Annual Progress Report for 2008

Monitoring the Effectiveness and Validating Response to the Road Related Mitigation Practices Implemented on the Pikes Peak Highway

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Executive Summary

Monitoring the Effectiveness and Validating Response to the Road Related Mitigation Practices Implemented on the Pikes Peak Highway

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This is the sixth annual report documenting the monitoring efforts on the Pikes 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.), (U.S. Department of Justice 2002). The original Monitoring 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 Pikes 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 seven and continues to the summit of Pikes Peak. The only resurfacing treatment used on the highway for mitigation purposes is asphalt paving. Approximately 6 miles of the highway have been paved since the onset of the mitigation project. Highway improvements continued in 2008 including the start of construction on two new sediment ponds in Basin 5 (Boehmer and East Fork of Beaver Creek Watersheds) and installation of a shotcrete ditch approximately 7,350 feet long just above mile marker eight. Construction on the sediment ponds is scheduled for completion in 2009 and will be included in the Monitoring Study after completion. Several riprap aprons were constructed on curves in Basin 5 to dissipate energy during rain events, but these features will not be included in the Monitoring Study because Basin 5 is scheduled for paving in 2009. Paving was not completed in Basin 5 in 2008 as a result of a nationwide shortage of a polymer used in asphalt oil, which is especially important in cold climate applications of asphalt. In addition, 4,968 tons of gravel were added to the road surface and 175 tons of gravel were removed from the rock weirs (personal communication with Jack Glavan, City of Colorado Springs, Capital Projects Manager). Road surface data were gathered during the 2008 monitoring season on 10 of the original 11 road reaches. Road reach 154RX was paved in 2006 and will no longer be surveyed.

The field procedure for monitoring sediment accumulation in the rock weirs was modified in 2008 to simplify both instrument requirements for the survey and software requirements for subsequent data reduction and analysis as well as to allow for a more consistent comparison of volumetric change from survey to survey. A fixed area was defined and monumented within each rock weir to be surveyed each time, and compared form survey to survey or year to year. The sampling protocol for monitoring cut slope silt fences with lower fences that cross rock surfaces was also modified in 2008. Using silt fences to monitor sediment transport has proven to be difficult where silt fences cross rock surfaces as indicated by the frequent breaching or failure that has occurred over the

course of the monitoring. The primary cause of silt fence failure has been that fence material cannot be reliably fastened to the frequently present rock surfaces, particularly lower fences at higher elevations. The lower cut slope silt fences at three monitoring sites were removed and two permanent survey cross sections were established. Monitoring consists of surveying the surface elevation, relative to the benchmark, of the cut slope cross sections to document erosion rates.

Precipitation measurements from the three rain gauges and the NRCS Snotel site, located at Glen Cove did not indicate rainfall amounts greater than average for 2008. As a result, the silt fences were not exposed to high runoff and erosion activities as in prior years and less time was allocated to cleaning out and repairing silt fences, allowing for increased opportunity to monitor other sites. Silt fences from 13 cut slope and 29 fill slope sites were monitored in 2008. Only two of the cut slope silt fences and 12 of the 58 fill slope silt fences were breached during the 2008 field season. All silt fence sites were visited on a weekly basis, sediment volume measured, and silt fences evaluated for repair or replacement.

Eighteen of the original 20 drainage ditches were surveyed in 2008. Site 092DD was paved in 2005 and site 107DD was lined with shotcrete in 2006, eliminating the need for further monitoring. Most drainage ditches will be paved or lined with shotcrete once the highway is paved and will no longer need to be surveyed unless visual inspection provides evidence of failure, in which case cross sections will be established to document change. 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 drainage ditch. Nine of the untreated drainage ditches are associated with road reaches.

Sixty-four of the original 115 conveyance channels were surveyed in 2008 and one new conveyance channel (244CC) was established. All of the conveyance channels surveyed in 2007 were surveyed in 2008, including a sub-sample of 13 conveyance channels specifically to compare treated (7) and untreated (6) road sections. Twenty-three conveyance channels located below established rock weirs and one conveyance channel below sediment pond 199RW were surveyed in 2008. For safety reasons, conveyance channel 118CC located below rock weir 242RW was not surveyed due to the exposure of large boulders and the general instability of the slope following weir failure. The field crew will continue to monitor 118CC each year, including photographing and recording observations in the field notes to document changes in conveyance channel geometry, but the site is not likely to be surveyed. Conveyance channel 232CC was surveyed for the first time since 2005. This site encompasses Glen Cove Creek and contains five cross sections instead of three. Water from Ski Creek is diverted into conveyance channel 232CC. In addition, three conveyance channels, 018CC, 020CC, and 244CC (new site), associated with the Rocky Mountain Field Institute's erosion control and mitigation site above North Fork of Crystal Creek were surveyed. Because monitoring the full set of 116 conveyance channels is not feasible during each field season, the field crew will continue to survey a sub-sample of 40 conveyance channels each year and survey additional channels as time permits.

Twenty-eight sediment traps were monitored in 2008, including 26 rock weirs and two sediment ponds. All but one site, 162RW, were surveyed at least twice to monitor their effectiveness in trapping sediment from winter and summer runoff. At these sites, the rock weirs were surveyed and sediment volume was measured in the silt fences located down slope of the rock weirs (17 rock weirs have associated silt fences). Of the 28 sites, 21 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, five of the silt fences associated with the rock weirs were breached in 2008.

The primary focus of the validation monitoring is to address the condition of the riparian wetland and aquatic systems along the Pikes Peak Highway. Stream channel surveys were completed on Boehmer Creek, East Fork of Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork of Crystal Creek, Oil Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork of Beaver Creek in 2008. 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 2008, stream channel surveys included only cross section surveys, thalweg surveys, vegetation surveys, pebble counts, and grab samples.

Numerous sediment grab samples were collected from the cut slope and fill slope silt fences, the rock weirs and their associated silt fences, and from the stream bars throughout the 2008 season. A subset of these was selected to be analyzed in the laboratory for particle size distribution. The balance of samples will be analyzed only if the variability in the particle size distribution of the subset of samples chosen for initial analysis warrants additional analysis. Because laboratory analyses for the 2008 grab samples were not complete at the time of this report, they will be included in the 2009 Annual Report. Laboratory analyses for 2005, 2006, and 2007 field seasons have been completed and a summary of particle size distributions and graphs are presented in this report. Comparing the distribution of material captured in traps near the highway to sediment deposits (bars) in the streams will validate response to highway mitigation practices.

Included with the full report is a data DVD containing all survey data (field and post processing) plus digital photographs (recommended viewing) for all sites for the 2008 season.

INTRODUCTION

The proposed actions presented in the Pikes Peak Highway Drainage, Erosion and Sediment Control Plan Environmental Assessment (Hydrosphere Resource Consultants 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 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.), (U.S. Department of Justice 2002). The Monitoring 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. Because 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 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 the 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, 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 rock weir with only the water percolating through a porous berm, 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 (as much as 2 miles) of both pavement and ditch line into single culverts and conveyance channels, 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 U.S. 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 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 6 miles of the highway have been paved since the onset of the mitigation project. In 2008, the highway crew began work on Basin 5 (Boehmer and East Fork of Beaver Creek Watersheds), which included starting construction on two new sediment ponds above East Fork of Beaver Creek, and installation of a shotcrete ditch approximately 7,350 feet long just above mile marker 18. Several riprap aprons were constructed on curves in Basin 5 to dissipate energy during rain events, but these features will not be included in the Monitoring Study because Basin 5 is scheduled for paving in 2009. Paving was not completed in Basin 5 in 2008 as a result of a nationwide shortage of a polymer used in asphalt oil, which is especially important in cold climate applications of asphalt. In addition, 4,968 tons of gravel were added to the road surface and 175 tons of gravel were removed from the 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 reach, conveyance channel and drainage ditch, rock weir and sediment pond, 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 alphanumeric 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 stream reach (e.g., OILC1 = Oil Creek, Reach 1; SVRY2 = Severy Creek, Reach 2; etc.).

Every site has at least three benchmarks or control points for use as relative reference points to complete repeated, spatially similar, three dimensional surveys. The benchmarks are monumented by 2.5 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 benchmarks 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 2008, one new conveyance channel monitoring site was established (244CC) above the North Fork of Crystal Creek. 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 2008 monitoring season.

In 2008, in response to the dislodging of several benchmarks during the 2007 season as the result of structural failures of rock weirs, the field crew completed a field evaluation of each monitoring site and established permanent benchmarks outside the area of risk for each waypoint as needed. Where possible, this benchmark is an 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. Three new permanent benchmarks were established at sites 233RW, 234RW, 236RW, 238RW, and 242RW. Sites 006RW, 008RW, 153RW, 179RW, 239RW, and 240RW required the relocation of one or more benchmarks.

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 2008 field season. Each annual report beginning in 2007 will consist of a description of the protocol used to monitor each metric of concern as defined by the Monitoring Plan or its amendment, 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 site 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 quality assurance and quality control assessment of 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 Computer Corp.) 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 10 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 (May 7–October 9, 2008) for the three monitoring sites is listed in Table 1. In 2008, seasonal totals varied between the three sites with the mid elevation receiving the most precipitation (Figure 1). Daily precipitation is presented in Appendix B and the basic rain gauge data (date-time stamp) is presented on the data DVD 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 the NRCS Snotel site can be obtained from:

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

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

Table 1. Location, precipitation accumulation, and dates of operation for three rain gauges on Pikes Peak, 2008.

Gauge ID	Latitude (hddd˚mm.mmm)	Longitude (hddd˚mm.mmm)	Altitude (ft)	Total Precipitation (in)	Dates of Operation 2008
075RG	N38 53.797	W105 03.890	10,109	8.78	5/07–10/09
076RG	N38 52.582	W105 03.970	11,810	11.25	5/07–10/09
077RG	N38 51.783	W105 03.999	13,069	8.50	5/07–10/09

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 surrounding Pikes Peak. 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 estimating 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 five intervals along each selected road segment (i.e., 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 2.5 foot piece of rebar driven into the road surface at the upper edge of the fill slope. In addition, permanently monumented baseline elevation points (benchmarks) 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 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

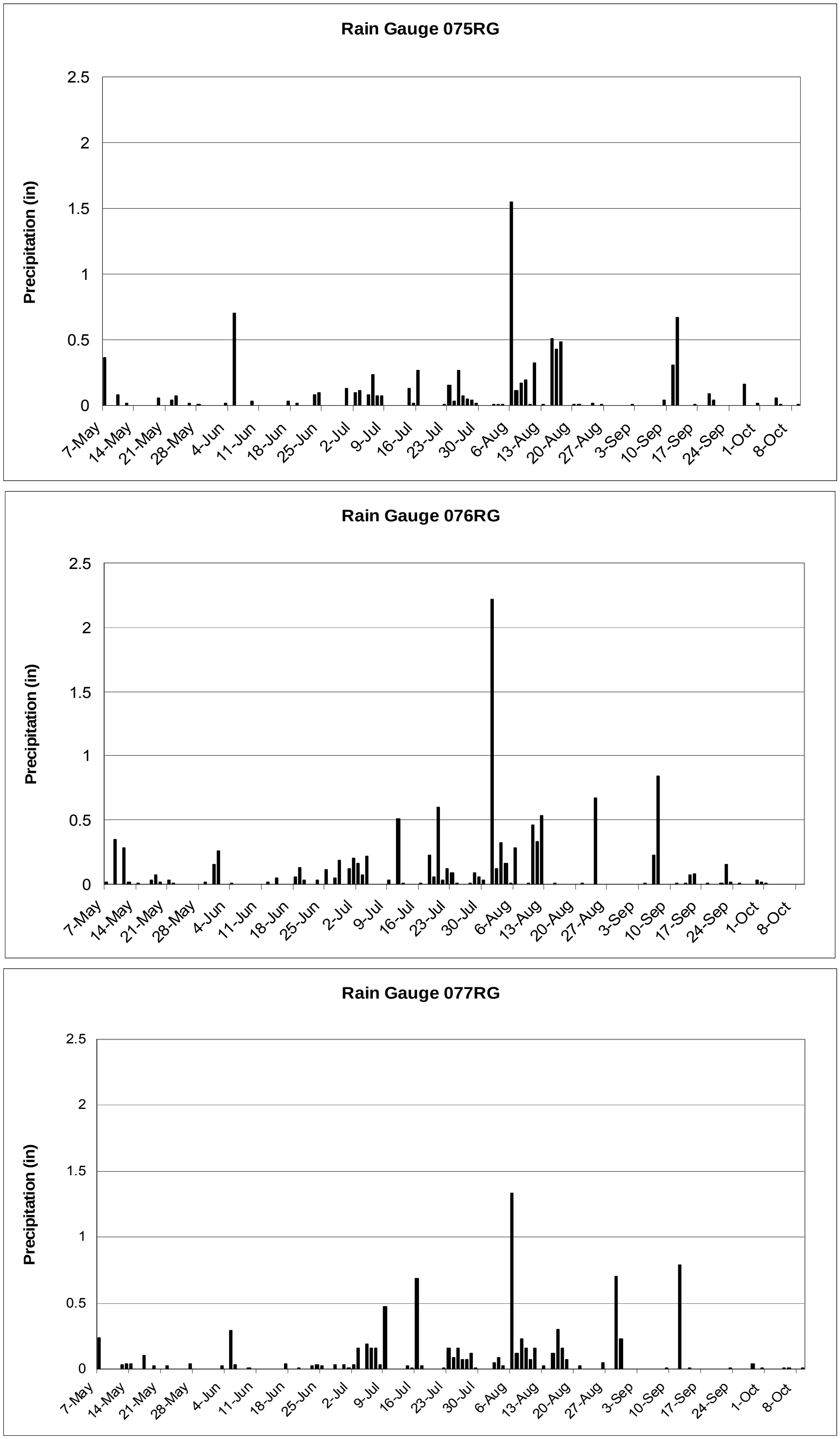

Figure 1. Daily precipitation for the three rain gauges on Pikes Peak, 2008.

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 one measurement of each cross section during the field 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 gathered during the 2008 monitoring season on 10 of the original 11 road reaches. Road reach 154RX was paved in 2006 and is no longer surveyed. In addition, 4,968 tons of gravel were added to the road surface (personal communication with Jack Glavan, City of Colorado Springs, Capital Projects Manager). All road reaches are associated with a corresponding drainage ditch except for 060RX. Table 2 contains a summary of road cross section monitoring sites measured in 2008. Cross section graphs for each road segment can be found in Appendix C. Photographs and survey data for all sites are available on the accompanying data DVD.

Table 2. Summary of road cross section monitoring sites surveyed on Pikes Peak, 2008.

Site ID	Basin #	Watershed	Survey Date
044RX	7	SKIC, NCRY	7/30/2008
047RX	7	SKIC	8/6/2008
050RX	7	SKIC	8/6/2008
056RX	7	SKIC	8/6/2008
060RX †	7	SKIC	8/6/2008
062RX	7	SKIC	8/6/2008
072RX	7	SKIC	7/30/2008
156RX	3	WBVR	7/24/2008
158RX	3	WBVR	7/23/2008
160RX	3	WBVR	7/24/2008

† Only road reach without a corresponding drainage ditch

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 (i.e., 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 ensure 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 (2003 and 2004), 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 five stability practices or treatments to be applied to each of the cut slopes on the highway (i.e., 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-three silt fences (13 sites) 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, ensuring a wide range in the variability of conditions sampled both before and after highway mitigation.

Cut slope silt fences were not exposed to high runoff and erosion activity in 2008. As a result, the field crew was able to complete weekly surveys of each site. Two of the 23 cut slope silt fences surveyed in 2008 were breached during the field season. 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 DVD, site visit and survey dates are annotated with the condition of the silt fence, any repairs or replacements that were done to maintain the silt fence, and an indication if the fence was breached prior to the survey date. The sediment volume for each cut slope silt fence was recorded on the site summary only if there was sediment accumulation in the cut slope silt fence. All other silt fence site visits would have had zero sediment accumulation. A summary of cut slope site visits, survey dates, and sediment accumulation in cut slope silt fences for the 2008 monitoring season are presented in Appendix D. All cut slope data and photographs for the 2008 season are available on the accompanying data DVD.

A similar design has been implemented for monitoring effectiveness of practices affecting erosion from fill slopes. The design includes the use of two 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. Fifty-eight silt fences (29 sites) have been installed to monitor fill slopes. 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.

As with the cut slope silt fences, accumulation in the fill slope silt fences did not exhibit high runoff and erosion activity in 2008, allowing time for the field crew to complete weekly surveys of each site. Twelve of the 58 silt fences (29 sites) were breached during the 2008 field season and three of those were breached more than once during the season. The sediment volume for the fill slope silt fences was recorded on the site summary only if there was sediment accumulation in the fill slope silt fence. All other silt fence site visits had zero sediment accumulation. A summary of fill slope site visits, survey dates, and sediment accumulation in fill slope silt fences for the 2008 monitoring season can be found in Appendix E. All fill slope data and photographs for 2008 are available on the accompanying data DVD.

Numerous sediment grab samples were collected from the cut slope and fill slope silt fences throughout the 2008 season. A subset of these was selected to be analyzed in the laboratory for particle size distribution. The balance of samples will be analyzed only if the variability in the particle size distribution of the subset of samples chosen for initial analysis warrants additional analysis. Because laboratory analyses for the 2008 grab samples were not complete at the time of this report, they will be included in the 2009 Annual Report. Laboratory analyses for 2005 and 2007 field seasons have been completed (grab samples were not collected from cut and fill slope silt fences during the 2006 field season) and a summary of particle size distributions and graphs are presented in Appendix F and on the accompanying data DVD.

Initially, the Monitoring Plan anticipated taking measurements of the accumulation behind all silt fences two to three times per year. The actual number of measurements taken is dependent on many factors including; winter snowpack, soil moisture, number of rainfall events, and availability of crew members to clean out silt fences while completing other tasks. Estimates of human induced 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), can be compared with estimates of “natural movement” estimated from what is trapped in the silt fencing placed above cut slopes that can be compared for periods before and after mitigation to determine the effectiveness of the practice and other best management practices (BMPs) on reducing human induced erosion.

Using silt fences to monitor sediment transport has proven to be difficult where silt fences cross rock surfaces as indicated by the frequent breaching or failure that has occurred over the course of the monitoring. The primary cause of silt fence failure has been that fence material cannot be reliably fastened to the frequently present rock surfaces, particularly at the base of cut slopes at higher elevations. As a corrective measure, the sampling protocol has been revised for three cut slope monitoring sites (102CS, 123CS, and 141 CS) with lower fences that cross rock surfaces. The lower cut slope silt fence has been removed and two permanent survey cross sections (labeled A and B) have been established, one at the vegetation line just below the upper fence, and one 1/3 of the way downslope of the upper fence. The cross sections are the same length as the original fence and have been monumented by the placement of rebar at each end. In addition, permanently monumented baseline elevation points have been established for each cut slope monitored in this way and are used as references for each cross section. Monitoring consists of surveying the surface elevation, relative to the benchmark, of the cut slope cross section. Sampling consists of two measurements of each cross section, one as soon after snowmelt as possible and the other at the end of the field season. The procedural change is intended to provide a qualitative estimate of cut slope erosion in situations where a quantitative estimate is not feasible. Cross section graphs for cut slope monitoring sites are presented in Appendix G. Photographs and survey data for all sites are available on the accompanying data DVD.

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 U.S. Forest Service Design Review (Burke 2002) are or will be lined with either shotcrete 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 paved or lined with shotcrete will no longer need to 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 drainage 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 sections as needed to complete the road slope/contributing area/armoring material matrix. As with the road surface erosion transects, five cross sectional transects (labeled A–E except for site 188DD, which has eight 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 2008. Ditch 092DD was paved in 2005, and ditch 107DD was shotcreted in 2006, eliminating the need for further surveys on those sites. Most drainage ditches will be paved or lined with shotcrete once the highway is paved and will no longer need to be surveyed unless the treatment is failing. 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 3 can be found in Appendix H. Drainage ditch survey data and photographs for 2008 are available on the accompanying data DVD.

Table 3. Description of road treatments above drainage ditches, treatments for drainage ditches, and drainage ditch survey dates on Pikes Peak, 2008.

Site ID	Basin #	Watershed	Road Treatment	Ditch Treatment	Survey Date
005DD	1	Lower SKIC	Asphalt	Fabric	6/5/2008
010DD	1	Lower SKIC	Asphalt	Fabric	5/16/2008
042DD	7	NCRY	Gravel	Untreated	7/30/2008
046DD	7	SKIC	Gravel	Untreated	8/6/2008
051DD	7	SKIC	Gravel	Untreated	8/6/2008
057DD	7	SKIC	Gravel	Untreated	8/6/2008
061DD	7	SKIC	Gravel	Untreated	8/6/2008
071DD	7	SKIC	Gravel	Untreated	7/30/2008
080DD	7	SKIC	Gravel, Recycled Asphalt	Untreated	7/30/2008
082DD	7	SKIC	Gravel, Recycled Asphalt	Untreated	7/30/2008
085DD	7	SKIC	Gravel, Recycled Asphalt	Untreated	7/30/2008
155DD	6	WBVR	Gravel	Untreated	7/24/2008
157DD	6	WBVR	Gravel	Untreated	7/23/2008
159DD	6	WBVR	Gravel	Untreated	7/24/2008
182DD	2	SKIC	Asphalt	Fabric	6/4/2008
188DD	2	NCRY	Asphalt	Fabric	6/27/2008
195DD	2	SKIC	Asphalt	Fabric	5/16/2008
205DD	2	SKIC	Asphalt	Fabric	6/6/2008

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. A sub-sample of 13 conveyance channels are surveyed every year, specifically to compare treated (7) and untreated (6) road sections. Each channel is surveyed using a series of three cross sections (labeled A–C except for site 232CC, which has five cross sections labeled A–E) located within the 150 foot boundary of the highway corridor.

Sixty-four of the original 115 conveyance channels were surveyed in 2008, and one new conveyance channel monitoring site (244CC) was established (Table 4). All of the conveyance channels surveyed in 2007 were surveyed in 2008, including the sub-sample of 13 (7 treated and 6 untreated) conveyance channels. Twenty-three conveyance channels located below established rock weirs and one conveyance channel below sediment pond 199RW were surveyed in 2008. For safety reasons, conveyance channel 118CC located below rock weir 242RW was not surveyed due to the exposure of large boulders and the general instability of the slope following weir failure. The field crew will continue to monitor 118CC each year, including photographing and recording observations in the field notes to document changes in conveyance channel geometry, but the site is not likely to be surveyed. Conveyance channel 232CC was surveyed in 2008. This site encompasses Glen Cove Creek and contains five cross sections instead of three. Water from Ski Creek is diverted into conveyance channel 232CC. In addition, three conveyance channels, 018CC, 020CC and 244CC (new site), associated with the Rocky Mountain Field Institute's erosion control and mitigation site above North Fork of Crystal Creek, were surveyed. Cross sections for the channels listed in Table 4 are presented in Appendix I. Conveyance channel survey data and photographs for 2008 are available on the accompanying data DVD.

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 rock weirs retain all the discharge long enough for the sediment to settle out, so that only water will percolate out of the rock weir through the porous berm. Therefore, measuring sediment accumulation in the rock weir will estimate total sediment movement. In the event the rock weir cannot retain all the storm flow delivered to it (actual discharge exceeds the design discharge or the rock weirs fail to function properly), silt fences have been installed on the downhill side of the rock weirs to measure sediment carried in surface discharge passing over or through the berm. A silt fence is preferred because any overflow or through flow that occurs is most likely to be diffused and not concentrated. The measurement protocol for these silt fences is the same as that employed for the cut and fill slope silt fences.

Table 4. Description of road treatments above conveyance channels, treatments for conveyance channels, and conveyance channel survey dates on Pikes Peak, 2008.

Site ID	Basin #	Watershed	Road Treatment	Channel Treatment †	Survey Date
012CC	2	SKIC	Asphalt	Rock Weir	8/7/2008
013CC	2	SKIC	Asphalt	Rock Weir	8/7/2008
016CC	2	NCRY	Asphalt	Culvert Plugged	6/12/2008
018CC	2	NCRY	Asphalt, Shotcrete Ditch		7/22/2008
020CC	2	NCRY	Asphalt, Shotcrete Ditch	Culvert Plugged	7/21/2008
021CC	2	NCRY	Asphalt, Shotcrete Ditch		6/12/2008
025CC	2	SKIC	Asphalt, Shotcrete Ditch		8/18/2008
030CC	2	NCRY	Asphalt, Fabric Ditch	Rock Weir	6/20/2008
031CC	2	NCRY	Asphalt, Fabric Ditch	Rock Weir	6/20/2008
036CC	7	NCRY	Gravel		8/7/2008
035CC	2	SKIC	Asphalt, Gravel		6/18/2008
037CC	7	NCRY	Gravel		6/12/2008
040CC	1	Lower NCRY	Asphalt, Curb		6/12/2008
058CC	7	SKIC	Gravel		6/16/2008
063CC	7	SKIC	Gravel		6/12/2008
070CC	7	SKIC	Gravel		6/18/2008
084CC	7	SKIC	Gravel		8/18/2008
089CC	3	GLEN	Asphalt	Rock Weir	6/3/2008 7/24/2008
094CC	3	SKIC	Asphalt	Culvert Plugged	7/21/2008
097CC	3	SKIC	Asphalt, Shotcrete Ditch	Culvert Plugged	8/4/2008
099CC	3	GLEN	Asphalt	Rock Weir	7/14/2008
104CC	6	WBVR	Gravel		6/16/2008
108CC	4	FRENCH	Asphalt, Shotcrete Ditch	Rock Weir	6/26/2008
111CC	4	GLEN	Asphalt, Shotcrete Ditch	Rock Weir	7/14/2008
114CC	4	FRENCH	Asphalt, Shotcrete Ditch	Rock Weir	7/23/2008
119CC	4	GLEN	Asphalt, Shotcrete Ditch	Rock Weir	7/22/2008
120CC	6	WBVR	Gravel		8/8/2008
121CC	6	WBVR	Gravel		8/14/2008
122CC	6	WBVR	Gravel		8/14/2008
125CC	6	WBVR	Gravel		8/14/2008
126CC	6	WBVR	Gravel		8/8/2008
127CC	6	WBVR	Gravel		6/16/2008
129CC	6	WBVR	Gravel		8/8/2008
130CC	5	EBVR	Gravel	Culvert Plugged	7/25/2008
131CC	5	EBVR	Gravel		8/4/2008
132CC	5	EBVR	Gravel		7/31/2008
133CC	5	EBVR	Gravel		7/28/2008
138CC	5	BHMR	Gravel		7/31/2008
139CC	5	EBVR	Gravel		7/28/2008
140CC	5	EBVR	Gravel		7/28/2008
175CC	1	Lower NCRY	Asphalt, Curb	Rock Weir	6/13/2008
184CC	2	SKIC	Gravel, Recycled Asphalt, Shotcrete Ditch	Sediment Pond, Shotcrete	5/14/2008
207CC	6	WBVR	Gravel		8/8/2008
208CC	7	SKIC	Gravel		8/21/2008
209CC	7	SKIC	Gravel		8/21/2008
210CC	2	SKIC	Asphalt, Shotcrete Ditch		8/7/2008
211CC	2	SKIC	Asphalt, Shotcrete Ditch		6/6/2008

Site ID	Basin #	Watershed	Road Treatment	Channel Treatment †	Survey Date
213CC	5	FRENCH	Gravel		8/4/2008
214CC	5	BHMR	Gravel		7/31/2008
216CC	1	Lower NCRY	Asphalt, Curb	Rock Weir	5/20/2008
217CC	1	Lower NCRY	Asphalt, Curb	Rock Weir	5/20/2008
218CC	1	Lower SKIC	Asphalt	Rock Weir	5/20/2008
220CC	1	Lower SKIC	Asphalt	Rock Weir	6/18/2008
221CC	1	Lower NCRY	Asphalt	Rock Weir	6/24/2008
222CC	1	Lower NCRY	Asphalt	Rock Weir	6/24/2008
223CC	1	Lower SKIC	Asphalt	Rock Weir	6/16/2008
224CC	2	NCRY	Asphalt, Asphalt Ditch	Rock Weir	6/6/2008
225CC	2	SKIC	Asphalt, Fabric Ditch	Rock Weir	7/18/2008
226CC	2	NCRY	Asphalt, Curb	Rock Weir	5/20/2008
228CC	2	SKIC	Asphalt	Rock Weir	7/23/2008
229CC	2	NCRY	Asphalt	Rock Weir	6/20/2008
230CC	2	NCRY	Asphalt	Rock Weir	5/28/2008
232CC	7	GLEN	Gravel		8/25/2008
235CC	3	SVRY	Asphalt, Shotcrete Ditch	Rock Weir	6/14/2008
244CC	2	NCRY	Asphalt, Shotcrete Ditch		7/25/2008

† Information on channel treatment unavailable for some sites at time of 2008 report.

The field procedure for monitoring sediment accumulation in the rock weirs was modified in 2008 to simplify both instrument requirements for the survey and software requirements for subsequent data reduction and analysis as well as to allow for a more consistent comparison of volumetric change from survey to survey. A fixed area was defined and monumented within each rock weir to be surveyed each time, and compared form survey to survey or year to year.

Prior to 2008, the area surveyed within each rock weir had not been predefined. Although the criteria for selecting the area to be surveyed within each rock weir was well defined in the survey protocol, the area actually surveyed as well as the number and distribution of survey points within that area were not necessarily consistent from one survey to the next, such as from the fall to spring or spring to fall surveys. Much was left to the discretion of the field crew. As part of each survey (spring, fall, and as needed during the summer), the field crew would identify areas of sediment accumulation within the rock weirs and although virtually all of the rock weir area was surveyed, sampling points were concentrated in the vicinity of the areas of deposition and more widely spaced over the balance of the rock weir area. The survey capabilities of the Trimble Robotics Total Station, which is used for all surveying on the Pikes Peak Project, records the geospatially correct location of survey points for virtually any survey pattern, so utilizing a variable sampling scheme did not create a problem. In order to compensate for the variable distribution of survey points an Auto-Cad package was used to develop a 0.5 foot Digital Terrain Model (DTM) for the surface of the sediment pond. This protocol allowed obtaining very high resolution of the topographic variability in the survey data collected in the vicinity of active deposition without requiring similar resolution (and sample size) in areas perceived to have had little or no activity. This DTM could then be intersected with the DTM for either an earlier or a subsequent survey to obtain an estimate of volumetric change between surveys. The procedure called for any nonoverlapping areas to be clipped from either survey as needed and resulted in two overlapping surfaces of equal size to be compared. The volumetric difference between the two intersected surfaces represented the estimate of the volumetric change in sediment accumulation that occurred in the rock weir during the interval between surveys. Although valid, it became apparent that this protocol had several drawbacks that included; 1) dependence on the Trimble Robotics Total Station, 2) risk of inconsistent data, and 3) dependence on an Auto-Cad package and associated technical skills.

First, the choice of survey tools was limited to automated systems such as the Trimble Robotics Total Station, limiting alternative instrument choices while requiring a specific level of technical expertise in the field crew. Second, because the area to be surveyed within each rock weir had not been predefined, the perimeter of the DTM's for individual surveys were not necessarily identical when intersected. Therefore, the clipping process that became necessary introduced the risk of inconsistent, or at worst, lost information. Fortunately, the field crew leader was the same for each year of monitoring up to 2007 so disparities in survey areas are in fact minimal. Lastly, the protocol required the use of an Auto-Cad package to develop and intersect the three dimensional surfaces used to estimate sediment accumulation. This required software and technical skills not readily available within the project, requiring that the data reduction be outsourced to other consultants.

In 2008 the field procedures for surveying the rock weirs were modified to; 1) reduce dependency on a specific survey instrument although the Trimble Robotics Total Station remains as the primary survey tool, 2) define and monument the area within each rock weir to be consistently surveyed, 3) introduce a more systematic survey protocol to reduce dependency on specific software and analytical procedures. Each rock weir was visited and the perimeter of the critical portion of the sediment accumulating pond was identified and monumented with rebar. These monumented locations were then referenced to the three benchmark locations (control points) already established for each rock weir. An attempt was made to define the area to be surveyed in rectangular form, but sometimes five or six sides were needed to most efficiently define the perimeter of the area of interest. In every case, the area selected for a given rock weir encompassed all the areas surveyed prior to 2008. It should be noted that all unstable areas identified to be within the rock weir were included in the survey area to ensure that migration of material from one location within the rock weir to another were balanced out in the survey and not construed to be additions or losses in accumulation between surveys. Because the permanent survey area defined for each rock weir encompasses the area of every previous survey, no loss of historic data will occur.

After the survey perimeter was defined, one side was arbitrarily selected as the baseline for the survey. Depending on the size and shape of the rock weir area of interest, a rectangular survey grid system was established that originates from the baseline and uniformly and consistently covers the rock weir area. Survey lines initiate from the baseline at uniform intervals, and cross the rock weir perpendicular to the baseline, and extend to the opposite boundary line. Survey points along each line are also uniformly spaced. The spacing of both survey lines and survey points on a survey line vary with rock weir size. An example schematic for rock weir 008RW is shown in Figure 2. Lines located perpendicular to the baseline and survey points along the line may result in a 1 X 1, 1 X 2, 2 X 1, 2 X 2, or comparable survey grid depending on the area and shape of the rock weir. The objective was to locate several hundred survey points, uniformly distributed in each rock weir that would be revisited at each survey. This approach has several advantages over the original survey protocol. First, surveying using a fixed grid system allows obtaining a simple estimate of elevation of the rock weir area relative to the control points for each survey. Following this protocol is not particularly instrument specific, nor is data reduction as software or skill dependant as the initial protocol. Second, because the area to be surveyed is fixed, repeated measures allow for a more uniform comparison of volumetric change from survey to survey, and surveys are not biased by crew changes or interpretations.

Changing the survey protocol may result in some loss of resolution (sampling intensity) in the areas of greatest accumulation. However, because the current rock weir area is fixed and the same points will be surveyed each time, that loss should be minimal and offset by greater consistency from survey to survey. Changing the field procedure does not preclude the use of Auto-Cad packages for data analysis. However, if an Auto-Cad package is not used to process the data, the average elevation of the rock weir surface can be obtained by determining the average elevation of the survey points. When using a simple average to obtain the elevation of the rock weir, it is suggested that the first and last point on each survey line be averaged and only the average of the two used as a single point in place of the two individual end points. This compensates for the fact that half of the area represented by the points at the beginning and end of each survey line is not actually included in the rock weir area. The volumetric change between any two surveys can be estimated by multiplying the difference in the average geo-referenced elevations for the two surveys by the area of the pond.

As part of the process of changing a protocol, several quality control and quality assurance checks have been or are being implemented as a means of better defining errors that might be associated with the proposed survey procedure. The concerns were; 1) whether or not the initial survey grid system selected for each rock weir was adequate to define the average elevation of the surface, 2) observed discrepancies in the total number of points in the successive surveys of the same pond, and 3) measurement error associated with defining the reference elevation used for the feature of interest. Two rock weirs (234RW and 243RW) were chosen for evaluation.

In order to assess whether or not the initial survey grid system selected for each rock weir was adequate to define the average elevation of the rock weir, the elevation of the two rock weirs (234RW and 243RW) was estimated for two different surveys using all the survey points for each weir and again using half of the total survey points. With the possible exception of the survey for 234RW on June 14, 2008, the estimates of average elevation were quite consistent when based on either all or only half of the survey points (Table 5) implying that using a survey grid system is appropriate but may have some potential for introducing error.

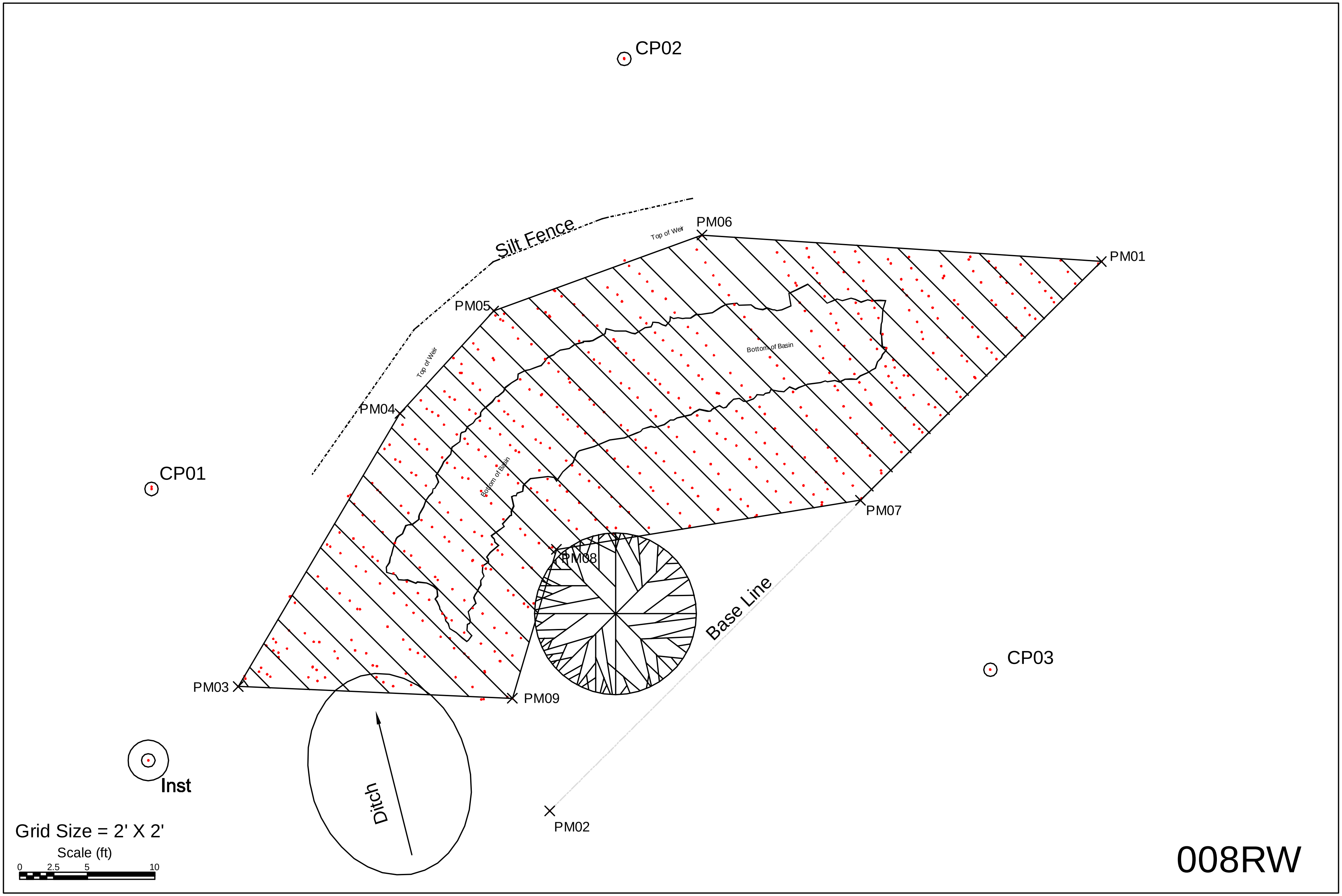

Figure 2. Schematic map of rock weir 008RW defining a fixed area, baseline, perimeter points and survey grid on Pikes Peak, 2008.

Table 5. Change in elevation of the rock weirs as indexed by rock weirs 234RW and 243RW on Pikes Peak, 2008.

Rock Weir	Survey Date	Number of Survey Points	Average Elevation Based on all Points (ft)	Average Elevation Based on half the Points (ft)
234RW	6/14/2008	747	12,100.93	12,100.02
234RW	8/20/2008	652	12,100.14	12,100.14
243RW	7/16/2008	422	12,896.97	12,896.96
243RW	8/29/2008	451	12,896.90	12,896.88

In the case of 234RW, the two successive surveys imply a decrease in sediment accumulation occurred between June 14, and August 20, 2008. A decrease in rock weir elevation is possible, if settling or scouring occurred during the interim between measurements. The discrepancy may also reflect survey error. In either case, the negative change reflects a resolution error in the measurement protocol, regardless of the cause. In 2009, as an additional check on survey resolution, we will determine how closely the elevation of the same rock weir is estimated by repeated surveys. This will eliminate the possibility that settling might be the cause of the discrepancy in repeated measurements.

The second concern is the slight discrepancy that exists in the total number of survey points in the successive surveys of the same pond, even though the same survey grid was used (Table 5). For example, 747 points were surveyed in 234RW on June 14, 2008 while only 652 were surveyed on August 20, 2008, but the reason for the discrepancy is not clear. Steps are being taken that will address this discrepancy before the 2009 field season although there is no indication that this discrepancy affected the 2008 survey resolution.

There is an additional error in the surveys of the rock weirs (and all other surveys as well) that is associated with the reference benchmarks for each feature. The benchmarks are used to orient the Trimble Robotics Total Station as to the elevation and the geospatial location of the feature being surveyed. Field experience in the use of the Total Station indicates that the measurement error in defining the reference elevation for the feature of interest, based on the use of three benchmarks, is 0.10 feet or less. This error could contribute to some of the discrepancies observed in Table 5.

During the winter of 2008/2009, several measures will be taken to clearly define and reduce potential survey errors associated with the rock weirs. First, a detailed schematic map of each rock weir will be developed that identifies and locates the optimal survey grid. This will assist the field crew in locating the survey lines and points on the lines. Second, the DTM's for all previous surveys will be corrected to match the currently defined rock weir area so that there is no loss of historic data.

As with the road surface erosion transects, the two sediment ponds are surveyed using a series of five cross sections (labeled A–E) to estimate volumetric changes in sediment accumulation. 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. Surveys of the sediment traps should be completed after spring snowmelt and again after significant rainfall events, perhaps a total of four times per year. In addition, surveys taken before and after rock weir 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.

As noted above, any conveyance channels that appear to be present below the rock weirs are monitored. If the rock weirs fail, as some did in 2008, any changes in the conveyance channel geometry that may result will be documented. If the rock 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.

In 2008, the highway crew began work on Basin 5 (Boehmer and East Fork of Beaver Creek Watersheds), which included beginning construction on two new sediment ponds above East Fork of Beaver Creek. Construction on the sediment ponds is scheduled for completion in 2009 (personal communication with Jack Glavan, City of Colorado Springs Capital Projects Manager) and will be included in the Monitoring Study after completion. Twenty-eight sites were monitored in 2008, two sediment ponds and 26 rock weirs. At these sites, the rock weirs were surveyed, and sediment volume was measured in the silt fences located down slope of the rock weirs (16 rock weirs have associated silt fences). Of the 28 sites, 21 demonstrated some degree of failure, where water and sediment were seen piping under or through the rock weir, the rock weir was overtopped, or the rock weir was breached. In addition, five of the sediment fences were breached. As noted earlier for silt fences on the cut and fill slopes, the data from the breached rock weirs or sediment fences may be an inaccurate estimate of total sediment production. Survey dates for the rock weirs and sediment ponds are presented in Table 6. A summary of rock weir silt fence site visits, and sediment accumulation in rock weir silt fences and the rock weirs for the 2008 monitoring season, as well as sediment pond cross sections from 2008 are presented in Appendix J. The average elevations for the rock weir surfaces were obtained by determining the average elevation of the survey points. The first and last points on each survey were averaged and only the average of the two points was used in place of the two individual points as suggested earlier. The volumetric change between the two surveys was then estimated by multiplying the difference in the average geo-referenced elevations for the two surveys by the area of the rock weir (Appendix J). The negative values imply a decrease in estimate of sediment accumulation between two surveys. Settling or scouring may have occurred during the interim between measurements, although the discrepancy may also reflect an error in the technique used for estimating volume change. Sediment trap data and photographs for 2008 are available on the accompanying data DVD.

Grab samples of the sediment retained in both the rock weirs and silt fences below the weirs were collected each time the weirs were surveyed or the fences cleaned. As noted earlier, a subset of these grab samples was selected for analysis of particle size distribution. The balance of samples will be analyzed only if the variability in the

Table 6. Description of management practices above sediment traps, and sediment trap survey dates on Pikes Peak, 2008.

Site ID	Basin #	Watershed	Management Practice	Survey Dates		
002RW	1	Lower SKIC	Ditch	5/16/2008	7/9/2008	9/29/2008
003RW	1	Lower SKIC	Shotcrete Ditch	6/3/2008	7/9/2008	9/29/2008
006RW	1	Lower SKIC	Shotcrete Ditch	6/4/2008	6/26/2008	9/29/2008
008RW	1	Lower NCRY	Shotcrete Ditch	5/8/2008	6/4/2008	9/30/2008
009RA	1	Lower SKIC	Erosion Control Fabric Ditch	5/30/2008	9/29/2008	
152RW	2	SKIC	Erosion Control Fabric Ditch	6/4/2008	9/30/2008	
153RW	2	SKIC	Ditch	6/3/2008	7/9/2008	9/30/2008
161RW	2	NCRY	Asphalt Ditch	5/30/2008	9/22/2008	
162RW	2	NCRY	Asphalt Ditch	5/30/2008		
176RW	2	NCRY	Erosion Control Fabric Ditch	5/28/2008	9/23/2008	
178RW	2	NCRY	Erosion Control Fabric Ditch	5/28/2008	9/23/2008	
179RW	2	NCRY	Erosion Control Fabric Ditch	5/28/2008	9/23/2008	
180RW	2	NCRY	Erosion Control Fabric Ditch	5/14/2008	7/9/2008	9/23/2008
181RW	2	NCRY	Erosion Control Fabric Ditch	5/28/2008	6/26/2008	9/23/2008
199RW	2	SKIC	Shotcrete Ditch	5/14/2008	10/6/2008	
200RW	1	Lower NCRY	Curb, Asphalt Ditch	5/8/2008	9/22/2008	
201RW	2	NCRY	Curb, Asphalt Ditch	5/14/2008	9/22/2008	
202RW	2	SKIC	Asphalt Ditch	5/30/2008	9/22/2008	
233RW	3	GLEN	Shotcrete Ditch	6/3/2008	9/5/2008	
234RW	3	SVRY	Shotcrete Ditch	6/14/2008	8/20/2008	
236RW	3	SKIC	Shotcrete Ditch	7/17/2008	8/20/2008	
237RW	3	GLEN, SKIC	Shotcrete Ditch	6/23/2008	9/11/2008	10/6/2008
238RW	3	GLEN	Shotcrete Ditch	7/14/2008	8/20/2008	
239RW	4	FRENCH	Shotcrete Ditch	6/26/2008	9/5/2008	
240RW	4	GLEN	Shotcrete Ditch	7/14/2008	8/29/2008	
241RW	4	FRENCH	Shotcrete Ditch	7/10/2008	8/27/2008	
242RW	4	GLEN	Shotcrete Ditch	7/16/2008	8/27/2008	
243RW	4	GLEN	Shotcrete Ditch	7/10/2008	8/29/2008	

particle size distribution of the subset of samples chosen for initial analysis warrants additional analysis. In addition, water samples to determine suspended sediment were collected from the inflow and outflow of the major sediment pond 199RW. Because laboratory analyses for the 2008 grab samples were not complete at the time of this report, they will be included in the 2009 Annual Report. Laboratory analyses for 2005, and 2007 field seasons have been completed (grab samples were not collected from the rock weirs and silt fences below the rock weirs during the 2006 field season) and a summary of particle size distributions and graphs are presented in Appendix K and on the accompanying data DVD. Laboratory analyses on the suspended sediment samples for 2007 and 2008 field seasons are also presented in Appendix K and on the accompanying data DVD.

As noted in the 2007 Annual Report, the repeated failures of several of the rock weirs necessitated a field trip (August 29, 2007) to address remediation of the structures. Alternatives were discussed to mitigate the erosive potential of storm runoff and eliminate rock weir failure that included:

- Increasing the size and capacity of the rock weirs and installing overflow pipes to allow any excess runoff to drain before the rock weirs fail
- Reconstructing the rock weirs in a fashion that would ensure their structural integrity if overtopped
- Breaching the rock weirs completely, armoring their conveyance channels, and installing energy dissipaters as originally planned

To date, factors such as construction techniques, storm design, and pond sizing are still being re-evaluated to further assess the appropriateness of the use of rock weirs to detain water and sediment.

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 onsite, or close to the highway. On-site response to the mitigation practices should be direct, dramatic, and occur in real time. Off-site response, such as in the channels, is likely to be much more diffused, less dramatic, cumulative in nature, and subject to changes 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, therefore creating a challenge in selecting the most appropriate indicator metric.

The scale chosen for validation monitoring is that of the stream channel reach. Within each stream reach selected, channel morphology, bed and bank particle size distribution, bank erosion, and vegetation diversity is monitored and characterized. 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. Stream reaches have been selected in each of the nine streams, and periodic monitoring will be conducted in each stream reach for the entire 15 year study period. Oil Creek has only one stream reach because upper sites of the stream are on private land. Glen Cove Creek also has only one stream reach because it is a tributary of South Catamount Creek which has three stream reaches. All other streams have two stream 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.

Because response can be expected to be gradual, it is not necessary that all streams be measured every year.

The monitoring design assumes that stream channel adjustments that occur in the impacted stream reaches after road mitigation practices will not occur on the reference stream reaches (those not influenced by the highway or subsequent mitigation practices). However, this does not imply that differences that may have existed at the start of the monitoring program between the four reference and the five impaired stream systems 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 stream reaches following road mitigation will be evaluated as potential indicators of response to mitigation.

The techniques proposed by Harrelson et al. (1994) are used to establish the stream channel reference sites. Selected stream reaches are at least 100 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 stream 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 stream reaches, 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 a 100 meter stream 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 stream 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. Because it can be expected that channel responses to the road mitigation practices will not be as robust as other metrics, it is not critical that each stream be surveyed each year.

Stream survey cross sections were completed on Boehmer Creek, East Fork of Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork of Crystal Creek, Oil Creek, South Catamount Creek, Ski Creek, Severy Creek, and West Fork of Beaver

Creek. The stream surveys did not include bank erosion surveys, planview surveys, or profile surveys. Stream channel cross sections from the 2008 monitoring season can be found in Appendix L. Stream channel cross section and thalweg survey data for 2008 are available on the accompanying data DVD.

Bank Erosion

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 stream reach (Harrelson et al., 1994) and through the use of permanent photo points. In each stream 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 stream 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 stream 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 stream 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.

In 2008, measurements specific to bank erosion consisted of channel cross section surveys, thalweg surveys, and photographic documentation. Bank erosion was not significant enough to warrant installation of bank pins to measure the lateral rate of erosion.

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 stream reach are conducted and particle size distribution determined during each survey using the Bevenger and King Pebble Count Procedure (Bevenger and King, 1995). The procedure calls for a zigzag sampling pattern that passes through the stream reach, crossing from bank to bank. Three hundred particles are sampled in each survey and one survey is completed in each of the two stream reaches. 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 of Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork of Crystal Creek, Oil Creek, South Catamount Creek, Ski Creek, Severy Creek and West Fork of Beaver Creek. A summary of the stream channel particle size distribution from the pebble counts is presented in Table 7. Stream pebble count particle size distribution graphs from the 2008 monitoring season can be found in Appendix M and on the accompanying data DVD.

Table 7. Summary of stream channel particle size distribution from pebble counts on Pikes Peak, 2008.

Site Name	Site ID	Date	Particle Size Distribution					
			D15	D35	D50	D84	D95	D100
Boehmer Creek Reach 1	BHMR1	9/25/2008	0.1	0.2	0.6	21.4	96.0	482.0
Boehmer Creek Reach 2	BHMR2	9/25/2008	0.6	10.6	21.7	70.8	140.1	450.0
East Fork Beaver Creek Reach 1	EBVR1	9/25/2008	0.9	3.2	5.0	13.9	206.3	470.0
East Fork Beaver Creek Reach 2	EBVR2	9/25/2008	1.2	3.8	5.5	11.8	20.6	555.0
Glen Cove Reach 1	GLEN1	9/24/2008	1.3	9.4	13.7	23.5	64.0	305.0
North Catamount Creek Reach 1	NCAT1	8/28/2008	0.2	2.3	3.9	8.9	14.1	25.0
North Catamount Creek Reach 2	NCAT2	8/28/2008	0.8	4.1	6.4	13.5	19.8	30.0
North Fork Crystal Creek Reach 1	NCRY1	9/17/2008	0.7	4.6	6.2	12.3	21.3	53.0
North Fork Crystal Creek Reach 2	NCRY2	9/17/2008	1.0	3.3	5.3	12.5	18.4	27.0
Oil Creek Reach 1	OILC1	10/2/2008	0.1	2.5	5.5	20.0	44.6	305.0
South Catamount Creek Reach 1	SCAT1	10/1/2008	1.8	7.0	11.7	28.4	50.8	123.0
South Catamount Creek Reach 2	SCAT2	9/10/2008	0.8	5.2	8.3	23.2	64.0	360.0
South Catamount Creek Reach 3	SCAT3	9/10/2008	0.9	4.0	5.9	11.4	128.0	315.0
Ski Creek Reach 1	SKIC1	9/24/2008	0.8	3.9	6.2	12.2	22.2	235.0
Ski Creek Reach 2	SKIC2	10/1/2008	0.6	3.7	5.8	22.1	96.0	480.0
Severy Creek Reach 1	SVRY1	9/3/2008	0.1	0.2	2.9	13.9	64.0	350.0
Severy Creek Reach 2	SVRY2	9/3/2008	2.0	5.8	9.2	45.3	109.1	257.0
West Fork Beaver Creek Reach 1	WBVR1	9/18/2008	2.8	7.2	10.4	36.1	235.8	300.0
West Fork Beaver Creek Reach 2	WBVR2	9/18/2008	0.6	3.8	6.5	37.6	59.6	386.0

Grab Samples

Sediment grab samples were collected from bars at Boehmer Creek, East Fork of Beaver Creek, Glen Cove Creek, North Catamount Creek, North Fork of Crystal Creek, Oil Creek, South Catamount Creek, Ski Creek, Severy Creek and West Fork of Beaver 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.

Because laboratory analyses for particle size distribution for 2008 were not completed at the time of this report, they will be included in the 2009 Annual Report. Laboratory analyses for 2005, 2006, and 2007 field seasons have been completed and a summary of particle size distributions and graphs is presented in Appendix N and on the accompanying data DVD.

Vegetation

Vegetation photo points established at the top of the left and right banks (facing downstream) at each cross section have been monumented and are intended to document changes in vegetation type, density, and percent cover over time as riparian and wetland areas recover (Hall 2002). Vegetation is grouped into general categories of moss, grass, sedge, forb, or shrub to document vegetation 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 stream reaches.

The riparian vegetation summary from the 2008 monitoring season is presented in Appendix O. Vegetation data and photographs from 2008 are available on the accompanying data DVD.

SUMMARY

The 2008 monitoring season was extremely successful with regard to the number of sites visited and the amount of data collected relative to previous years. A total of 167 sites were monitored during the 2008 field season, many of which were visited more than once. This allowed for better quality assurance and quality control assessments. As a result, minor but important changes were made to some of the monitoring protocols.

The field procedure for monitoring sediment accumulation in the rock weirs was modified in 2008 to simplify both instrument requirements for the survey and software requirements for subsequent data reduction and analysis as well as to allow for a more consistent comparison of volumetric change from survey to survey. A fixed area was defined and monumented within each rock weir to be surveyed each time, and compared form survey to survey or year to year. The sampling protocol for monitoring cut slope silt fences with lower fences that cross rock surfaces was also modified in 2008. Using silt fences to monitor sediment transport has proven to be difficult where silt fences cross rock surfaces as indicated by the frequent breaching or failure that has occurred over the course of the monitoring. The primary cause of silt fence failure has been that fence material cannot be reliably fastened to the frequently present rock surfaces, particularly lower fences at higher elevations. The lower cut slope silt fences at three monitoring sites were removed and two permanent survey cross sections were established. Monitoring consists of surveying the surface elevation, relative to the benchmark, of the cut slope cross sections to document erosion rates. These modifications are a result of the adaptive processes used throughout this Monitoring Study to meet the monitoring objectives.

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REFERENCES

Bevenger, G. S.; King R.M. 1995. A pebble count procedure for assessing watershed cumulative effects. Res. Pap. RM-RP-319. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 17 p.

Burke, M. 2002. Pikes Peak Highway drainage, erosion, and sediment control plan Forest Service engineering design review. Phase 2 Report, v. 1.4. U.S. Department of Agriculture, Forest Service.18 p.

Hall, F.C. 2002. Photo point monitoring handbook: part A-field procedures. Gen. Tech. Rep. PNW-GTR-526. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 48 p.

Harrelson, C.C.; Rawlins, C.L.; Potyondy J.P. 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 Research Station. 61 p.

Hydrosphere Resource Consultants. 1999. Pikes Peak Highway drainage, erosion and sediment control plan environmental assessment. Unpublished report. Boulder, CO. 97 p.

Nankervis, J.M. 2004. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished report. Blue Mountain Consultants, Berthoud, CO. 22 p.

Nankervis, J.M. 2005. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished report. Blue Mountain Consultants, Berthoud, CO. 29 p.

Nankervis, J.M. 2006. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished report. Blue Mountain Consultants, Berthoud, CO. 21 p.

Nankervis, J.M. 2007. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished report. Blue Mountain Consultants, Berthoud, CO. 19 p.

Robichaud, P.R.; Brown, R.E. 2002. Silt fences: an economical technique for measuring hillslope soil erosion. Gen. Tech. Rep. RMRS-GTR-94. Moscow, ID: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 24 p.

Troendle, C.A.; Winkler, S.; LaPerriere, M. 2008. Monitoring effectiveness and validating response to the road related mitigation practices implemented on the Pikes Peak Highway. Unpublished report. METI Inc., El Paso, TX. 24 p.

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

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. 16 p.

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. Unpublished report. 2 p.

U.S. Department of Justice. 2002. Settlement Agreement between the U.S. Forest Service and the Sierra Club. Unpublished report. Denver, CO. 15 p.

Appendix A

Site Locations for Effectiveness and Validation Monitoring

2008

Site Locations for Effectiveness and Validation Monitoring on Pikes Peak, 2008 †

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
244CC	N38 54.487	W105 03.232	9569	Conveyance Channel
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

Site ID	Latitude (hddd°mm.mmm)	Longitude (hddd°mm.mmm)	Altitude (ft)	Feature Description
NCAT1	N38 54.746	W105 05.994	9415	North Catamount Creek 1
NCAT2	N38 54.402	W105 06.106	9519	North Catamount Creek 2
NCRY ∞	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 2008 field season
∞ North Fork Crystal Creek 2 (NCRY2) is located 200 ft upstream from NCRY1

Appendix B

Daily Precipitation

2008

Daily Precipitation for Rain Gauges on Pikes Peak, 2008

Date	075RG (Altitude 10,109') Precipitation (in)	076RG (Altitude 11,810') Precipitation (in)	077RG (Altitude 13,069') Precipitation (in)
5/7/2008	0.36	0	0.24
5/8/2008	0	0	0
5/9/2008	0	0	0
5/10/2008	0.08	0	0
5/11/2008	0	0	0
5/12/2008	0.02	0.02	0.03
5/13/2008	0	0	0.04
5/14/2008	0	0.35	0.04
5/15/2008	0	0	0
5/16/2008	0	0.28	0
5/17/2008	0	0.02	0.1
5/18/2008	0	0	0
5/19/2008	0.06	0.01	0.02
5/20/2008	0	0	0
5/21/2008	0	0	0
5/22/2008	0.04	0.03	0.02
5/23/2008	0.07	0.07	0
5/24/2008	0	0.02	0
5/25/2008	0	0	0
5/26/2008	0.02	0.03	0
5/27/2008	0	0.01	0.04
5/28/2008	0.01	0	0
5/29/2008	0	0	0
5/30/2008	0	0	0
5/31/2008	0	0	0
6/1/2008	0	0	0
6/2/2008	0	0	0
6/3/2008	0.02	0.02	0.02
6/4/2008	0	0	0
6/5/2008	0.7	0.15	0.29
6/6/2008	0	0.26	0.03
6/7/2008	0	0	0
6/8/2008	0	0	0
6/9/2008	0.03	0.01	0.01
6/10/2008	0	0	0
6/11/2008	0	0	0
6/12/2008	0	0	0
6/13/2008	0	0	0
6/14/2008	0	0	0
6/15/2008	0	0	0
6/16/2008	0	0	0
6/17/2008	0.03	0.02	0.04
6/18/2008	0	0	0
6/19/2008	0.02	0.05	0

Date	075RG (Altitude 10,109') Precipitation (in)	076RG (Altitude 11,810') Precipitation (in)	077RG (Altitude 13,069') Precipitation (in)
6/20/2008	0	0	0.01
6/21/2008	0	0	0
6/22/2008	0	0	0
6/23/2008	0.08	0.06	0.02
6/24/2008	0.1	0.13	0.03
6/25/2008	0	0.03	0.02
6/26/2008	0	0	0
6/27/2008	0	0	0
6/28/2008	0	0.03	0.03
6/29/2008	0	0	0
6/30/2008	0.13	0.11	0.03
7/1/2008	0	0	0.01
7/2/2008	0.1	0.05	0.03
7/3/2008	0.11	0.19	0.16
7/4/2008	0	0	0
7/5/2008	0.08	0.12	0.19
7/6/2008	0.23	0.2	0.16
7/7/2008	0.07	0.16	0.16
7/8/2008	0.07	0.07	0.03
7/9/2008	0	0.22	0.47
7/10/2008	0	0	0
7/11/2008	0	0	0
7/12/2008	0	0	0
7/13/2008	0	0	0
7/14/2008	0.13	0.03	0.02
7/15/2008	0.02	0	0.01
7/16/2008	0.27	0.51	0.69
7/17/2008	0	0.01	0.02
7/18/2008	0	0	0
7/19/2008	0	0	0
7/20/2008	0	0	0
7/21/2008	0	0.01	0
7/22/2008	0.01	0	0.01
7/23/2008	0.15	0.23	0.16
7/24/2008	0.03	0.06	0.09
7/25/2008	0.27	0.6	0.16
7/26/2008	0.07	0.03	0.07
7/27/2008	0.05	0.12	0.07
7/28/2008	0.04	0.09	0.12
7/29/2008	0.02	0.01	0.01
7/30/2008	0	0	0
7/31/2008	0	0	0
8/1/2008	0	0.01	0
8/2/2008	0.01	0.09	0.05
8/3/2008	0.01	0.06	0.09
8/4/2008	0.01	0.03	0.02

Date	075RG (Altitude 10,109’) Precipitation (in)	076RG (Altitude 11,810’) Precipitation (in)	077RG (Altitude 13,069’) Precipitation (in)
8/5/2008	0	0	0
8/6/2008	1.55	2.22	1.33
8/7/2008	0.11	0.12	0.12
8/8/2008	0.17	0.32	0.23
8/9/2008	0.19	0.16	0.16
8/10/2008	0.01	0.01	0.07
8/11/2008	0.32	0.28	0.16
8/12/2008	0	0	0
8/13/2008	0.01	0	0.02
8/14/2008	0	0.01	0
8/15/2008	0.51	0.46	0.12
8/16/2008	0.43	0.33	0.3
8/17/2008	0.48	0.53	0.16
8/18/2008	0	0	0.07
8/19/2008	0	0	0
8/20/2008	0.01	0.01	0
8/21/2008	0.01	0	0.02
8/22/2008	0	0	0
8/23/2008	0	0	0
8/24/2008	0.02	0	0
8/25/2008	0	0	0
8/26/2008	0.01	0.01	0.05
8/27/2008	0	0	0
8/28/2008	0	0	0
8/29/2008	0	0.67	0.7
8/30/2008	0	0	0.23
8/31/2008	0	0	0
9/1/2008	0	0	0
9/2/2008	0.01	0	0
9/3/2008	0	0	0
9/4/2008	0	0	0
9/5/2008	0	0	0
9/6/2008	0	0	0
9/7/2008	0	0	0
9/8/2008	0	0	0
9/9/2008	0.04	0.01	0.01
9/10/2008	0	0	0
9/11/2008	0.31	0.23	0
9/12/2008	0.67	0.84	0.79
9/13/2008	0	0	0
9/14/2008	0	0	0.01
9/15/2008	0	0	0
9/16/2008	0.01	0.01	0
9/17/2008	0	0	0
9/18/2008	0	0.01	0
9/19/2008	0.09	0.07	0

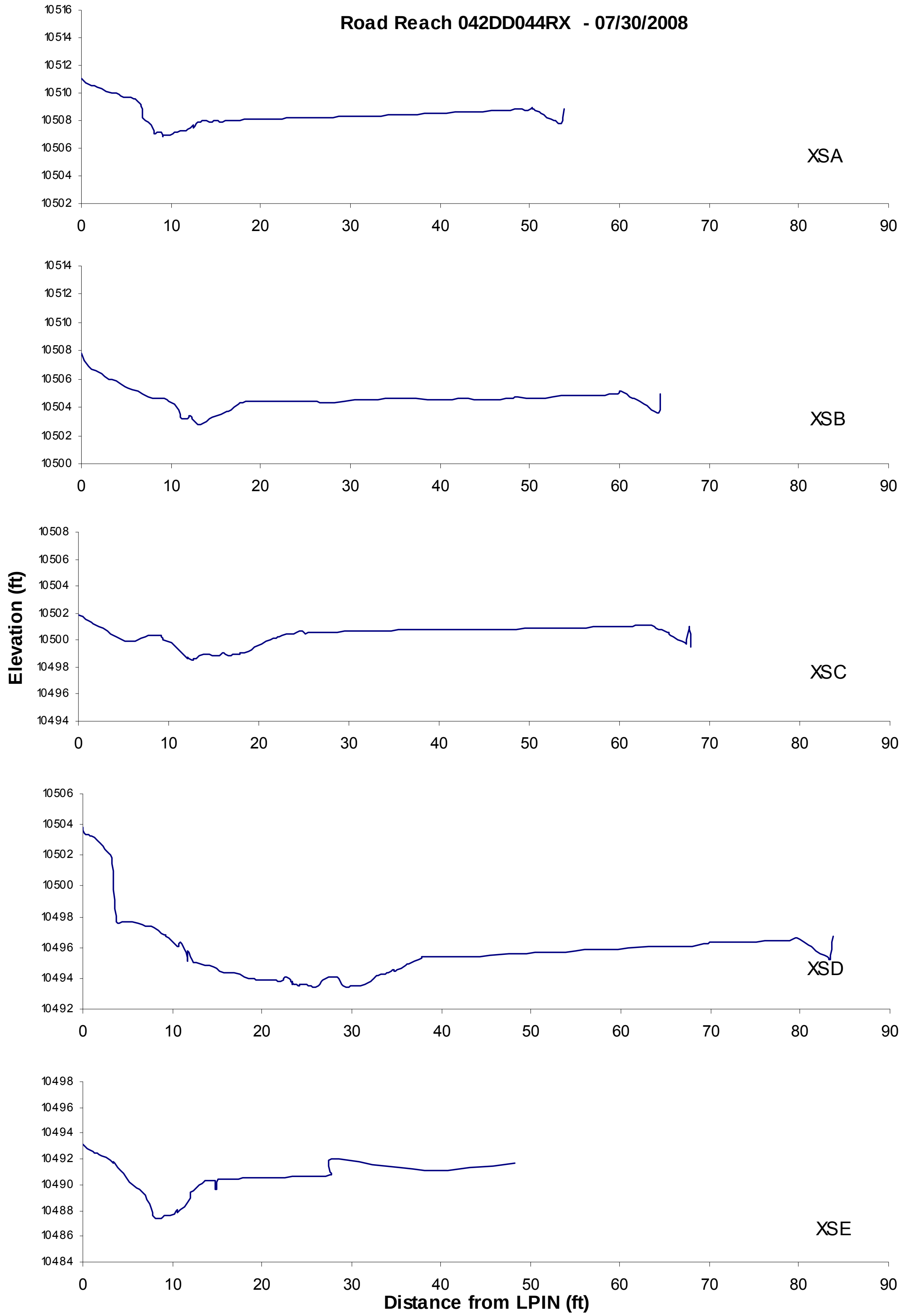
Date	075RG (Altitude 10,109’) Precipitation (in)	076RG (Altitude 11,810’) Precipitation (in)	077RG (Altitude 13,069’) Precipitation (in)
9/20/2008	0.04	0.08	0
9/21/2008	0	0	0
9/22/2008	0	0	0
9/23/2008	0	0.01	0.01
9/24/2008	0	0	0
9/25/2008	0	0	0
9/26/2008	0	0.01	0
9/27/2008	0.16	0.15	0
9/28/2008	0	0.02	0.04
9/29/2008	0	0	0
9/30/2008	0.02	0.01	0.01
10/1/2008	0	0	0
10/2/2008	0	0	0
10/3/2008	0	0	0
10/4/2008	0.06	0.03	0
10/5/2008	0.01	0.02	0.01
10/6/2008	0	0.01	0.01
10/7/2008	0	0	0
10/8/2008	0	0	0
10/9/2008	0.01	0	0.01
Total	**8.78**	**11.25**	**8.5**

Appendix C

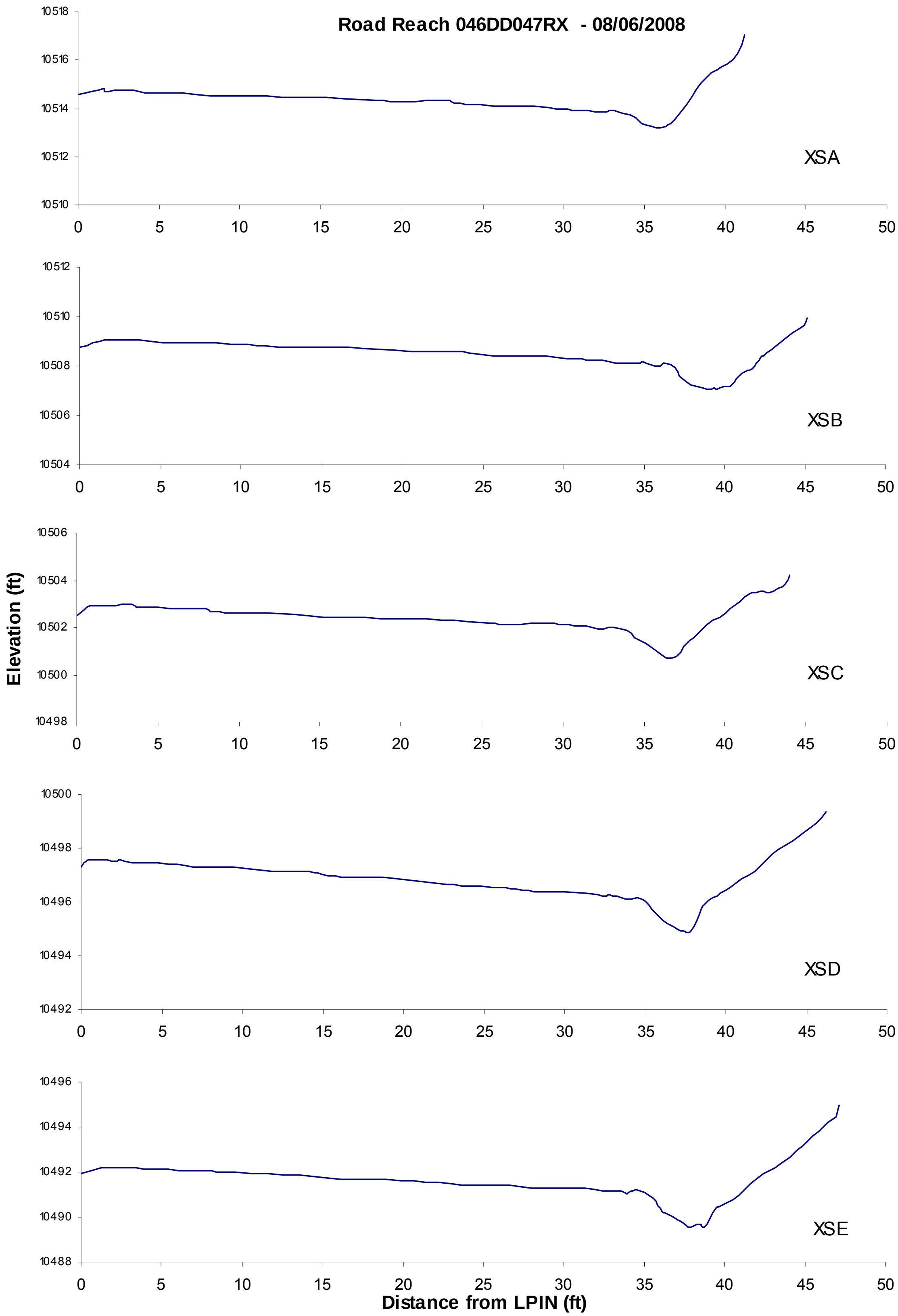
Road Reach

Cross Section Graphs

2008



Road Reach 042DD044RX - 07/30/2008
Elevation (ft)
XSA
XSB
XSC
XSD
XSE
Distance from LPIN (ft)


Road Reach 046DD047RX - 08/06/2008
10518
10516
10514
10512
10510
XSA
10512
10510
10508
10506
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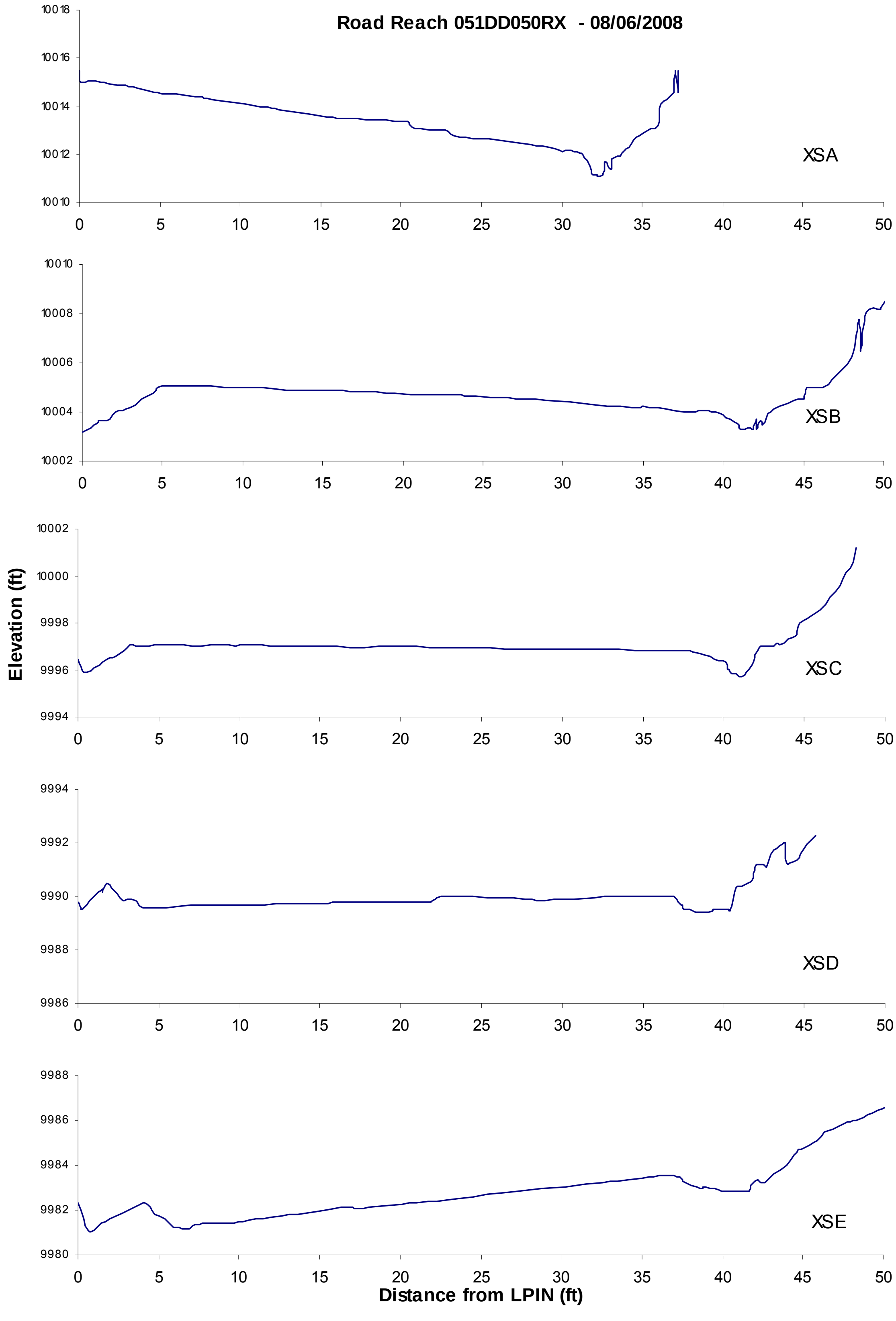
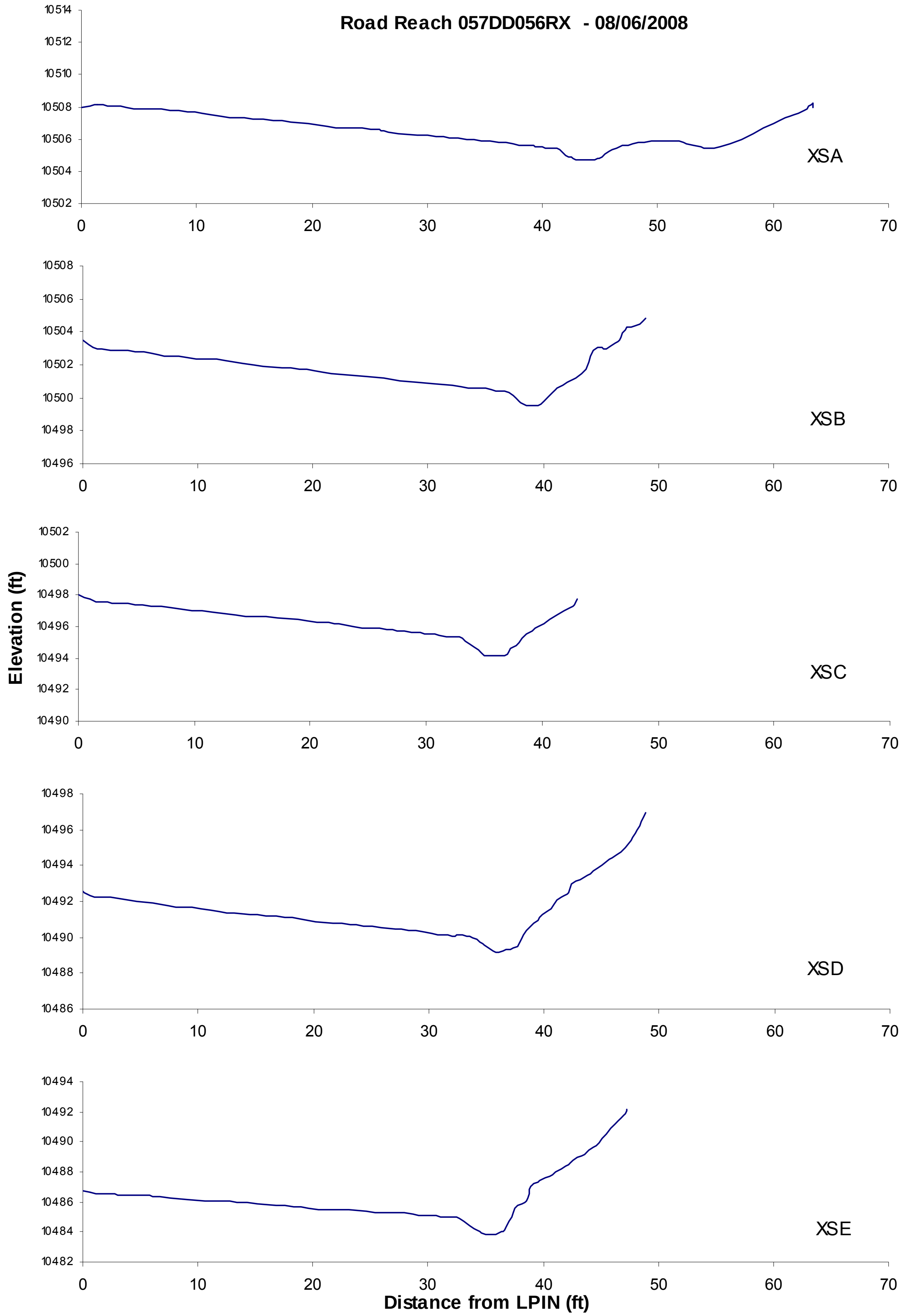
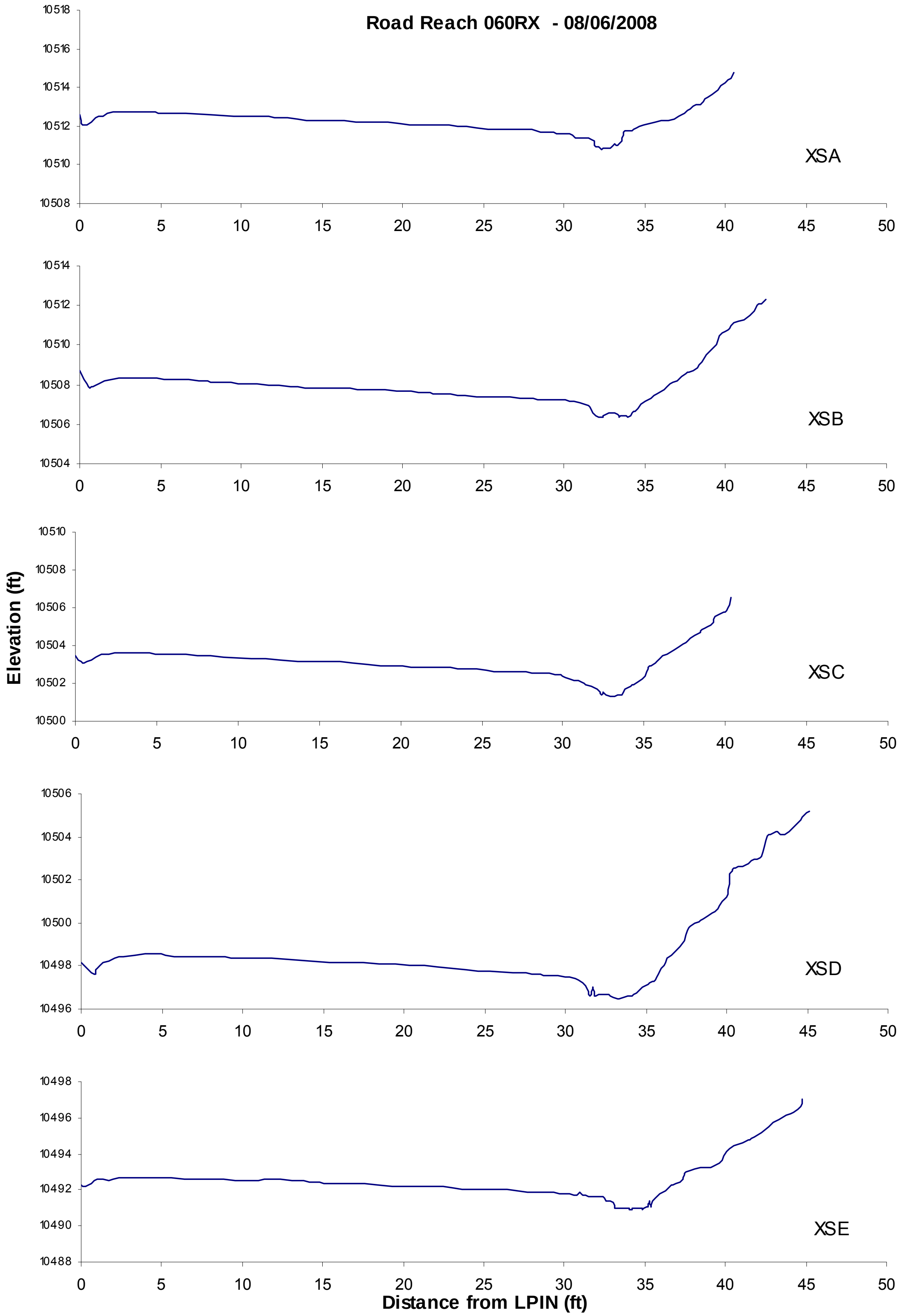
XSB
10506
10504
10502
10500
10498
XSC
10500
10498
10496
10494
10492
XSD
10496
10494
10492
10490
10488
XSE
0
5
10
15
20
25
30
35
40
45
50
Elevation (ft)
Distance from LPIN (ft)



