.8	65	sedge, grass, forb
BHMR1		Olympus Stylus 400	B		Right	9.9	5.8	85	sedge, grass, forb
BHMR1		Olympus Stylus 400	C (16.81)		Left	8.2	13.0	45	forb, sedge
BHMR1		Olympus Stylus 400	C		Right	11.8	7.5	50	sedge, grass, forb, shrub
BHMR1		Olympus Stylus 400	D (20.28)		Left	7.4	11.0	80	sedge, grass, forb
BHMR1		Olympus Stylus 400	D		Right	11.2	7.0	75	sedge, grass, forb
BHMR1		Olympus Stylus 400	E (34.42)		Left	21.8	27.0	40	forb, sedge
BHMR1		Olympus Stylus 400	E		Right	27.6	22.3	40	sedge, grass, forb
BHMR2	9/12/07	Olympus Stylus 400	A (25.43)	18' Upstream from XSB	Left	11.5	6.0	40	grass, forb, shrub
BHMR2		Olympus Stylus 400	A		Right	4.9	10.0	80	grass, forb, shrub
BHMR2		Olympus Stylus 400	B (17.59)		Left	2.9	5.6	65	grass, forb, shrub
BHMR2		Olympus Stylus 400	B		Right	13.9	11.1	40	grass, forb, shrub
BHMR2		Olympus Stylus 400	C (18.46)		Left	6.0	10.0	85	grass, forb, shrub
BHMR2		Olympus Stylus 400	C		Right	10.3	6.0	60	sedge, grass
BHMR2		Olympus Stylus 400	D (30.44)		Left	15.5	19.0	50	grass, forb, shrub
BHMR2		Olympus Stylus 400	D		Right	22.0	17.0	95	grass, forb, shrub
BHMR2		Olympus Stylus 400	E (43.02)		Left	16.1	11.5	60	grass, forb, shrub
BHMR2		Olympus Stylus 400	E		Right	11.0	16.0	35	sedge
EBVR1	9/11/07	Olympus Stylus 400	A (20.70)	Downstream from XSB	Left	1.3	5.0	0	rock
EBVR1		Olympus Stylus 400	A		Right	17.1	13.6	10	shrub, grass

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
EBVR1		Olympus Stylus 400	B (24.53)		Left	3.0	5.0	85	grass, forb, shrub
EBVR1		Olympus Stylus 400	B		Right	13.5	9.0	95	grass, forb, shrub
EBVR1		Olympus Stylus 400	C (29.05)		Left	6.8	11.0	95	sedge, grass, forb, shrub
EBVR1		Olympus Stylus 400	C		Right	17.0	12.0	70	grass, forb, shrub
EBVR1		Olympus Stylus 400	D (12.77)		Left	1.9	6.5	80	moss, sedge, forb
EBVR1		Olympus Stylus 400	D		Right	10.1	5.0	2	shrub
EBVR1		Olympus Stylus 400	E (18.48)		Left	8.3	11.0	65	sedge, forb, shrub
EBVR1		Olympus Stylus 400	E		Right	14.2	10.0	20	forb, shrub
EBVR2	9/11/07	Olympus Stylus 400	A (37.63)	6' Upstream from XSE	Left	14.3	19.0	95	sedge, grass, forb
EBVR2		Olympus Stylus 400	A		Right	20.0	16.0	85	sedge, grass, forb
EBVR2		Olympus Stylus 400	B (21.24)		Left	9.2	15.0	65	sedge, grass, forb
EBVR2		Olympus Stylus 400	B		Right	14.3	11.0	85	sedge, grass, forb
EBVR2		Olympus Stylus 400	C (20.46)		Left	9.2	13.0	55	sedge, grass, forb
EBVR2		Olympus Stylus 400	C		Right	13.4	11.0	85	sedge, grass, forb
EBVR2		Olympus Stylus 400	D (17.45)		Left	7.7	12.5	70	sedge, grass, forb
EBVR2		Olympus Stylus 400	D		Right	13.2	10.0	75	sedge, grass, forb
EBVR2		Olympus Stylus 400	E (19.66)		Left	9.8	14.0	65	sedge, grass, forb