Road Reach 051DD050RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE


Road Reach 057DD056RX - 08/06/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Road Reach 060RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
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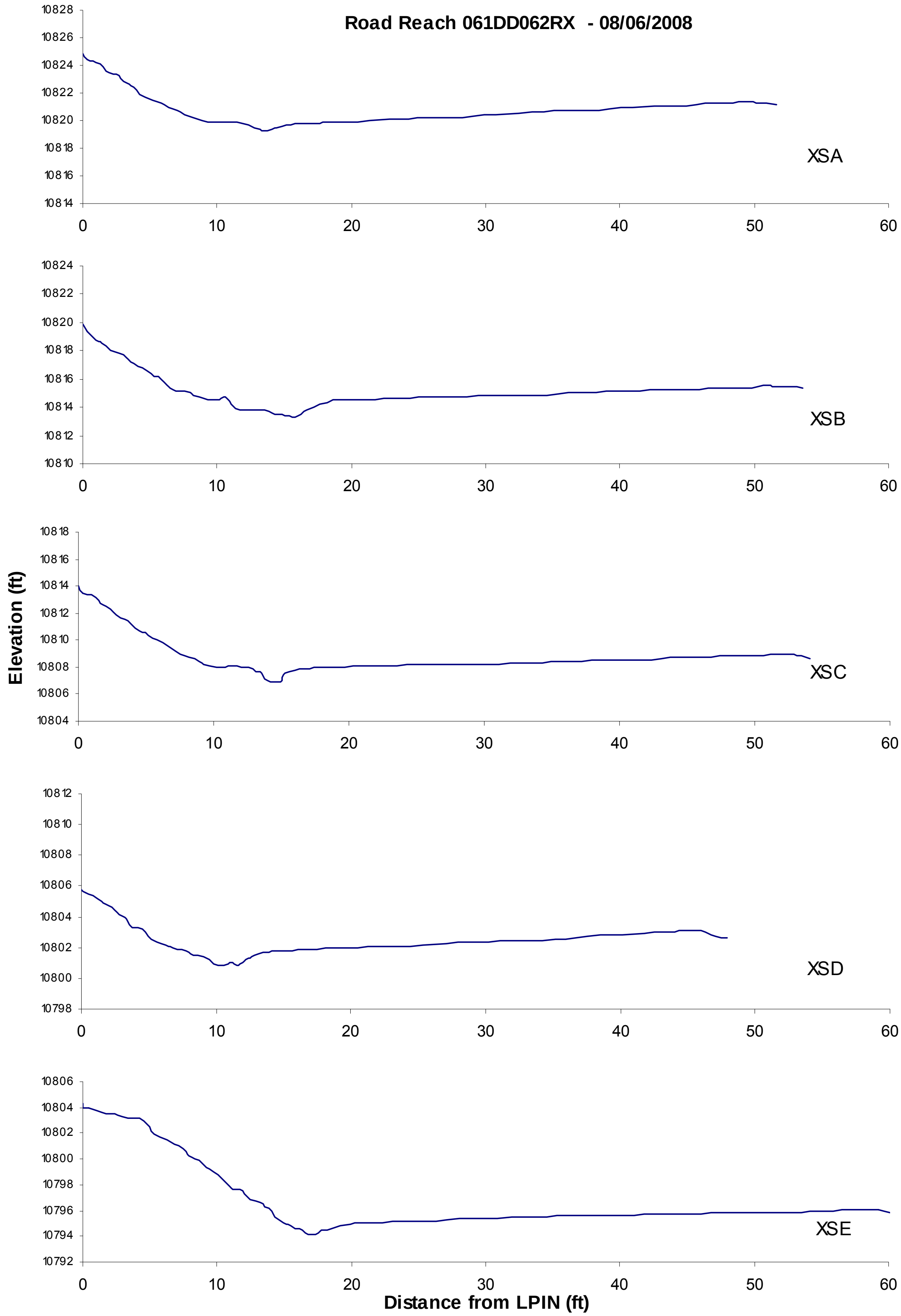
XSB
XSC
XSD
XSE
10518
10516
10514
10512
10510
10508
10506
10504
10502
10500
10498
10496
10494
10492
10490
10488
0
5
10
15
20
25
30
35
40
45
50


Road Reach 061DD062RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
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XSB
XSC
XSD
XSE
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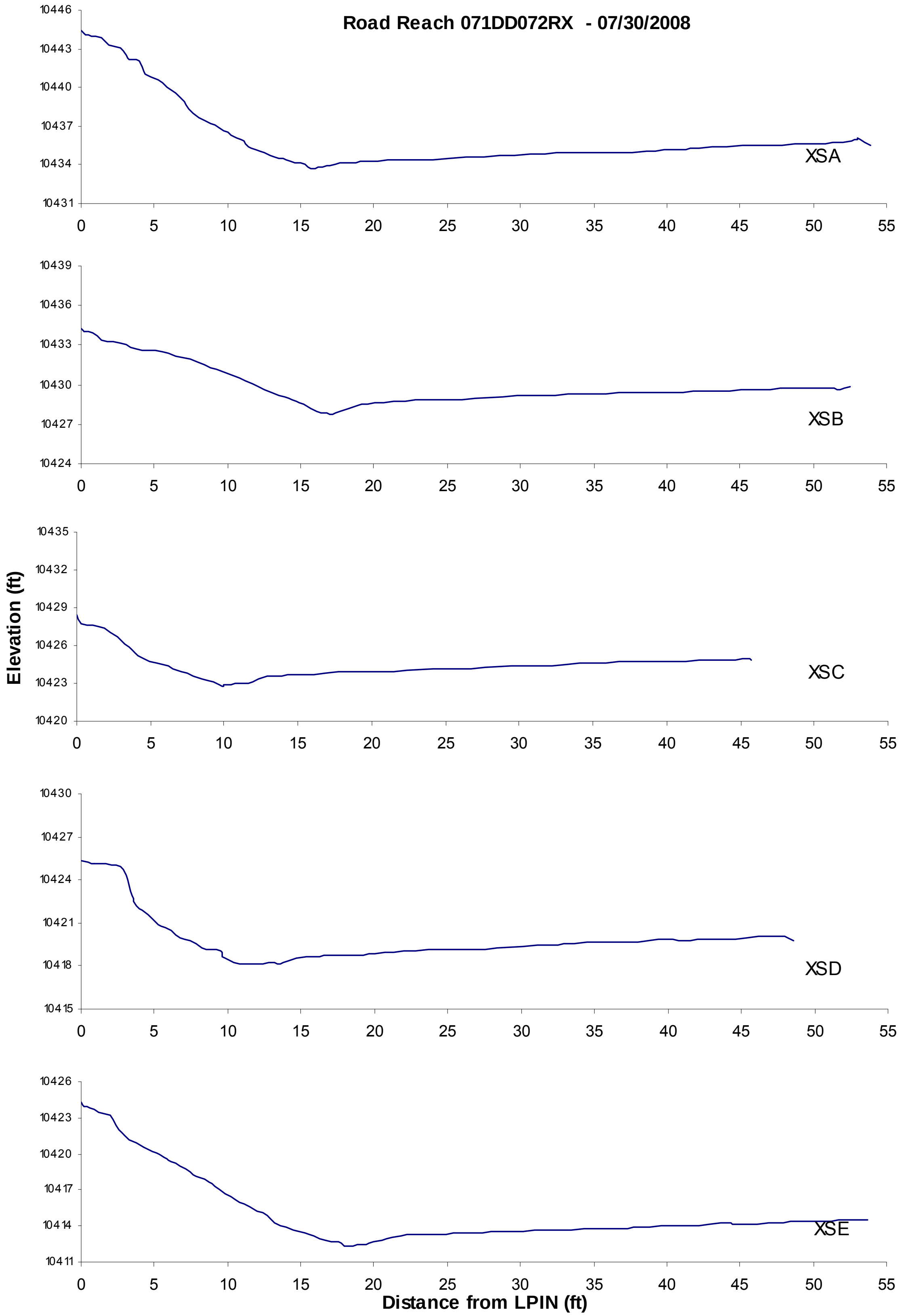
20
30
40
50
60


Road Reach 071DD072RX - 07/30/2008
Elevation (ft)
Distance from LPIN (ft)
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XSB
XSC
XSD
XSE
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10432
10429
10426
10423
10420
10430
10427
10424
10421
10418
10415
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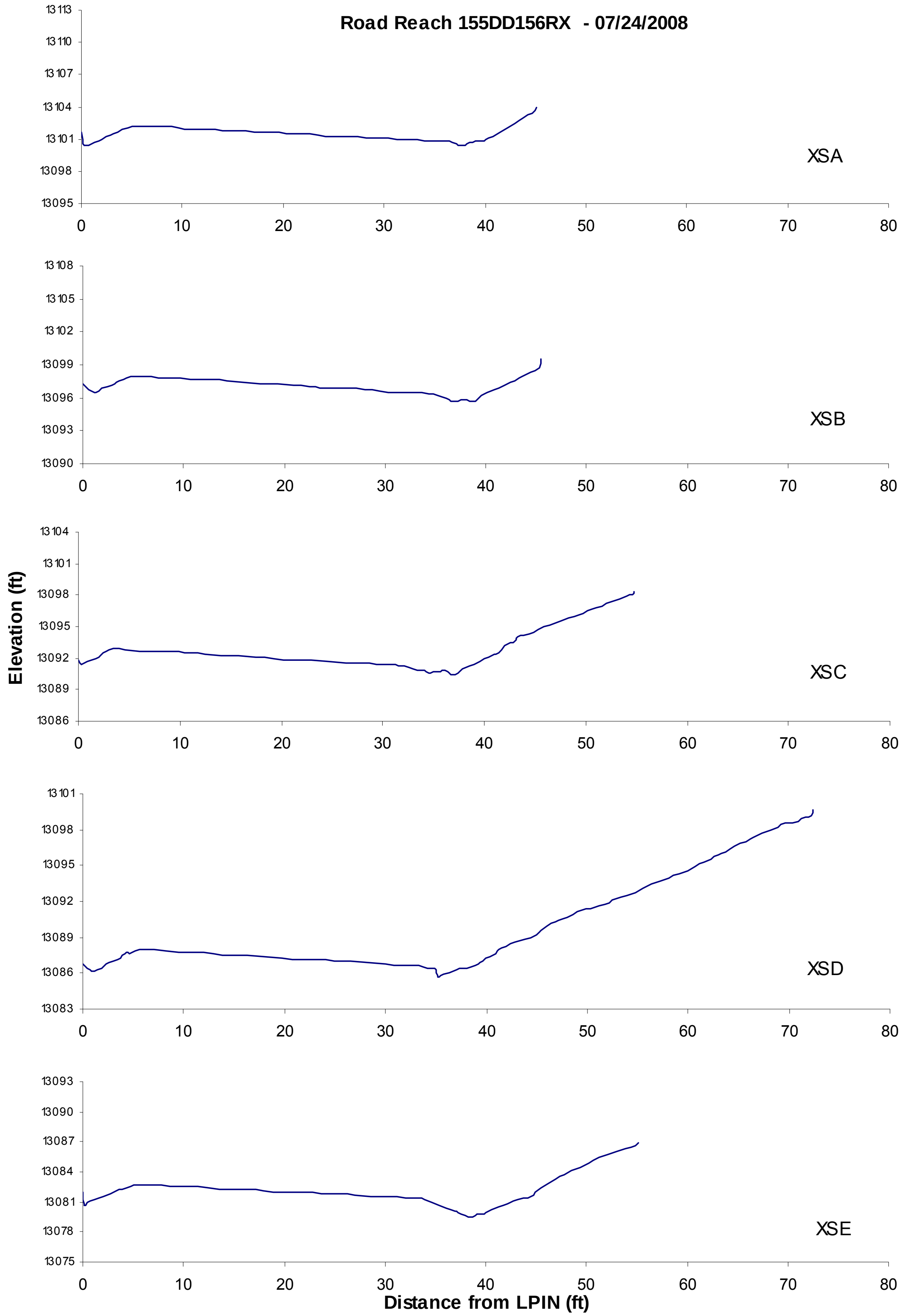
40
45
50
55


Road Reach 155DD156RX - 07/24/2008
Elevation (ft)
Distance from LPIN (ft)
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XSB
XSC
XSD
XSE
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13110
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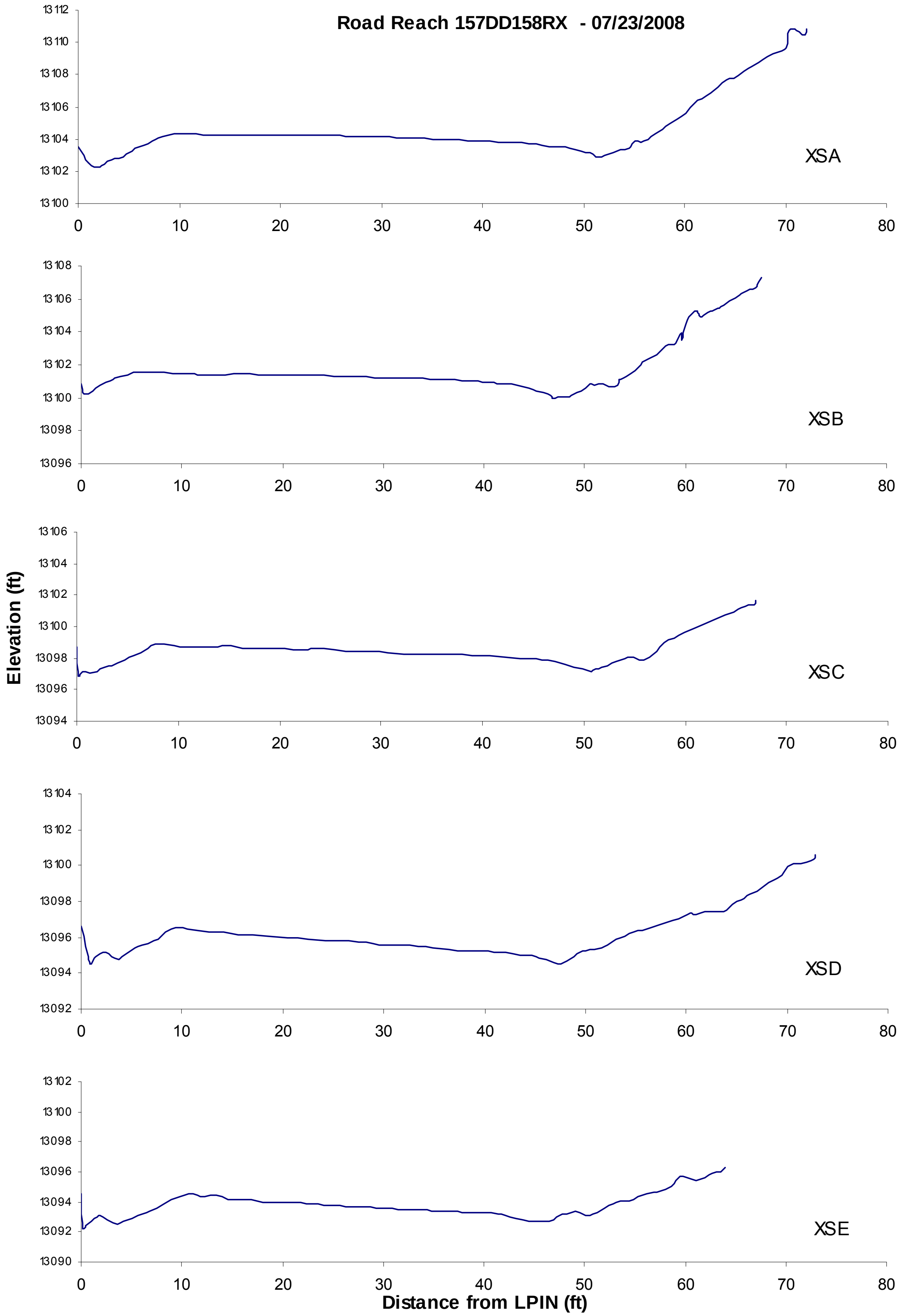
13101
13098
13095
13108
13105
13102
13099
13096
13093
13090
13104
13101
13098
13095
13092
13089
13086
13101
13098
13095
13092
13089
13086
13083
13093
13090
13087
13084
13081
13078
13075
0
10
20
30
40
50
60
70
80


Road Reach 157DD158RX - 07/23/2008
Elevation (ft)
Distance from LPIN (ft)
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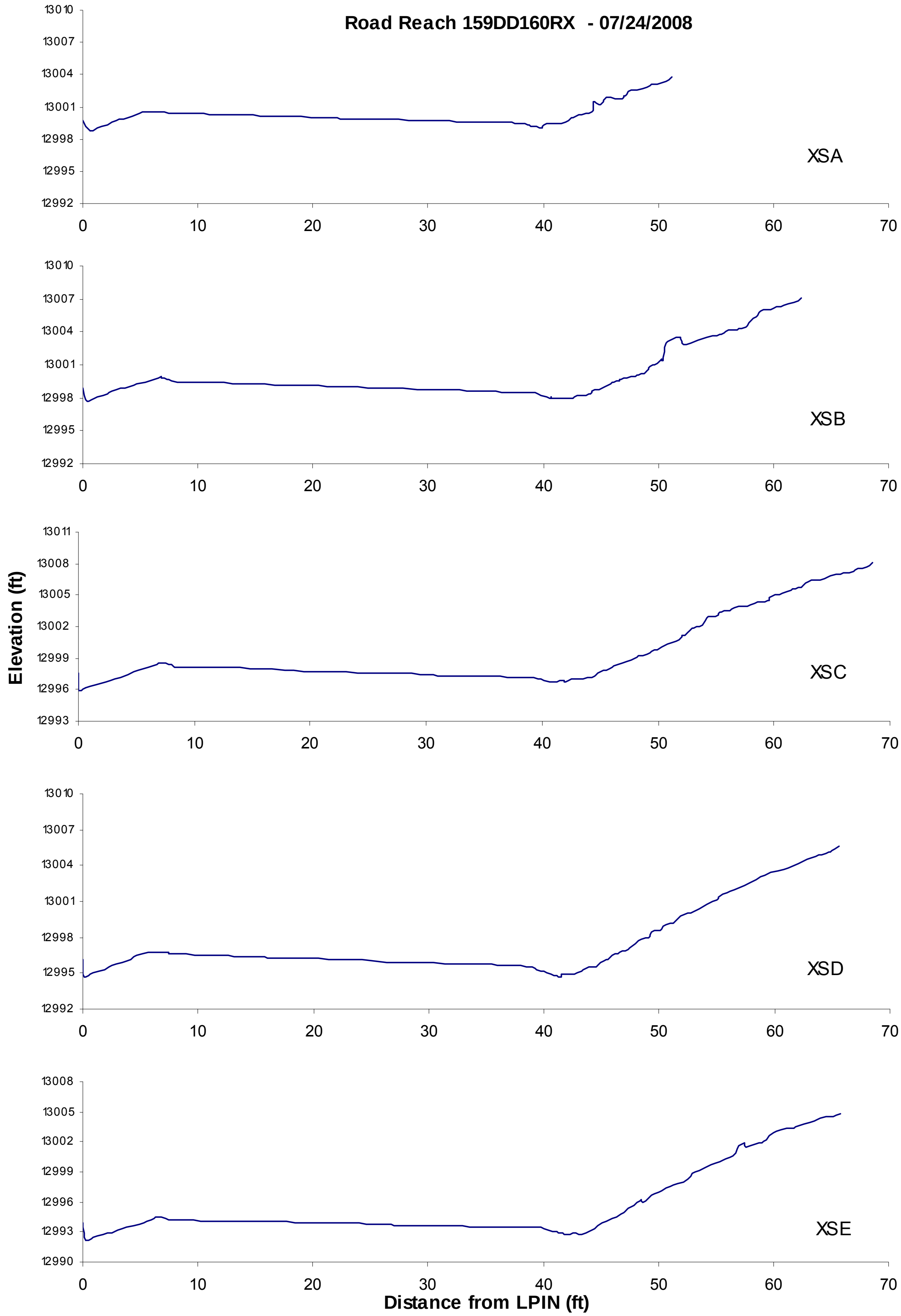
XSB
XSC
XSD
XSE
13112
13110
13108
13106
13104
13102
13100
13098
13096
13094
13092
13090
0
10
20
30
40
50
60
70
80


Road Reach 159DD160RX - 07/24/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

Appendix D

Cut Slope

Site Visit and Survey Dates
and
Sediment Accumulation

2008

Site Visit and Survey Dates of Cut Slope Silt Fences on Pikes Peak, 2008

Site ID	Cut Slope Site Visit and Survey Dates 2008																			
011CS	5/7	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
045CS	5/6	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
049CS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
059CS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/22	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
078CS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/22	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
087CS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/13	8/19	8/26	9/2	9/9	9/16		
090CS	5/9	5/19	5/27	6/2	6/9	6/11	6/17	6/24	7/3	7/8	7/22	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
102CS	5/19	5/27	6/2	6/9	6/17	7/3	7/8	7/10	7/15	7/22	7/29	8/5	8/19	8/19	8/26	9/2	9/9	9/16		
123CS	5/19	5/27	6/2	6/9	6/17	7/3	7/8	7/10	7/15	7/29	7/29	8/5	8/13	8/19	8/26	9/2	9/9			
141CS	5/19	5/27	6/2	6/9	6/17	7/8	7/8	7/10	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
185CS	5/7	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
192CS	5/7	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/17	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
197CS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	

Sediment Accumulation in Cut Slope Silt Fences on Pikes Peak, 2008

Site ID	Location	Date	Volume (ft^3)	Grab Sample
045CS	Lower Fence	5/6/08	0.81	Yes
045CS	Upper Fence	5/6/08	0.27	Yes
011CS	Lower Fence	5/7/08	0.61	Yes
011CS	Upper Fence	5/7/08	0.13	Yes
192CS	Lower Fence	5/7/08	2.15	Yes
192CS	Upper Fence	5/7/08	0.07	Yes
049CS	Lower Fence	5/12/08	0.27	Yes
059CS	Lower Fence	5/27/08	0.27 ‡	Yes
078CS	Lower Fence	5/27/08	0.27	Yes
087CS	Lower Fence	6/2/08	0.81	Yes
087CS	Upper Fence	6/2/08	0.07	Yes
102CS	Lower Fence	6/9/08	1.75 ‡	Yes
090CS	Lower Fence	6/11/08	0.07	Yes
192CS	Lower Fence	6/17/08	0.67	Yes
123CS	Upper Fence	7/3/08	4.85	Yes
087CS	Lower Fence	7/15/08	1.08	Yes
192CS	Lower Fence	7/17/08	0.19	Yes
049CS	Lower Fence	7/22/08	0.34	Yes
087CS	Lower Fence	7/29/08	1.75	Yes
087CS	Upper Fence	7/29/08	0.13	Yes
059CS	Lower Fence	8/5/08	0.27	Yes
049CS	Lower Fence	8/13/08	0.81	Yes
078CS	Lower Fence	8/13/08	0.94	Yes
087CS	Lower Fence	8/13/08	1.95	Yes
087CS	Upper Fence	8/13/08	0.40	Yes
192CS	Lower Fence	8/19/08	0.54	Yes
192CS	Upper Fence	8/19/08	0.07	Yes
123CS	Upper Fence	8/26/08	0.81	Yes
141CS	Upper Fence	8/26/08	0.20	Yes
059CS	Lower Fence	9/16/08	0.34	Yes
‡ Indicates possible data inaccuracy due to breached silt fence				

Appendix E

Fill Slope

Site Visit and Survey Dates
and
Sediment Accumulation

2008

Site Visit and Survey Dates of Fill Slope Silt Fences on Pikes Peak, 2008

Site ID	Fill Slope Site Visit and Survey Dates 2008																				
001FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
007FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/26	9/2	9/9	9/16			
039FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
043FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
048FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
052FS	5/9	5/12	5/19	5/27	6/2	6/4	6/9	6/17	6/24	7/3	7/8	7/17	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16
055FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
074FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
079FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/17	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
083FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
086FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/17	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
088FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
093FS	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
098FS	5/19	5/27	6/2	6/9	6/11	6/17	6/24	7/3	7/8	7/17	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
101FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
103FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
105FS	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16				
124FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
128FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
177FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
183FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
186FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
187FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
193FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
194FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
196FS	5/6	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
198FS	5/9	5/12	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
203FS	5/7	5/9	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
204FS	5/19	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			

Sediment Accumulation in Fill Slope Silt Fences on Pikes Peak, 2008

Site ID	Location	Date	Volume (ft^3)	Grab Sample
196FS	Lower Fence	5/6/08	3.36 ‡	Yes
203FS	Lower Fence	5/7/08	0.07	Yes
203FS	Upper Fence	5/7/08	0.54	Yes
001FS	Lower Fence	5/12/08	0.13	Yes
001FS	Upper Fence	5/12/08	0.54	Yes
043FS	Lower Fence	5/12/08	0.07	Yes
043FS	Upper Fence	5/12/08	1.21	Yes
048FS	Lower Fence	5/12/08	0.13	Yes
048FS	Upper Fence	5/12/08	2.69	Yes
052FS	Lower Fence	5/12/08	0.40 ‡	Yes
052FS	Upper Fence	5/12/08	14.40 ‡	Yes
177FS	Upper Fence	5/12/08	1.21	Yes
183FS	Upper Fence	5/12/08	1.21	Yes
186FS	Lower Fence	5/12/08	0.20 ‡	Yes
186FS	Upper Fence	5/12/08	0.81	Yes
187FS	Upper Fence	5/12/08	2.56	Yes
193FS	Upper Fence	5/12/08	0.20 ‡	Yes
194FS	Upper Fence	5/12/08	0.34	Yes
198FS	Upper Fence	5/12/08	0.20	No
074FS	Lower Fence	5/27/08	0.04	Yes
074FS	Upper Fence	5/27/08	2.29	Yes
079FS	Upper Fence	6/2/08	0.81	Yes
083FS	Lower Fence	6/2/08	1.28	Yes
083FS	Upper Fence	6/2/08	0.94	Yes
086FS	Upper Fence	6/2/08	3.43	Yes
088FS	Lower Fence	6/2/08	0.13	Yes
088FS	Upper Fence	6/2/08	3.23	Yes
093FS	Upper Fence	6/2/08	0.81	Yes
052FS	Upper Fence	6/4/08	9.69 ‡	Yes
039FS	Lower Fence	6/9/08	0.81	Yes
039FS	Upper Fence	6/9/08	1.28	Yes
103FS	Lower Fence	6/9/08	0.67	Yes
103FS	Upper Fence	6/9/08	1.48	Yes
128FS	Upper Fence	6/9/08	1.48	Yes
098FS	Upper Fence	6/11/08	1.48	Yes
055FS	Upper Fence	6/17/08	0.74	Yes
074FS	Upper Fence	6/17/08	0.27	Yes
101FS	Lower Fence	6/17/08	1.01	Yes

Site ID	Location	Date	Volume (ft^3)	Grab Sample
101FS	Upper Fence	6/17/08	7.81 ‡	Yes
105FS	Lower Fence	6/17/08	1.35	Yes
105FS	Upper Fence	6/17/08	18.78	Yes
124FS	Upper Fence	6/17/08	8.88 ‡	Yes
128FS	Upper Fence	6/17/08	0.13	Yes
204FS	Upper Fence	6/17/08	0.40	Yes
048FS	Upper Fence	6/24/08	1.08	Yes
052FS	Upper Fence	7/17/08	0.54	Yes
079FS	Upper Fence	7/17/08	0.27	Yes
086FS	Lower Fence	7/17/08	1.01	Yes
086FS	Upper Fence	7/17/08	0.54	Yes
098FS	Upper Fence	7/17/08	0.81	Yes
055FS	Upper Fence	7/22/08	0.74	Yes
088FS	Upper Fence	7/22/08	0.40	Yes
093FS	Upper Fence	7/22/08	0.34	Yes
105FS	Upper Fence	7/22/08	1.62	Yes
124FS	Upper Fence	7/22/08	0.27	Yes
039FS	Lower Fence	7/29/08	0.13	Yes
039FS	Upper Fence	7/29/08	0.54	Yes
048FS	Upper Fence	7/29/08	0.61	Yes
074FS	Upper Fence	7/29/08	3.63	Yes
186FS	Upper Fence	7/29/08	0.74	Yes
001FS	Upper Fence	8/5/08	0.67	Yes
048FS	Upper Fence	8/5/08	0.13	Yes
083FS	Lower Fence	8/5/08	0.20	Yes
083FS	Upper Fence	8/5/08	2.69	Yes
086FS	Upper Fence	8/5/08	0.81	Yes
001FS	Upper Fence	8/13/08	1.88	Yes
043FS	Upper Fence	8/13/08	9.69	Yes
048FS	Upper Fence	8/13/08	2.29	Yes
055FS	Upper Fence	8/13/08	8.88	Yes
074FS	Upper Fence	8/13/08	16.29	Yes
079FS	Upper Fence	8/13/08	1.88	Yes
083FS	Lower Fence	8/13/08	0.74	Yes
083FS	Upper Fence	8/13/08	17.23 ‡	Yes
088FS	Upper Fence	8/13/08	1.08	Yes
103FS	Upper Fence	8/13/08	8.75	Yes
105FS	Upper Fence	8/13/08	1.82	Yes
186FS	Upper Fence	8/13/08	1.88	Yes

Site ID	Location	Date	Volume (ft^3)	Grab Sample
007FS	Lower Fence	8/19/08	0.13	Yes
007FS	Upper Fence	8/19/08	0.27	Yes
052FS	Lower Fence	8/19/08	0.13	Yes
052FS	Upper Fence	8/19/08	1.08	Yes
183FS	Upper Fence	8/19/08	0.27	Yes
196FS	Lower Fence	8/19/08	5.38 ‡	Yes
196FS	Upper Fence	8/19/08	20.19 ‡	Yes
083FS	Lower Fence	8/26/08	0.27	Yes
083FS	Upper Fence	8/26/08	0.81 ‡	Yes
124FS	Upper Fence	8/26/08	1.75	Yes
098FS	Upper Fence	9/2/08	0.61	Yes
093FS	Upper Fence	9/2/08	0.67	Yes
101FS	Lower Fence	9/9/08	0.40	Yes
101FS	Upper Fence	9/9/08	1.55	Yes
203FS	Upper Fence	9/9/08	2.42	Yes
043FS	Lower Fence	9/16/08	0.54	Yes
043FS	Upper Fence	9/16/08	0.40	Yes
048FS	Upper Fence	9/16/08	0.94	Yes
055FS	Upper Fence	9/16/08	0.67	Yes
105FS	Upper Fence	9/16/08	2.89	Yes
196FS	Upper Fence	9/16/08	3.30	Yes
‡ Indicates possible data inaccuracy due to breached silt fence				

Appendix F

Cut and Fill Slope

Particle Size Distribution and Graphs

2008

Summary of Cut and Fill Slope Particle Size Distribution from Sieve Analysis of Grab Samples on Pikes Peak, 2005 and 2007

			Particle Size Distribution–Grab Samples 2005–2007 †					
Site Name	**ID**	**Date**	**D15**	**D35**	**D50**	**D84**	**D95**	**D100**
Pikes Peak Highway–Cut Slope	011CS Lower Fence	5/5/2005	0.644	2.319	4.230	12.156	23.714	25.0
Pikes Peak Highway–Cut Slope	182CS Lower Fence	6/8/2005	0.531	1.797	3.069	8.809	15.486	26.0
Pikes Peak Highway–Cut Slope	182CS Upper Fence	6/8/2005	0.039	0.643	1.646	6.187	9.619	15.0
Pikes Peak Highway–Cut Slope	059CS Lower Fence	6/21/2007	0.100	1.208	3.659	52.637	60.208	45.0
Pikes Peak Highway–Cut Slope	087CS Lower Fence	6/20/2007	1.039	10.384	17.421	36.777	40.293	42.0
Pikes Peak Highway–Cut Slope	087CS Upper Fence	6/20/2007	0.070	1.150	32.293	37.984	40.033	41.0
Pikes Peak Highway–Cut Slope	102CS Lower Fence	8/10/2007	0.347	1.728	2.925	7.217	11.137	23.0
Pikes Peak Highway–Cut Slope	039FS Lower Fence	5/31/2005	0.132	1.049	1.790	5.189	9.264	22.0
Pikes Peak Highway–Cut Slope	039FS Upper Fence	5/31/2005	0.956	3.834	6.161	14.812	23.502	33.0
Pikes Peak Highway–Cut Slope	196FS Upper Fence	6/1/2005	0.506	1.241	2.176	8.161	15.228	29.0
Pikes Peak Highway–Cut Slope	007FS Lower Fence	7/2/2007	0.071	1.076	2.132	6.529	13.439	16.0
Pikes Peak Highway–Cut Slope	083FS Upper Fence	6/20/2007	0.610	2.069	5.355	52.036	55.400	57.0
Pikes Peak Highway–Cut Slope	101FS Lower Fence	6/29/2007	1.239	4.452	16.201	49.437	51.860	53.0
Pikes Peak Highway–Cut Slope	101FS Upper Fence	6/29/2007	1.352	4.567	10.951	35.104	41.001	44.0
Pikes Peak Highway–Cut Slope	128FS Lower Fence	6/26/2007	0.881	2.438	5.355	49.687	51.942	53.0
Pikes Peak Highway–Cut Slope	128FS Upper Fence	6/26/2007	0.605	2.020	3.829	16.303	27.336	32.0

† Grab samples were not collected during the 2006 field season

Sieve Analysis Worksheet

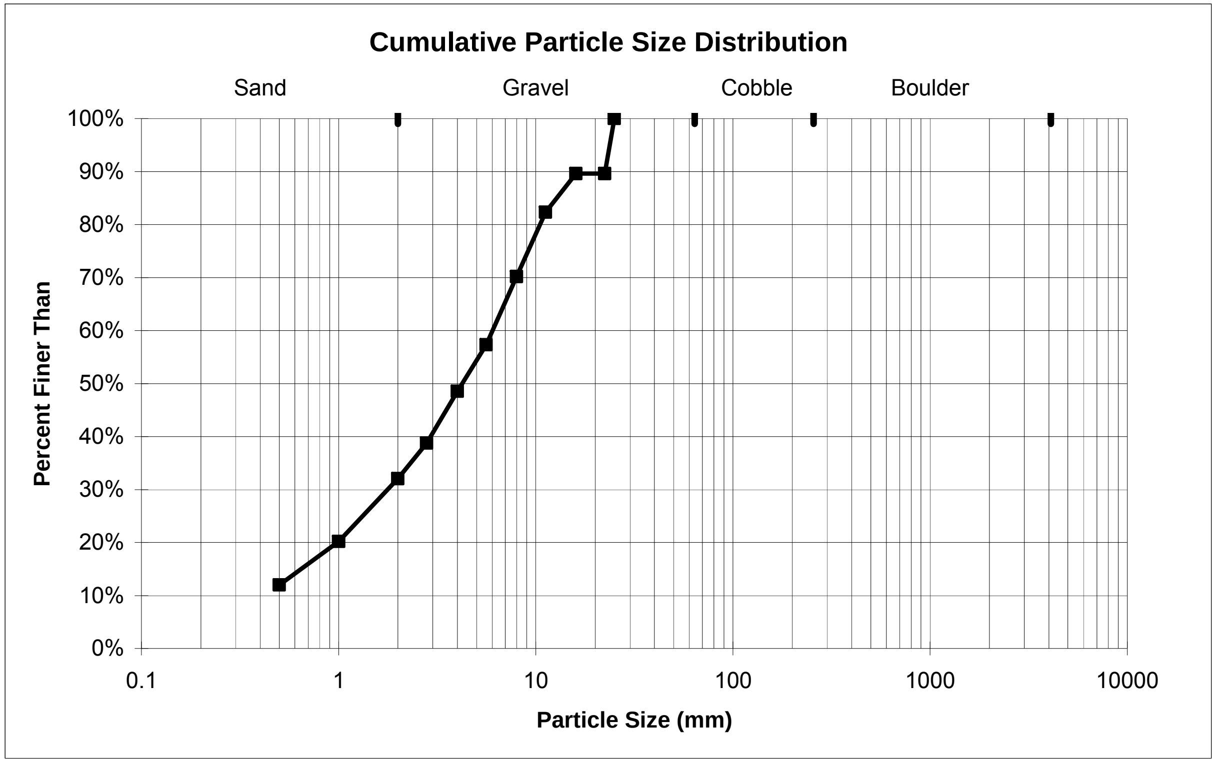
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	38.40	12.0%	
0.5	26.40	8.2%	12.0%
1.0	37.80	11.8%	20.2%
2.0	21.60	6.7%	32.0%
2.8	31.30	9.8%	38.8%
4.0	28.00	8.7%	48.5%
5.6	41.30	12.9%	57.3%
8.0	38.90	12.1%	70.2%
11.2	23.30	7.3%	82.3%
16.0	0.00	0.0%	89.6%
22.4	33.30	10.4%	89.6%
25.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	320.30		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 011CS Lower Fence
DATE: 5/5/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.644	2.319	4.230	12.156	23.714	25.0



Sieve Analysis Worksheet

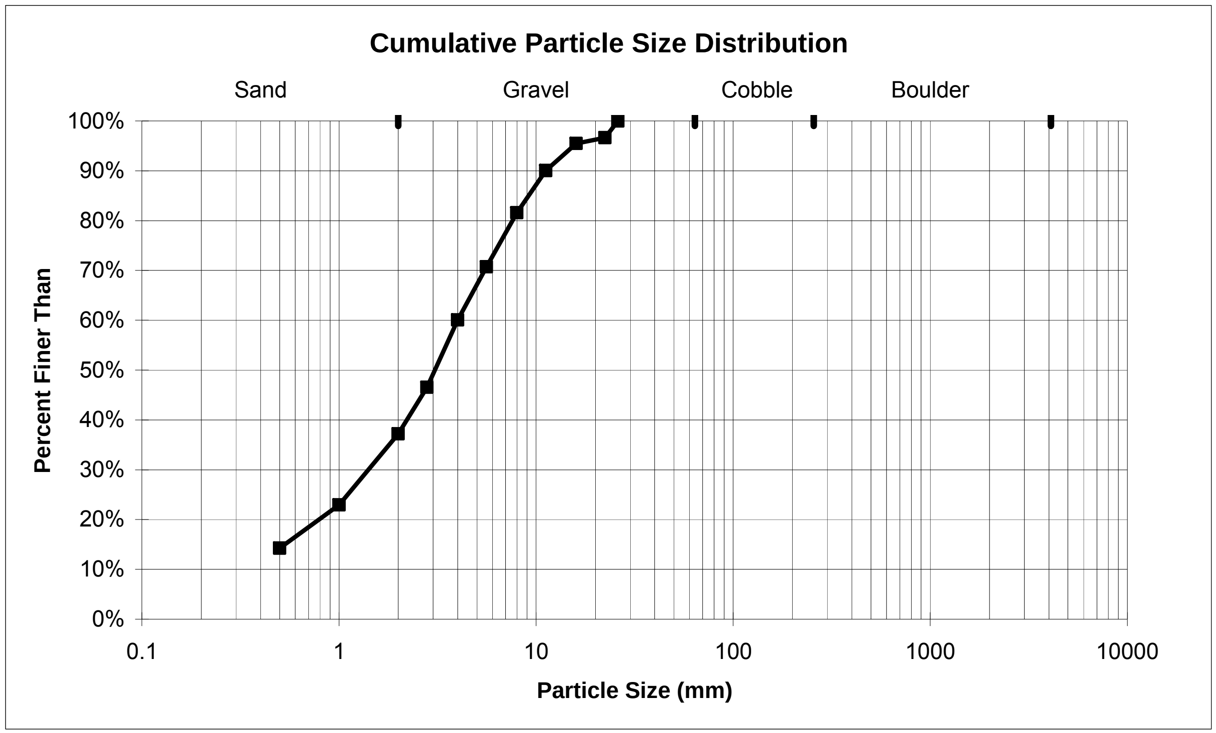
COMMENTS: Grab Sample of 2005 Sediment Accumulation

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	60.80	14.3%	
0.5	37.00	8.7%	14.3%
1.0	60.90	14.3%	22.9%
2.0	39.70	9.3%	37.2%
2.8	57.80	13.6%	46.5%
4.0	45.50	10.7%	60.1%
5.6	46.20	10.8%	70.7%
8.0	36.20	8.5%	81.6%
11.2	23.20	5.4%	90.1%
16.0	4.90	1.1%	95.5%
22.4	14.30	3.4%	96.6%
26.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	426.50		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 182CS Lower Fence
DATE: 6/8/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.531	**1.797**	**3.069**	**8.809**	**15.486**	**26.0**



Sieve Analysis Worksheet

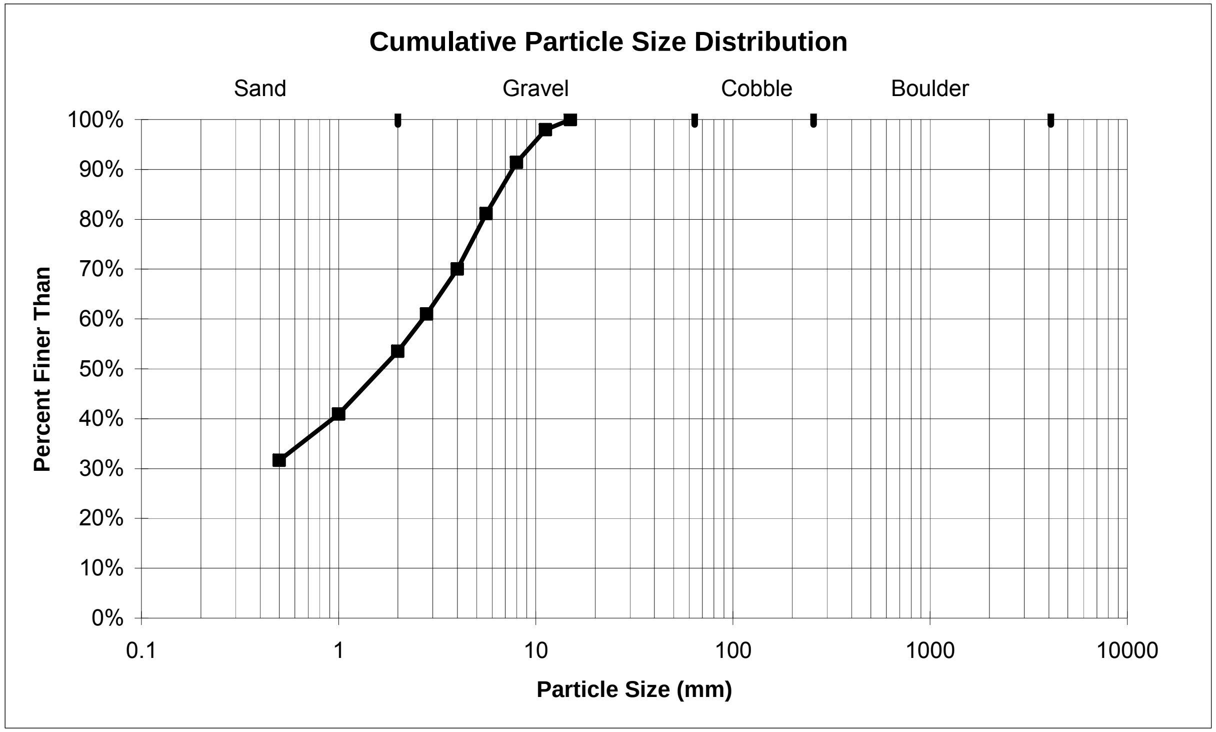
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	275.30	31.6%	
0.5	80.80	9.3%	31.6%
1.0	109.80	12.6%	40.9%
2.0	64.90	7.5%	53.5%
2.8	78.50	9.0%	61.0%
4.0	96.50	11.1%	70.0%
5.6	89.80	10.3%	81.1%
8.0	56.60	6.5%	91.4%
11.2	17.90	2.1%	97.9%
15.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	870.10		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 182CS Upper Fence
DATE: 6/8/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.039	0.643	1.646	6.187	9.619	15.0



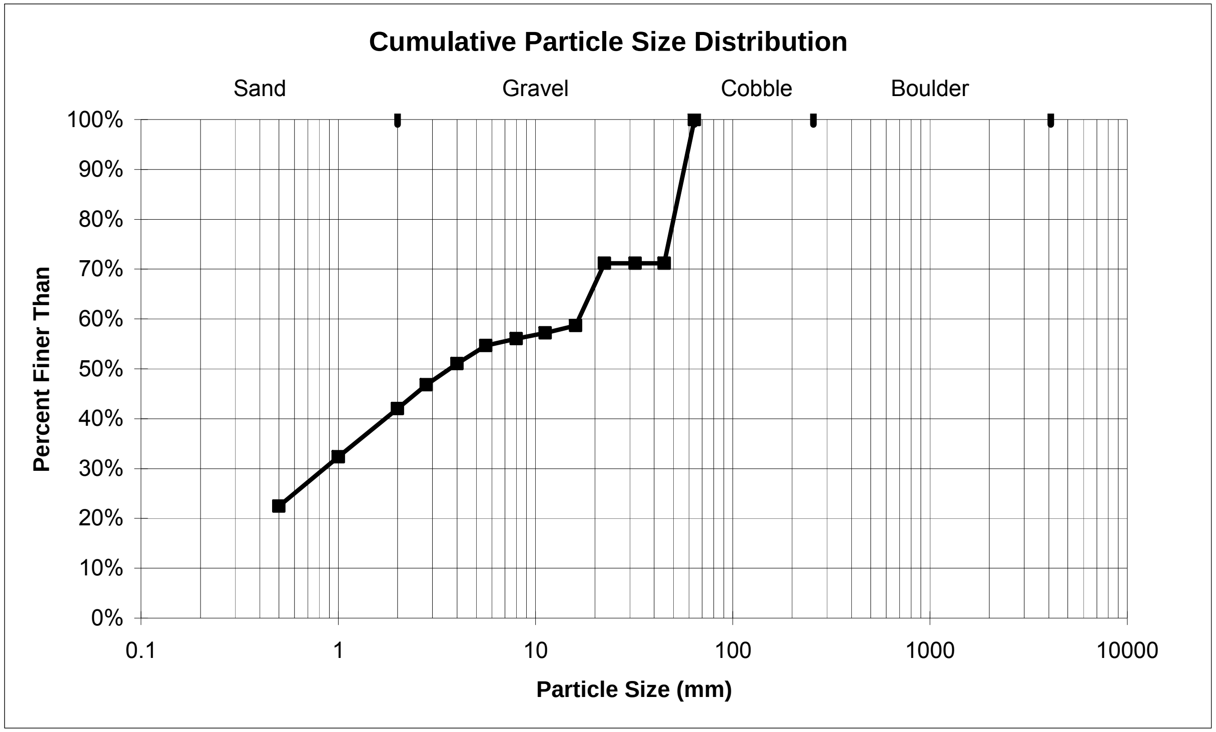
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	90.30	22.5%	
0.5	39.80	9.9%	22.5%
1.0	38.90	9.7%	32.4%
2.0	19.10	4.8%	42.0%
2.8	17.20	4.3%	46.8%
4.0	14.50	3.6%	51.1%
5.6	5.50	1.4%	54.7%
8.0	4.60	1.1%	56.0%
11.2	6.10	1.5%	57.2%
16.0	50.10	12.5%	58.7%
22.4	0.00	0.0%	71.2%
32.0	0.00	0.0%	71.2%
45.0	115.90	28.8%	71.2%
64.0			100.0%
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	402.00		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 059CS Lower Fence
DATE: 6/21/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.100	**1.208**	**3.659**	**52.637**	**60.208**	**45.0**



Sieve Analysis Worksheet

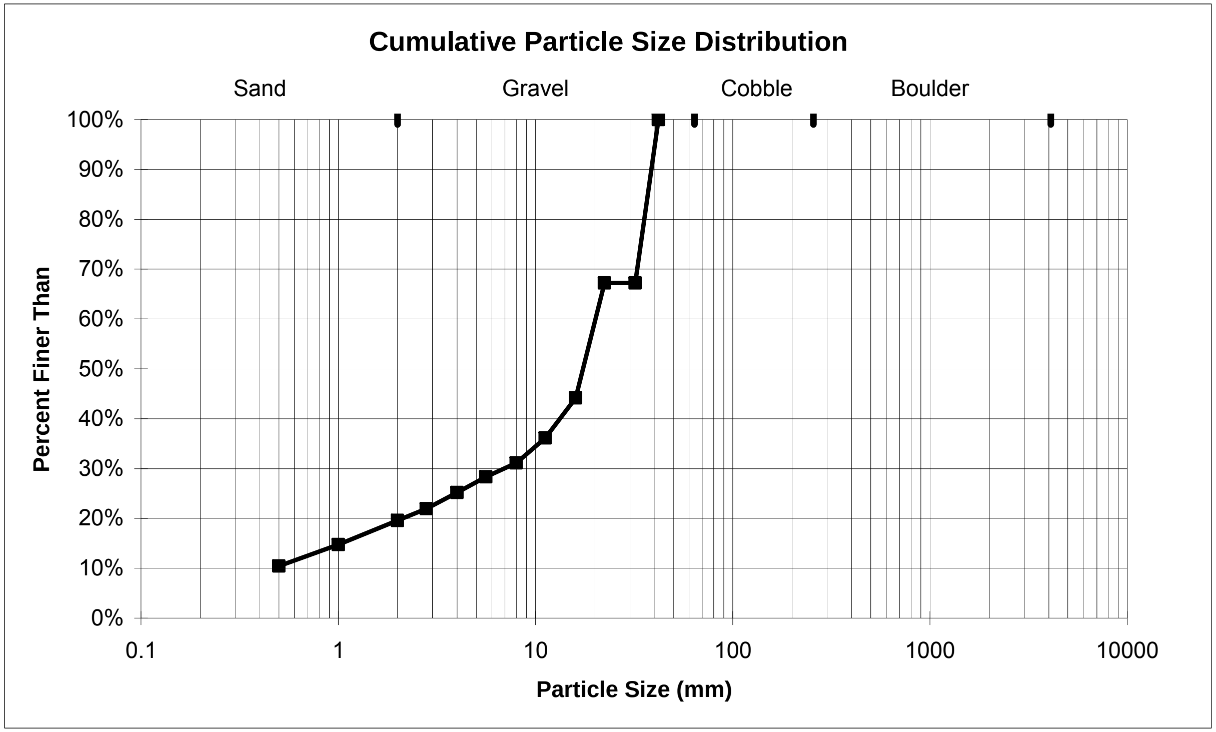
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	43.10	10.5%	
0.5	17.50	4.3%	10.5%
1.0	19.90	4.8%	14.7%
2.0	9.80	2.4%	19.6%
2.8	13.30	3.2%	21.9%
4.0	13.00	3.2%	25.2%
5.6	11.50	2.8%	28.3%
8.0	20.50	5.0%	31.1%
11.2	33.1	8.0%	36.1%
16.0	94.9	23.1%	44.2%
22.4	0	0.0%	67.2%
32.0	134.8	32.8%	67.2%
42.0	*		100.0%
64.0			-
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	411.40		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 087CS Lower Fence
DATE: 6/20/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	1.039	**10.384**	**17.421**	**36.777**	**40.293**	**42.0**



Sieve Analysis Worksheet

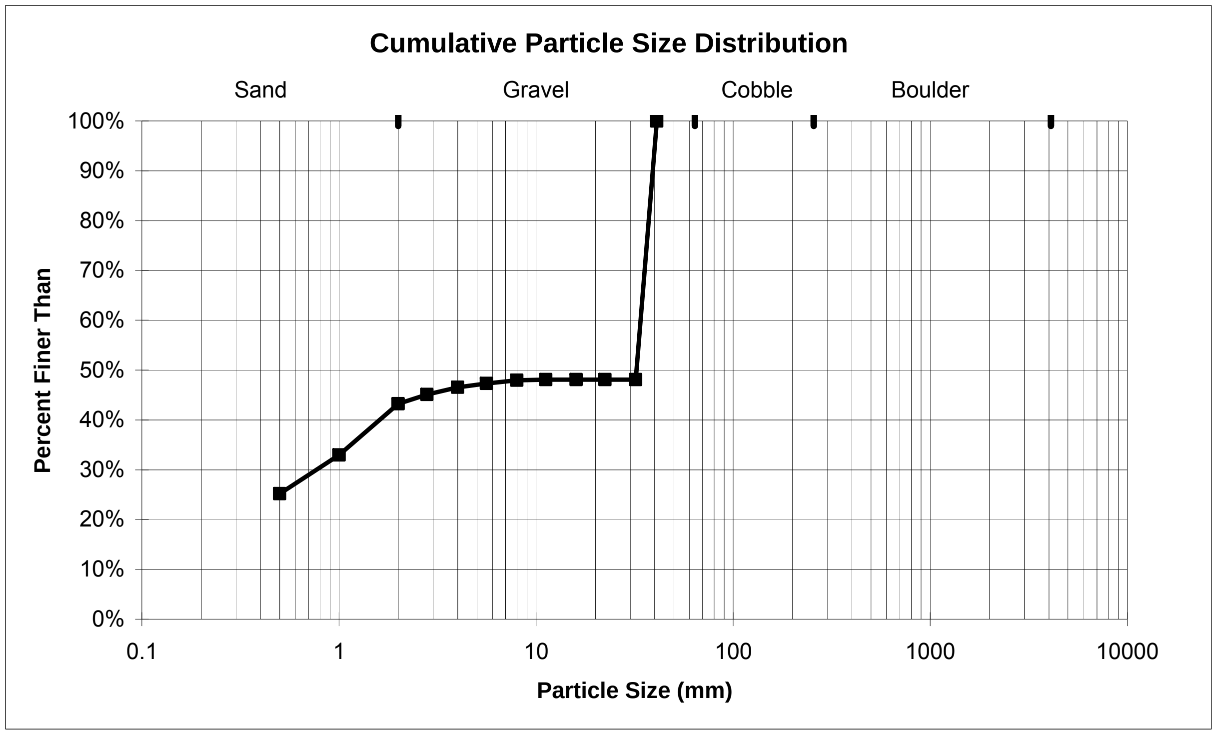
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	95.20	25.2%	
0.5	29.20	7.7%	25.2%
1.0	38.90	10.3%	32.9%
2.0	7.10	1.9%	43.2%
2.8	5.40	1.4%	45.1%
4.0	3.00	0.8%	46.5%
5.6	2.40	0.6%	47.3%
8.0	0.50	0.1%	48.0%
11.2	0	0.0%	48.1%
16.0	0	0.0%	48.1%
22.4	0	0.0%	48.1%
32.0	196.1	51.9%	48.1%
41.0	*		100.0%
64.0			-
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	377.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 087CS Upper Fence
DATE: 6/20/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.070	1.150	32.293	37.984	40.033	41.0



Sieve Analysis Worksheet

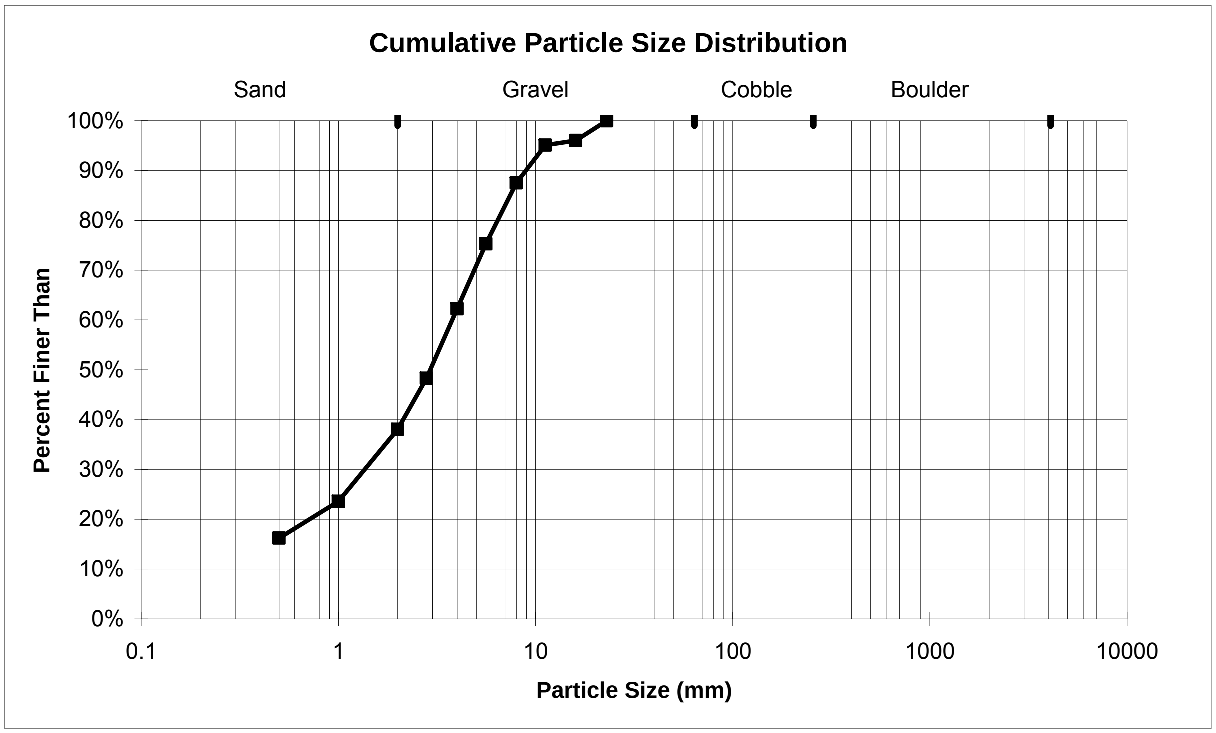
COMMENTS: Grab Sample of 2007 Sediment Accumulation

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	72.90	16.2%	
0.5	33.10	7.4%	16.2%
1.0	65.00	14.5%	23.6%
2.0	46.00	10.2%	38.1%
2.8	62.90	14.0%	48.3%
4.0	58.40	13.0%	62.3%
5.6	55.10	12.3%	75.3%
8.0	34.10	7.6%	87.5%
11.2	4.20	0.9%	95.1%
16.0	17.70	3.9%	96.1%
23.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	449.40		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - Cut Slope
ID NUMBER: 102CS Lower Fence
DATE: 8/10/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.347	**1.728**	**2.925**	**7.217**	**11.137**	**23.0**



Sieve Analysis Worksheet

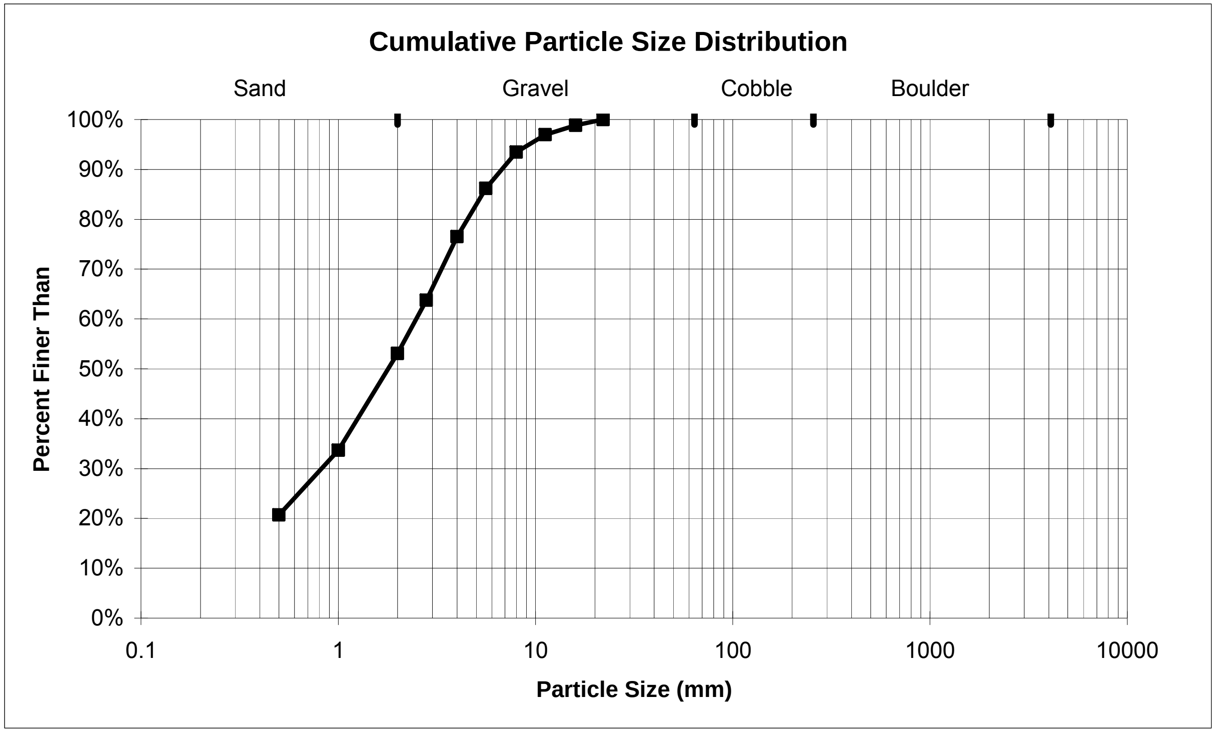
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	92.80	20.7%	
0.5	58.40	13.0%	20.7%
1.0	87.30	19.4%	33.7%
2.0	47.80	10.6%	53.1%
2.8	57.30	12.8%	63.7%
4.0	43.50	9.7%	76.5%
5.6	32.70	7.3%	86.2%
8.0	15.70	3.5%	93.5%
11.2	8.40	1.9%	97.0%
16.0	5.20	1.2%	98.8%
22.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	449.10		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 039FS Lower Fence
DATE: 5/31/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.132	**1.049**	**1.790**	**5.189**	**9.264**	**22.0**



Sieve Analysis Worksheet

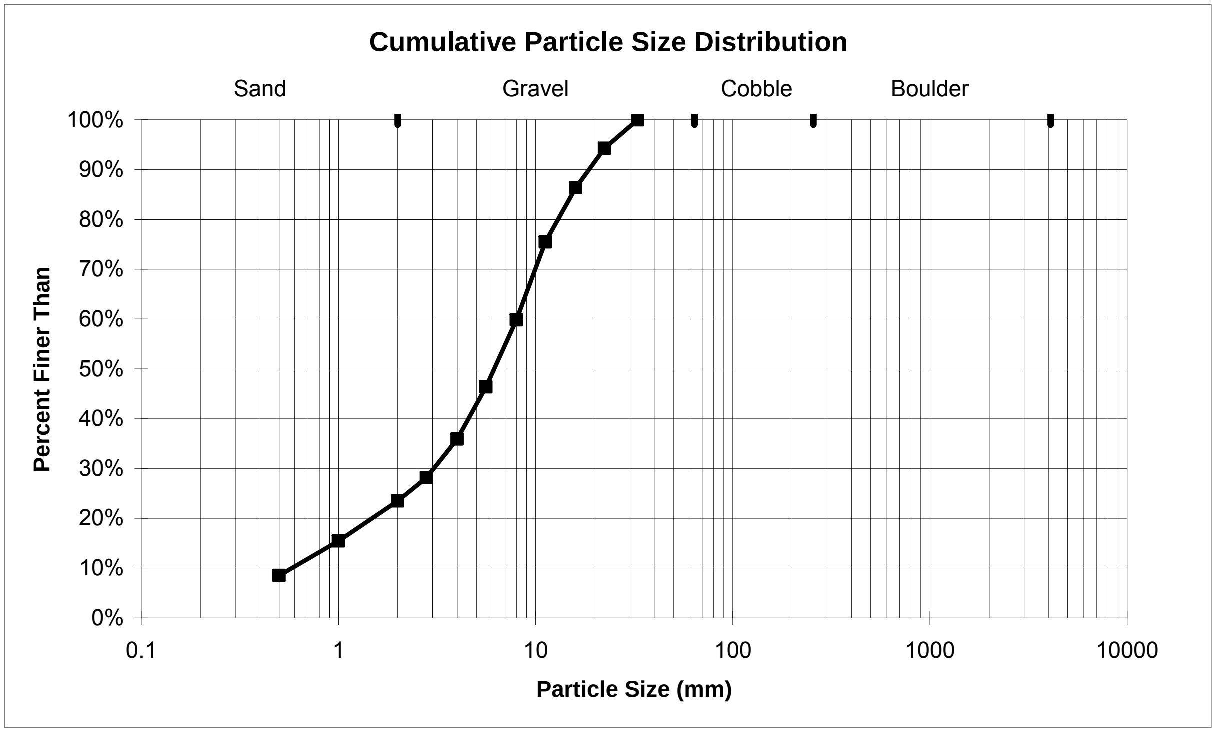
COMMENTS: Grab Sample of 2005 Sediment Accumulation

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	29.00	8.5%	
0.5	23.50	6.9%	8.5%
1.0	27.40	8.1%	15.4%
2.0	15.80	4.6%	23.5%
2.8	26.40	7.8%	28.2%
4.0	35.60	10.5%	35.9%
5.6	45.80	13.5%	46.4%
8.0	53.10	15.6%	59.9%
11.2	36.90	10.9%	75.5%
16.0	27.00	7.9%	86.3%
22.4	19.40	5.7%	94.3%
33.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	339.90		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 039FS Upper Fence
DATE: 5/31/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.956	**3.834**	**6.161**	**14.812**	**23.502**	**33.0**



Sieve Analysis Worksheet

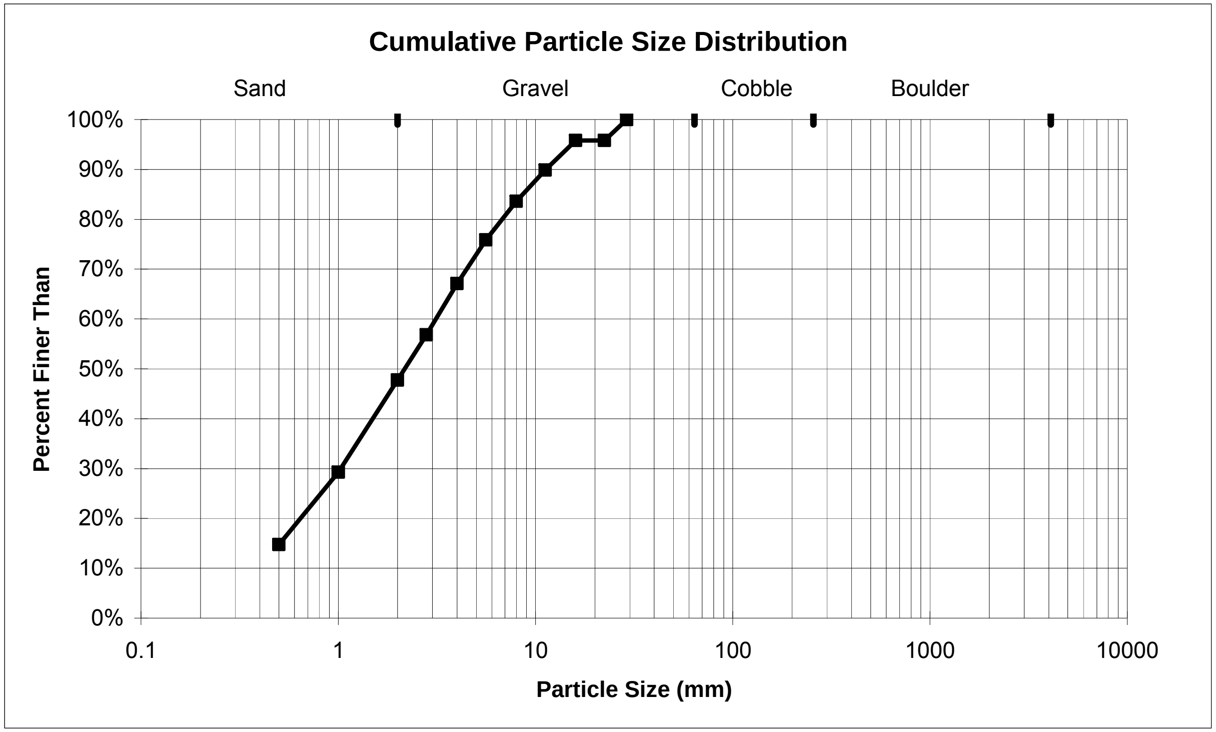
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	65.30	14.7%	
0.5	64.20	14.5%	14.7%
1.0	81.90	18.5%	29.2%
2.0	40.20	9.1%	47.7%
2.8	45.50	10.3%	56.8%
4.0	38.90	8.8%	67.1%
5.6	34.40	7.8%	75.9%
8.0	27.70	6.3%	83.6%
11.2	26.30	5.9%	89.9%
16.0	0	0.0%	95.8%
22.4	18.50	4.2%	95.8%
29.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	442.90		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 196FS Upper Fence
DATE: 6/1/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.506	1.241	2.176	8.161	15.228	29.0



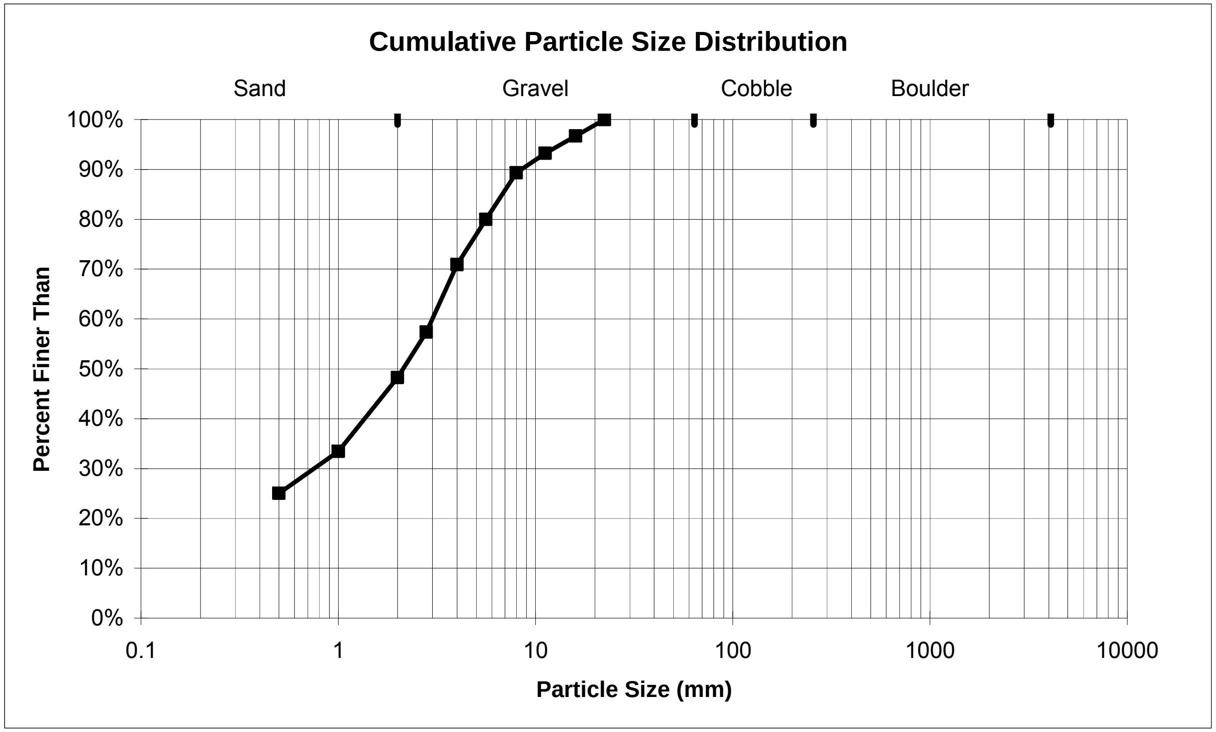
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	92.50	25.1%	
0.5	30.90	8.4%	25.1%
1.0	54.80	14.8%	33.4%
2.0	33.60	9.1%	48.3%
2.8	49.90	13.5%	57.4%
4.0	33.50	9.1%	70.9%
5.6	34.70	9.4%	80.0%
8.0	14.30	3.9%	89.4%
11.2	12.80	3.5%	93.2%
16.0	12.20	3.3%	96.7%
22.4			100.0%
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	369.20		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 007FS Lower Fence
DATE: 7/2/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.071	1.076	2.132	6.529	13.439	16.0



Sieve Analysis Worksheet

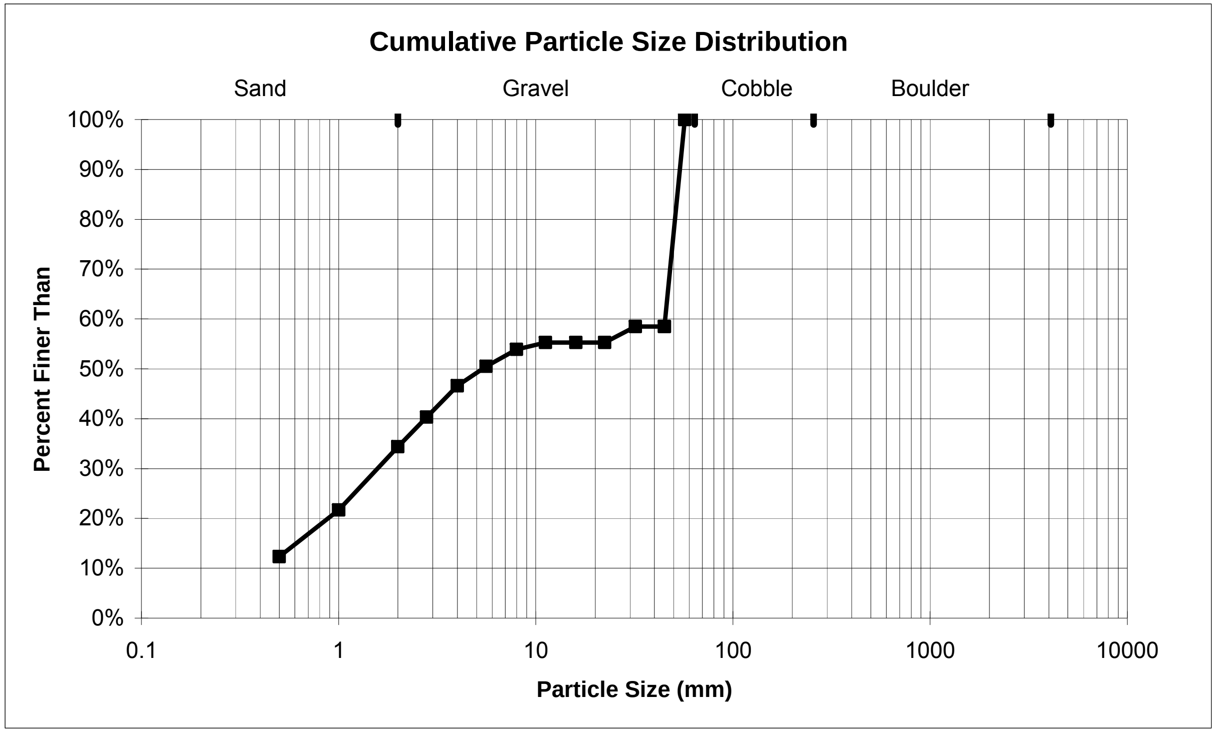
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	51.00	12.3%	
0.5	38.60	9.3%	12.3%
1.0	52.80	12.8%	21.6%
2.0	24.40	5.9%	34.4%
2.8	26.10	6.3%	40.3%
4.0	16.20	3.9%	46.6%
5.6	14.10	3.4%	50.5%
8.0	5.60	1.4%	53.9%
11.2	0	0.0%	55.3%
16.0	0	0.0%	55.3%
22.4	13.30	3.2%	55.3%
32.0	0	0.0%	58.5%
45.0	171.8	41.5%	58.5%
57.0	*		100.0%
90			-
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	413.90		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 083FS Upper Fence
DATE: 6/20/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.610	**2.069**	**5.355**	**52.036**	**55.400**	**57.0**



Sieve Analysis Worksheet

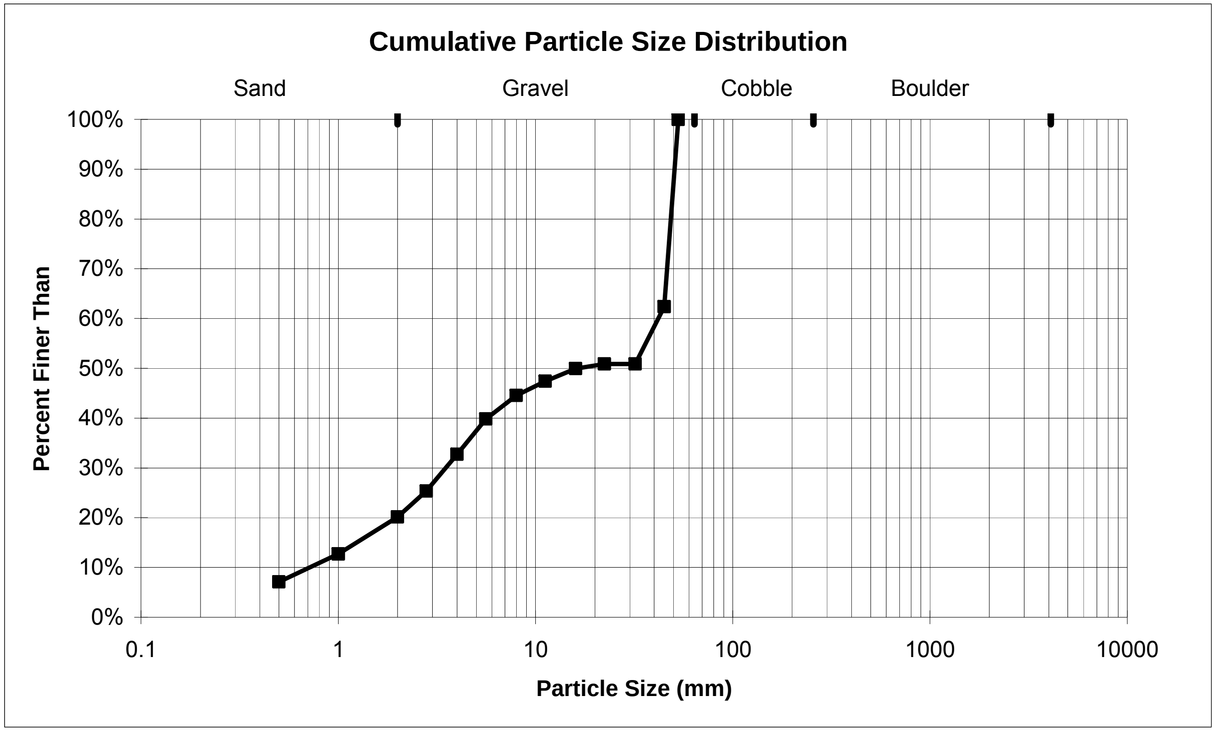
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	40.90	7.1%	
0.5	32.50	5.6%	7.1%
1.0	43.20	7.5%	12.7%
2.0	30.10	5.2%	20.2%
2.8	42.70	7.4%	25.4%
4.0	41.00	7.1%	32.7%
5.6	27.30	4.7%	39.8%
8.0	16.50	2.9%	44.6%
11.2	14.80	2.6%	47.4%
16.0	5.40	0.9%	50.0%
22.4	0	0.0%	50.9%
32.0	66.4	11.5%	50.9%
45.0	217.6	37.6%	62.4%
53.0	*		100.0%
90			-
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	578.40		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 101FS Lower Fence
DATE: 6/29/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.239	4.452	16.201	49.437	51.860	53.0



Sieve Analysis Worksheet

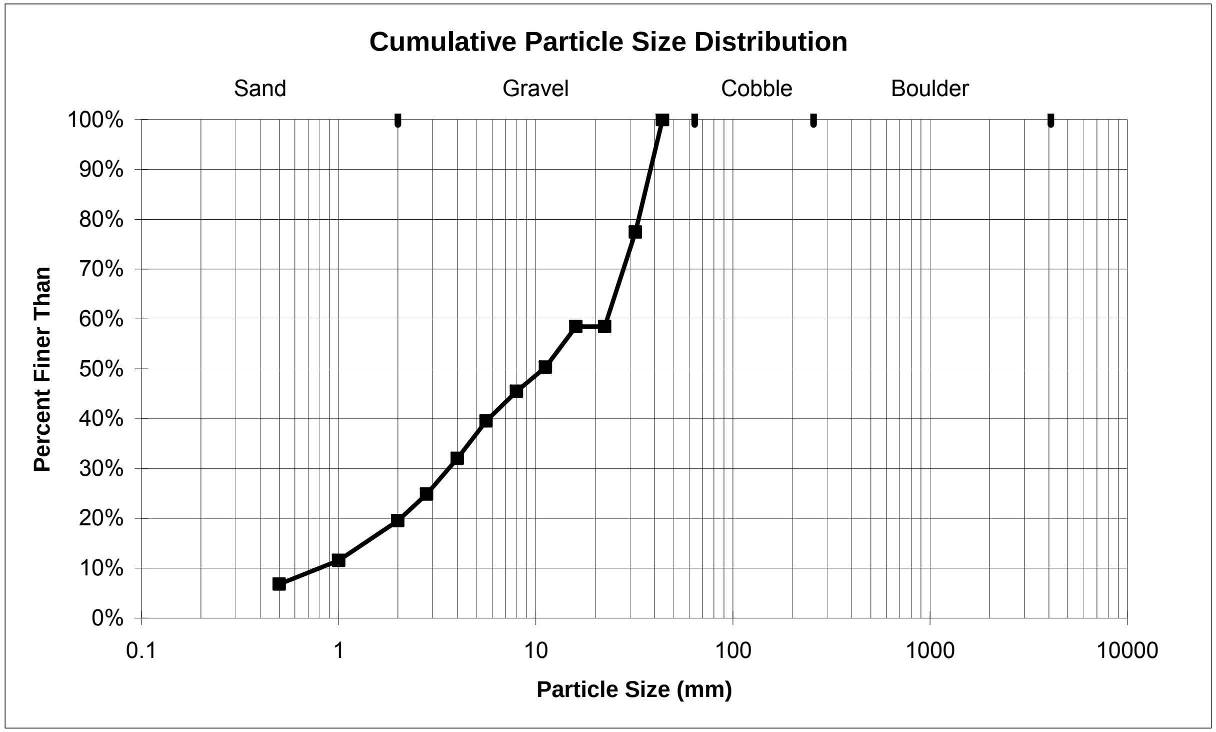
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	28.50	6.8%	
0.5	19.80	4.7%	6.8%
1.0	33.40	8.0%	11.5%
2.0	22.40	5.3%	19.5%
2.8	30.10	7.2%	24.9%
4.0	31.50	7.5%	32.0%
5.6	24.90	5.9%	39.6%
8.0	20.20	4.8%	45.5%
11.2	34.10	8.1%	50.3%
16.0	0	0.0%	58.5%
22.4	79.50	19.0%	58.5%
32.0	94.50	22.6%	77.4%
44.0	*		100.0%
64.0			-
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	418.90		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 101FS Upper Fence
DATE: 6/29/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	1.352	**4.567**	**10.951**	**35.104**	**41.001**	**44.0**



Sieve Analysis Worksheet

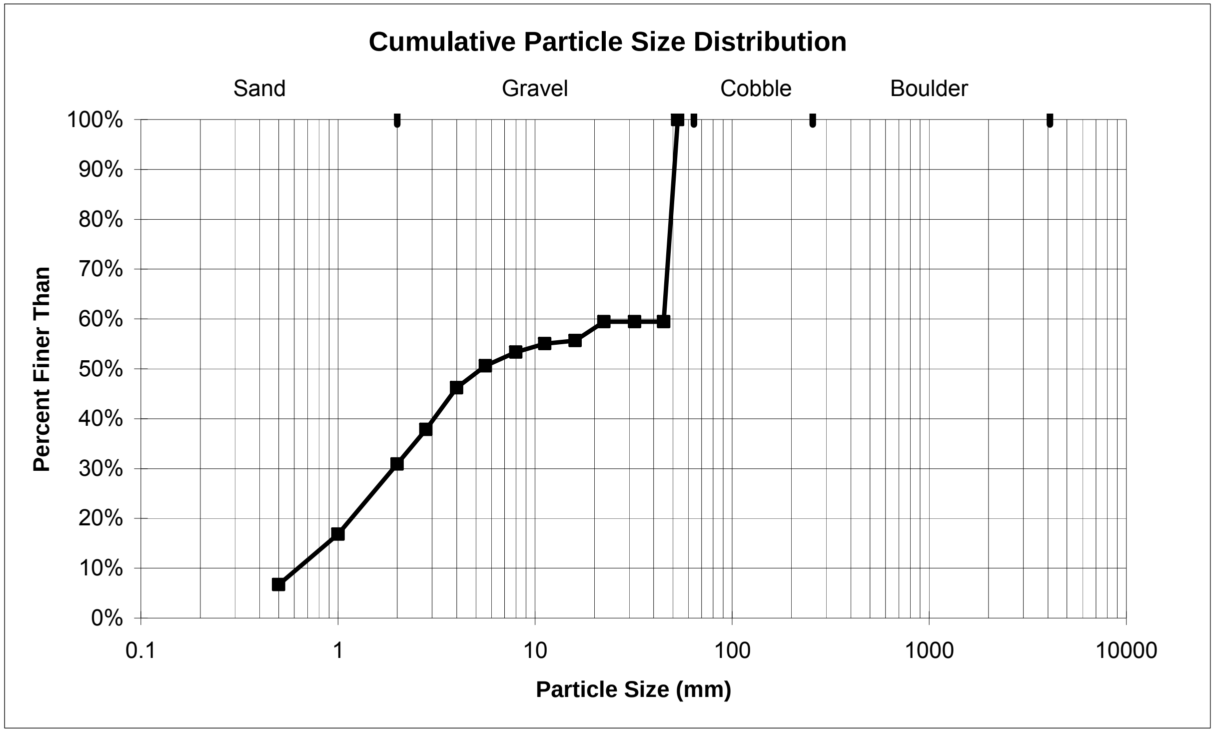
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	31.90	6.7%	
0.5	48.20	10.1%	6.7%
1.0	66.90	14.1%	16.9%
2.0	32.90	6.9%	30.9%
2.8	39.80	8.4%	37.8%
4.0	20.70	4.4%	46.2%
5.6	13.30	2.8%	50.6%
8.0	8.10	1.7%	53.4%
11.2	2.90	0.6%	55.1%
16.0	17.80	3.7%	55.7%
22.4	0	0.0%	59.4%
32.0	0	0.0%	59.4%
45.0	192.8	40.6%	59.4%
53.0	*		100.0%
90			-
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	475.30		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 128FS Lower Fence
DATE: 6/26/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.881	2.438	5.355	49.687	51.942	53.0



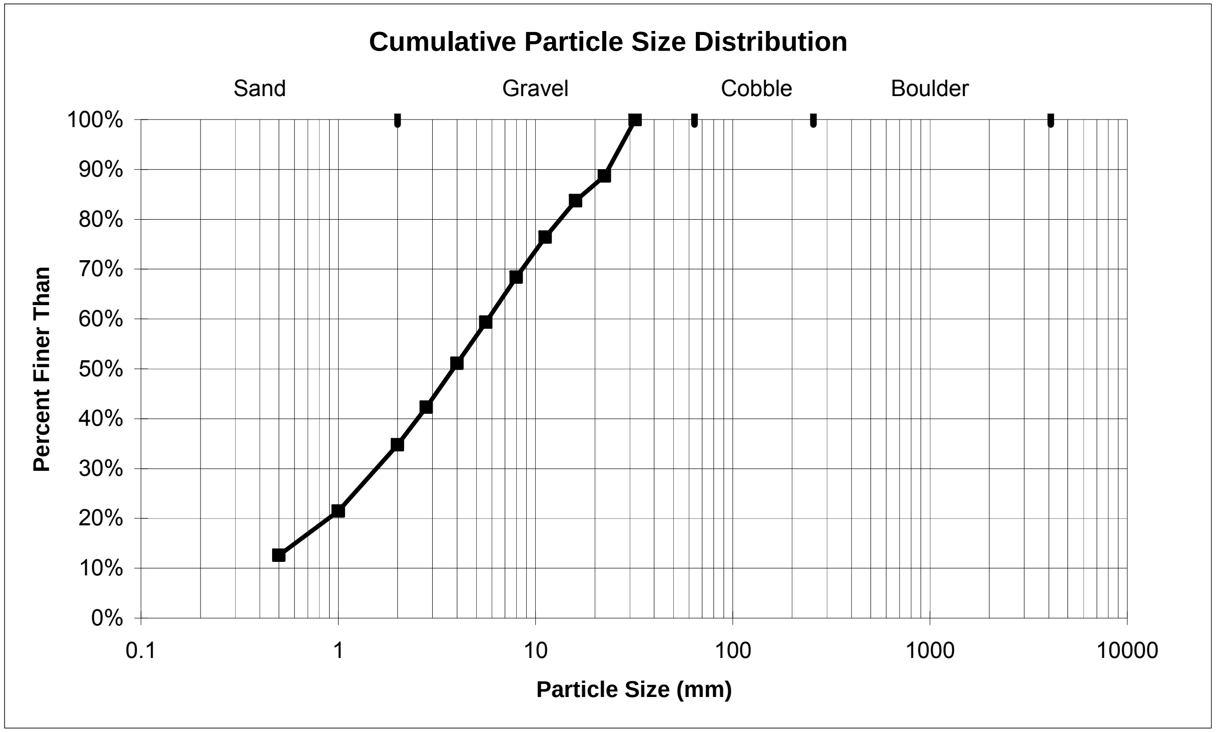
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	55.30	12.6%	
0.5	39.00	8.9%	12.6%
1.0	58.70	13.3%	21.4%
2.0	33.00	7.5%	34.8%
2.8	38.70	8.8%	42.3%
4.0	36.40	8.3%	51.1%
5.6	39.60	9.0%	59.4%
8.0	35.40	8.0%	68.4%
11.2	32.20	7.3%	76.4%
16.0	21.80	5.0%	83.7%
22.4	49.80	11.3%	88.7%
32.0			100.0%
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	439.90		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Fill Slope
ID NUMBER: 128FS Upper Fence
DATE: 6/26/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.605	2.020	3.829	16.303	27.336	32.0

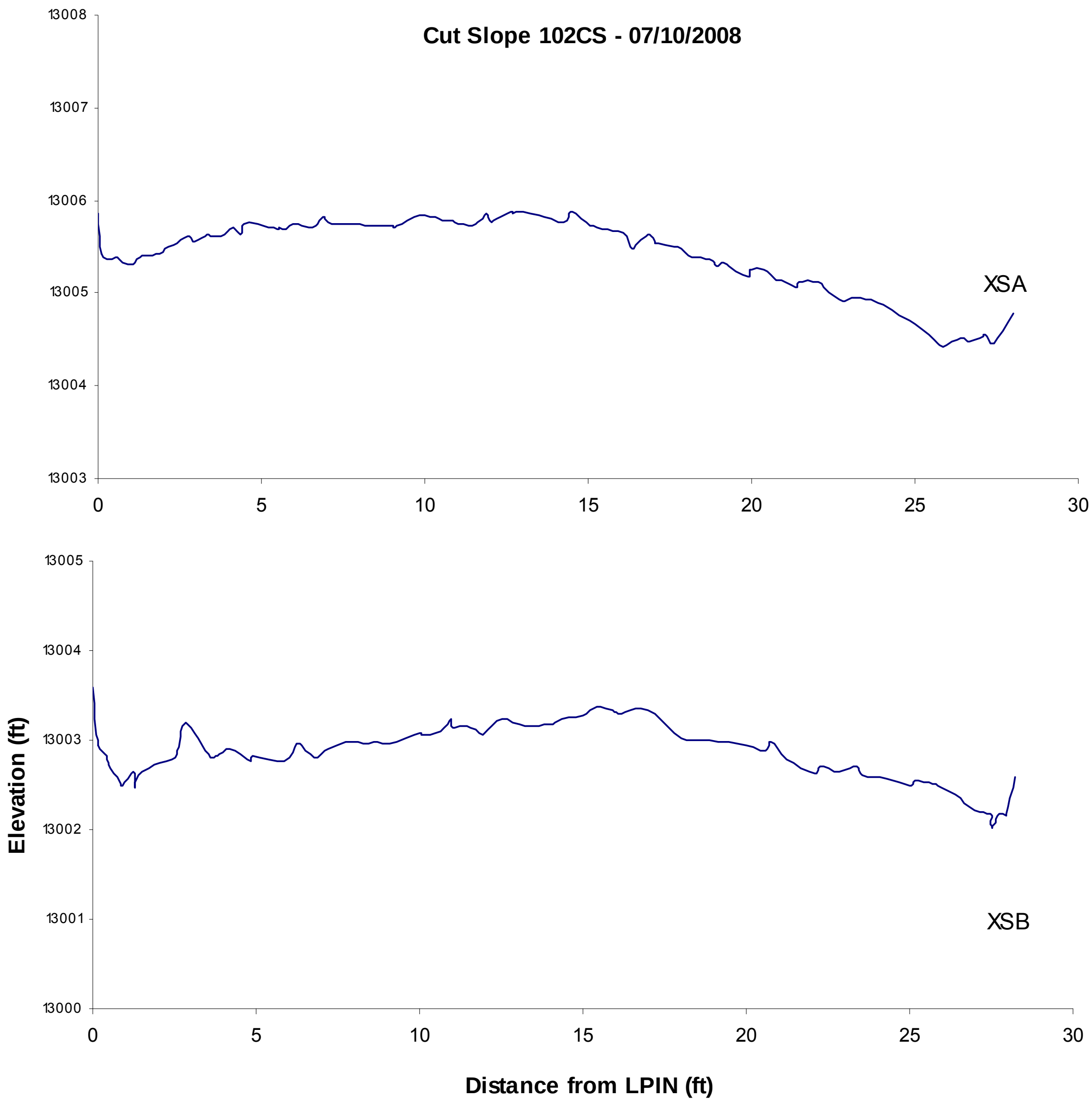


Appendix G

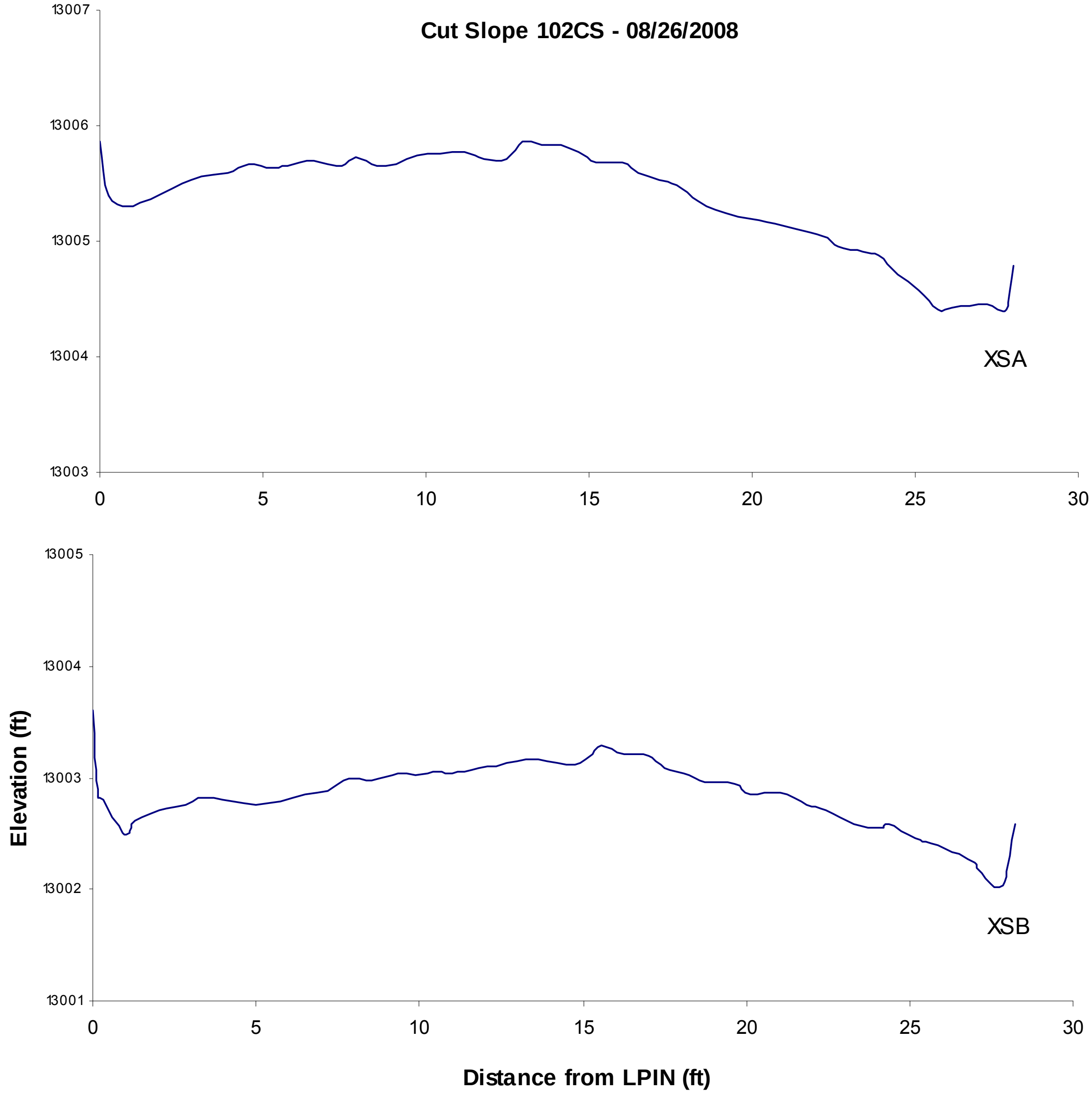
Cut Slope

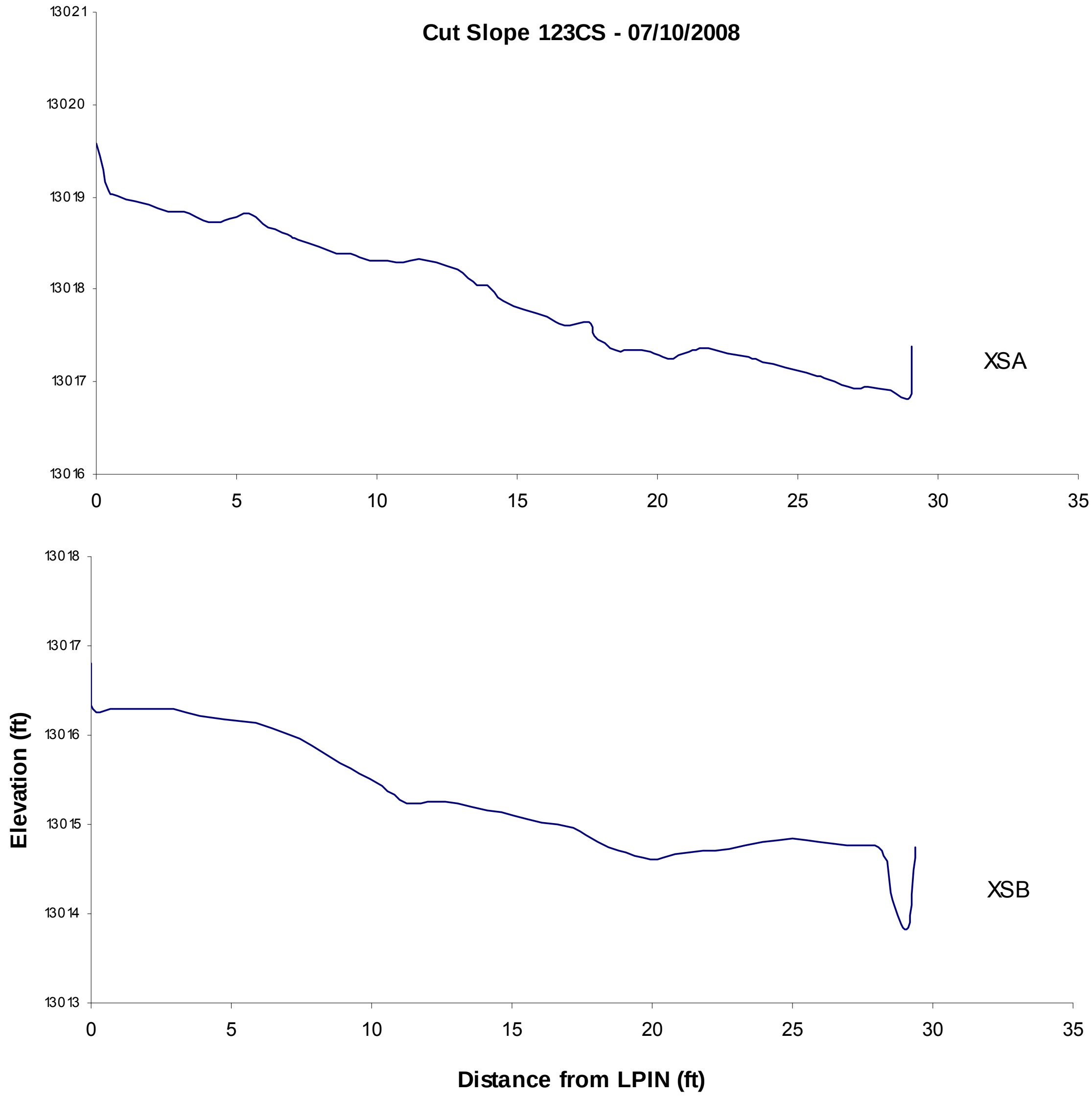
Cross Section Graphs

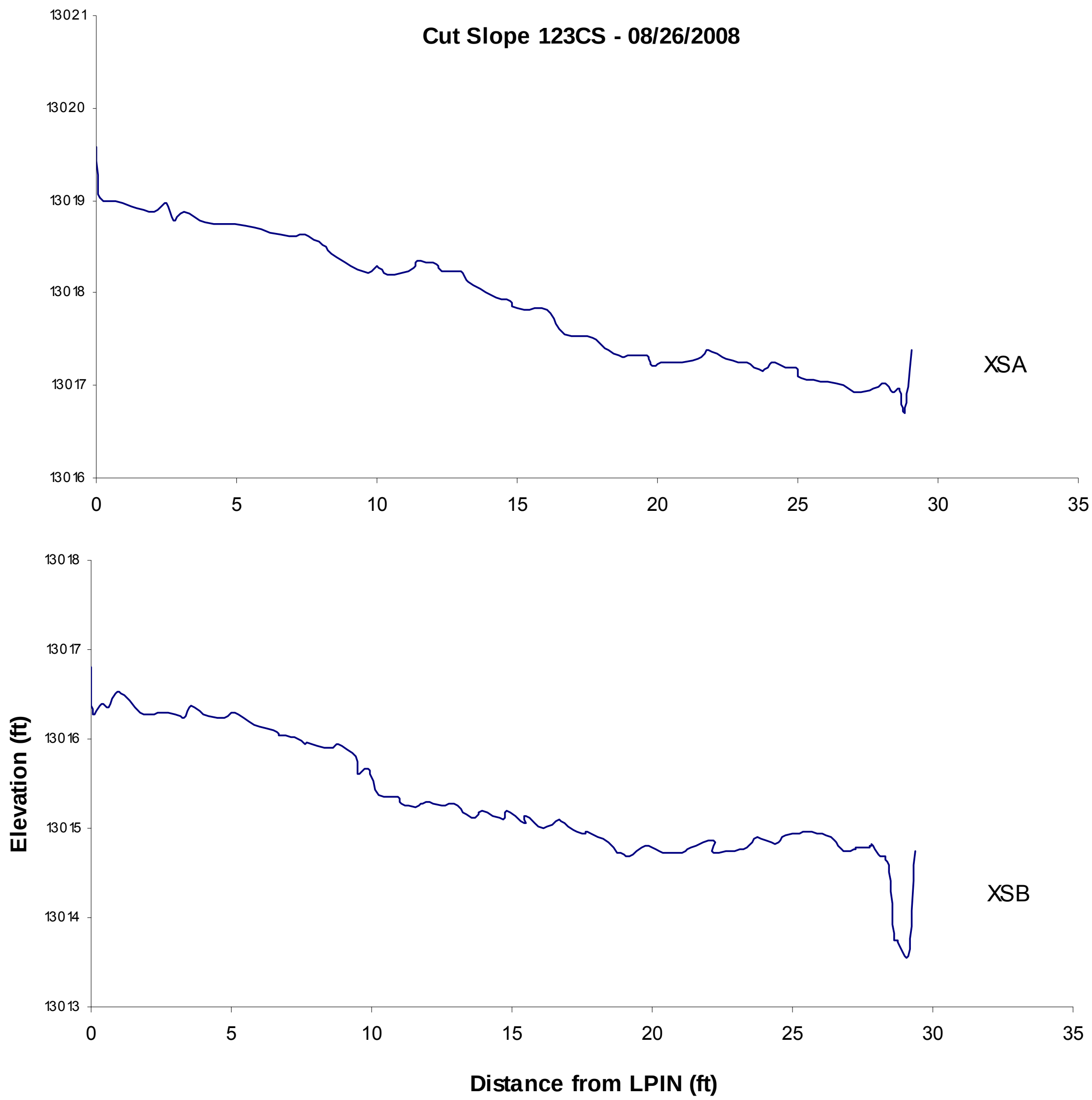
2008

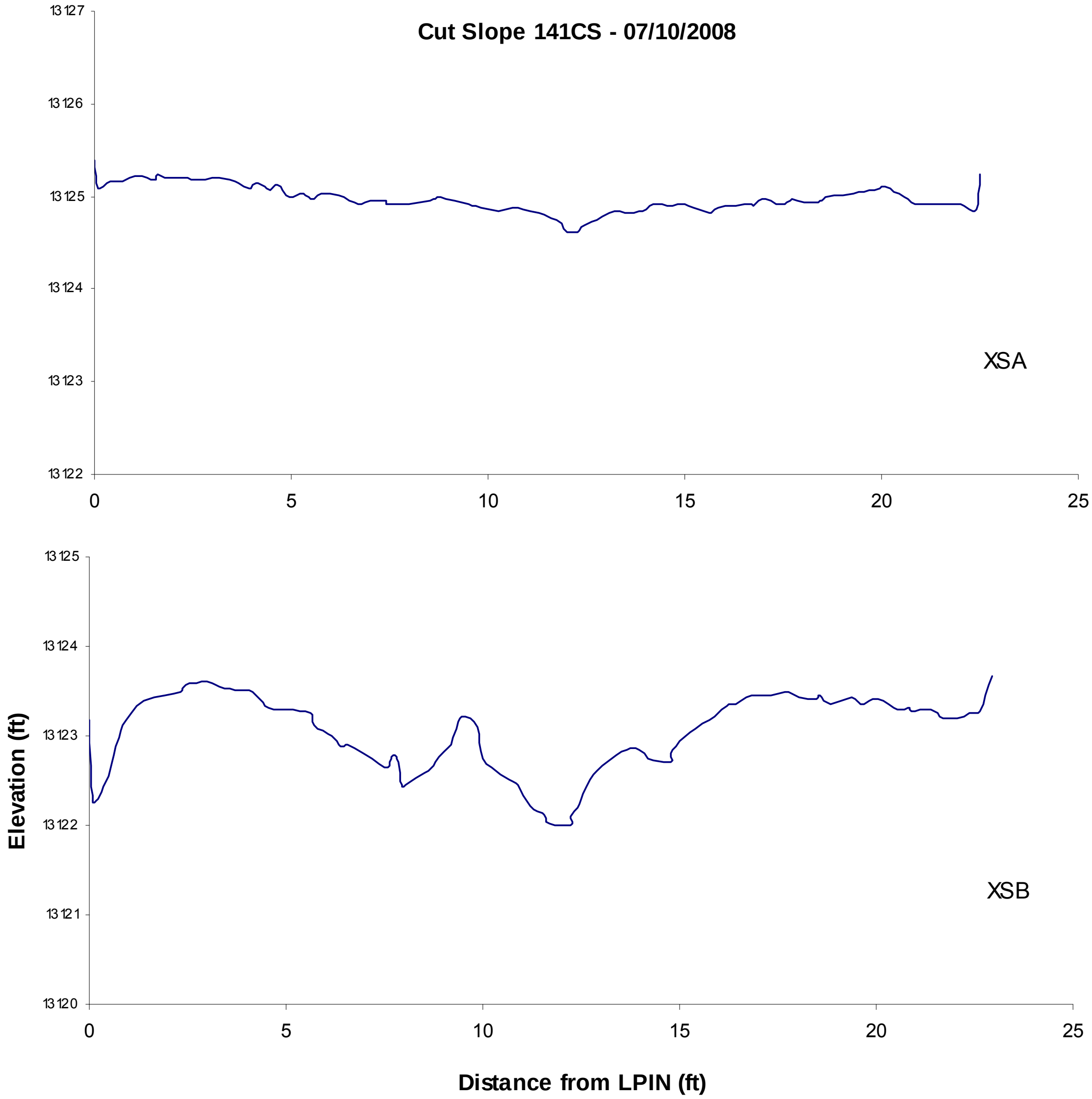


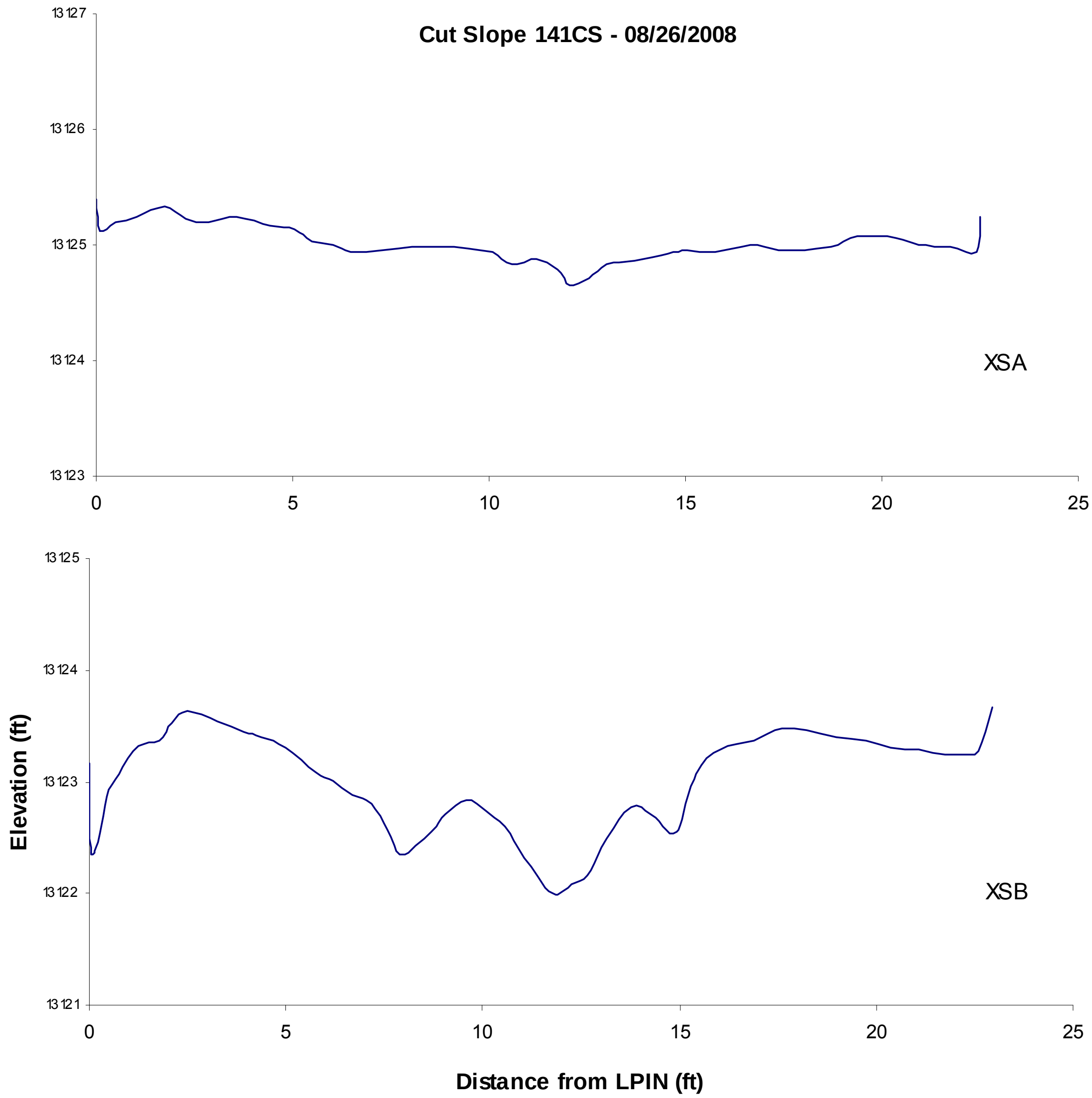
Cut Slope 102CS - 07/10/2008
13008
13007
13006
13005
13004
13003
0
5
10
15
20
25
30
XSA
13005
13004
13003
13002
13001
13000
XSB
Elevation (ft)
Distance from LPIN (ft)


Cut Slope 102CS - 08/26/2008
13007
13006
13005
13004
13003
0
5
10
15
20
25
30
XSA
13005
13004
13003
13002
13001
XSB
Elevation (ft)
Distance from LPIN (ft)


Cut Slope 123CS - 07/10/2008
13021
13020
13019
13018
13017
13016
0
5
10
15
20
25
30
35
XSA
13018
13017
13016
13015
13014
13013
XSB
Elevation (ft)
Distance from LPIN (ft)


Cut Slope 123CS - 08/26/2008
13021
13020
13019
13018
13017
13016
0
5
10
15
20
25
30
35
XSA
13018
13017
13016
13015
13014
13013
XSB
Elevation (ft)
Distance from LPIN (ft)


Cut Slope 141CS - 07/10/2008
13127
13126
13125
13124
13123
13122
0
5
10
15
20
25
XSA
13125
13124
13123
13122
13121
13120
0
5
10
15
20
25
XSB
Elevation (ft)
Distance from LPIN (ft)



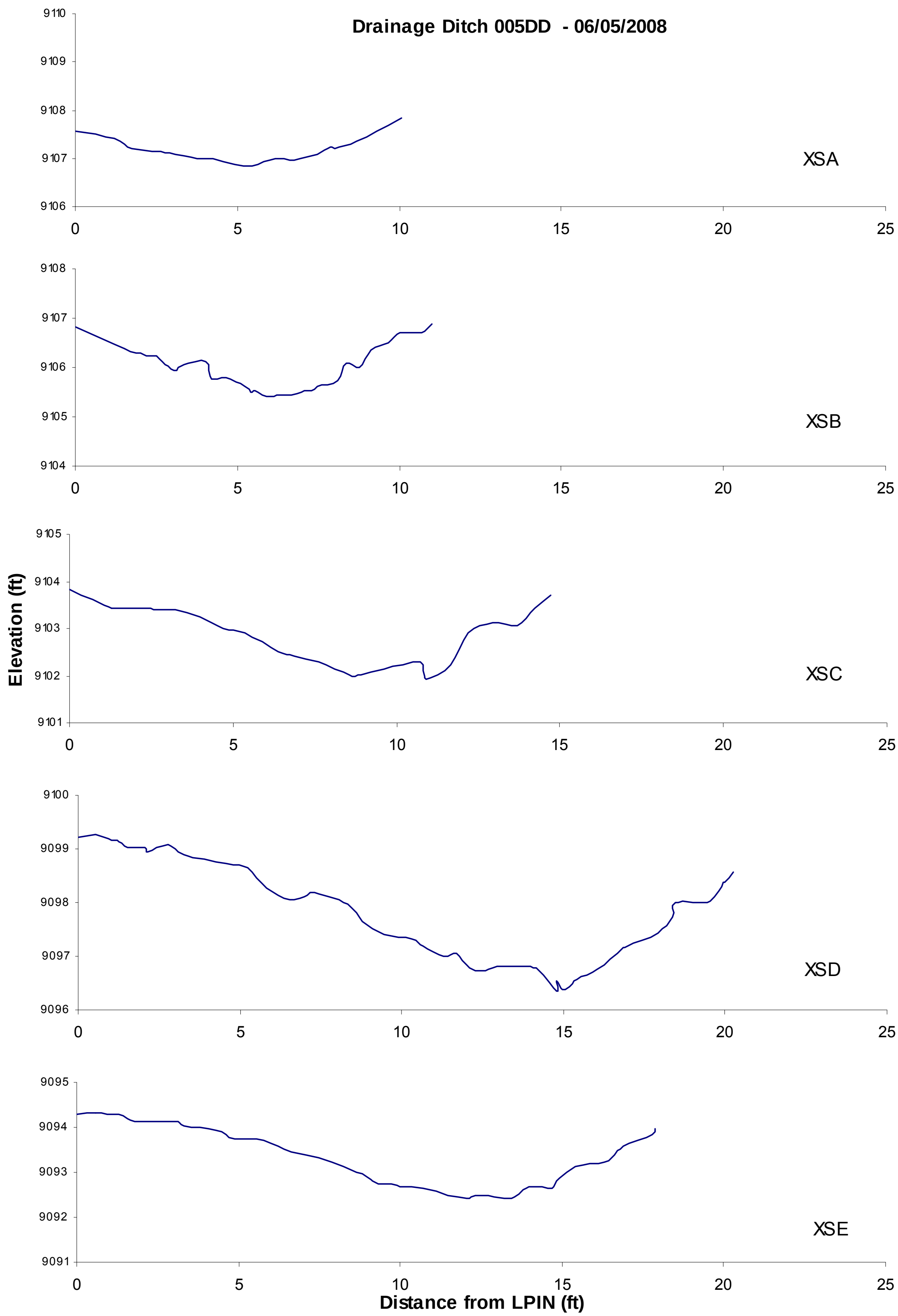
Cut Slope 141CS - 08/26/2008
13127
13126
13125
13124
13123
0
5
10
15
20
25
XSA
13125
13124
13123
13122
13121
XSB
Elevation (ft)
Distance from LPIN (ft)

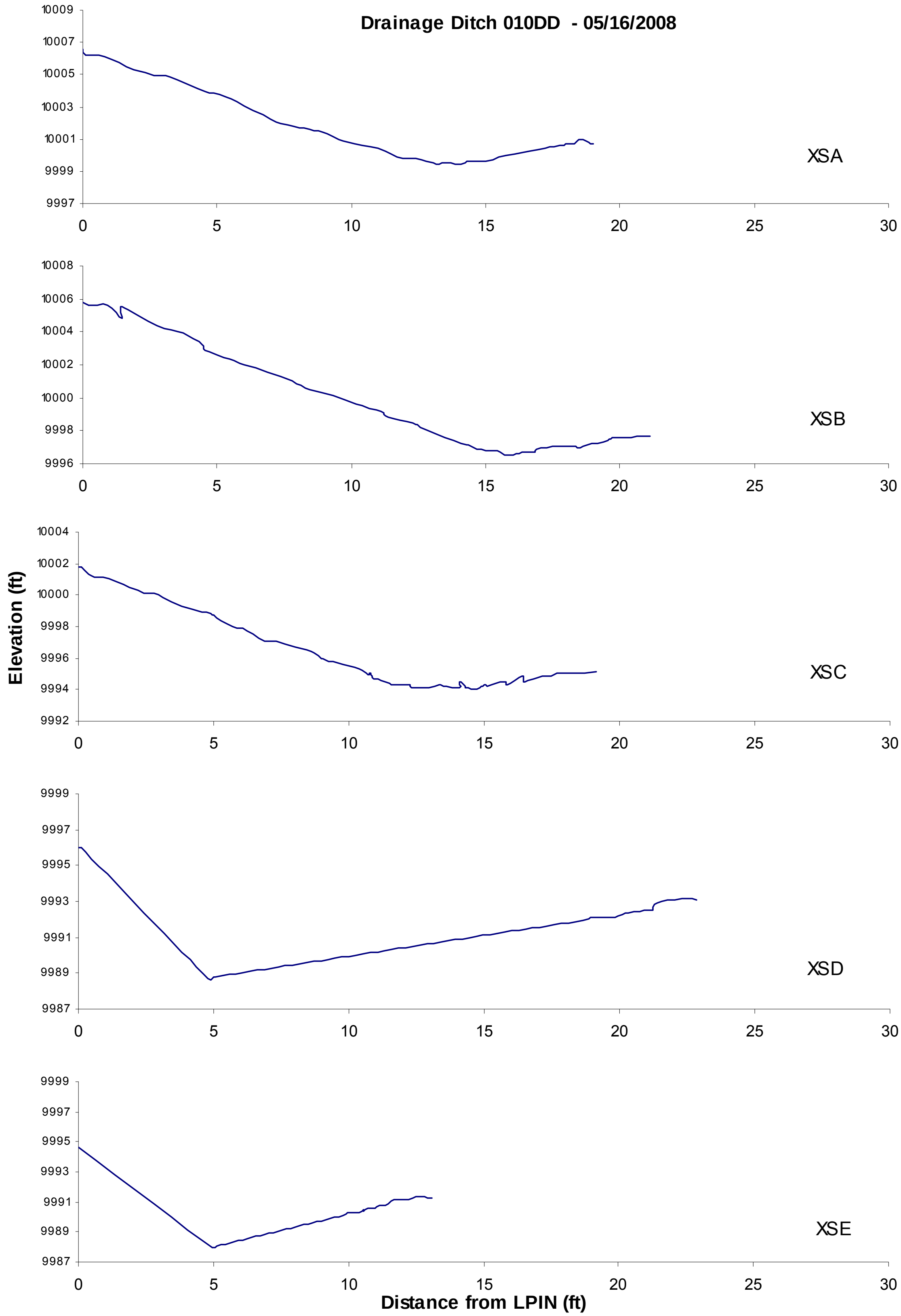
Appendix H

Drainage Ditch

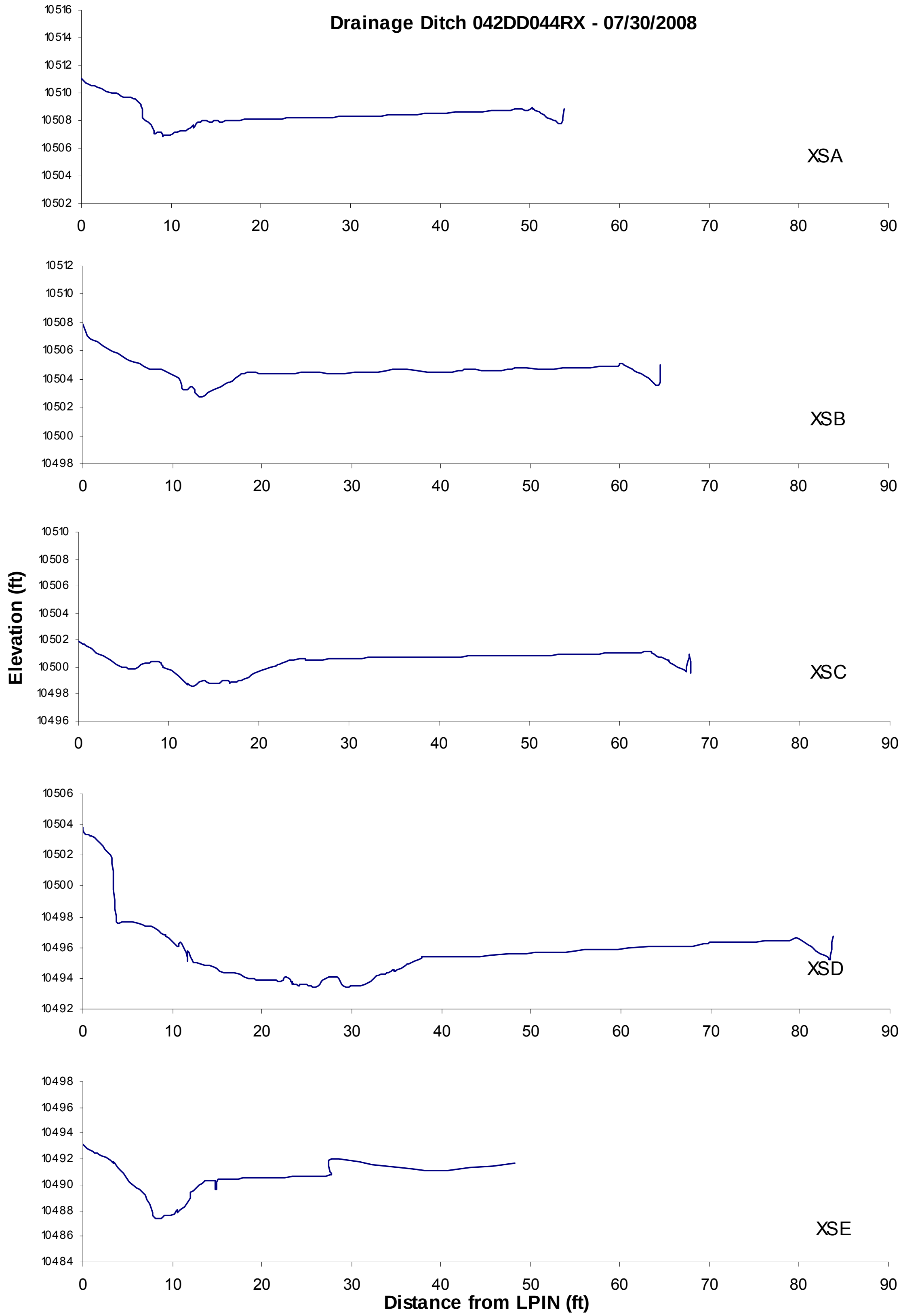
Cross Section Graphs

2008

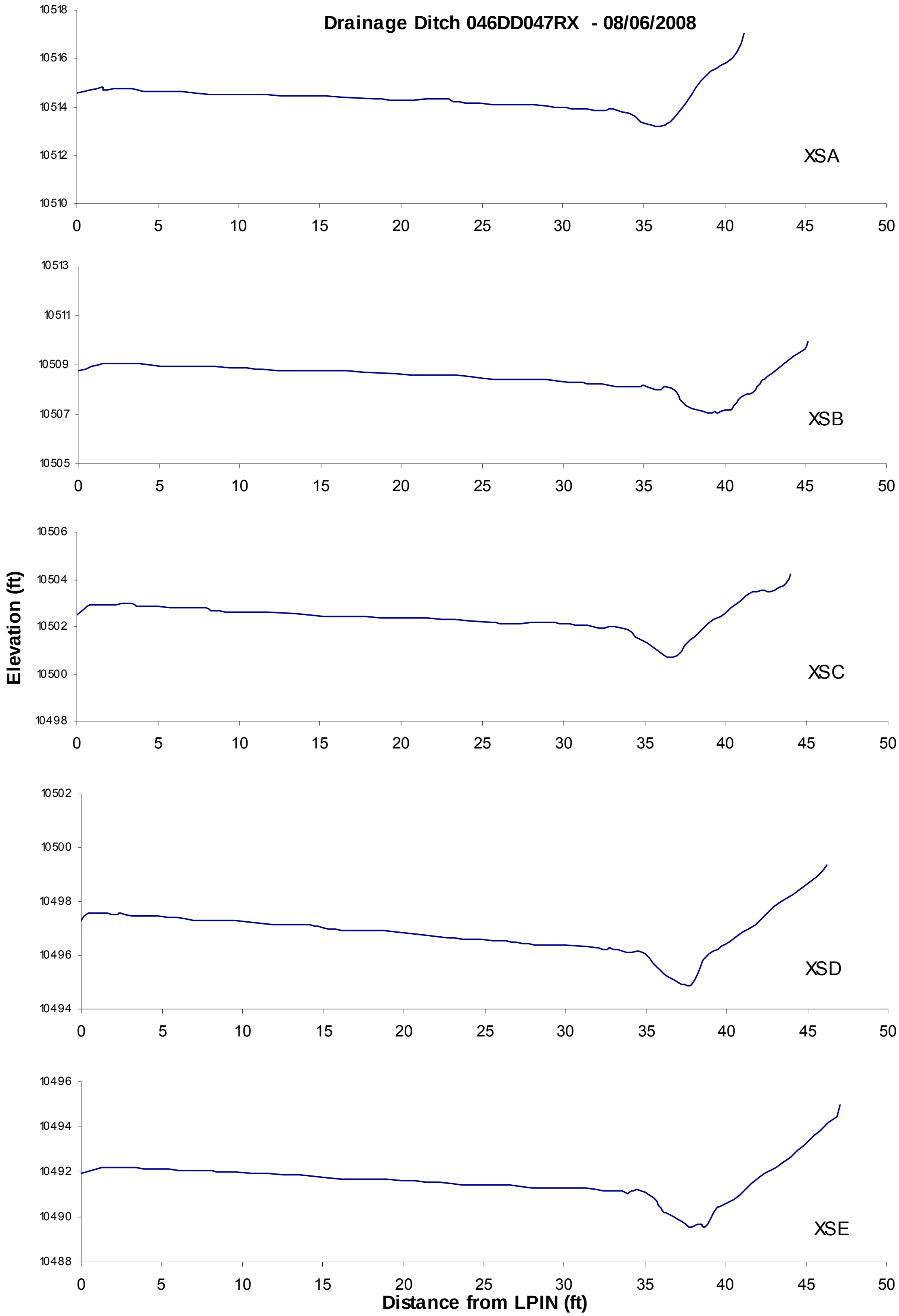

Drainage Ditch 005DD - 06/05/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9110
9109
9108
9107
9106
9105
9104
9103
9102
9101
9100
9099
9098
9097
9096
9095
9094
9093
9092
9091
0
5
10
15
20
25



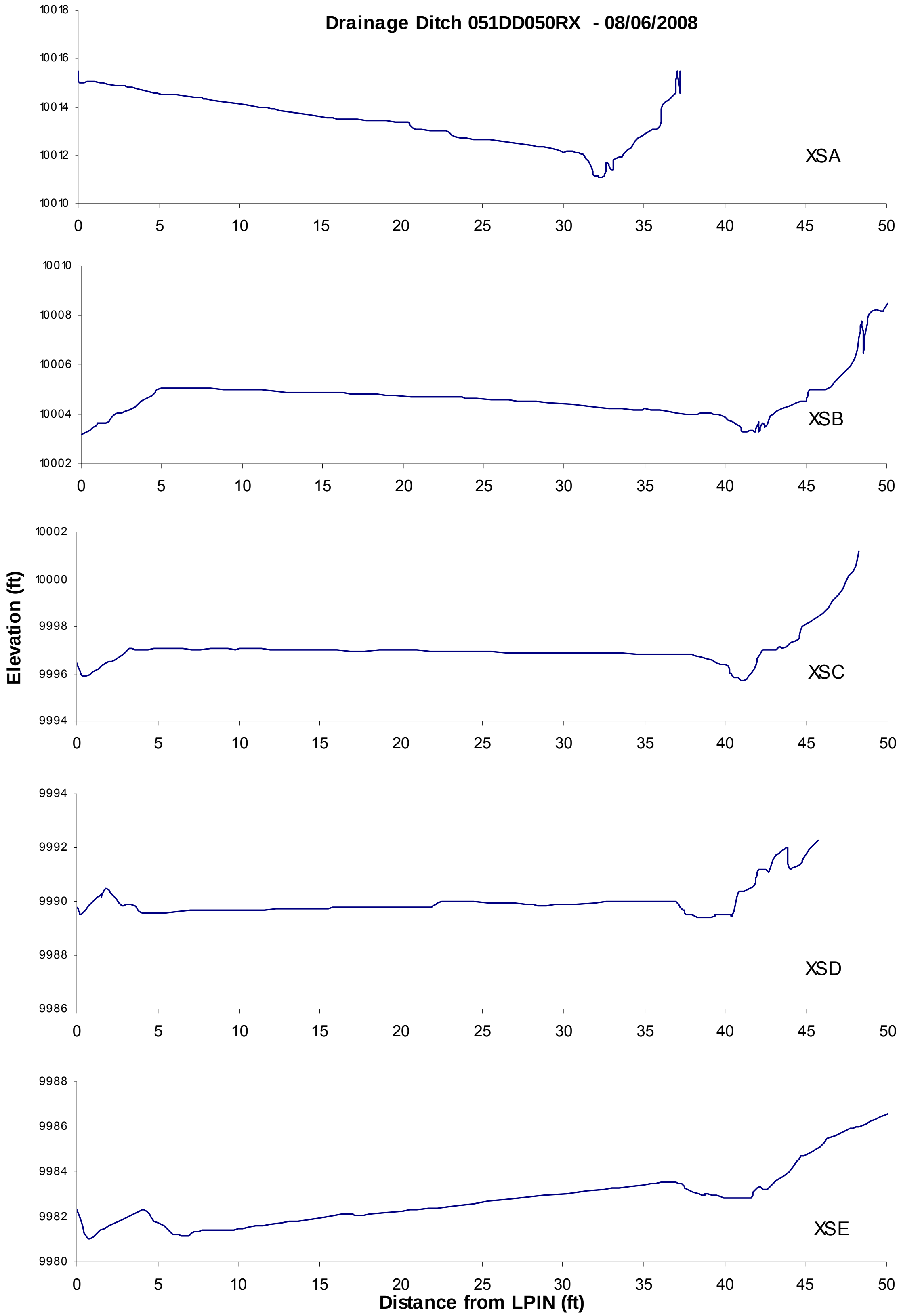
Drainage Ditch 010DD - 05/16/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

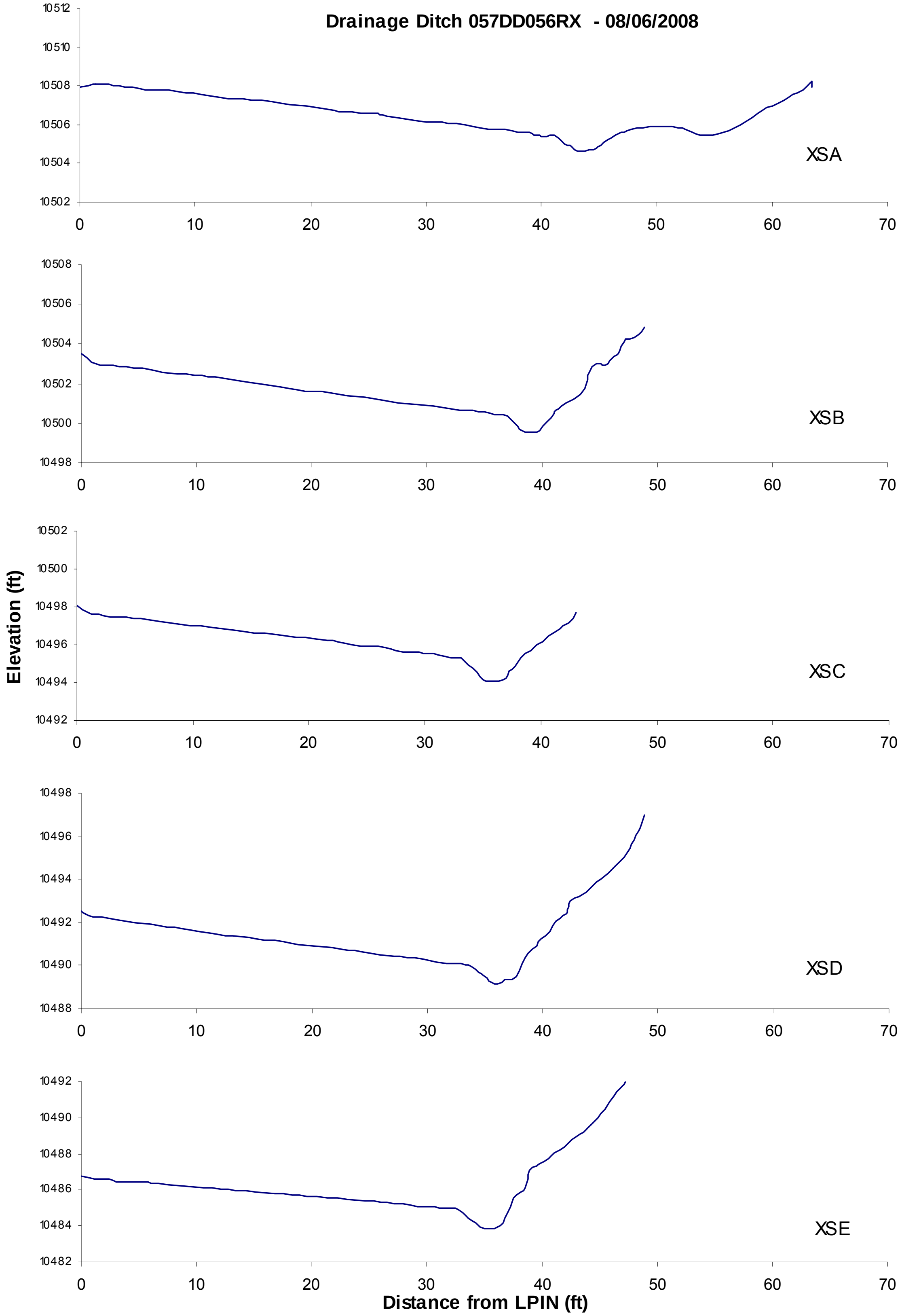


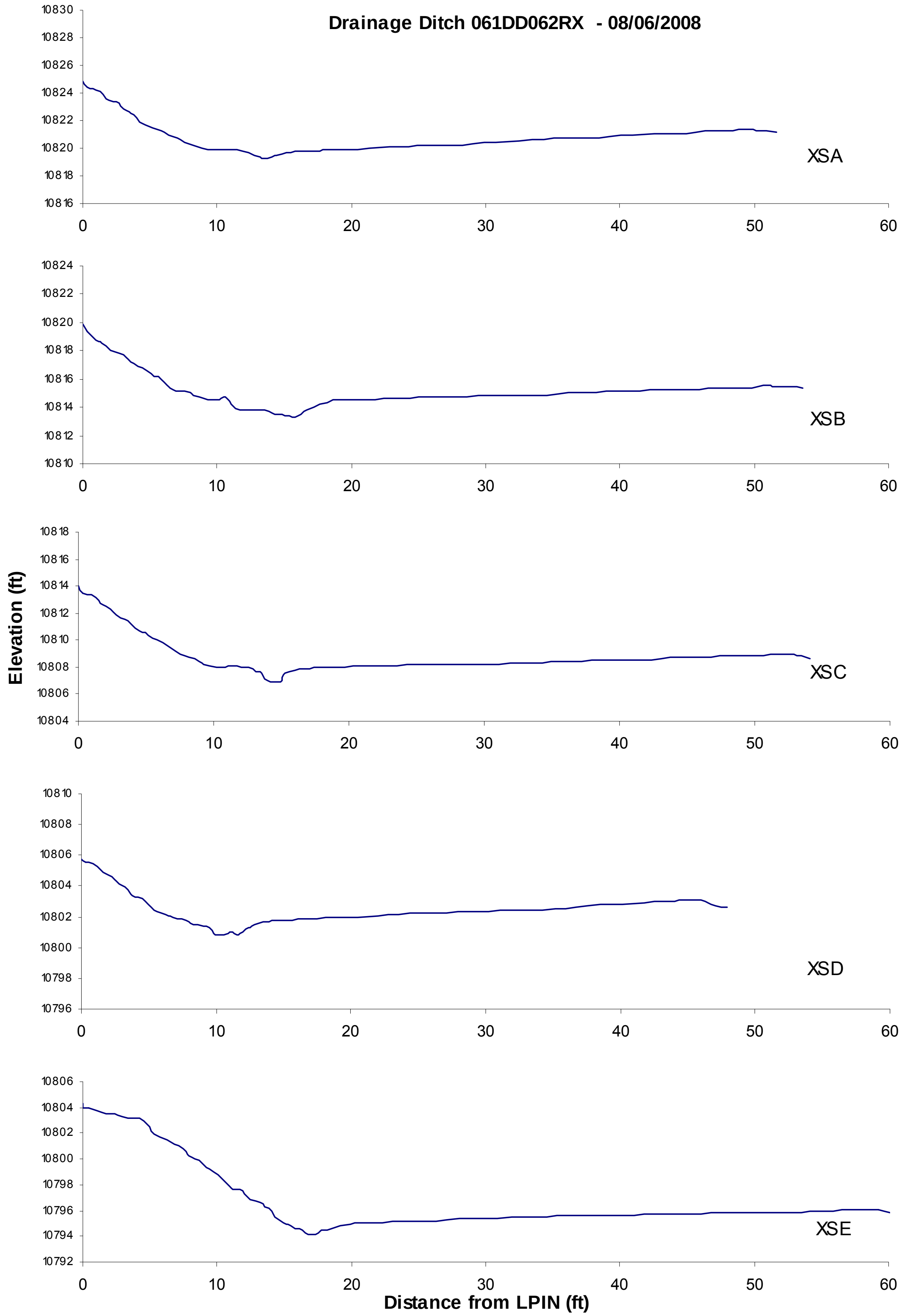
Drainage Ditch 042DD044RX - 07/30/2008
Elevation (ft)
XSA
XSB
XSC
XSD
XSE
Distance from LPIN (ft)

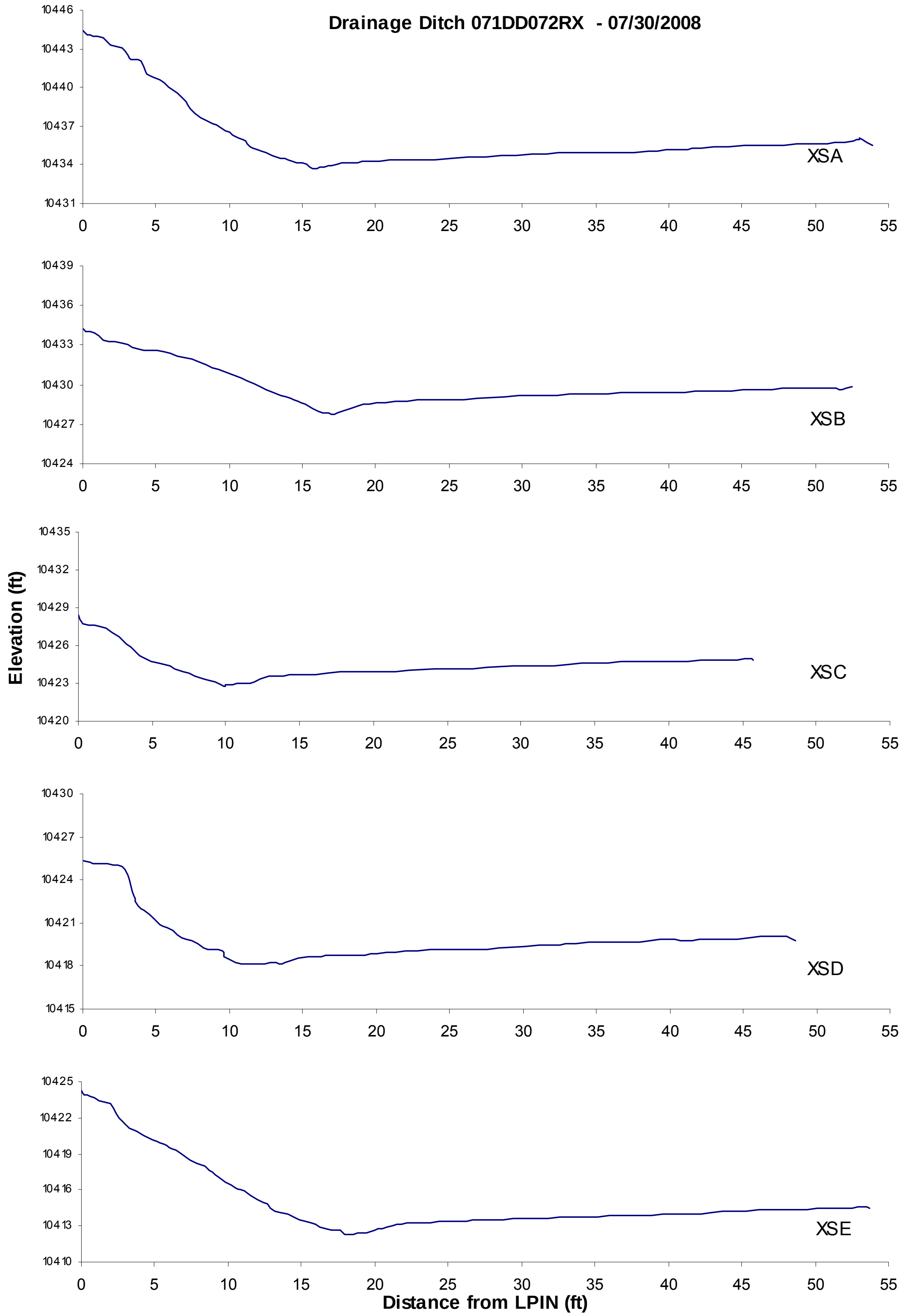


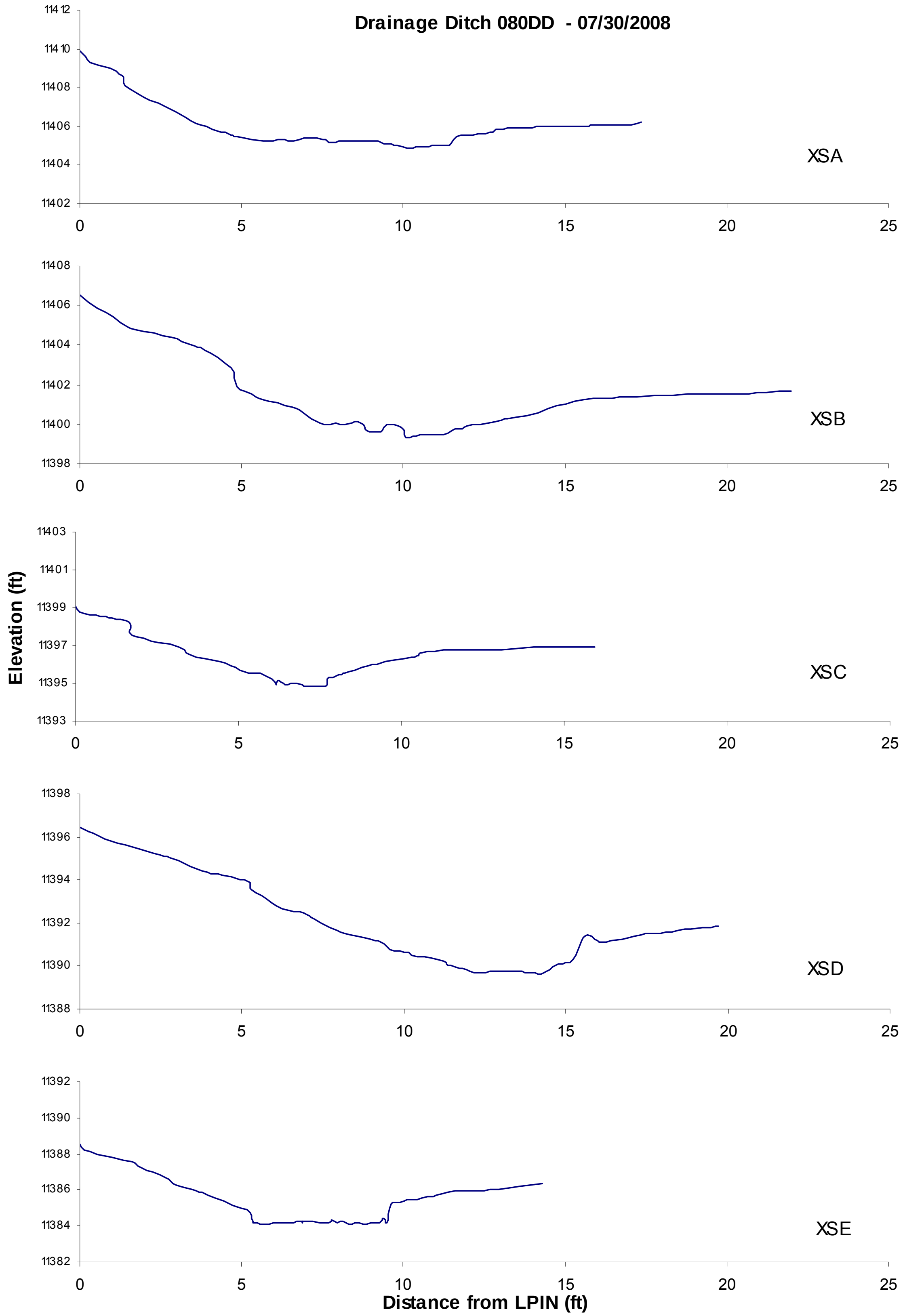
Drainage Ditch 046DD047RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE

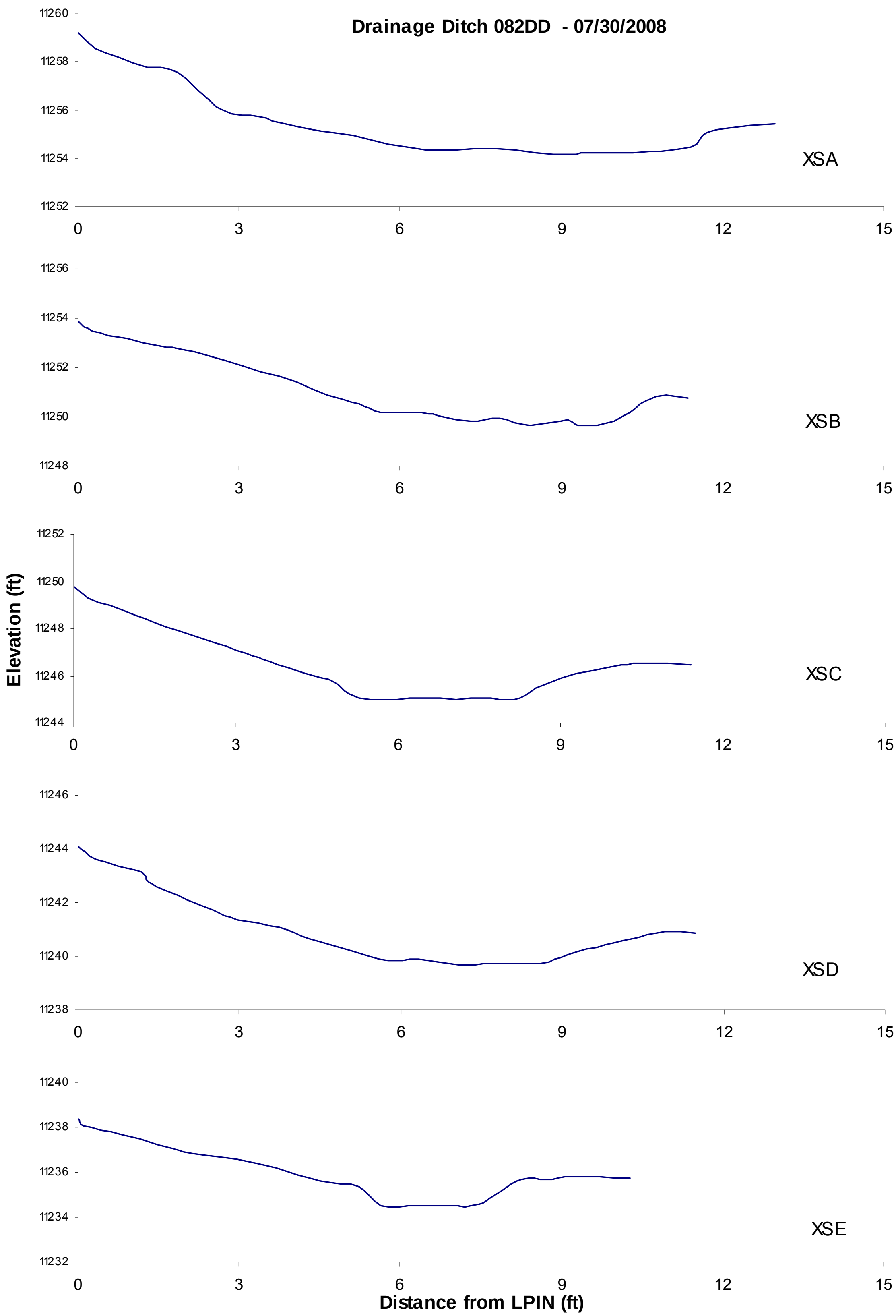

Drainage Ditch 051DD050RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10018
10016
10014
10012
10010
10008
10006
10004
10002
10000
9998
9996
9994
9992
9990
9988
9986
9984
9982
9980
0
5
10
15
20
25
30
35
40
45
50

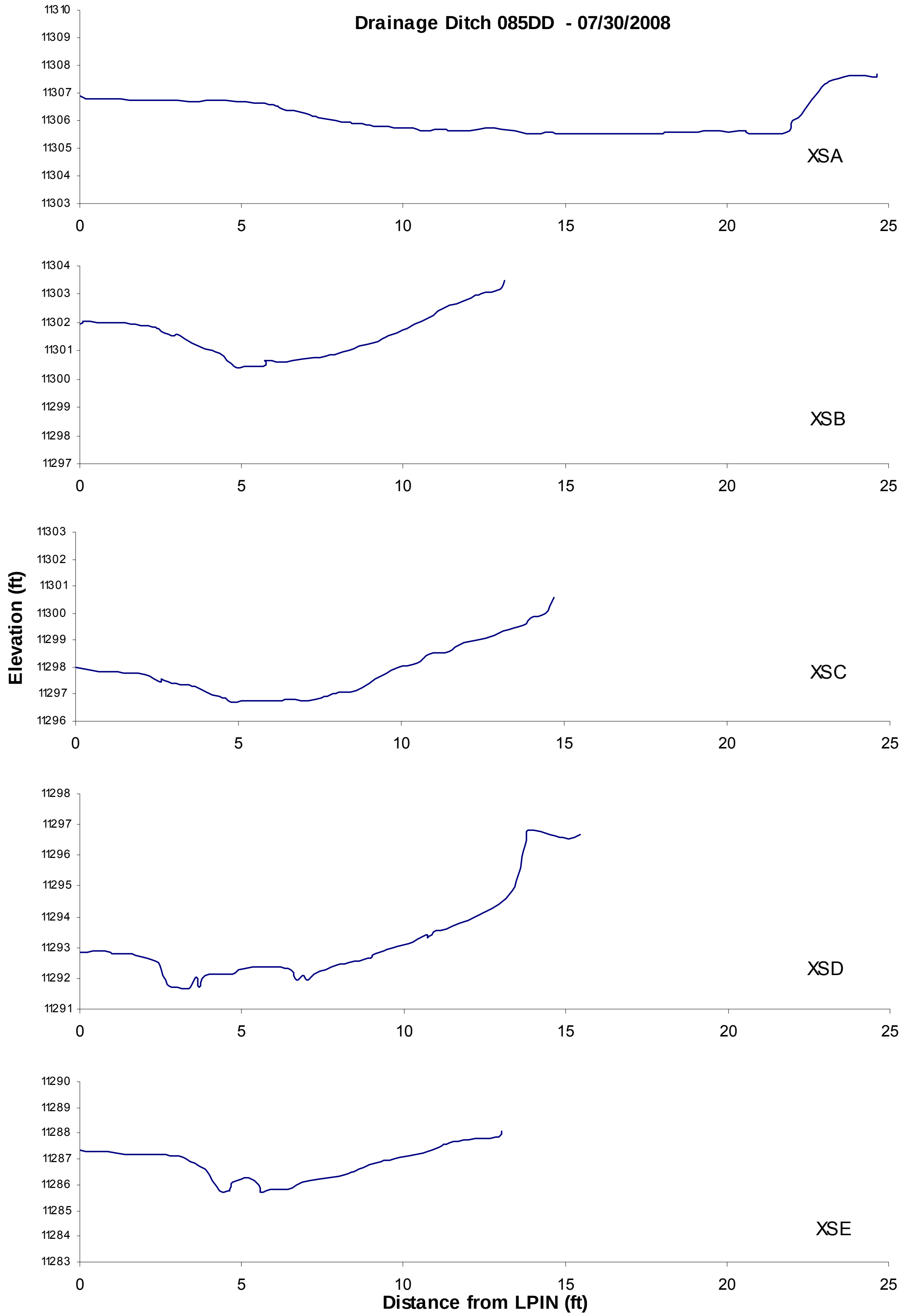

Drainage Ditch 057DD056RX - 08/06/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

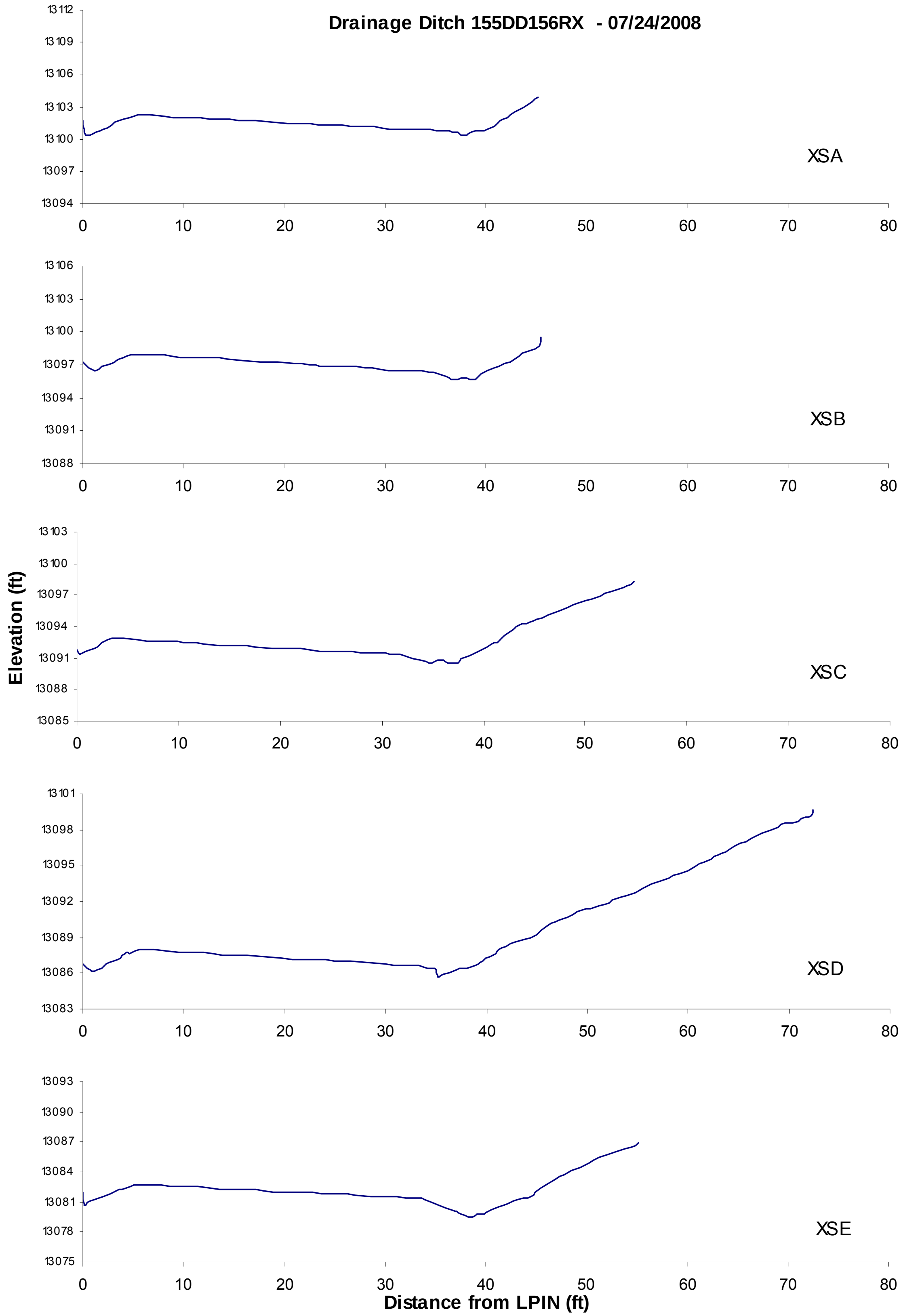

Drainage Ditch 061DD062RX - 08/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE


Drainage Ditch 071DD072RX - 07/30/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
10446
10443
10440
10437
10434
10431
XSB
10439
10436
10433
10430
10427
10424
XSC
10435
10432
10429
10426
10423
10420
XSD
10430
10427
10424
10421
10418
10415
XSE
10425
10422
10419
10416
10413
10410
0
5
10
15
20
25
30
35
40
45
50
55

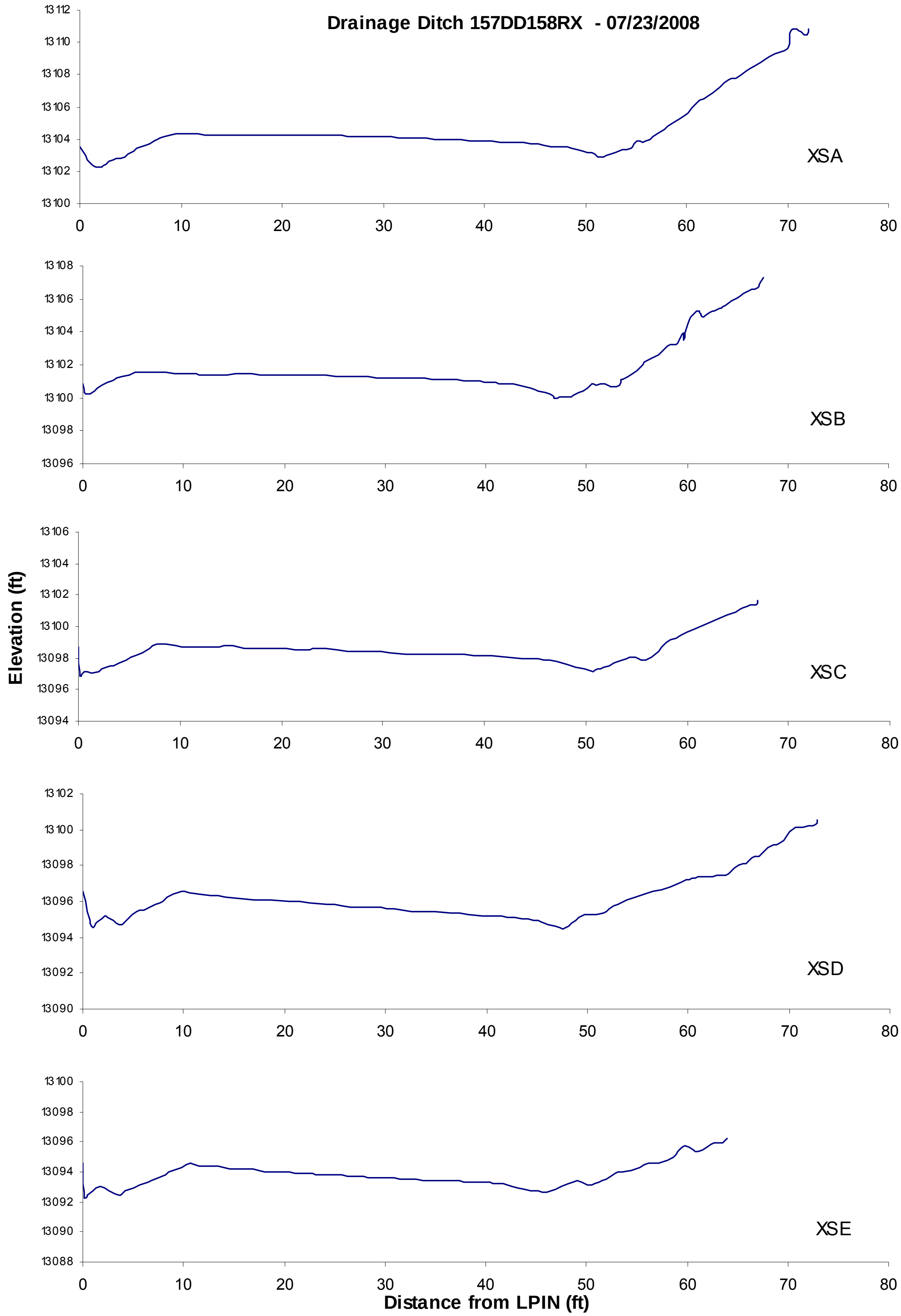

Drainage Ditch 080DD - 07/30/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11412
11410
11408
11406
11404
11402
11400
11398
11403
11401
11399
11397
11395
11393
11396
11394
11392
11390
11388
11386
11384
11382
0
5
10
15
20
25

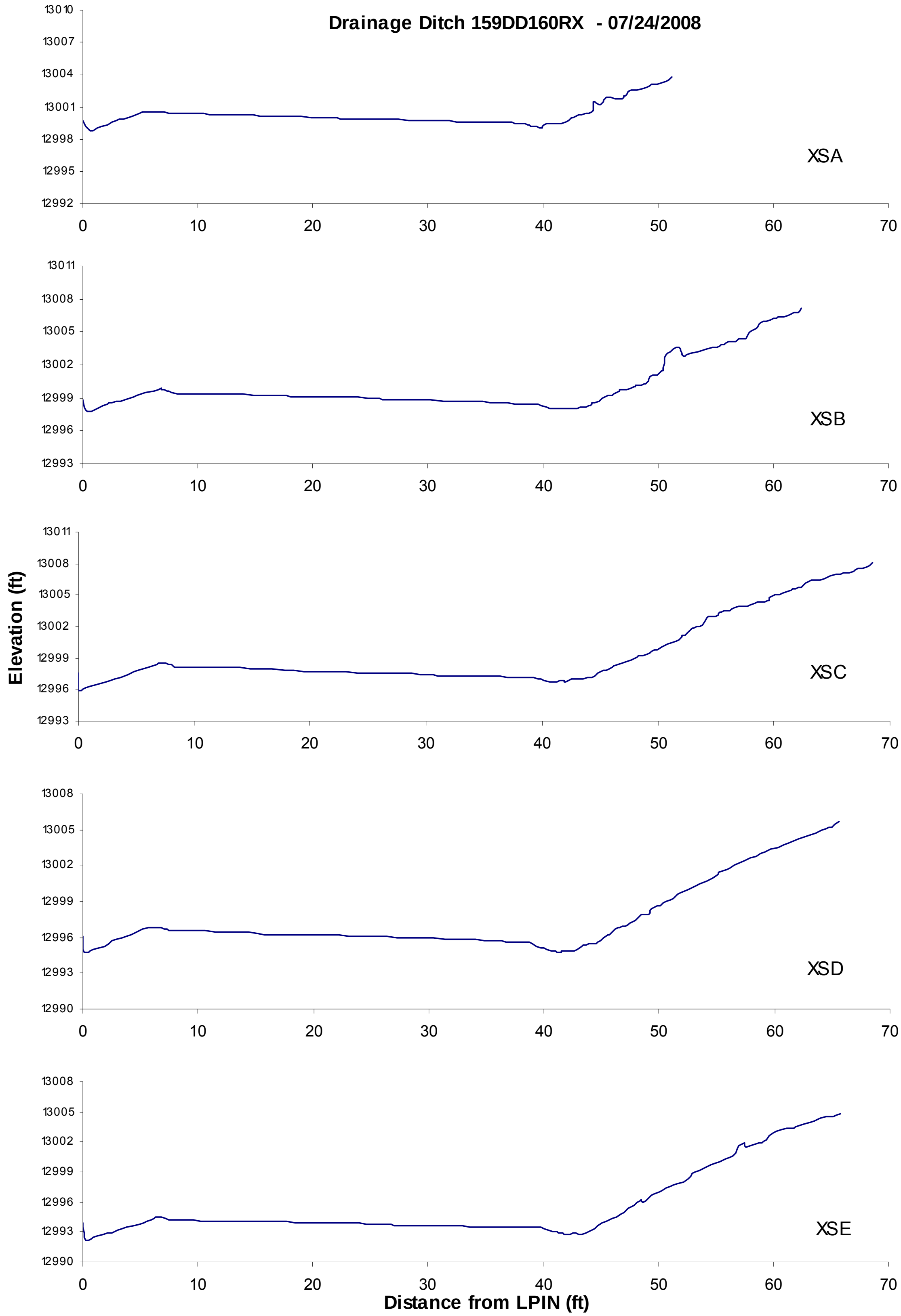

Drainage Ditch 082DD - 07/30/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11260
11258
11256
11254
11252
11250
11248
11246
11244
11242
11240
11238
11236
11234
11232
0
3
6
9
12
15

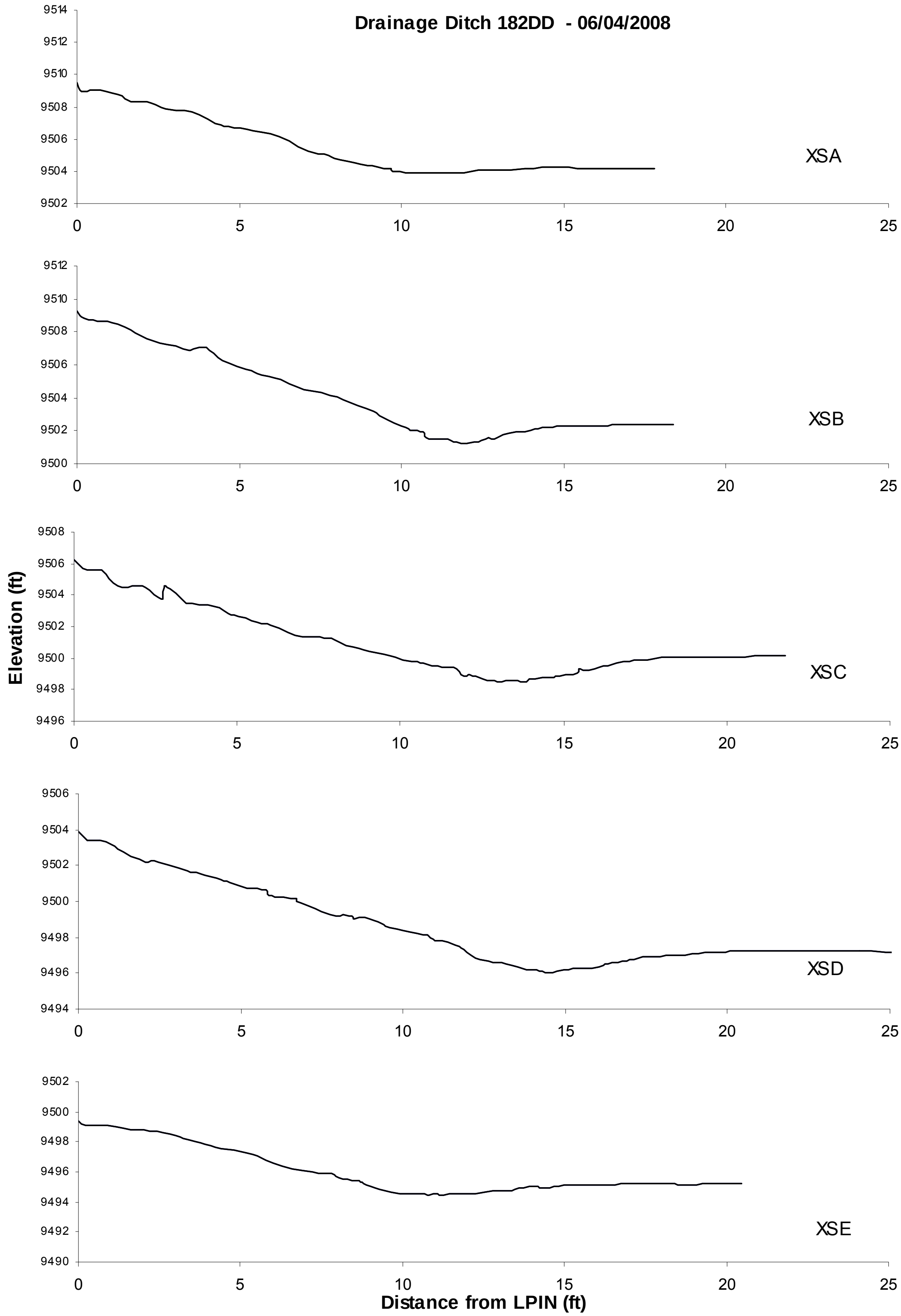

Drainage Ditch 085DD - 07/30/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11310
11309
11308
11307
11306
11305
11304
11303
11304
11303
11302
11301
11300
11299
11298
11297
11303
11302
11301
11300
11299
11298
11297
11296
11298
11297
11296
11295
11294
11293
11292
11291
11290
11289
11288
11287
11286
11285
11284
11283
0
5
10
15
20
25