EBVR2		Olympus Stylus 400	E		Right	14.6	11.0	55	sedge, grass, forb
GLEN1	9/5/07	Olympus Stylus 400	A (20.03)	at XSE	Left	9.5	12.9	20	sedge, grass, forb, shrub
GLEN1		Olympus Stylus 400	A		Right	13.0	8.5	30	sedge, grass, forb, shrub
GLEN1		Olympus Stylus 400	B(16.57)		Left	6.3	9.5	15	grass, forb, shrub
GLEN1		Olympus Stylus 400	B		Right	11.5	5.7	75	sedge, grass, forb, shrub
GLEN1		Olympus Stylus 400	C (17.31)		Left	5.9	9.9	30	sedge
GLEN1		Olympus Stylus 400	C		Right	9.3	5.0	50	forb, sedge

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
GLEN1		Olympus Stylus 400	D (49.99)		Left	15.1	19.9	25	sedge, grass, forb
GLEN1		Olympus Stylus 400	D		Right	31.1	27.2	5	tree, shrub
GLEN1		Olympus Stylus 400	E (24.29)		Left	8.0	15.5	5	forb, sedge
GLEN1		Olympus Stylus 400	E		Right	19.7	16.0	20	grass, shrub
NCAT1	9/4/07	Olympus Stylus 400	A (57.53)	at XSB	Left	12.5	17.0	85	grass, forb, shrub, moss
NCAT1		Olympus Stylus 400	A		Right	16.5	12.0	80	sedge
NCAT1		Olympus Stylus 400	B (58.83)		Left	46.0	50.0	100	sedge
NCAT1		Olympus Stylus 400	B		Right	48.8	45.0	70	forb, sedge
NCAT1		Olympus Stylus 400	C (38.85)		Left	16.7	21.5	70	grass, shrub, sedge
NCAT1		Olympus Stylus 400	C		Right	30.3	26.0	60	sedge, grass
NCAT1		Olympus Stylus 400	D (44.77)		Left	26.0	30.0	35	sedge, shrub
NCAT1		Olympus Stylus 400	D		Right	32.5	29.3	80	sedge
NCAT1		Olympus Stylus 400	E (60.78)		Left	42.8	47.0	60	forb, sedge
NCAT1		Olympus Stylus 400	E		Right	45.1	41.0	40	sedge
NCAT2	9/4/07	Olympus Stylus 400	A (29.17)	3' Downstream from XSB	Left	12.0	16.5	95	sedge, grass, forb
NCAT2		Olympus Stylus 400	A		Right	16.2	12.0	90	sedge, grass, forb
NCAT2		Olympus Stylus 400	B (40.59)		Left	8.8	13.0	90	sedge, grass, forb
NCAT2		Olympus Stylus 400	B		Right	11.8	8.0	70	grass, shrub, sedge
NCAT2		Olympus Stylus 400	C (42.34)		Left	12.4	17.0	80	sedge, grass, forb
NCAT2		Olympus Stylus 400	C		Right	16.0	11.5	75	sedge, grass, forb
NCAT2		Olympus Stylus 400	D (29.78)		Left	6.4	10.5	50	sedge, grass, forb
NCAT2		Olympus Stylus 400	D		Right	9.7	5.0	40	forb, sedge, shrub
NCAT2		Olympus Stylus 400	E (34.25)		Left	10.5	14.0	55	moss, sedge, shrub
NCAT2		Olympus Stylus 400	E		Right	13.1	9.5	40	sedge, forb, shrub
NCRY1	9/5/07	Olympus Stylus 400	A (54.53)	at XSA	Left	31.7	35.0	10	sedge, shrub

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
NCRY1		Olympus Stylus 400	A		Right	38.8	36.0	10	grass
NCRY1		Olympus Stylus 400	B (51.31)		Left	39.2	42.0	20	sedge, grass, forb
NCRY1		Olympus Stylus 400	B		Right	41.5	38.0	5	tree, grass
NCRY1		Olympus Stylus 400	C (43.61)		Left	26.7	29.0	25	moss, grass, forb
NCRY1		Olympus Stylus 400	C		Right	28.7	25.0	1	moss, grass