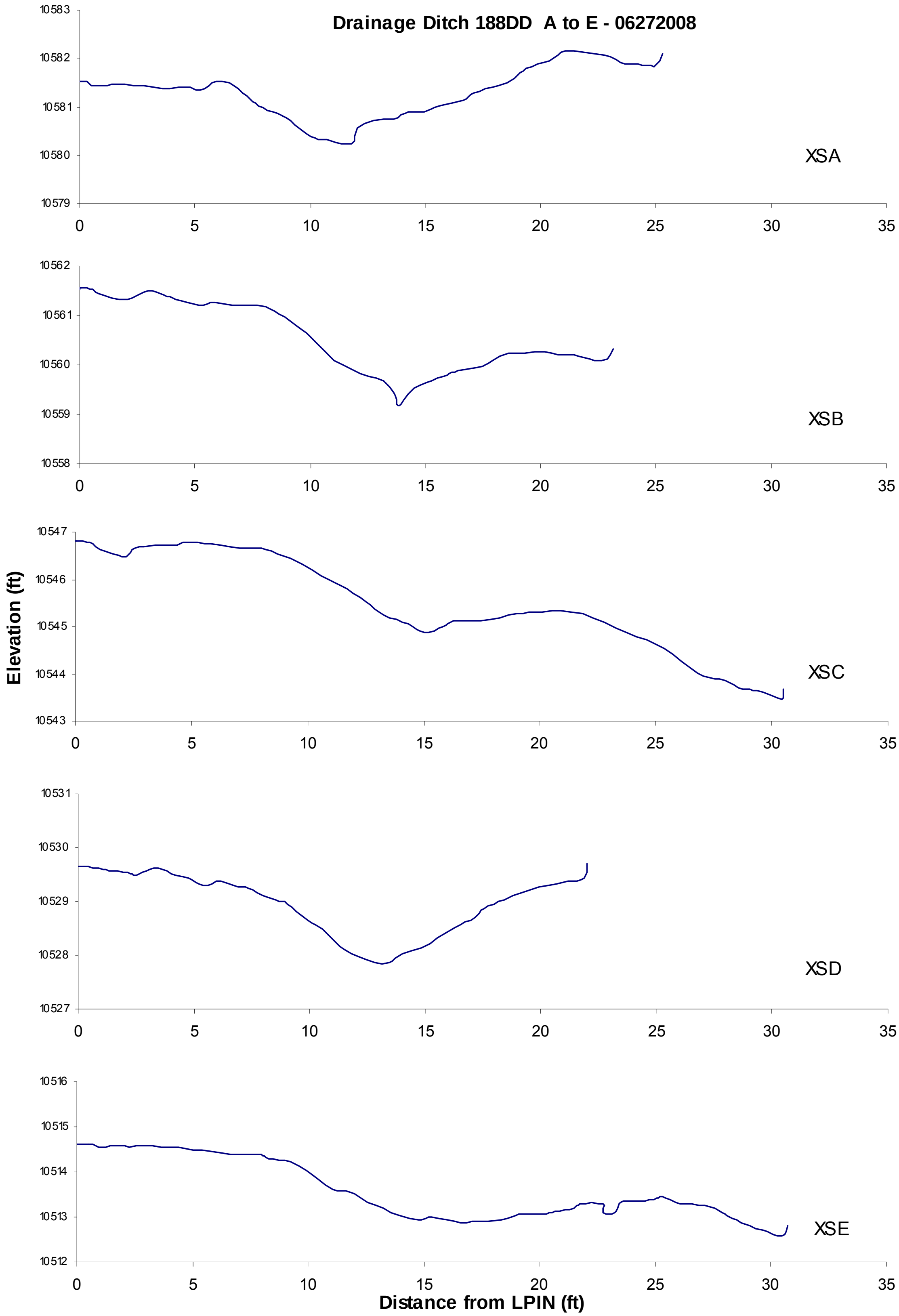


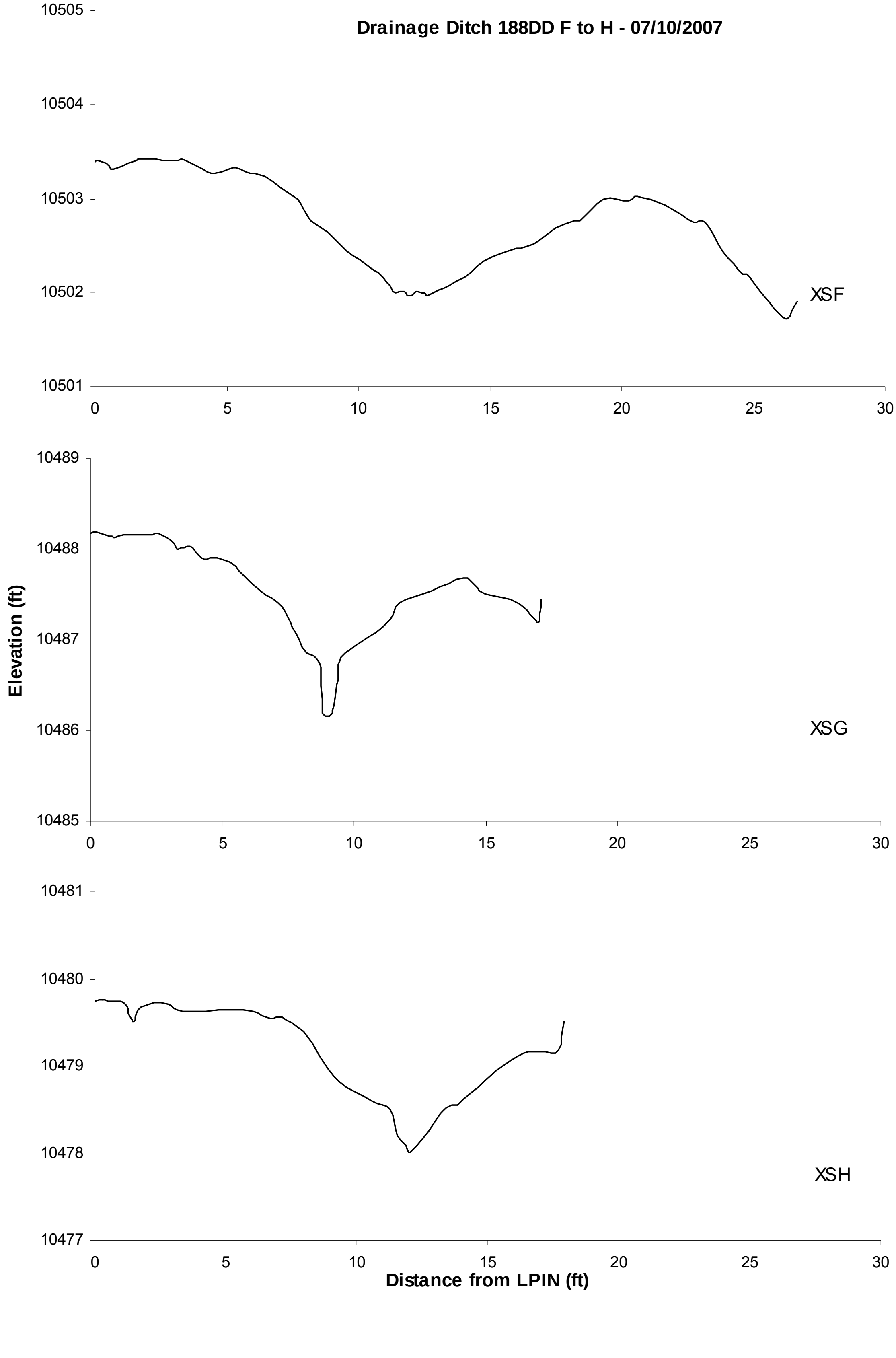
Drainage Ditch 155DD156RX - 07/24/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Drainage Ditch 157DD158RX - 07/23/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE

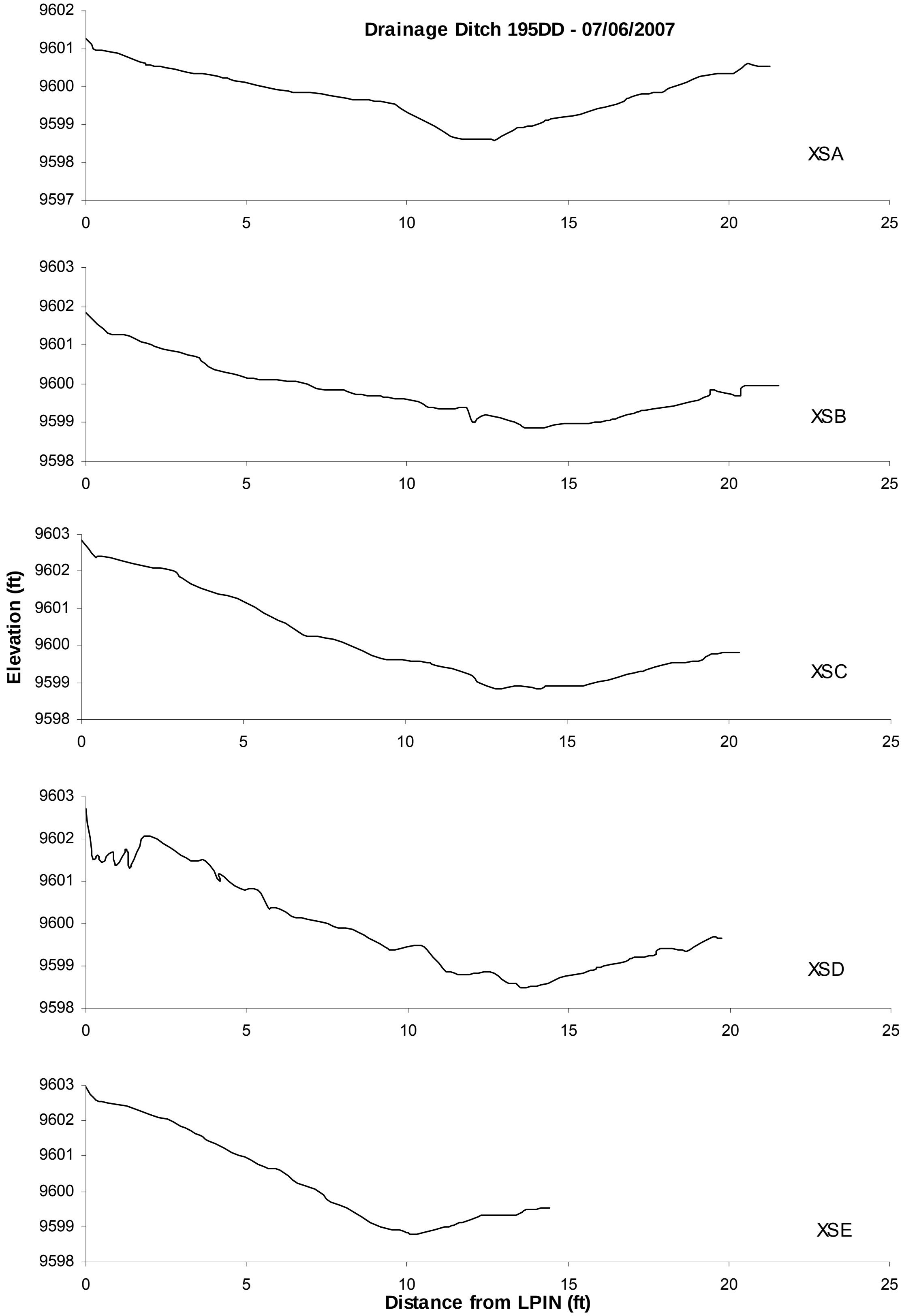

Drainage Ditch 159DD160RX - 07/24/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

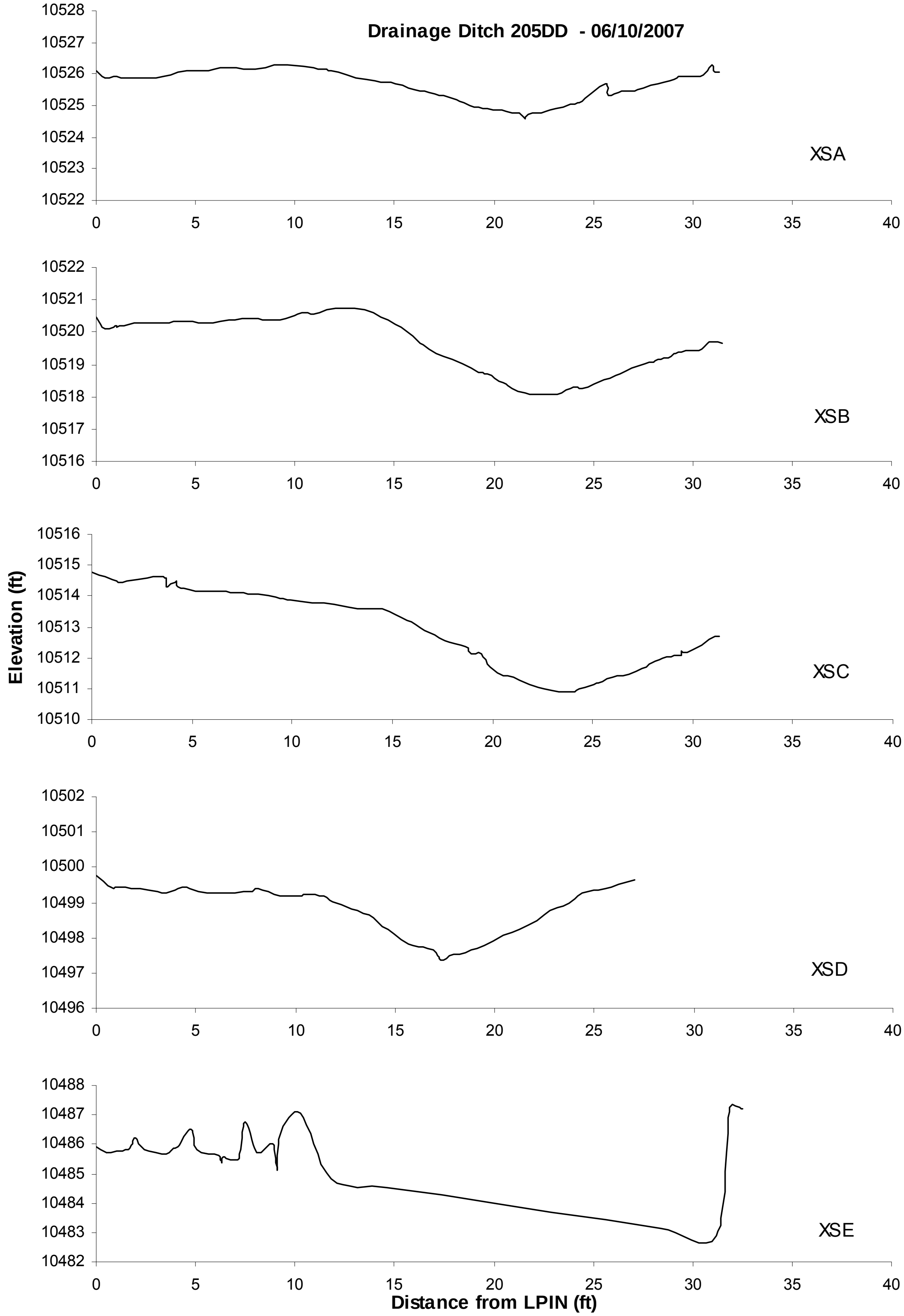

Drainage Ditch 182DD - 06/04/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
0
5
10
15
20
25
9514
9512
9510
9508
9506
9504
9502
9500
9498
9496
9494
9492
9490


Drainage Ditch 188DD A to E - 06272008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10583
10582
10581
10580
10579
10562
10561
10560
10559
10558
10547
10546
10545
10544
10543
10531
10530
10529
10528
10527
10516
10515
10514
10513
10512
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
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9602
9601
9600
9599
9598
9597
9603
0
5
10
15
20
25

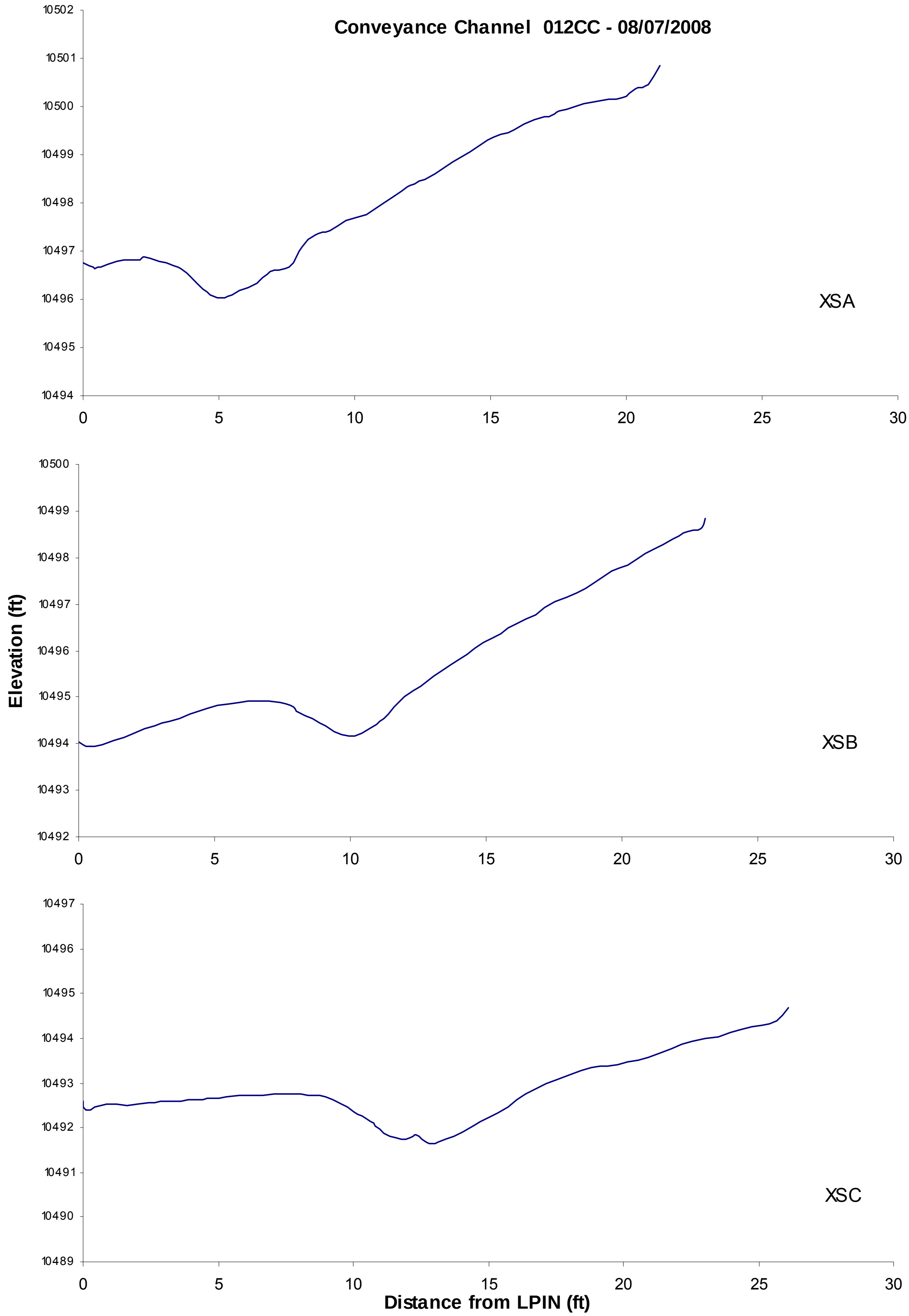

Drainage Ditch 205DD - 06/10/2007
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

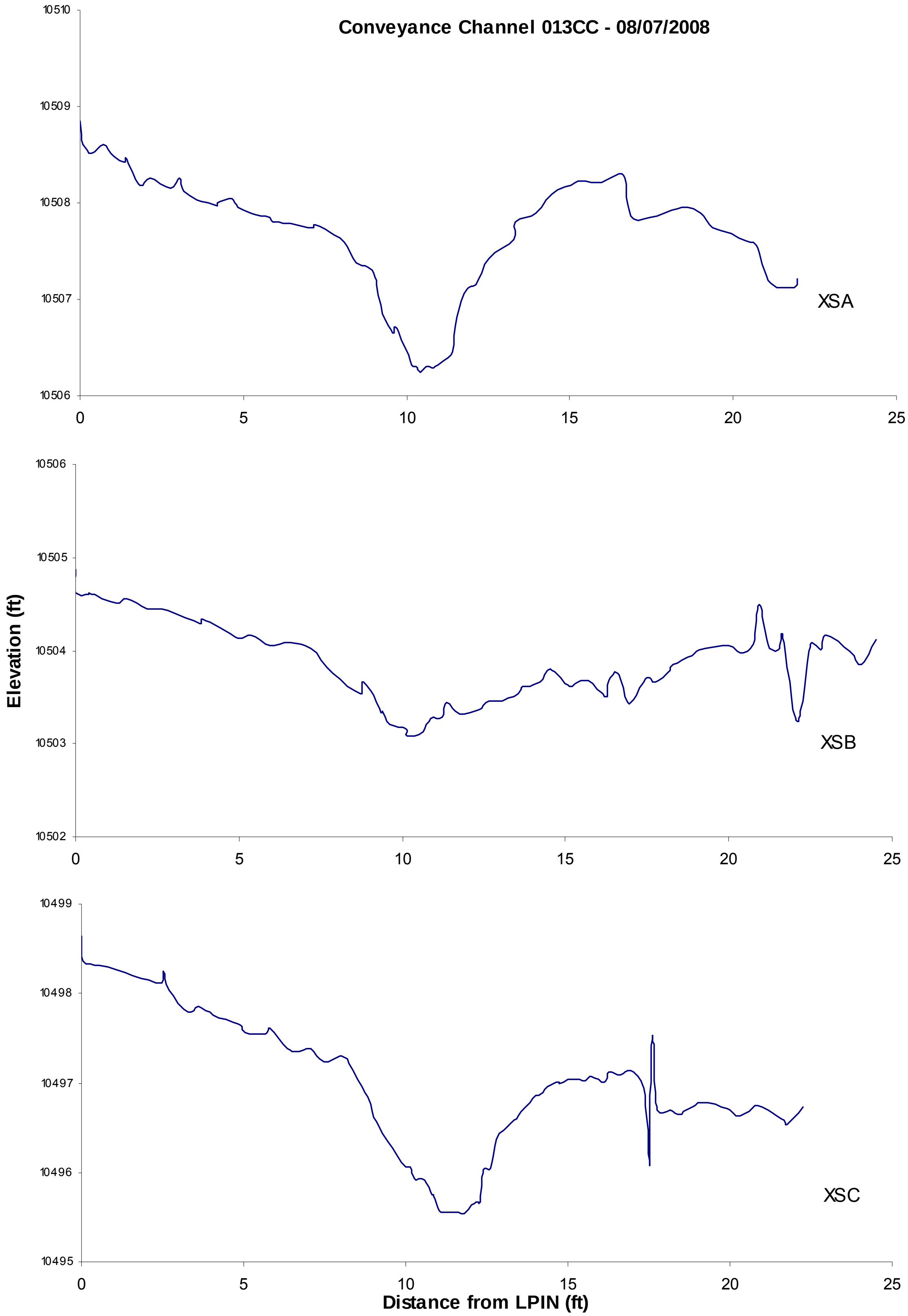
Appendix I

Conveyance Channel

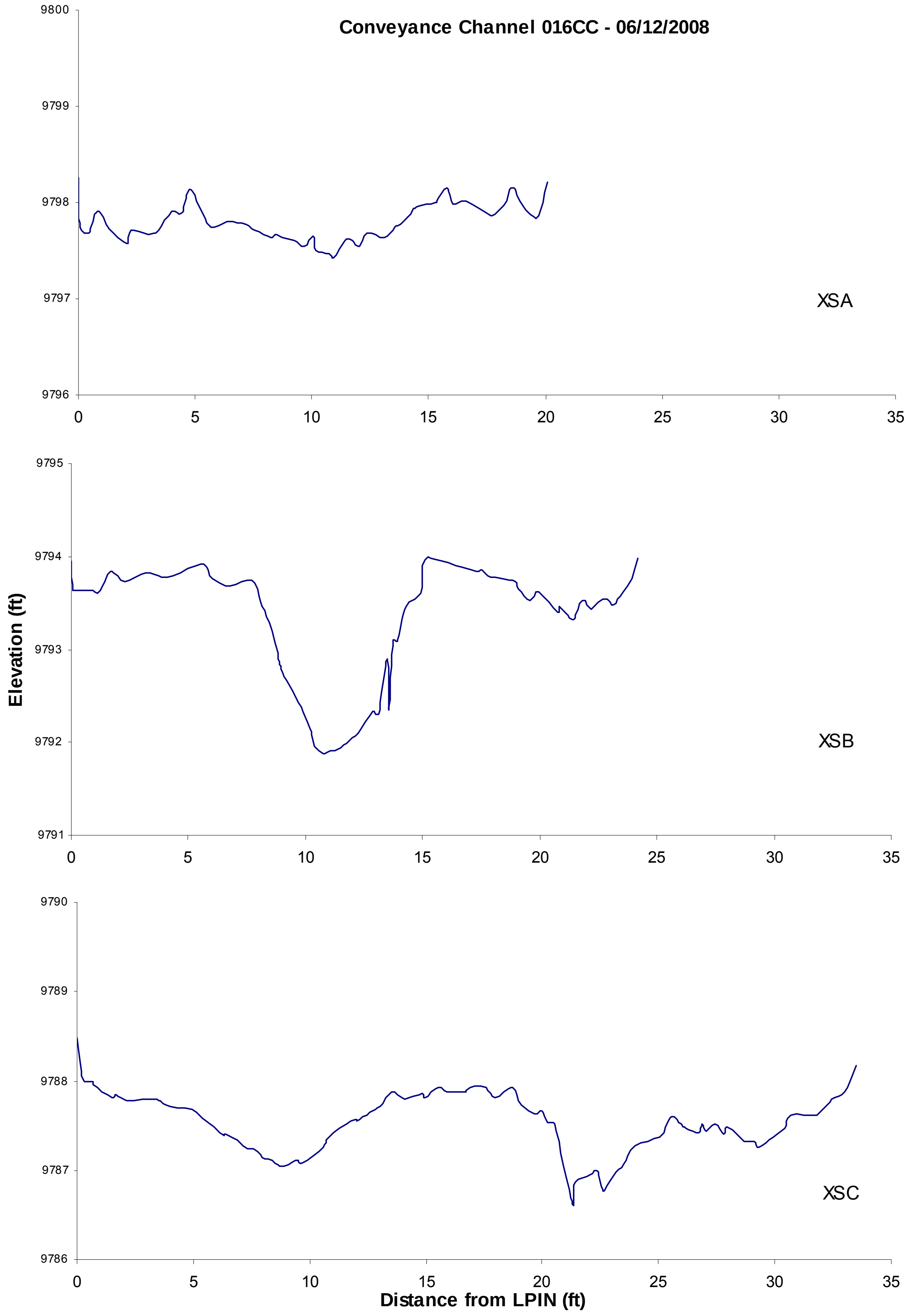
Cross Section Graphs

2008

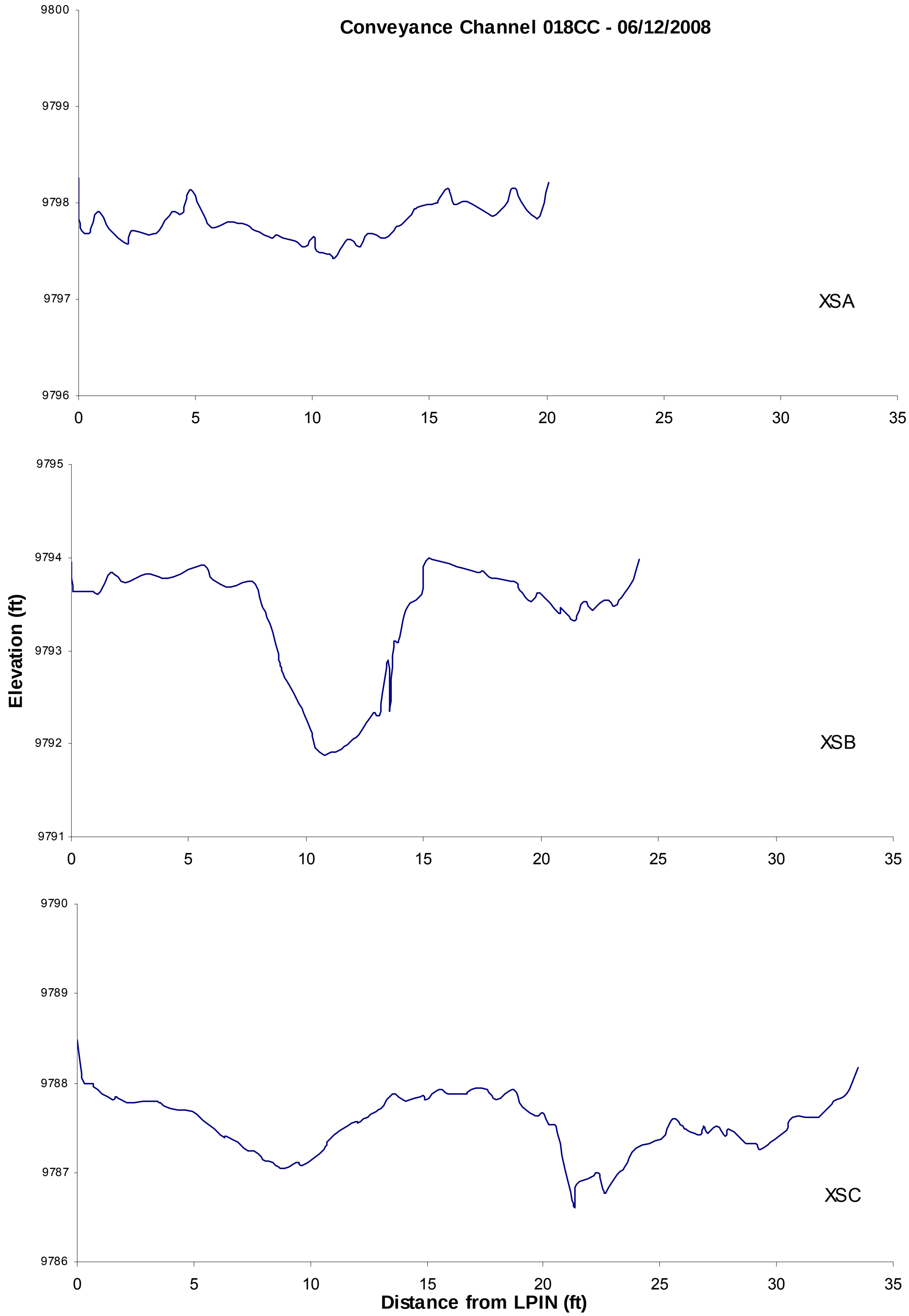

Conveyance Channel 012CC - 08/07/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10502
10501
10500
10499
10498
10497
10496
10495
10494
10493
10492
10491
10490
10489
0
5
10
15
20
25
30

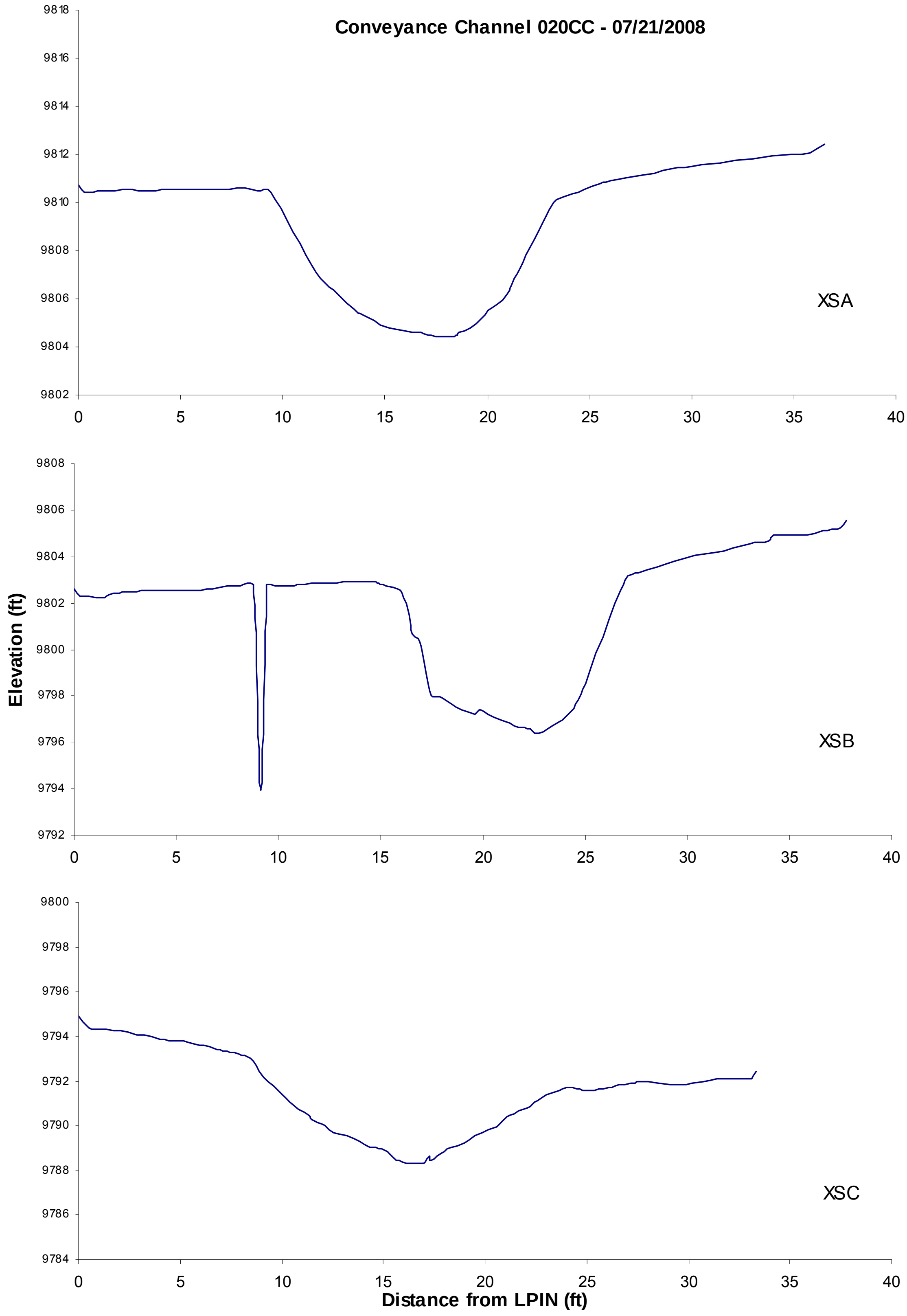


Conveyance Channel 013CC - 08/07/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10510
10509
10508
10507
10506
10505
10504
10503
10502
10499
10498
10497
10496
10495
0
5
10
15
20
25

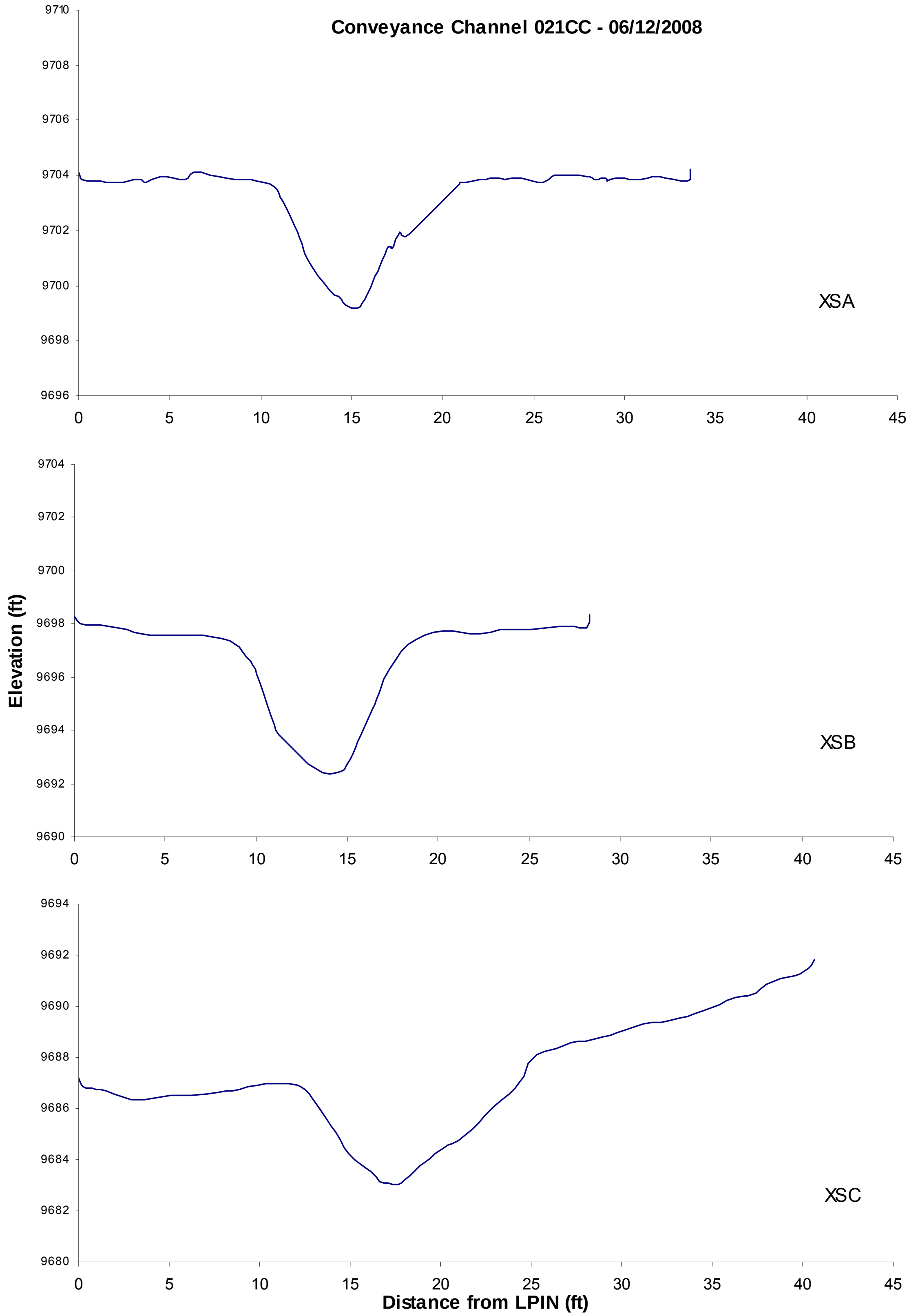


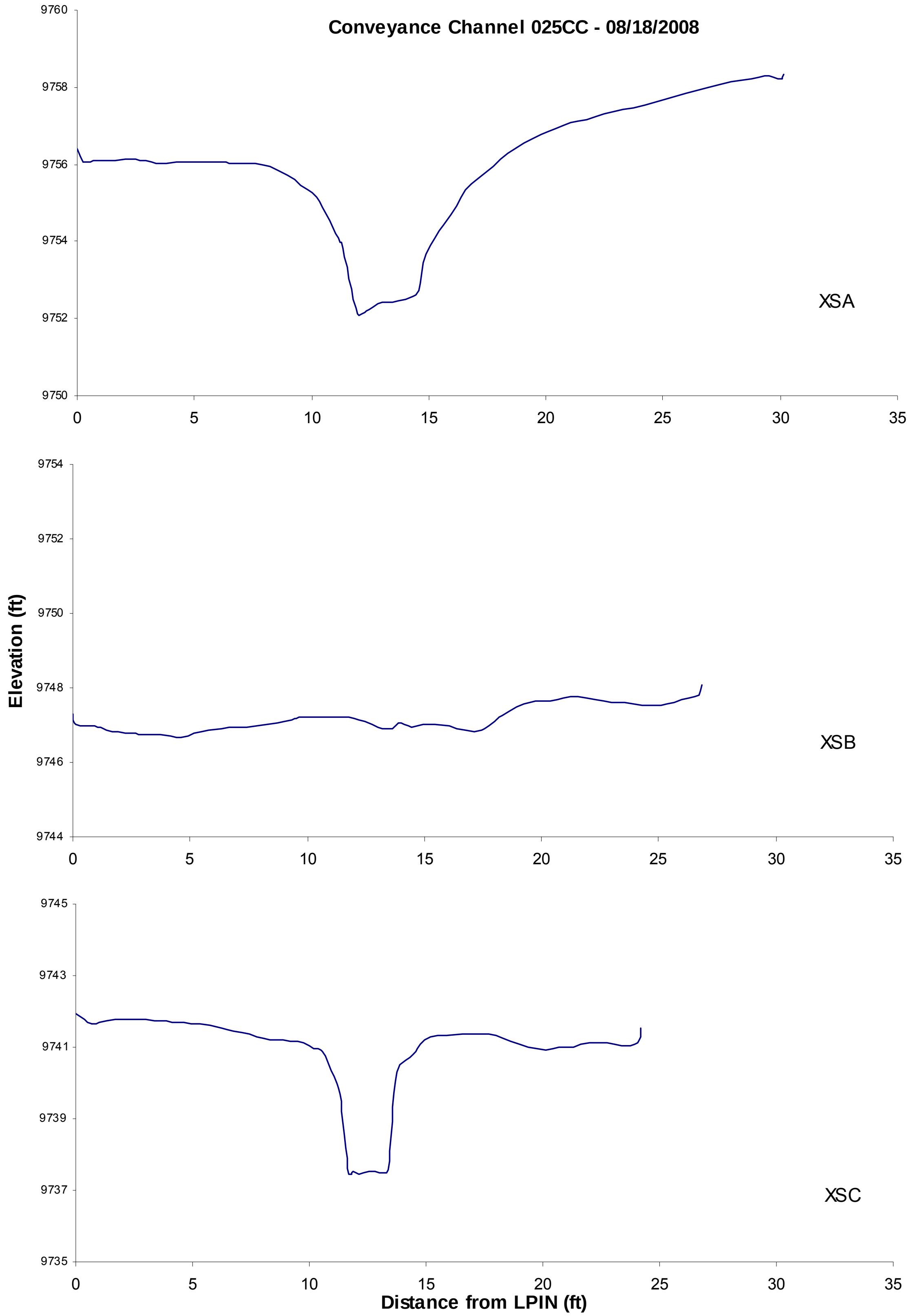
Conveyance Channel 016CC - 06/12/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9800
9799
9798
9797
9796
9795
9794
9793
9792
9791
9790
9789
9788
9787
9786
0
5
10
15
20
25
30
35

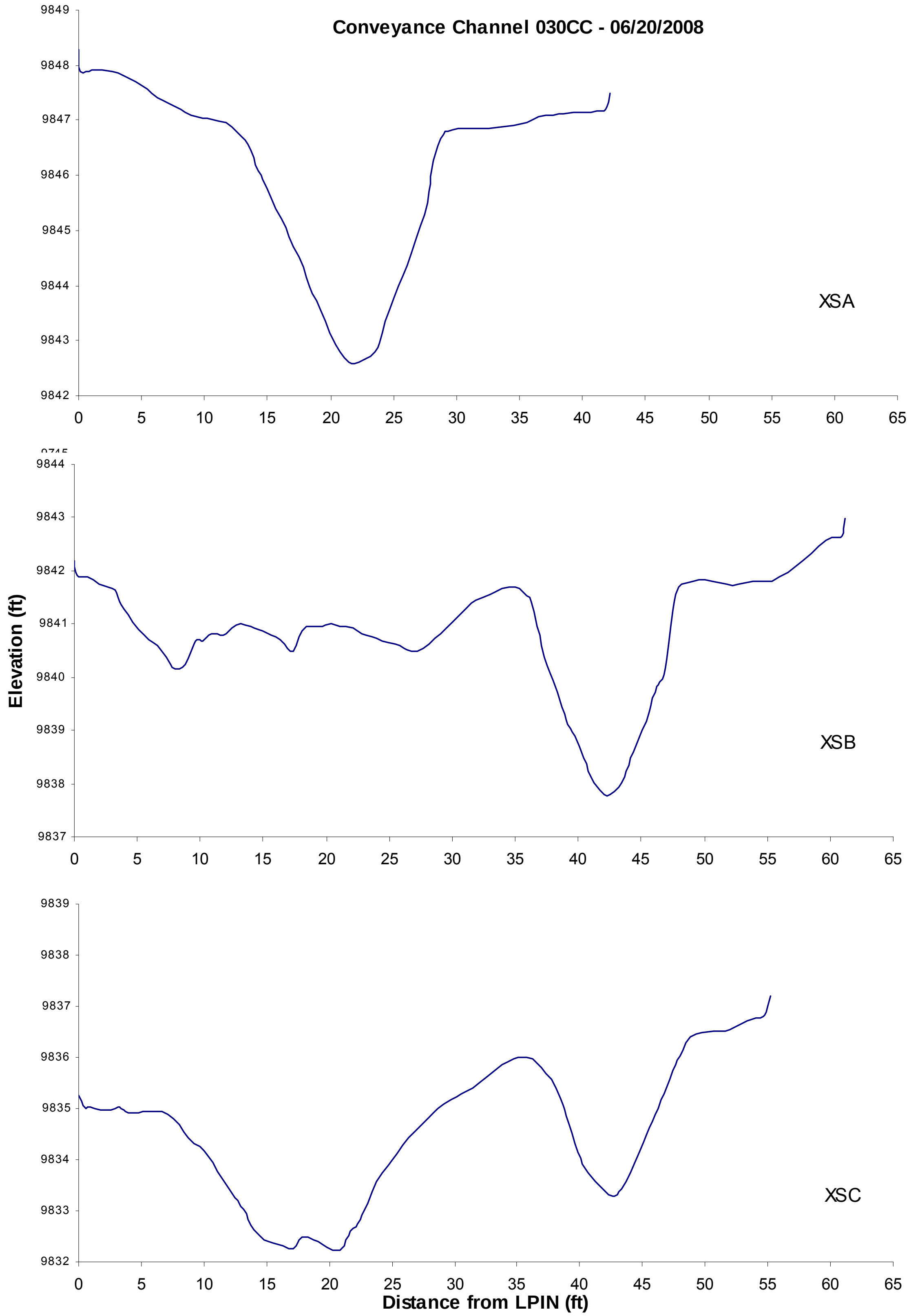

Conveyance Channel 018CC - 06/12/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9800
9799
9798
9797
9796
9795
9794
9793
9792
9791
9790
9789
9788
9787
9786
0
5
10
15
20
25
30
35

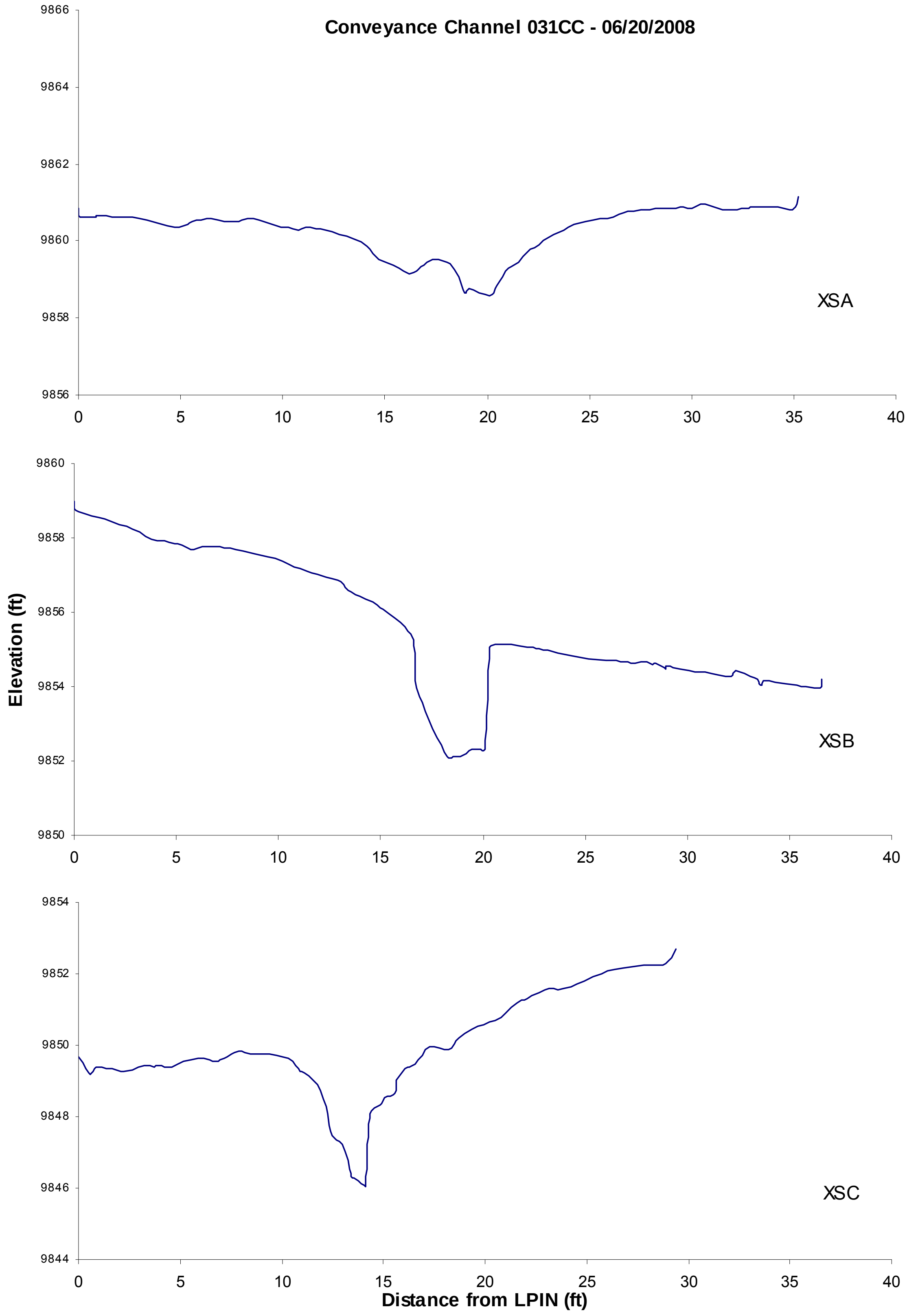


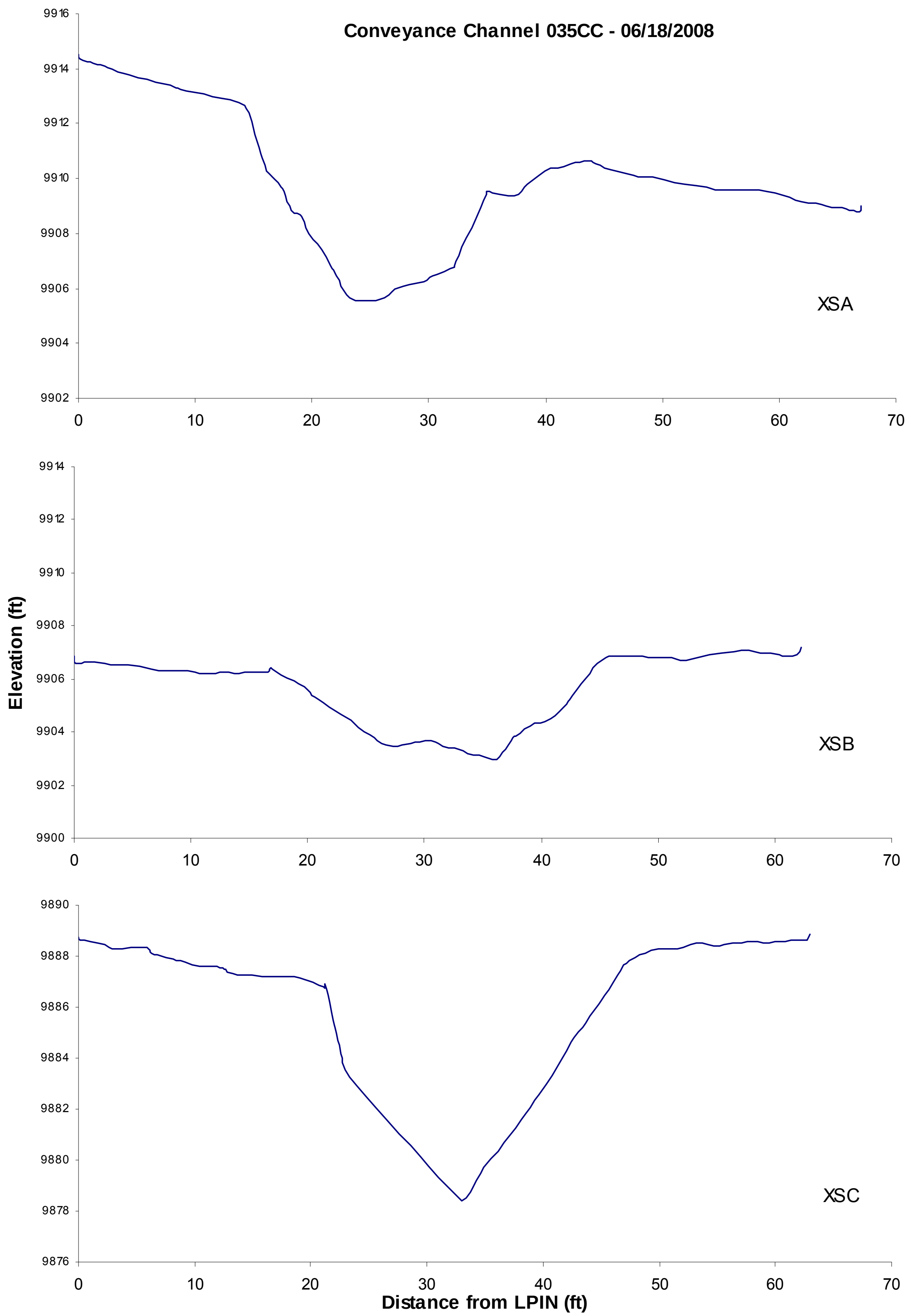
Conveyance Channel 020CC - 07/21/2008
9818
9816
9814
9812
9810
9808
9806
9804
9802
0
5
10
15
20
25
30
35
40
XSA
9808
9806
9804
9802
9800
9798
9796
9794
9792
Elevation (ft)
XSB
9800
9798
9796
9794
9792
9790
9788
9786
9784
XSC
Distance from LPIN (ft)


Conveyance Channel 021CC - 06/12/2008
9710
9708
9706
9704
9702
9700
9698
9696
0 5 10 15 20 25 30 35 40 45
XSA
9704
9702
9700
9698
9696
9694
9692
9690
0 5 10 15 20 25 30 35 40 45
XSB
Elevation (ft)
9694
9692
9690
9688
9686
9684
9682
9680
0 5 10 15 20 25 30 35 40 45
XSC
Distance from LPIN (ft)

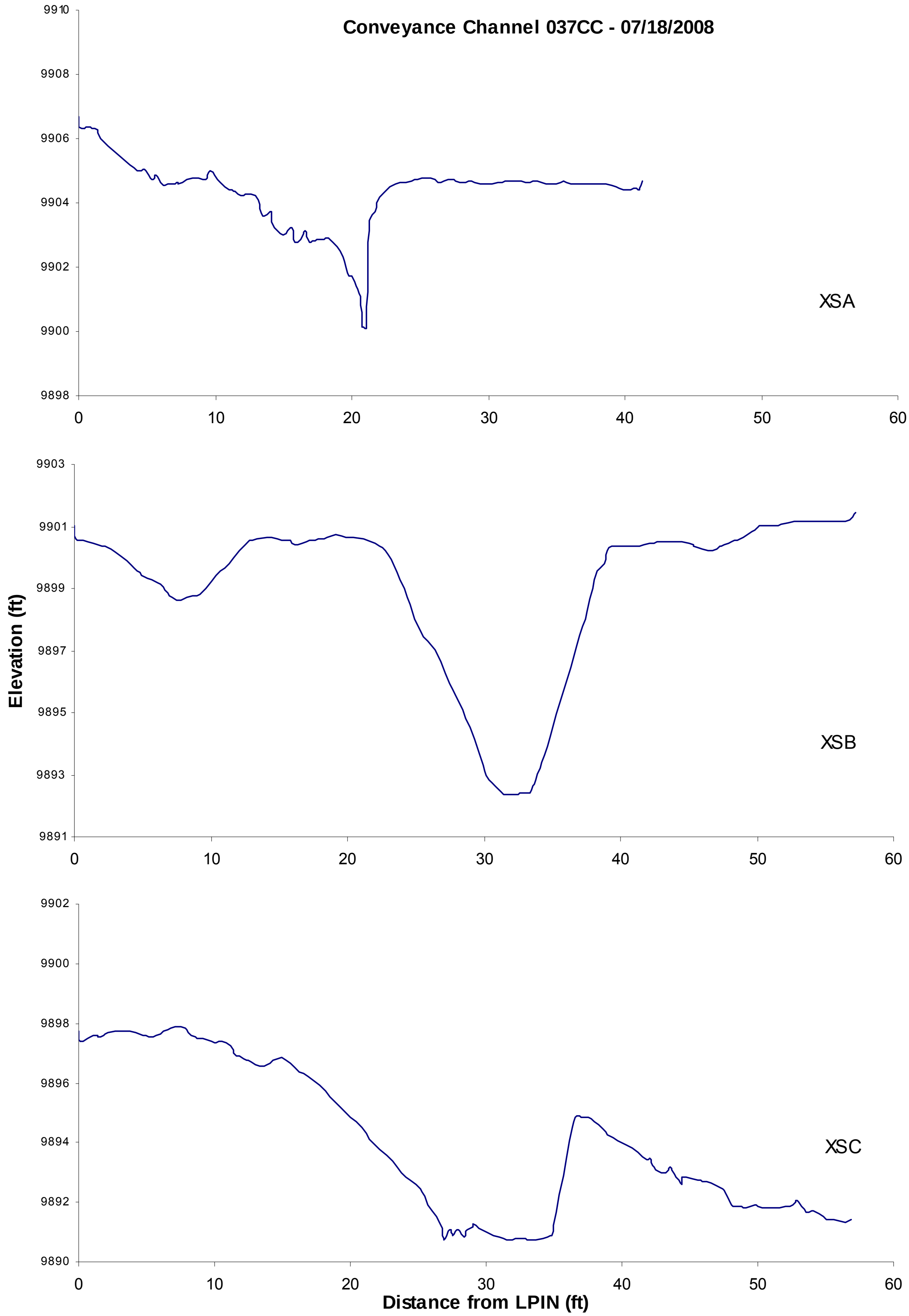

Conveyance Channel 025CC - 08/18/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9760
9758
9756
9754
9752
9750
9754
9752
9750
9748
9746
9744
9745
9743
9741
9739
9737
9735
0
5
10
15
20
25
30
35

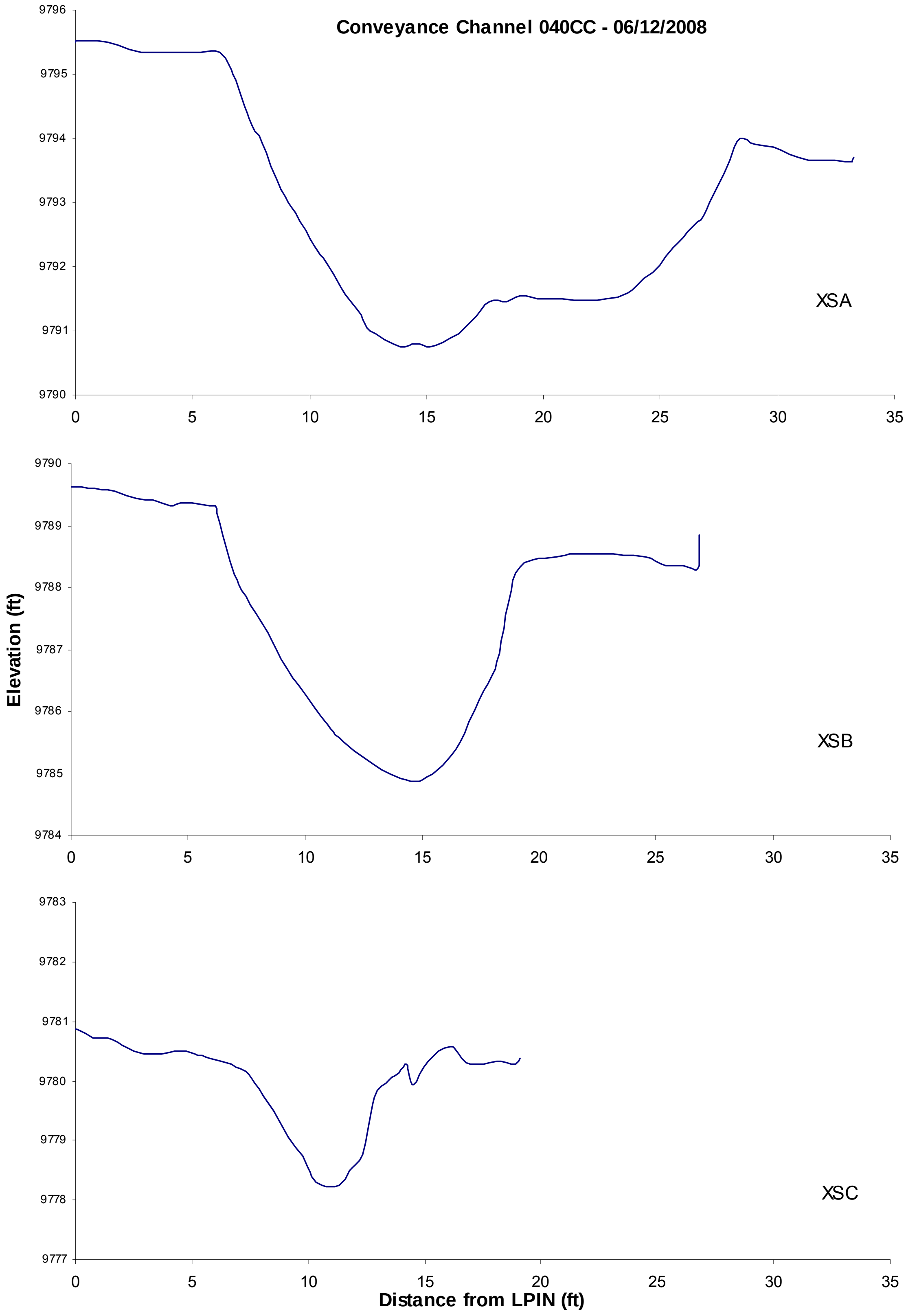

Conveyance Channel 030CC - 06/20/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)


Conveyance Channel 031CC - 06/20/2008
Elevation (ft)
XSA
XSB
XSC
Distance from LPIN (ft)
9866
9864
9862
9860
9858
9856
9854
9852
9850
9848
9846
9844
0
5
10
15
20
25
30
35
40

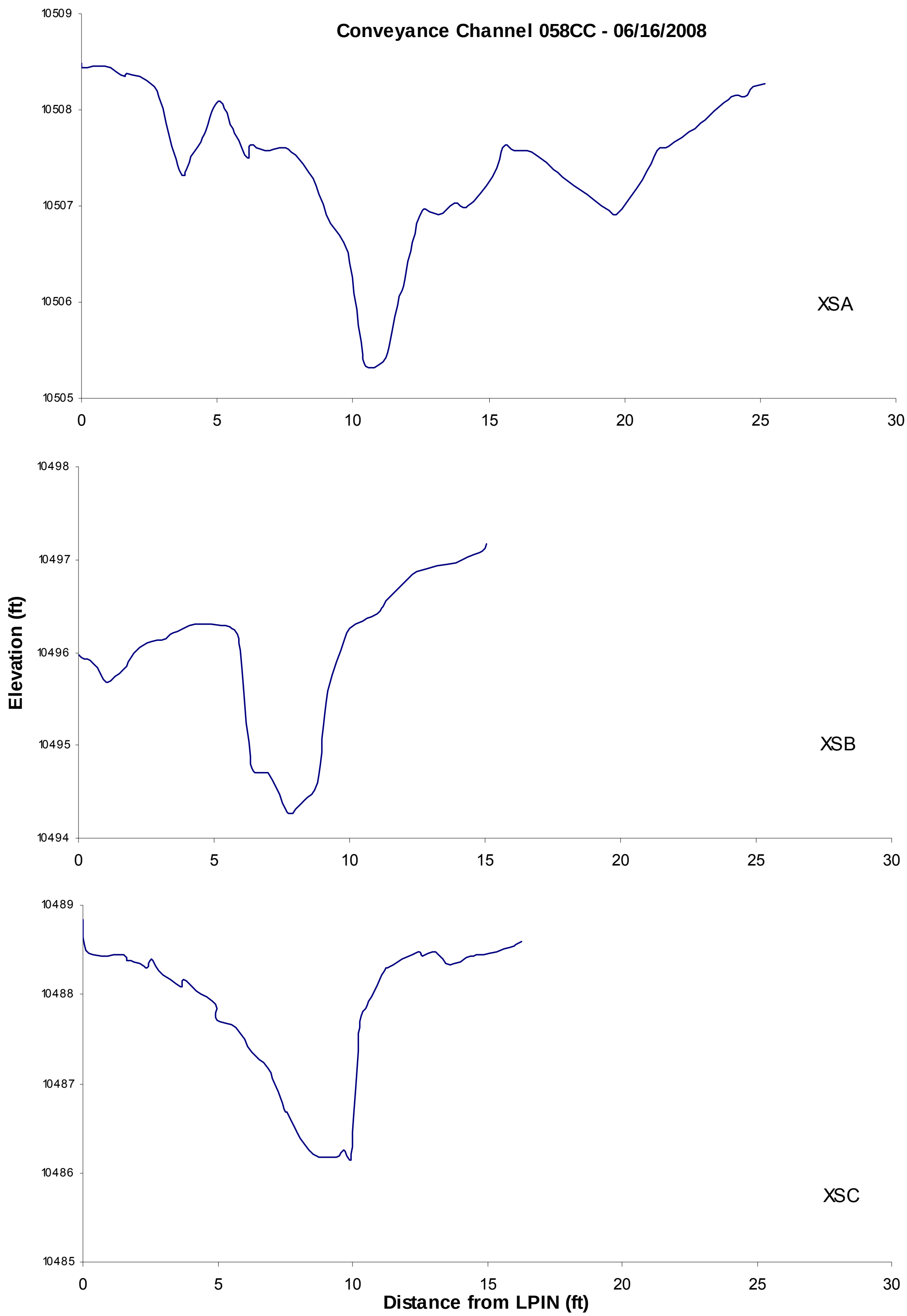

Conveyance Channel 035CC - 06/18/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9916
9914
9912
9910
9908
9906
9904
9902
9900
9890
9888
9886
9884
9882
9880
9878
9876
0
10
20
30
40
50
60
70

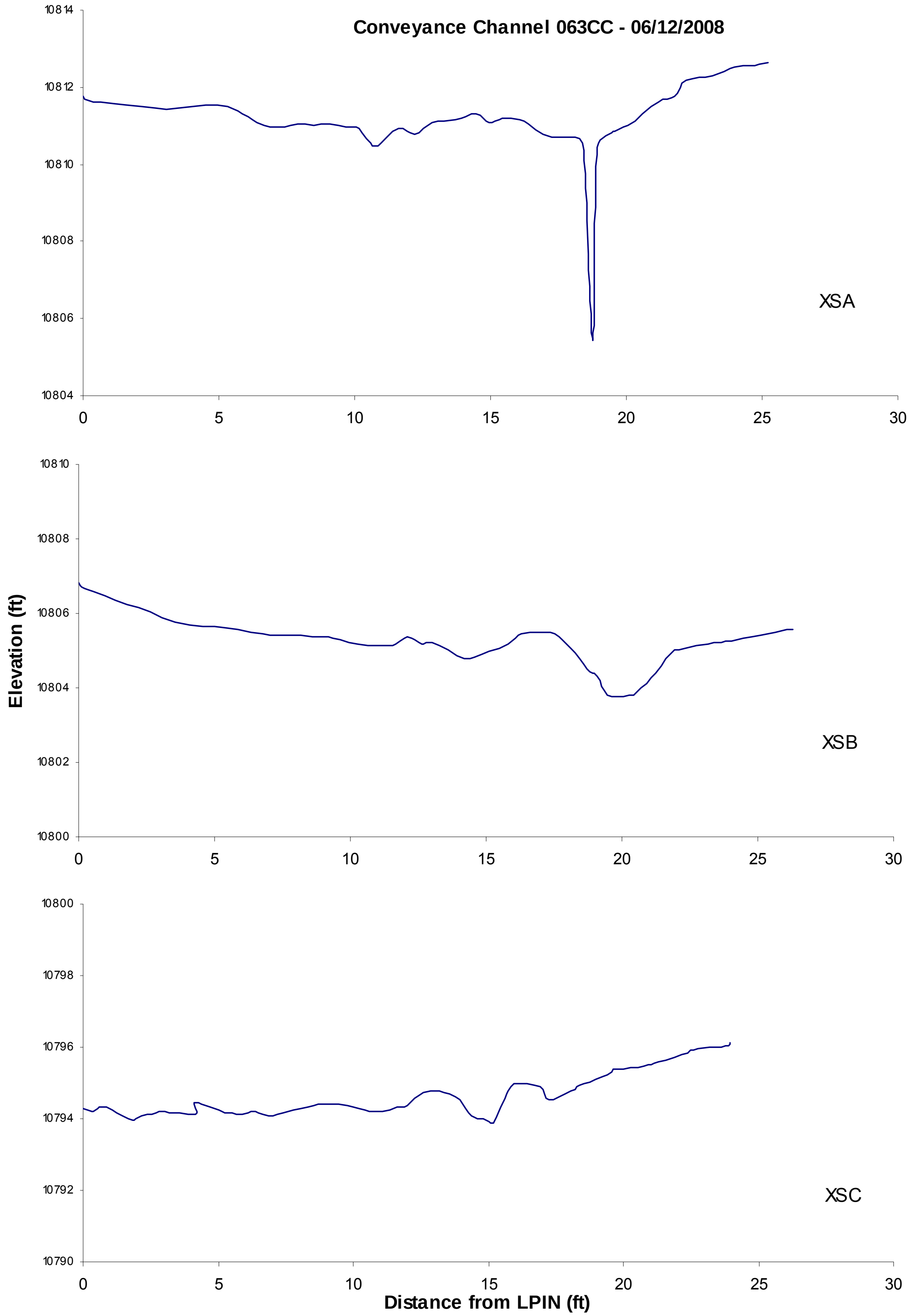

Conveyance Channel 036CC - 08/07/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10005
10004
10003
10002
10001
10000
9999
9998
9997
9996
9995
9994
0
5
10
15
20
25
30
35
40
45
50
55
60


Conveyance Channel 037CC - 07/18/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9910
9908
9906
9904
9902
9900
9898
9903
9901
9899
9897
9895
9893
9891
9902
9900
9898
9896
9894
9892
9890
0
10
20
30
40
50
60

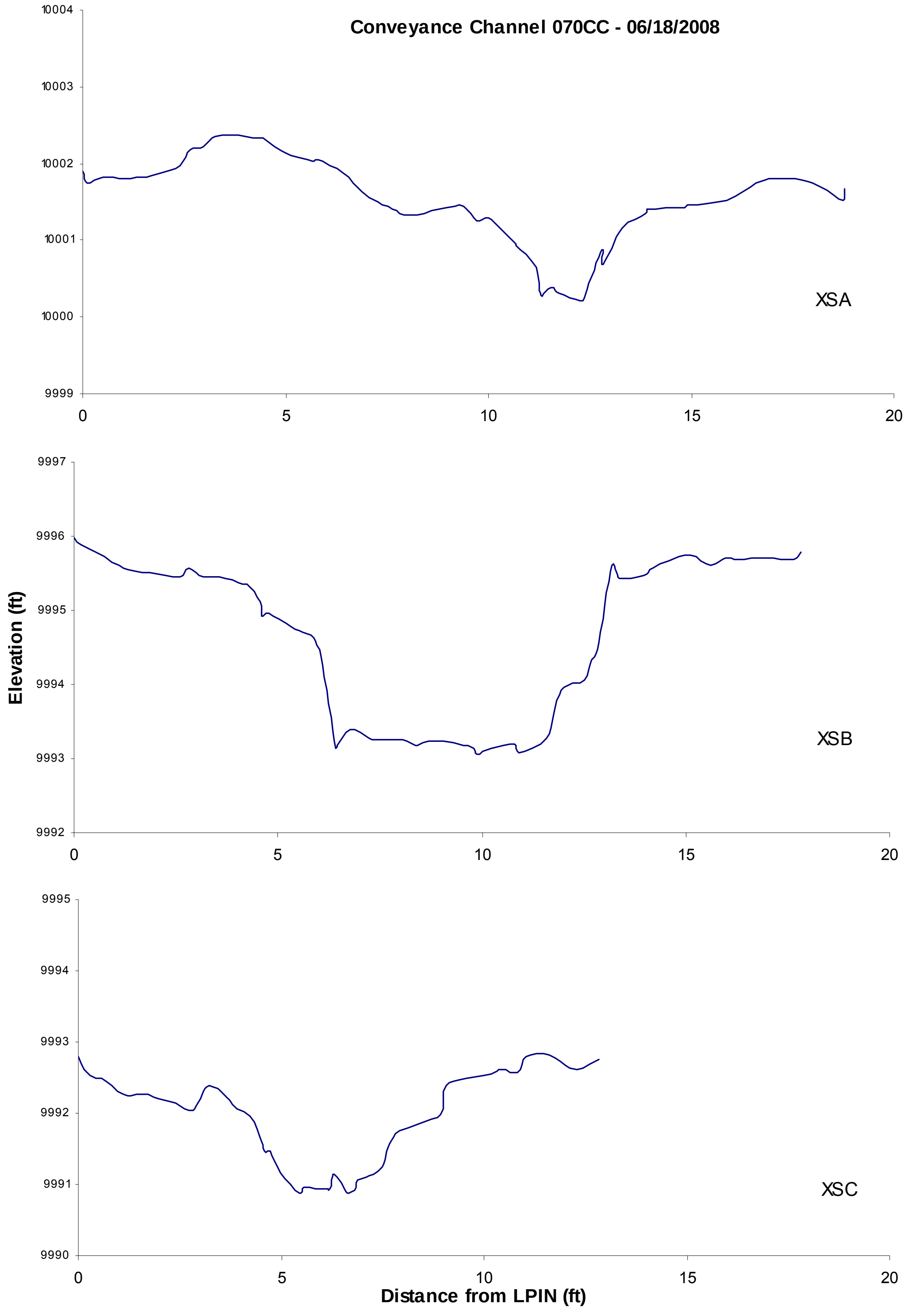


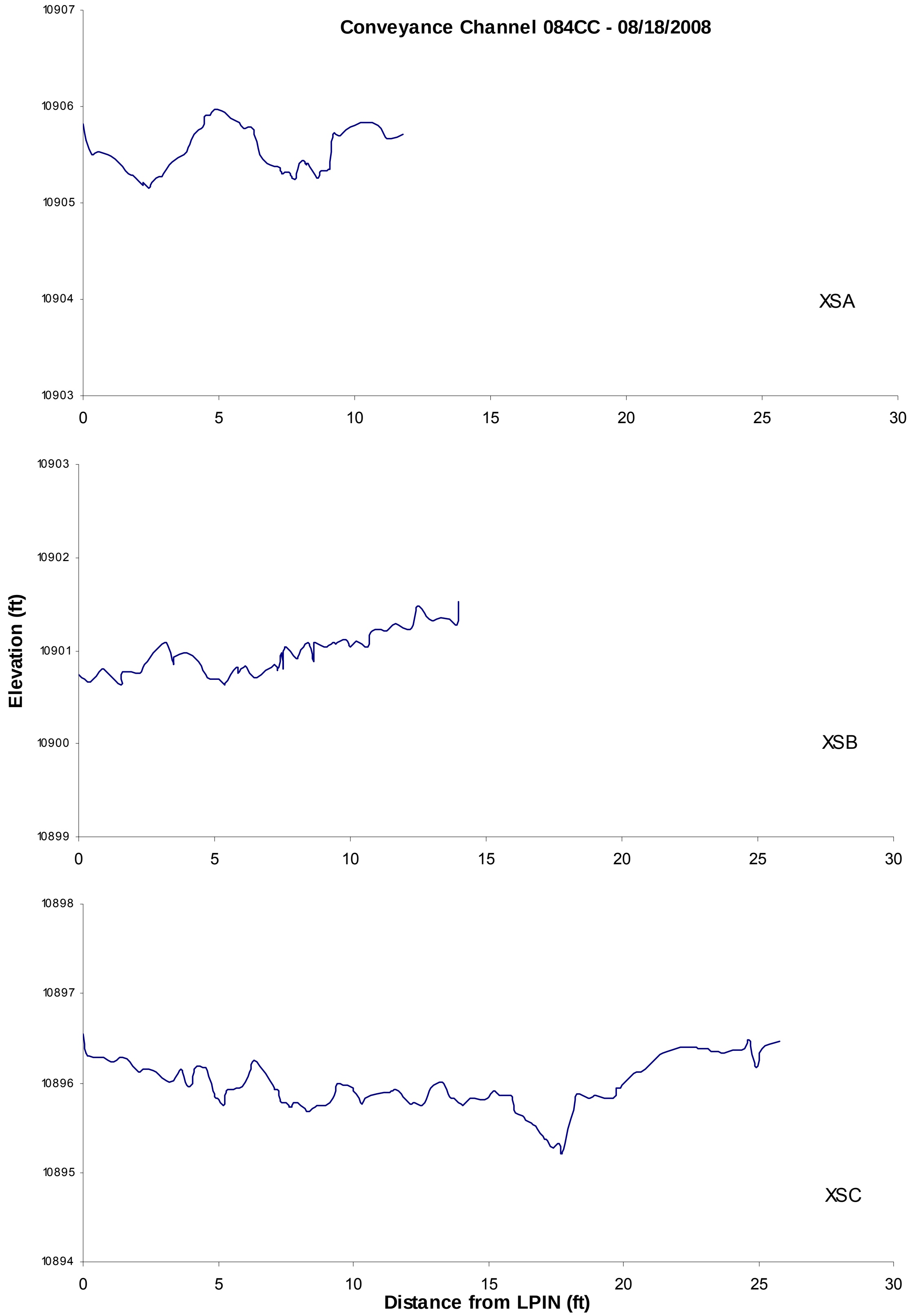
Conveyance Channel 040CC - 06/12/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9796
9795
9794
9793
9792
9791
9790
9789
9788
9787
9786
9785
9784
9783
9782
9781
9780
9779
9778
9777
0
5
10
15
20
25
30
35

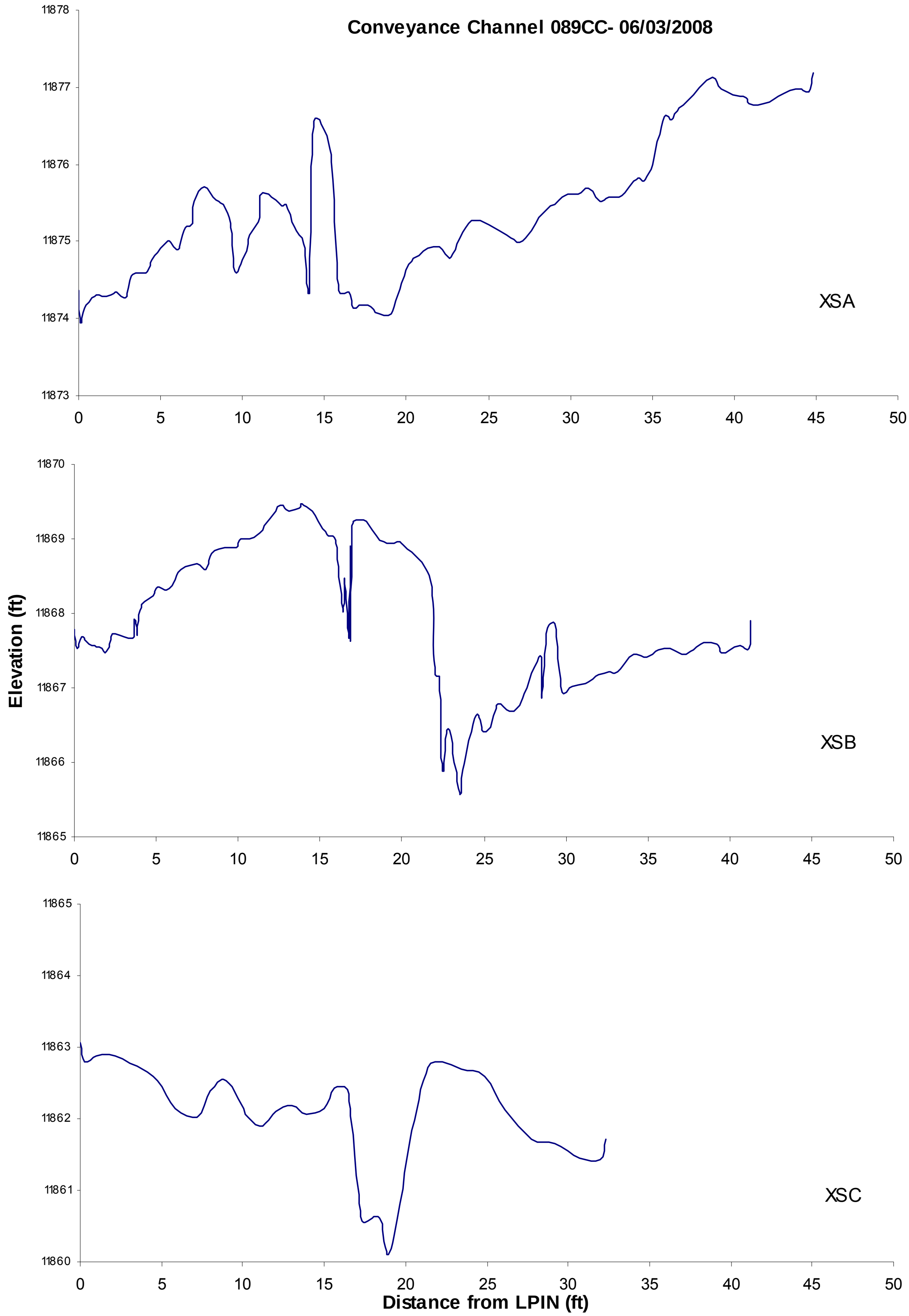

Conveyance Channel 058CC - 06/16/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10509
10508
10507
10506
10505
10498
10497
10496
10495
10494
10489
10488
10487
10486
10485
0
5
10
15
20
25
30



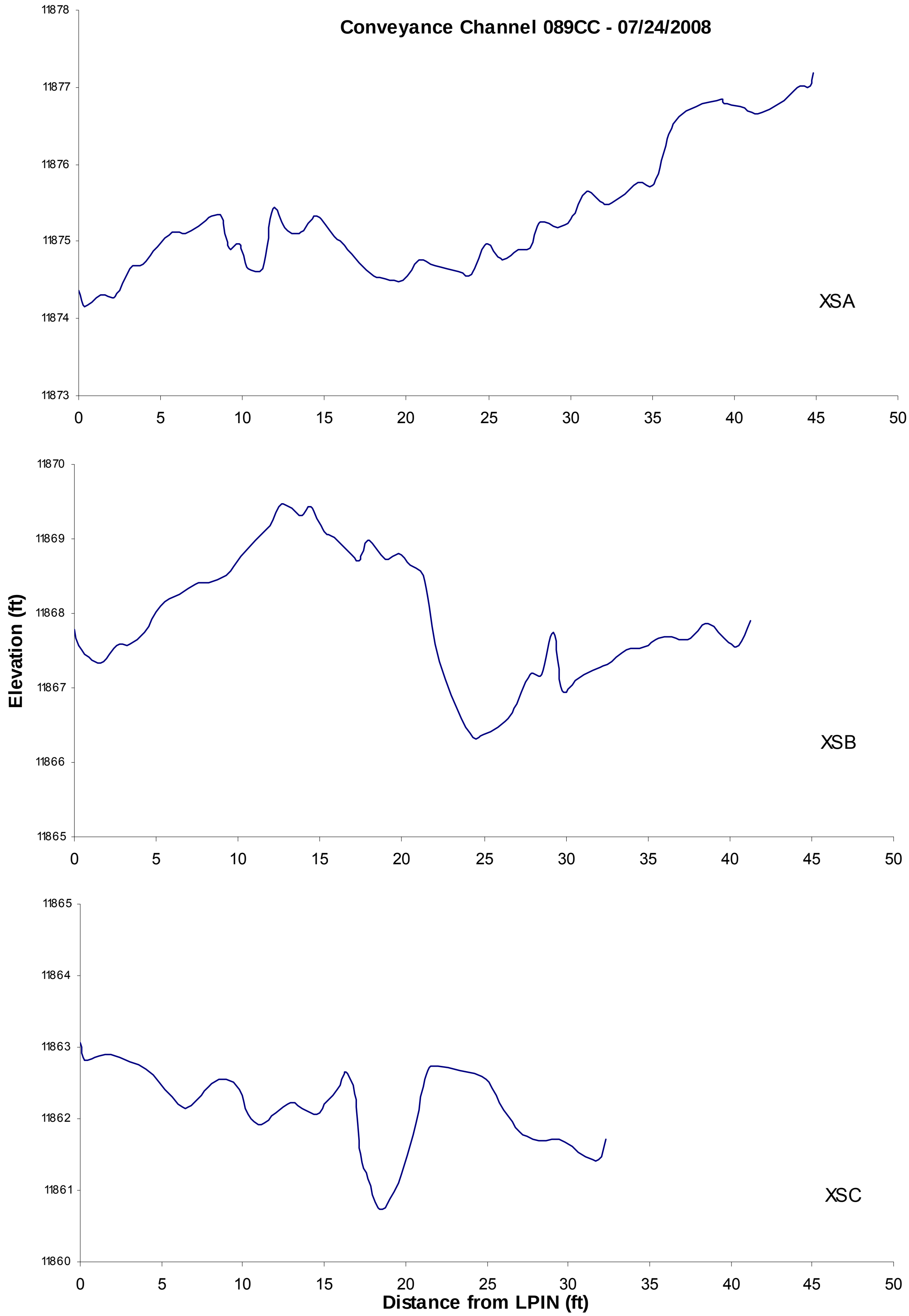
Conveyance Channel 063CC - 06/12/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
10814
10812
10810
10808
10806
10804
10800
10802
10798
10796
10794
10792
10790
0
5
10
15
20
25
30