NCRY1		Olympus Stylus 400	D (41.53)		Left	30.0	32.8	5	moss, grass
NCRY1		Olympus Stylus 400	D		Right	31.5	29.5	5	moss, grass, shrub
NCRY1		Olympus Stylus 400	E (37.98)		Left	30.0	33.7	20	sedge, grass
NCRY1		Olympus Stylus 400	E		Right	34.3	31.0	5	moss, forb, grass, shrub
NCRY2	9/6/07	Olympus Stylus 400	A (24.23)	Upstream from XSE	Left	11.0	15.5	5	moss, forb
NCRY2		Olympus Stylus 400	A		Right	20.6	15.0	15	moss, grass, forb
NCRY2		Olympus Stylus 400	B (35.00)		Left	21.4	25.0	15	moss, forb, grass, shrub
NCRY2		Olympus Stylus 400	B		Right	30.0	26.0	40	moss, forb, shrub
NCRY2		Olympus Stylus 400	C (33.82)		Left	19.3	24.0	10	moss, grass, forb
NCRY2		Olympus Stylus 400	C		Right	27.4	23.0	10	moss, forb
NCRY2		Olympus Stylus 400	D (28.71)		Left	14.5	18.3	2	moss, grass
NCRY2		Olympus Stylus 400	D		Right	22.9	19.3	2	moss
NCRY2		Olympus Stylus 400	E (34.35)		Left	5.3	7.1	1	grass, forb
NCRY2		Olympus Stylus 400	E		Right	18.4	15.6	10	moss
OILC1		Olympus Stylus 400	A (43.95)	XSD <> XSE	Left	7.2	9.0		NO SURVEY
OILC1		Olympus Stylus 400	A	right bank	Right	11.7	8.5		NO SURVEY
OILC1		Olympus Stylus 400	B (41.34)		Left	9.8	8.5		NO SURVEY
OILC1		Olympus Stylus 400	B		Right	15.6	16.6		NO SURVEY
OILC1		Olympus Stylus 400	C (32.67)		Left	15.7	14.5		NO SURVEY
OILC1		Olympus Stylus 400	C		Right	20.7	22.2		NO SURVEY

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
OILC1		Olympus Stylus 400	D (33.98)		Left	12.6	11.0		NO SURVEY
OILC1		Olympus Stylus 400	D		Right	21.0	22.5		NO SURVEY
OILC1		Olympus Stylus 400	E (38.35)		Left	8.9	7.0		NO SURVEY
OILC1		Olympus Stylus 400	E		Right	16.7	18.5		NO SURVEY
SVRY1	10/3/07	Olympus Stylus 400	A (13.70)	at XSA	Left	2.0	3.0	80	sedge
SVRY1		Olympus Stylus 400	A		Right	7.8	4.0	80	sedge, shrub
SVRY1		Olympus Stylus 400	B (11.83)		Left	5.0	8.0	85	sedge, shrub
SVRY1		Olympus Stylus 400	B		Right	8.9	7.0	75	sedge, shrub
SVRY1		Olympus Stylus 400	C (14.82)		Left	4.9	8.0	70	sedge, shrub
SVRY1		Olympus Stylus 400	C		Right	7.8	5.0	80	sedge, shrub
SVRY1		Olympus Stylus 400	D (12.09)		Left	4.6	8.0	65	sedge, shrub
SVRY1		Olympus Stylus 400	D		Right	8.6	5.2	30	moss, forb, sedge, shrub
SVRY1		Olympus Stylus 400	E (9.57)		Left	2.7	7.0	80	sedge, forb, shrub
SVRY1		Olympus Stylus 400	E		Right	6.6	4.0	65	moss, forb, sedge, shrub
SVRY2	10/3/07	Olympus Stylus 400	A (95.72)	Downstream from XSE	Left	20.2	28.0	0	gravel
SVRY2		Olympus Stylus 400	A		Right	44.3	37.0	0	gravel
SVRY2		Olympus Stylus 400	B (116.96)		Left	32.0	35.0	0	gravel
SVRY2		Olympus Stylus 400	B		Right	45.0	47.0	0	gravel
SVRY2		Olympus Stylus 400	C (158.61)		Left	61.0	65.0	0	gravel
SVRY2		Olympus Stylus 400	C		Right	75.8	74.0	0	gravel
SVRY2		Olympus Stylus 400	D (156.58)		Left	75.9	79.0	0	gravel
SVRY2		Olympus Stylus 400	D		Right	90.1	87.0	0	gravel
SVRY2		Olympus Stylus 400	E (211.52)		Left	80.0	83.0	0	gravel
SVRY2		Olympus Stylus 400	E		Right	85.0	81.0	0	gravel
SKIC1	9/7/07	Olympus Stylus 400	A (15.04)		Left	6.2	8.0	10	moss, forb, grass

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
SKIC1		Olympus Stylus 400	A		Right	11.1	8.5	20	moss, forb, grass
SKIC1		Olympus Stylus 400	B (14.15)		Left	4.9	7.0	2	moss, forb
SKIC1		Olympus Stylus 400	B		Right	10.5	7.5	10	moss, forb, grass, tree
SKIC1		Olympus Stylus 400	C (16.60)		Left	4.1	7.0	10	forb, grass
SKIC1		Olympus Stylus 400	C		Right	12.2	9.0	30	grass, forb, tree, shrub
SKIC1		Olympus Stylus 400	D (33.57)		Left	23.2	19.5	10	forb, grass
SKIC1		Olympus Stylus 400	D		Right	16.4	19.5	2	moss, forb, grass
SKIC1		Olympus Stylus 400	E (21.78)		Left	19.2	15.0	35	forb, grass
SKIC1		Olympus Stylus 400	E		Right	14.5	17.5	10	moss, forb, grass
SKIC2	9/9/07	Olympus Stylus 400	A (50.70)	6' Upstream from XSB	Left	32.8	36.0	15	grass, forb, shrub
SKIC2		Olympus Stylus 400	A		Right	40.7	35.0	20	grass, forb, tree, shrub, moss
SKIC2		Olympus Stylus 400	B (46.73)		Left	29.4	35.5	2	moss, shrub
SKIC2		Olympus Stylus 400	B		Right	35.1	32.5	15	moss, shrub
SKIC2		Olympus Stylus 400	C (29.76)		Left	2.6	6.0	5	forb, grass, sedge
SKIC2		Olympus Stylus 400	C		Right	10.6	7.0	1	moss, grass
SKIC2		Olympus Stylus 400	D (28.31)		Left	4.3	11.0	5	moss, forb, shrub
SKIC2		Olympus Stylus 400	D		Right	11.5	12.0	1	moss
SKIC2		Olympus Stylus 400	E (41.90)		Left	24.9	31.0	2	moss, forb
SKIC2		Olympus Stylus 400	E		Right	31.1	26.0	1	moss
SCAT1	9/5/07	Olympus Stylus 400	A (22.96)	40' below XSA	Left	6.4	11.5	35	grass, forb, sedge
SCAT1		Olympus Stylus 400	A		Right	11.7	8.9	55	moss, forb, grass
SCAT1		Olympus Stylus 400	B (20.83)		Left	10.5	14.0	35	moss, forb, grass
SCAT1		Olympus Stylus 400	B		Right	18.3	14.0	40	moss, forb, shrub, grass

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
SCAT1		Olympus Stylus 400	C (21.86)		Left	4.8	10.0	10	moss, forb, grass
SCAT1		Olympus Stylus 400	C		Right	13.7	9.6	15	forb, sedge, grass
SCAT1		Olympus Stylus 400	D (18.12)		Left	5.5	12.0	30	forb, sedge, grass
SCAT1		Olympus Stylus 400	D		Right	11.7	6.0	35	forb, grass
SCAT1		Olympus Stylus 400	E (24.02)		Left	8.8	16.0	30	moss, forb, sedge, grass
SCAT1		Olympus Stylus 400	E		Right	15.5	10.0	25	moss, forb, sedge, grass
SCAT2	9/5/07	Olympus Stylus 400	A (28.57)	15' Upstream from XSE	Left	3.9	9.0	5	grass, forb
SCAT2		Olympus Stylus 400	A		Right	15.0	9.5	15	moss, forb
SCAT2		Olympus Stylus 400	B (17.05)		Left	3.0	7.0	5	grass, forb