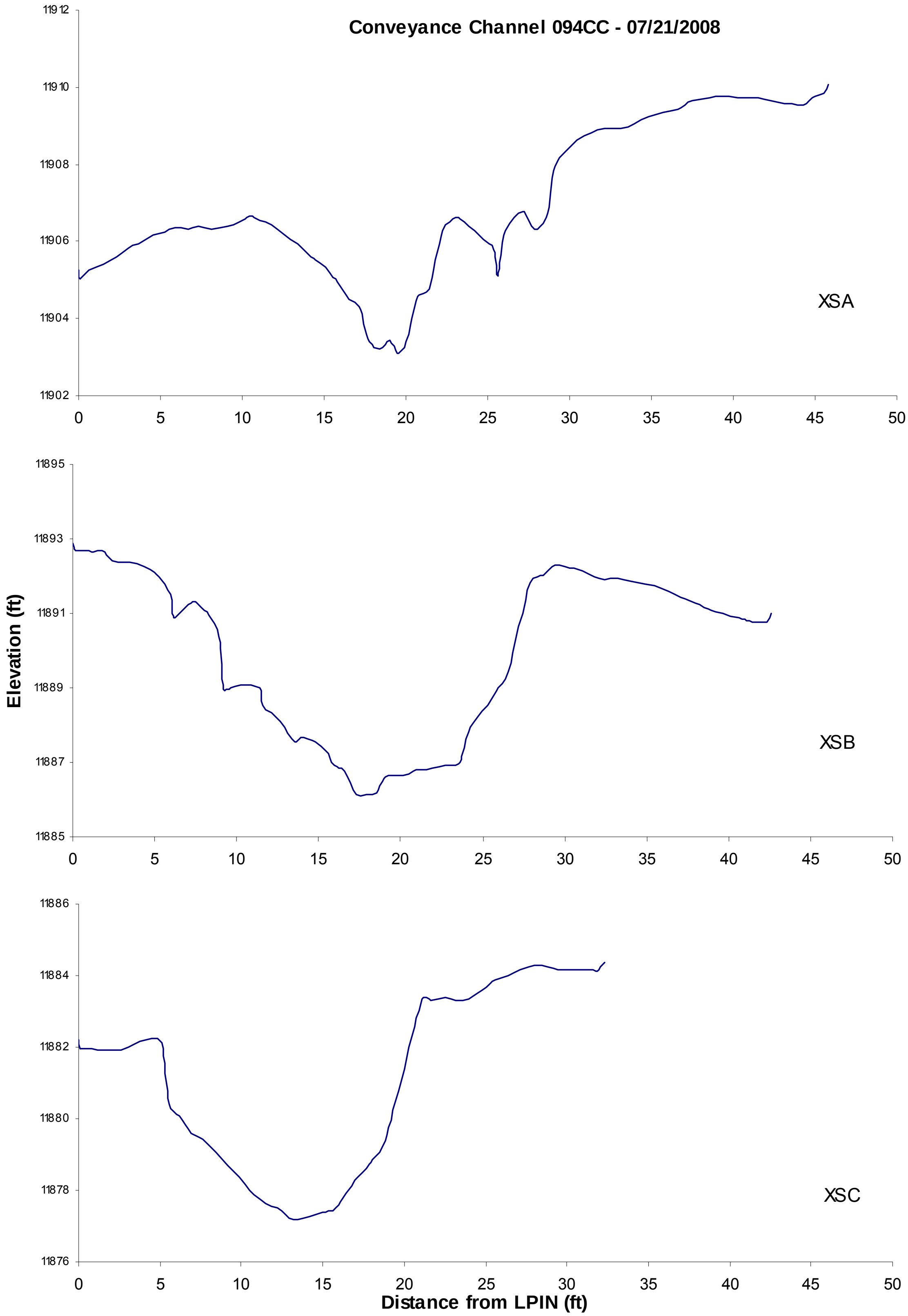

Conveyance Channel 070CC - 06/18/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
10004
10003
10002
10001
10000
9999
9997
9996
9995
9994
9993
9992
9995
9994
9993
9992
9991
9990
0
5
10
15
20


Conveyance Channel 084CC - 08/18/2008
10907
10906
10905
10904
10903
XSA
0
5
10
15
20
25
30
10903
10902
10901
10900
10899
XSB
Elevation (ft)
10898
10897
10896
10895
10894
XSC
Distance from LPIN (ft)

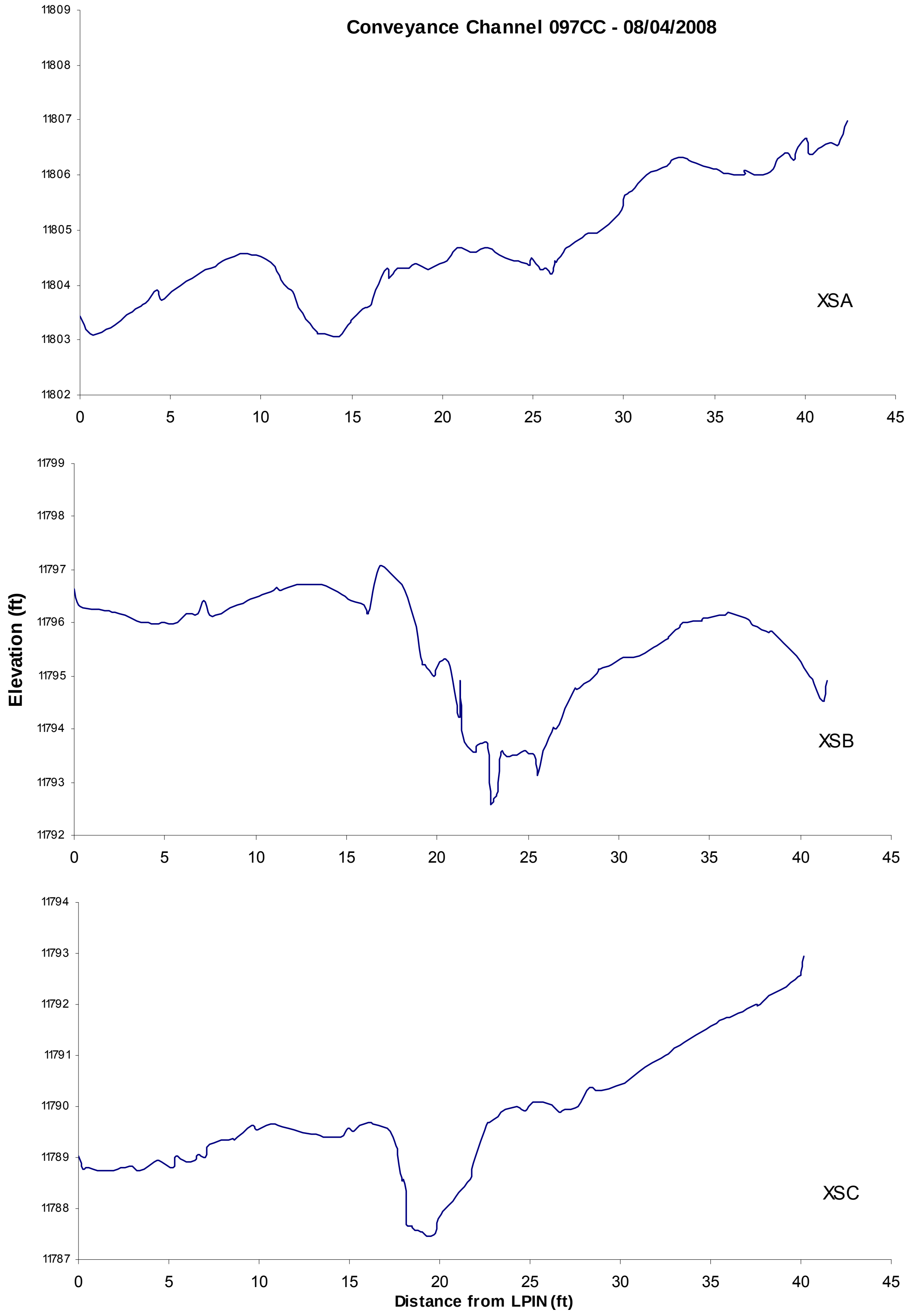


Conveyance Channel 089CC- 06/03/2008
11878
11877
11876
11875
11874
11873
0
5
10
15
20
25
30
35
40
45
50
XSA
11870
11869
11868
11867
11866
11865
XSB
Elevation (ft)
11865
11864
11863
11862
11861
11860
XSC
Distance from LPIN (ft)

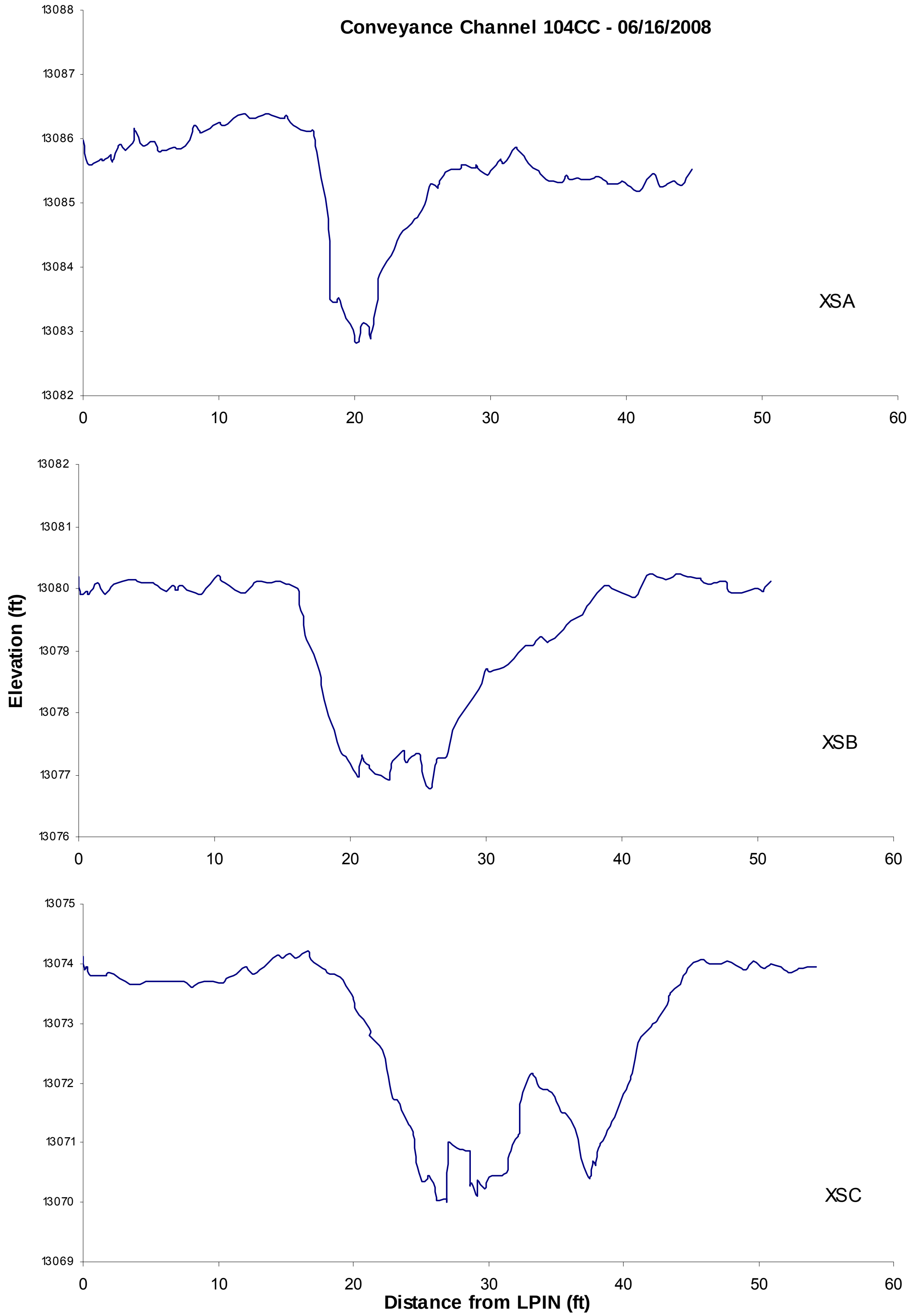

Conveyance Channel 089CC - 07/24/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
11878
11877
11876
11875
11874
11873
11870
11869
11868
11867
11866
11865
11865
11864
11863
11862
11861
11860
0
5
10
15
20
25
30
35
40
45
50



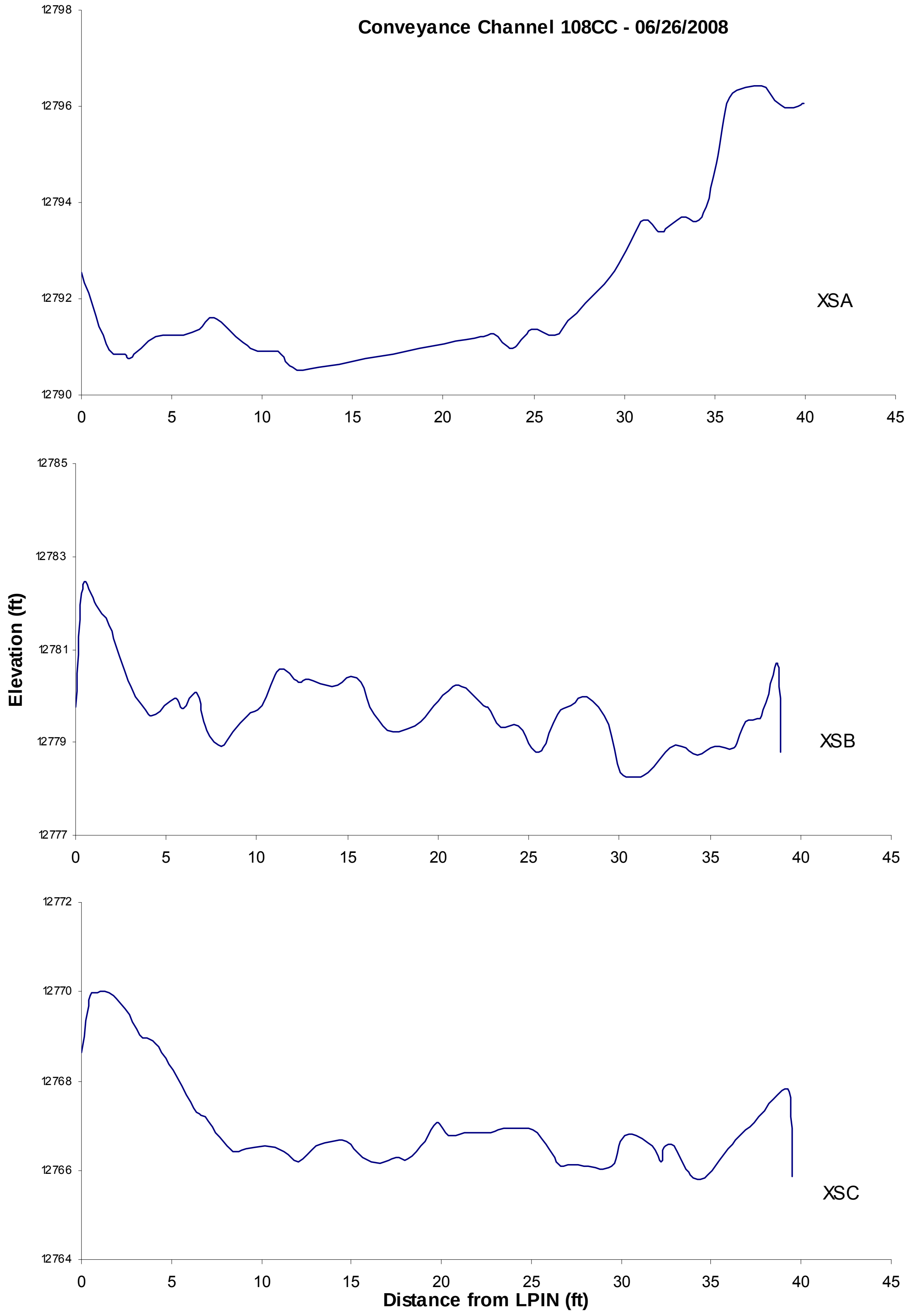
Conveyance Channel 094CC - 07/21/2008
11912
11910
11908
11906
11904
11902
0
5
10
15
20
25
30
35
40
45
50
XSA
11895
11893
11891
11889
11887
11885
XSB
11886
11884
11882
11880
11878
11876
XSC
Elevation (ft)
Distance from LPIN (ft)

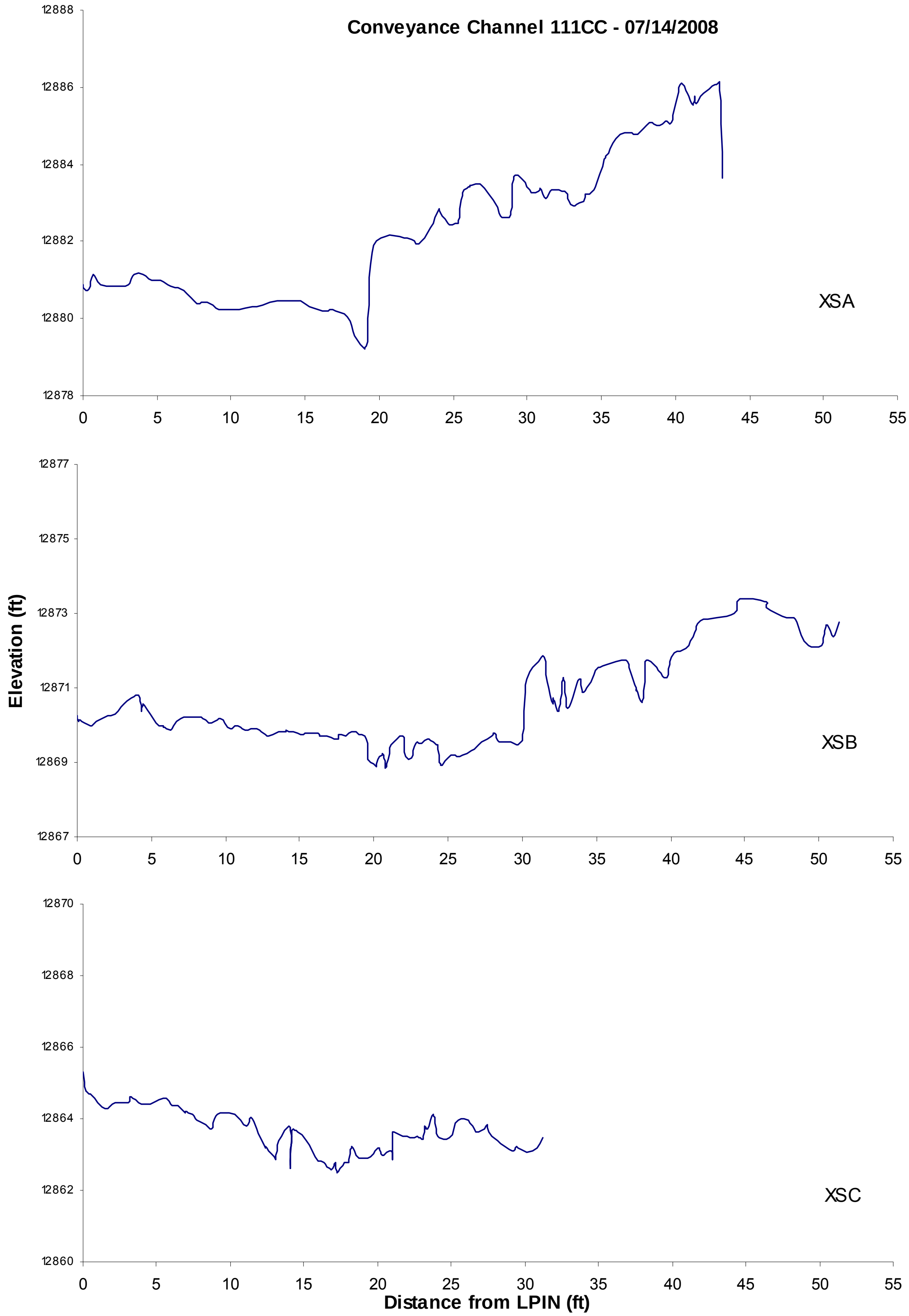

Conveyance Channel 097CC - 08/04/2008
Elevation (ft)
XSA
XSB
XSC
Distance from LPIN (ft)
11809
11808
11807
11806
11805
11804
11803
11802
11799
11798
11797
11796
11795
11794
11793
11792
11794
11793
11792
11791
11790
11789
11788
11787
0
5
10
15
20
25
30
35
40
45

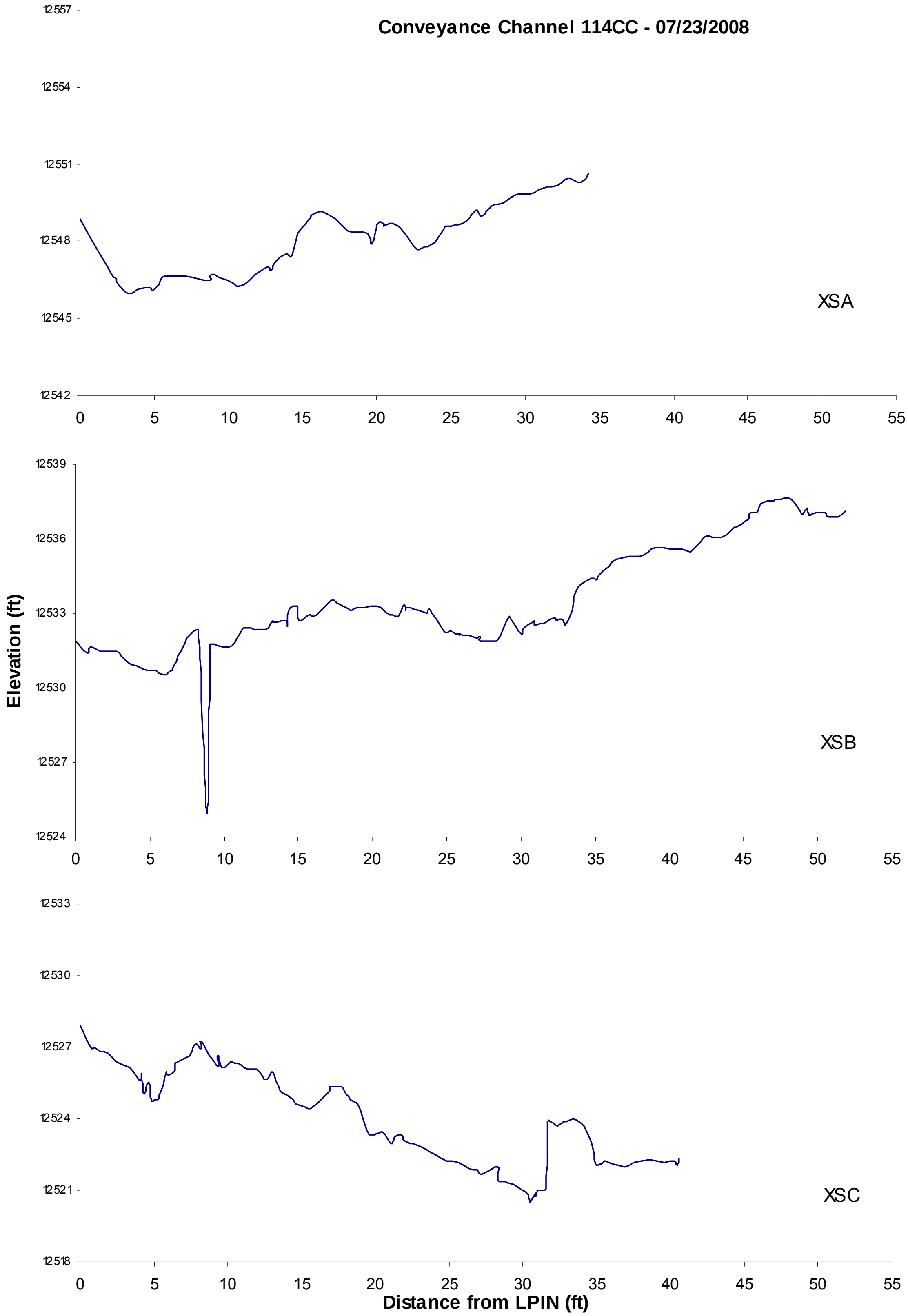

Conveyance Channel 099CC - 07/14/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)

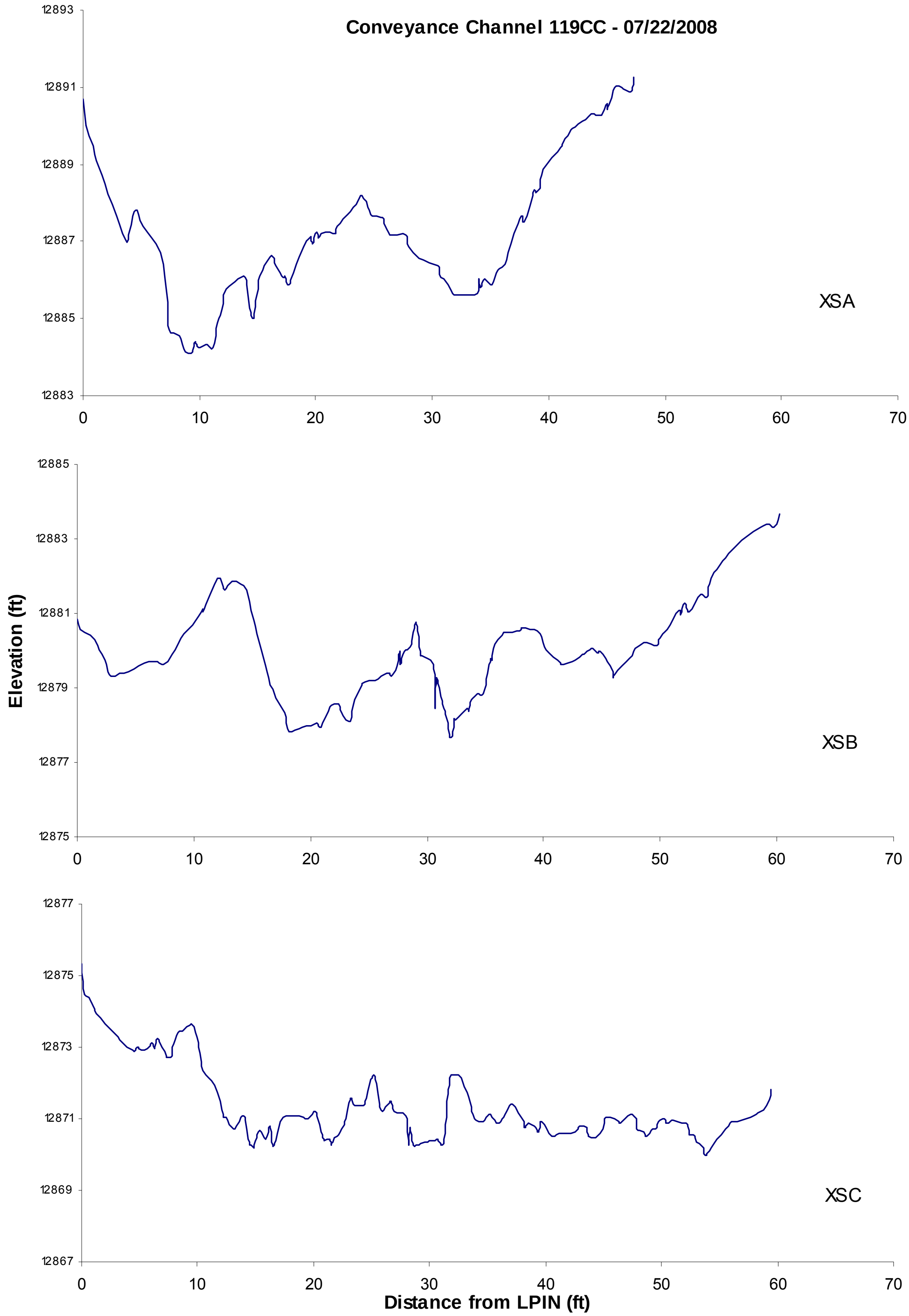


Conveyance Channel 104CC - 06/16/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
13088
13087
13086
13085
13084
13083
13082
13081
13080
13079
13078
13077
13076
13075
13074
13073
13072
13071
13070
13069
0
10
20
30
40
50
60

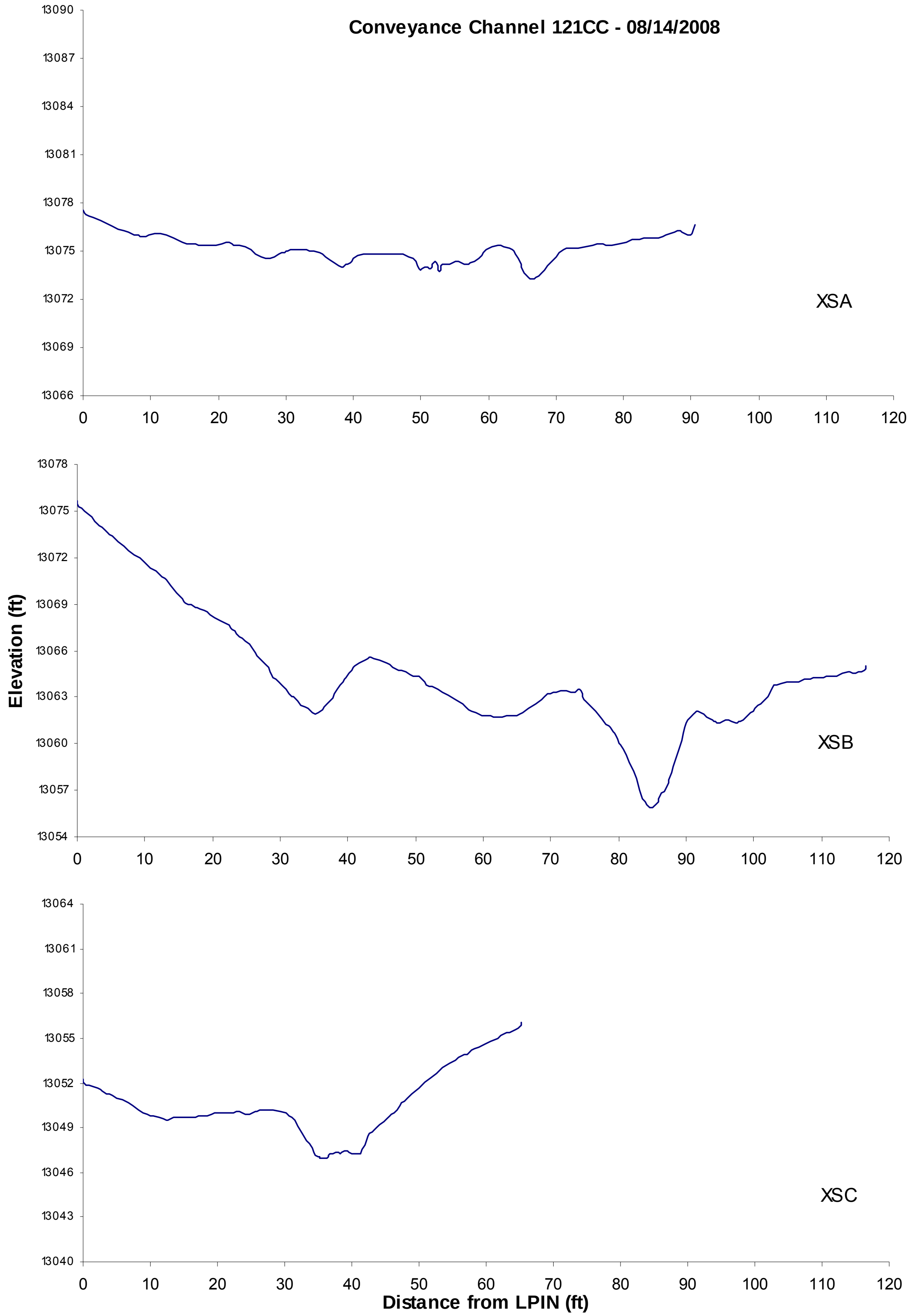

Conveyance Channel 108CC - 06/26/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
12798
12796
12794
12792
12790
12785
12783
12781
12779
12777
12772
12770
12768
12766
12764
0
5
10
15
20
25
30
35
40
45


Conveyance Channel 111CC - 07/14/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
12888
12886
12884
12882
12880
12878
12877
12875
12873
12871
12869
12867
12870
12868
12866
12864
12862
12860
0
5
10
15
20
25
30
35
40
45
50
55

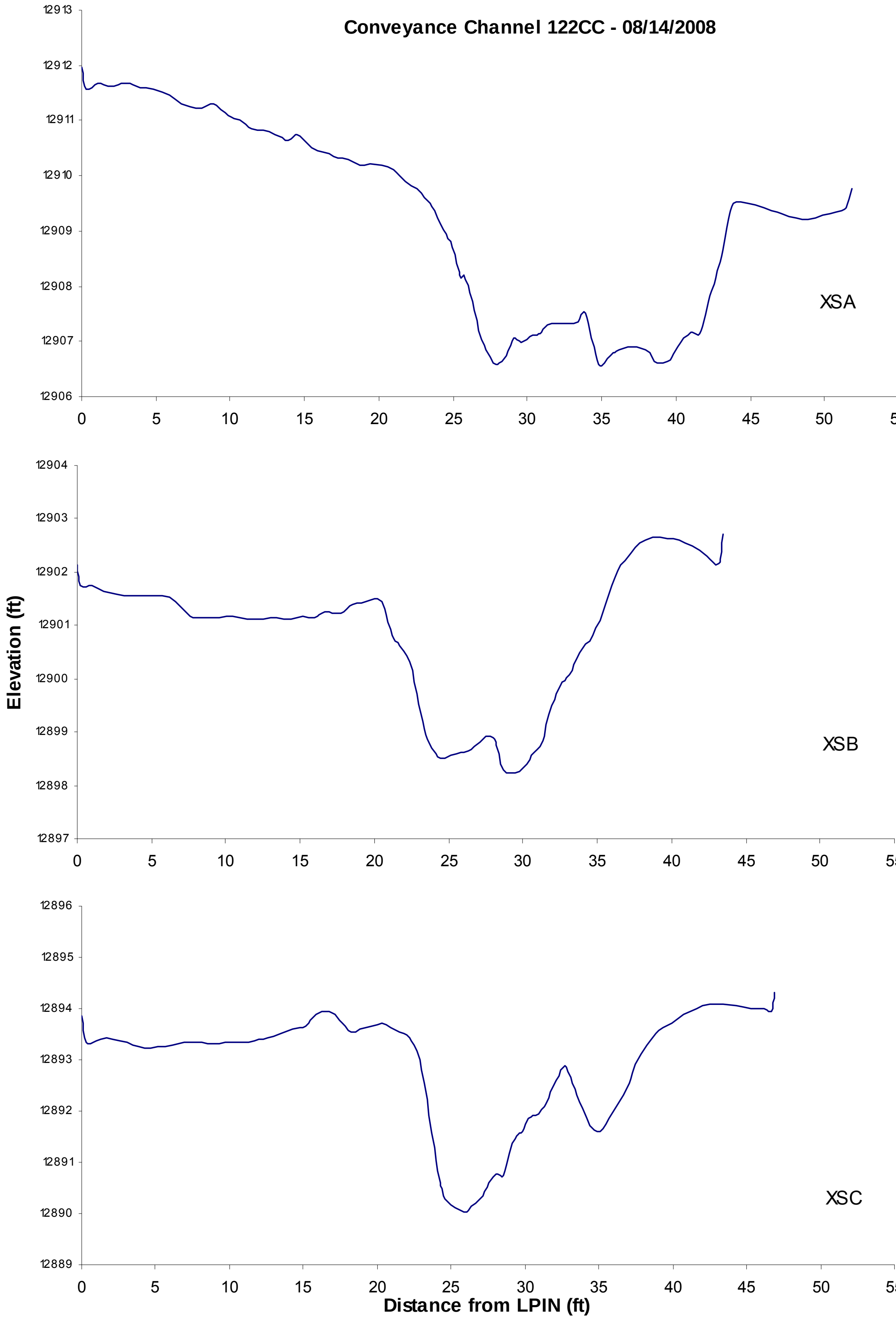

Conveyance Channel 114CC - 07/23/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12557
12554
12551
12548
12545
12542
12539
12536
12533
12530
12527
12524
12521
12518
0
5
10
15
20
25
30
35
40
45
50
55

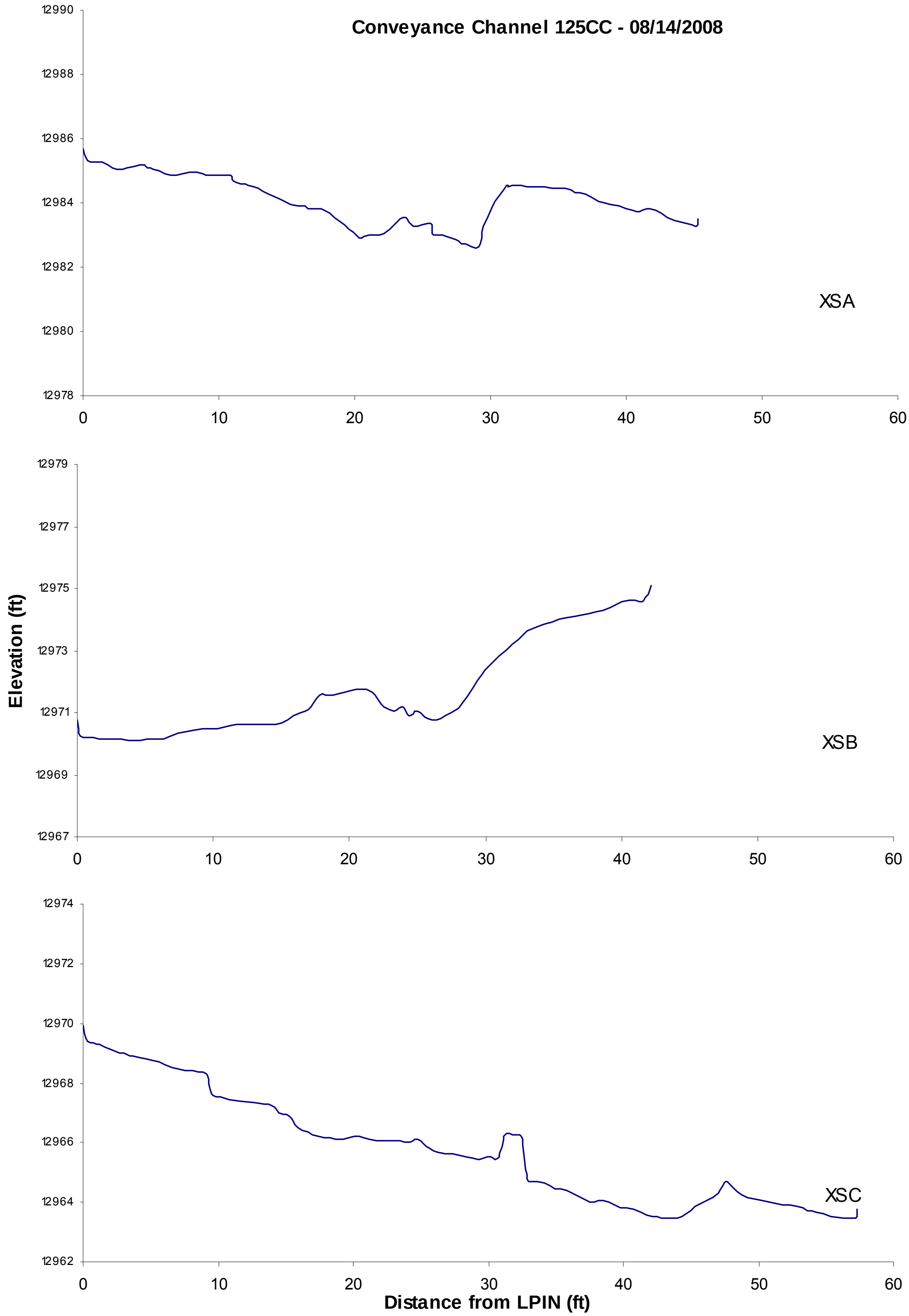

Conveyance Channel 119CC - 07/22/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12893
12891
12889
12887
12885
12883
12881
12879
12877
12875
12873
12871
12869
12867
0
10
20
30
40
50
60
70

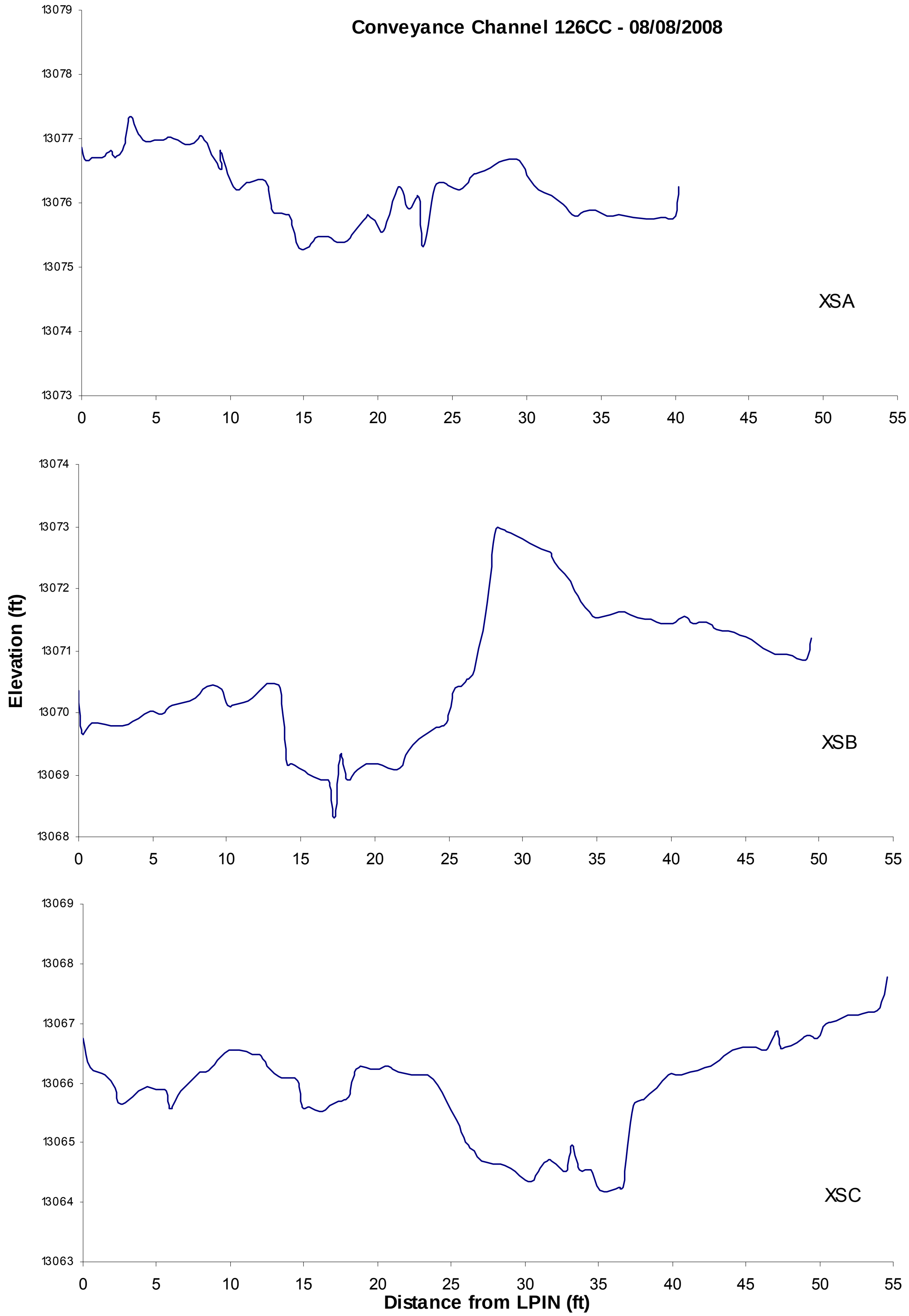
Conveyance Channel 120CC - 08/08/2008
12943
12942
12941
12940
12939
12938
12937
0
10
20
30
40
50
60
70
80
XSA
12939
12938
12937
12936
12935
12934
12933
XSB
12936
12935
12934
12933
12932
12931
12930
XSC
Elevation (ft)
Distance from LPIN (ft)



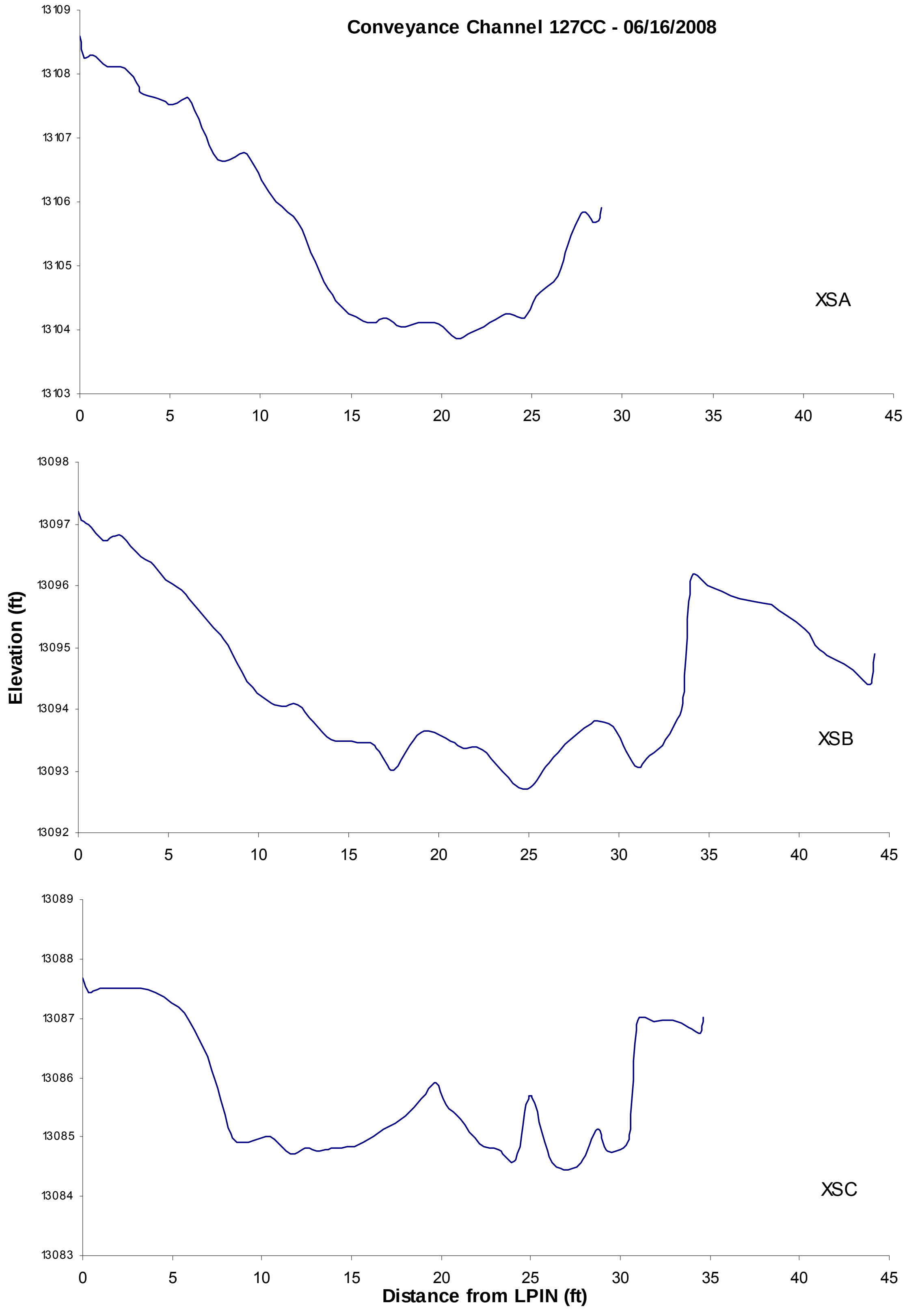
Conveyance Channel 121CC - 08/14/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)

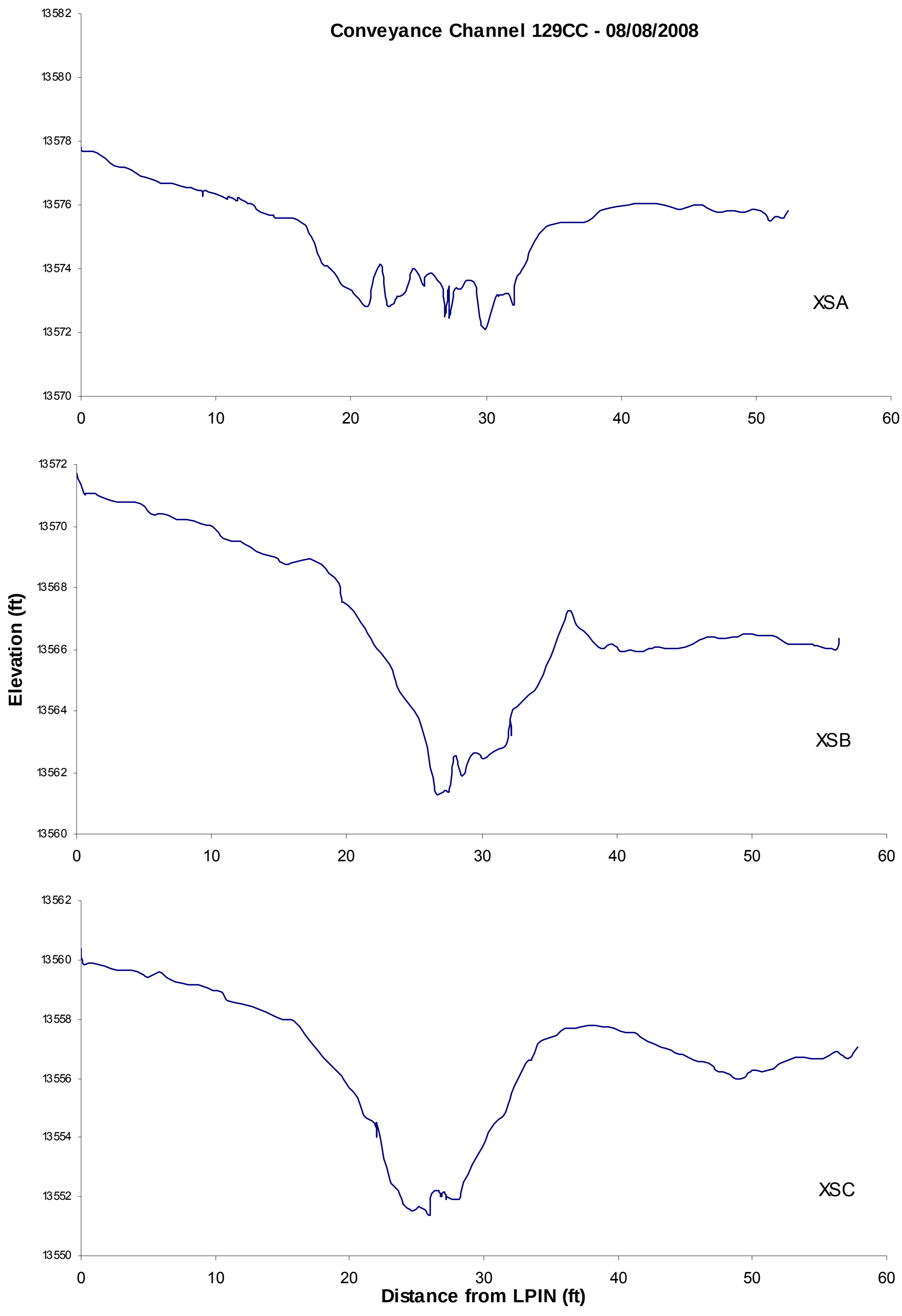

Conveyance Channel 122CC - 08/14/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
12913
12912
12911
12910
12909
12908
12907
12906
12904
12903
12902
12901
12900
12899
12898
12897
12896
12895
12894
12893
12892
12891
12890
12889
0
5
10
15
20
25
30
35
40
45
50
55


Conveyance Channel 125CC - 08/14/2008
Elevation (ft)
12990
12988
12986
12984
12982
12980
12978
XSA
12979
12977
12975
12973
12971
12969
12967
XSB
12974
12972
12970
12968
12966
12964
12962
XSC
0
10
20
30
40
50
60
Distance from LPIN (ft)

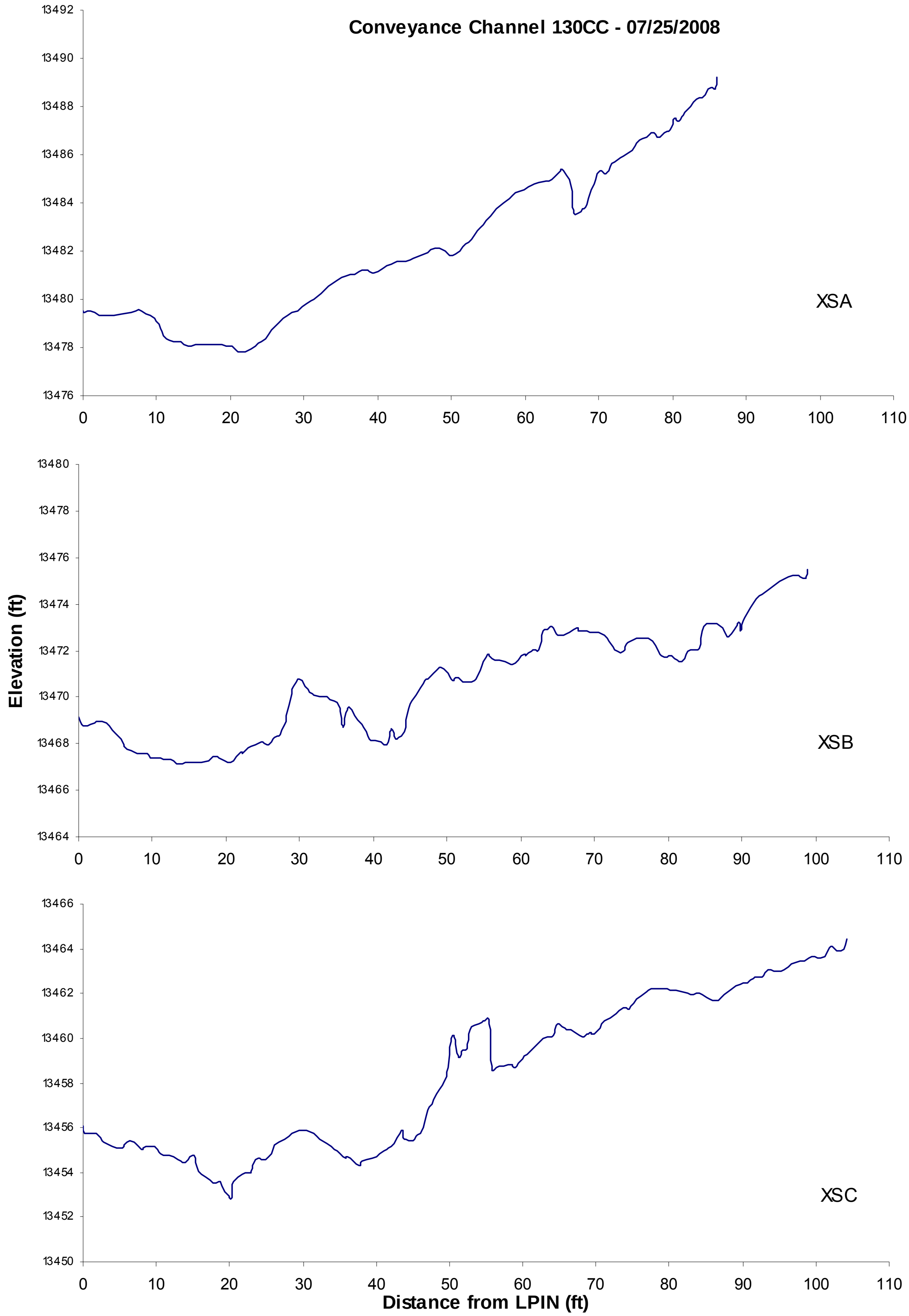


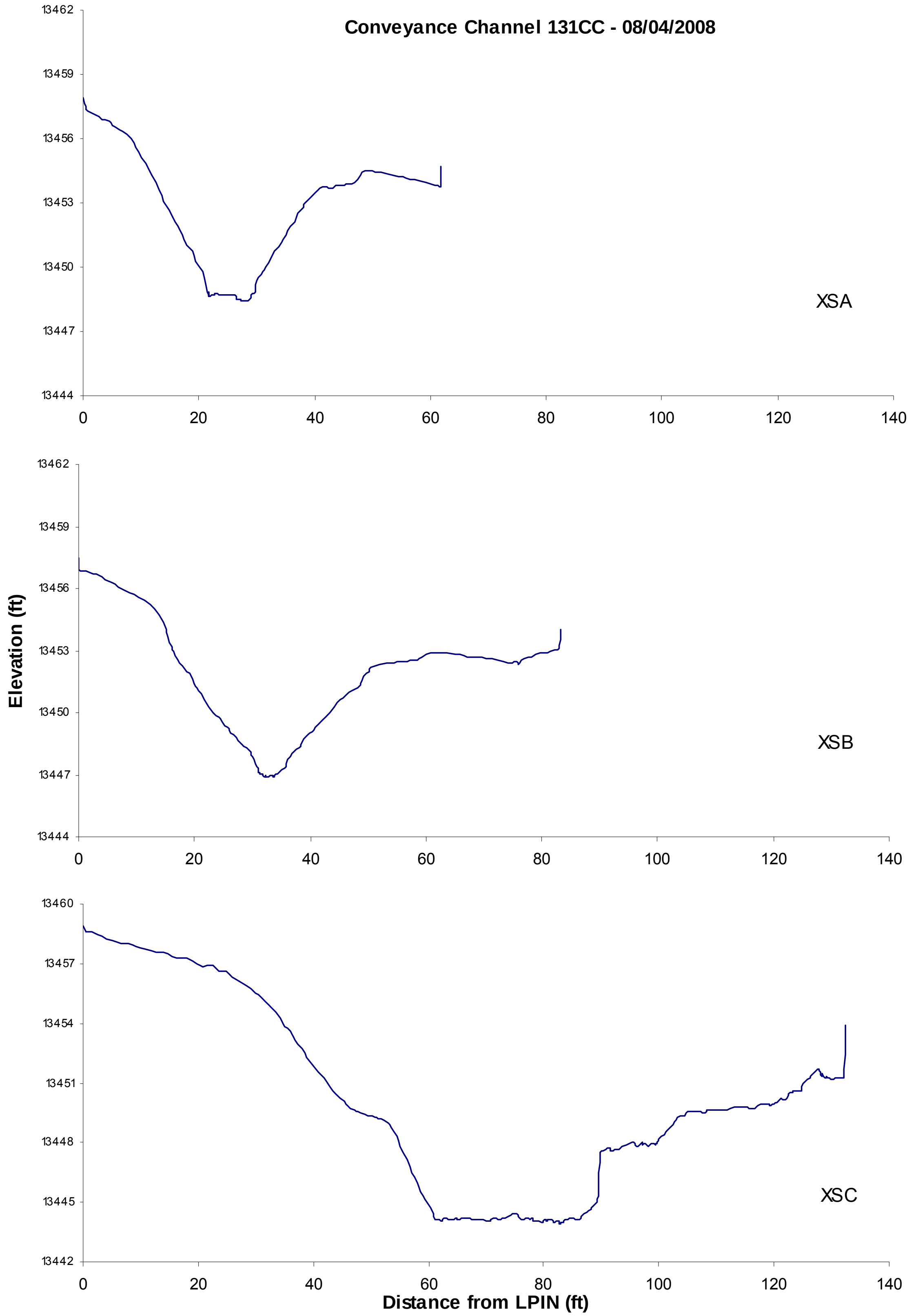
Conveyance Channel 126CC - 08/08/2008
13079
13078
13077
13076
13075
13074
13073
0 5 10 15 20 25 30 35 40 45 50 55
XSA
13074
13073
13072
13071
13070
13069
13068
0 5 10 15 20 25 30 35 40 45 50 55
XSB
Elevation (ft)
13069
13068
13067
13066
13065
13064
13063
0 5 10 15 20 25 30 35 40 45 50 55
XSC
Distance from LPIN (ft)


Conveyance Channel 127CC - 06/16/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13109
13108
13107
13106
13105
13104
13103
13098
13097
13096
13095
13094
13093
13092
13089
13088
13087
13086
13085
13084
13083
0
5
10
15
20
25
30
35
40
45

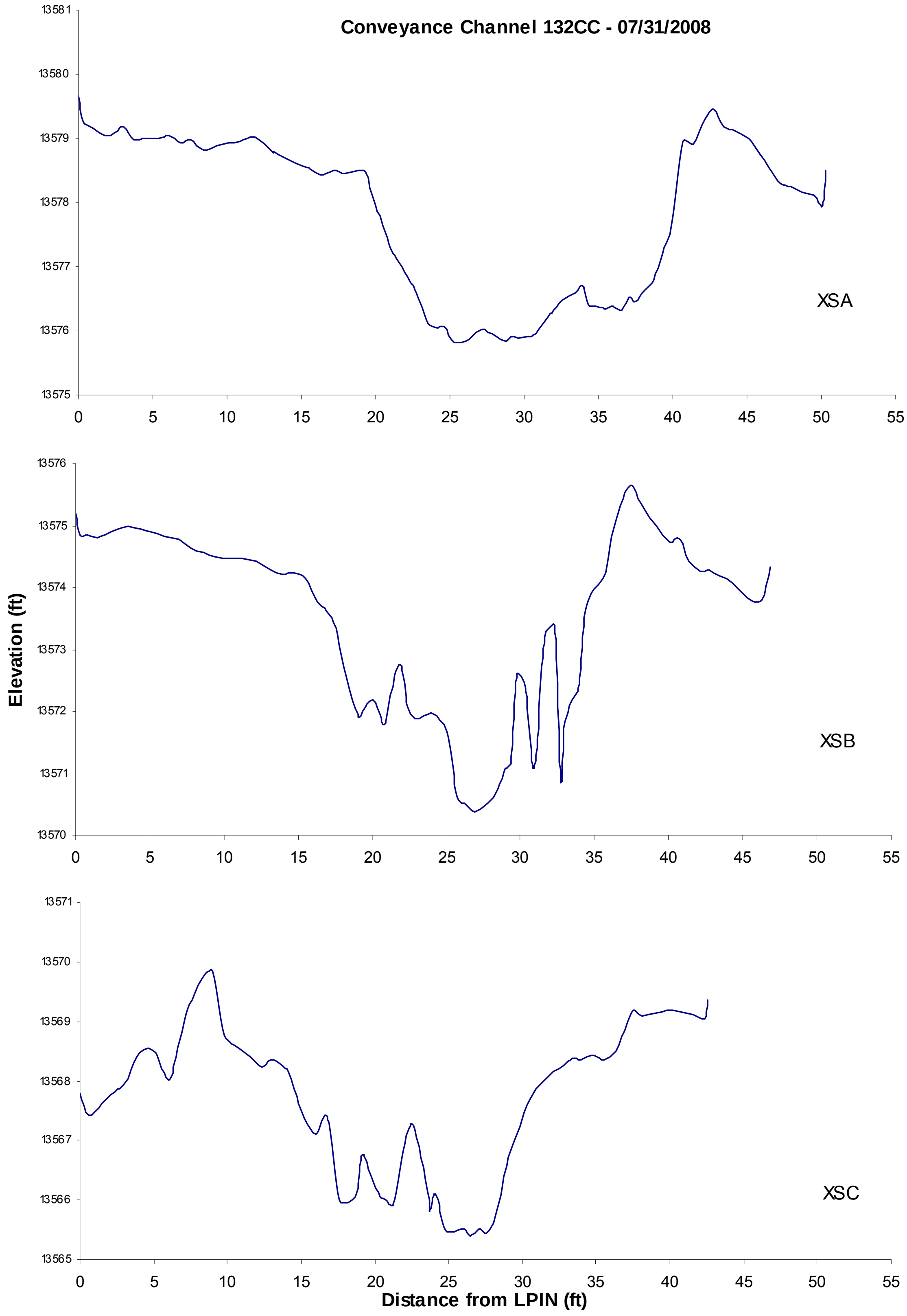


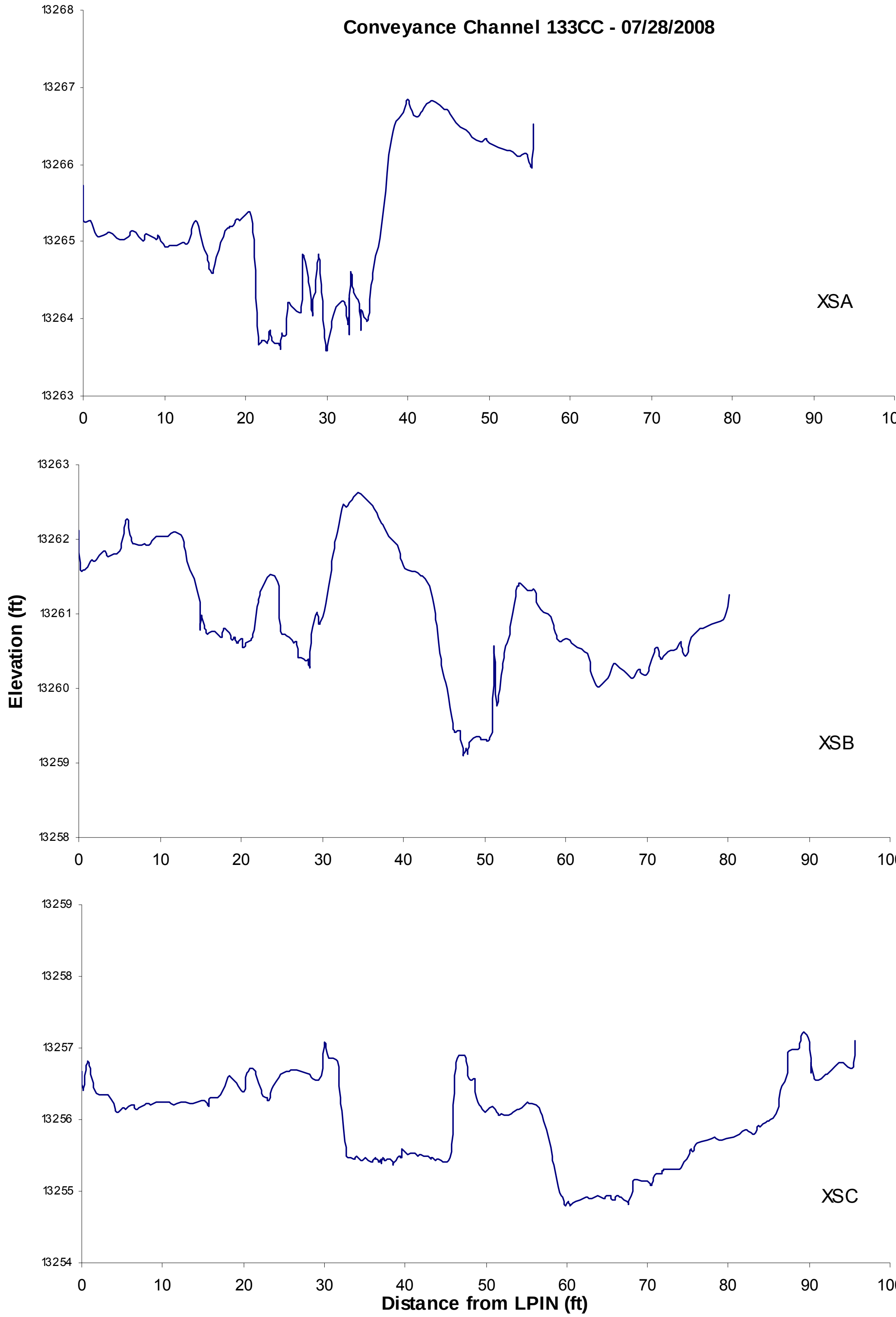
Conveyance Channel 129CC - 08/08/2008
Elevation (ft)
XSA
XSB
XSC
Distance from LPIN (ft)
13582
13580
13578
13576
13574
13572
13570
13568
13566
13564
13562
13560
13558
13556
13554
13552
13550
0
10
20
30
40
50
60

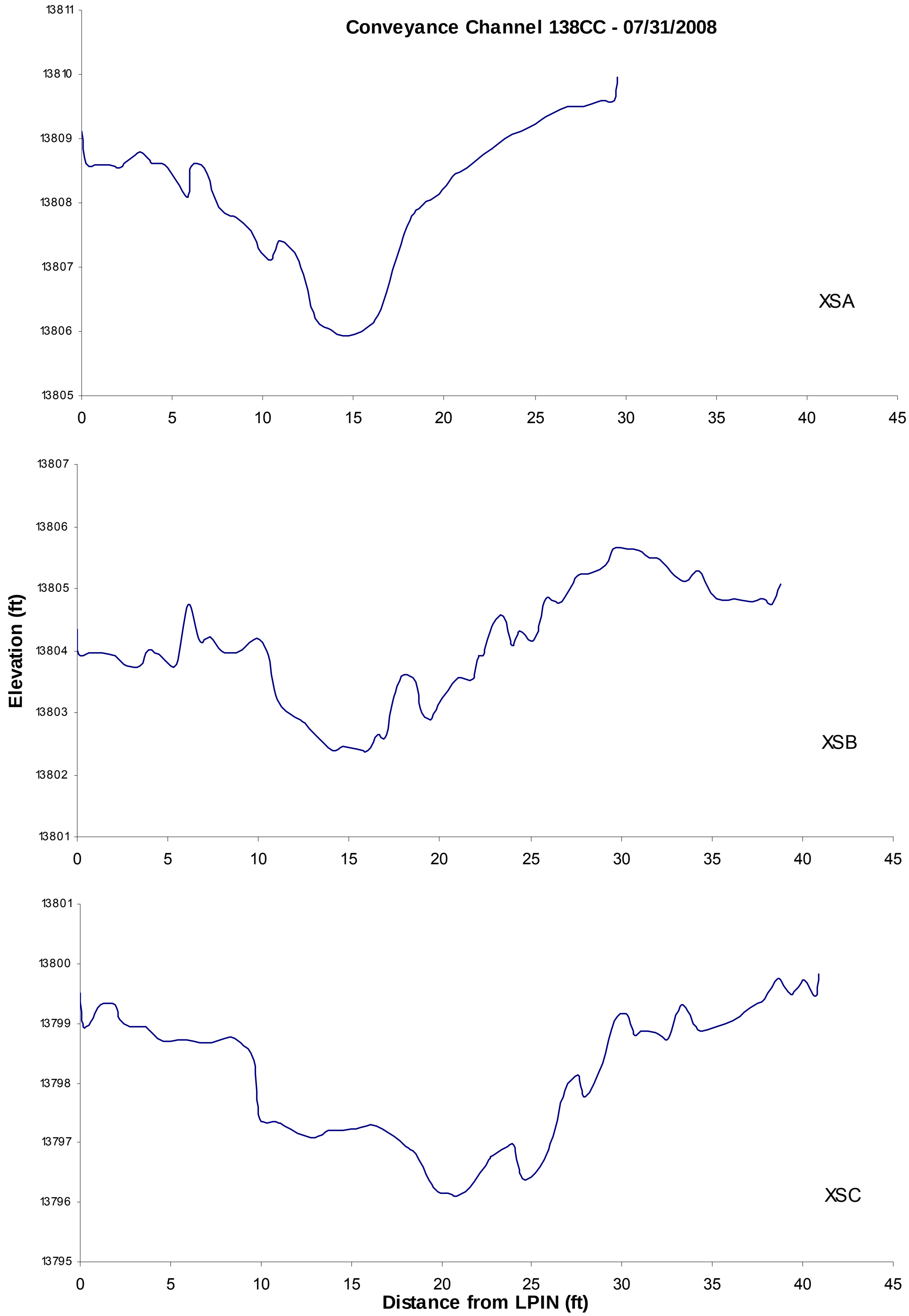

Conveyance Channel 130CC - 07/25/2008
Elevation (ft)
XSA
XSB
XSC
Distance from LPIN (ft)

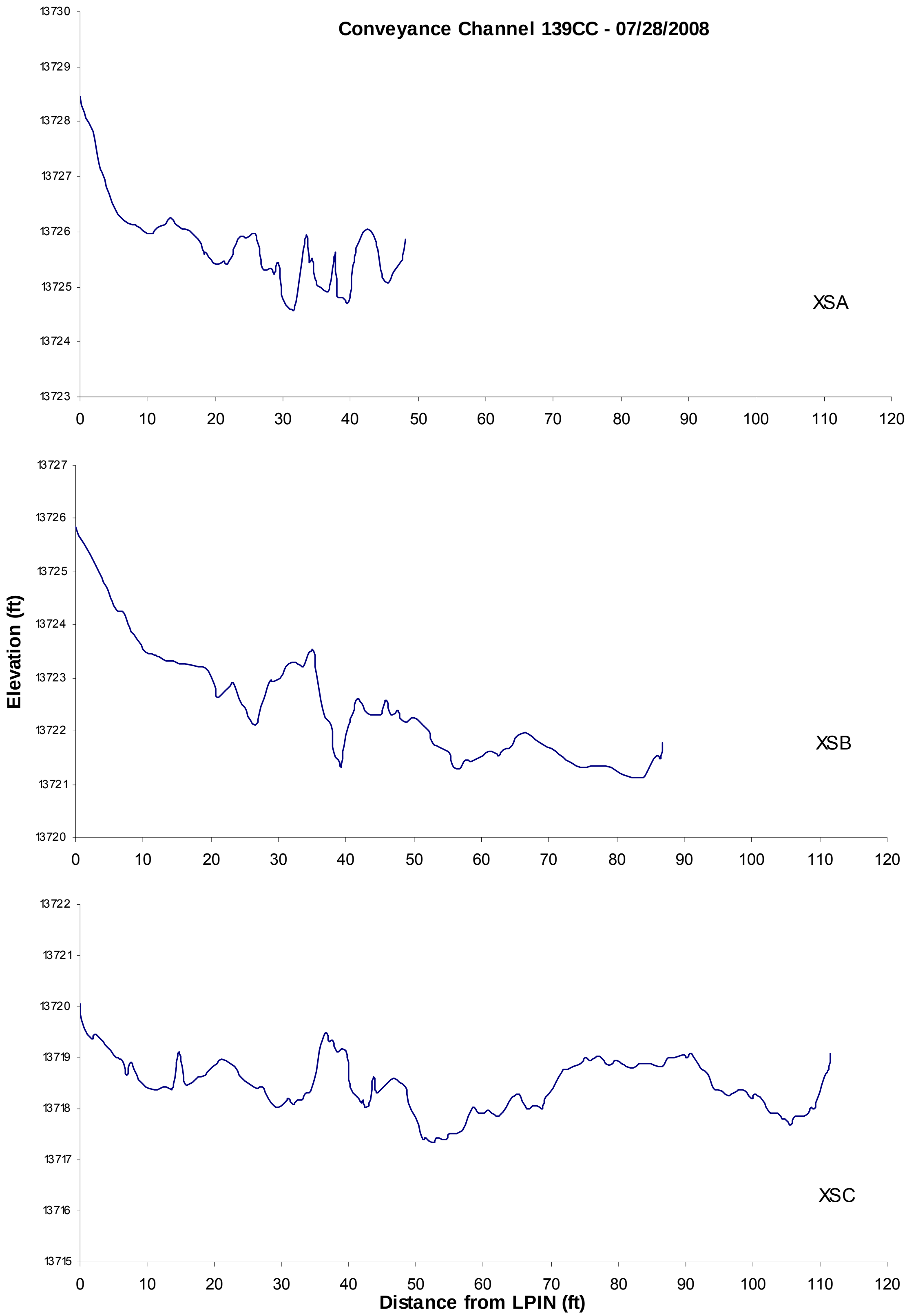


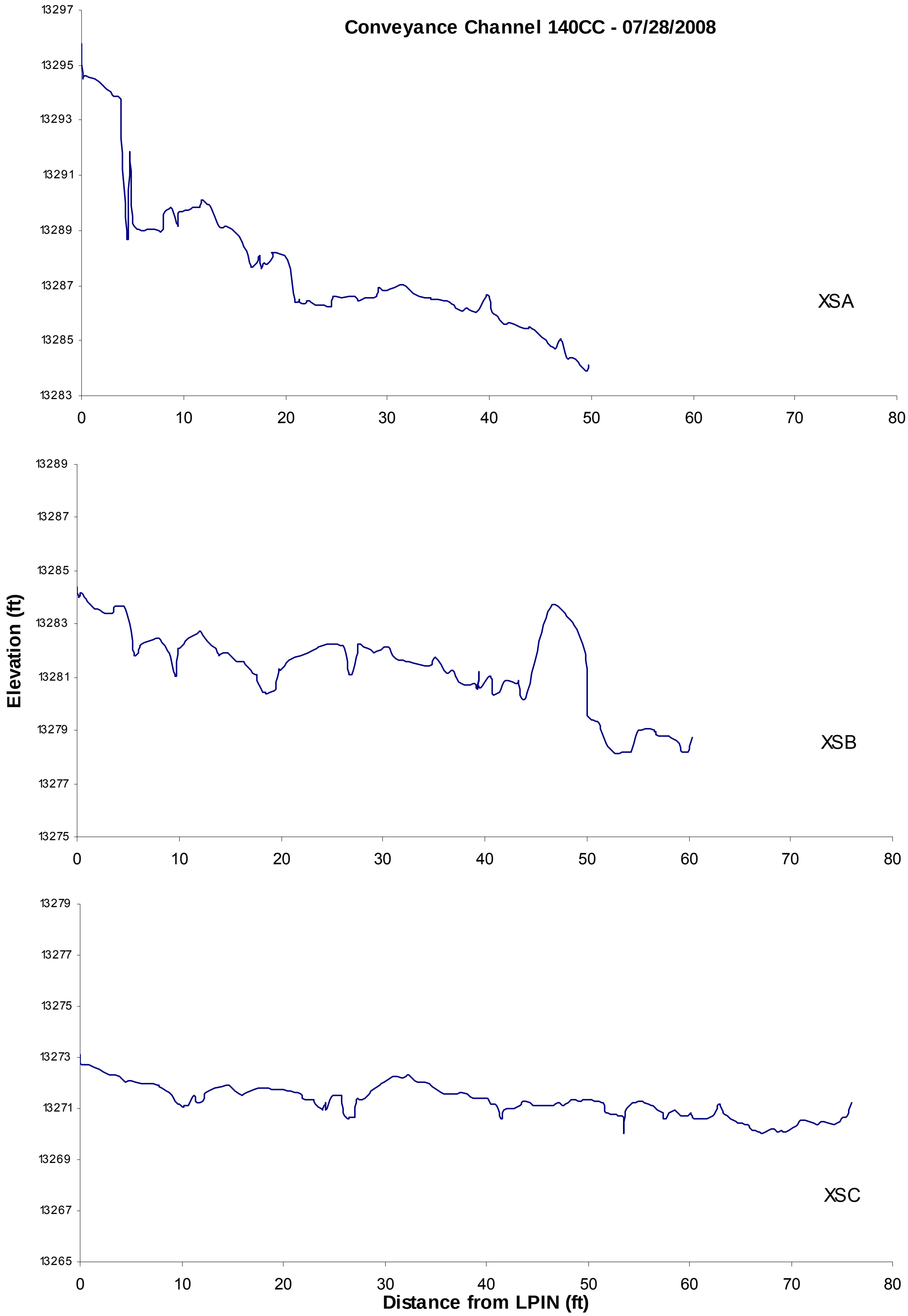
Conveyance Channel 131CC - 08/04/2008
Elevation (ft)
13462
13459
13456
13453
13450
13447
13444
0
20
40
60
80
100
120
140
XSA
XSB
13460
13457
13454
13451
13448
13445
13442
XSC
Distance from LPIN (ft)

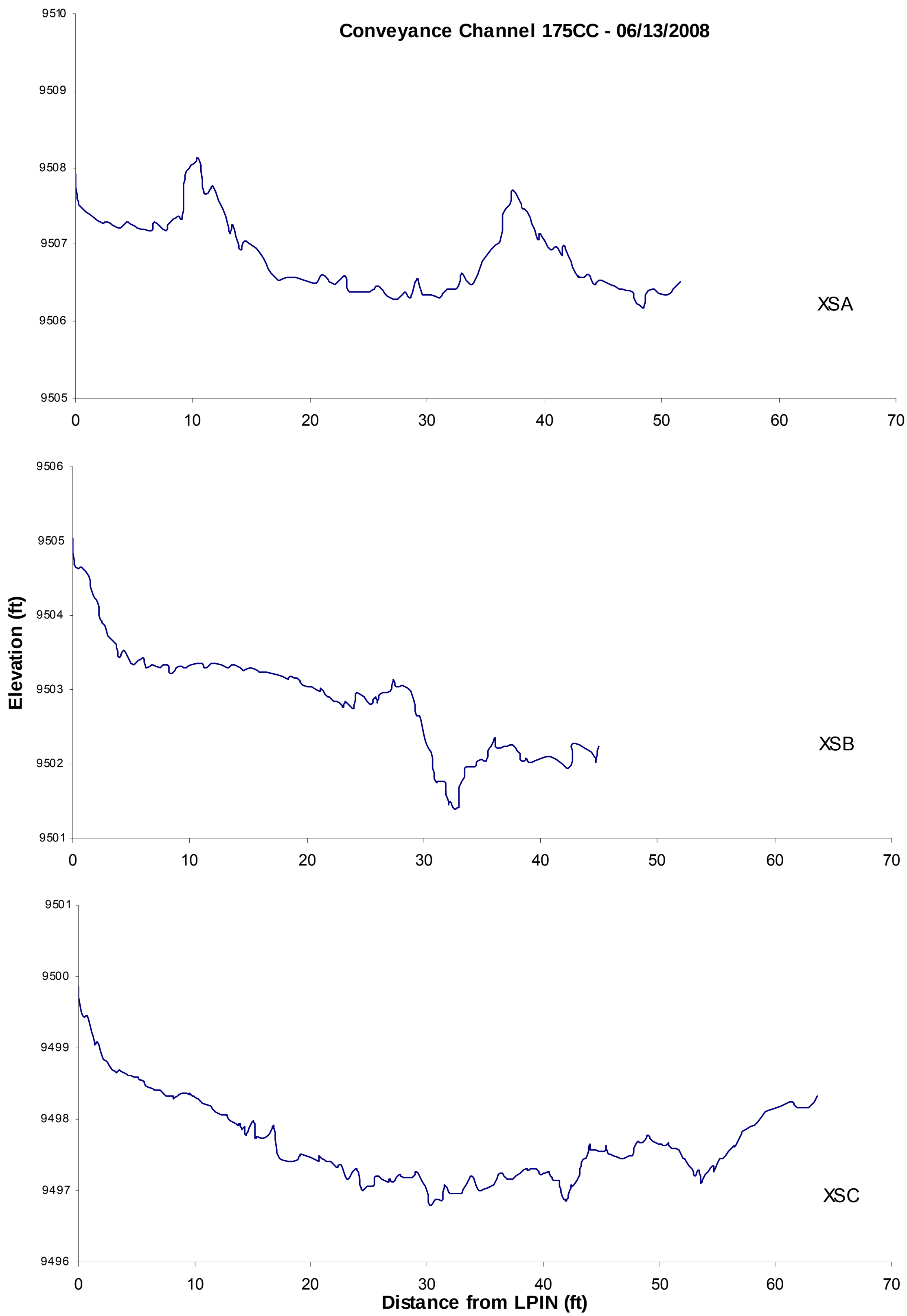

Conveyance Channel 132CC - 07/31/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13581
13580
13579
13578
13577
13576
13575
13574
13573
13572
13571
13570
13569
13568
13567
13566
13565
0
5
10
15
20
25
30
35
40
45
50
55

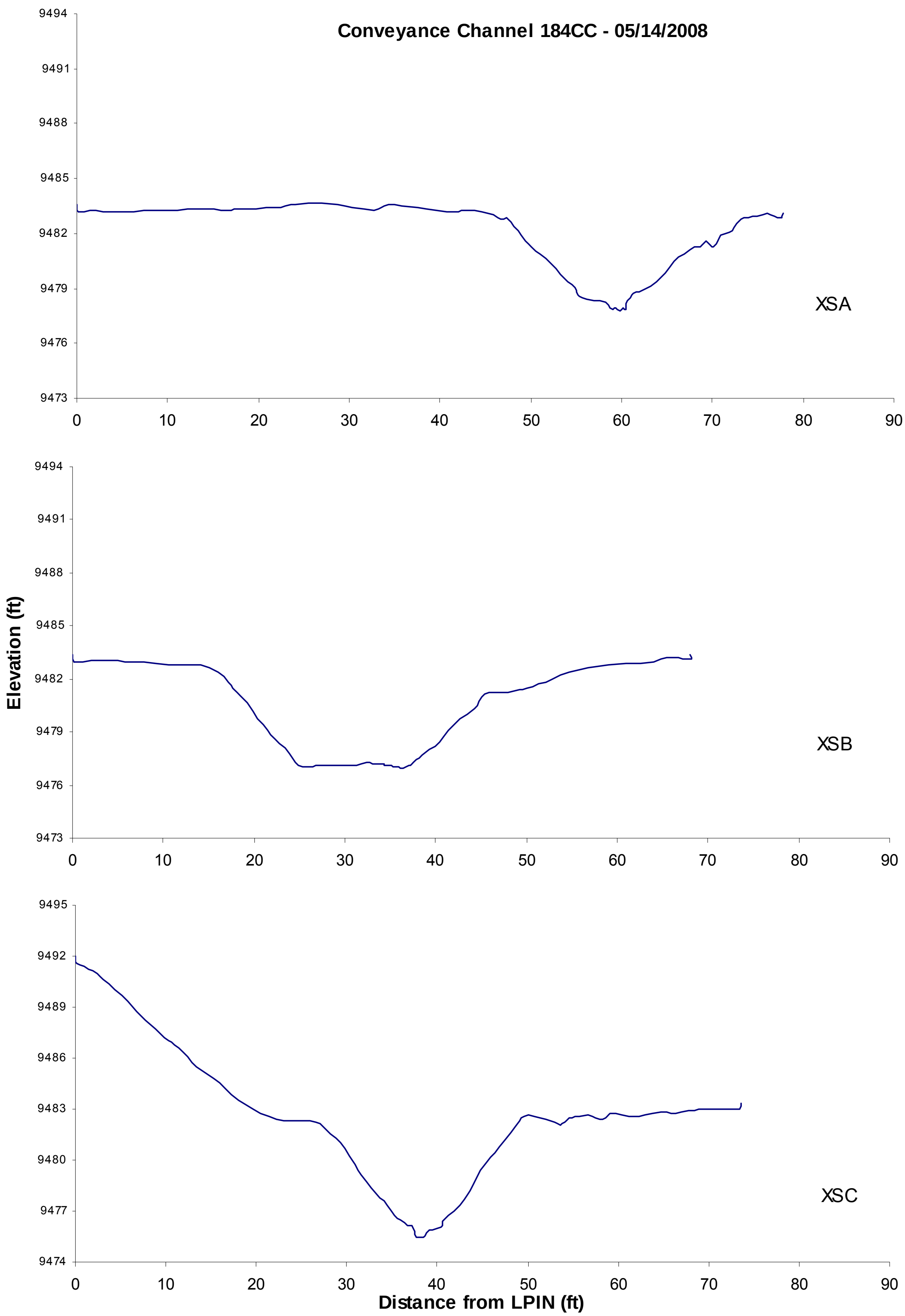

Conveyance Channel 133CC - 07/28/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
13268
13267
13266
13265
13264
13263
13262
13261
13260
13259
13258
13257
13256
13255
13254
0
10
20
30
40
50
60
70
80
90
100

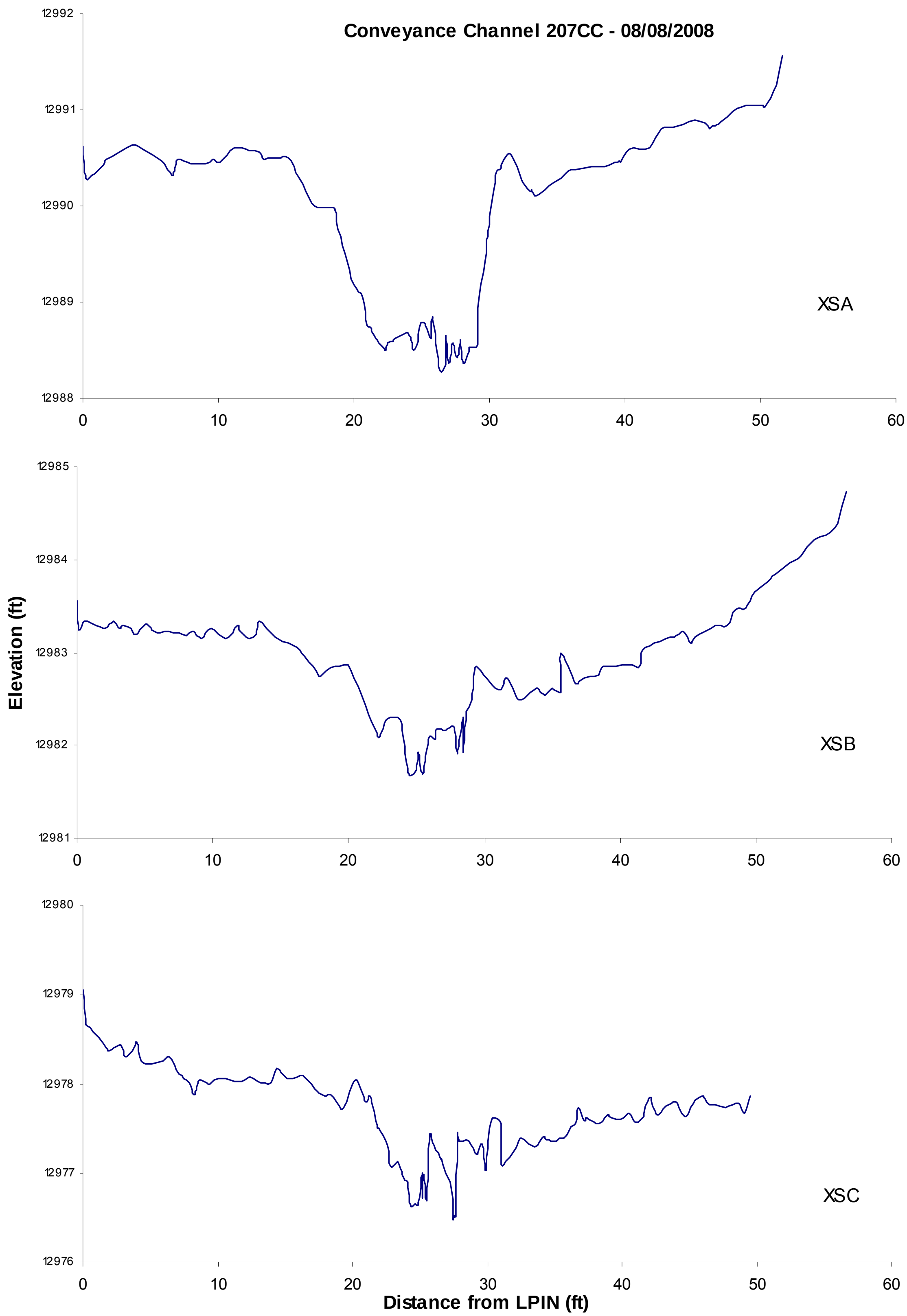

Conveyance Channel 138CC - 07/31/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
13811
13810
13809
13808
13807
13806
13805
13804
13803
13802
13801
13800
13799
13798
13797
13796
13795
0
5
10
15
20
25
30
35
40
45


Conveyance Channel 139CC - 07/28/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
13730
13729
13728
13727
13726
13725
13724
13723
13722
13721
13720
13719
13718
13717
13716
13715
0
10
20
30
40
50
60
70
80
90
100
110
120

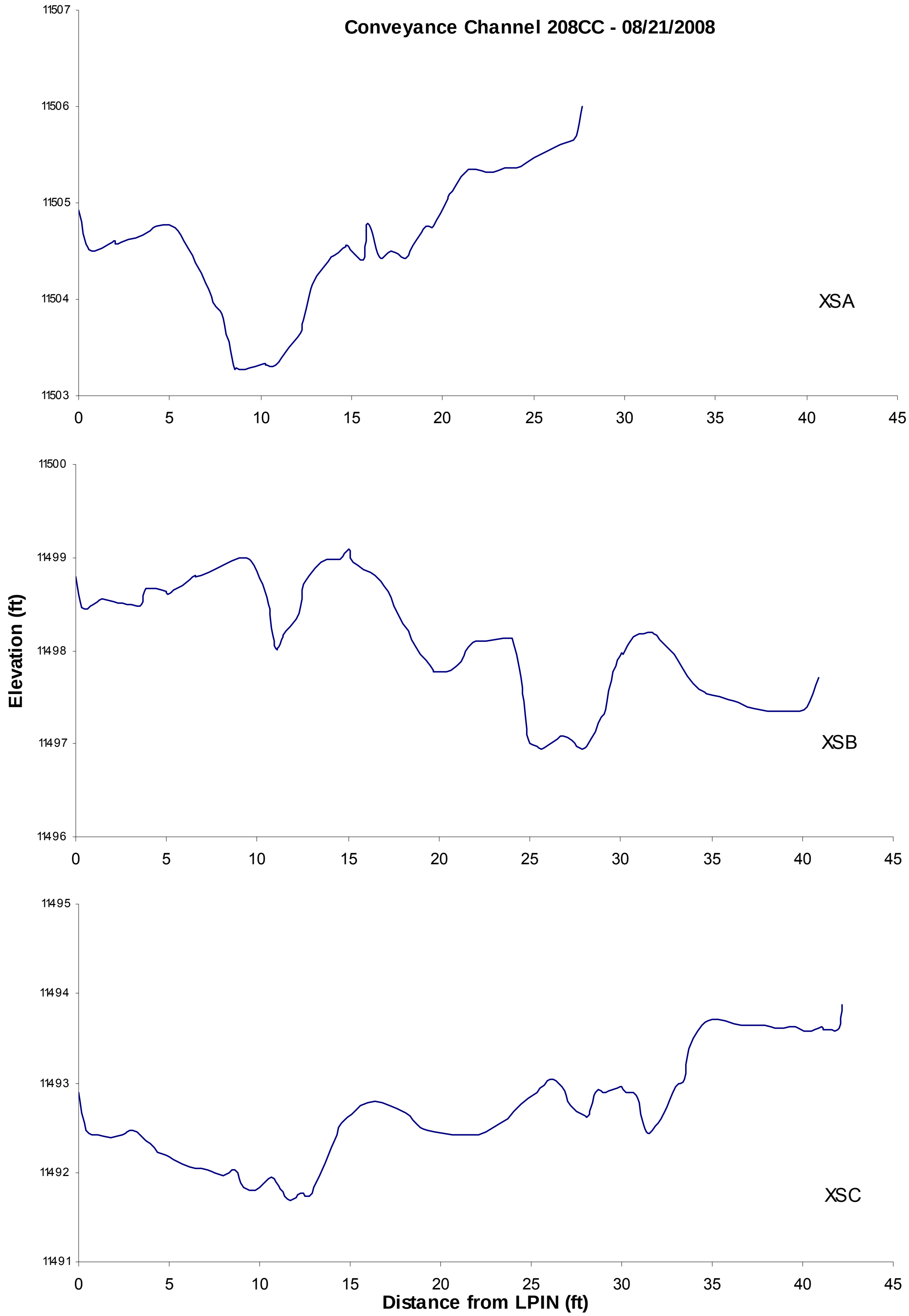

Conveyance Channel 140CC - 07/28/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)


Conveyance Channel 175CC - 06/13/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9510
9509
9508
9507
9506
9505
9504
9503
9502
9501
9500
9499
9498
9497
9496
0
10
20
30
40
50
60
70

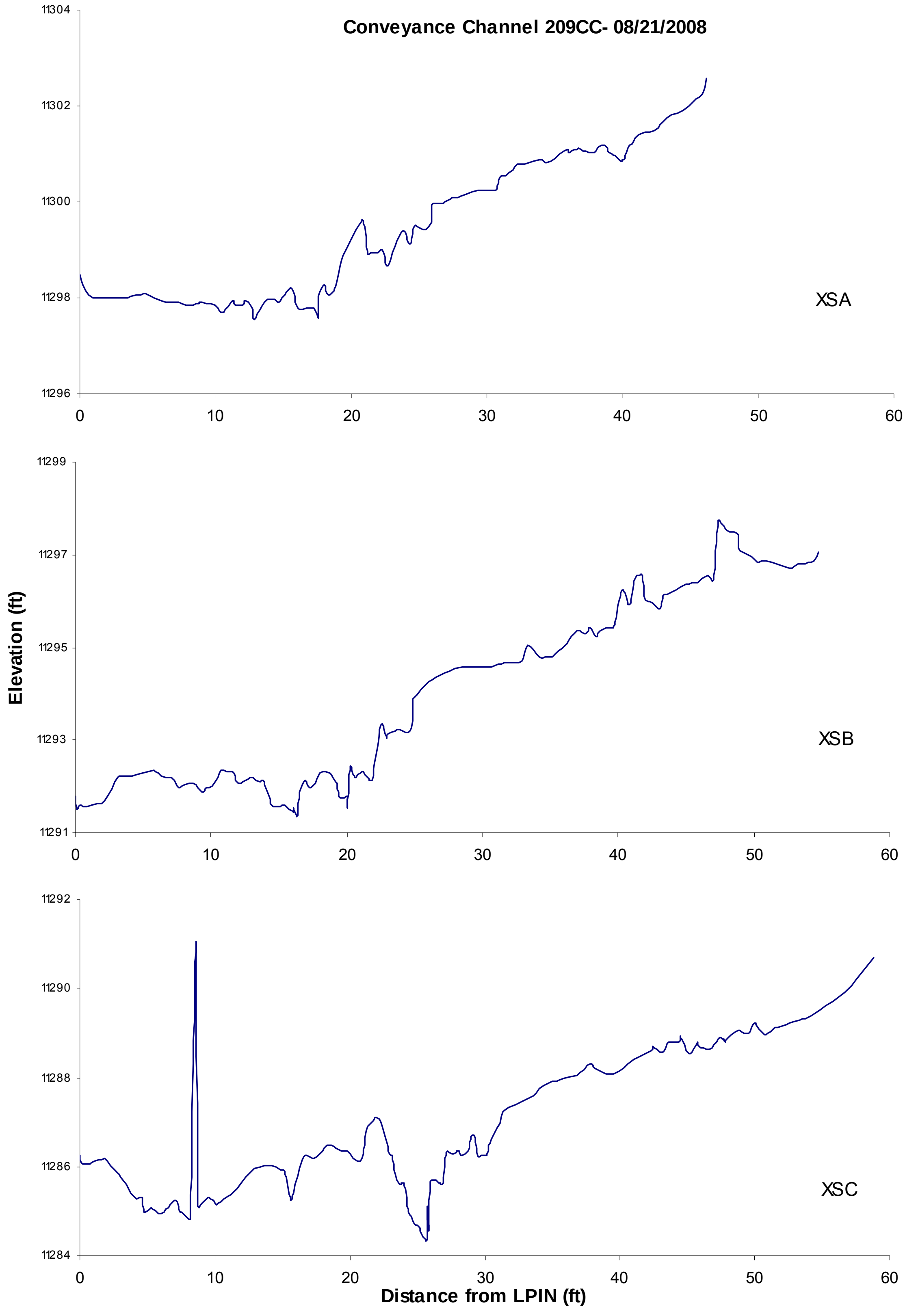

Conveyance Channel 184CC - 05/14/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9494
9491
9488
9485
9482
9479
9476
9473
9495
9492
9489
9486
9483
9480
9477
9474
0
10
20
30
40
50
60
70
80
90

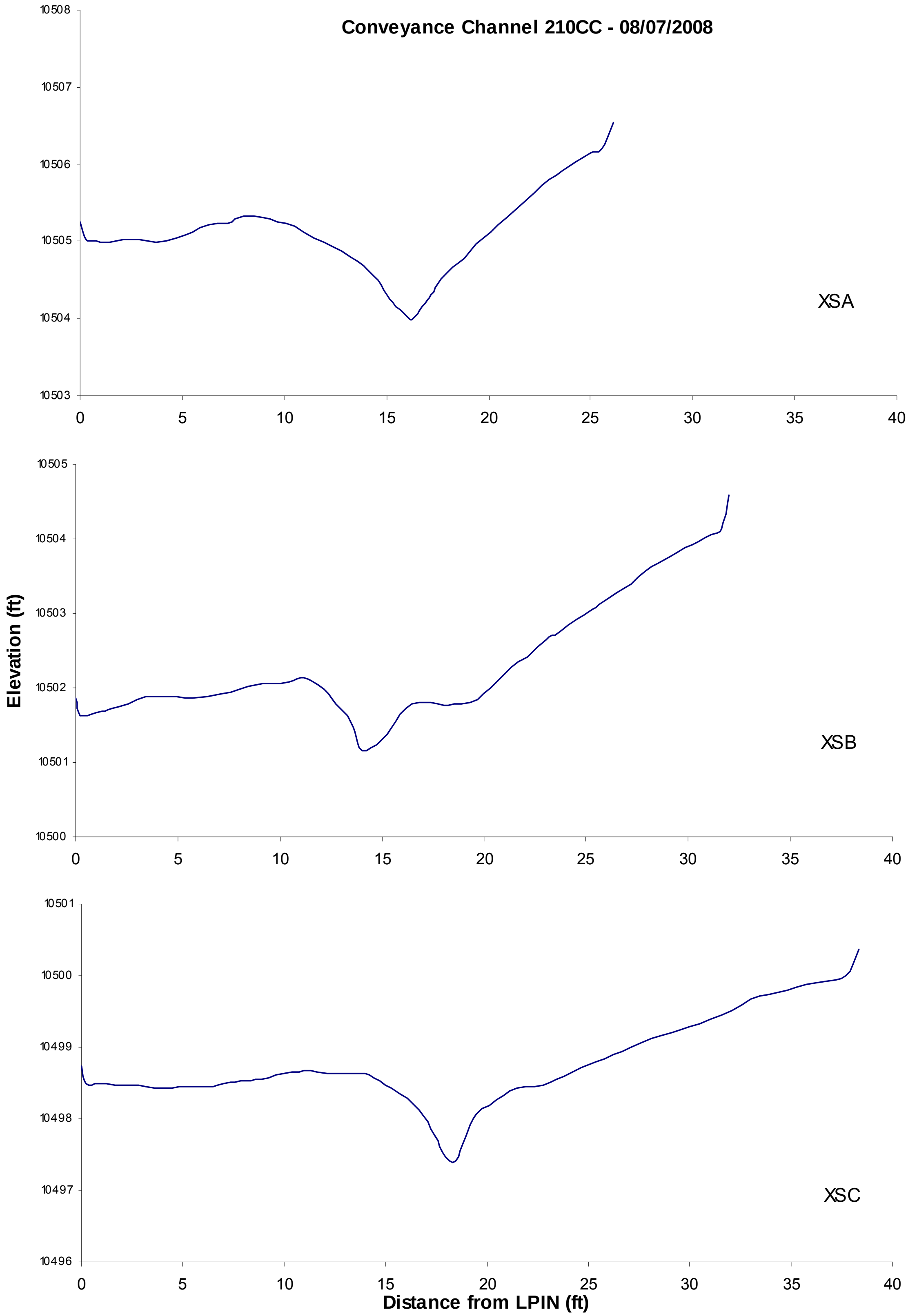


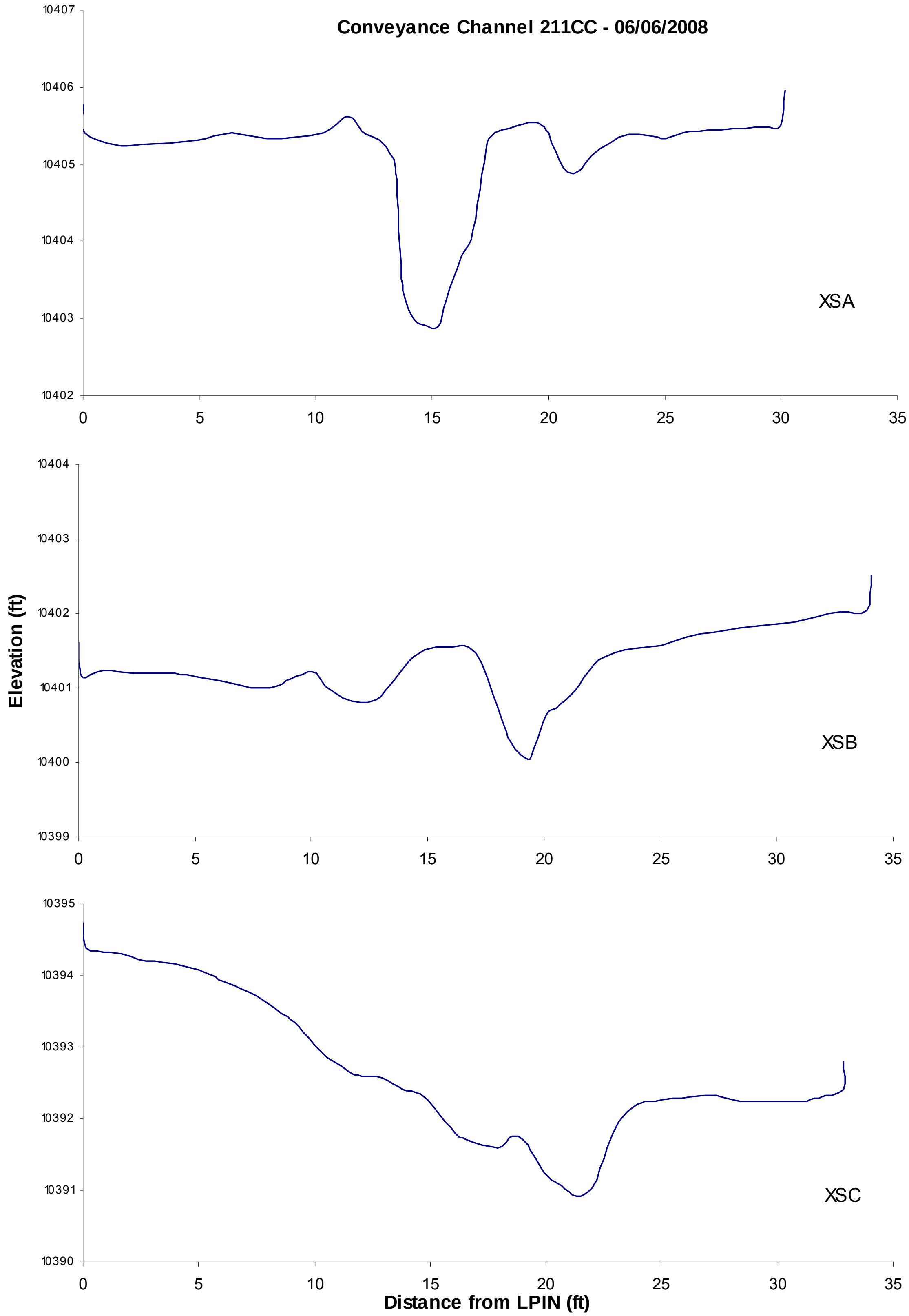
Conveyance Channel 207CC - 08/08/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
12992
12991
12990
12989
12988
12985
12984
12983
12982
12981
12980
12979
12978
12977
12976
0
10
20
30
40
50
60

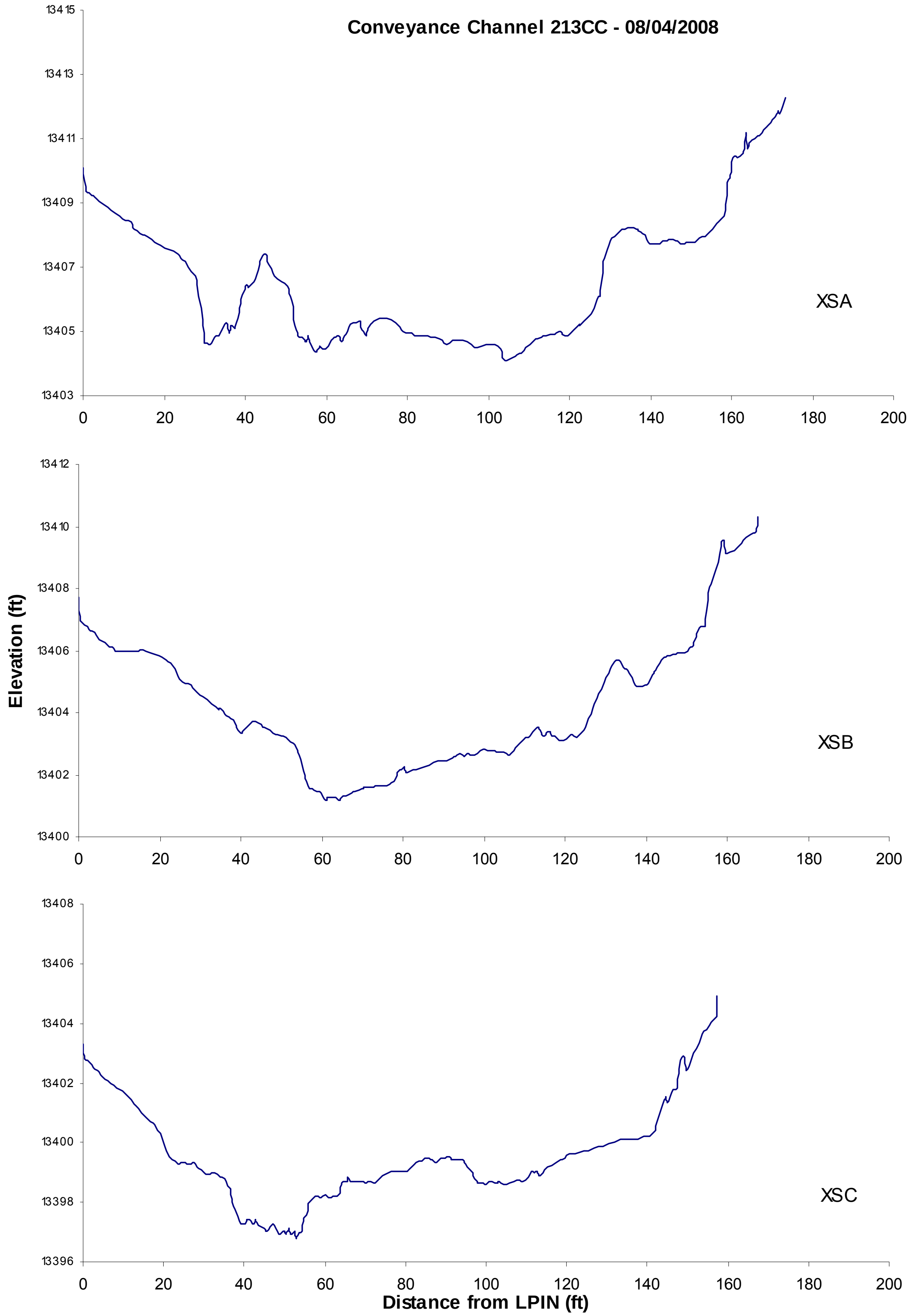


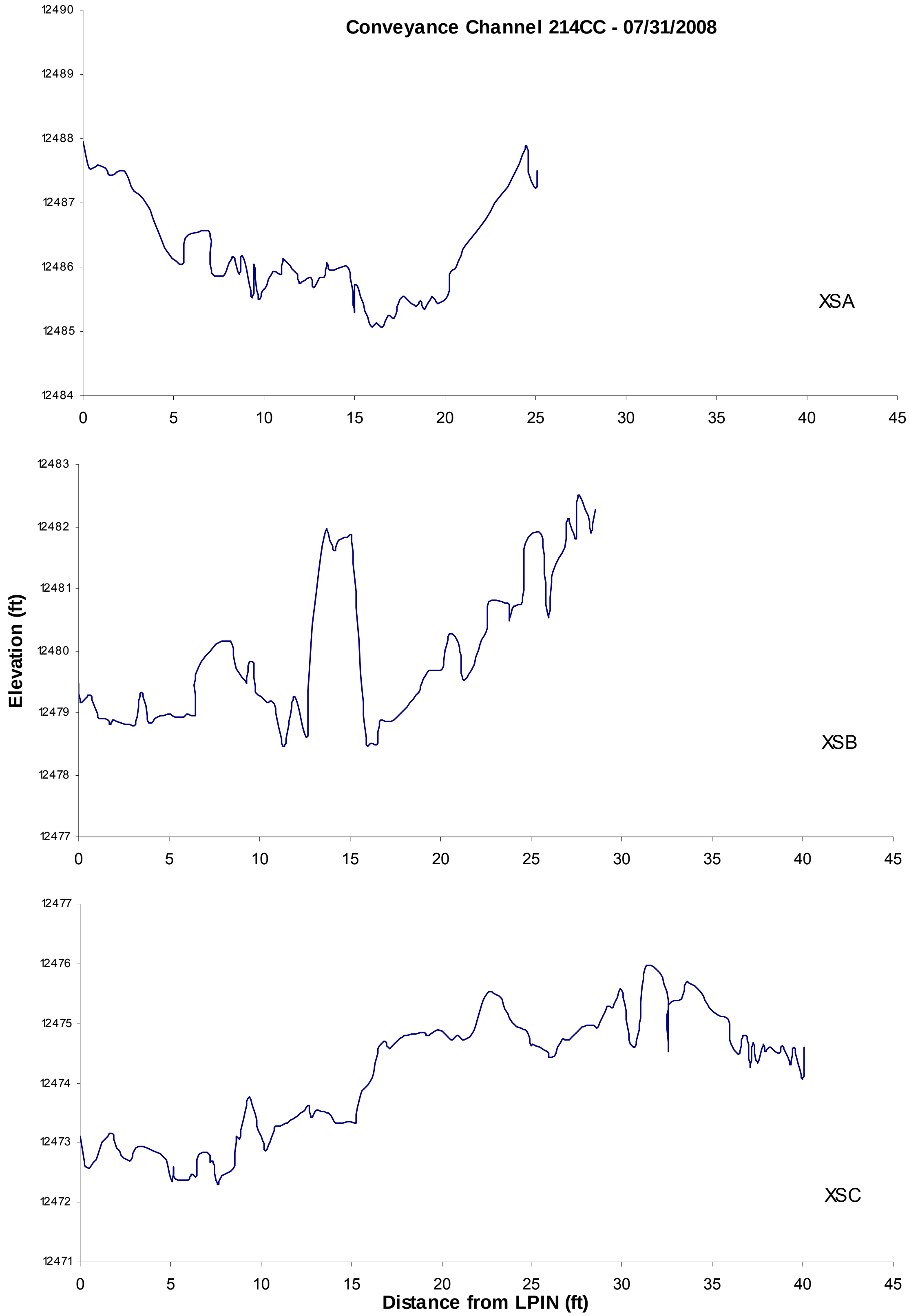
Conveyance Channel 208CC - 08/21/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
11507
11506
11505
11504
11503
11500
11499
11498
11497
11496
11495
11494
11493
11492
11491
0
5
10
15
20
25
30
35
40
45

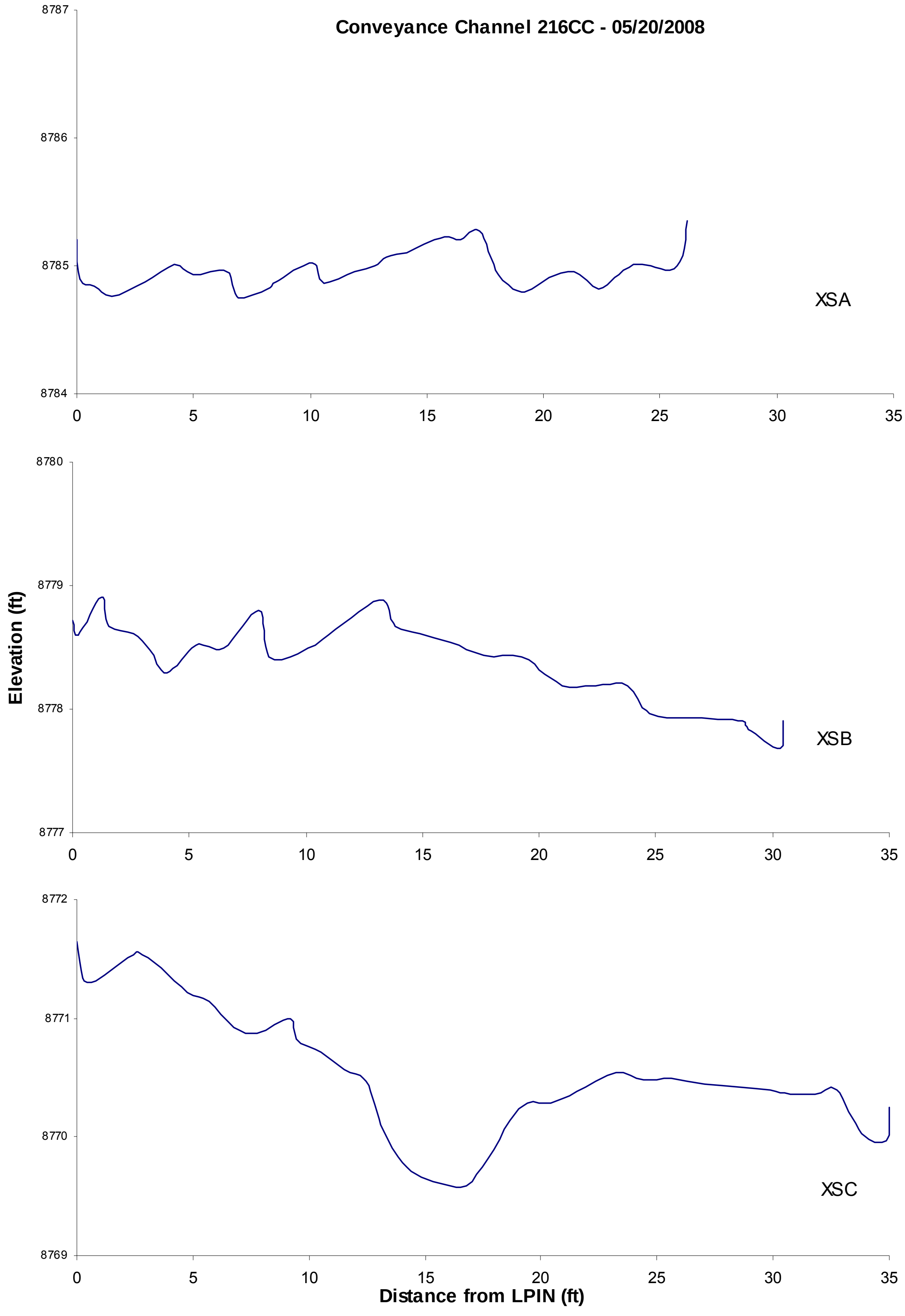

Conveyance Channel 209CC- 08/21/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
11304
11302
11300
11298
11296
11299
11297
11295
11293
11291
11292
11290
11288
11286
11284
0
10
20
30
40
50
60

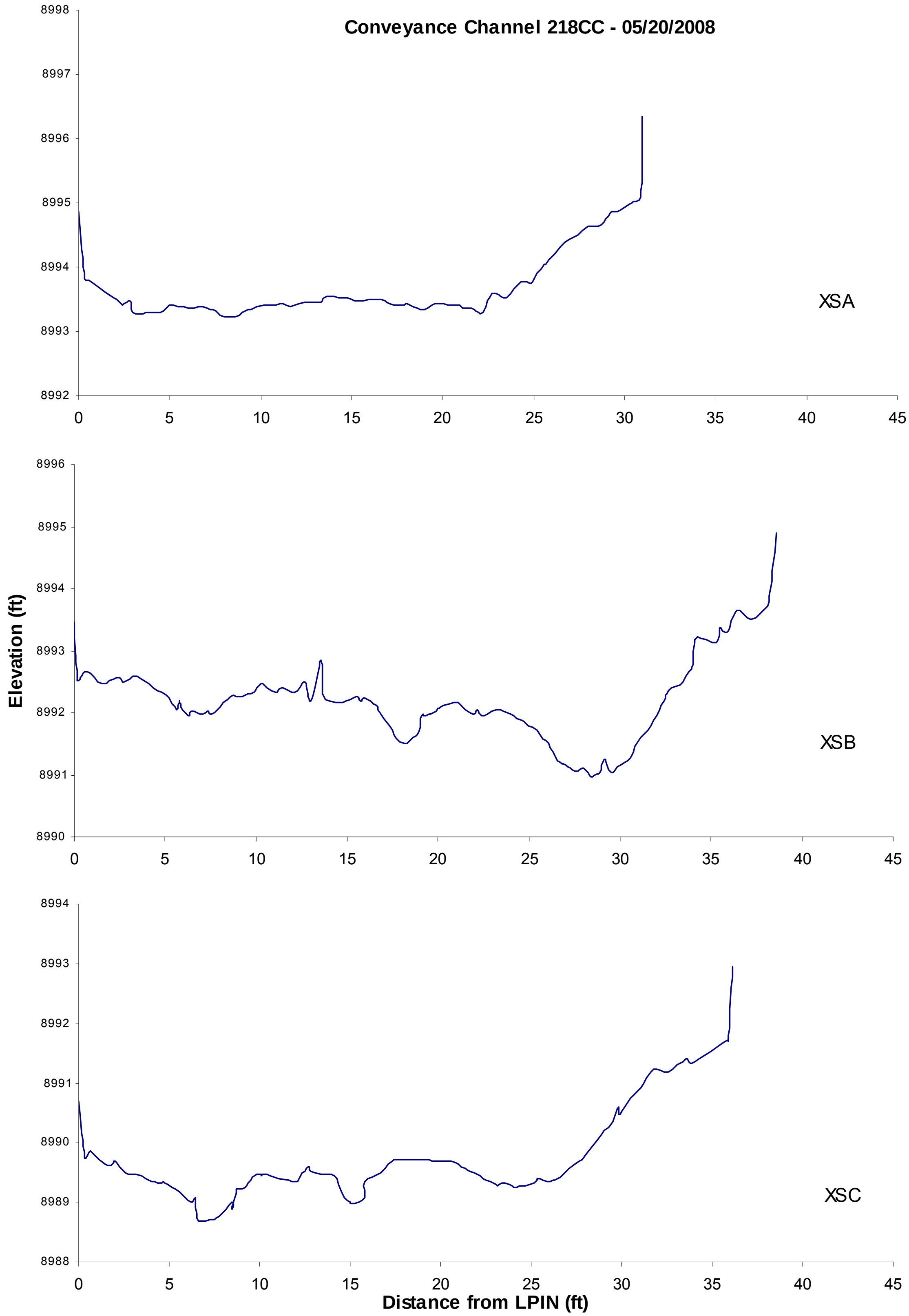

Conveyance Channel 210CC - 08/07/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10508
10507
10506
10505
10504
10503
10505
10504
10503
10502
10501
10500
10501
10500
10499
10498
10497
10496
0
5
10
15
20
25
30
35
40

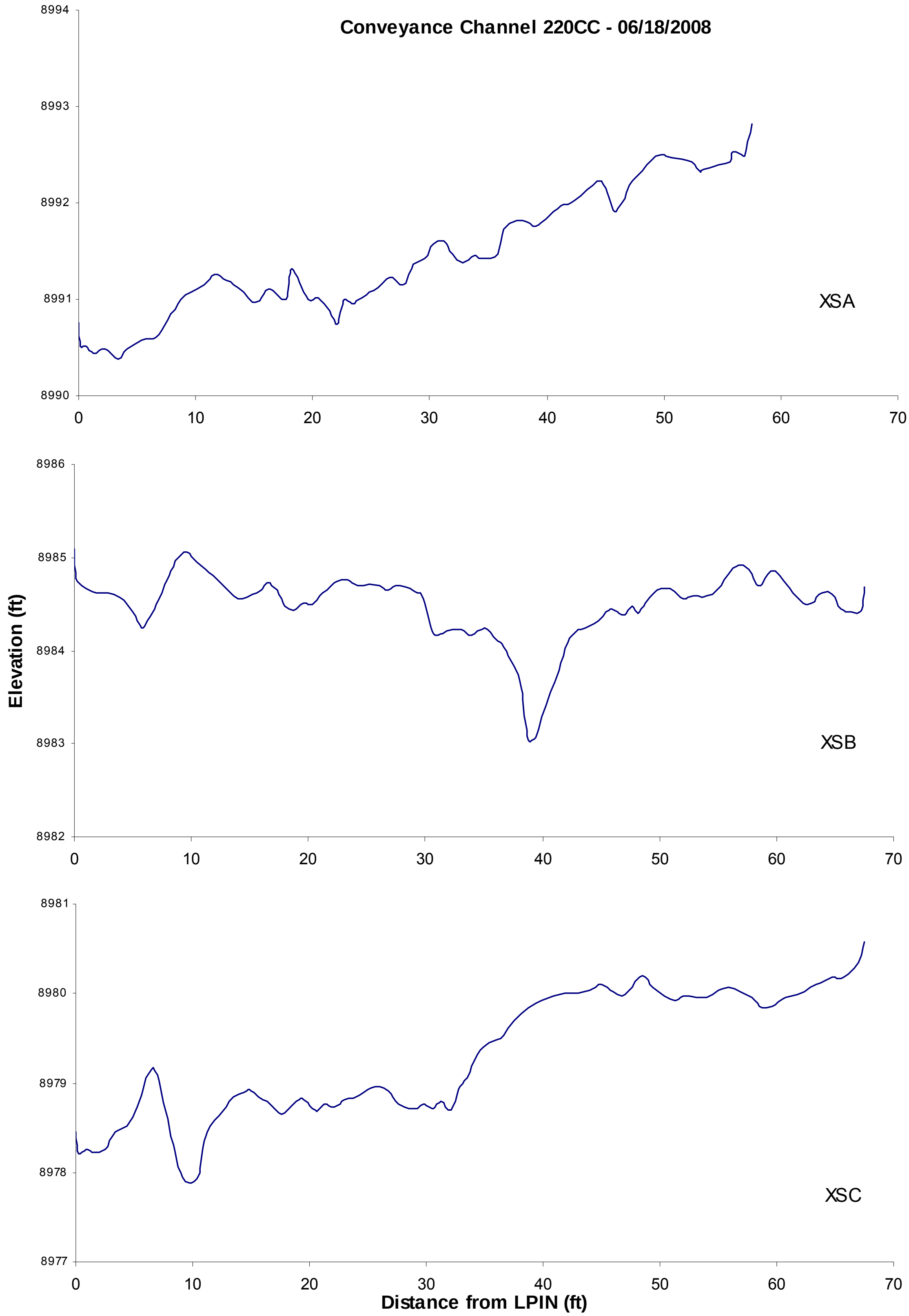

Conveyance Channel 211CC - 06/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
10407
10406
10405
10404
10403
10402
10401
10400
10399
10395
10394
10393
10392
10391
10390
0
5
10
15
20
25
30
35

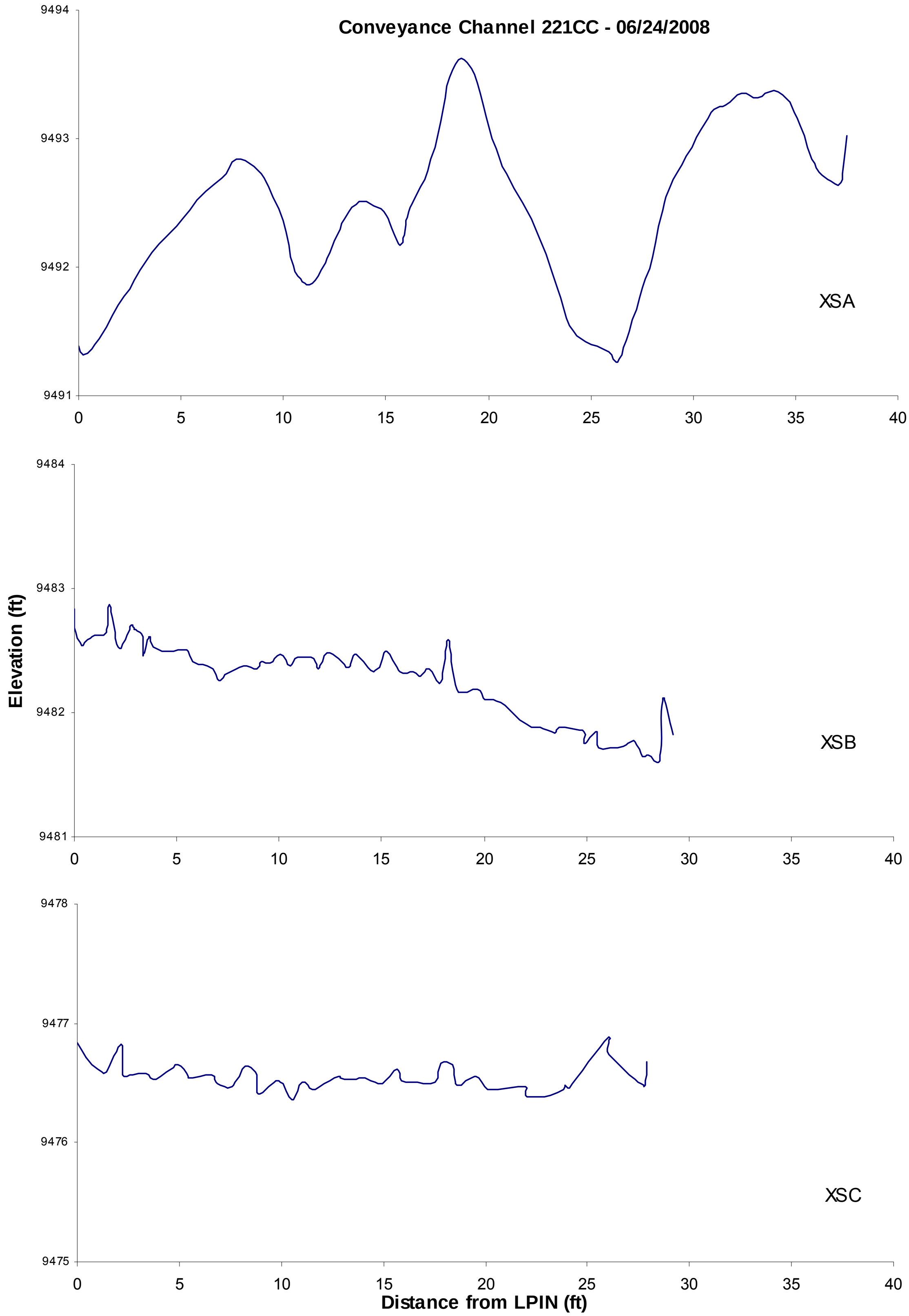

Conveyance Channel 213CC - 08/04/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)

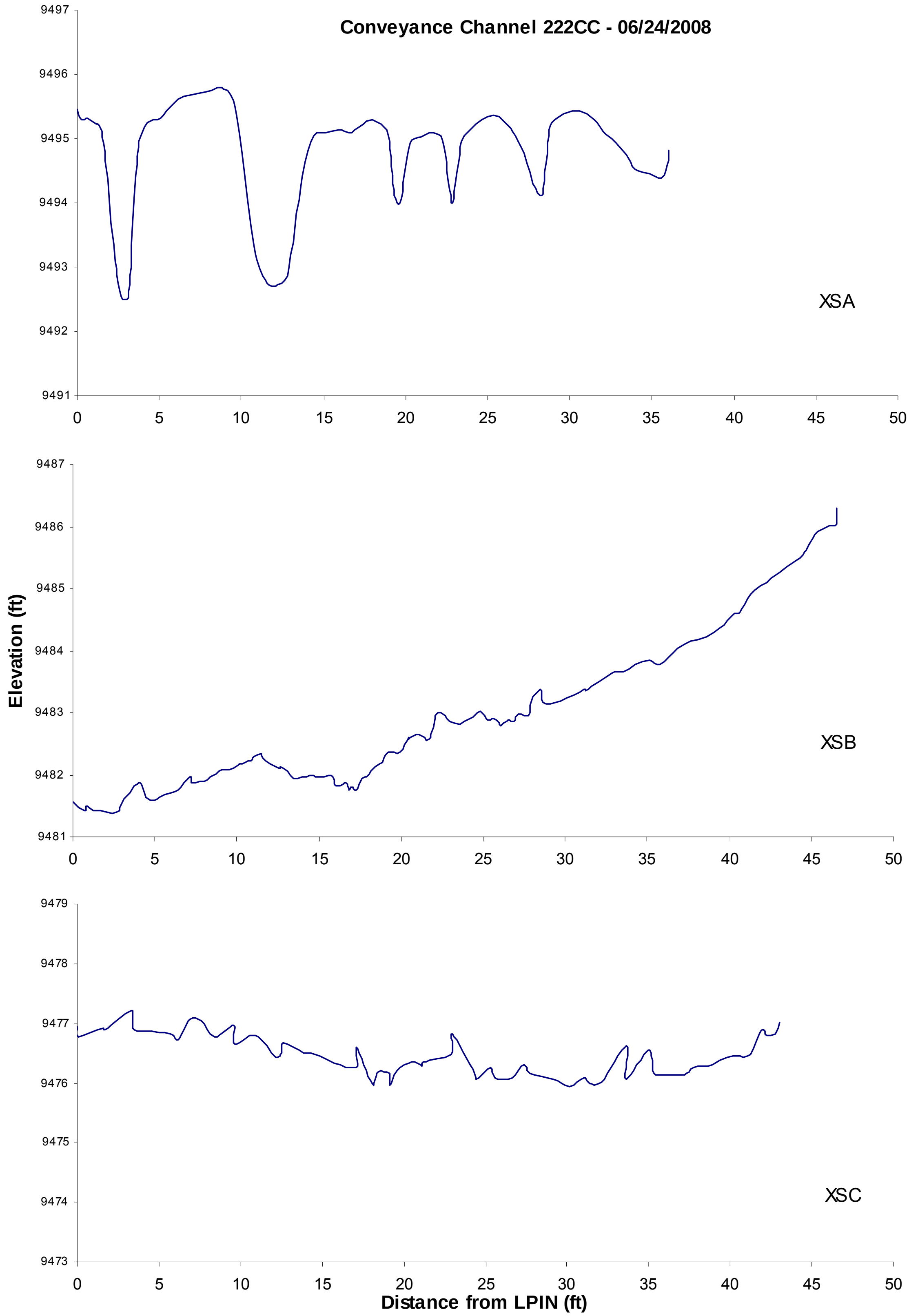

Conveyance Channel 214CC - 07/31/2008
Elevation (ft)
12490
12489
12488
12487
12486
12485
12484
XSA
12483
12482
12481
12480
12479
12478
12477
XSB
12477
12476
12475
12474
12473
12472
12471
XSC
0
5
10
15
20
25
30
35
40
45
Distance from LPIN (ft)

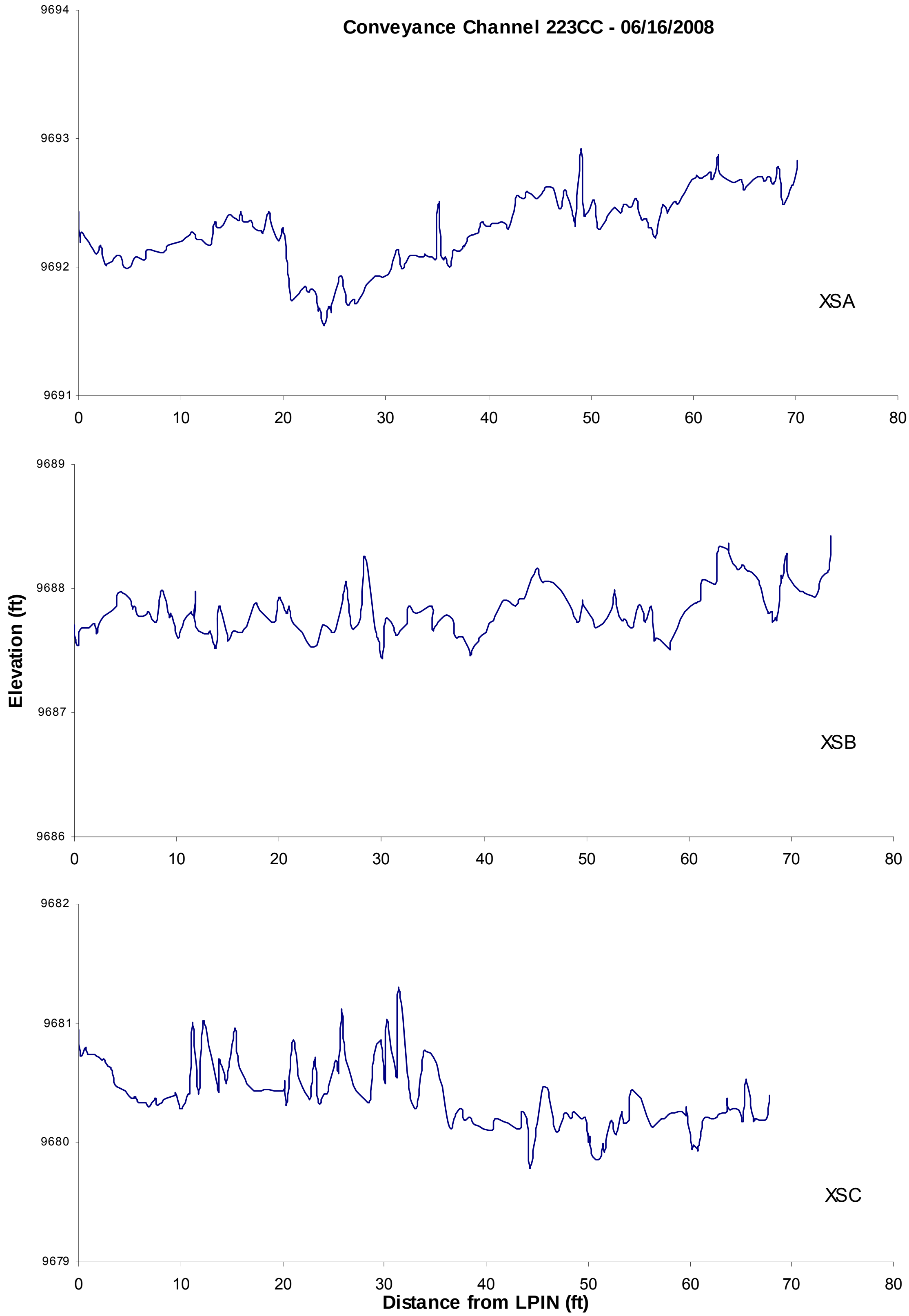

Conveyance Channel 216CC - 05/20/2008
Elevation (ft)
8787
8786
8785
8784
XSA
8780
8779
8778
8777
XSB
8772
8771
8770
8769
XSC
0
5
10
15
20
25
30
35
Distance from LPIN (ft)

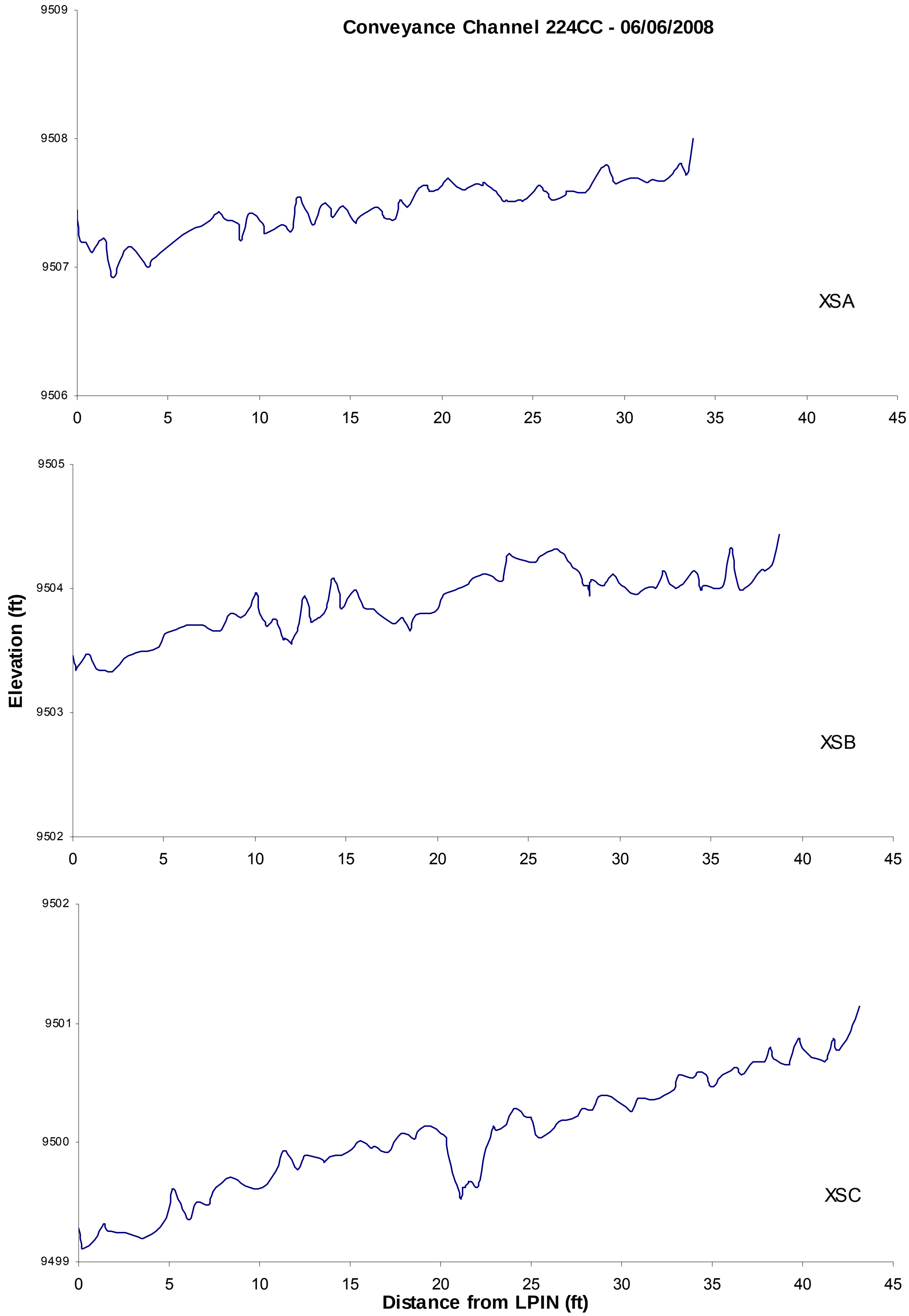

Conveyance Channel 218CC - 05/20/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
8998
8997
8996
8995
8994
8993
8992
8991
8990
8989
8988
0
5
10
15
20
25
30
35
40
45

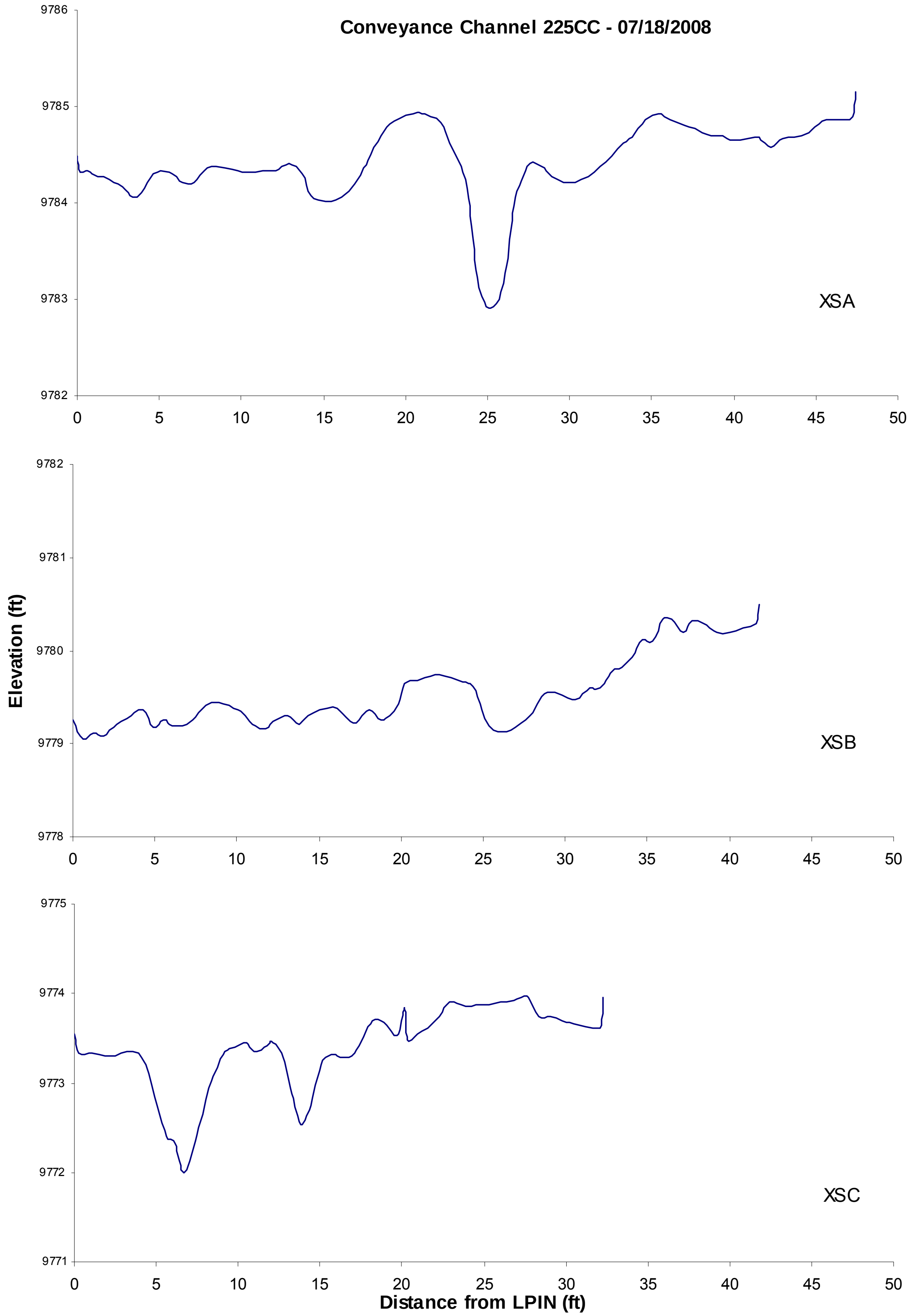

Conveyance Channel 220CC - 06/18/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
8994
8993
8992
8991
8990
8986
8985
8984
8983
8982
8981
8980
8979
8978
8977
0
10
20
30
40
50
60
70


Conveyance Channel 221CC - 06/24/2008
9494
9493
9492
9491
XSA
0
5
10
15
20
25
30
35
40
9484
9483
9482
9481
XSB
Elevation (ft)
9478
9477
9476
9475
XSC
Distance from LPIN (ft)

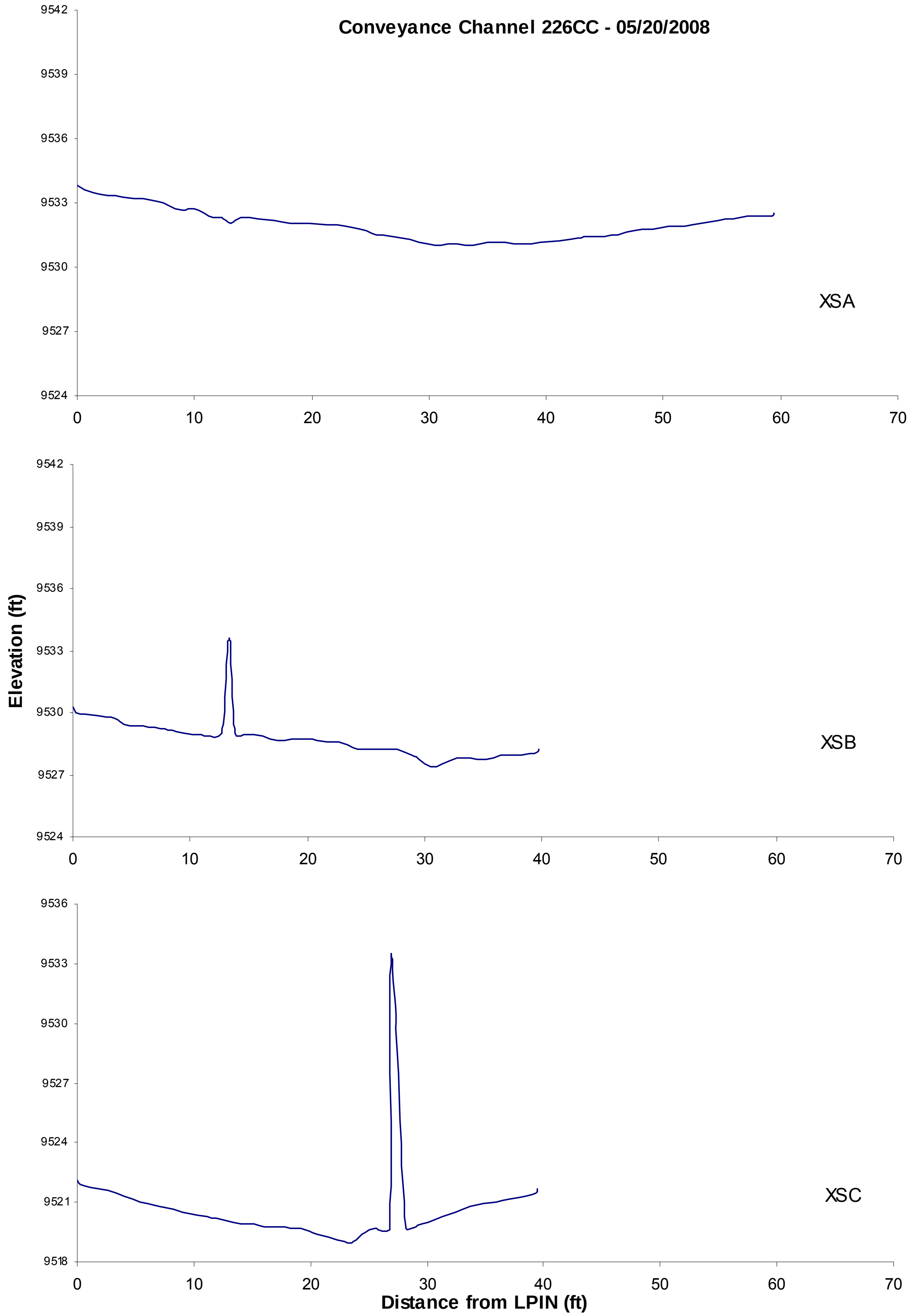

Conveyance Channel 222CC - 06/24/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9497
9496
9495
9494
9493
9492
9491
9487
9486
9485
9484
9483
9482
9481
9479
9478
9477
9476
9475
9474
9473
0
5
10
15
20
25
30
35
40
45
50

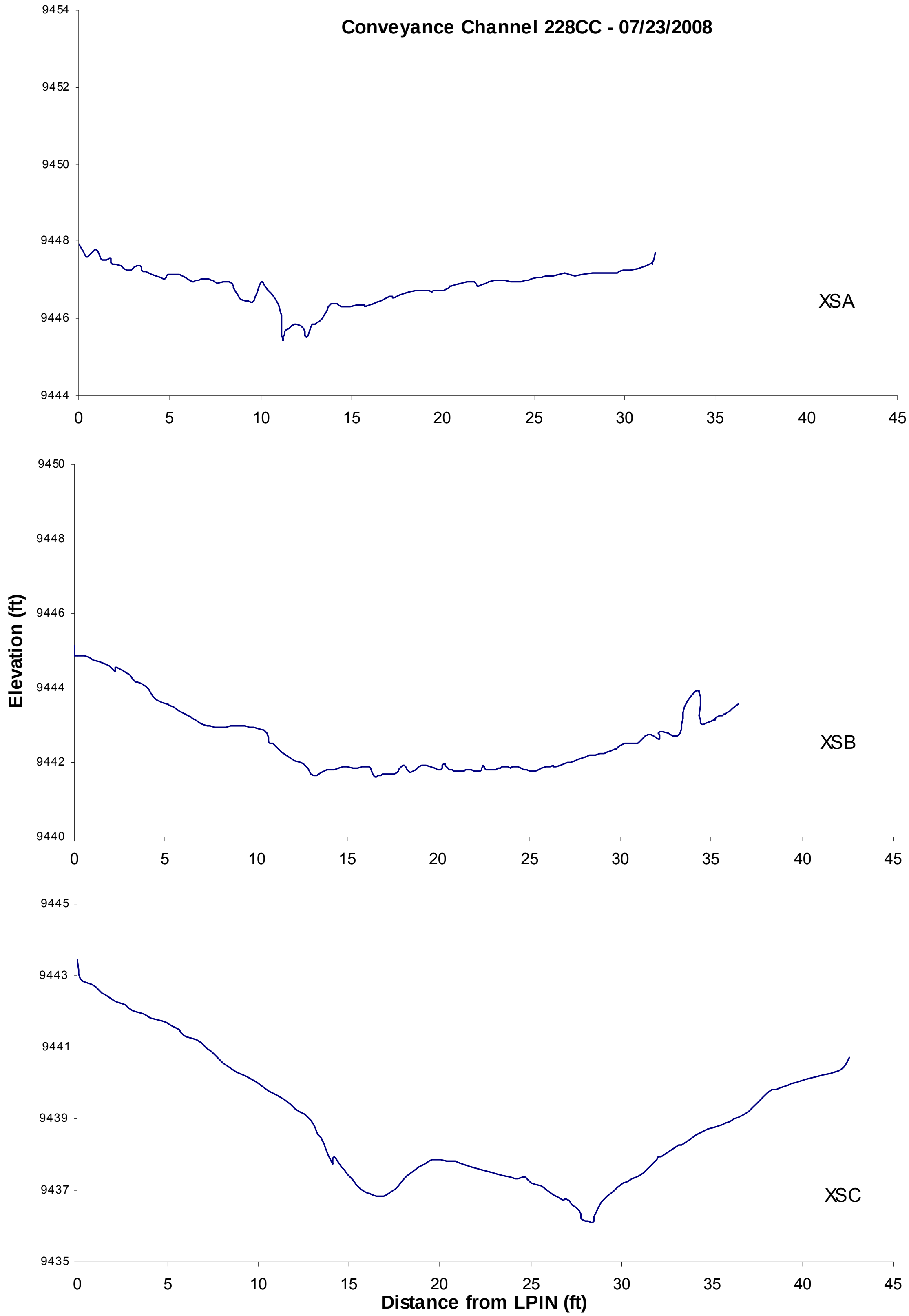

Conveyance Channel 223CC - 06/16/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9694
9693
9692
9691
9689
9688
9687
9686
9682
9681
9680
9679
0
10
20
30
40
50
60
70
80

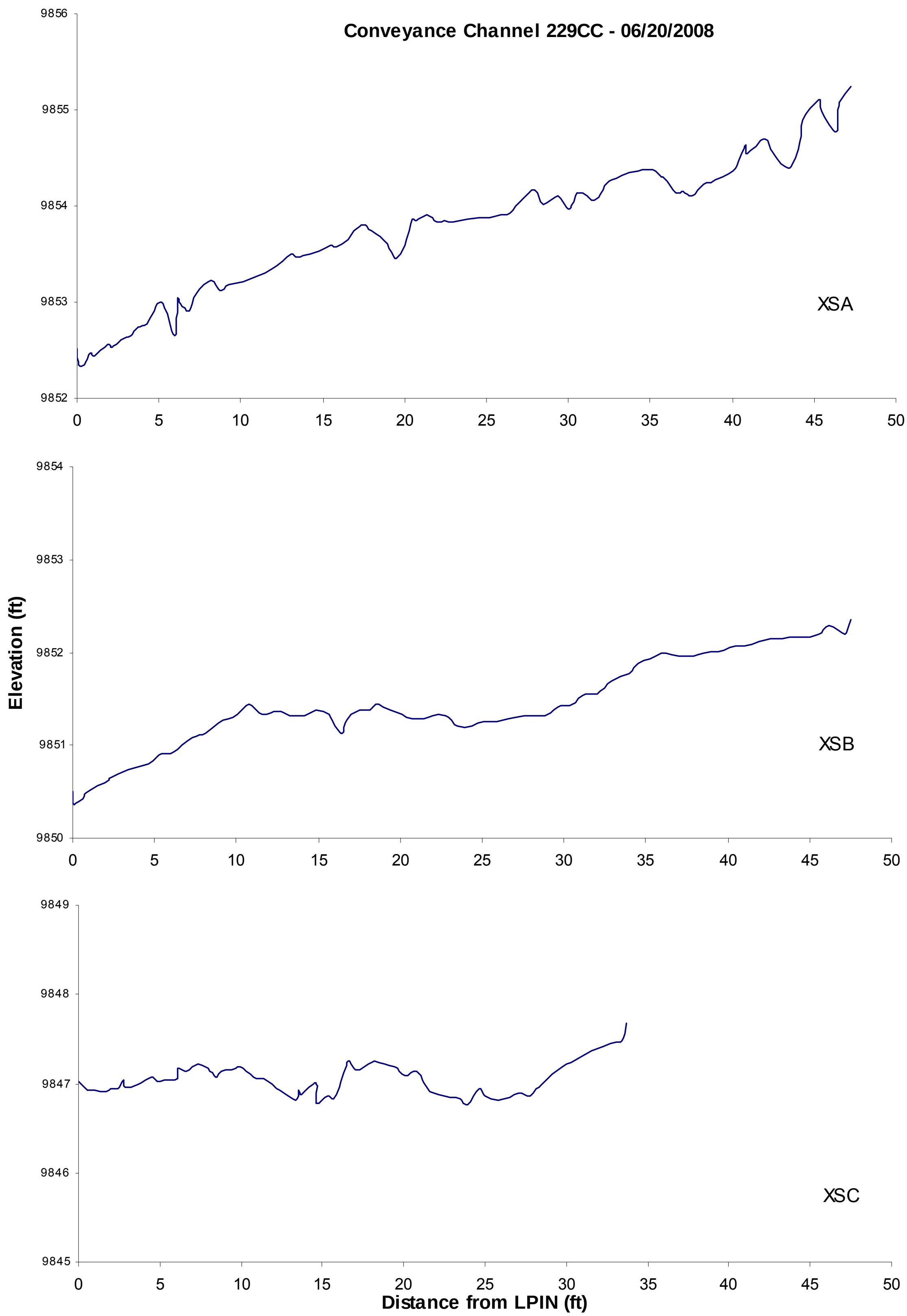

Conveyance Channel 224CC - 06/06/2008
9509
9508
9507
9506
0
5
10
15
20
25
30
35
40
45
XSA
9505
9504
9503
9502
XSB
9502
9501
9500
9499
XSC
Elevation (ft)
Distance from LPIN (ft)

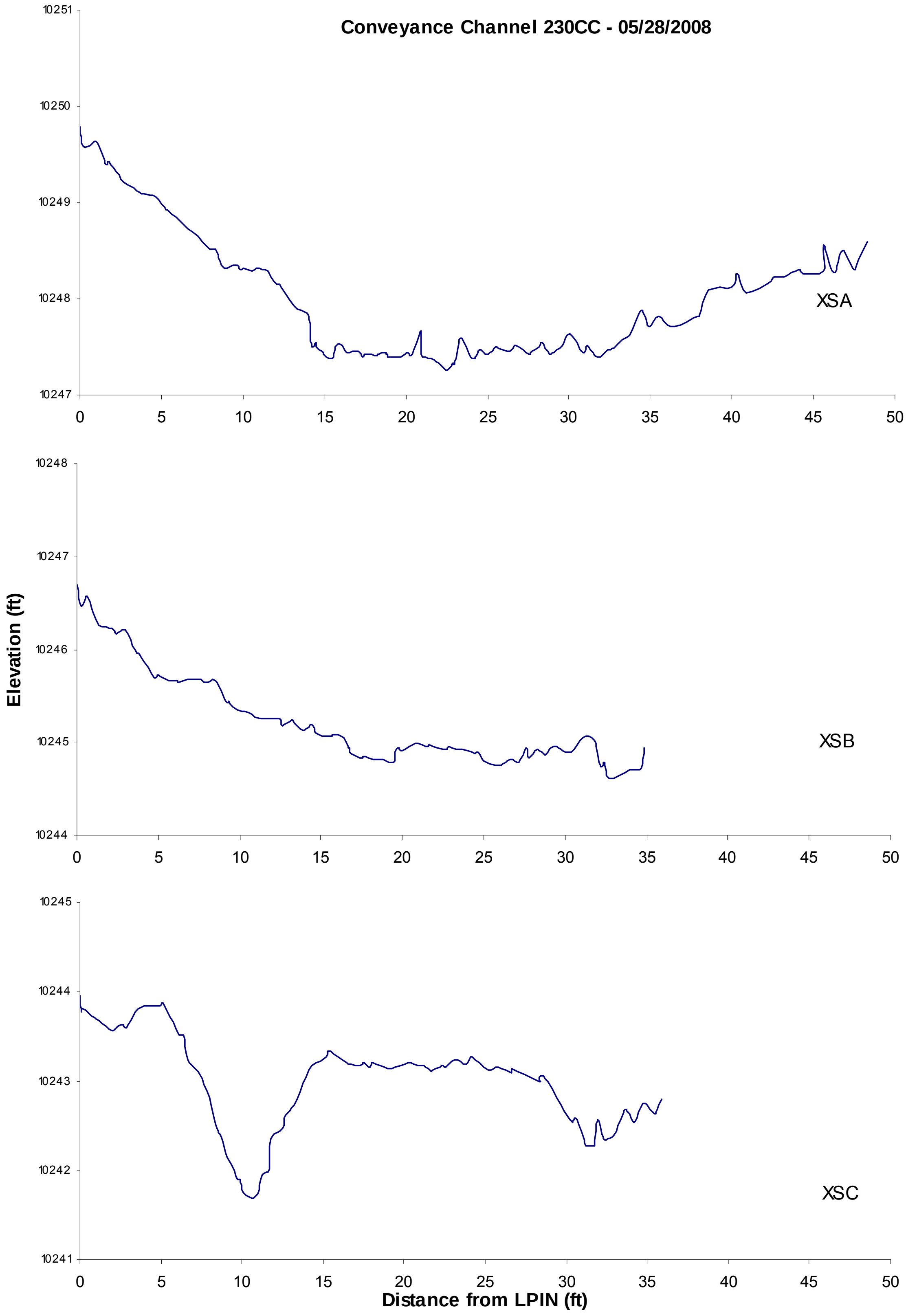


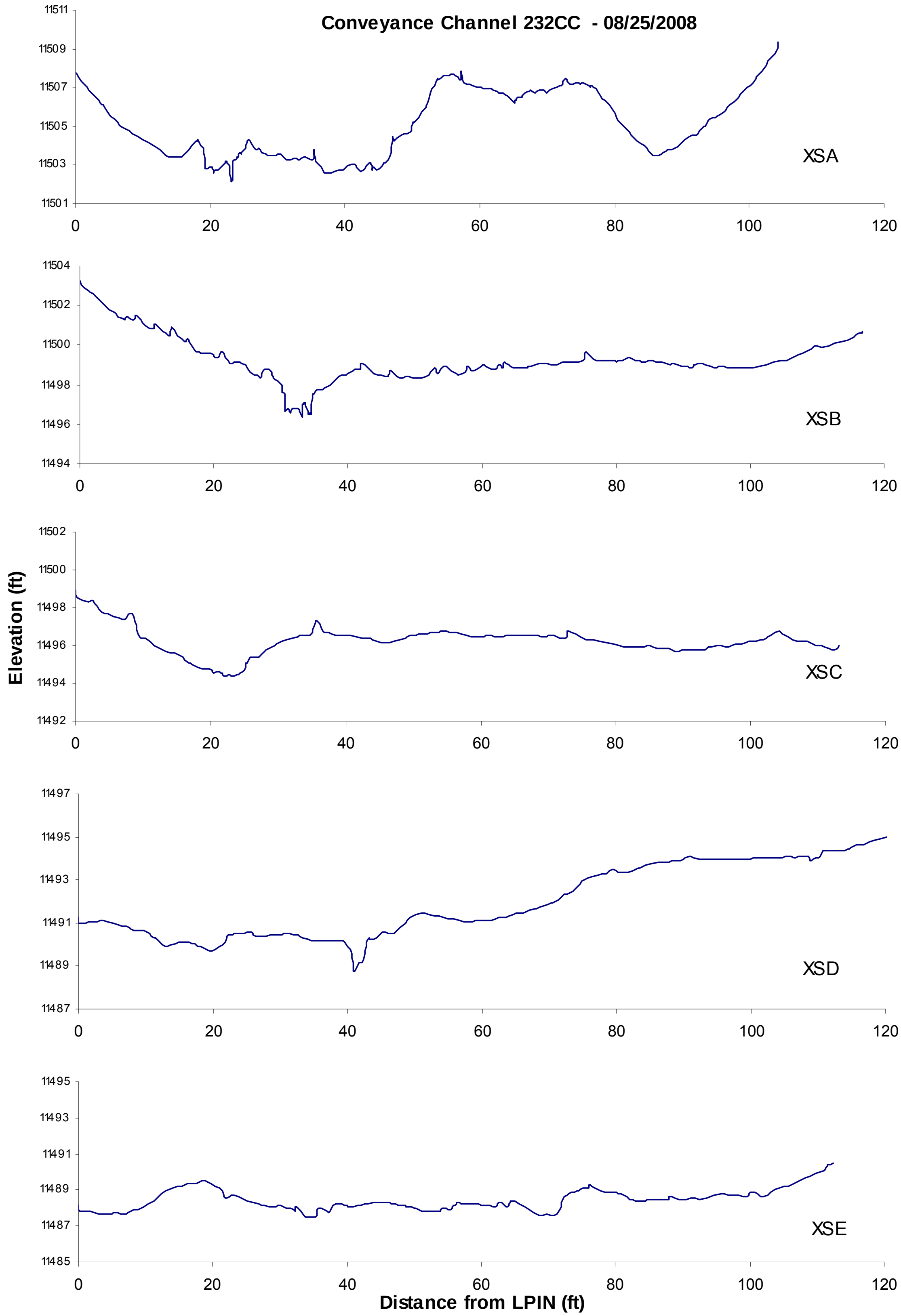
Conveyance Channel 225CC - 07/18/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9786
9785
9784
9783
9782
9781
9780
9779
9778
9775
9774
9773
9772
9771
0
5
10
15
20
25
30
35
40
45
50


Conveyance Channel 226CC - 05/20/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9542
9539
9536
9533
9530
9527
9524
9521
9518
0
10
20
30
40
50
60
70


Conveyance Channel 228CC - 07/23/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9454
9452
9450
9448
9446
9444
9442
9440
9445
9443
9441
9439
9437
9435
0
5
10
15
20
25
30
35
40
45

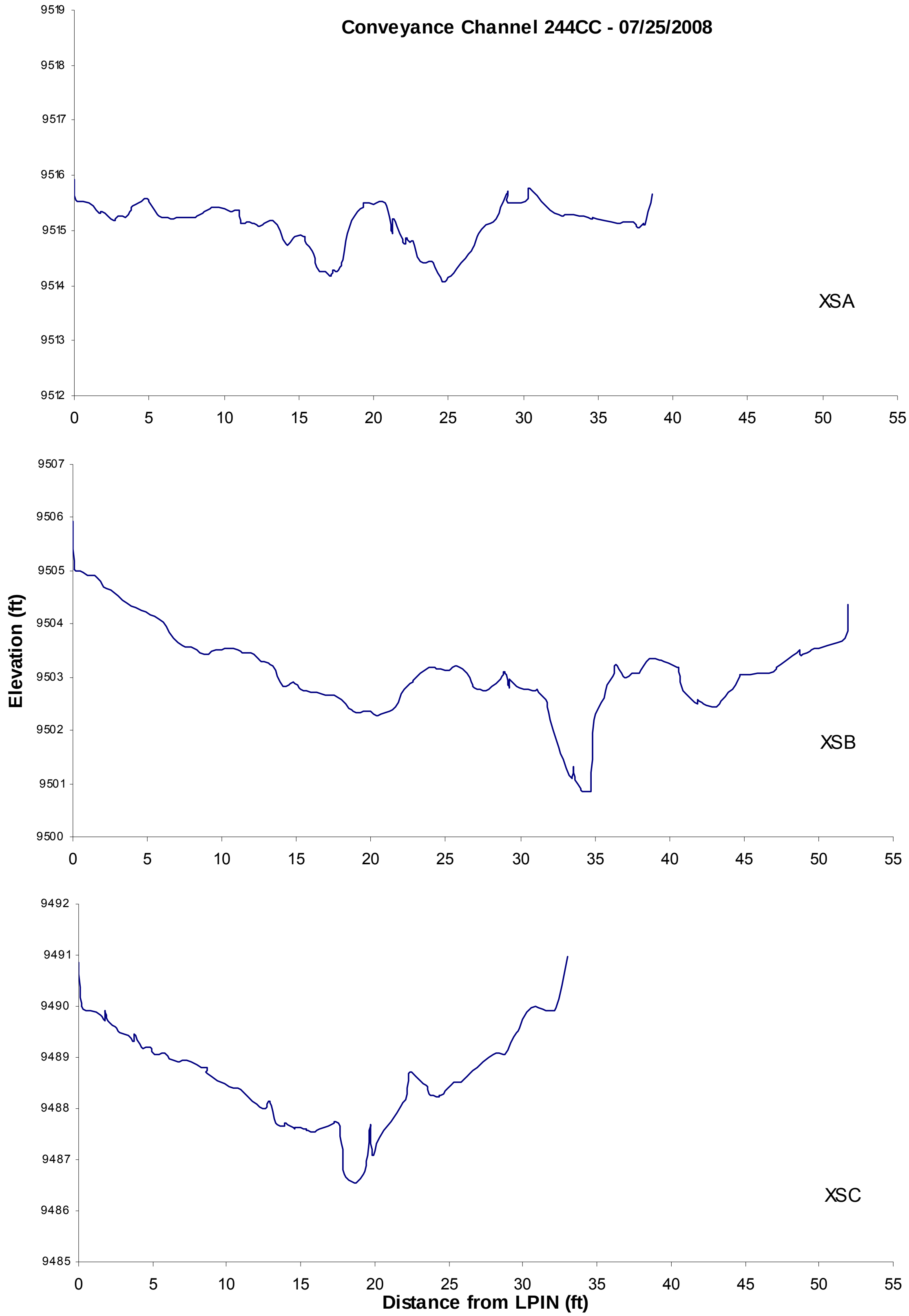

Conveyance Channel 229CC - 06/20/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)
9856
9855
9854
9853
9852
9851
9850
9849
9848
9847
9846
9845
0
5
10
15
20
25
30
35
40
45
50


Conveyance Channel 230CC - 05/28/2008
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 232CC - 08/25/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Conveyance Channel 235CC - 06/14/2008
12096
12094
12092
12090
12088
12086
12084
0
10
20
30
40
50
60
70
XSA
12089
12087
12085
12083
12081
12079
12077
XSB
12078
12076
12074
12072
12070
12068
12066
XSC
Elevation (ft)
Distance from LPIN (ft)



Conveyance Channel 244CC - 07/25/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
9519
9518
9517
9516
9515
9514
9513
9512
9507
9506
9505
9504
9503
9502
9501
9500
9492
9491
9490
9489
9488
9487
9486
9485
0
5
10
15
20
25
30
35
40
45
50
55

Appendix J

Rock Weir and Sediment Pond

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

2008

Site Visit and Survey Dates of Rock Weir (Sediment Trap) Silt Fences on Pikes Peak, 2008