SCAT2		Olympus Stylus 400	B		Right	11.3	7.0	15	moss, forb, grass
SCAT2		Olympus Stylus 400	C (19.81)		Left	2.2	6.0	10	grass, forb
SCAT2		Olympus Stylus 400	C		Right	13.2	9.0	5	moss, forb, grass
SCAT2		Olympus Stylus 400	D (38.50)		Left	15.4	12.7	20	moss, forb, shrub, grass
SCAT2		Olympus Stylus 400	D		Right	7.6	11.0	15	moss, forb, shrub, grass
SCAT2		Olympus Stylus 400	E (18.95)		Left	3.8	7.0	25	grass, forb, shrub
SCAT2		Olympus Stylus 400	E		Right	11.2	8.0	15	moss, forb, grass
SCAT3	9/5/07	Olympus Stylus 400	A (44.32)		Left	26.0	29.4	45	sedge, grass
SCAT3		Olympus Stylus 400	A		Right	29.2	25.2	60	sedge, grass
SCAT3		Olympus Stylus 400	B (32.19)		Left	12.1	16.0	10	sedge, tree
SCAT3		Olympus Stylus 400	B		Right	15.5	12.7	30	sedge, grass, forb
SCAT3		Olympus Stylus 400	C (15.79)		Left	3.0	6.8	60	sedge, grass, forb
SCAT3		Olympus Stylus 400	C		Right	6.8	3.1	30	sedge, grass, forb
SCAT3		Olympus Stylus 400	D (19.60)		Left	8.2	11.6	75	sedge, grass
SCAT3		Olympus Stylus 400	D		Right	10.8	8.1	80	sedge, grass, forb

Site	Date	Camera	Cross Section and pin to pin distance in feet	Bar Sample	Bank	Bank - Distance from LPIN (ft)	Camera - Distance from LPIN (ft)	Percent Cover	Comments
SCAT3		Olympus Stylus 400	E (18.48)		Left	5.1	8.2	40	sedge, grass, forb, shrub
SCAT3		Olympus Stylus 400	E		Right	6.5	3.8	25	sedge, forb, shrub
WBVR1	10/8/07	Olympus Stylus 400	A (36.64)	XSD <> XSE	Left	15.9	14.5	55	forb, moss
WBVR1		Olympus Stylus 400	A		Right	31.0	32.5	15	grass
WBVR1		Olympus Stylus 400	B (20.98)		Left	4.3	30.0	20	grass, sedge, shrub
WBVR1		Olympus Stylus 400	B		Right	15.5	17.5	30	sedge, shrub
WBVR1		Olympus Stylus 400	C (28.83)		Left	4.0	0.7	35	forb, grass, shrub
WBVR1		Olympus Stylus 400	C		Right	17.0	18.0	30	sedge, shrub
WBVR1		Olympus Stylus 400	D (34.18)		Left	9.7	14.0	20	grass, moss, shrub
WBVR1		Olympus Stylus 400	D		Right	25.0	27.0	25	sedge, shrub
WBVR1		Olympus Stylus 400	E (29.56)		Left	6.0	12.0	40	moss, sedge, shrub
WBVR1		Olympus Stylus 400	E		Right	20.0	21.5	60	grass, sedge
WBVR2	9/21/07	Olympus Stylus 400	A (44.40)	XSB <> XSC	Left	11.0	18.0	0	gravel
WBVR2		Olympus Stylus 400	A		Right	24.0	19.0	0	gravel
WBVR2		Olympus Stylus 400	B (90.60)		Left	21.0	26.0	0	gravel
WBVR2		Olympus Stylus 400	B		Right	37.0	31.0	0	gravel
WBVR2		Olympus Stylus 400	C (151.93)		Left	104.0	108.0	25	grass, shrub
WBVR2		Olympus Stylus 400	C		Right	123.0	119.0	0	gravel
WBVR2		Olympus Stylus 400	D (149.43)		Left	104.5	108.0	0	gravel
WBVR2		Olympus Stylus 400	D		Right	118.0	114.0	0	gravel
WBVR2		Olympus Stylus 400	E (96.25).		Left	33.4	39.0	0	gravel
WBVR2		Olympus Stylus 400	E		Right	48.9	43.0	0	gravel