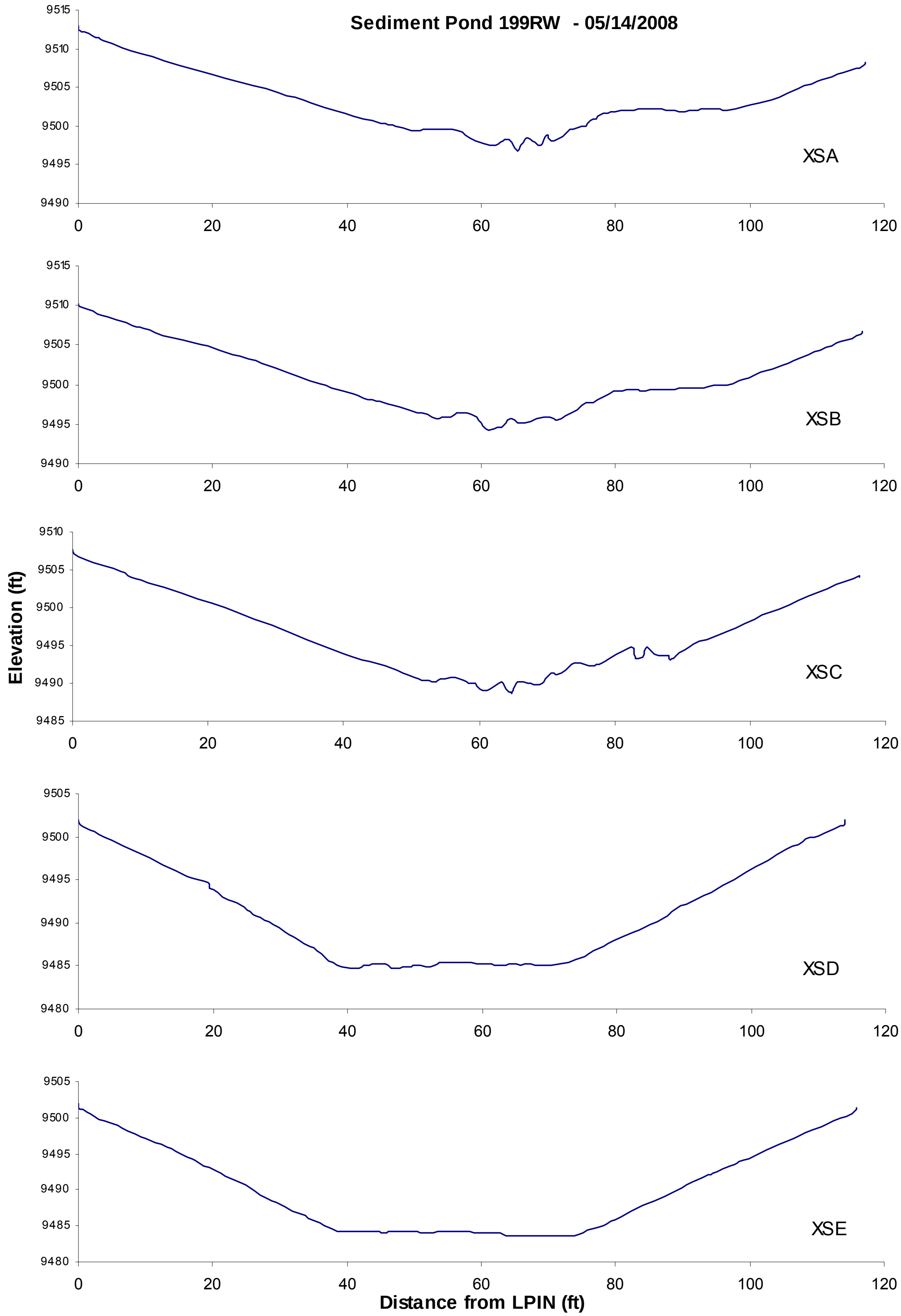
Site ID	Rock Weir (Sediment Trap) Silt Fence Site Visit Dates 2008																			
002RW	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16						
003RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
006RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
008RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
009RA	5/19	5/21	5/27	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16		
152RW	5/19	5/21	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16			
161RW	8/30	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/19	8/26	9/2	9/9	9/16	
162RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
176RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
178RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
179RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
180RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/7	8/13	8/19	8/26	9/2	9/9	9/16
181RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/7	8/13	8/19	8/26	9/2	9/9	9/16
200RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
201RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	
202RW	5/19	5/21	5/27	6/2	6/9	6/17	6/24	7/3	7/8	7/15	7/22	7/29	8/5	8/13	8/19	8/26	9/2	9/9	9/16	

Sediment Accumulation in Rock Weir Silt Fences on Pikes Peak, 2008

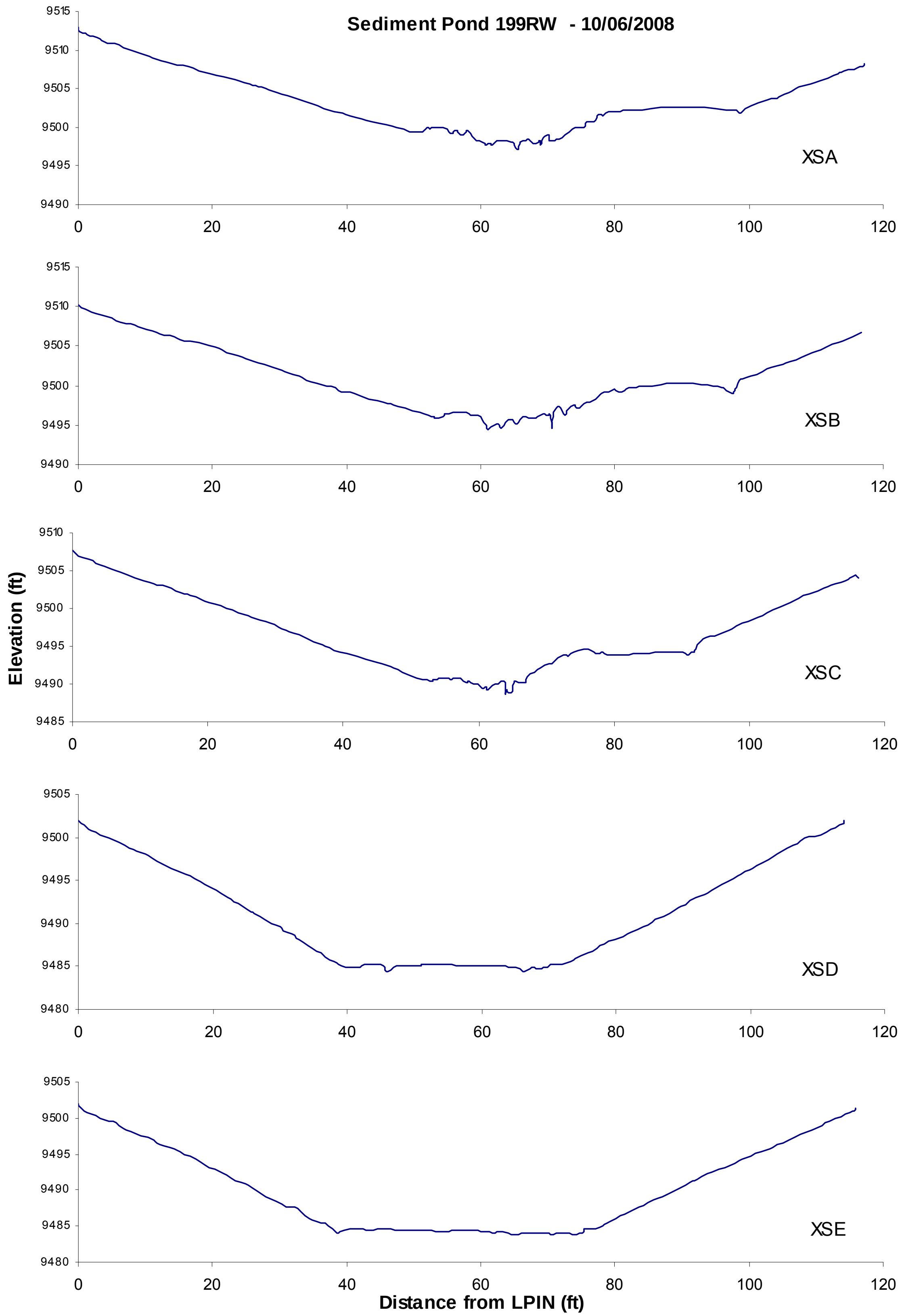
Site ID	Location	Date	Volume (ft^3)	Grab Sample
180RW	Silt Fence	5/14/08	0.13 ‡	Yes
162RW	Silt Fence	5/19/08	0.54	Yes
202RW	Silt Fence	5/19/08	0.13	Yes
161RW	Silt Fence	5/30/08	0.07	Yes
006RW	Silt Fence	6/4/08	0.07 ‡	Yes
161RW	Silt Fence	9/22/08	0.07	Yes
202RW	Silt Fence	9/22/08	0.07 ‡	Yes
180RW	Silt Fence	9/23/08	0.20 ‡	Yes
181RW	Silt Fence	9/23/08	0.13 ‡	Yes
‡ Indicates possible data inaccuracy due to breached silt fence				

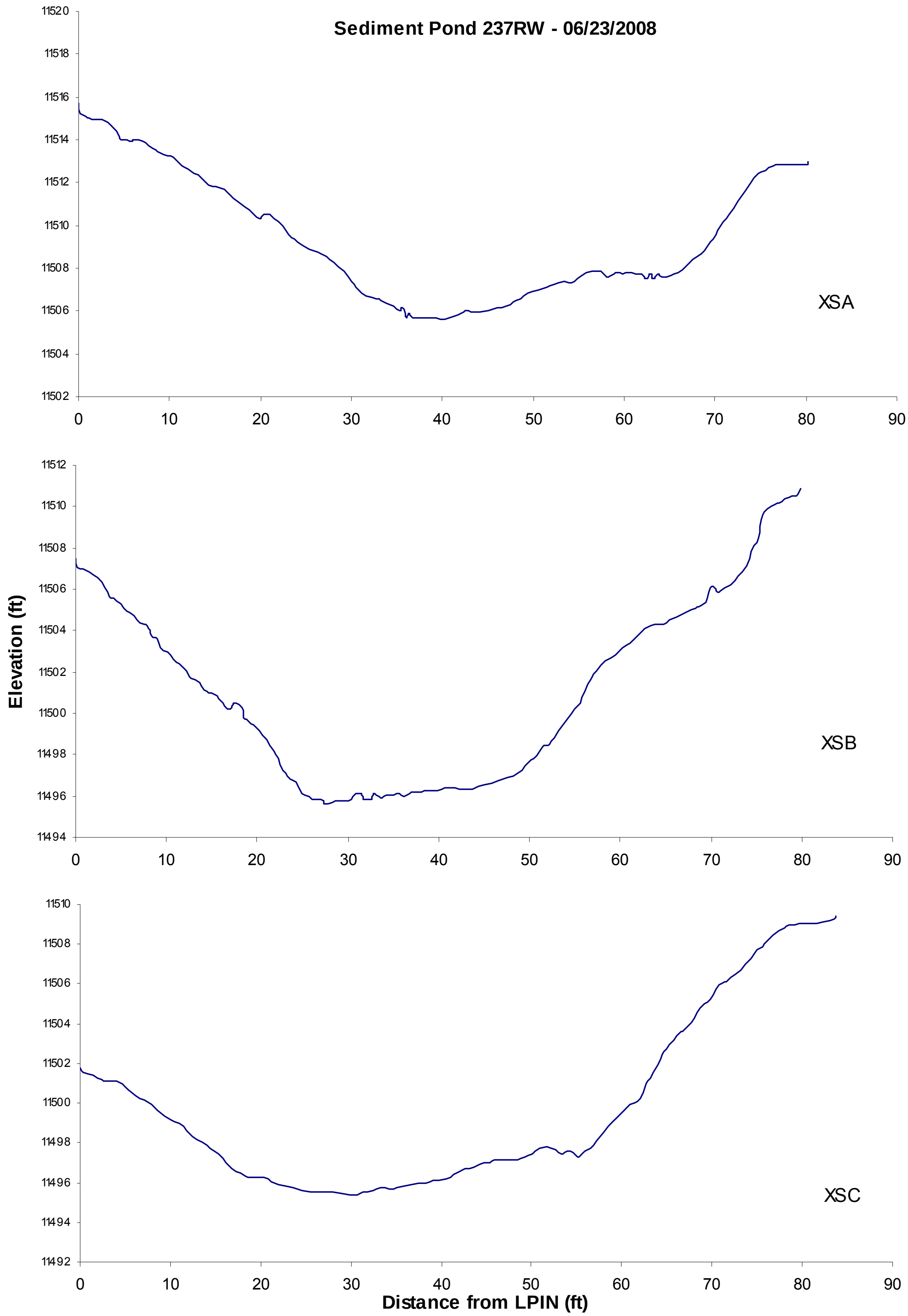
Rock Weir Sediment Accumulation Values on Pikes Peak, 2008

Site ID	Area (sq ft)	Survey1		Survey 2				Survey 3			
		Date	Average Elevation (ft)	Date	Average Elevation (ft)	Elevation Change (ft) †	Volume Change (ft^3) †	Date	Average Elevation (ft)	Elevation Change (ft) †	Volume Change (ft^3) †
002RW	1679.00	5/16/08	8998.13	7/9/08	8998.01	-0.12	-201.48	8/19/24	8998.21	0.20	335.80
003RW	521.00	6/3/08	8991.29	7/9/08	8991.13	-0.16	-83.36	9/29/08	8991.38	0.25	130.25
006RW	798.00	6/4/08	8997.08	6/26/08	8997.01	-0.07	-55.86	9/29/08	8996.99	-0.02	-15.96
008RW	1374.00	5/8/08	9499.51	9/3/08	9499.37	-0.18	-247.32				
008RW	1044.00	6/4/08	9499.00	9/30/08	9499.02	0.02	20.88				
009RA	905.00	5/30/08	9695.79	9/29/08	9695.78	-0.01	-9.05				
152RW	917.00	6/4/08	9791.83	9/30/08	9791.80	-0.03	-27.51				
153RW	1568.00	6/3/08	9452.19	7/9/08	9452.24	0.05	78.40	9/30/08	9452.40	0.16	250.88
161RW	263.00	5/30/08	9504.92	9/22/08	9504.88	-0.04	-10.52				
162RW	130.00	5/30/08	9512.21								
176RW	372.00	5/28/08	10193.95	9/23/08	10193.88	-0.07	-26.04				
178RW	377.00	5/28/08	10202.31	9/23/08	10201.71	-0.06	-22.62				
179RW	792.00	5/28/08	10193.15	9/23/08	10214.58	21.43	16972.56				
180RW	542.00	5/14/08	10235.05	7/9/08	10234.84	-0.21	-113.82	9/23/08	10234.84	0.00	0.00
181RW	1299.00	5/28/08	10253.14	6/26/08	10252.72	-0.42	-545.58	9/23/08	10252.67	-0.05	64.95
200RW	412.00	5/8/08	9194.94	9/22/08	9193.83	-1.11	-457.32				
201RW	183.00	5/14/08	9588.56	9/22/08	9588.58	0.02	3.66				
202RW	179.00	5/30/08	9690.32	9/22/08	9690.37	0.05	8.95				
233RW	359.00	6/3/08	11902.03	9/5/08	11902.08	0.05	17.95				
234RW	514.00	6/14/08	12100.03	8/20/08	12100.14	0.11	56.54				
236RW	630.00	7/17/08	12457.82	8/20/08	12457.55	-0.27	-170.10				
238RW	933.00	7/14/08	12198.50	8/20/08	12198.80	0.30	279.90				
239RW	381.00	6/26/08	12798.97	9/5/08	12798.88	-0.09	-34.29				
240RW	634.00	7/14/08	12897.07	8/29/08	12897.07	0.00	0.00				
241RW	1015.00	7/10/08	12551.51	8/27/08	12551.49	-0.02	-20.30				
242RW	1170.00	7/16/08	12900.75	8/27/08	12900.67	-0.08	-93.60				
243RW	743.00	7/16/08	12896.97	8/29/08	12896.90	-0.07	-52.01				
† Negative values imply a decrease in estimate of sediment accumulation between two surveys											

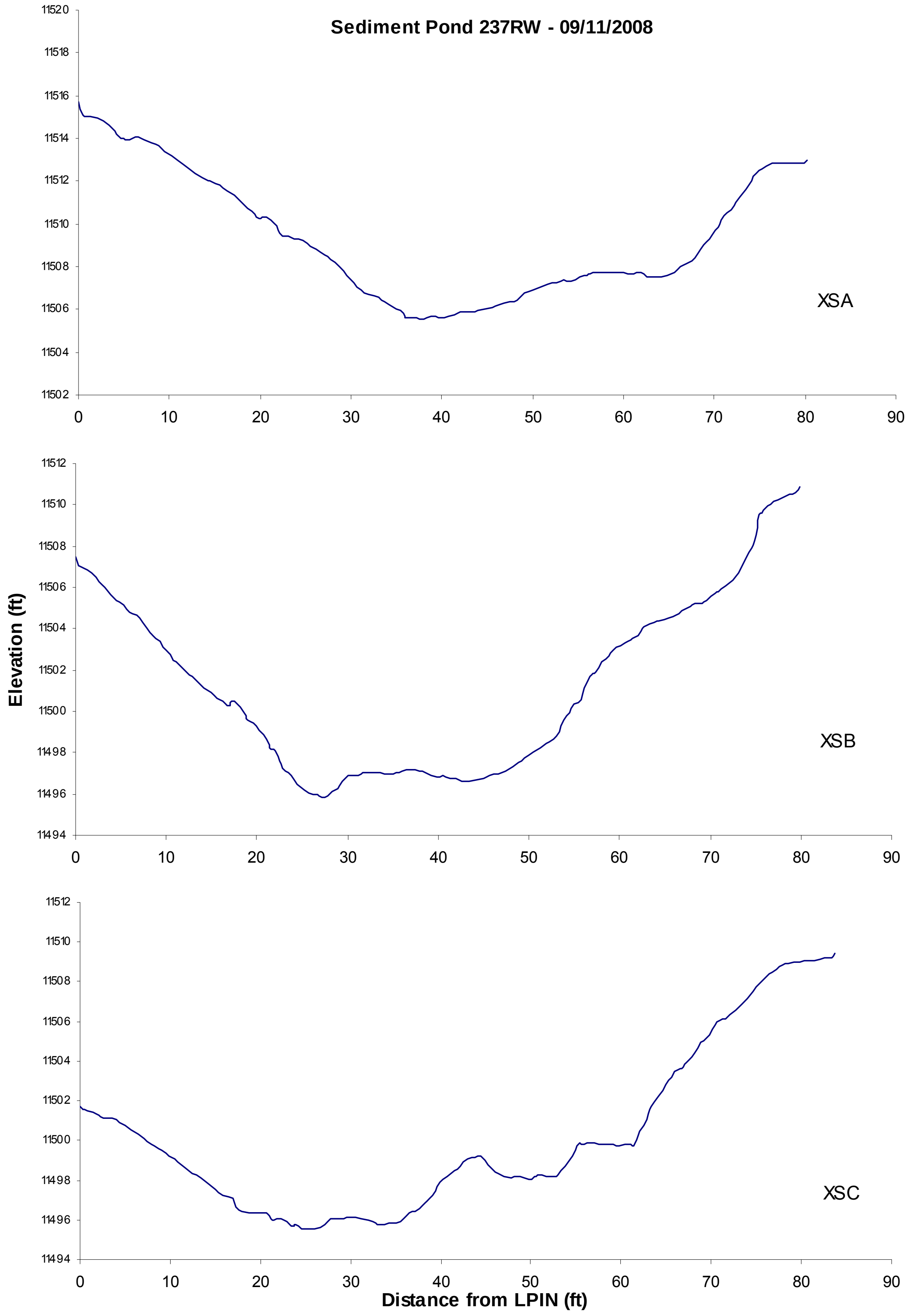


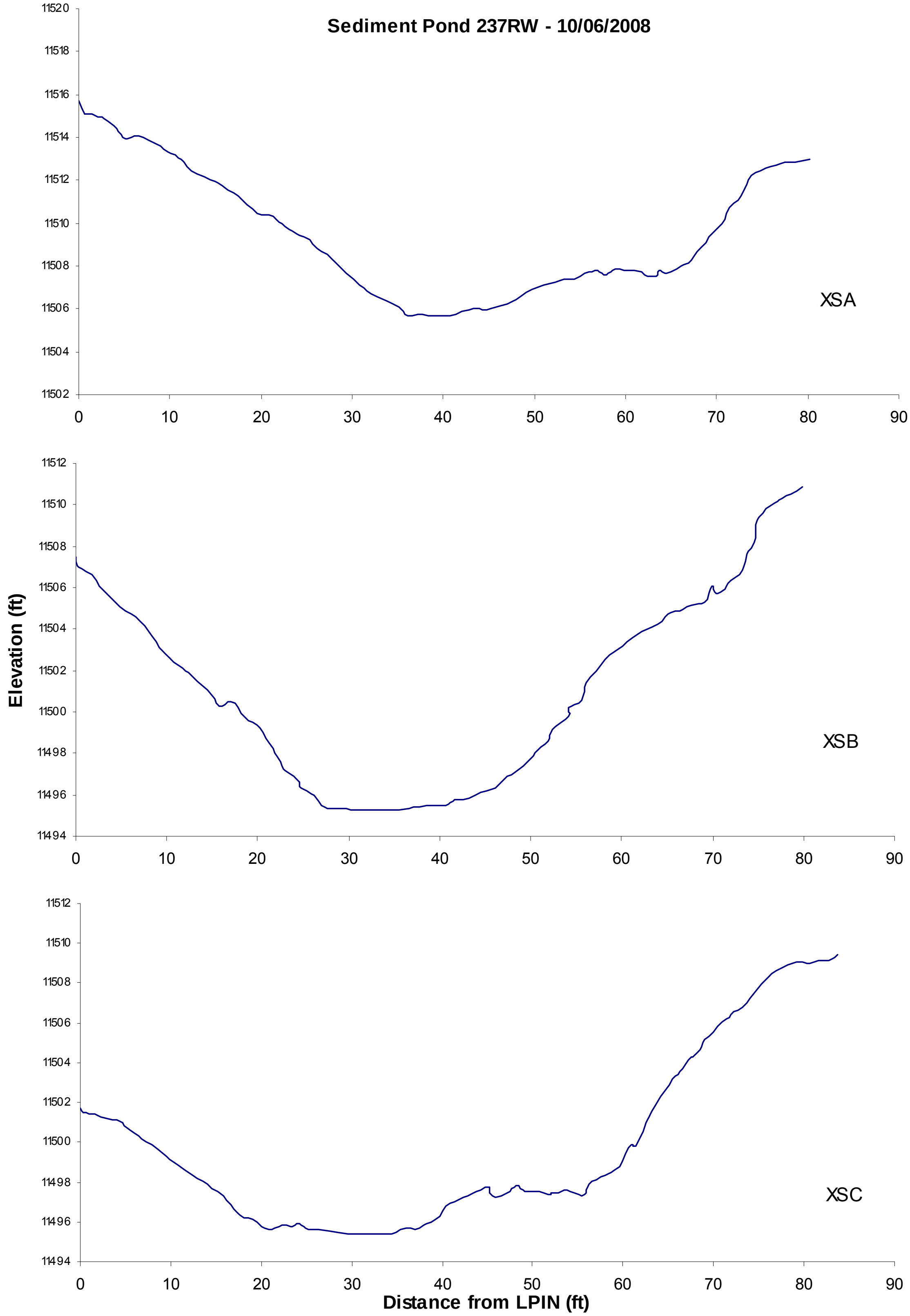
Sediment Pond 199RW - 05/14/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


Sediment Pond 199RW - 10/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9515
9510
9505
9500
9495
9490
9485
9480
0
20
40
60
80
100
120



Sediment Pond 237RW - 06/23/2008
XSA
XSB
XSC
Elevation (ft)
Distance from LPIN (ft)


Sediment Pond 237RW - 09/11/2008
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 - 10/06/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
11520
11518
11516
11514
11512
11510
11508
11506
11504
11502
11500
11498
11496
11494
0
10
20
30
40
50
60
70
80
90

Appendix K

Rock Weir and Sediment Pond

Particle Size Distribution and Graphs
and
Suspended Sediment Data

2008

Summary of Rock Weir and Silt Fence Particle Size Distribution from Sieve Analysis of Grab Samples on Pikes Peak, 2005 and 2007

			Particle Size Distribution–Grab Samples 2005–2007 †					
Site Name	**ID**	**Date**	**D15**	**D35**	**D50**	**D84**	**D95**	**D100**
Pikes Peak Highway–Rock Weir	162RW Silt Fence	5/31/2005	0.043	0.613	1.183	5.771	13.056	25.0
Pikes Peak Highway–Rock Weir	202RW Silt Fence	6/21/2005	0.273	1.164	2.066	6.811	15.439	26.0
Pikes Peak Highway–Rock Weir	002RW Rock Weir	6/13/2007	0.672	1.911	3.052	8.182	12.771	16.0
Pikes Peak Highway–Rock Weir	002RW Silt Fence	6/13/2007	1.000	2.293	3.556	11.215	20.820	25.0
Pikes Peak Highway–Rock Weir	008RW Rock Weir	6/14/2007	0.041	0.646	1.518	9.798	23.603	25.0
Pikes Peak Highway–Rock Weir	009RA Rock Weir	6/6/2007	0.260	2.387	4.254	10.454	15.729	19.0
Pikes Peak Highway–Rock Weir	009RA Silt Fence	6/6/2007	0.188	1.196	2.135	34.088	41.259	32.0
Pikes Peak Highway–Rock Weir	009RA Rock Weir	8/23/2007	0.119	1.129	2.052	7.267	14.852	16.0

† Grab samples were not collected during the 2006 field season

Sieve Analysis Worksheet

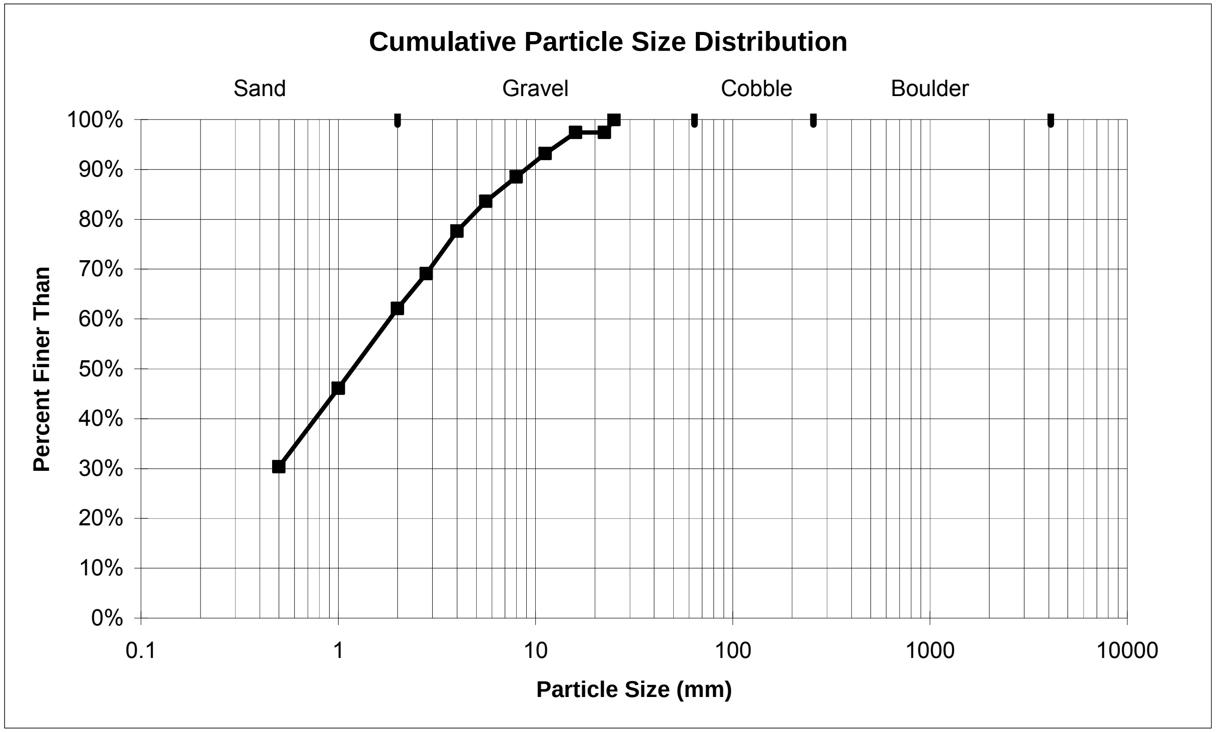
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	147.30	30.4%	
0.5	76.30	15.7%	30.4%
1.0	77.60	16.0%	46.1%
2.0	33.90	7.0%	62.1%
2.8	41.30	8.5%	69.1%
4.0	28.90	6.0%	77.6%
5.6	23.90	4.9%	83.6%
8.0	22.60	4.7%	88.5%
11.2	20.60	4.2%	93.2%
16.0	0	0.0%	97.4%
22.4	12.50	2.6%	97.4%
25.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	484.90		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 162RW Silt Fence
DATE: 5/31/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.043	0.613	1.183	5.771	13.056	25.0



Sieve Analysis Worksheet

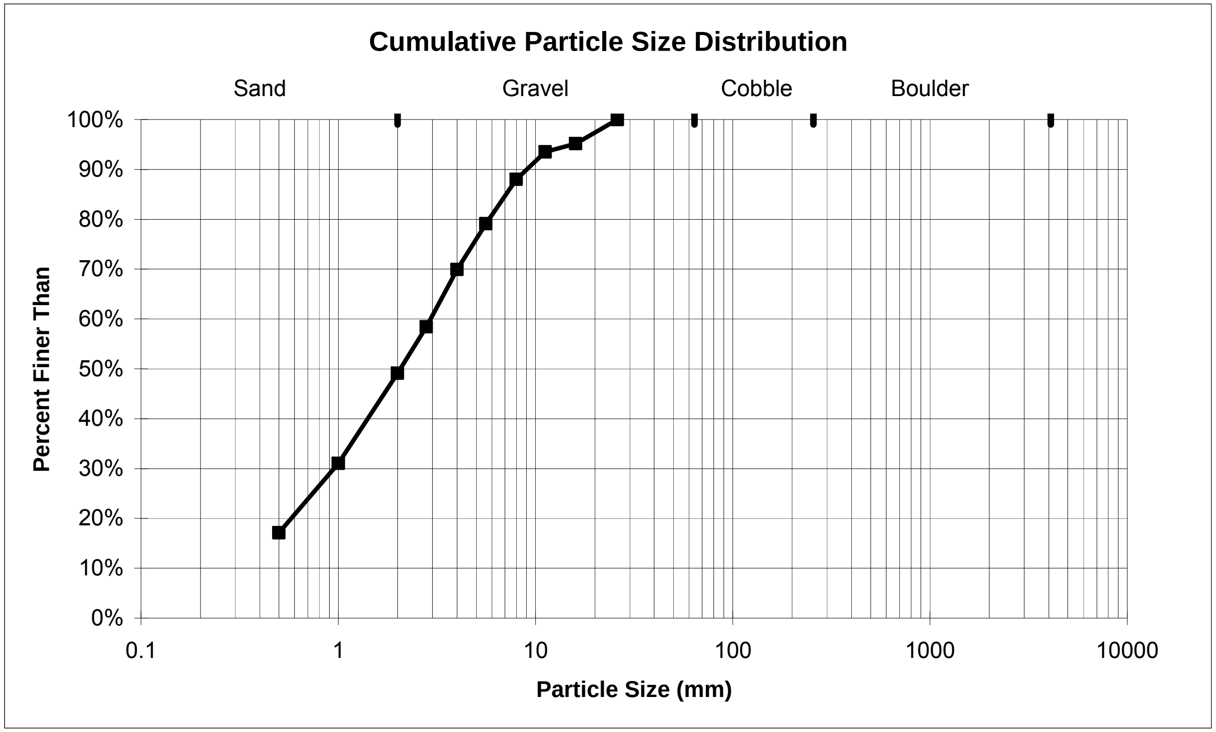
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	55.30	17.1%	
0.5	44.90	13.9%	17.1%
1.0	58.30	18.1%	31.0%
2.0	30.00	9.3%	49.1%
2.8	37.10	11.5%	58.4%
4.0	29.80	9.2%	69.9%
5.6	28.70	8.9%	79.1%
8.0	17.70	5.5%	88.0%
11.2	5.40	1.7%	93.5%
16.0	15.60	4.8%	95.2%
26.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	322.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2005 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 202RW Silt Fence
DATE: 6/21/2005
CREW: Howell, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.273	**1.164**	**2.066**	**6.811**	**15.439**	**26.0**



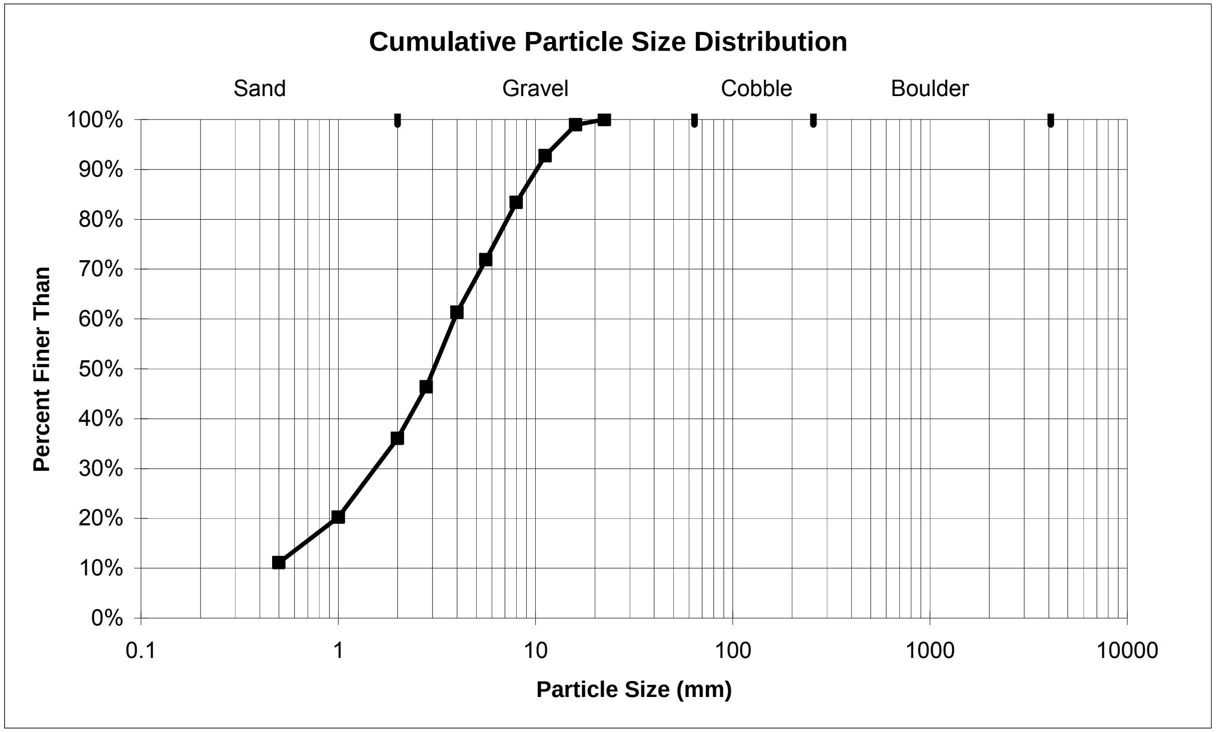
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	49.80	11.1%	
0.5	41.10	9.2%	11.1%
1.0	70.80	15.8%	20.3%
2.0	46.40	10.3%	36.0%
2.8	67.20	15.0%	46.4%
4.0	47.30	10.5%	61.4%
5.6	51.50	11.5%	71.9%
8.0	41.90	9.3%	83.4%
11.2	27.90	6.2%	92.7%
16.0	4.80	1.1%	98.9%
22.4			100.0%
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	448.70		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 002RW Rock Weir
DATE: 6/13/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.672	**1.911**	**3.052**	**8.182**	**12.771**	**16.0**



Sieve Analysis Worksheet

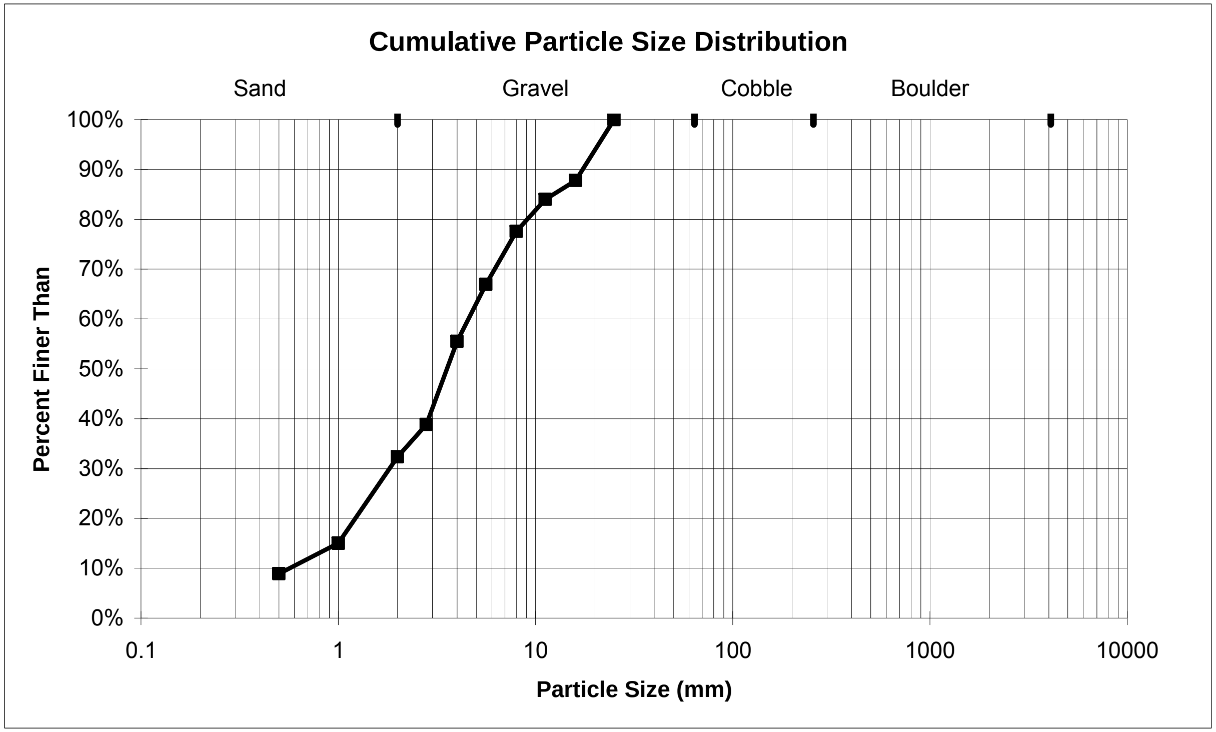
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	29.00	8.9%	
0.5	19.70	6.1%	8.9%
1.0	56.40	17.4%	15.0%
2.0	21.00	6.5%	32.4%
2.8	54.10	16.7%	38.8%
4.0	37.10	11.4%	55.5%
5.6	34.50	10.6%	66.9%
8.0	20.90	6.4%	77.5%
11.2	12.40	3.8%	84.0%
16.0	39.60	12.2%	87.8%
25.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	324.70		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 002RW Silt Fence
DATE: 6/13/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	1.000	**2.293**	**3.556**	**11.215**	**20.820**	**25.0**



Sieve Analysis Worksheet

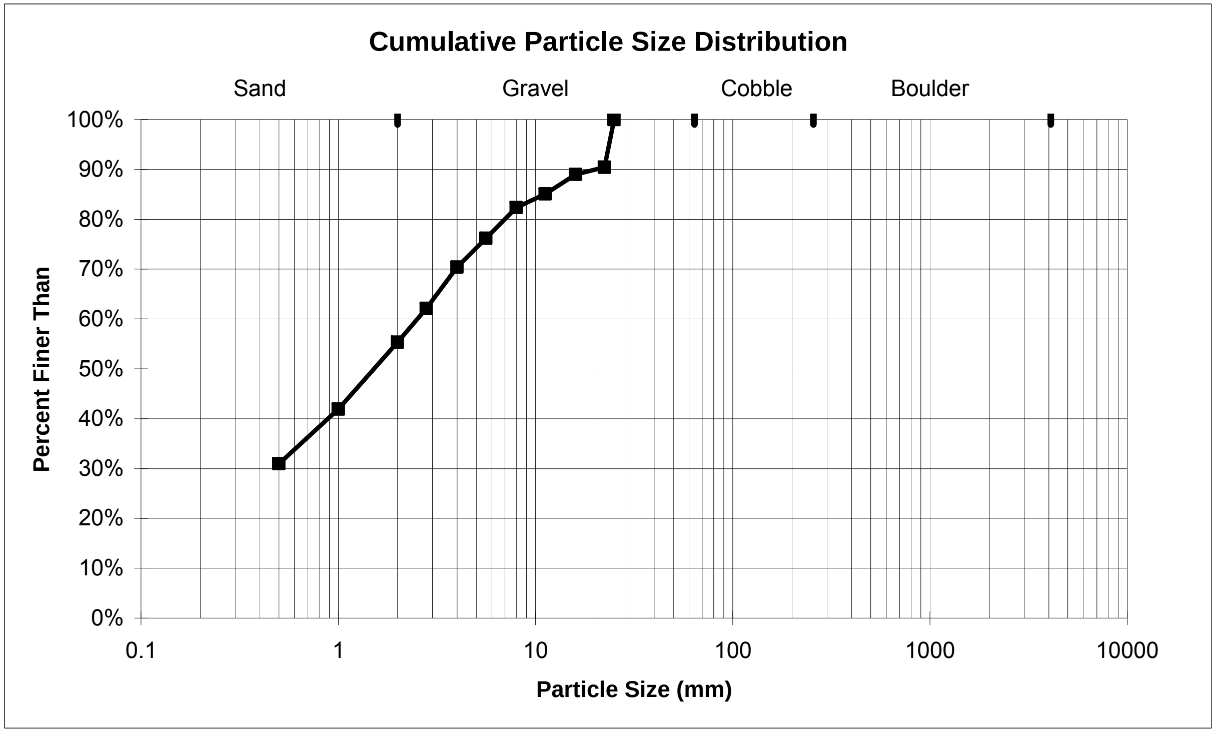
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	142.10	31.0%	
0.5	50.10	10.9%	31.0%
1.0	61.80	13.5%	41.9%
2.0	30.90	6.7%	55.4%
2.8	38.10	8.3%	62.1%
4.0	26.40	5.8%	70.4%
5.6	28.40	6.2%	76.2%
8.0	12.60	2.7%	82.3%
11.2	17.90	3.9%	85.1%
16.0	6.70	1.5%	89.0%
22.4	43.80	9.5%	90.5%
25.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	458.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 008RW Rock Weir
DATE: 6/14/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.041	0.646	1.518	9.798	23.603	25.0



Sieve Analysis Worksheet

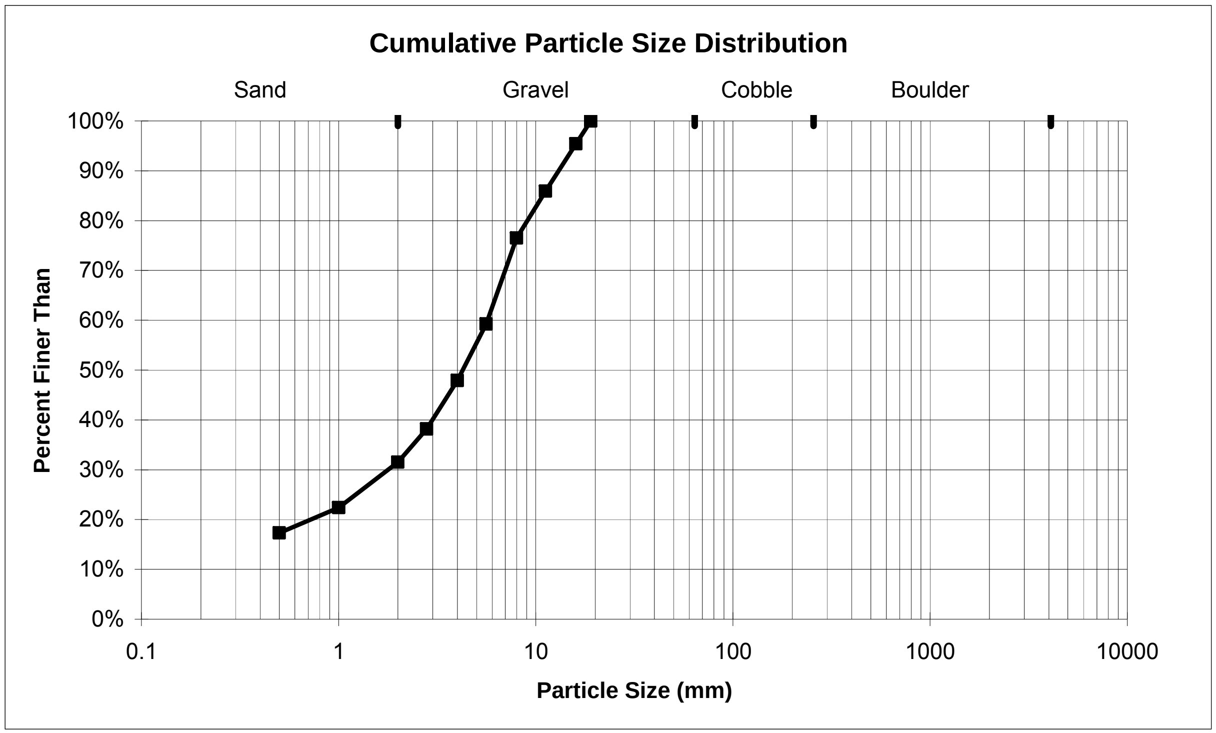
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	35.50	17.3%	
0.5	10.30	5.0%	17.3%
1.0	18.70	9.1%	22.4%
2.0	13.60	6.6%	31.5%
2.8	20.00	9.8%	38.2%
4.0	23.20	11.3%	47.9%
5.6	35.30	17.2%	59.3%
8.0	19.30	9.4%	76.5%
11.2	19.50	9.5%	85.9%
16.0	9.30	4.5%	95.5%
19.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	204.70		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 009RA Rock Weir
DATE: 6/6/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.260	2.387	4.254	10.454	15.729	19.0



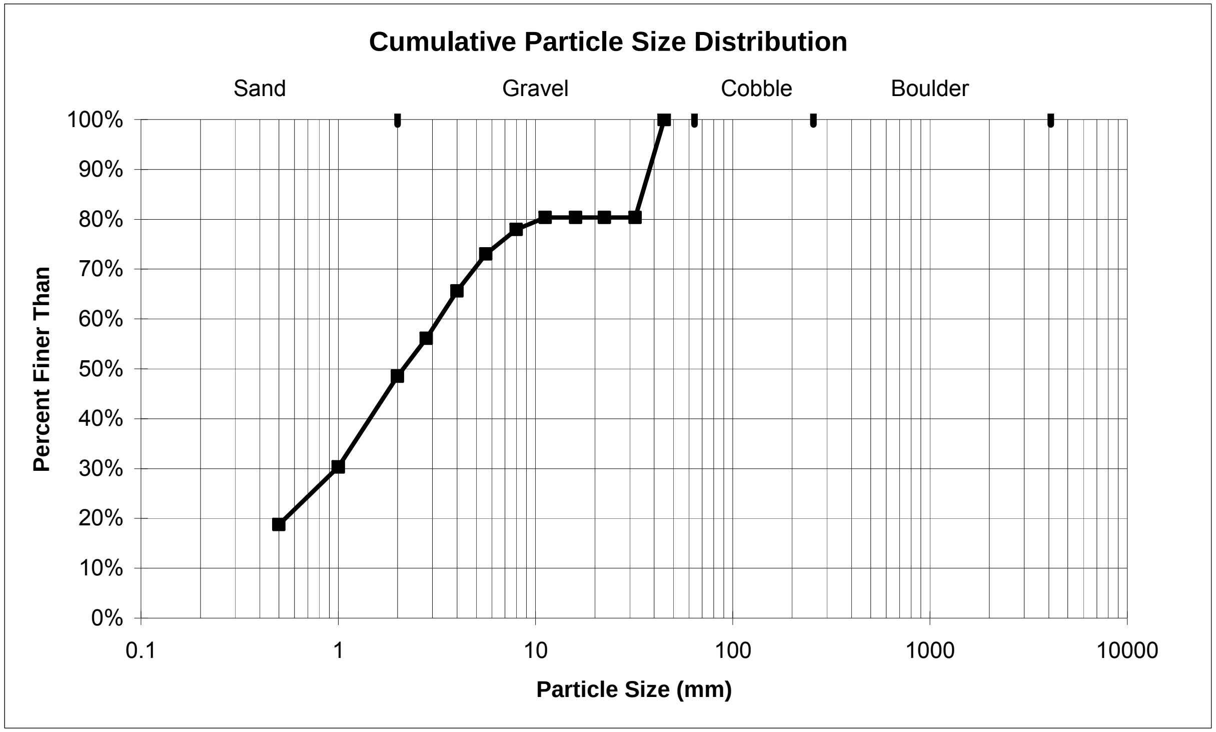
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	67.20	18.8%	
0.5	41.20	11.5%	18.8%
1.0	65.30	18.2%	30.3%
2.0	27.10	7.6%	48.5%
2.8	34.00	9.5%	56.1%
4.0	26.60	7.4%	65.6%
5.6	17.50	4.9%	73.0%
8.0	8.70	2.4%	77.9%
11.2	0	0.0%	80.4%
16.0	0	0.0%	80.4%
22.4	0	0.0%	80.4%
32.0	70.30	19.6%	80.4%
45.0			100.0%
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	357.90		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 009RA Silt Fence
DATE: 6/6/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.188	1.196	2.135	34.088	41.259	32.0



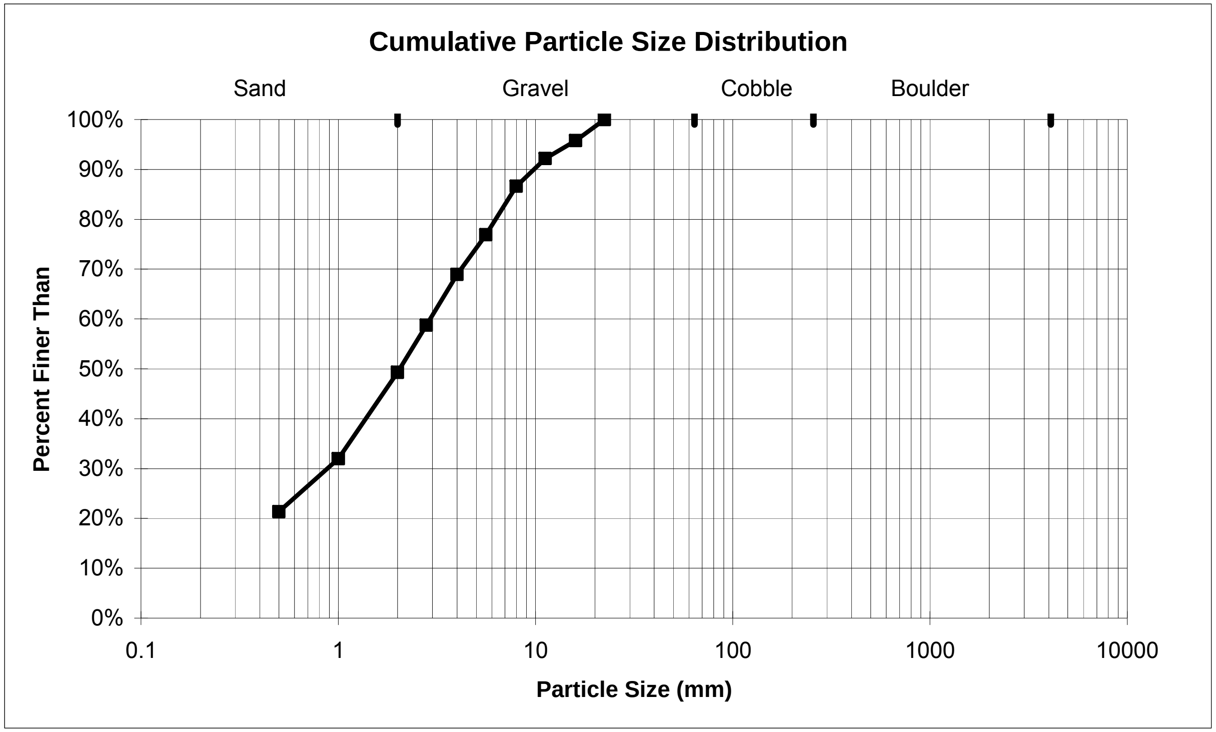
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	85.20	21.3%	
0.5	42.60	10.7%	21.3%
1.0	69.20	17.3%	32.0%
2.0	37.70	9.4%	49.3%
2.8	40.80	10.2%	58.7%
4.0	31.90	8.0%	68.9%
5.6	38.80	9.7%	76.9%
8.0	22.20	5.6%	86.6%
11.2	14.30	3.6%	92.2%
16.0	17.00	4.3%	95.7%
22.4			100.0%
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	399.70		

COMMENTS: Grab Sample of 2007 Sediment Accumulation

SITE NAME: Pike's Peak Highway - Rock Weir
ID NUMBER: 009RA Rock Weir
DATE: 8/23/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.119	**1.129**	**2.052**	**7.267**	**14.852**	**16.0**



Summary of Sediment Pond 199RW Suspended Sediment Analysis of Grab Samples on Pikes Peak, 2007 and 2008

Site ID	Date	Tin + Filter Initial (g)	Tin +Filter Final (g)	Bottle Initial (g)	Bottle Final (g)	Weight Sample (g)	Weight Solids (g)	Solids (mg/l)
199RW #1 Entrance culvert	06/12/07	1.441	1.6001	1008.6	105.4	903.2	0.1591	176.2
199RW #2 Above sed pond	06/12/07	1.4406	1.4788	992.9	105.5	887.4	0.0382	43.0
199RW #3 Exit culvert	06/12/07	1.4193	1.4235	1075.1	108.8	966.3	0.0042	4.3
199RW #1 Entrance culvert	07/12/07	1.425	1.6518	1074	105.1	968.9	0.2268	234.1
199RW #2 Above sed pond	07/12/07	1.4452	1.4652	1120.8	104.3	1016.5	0.02	19.7
199RW #3 Exit culvert	07/12/07	1.4184	1.4192	1076.3	91.4	984.9	0.0008	0.8
199RW #1 Entrance culvert	07/26/07	1.4085	1.8303	1072	106.6	965.4	0.4218	436.9
199RW #2 Above sed pond	07/26/07	1.4198	2.2855	980.1	106.2	873.9	0.8657	990.6
199RW #3 Exit culvert	07/26/07	1.4454	1.4575	818.6	105.6	713.0	0.0121	17.0
199RW #1 Entrance culvert	08/02/07	1.4202	3.3702	1117.1	107.2	1009.9	1.95	1930.9
199RW #2 Above sed pond	08/02/07	1.4105	3.2872	1110.4	107.3	1003.1	1.8767	1870.9
199RW #3 Exit culvert	08/02/07	1.4283	1.4314	1109.3	105.6	1003.7	0.0031	3.1
199RW #1 Entrance culvert	08/13/07	1.4531	1.5850	1056.8	107.1	949.7	0.1319	138.9
199RW #2 Above sed pond	08/13/07	1.4345	1.8253	1054.2	105.3	948.9	0.3908	411.8
199RW #3 Exit culvert	08/13/07	1.4298	1.4313	1162.6	106.7	1055.9	0.0015	1.4
199RW #1 Entrance culvert	06/05/08	1.4490	1.5944	881.4	81.1	800.3	0.1454	181.7
199RW #2 Above sed pond	06/05/08	1.4327	1.5006	963.5	80.0	883.5	0.0679	76.9
199RW #3 Exit culvert	06/05/08	1.4249	1.5747	1015.9	79.9	936.0	0.1498	160.0
199RW #1 Entrance culvert	07/14/08	1.4394	2.0492	1025.7	106.4	919.3	0.6098	663.3
199RW #2 Above sed pond	07/14/08	1.4158	1.7801	1091.4	104.6	986.8	0.3643	369.2
199RW #3 Exit culvert	07/14/08	1.4151	1.4193	960.1	107.5	852.6	0.0042	4.9
199RW #1 Entrance culvert	07/27/08	1.4156	2.9359	1015.9	107.3	908.6	1.5203	1673.2
199RW #2 Above sed pond	07/27/08	1.4159	1.6084	997.1	107.3	889.8	0.1925	216.3
199RW #3 Exit culvert †	07/27/08							
199RW #1 Entrance culvert	08/18/08	1.4326	1.5605	928.1	79.4	848.7	0.1279	150.7
199RW #2 Above sed pond	08/18/08	1.4382	4.0652	957.4	79.7	877.7	2.6270	2993.1
199RW #3 Exit culvert	08/18/08	1.4074	1.5454	916.2	81.4	834.8	0.1380	165.3

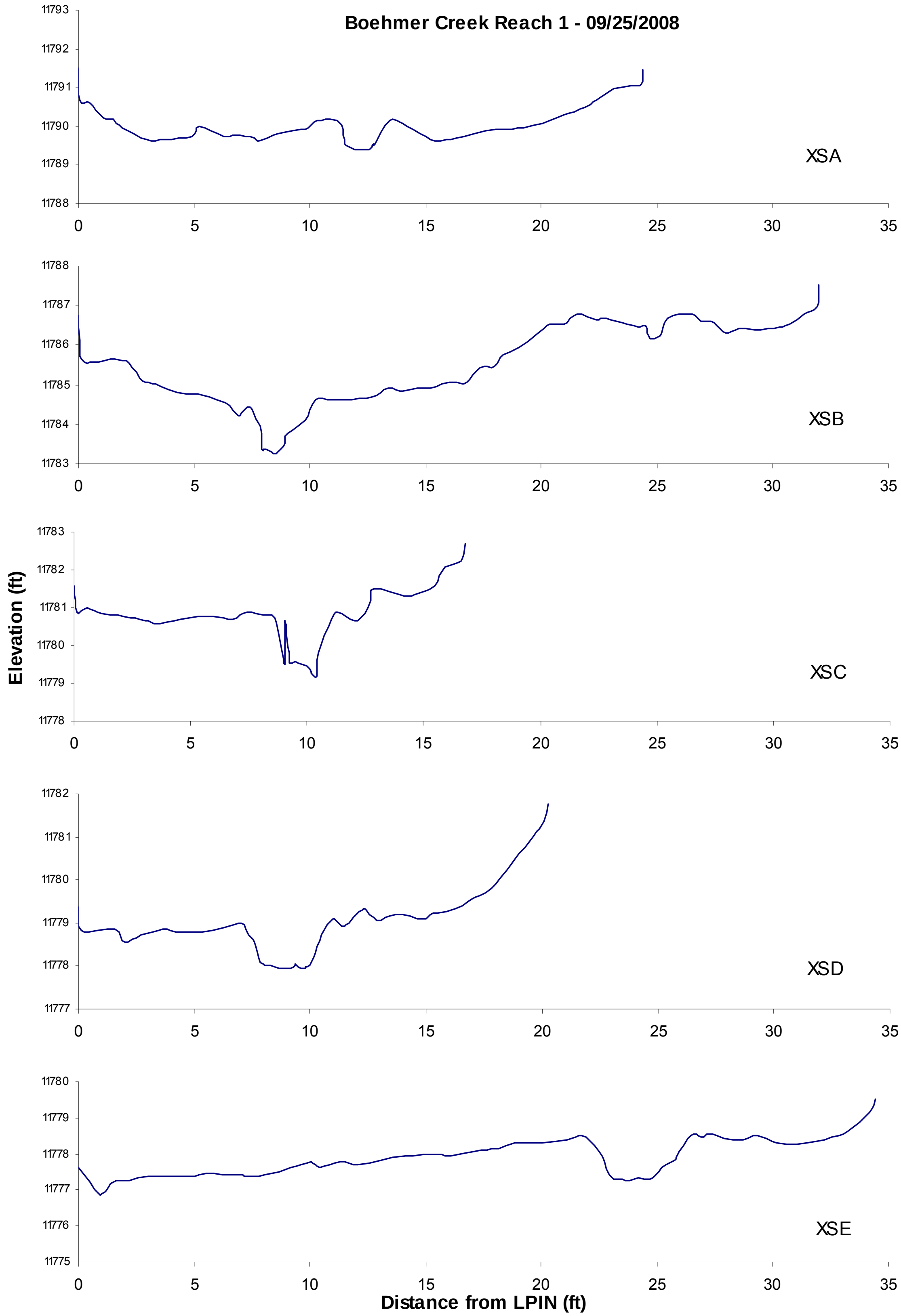
† No measurable outflow available for collection from exit culvert

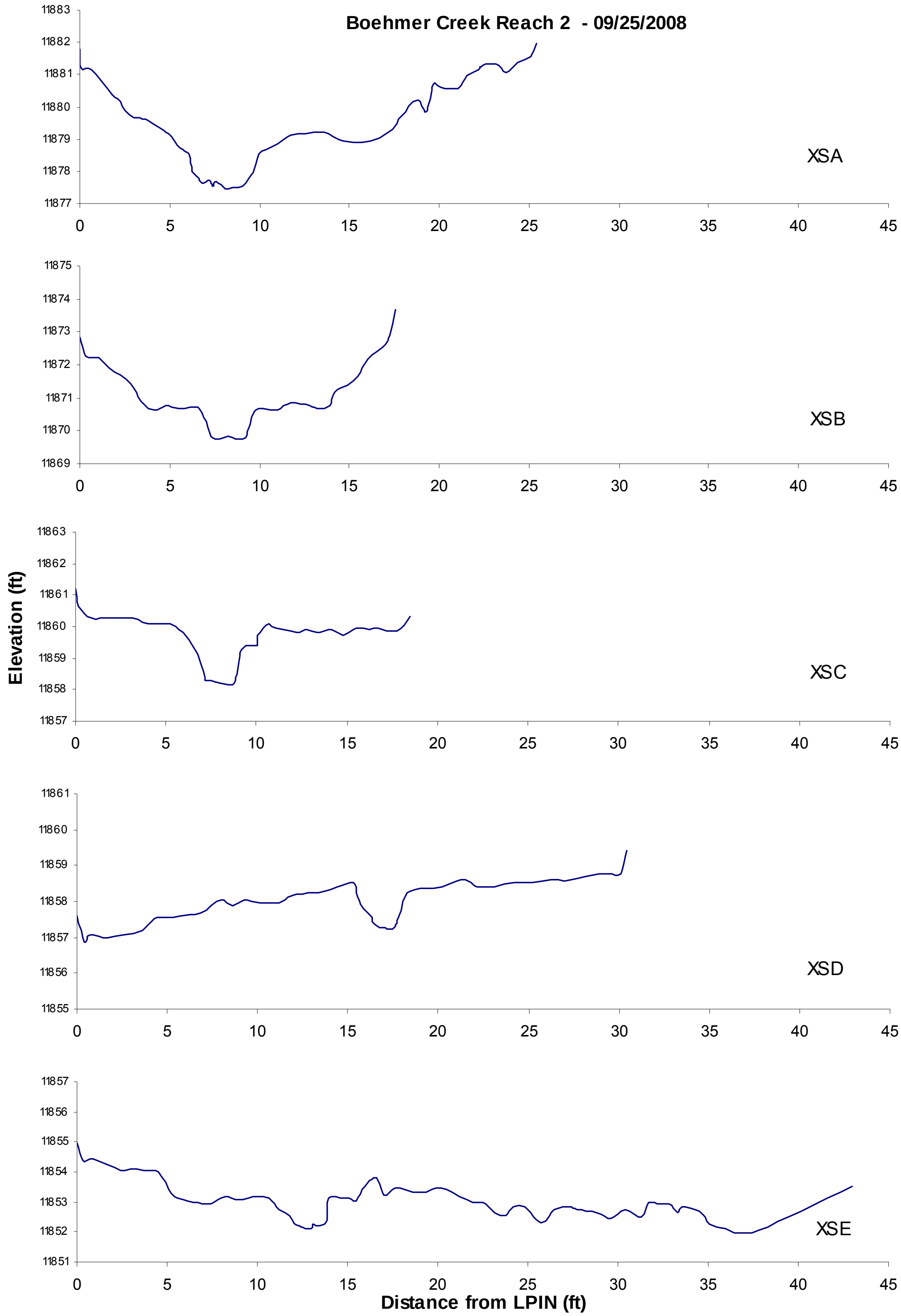
Appendix L

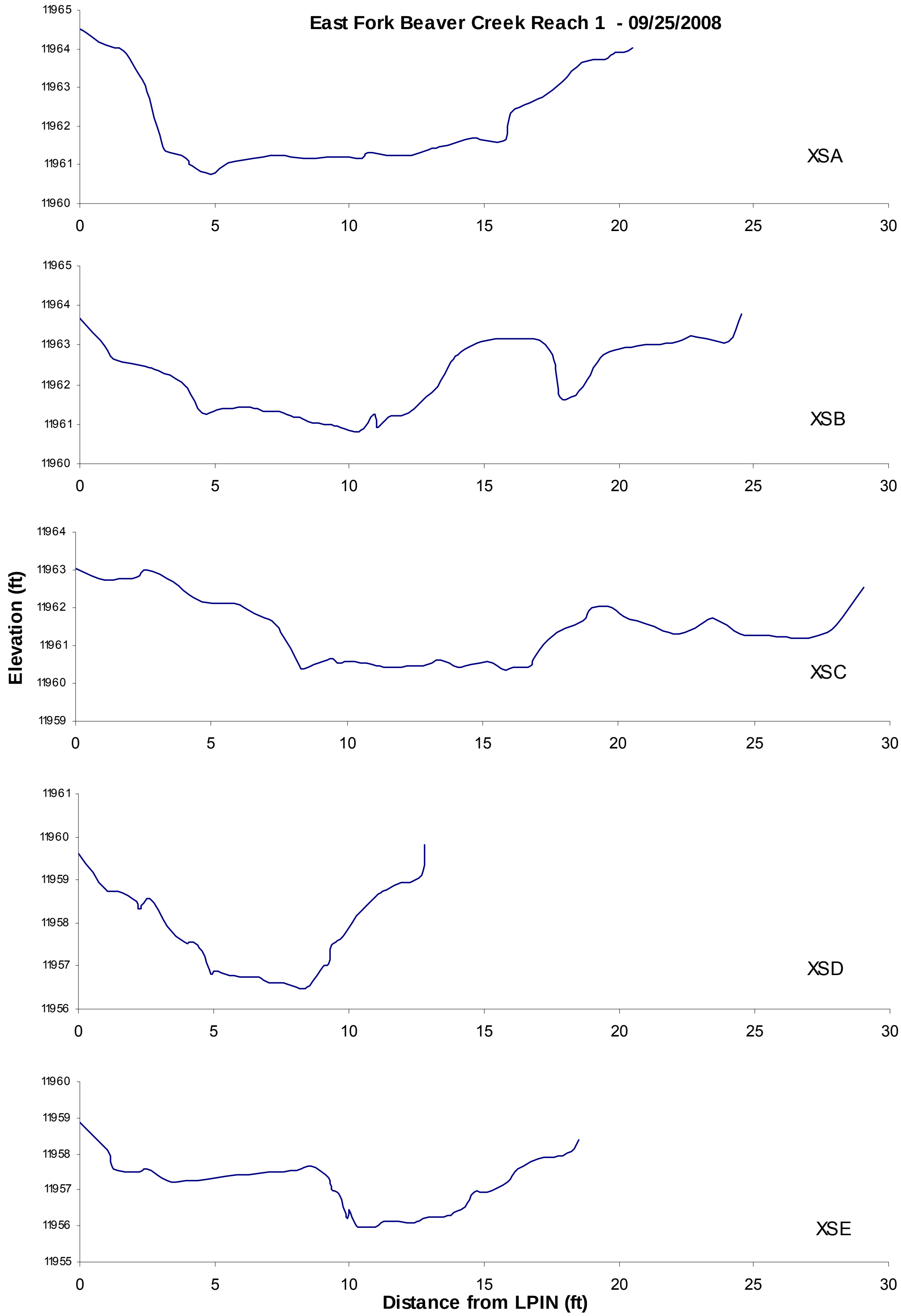
Stream Channel

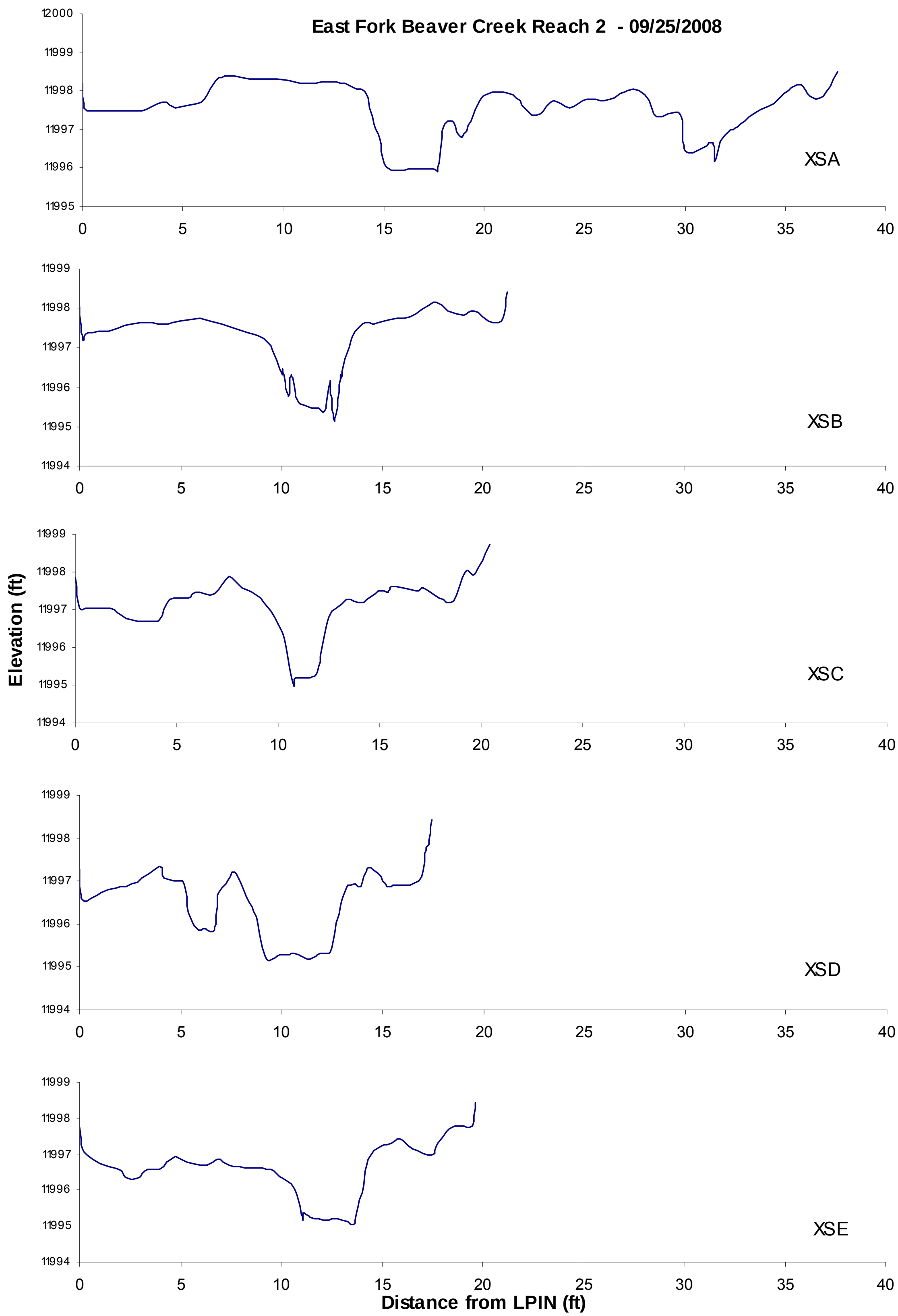
Cross Section Graphs

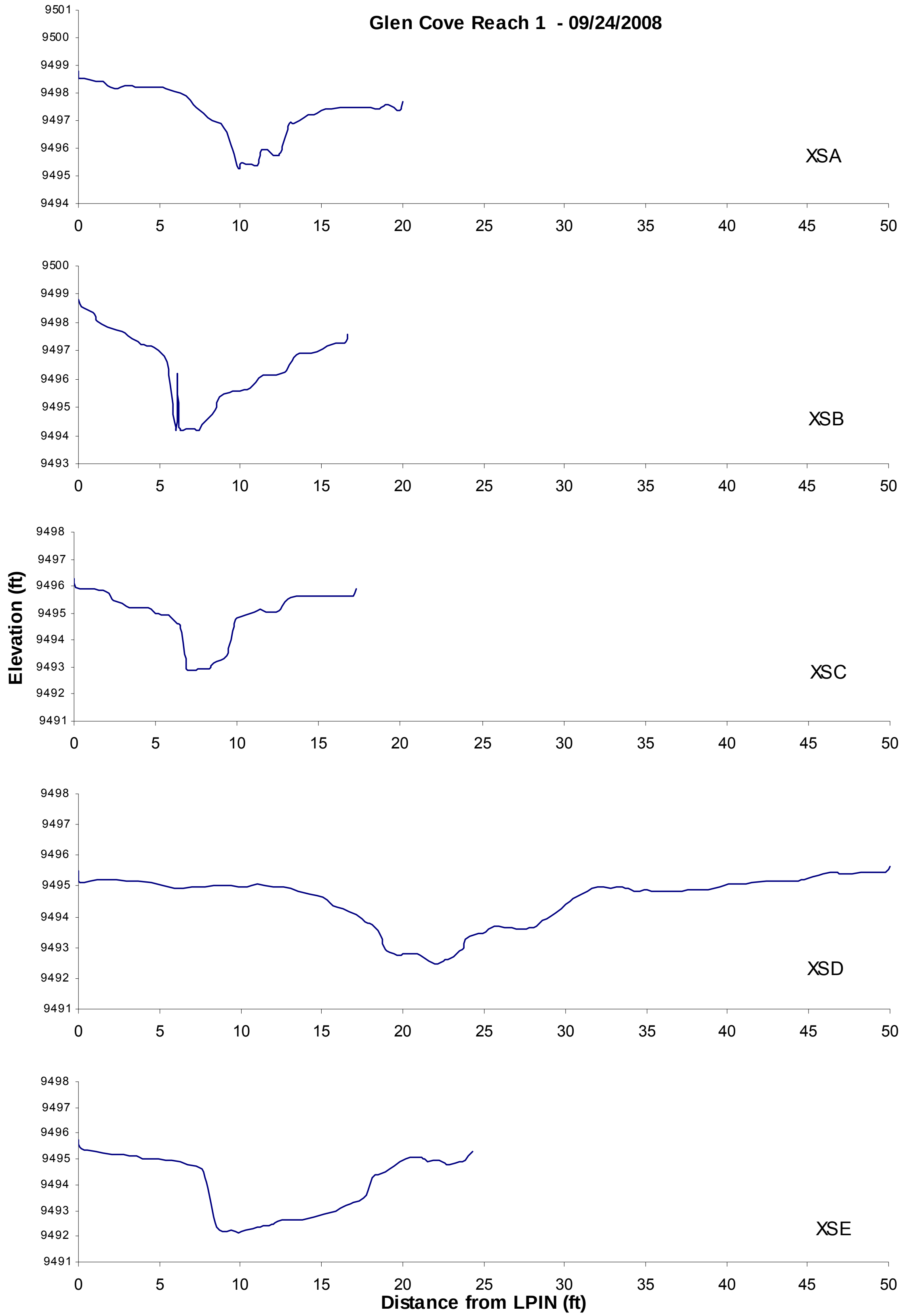
2008


Boehmer Creek Reach 1 - 09/25/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
11793
11792
11791
11790
11789
11788
11787
11786
11785
11784
11783
11782
11781
11780
11779
11778
11777
11776
11775
0
5
10
15
20
25
30
35

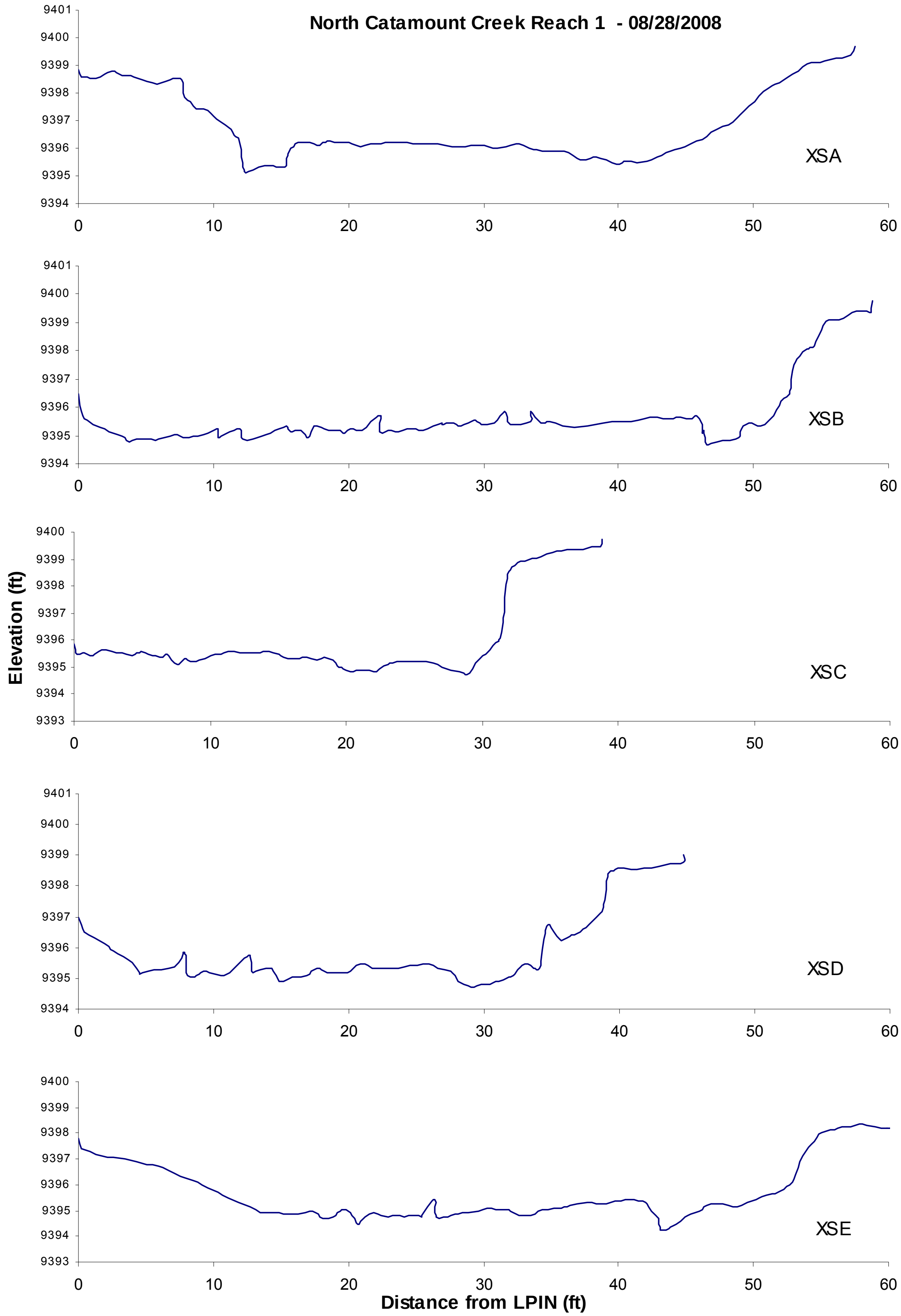

Boehmer Creek Reach 2 - 09/25/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


East Fork Beaver Creek Reach 1 - 09/25/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

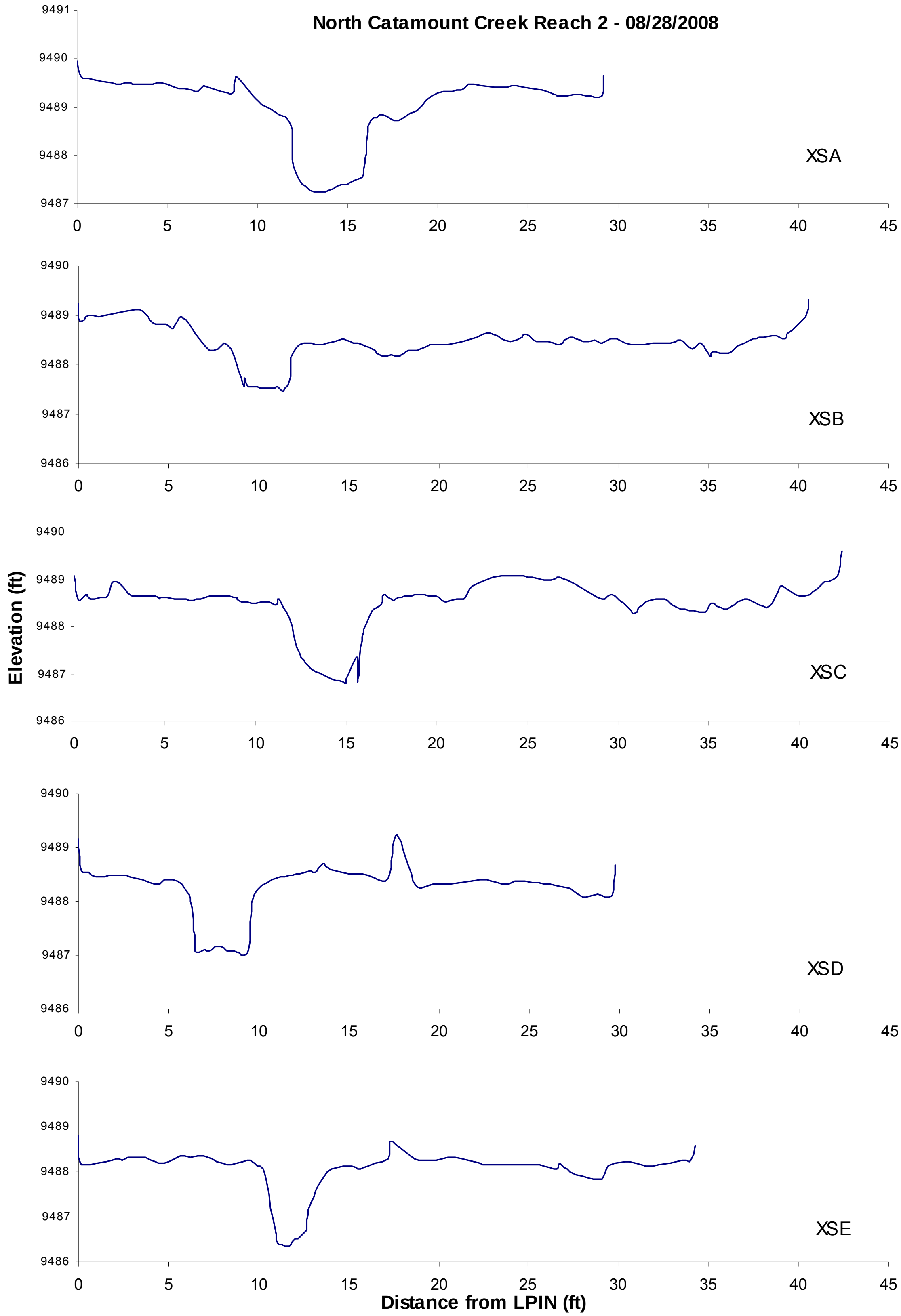

East Fork Beaver Creek Reach 2 - 09/25/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE

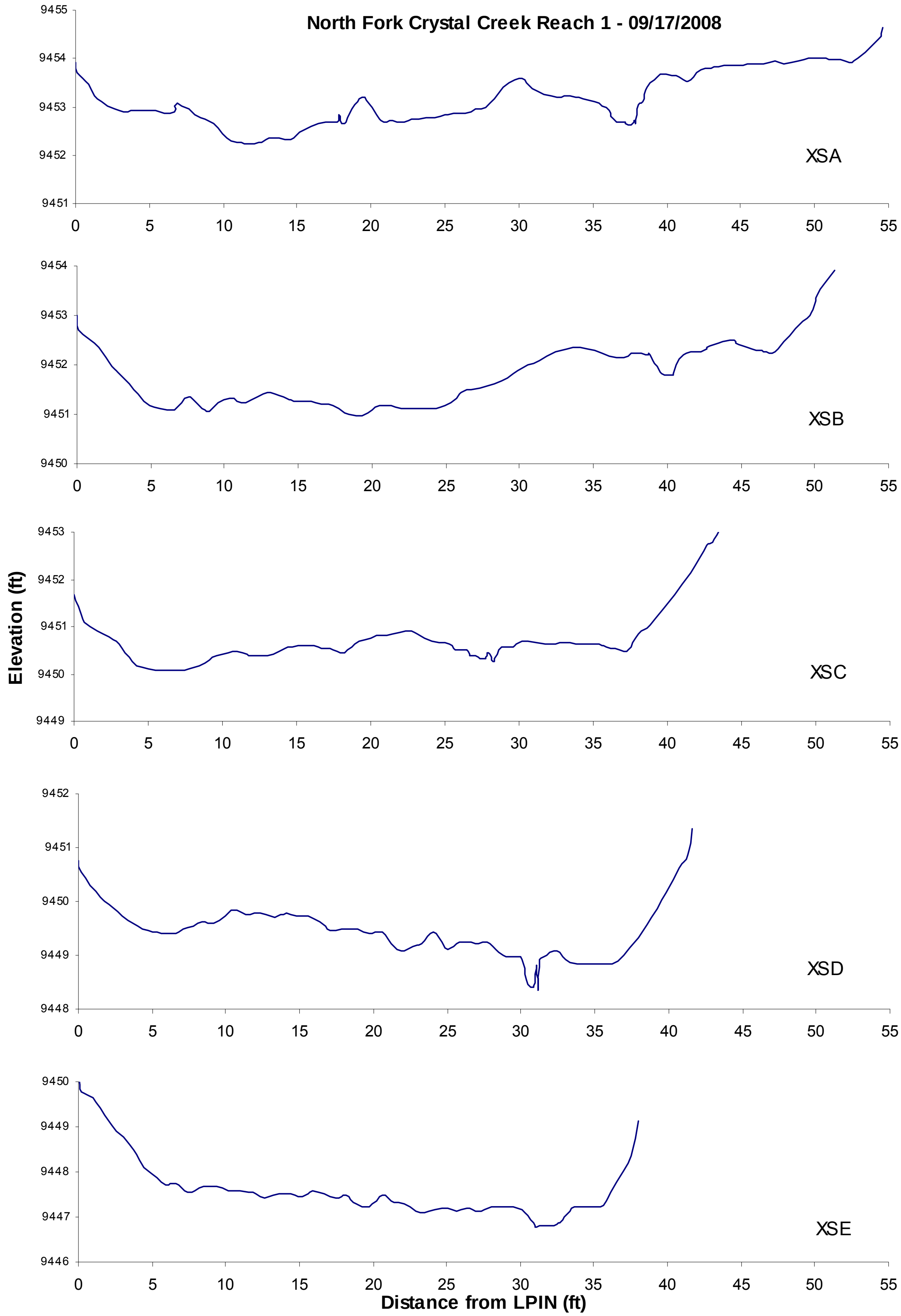


Glen Cove Reach 1 - 09/24/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE

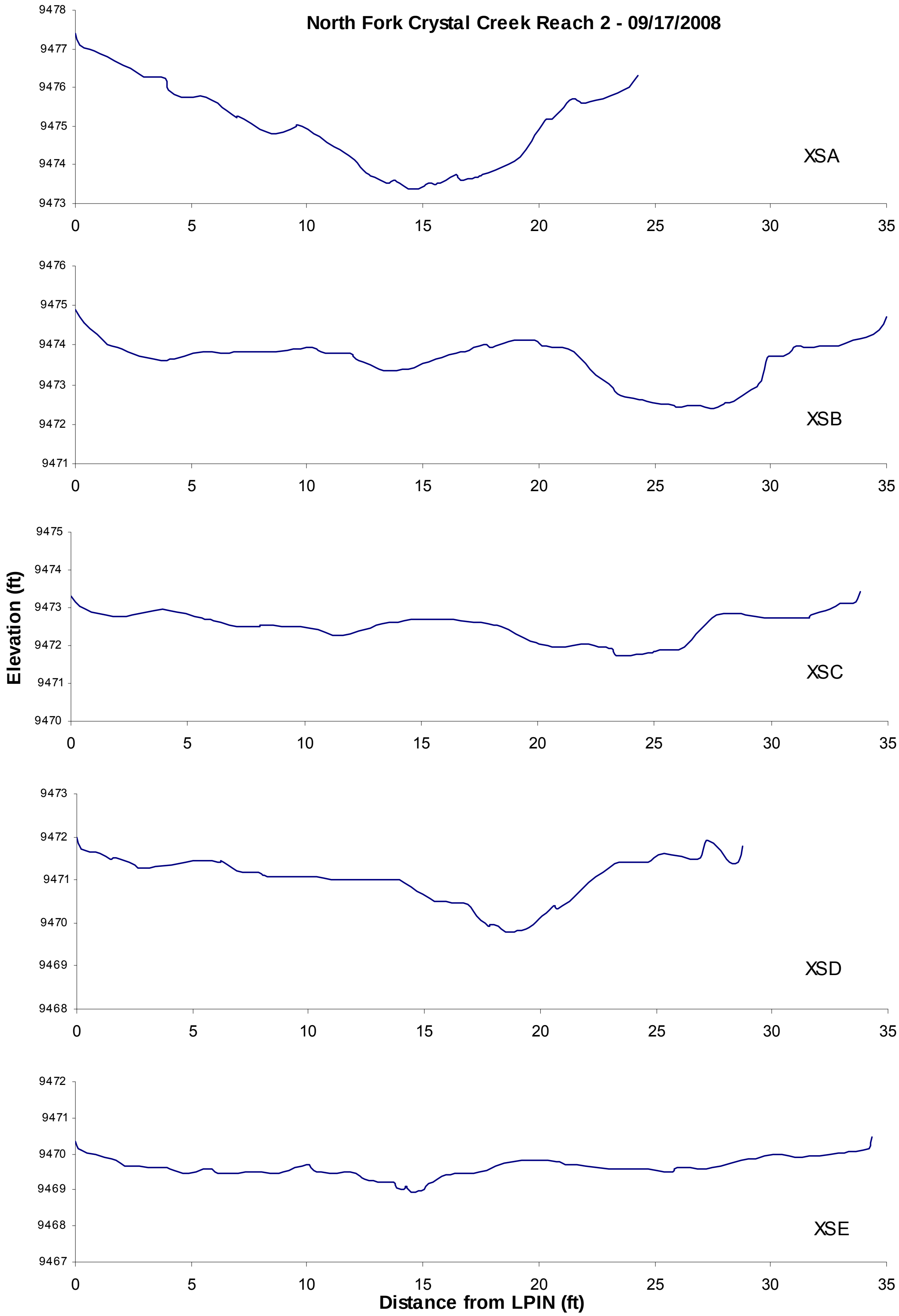


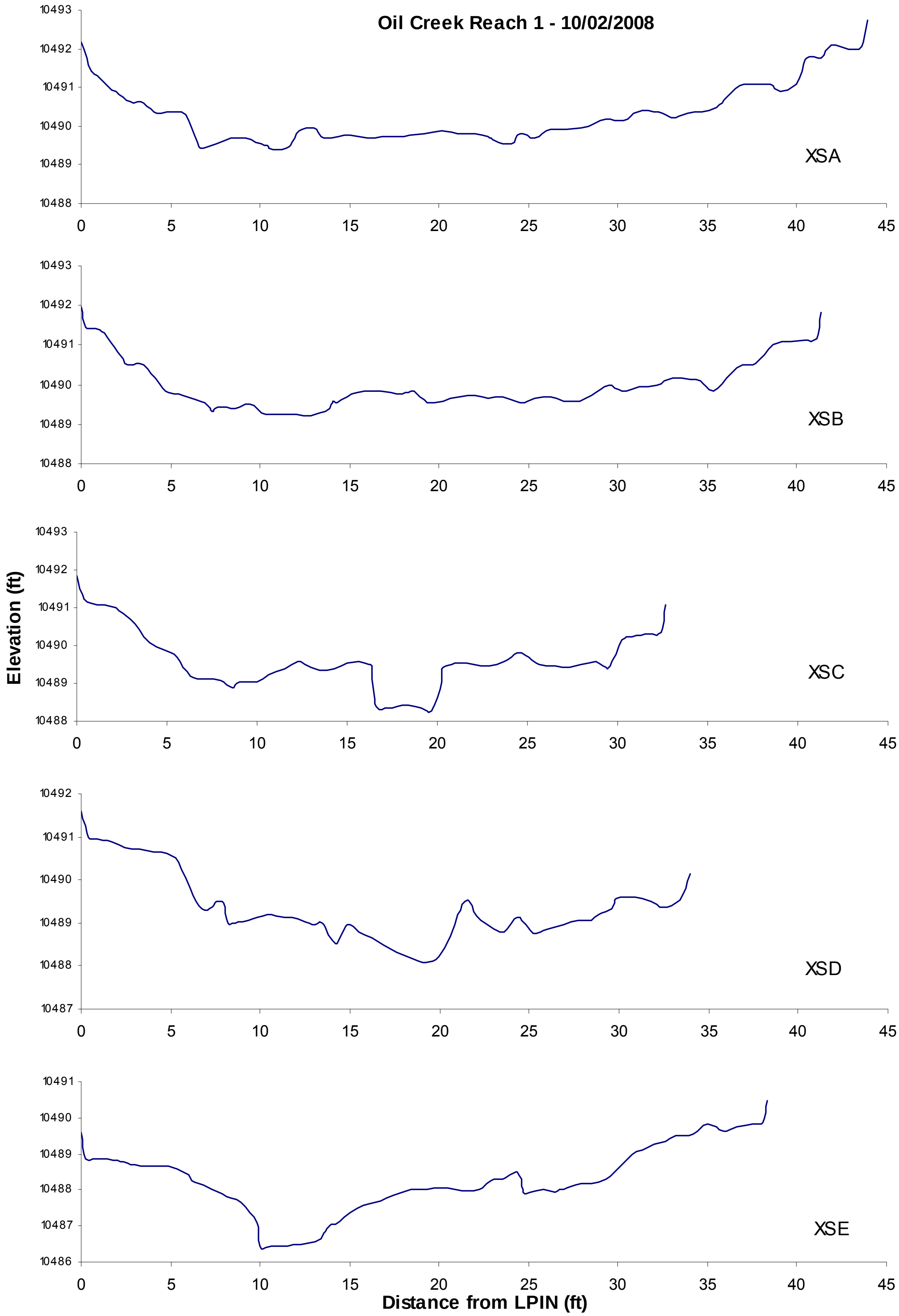
North Catamount Creek Reach 1 - 08/28/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
9401
9400
9399
9398
9397
9396
9395
9394
9393
0
10
20
30
40
50
60


North Catamount Creek Reach 2 - 08/28/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

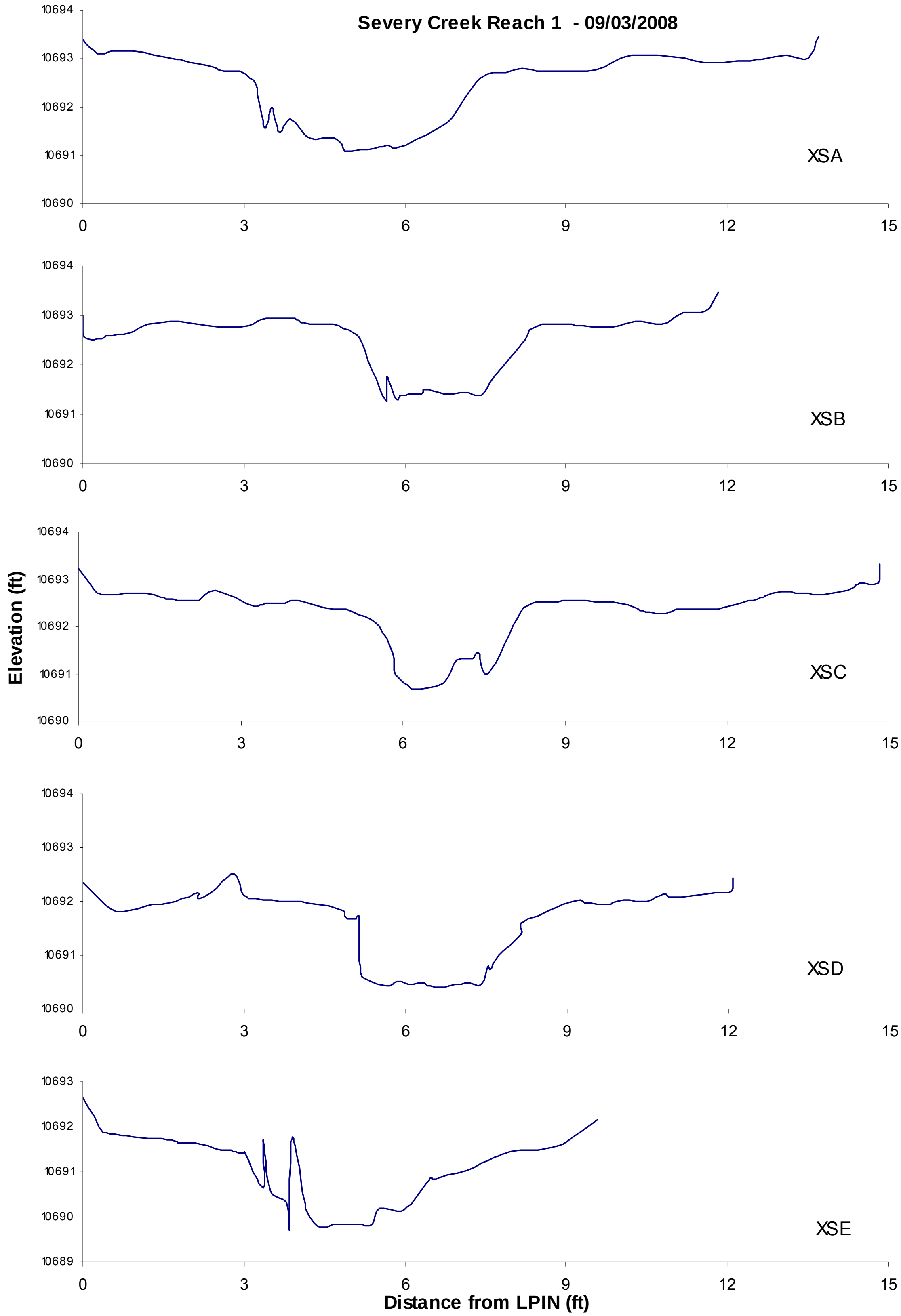


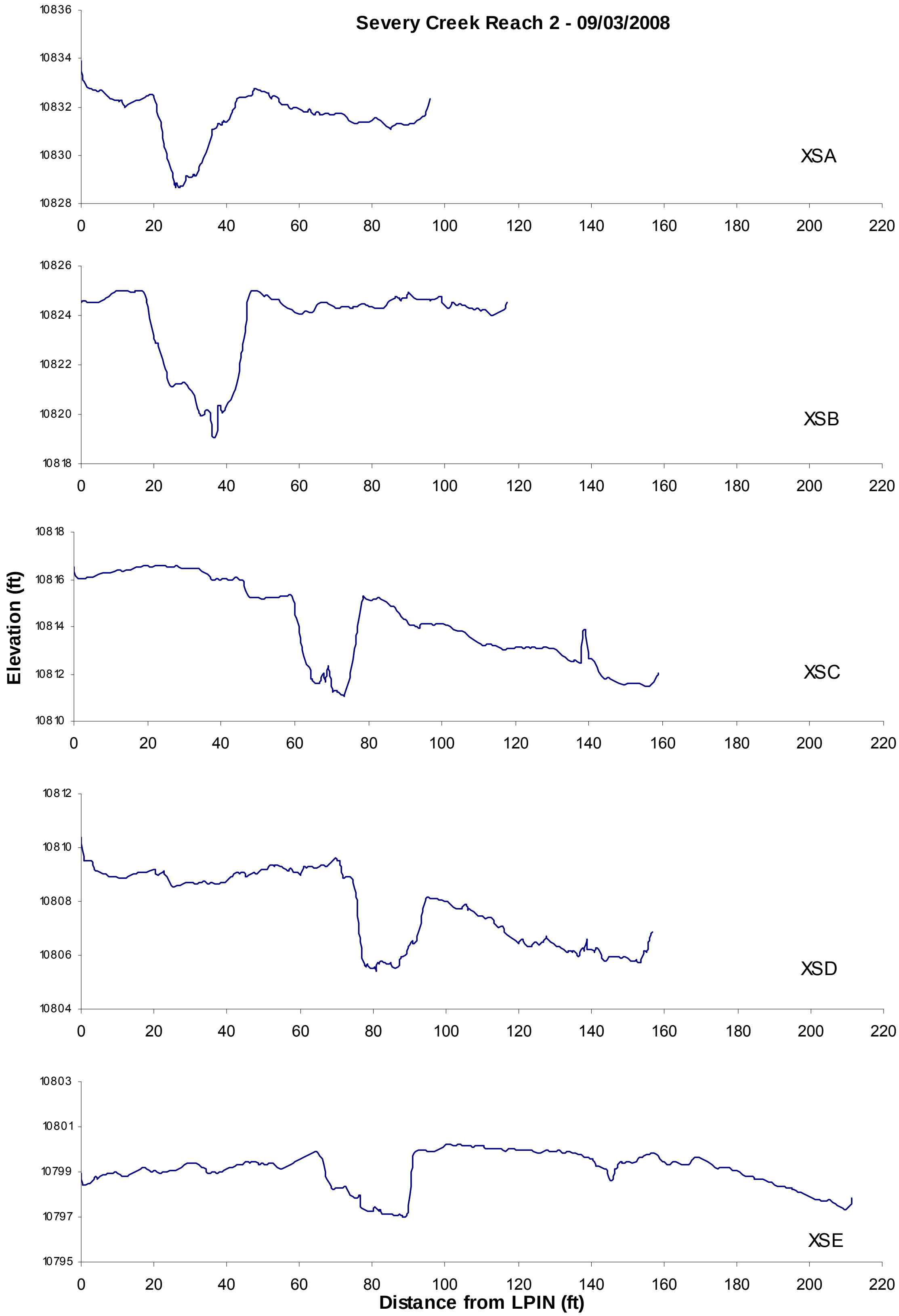
North Fork Crystal Creek Reach 1 - 09/17/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

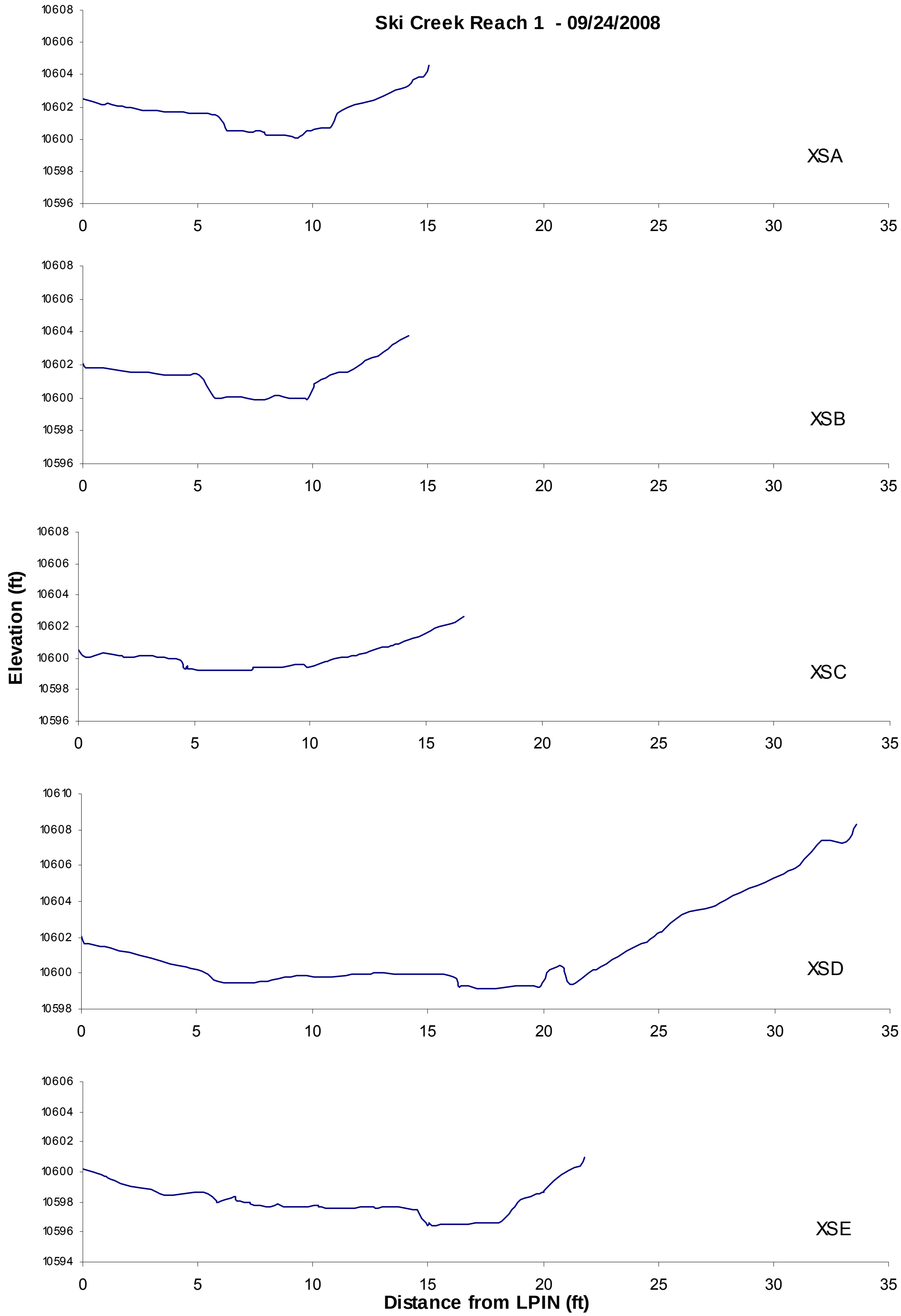

North Fork Crystal Creek Reach 2 - 09/17/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9478
9477
9476
9475
9474
9473
9472
9471
9470
9469
9468
9467
0
5
10
15
20
25
30
35

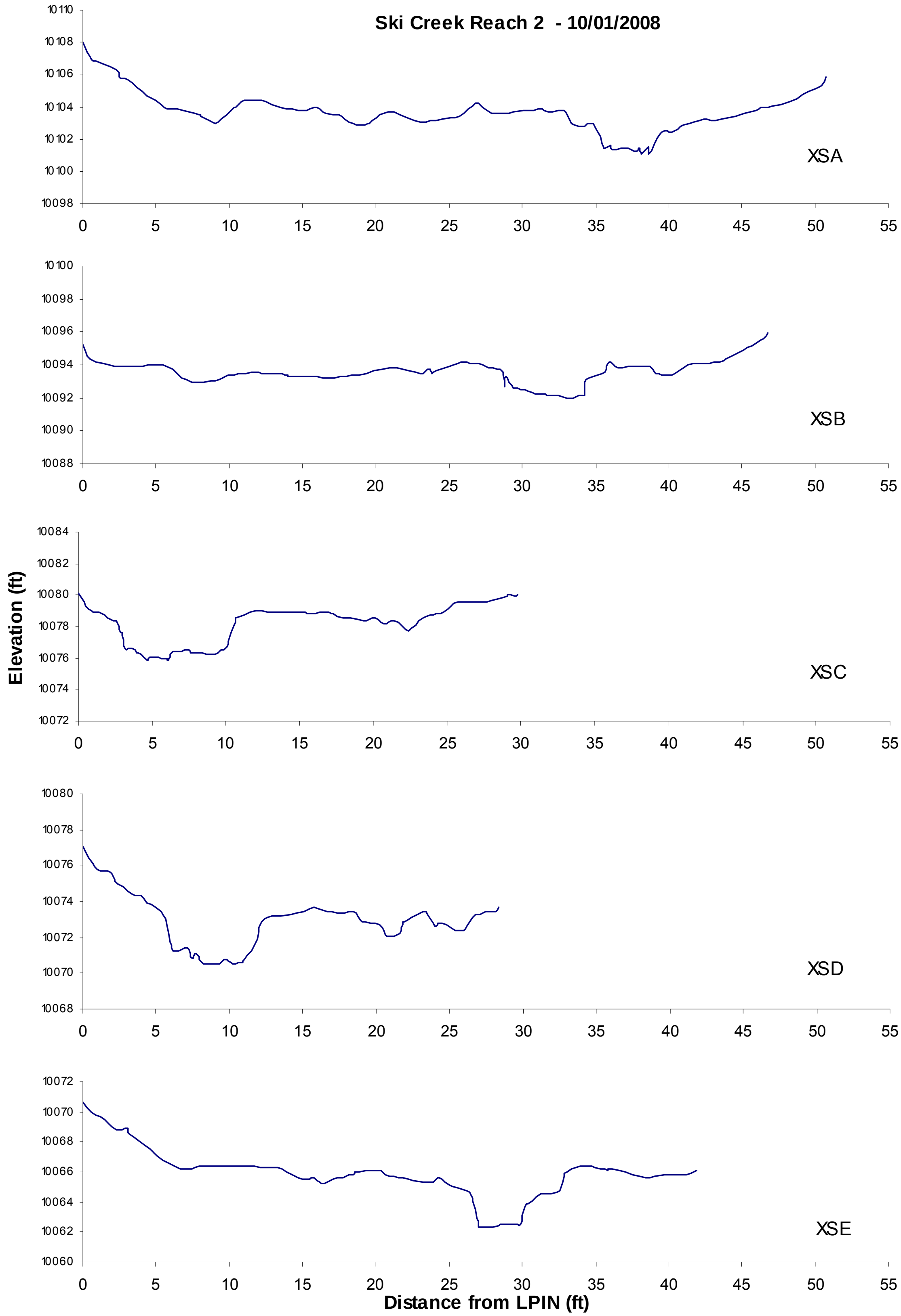


Oil Creek Reach 1 - 10/02/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

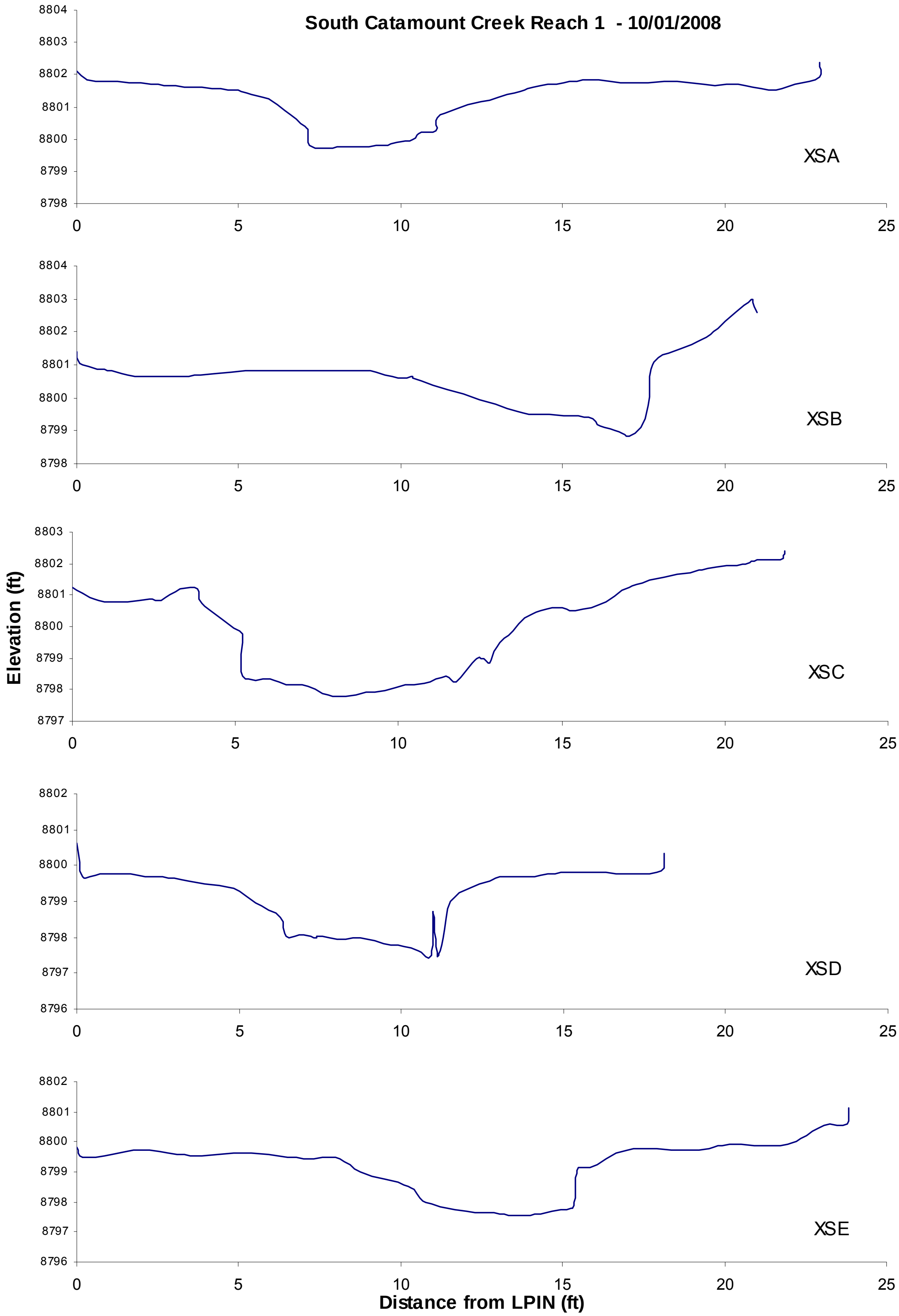

Severy Creek Reach 1 - 09/03/2008
Elevation (ft)
XSA
XSB
XSC
XSD
XSE
Distance from LPIN (ft)

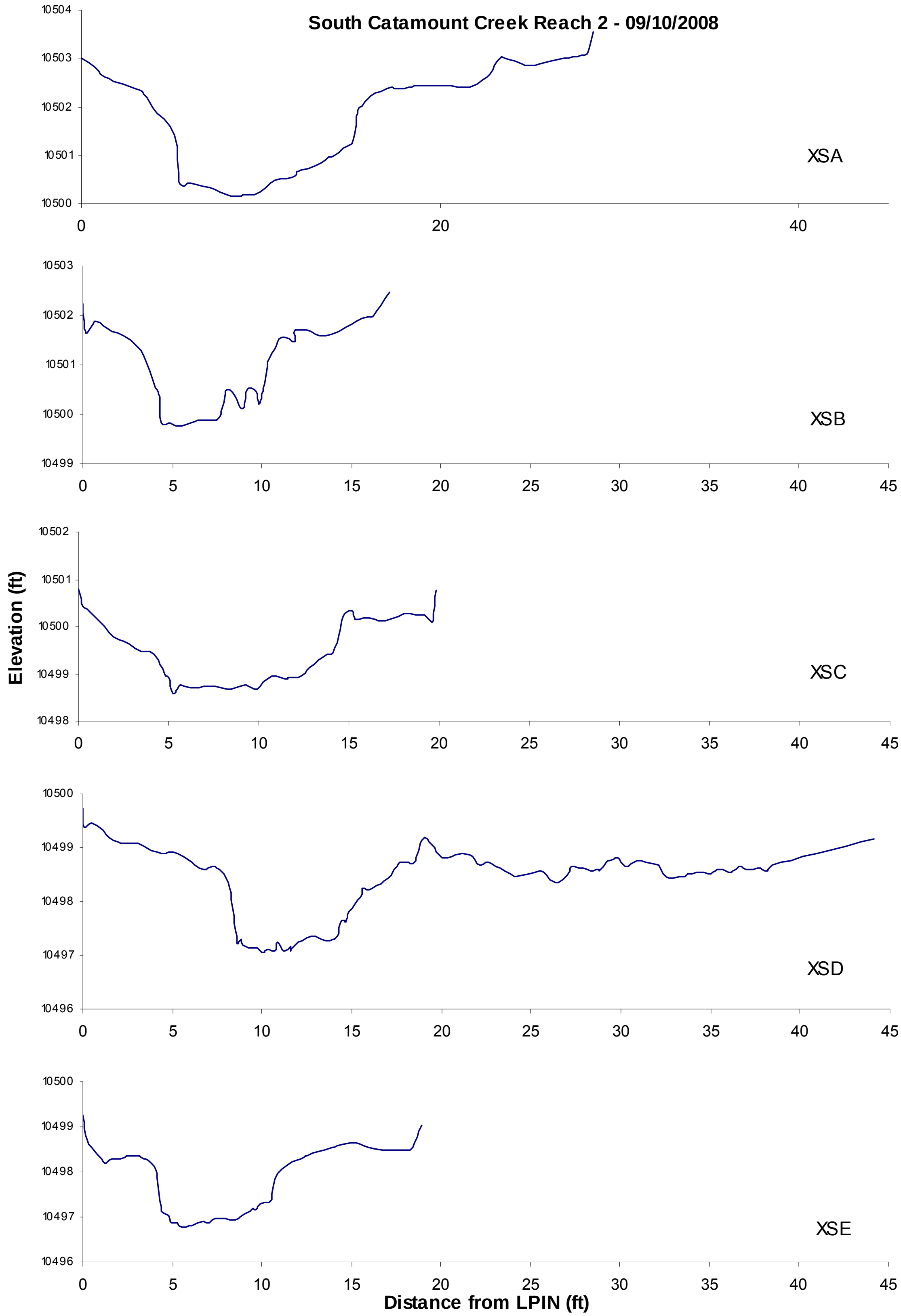

Severy Creek Reach 2 - 09/03/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)

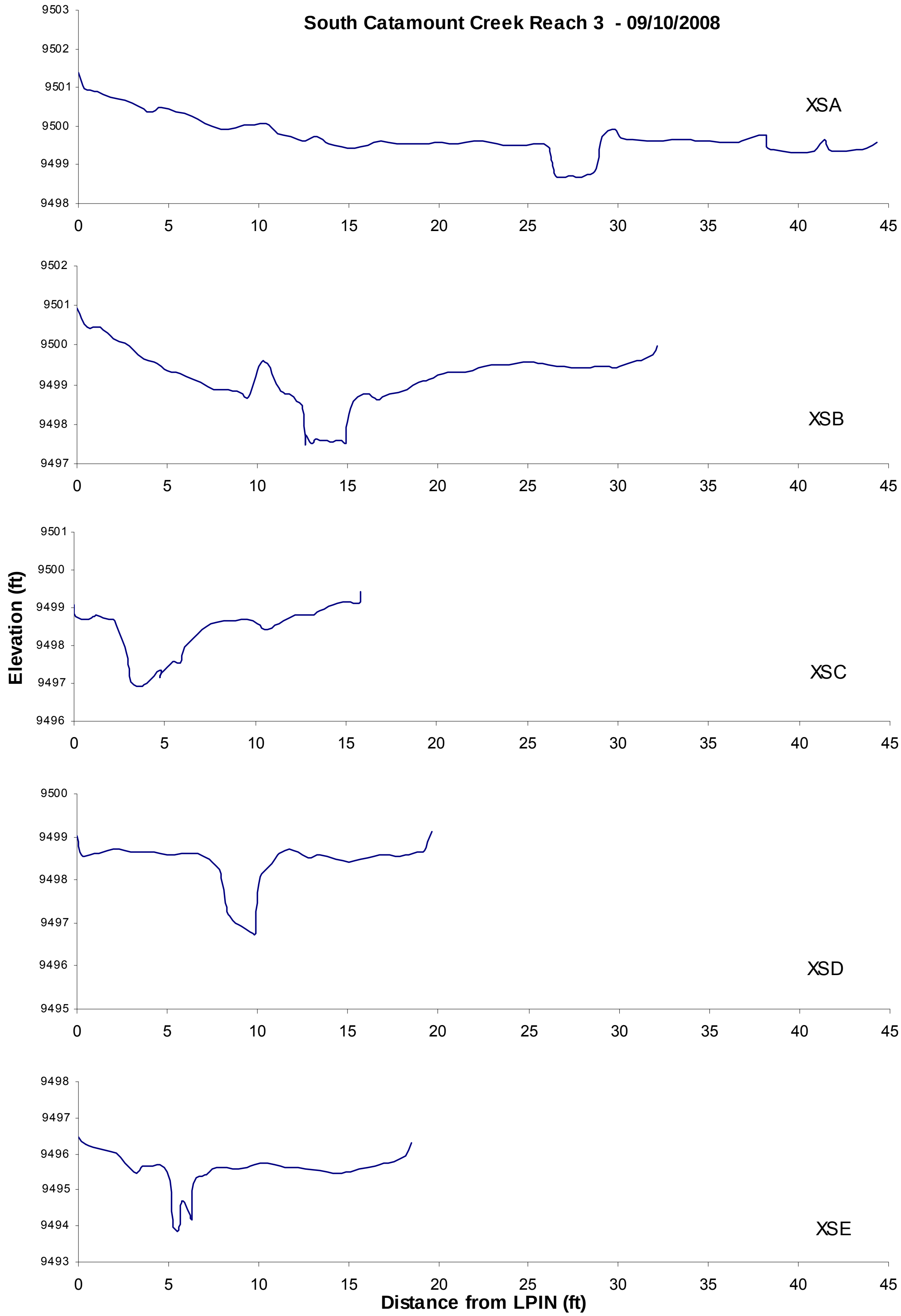

Ski Creek Reach 1 - 09/24/2008
Elevation (ft)
XSA
XSB
XSC
XSD
XSE
Distance from LPIN (ft)
0
5
10
15
20
25
30
35
10596
10598
10600
10602
10604
10606
10608
10610
10594

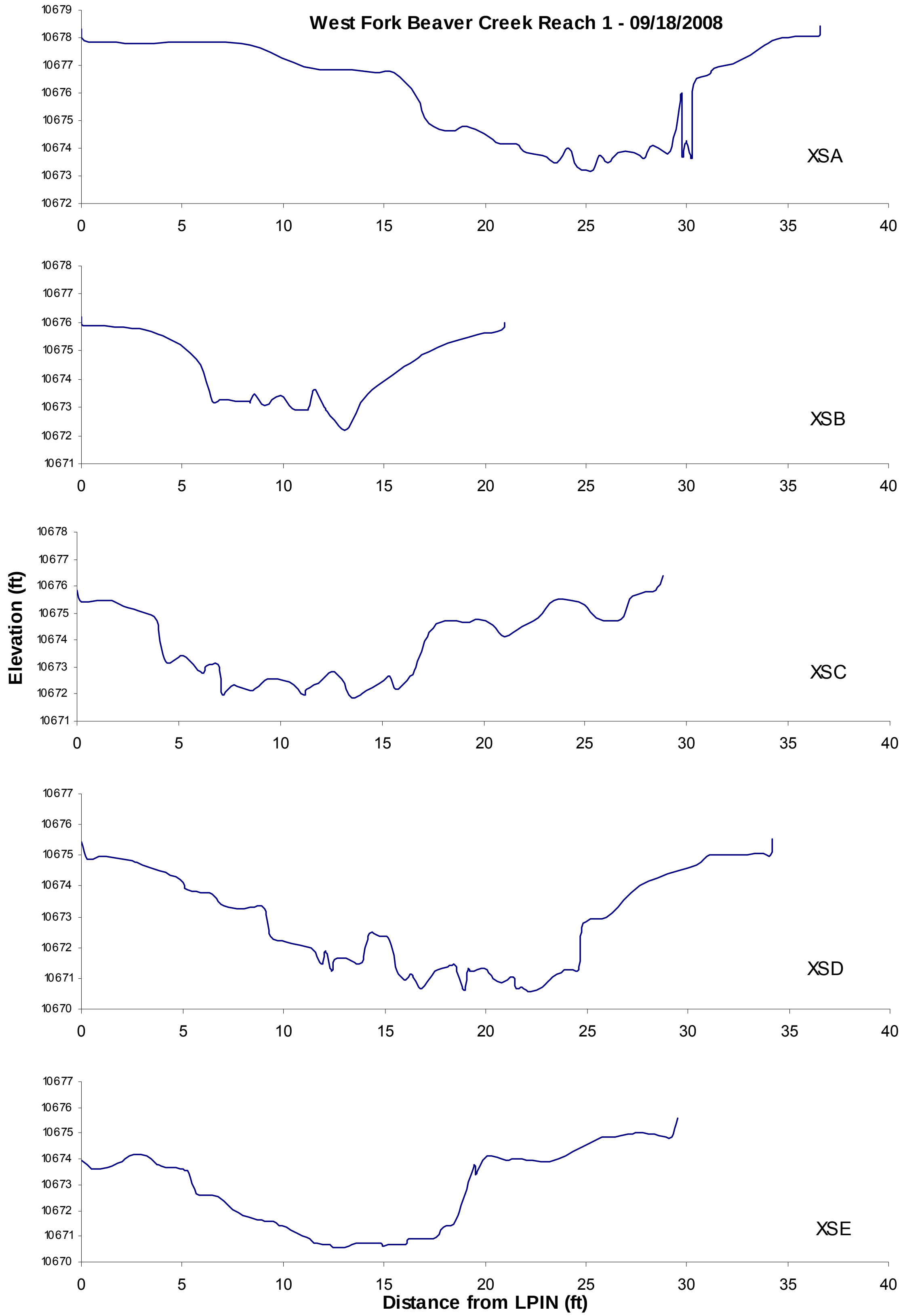


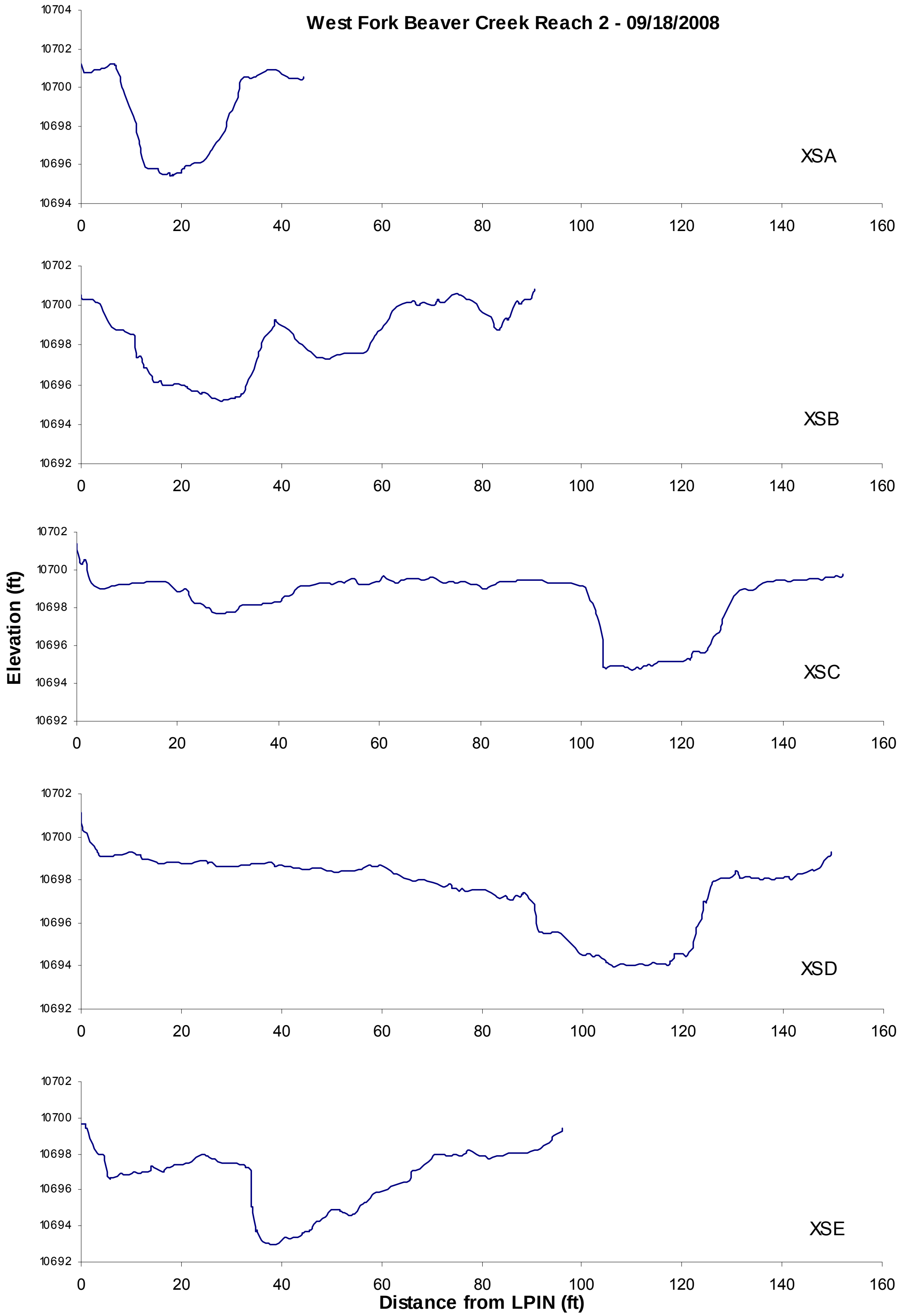
Ski Creek Reach 2 - 10/01/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


South Catamount Creek Reach 1 - 10/01/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
8804
8803
8802
8801
8800
8799
8798
8797
8796
0
5
10
15
20
25


South Catamount Creek Reach 2 - 09/10/2008
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
45


South Catamount Creek Reach 3 - 09/10/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)
9503
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 - 09/18/2008
XSA
XSB
XSC
XSD
XSE
Elevation (ft)
Distance from LPIN (ft)


West Fork Beaver Creek Reach 2 - 09/18/2008
Elevation (ft)
Distance from LPIN (ft)
XSA
XSB
XSC
XSD
XSE
10704
10702
10700
10698
10696
10694
10692
0
20
40
60
80
100
120
140
160

Appendix M

Stream Pebble Count

Particle Size Distribution Graphs

2008

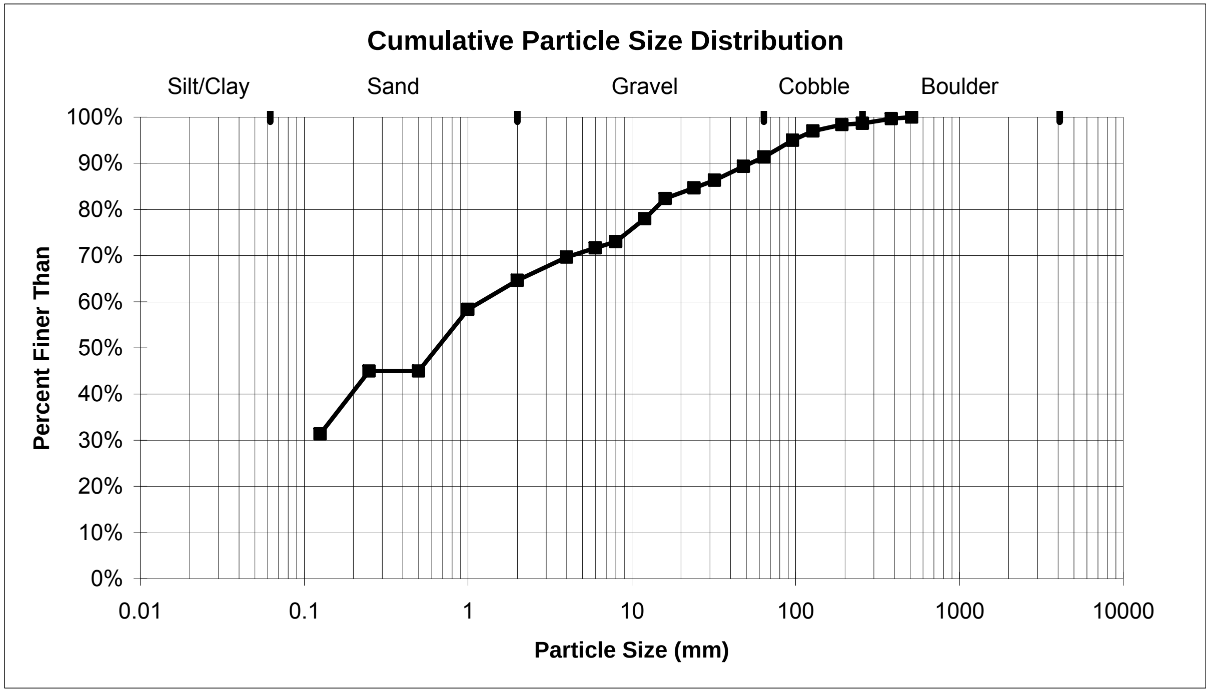
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	94	31.3%	
0.062 - 0.125	0	0.0%	31%
0.125 - 0.25	41	13.7%	45%
0.25 - .5	0	0.0%	45%
0.5 - 1.0	40	13.3%	58%
1 - 2	19	6.3%	65%
2 - 4	15	5.0%	70%
4 - 6	6	2.0%	72%
6 - 8	4	1.3%	73%
8 - 12	15	5.0%	78%
12 - 16	13	4.3%	82%
16 - 24	7	2.3%	85%
24 - 32	5	1.7%	86%
32 - 48	9	3.0%	89%
48 - 64	6	2.0%	91%
64 - 96	11	3.7%	95%
96 - 128	6	2.0%	97%
128 - 192	4	1.3%	98%
192 - 256	1	0.3%	99%
256 - 384	3	1.0%	100%
384 - 512	1	0.3%	100%
512 - 1024			
1024 - 2048			
2048 - 4096			
Total	300.00		

COMMENTS: ERO Reach

STREAM NAME: Pike's Peak Highway - Boehmer Creek Reach 1
ID NUMBER: BHMR1
DATE: 9/25/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.087	0.151	0.648	21.375	96.000	482.0



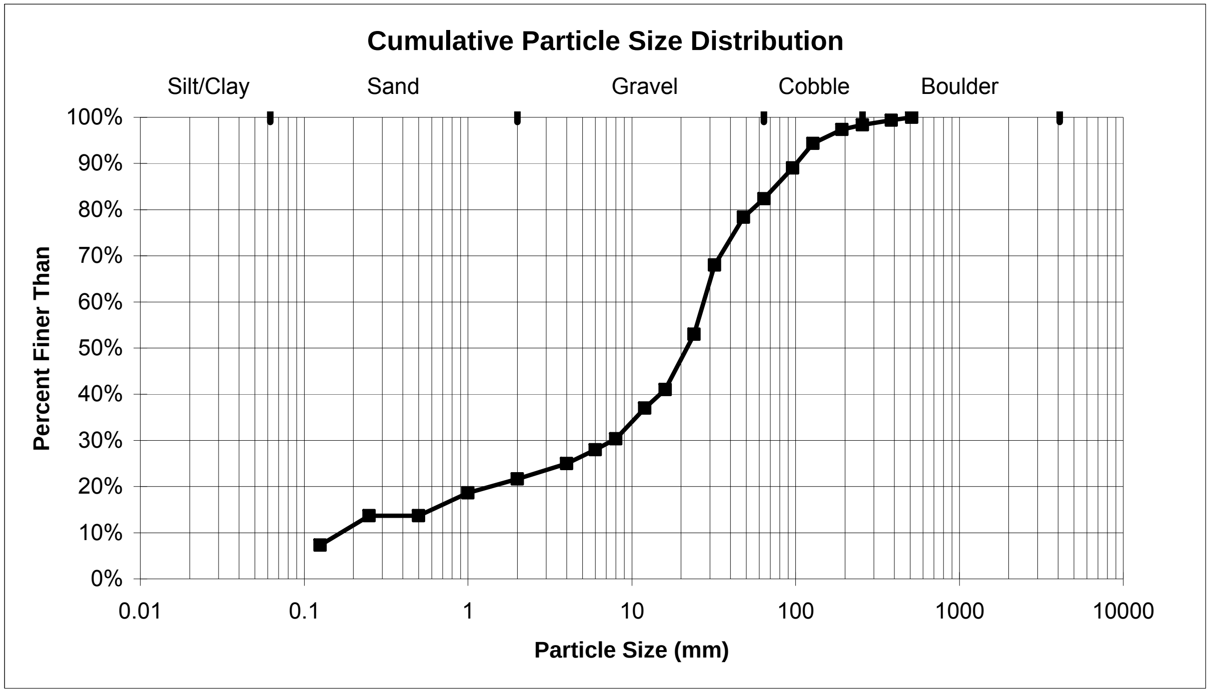
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	22	7.3%	
0.062 - 0.125	0	0.0%	7%
0.125 - 0.25	19	6.3%	14%
0.25 - .5	0	0.0%	14%
0.5 - 1.0	15	5.0%	19%
1 - 2	9	3.0%	22%
2 - 4	10	3.3%	25%
4 - 6	9	3.0%	28%
6 - 8	7	2.3%	30%
8 - 12	20	6.7%	37%
12 - 16	12	4.0%	41%
16 - 24	36	12.0%	53%
24 - 32	45	15.0%	68%
32 - 48	31	10.3%	78%
48 - 64	12	4.0%	82%
64 - 96	20	6.7%	89%
96 - 128	16	5.3%	94%
128 - 192	9	3.0%	97%
192 - 256	3	1.0%	98%
256 - 384	3	1.0%	99%
384 - 512	2	0.7%	100%
512 - 1024			
1024 - 2048			
2048 - 4096			
Total	300.00		

COMMENTS: Second reach 500 ft upstream of ERO Reach

STREAM NAME: Pike's Peak Highway - Boehmer Creek Reach 2
ID NUMBER: BHMR2
DATE: 9/25/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.602	10.626	21.686	70.828	140.069	450.0



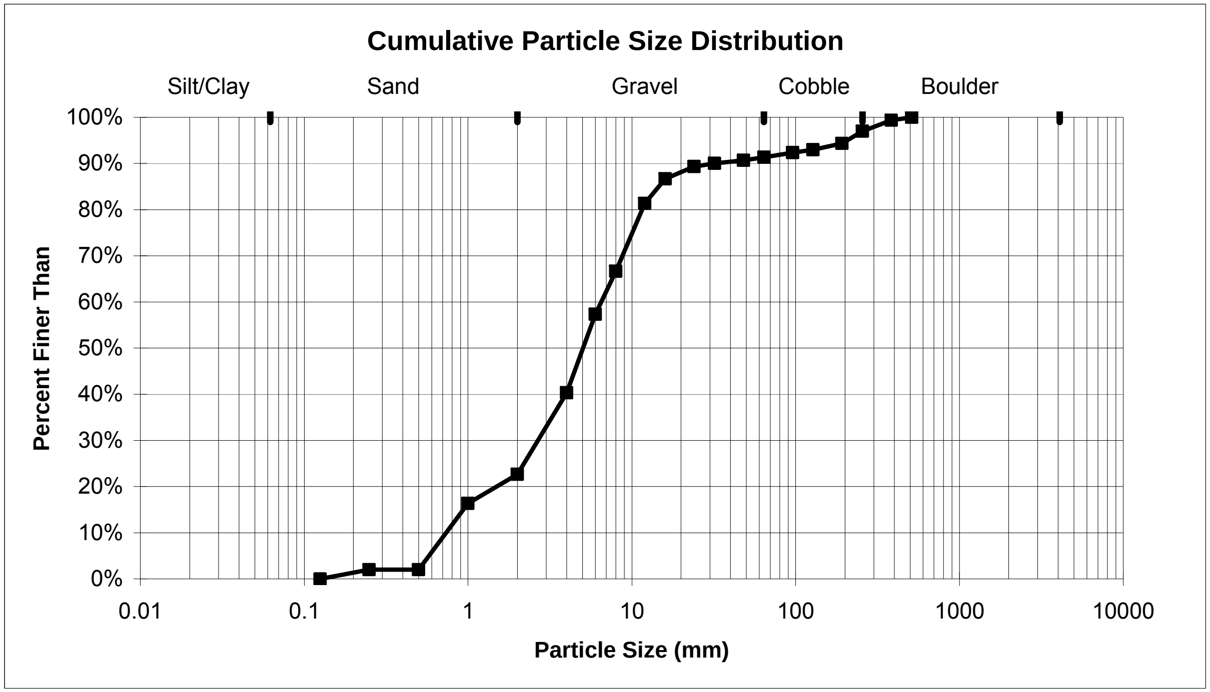
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	0	0.0%	
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	6	2.0%	2%
0.25 - .5	0	0.0%	2%
0.5 - 1.0	43	14.3%	16%
1 - 2	19	6.3%	23%
2 - 4	53	17.7%	40%
4 - 6	51	17.0%	57%
6 - 8	28	9.3%	67%
8 - 12	44	14.7%	81%
12 - 16	16	5.3%	87%
16 - 24	8	2.7%	89%
24 - 32	2	0.7%	90%
32 - 48	2	0.7%	91%
48 - 64	2	0.7%	91%
64 - 96	3	1.0%	92%
96 - 128	2	0.7%	93%
128 - 192	4	1.3%	94%
192 - 256	8	2.7%	97%
256 - 384	7	2.3%	99%
384 - 512	2	0.7%	100%
512 - 1024			
1024 - 2048			
2048 - 4096			
Total	300.00		

COMMENTS: ERO Reach

STREAM NAME: East Fork Beaver Creek Reach 1
ID NUMBER: EBVR1
DATE: 9/25/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.938	**3.245**	**5.037**	**13.856**	**206.317**	**470.0**



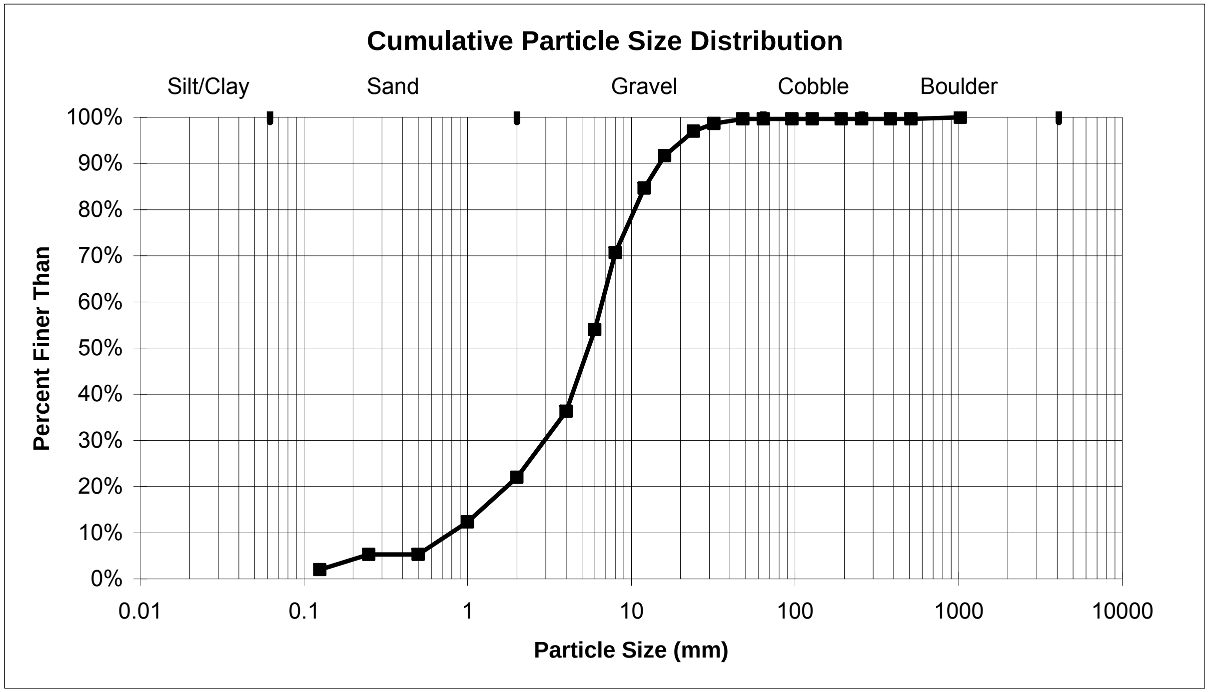
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	6	2.0%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	10	3.3%	5%
0.25 - .5	0	0.0%	5%
0.5 - 1.0	21	7.0%	12%
1 - 2	29	9.7%	22%
2 - 4	43	14.3%	36%
4 - 6	53	17.7%	54%
6 - 8	50	16.7%	71%
8 - 12	42	14.0%	85%
12 - 16	21	7.0%	92%
16 - 24	16	5.3%	97%
24 - 32	5	1.7%	99%
32 - 48	3	1.0%	100%
48 - 64	0	0.0%	100%
64 - 96	0	0.0%	100%
96 - 128	0	0.0%	100%
128 - 192	0	0.0%	100%
192 - 256	0	0.0%	100%
256 - 384	0	0.0%	100%
384 - 512	0	0.0%	100%
512 - 1024	1	0.3%	100%
1024 - 2048			
2048 - 4096			
Total	300.00		

COMMENTS: Second reach 500 ft of ERO Reach

STREAM NAME: Pike's Peak Highway - East Fork Beaver Creek Reach 2
ID NUMBER: EBVR2
DATE: 9/25/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.211	3.750	5.474	11.771	20.615	555.0



Pebble Count Worksheet

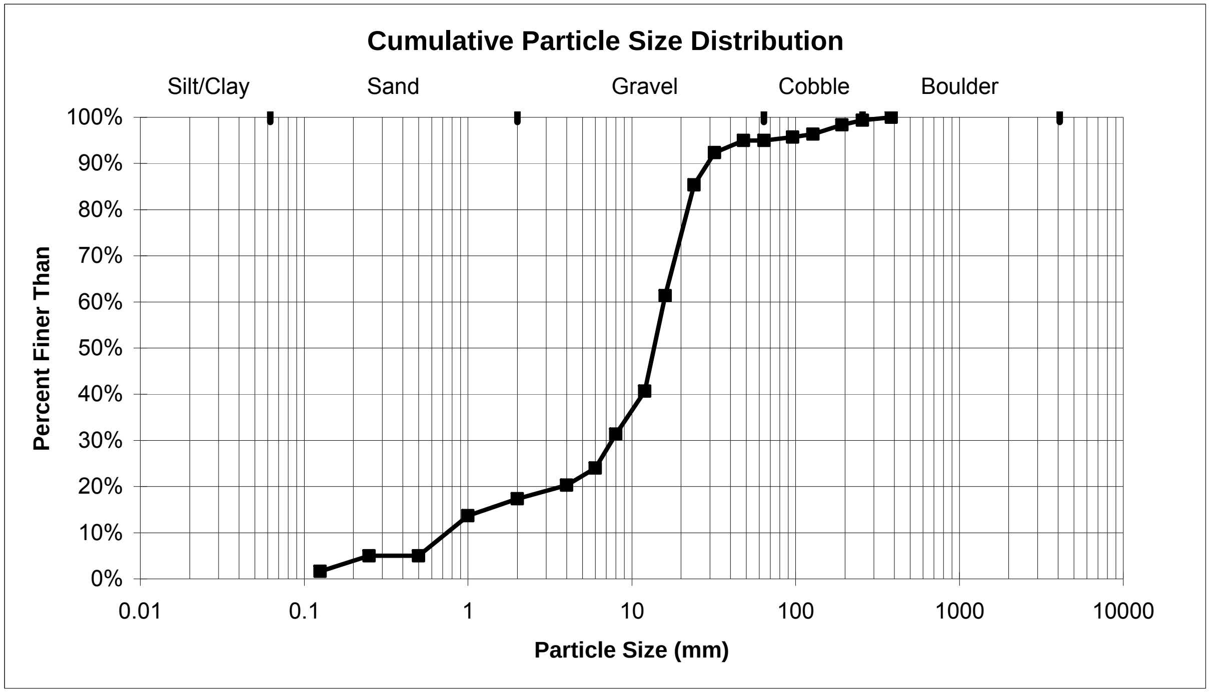
Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	5	1.7%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	10	3.3%	5%
0.25 - .5	0	0.0%	5%
0.5 - 1.0	26	8.7%	14%
1 - 2	11	3.7%	17%
2 - 4	9	3.0%	20%
4 - 6	11	3.7%	24%
6 - 8	22	7.3%	31%
8 - 12	28	9.3%	41%
12 - 16	62	20.7%	61%
16 - 24	72	24.0%	85%
24 - 32	21	7.0%	92%
32 - 48	8	2.7%	95%
48 - 64	0	0.0%	95%
64 - 96	2	0.7%	96%
96 - 128	2	0.7%	96%
128 - 192	6	2.0%	98%
192 - 256	3	1.0%	99%
256 - 384	2	0.7%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2048 - 4096			
Total	300.00		

COMMENTS: Reach established upstream from confluence with South Catamount Creek because of the transbasin diversion installed in Ski Creek

STREAM NAME: Pike's Peak Highway - Glen Cove Creek Reach 1
ID NUMBER: GLEN1
DATE: 9/24/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)

D15	D35	D50	D84	D95	Lpart
1.287	9.381	13.665	23.465	64.000	305.0



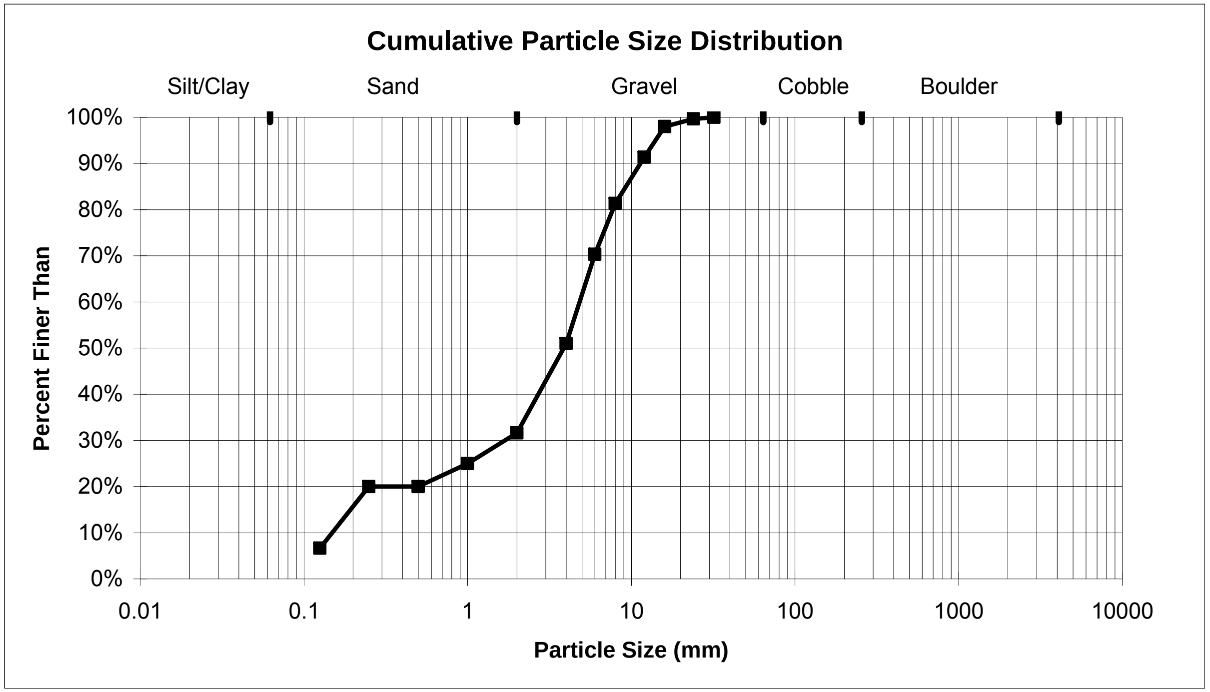
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	20	6.7%	
0.062 - 0.125	0	0.0%	7%
0.125 - 0.25	40	13.3%	20%
0.25 - .5	0	0.0%	20%
0.5 - 1.0	15	5.0%	25%
1 - 2	20	6.7%	32%
2 - 4	58	19.3%	51%
4 - 6	58	19.3%	70%
6 - 8	33	11.0%	81%
8 - 12	30	10.0%	91%
12 - 16	20	6.7%	98%
16 - 24	5	1.7%	100%
24 - 32	1	0.3%	100%
32 - 48			
48 - 64			
64 - 96			
96 - 128			
128 - 192			
192 - 256			
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Study Site

STREAM NAME: Pike's Peak Highway - North Catamount Creek Reach 1
ID NUMBER: NCAT1
DATE: 8/28/2008
CREW: Derengowski, LaPerriere, Nankervis, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.193	**2.254**	**3.859**	**8.913**	**14.057**	**25.0**



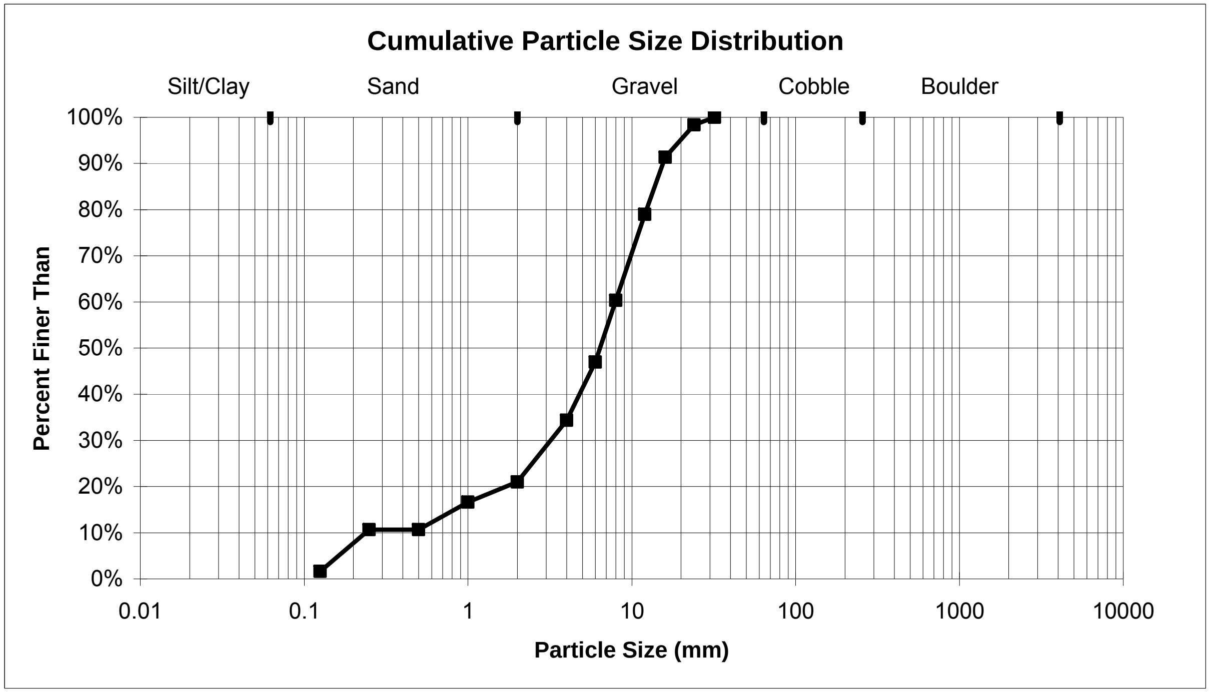
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	5	1.7%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	27	9.0%	11%
0.25 - .5	0	0.0%	11%
0.5 - 1.0	18	6.0%	17%
1 - 2	13	4.3%	21%
2 - 4	40	13.3%	34%
4 - 6	38	12.7%	47%
6 - 8	40	13.3%	60%
8 - 12	56	18.7%	79%
12 - 16	37	12.3%	91%
16 - 24	21	7.0%	98%
24 - 32	5	1.7%	100%
32 - 48			
48 - 64			
64 - 96			
96 - 128			
128 - 192			
192 - 256			
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach 0.5 miles upstream from ERO Study Site

STREAM NAME: Pike's Peak Highway - North Catamount Creek Reach 2
ID NUMBER: NCAT2
DATE: 8/28/2008
CREW: Derengowski, LaPerriere, Nankervis, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.825	**4.086**	**6.401**	**13.484**	**19.786**	**30.0**



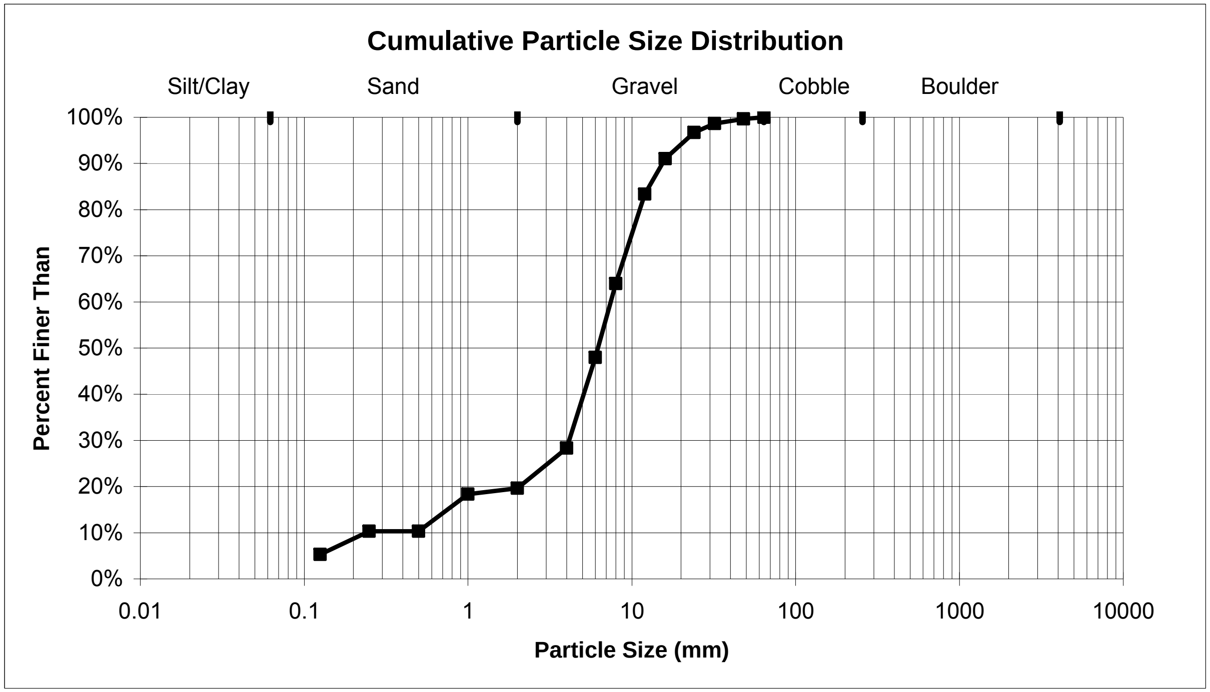
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	16	5.3%	
0.062 - 0.125	0	0.0%	5%
0.125 - 0.25	15	5.0%	10%
0.25 - .5	0	0.0%	10%
0.5 - 1.0	24	8.0%	18%
1 - 2	4	1.3%	20%
2 - 4	26	8.7%	28%
4 - 6	59	19.7%	48%
6 - 8	48	16.0%	64%
8 - 12	58	19.3%	83%
12 - 16	23	7.7%	91%
16 - 24	17	5.7%	97%
24 - 32	6	2.0%	99%
32 - 48	3	1.0%	100%
48 - 64	1	0.3%	100%
64 - 96			
96 - 128			
128 - 192			
192 - 256			
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Study Site

STREAM NAME: Pike's Peak Highway - North Fork Crystal Creek Reach 1
ID NUMBER: NCRY1
DATE: 9/17/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.749	**4.589**	**6.220**	**12.304**	**21.302**	**53.0**



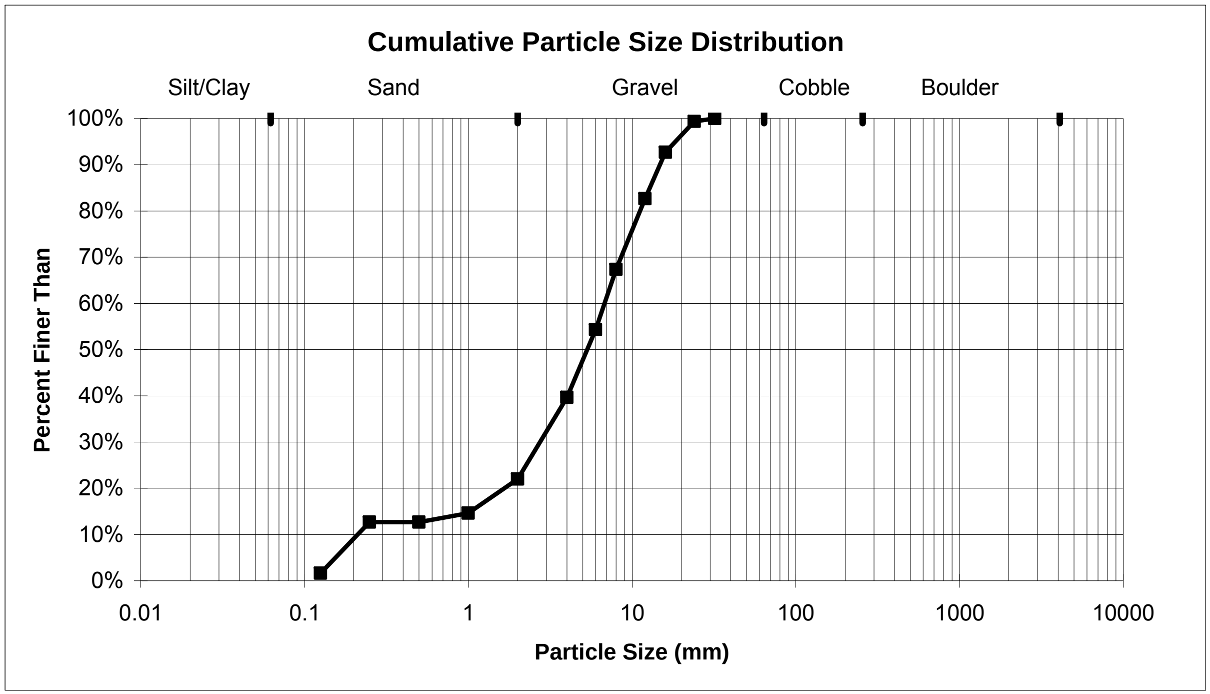
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	5	1.7%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	33	11.0%	13%
0.25 - .5	0	0.0%	13%
0.5 - 1.0	6	2.0%	15%
1 - 2	22	7.3%	22%
2 - 4	53	17.7%	40%
4 - 6	44	14.7%	54%
6 - 8	39	13.0%	67%
8 - 12	46	15.3%	83%
12 - 16	30	10.0%	93%
16 - 24	20	6.7%	99%
24 - 32	2	0.7%	100%
32 - 48			
48 - 64			
64 - 96			
96 - 128			
128 - 192			
192 - 256			
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach 500 ft upstream from ERO Study Site

STREAM NAME: Pike's Peak Highway - North Fork Crystal Creek Reach 2
ID NUMBER: NCRY2
DATE: 9/17/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.032	3.331	5.323	12.469	18.440	27.0



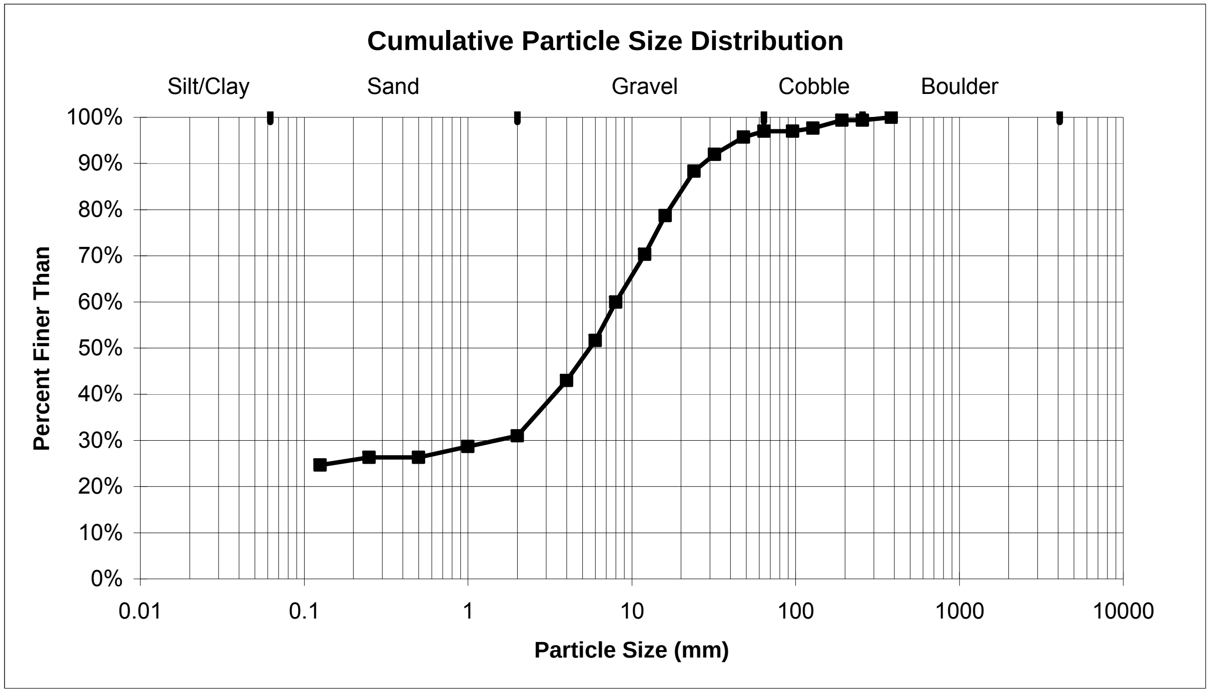
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	74	24.7%	
0.062 - 0.125	0	0.0%	25%
0.125 - 0.25	5	1.7%	26%
0.25 - .5	0	0.0%	26%
0.5 - 1.0	7	2.3%	29%
1 - 2	7	2.3%	31%
2 - 4	36	12.0%	43%
4 - 6	26	8.7%	52%
6 - 8	25	8.3%	60%
8 - 12	31	10.3%	70%
12 - 16	25	8.3%	79%
16 - 24	29	9.7%	88%
24 - 32	11	3.7%	92%
32 - 48	11	3.7%	96%
48 - 64	4	1.3%	97%
64 - 96	0	0.0%	97%
96 - 128	2	0.7%	98%
128 - 192	5	1.7%	99%
192 - 256	0	0.0%	99%
256 - 384	2	0.7%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Reach

STREAM NAME: Pike's Peak Highway - Oil Creek Reach 1
ID NUMBER: OILC1
DATE: 10/2/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.095	2.520	5.550	20.011	44.589	305.0



Pebble Count Worksheet

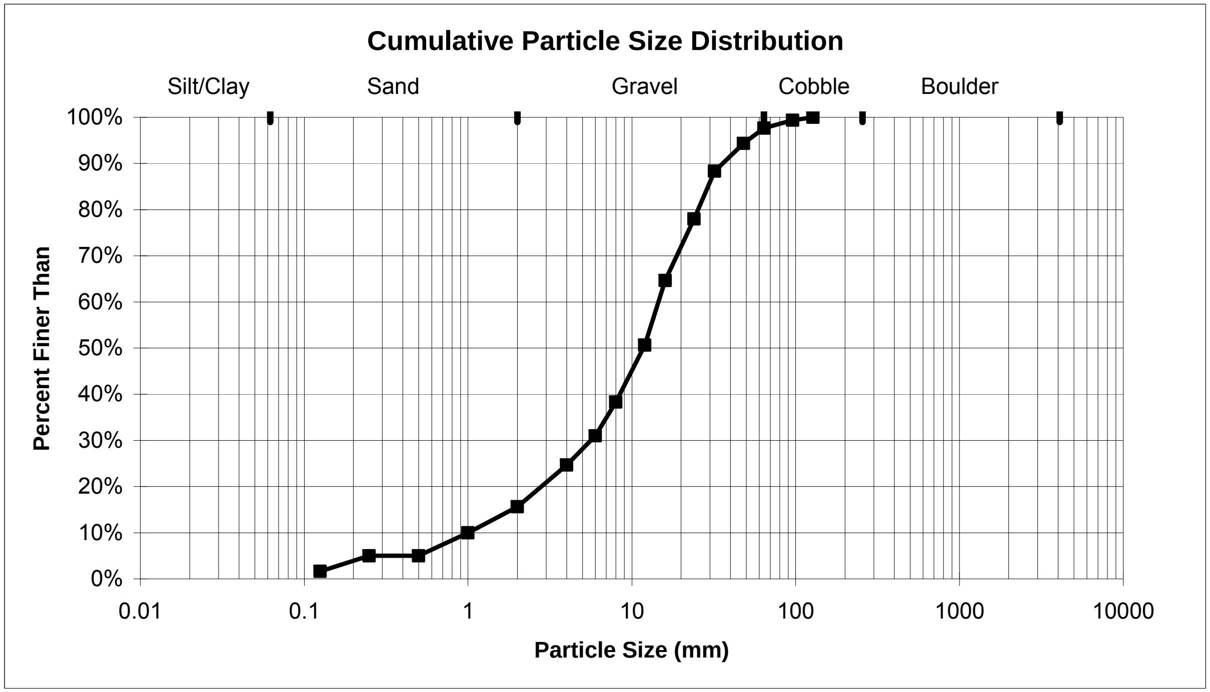
Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	5	1.7%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	10	3.3%	5%
0.25 - .5	0	0.0%	5%
0.5 - 1.0	15	5.0%	10%
1 - 2	17	5.7%	16%
2 - 4	27	9.0%	25%
4 - 6	19	6.3%	31%
6 - 8	22	7.3%	38%
8 - 12	37	12.3%	51%
12 - 16	42	14.0%	65%
16 - 24	40	13.3%	78%
24 - 32	31	10.3%	88%
32 - 48	18	6.0%	94%
48 - 64	10	3.3%	98%
64 - 96	5	1.7%	99%
96 - 128	2	0.7%	100%
128 - 192			
192 - 256			
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Study Site

STREAM NAME: Pike's Peak Highway - South Catamount Creek Reach 1
ID NUMBER: SCAT1
DATE: 10/1/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)

D15	D35	D50	D84	D95	Lpart
1.843	7.019	11.740	28.363	50.843	123.0



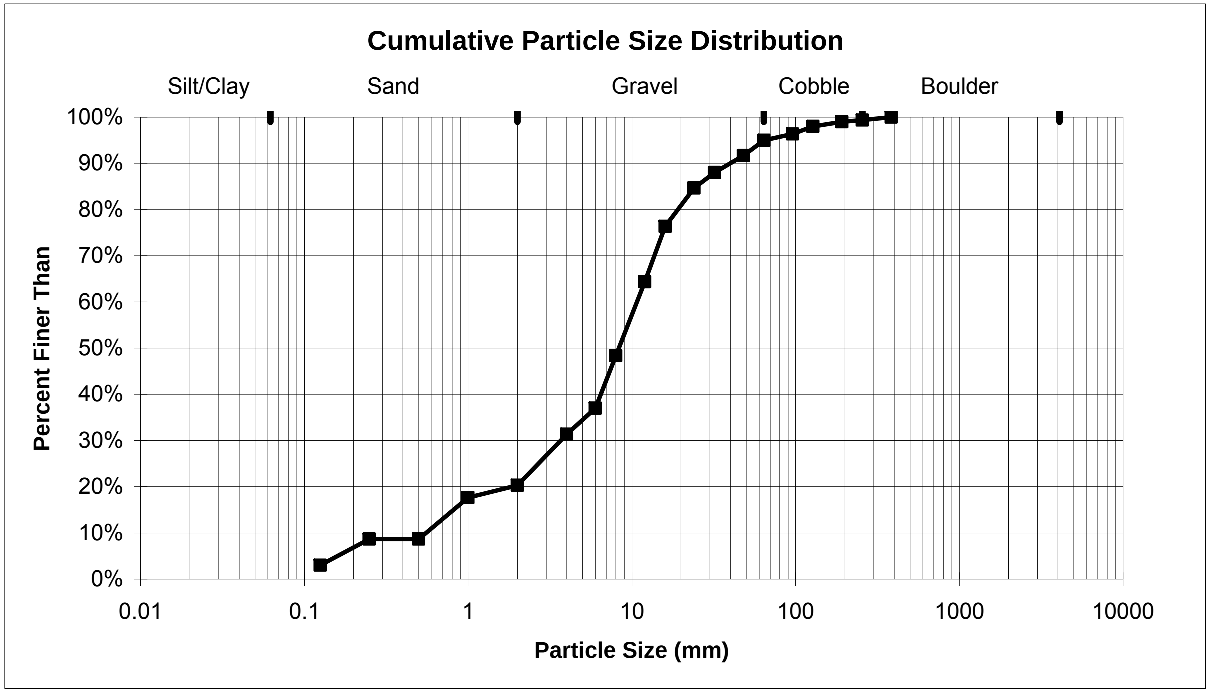
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	9	3.0%	
0.062 - 0.125	0	0.0%	3%
0.125 - 0.25	17	5.7%	9%
0.25 - .5	0	0.0%	9%
0.5 - 1.0	27	9.0%	18%
1 - 2	8	2.7%	20%
2 - 4	33	11.0%	31%
4 - 6	17	5.7%	37%
6 - 8	34	11.3%	48%
8 - 12	48	16.0%	64%
12 - 16	36	12.0%	76%
16 - 24	25	8.3%	85%
24 - 32	10	3.3%	88%
32 - 48	11	3.7%	92%
48 - 64	10	3.3%	95%
64 - 96	4	1.3%	96%
96 - 128	5	1.7%	98%
128 - 192	3	1.0%	99%
192 - 256	1	0.3%	99%
256 - 384	2	0.7%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach 500 ft upstream from ERO Study Site

STREAM NAME: Pike's Peak Highway - South Catamount Creek Reach 2
ID NUMBER: SCAT2
DATE: 9/10/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.814	**5.200**	**8.345**	**23.234**	**64.000**	**360.0**



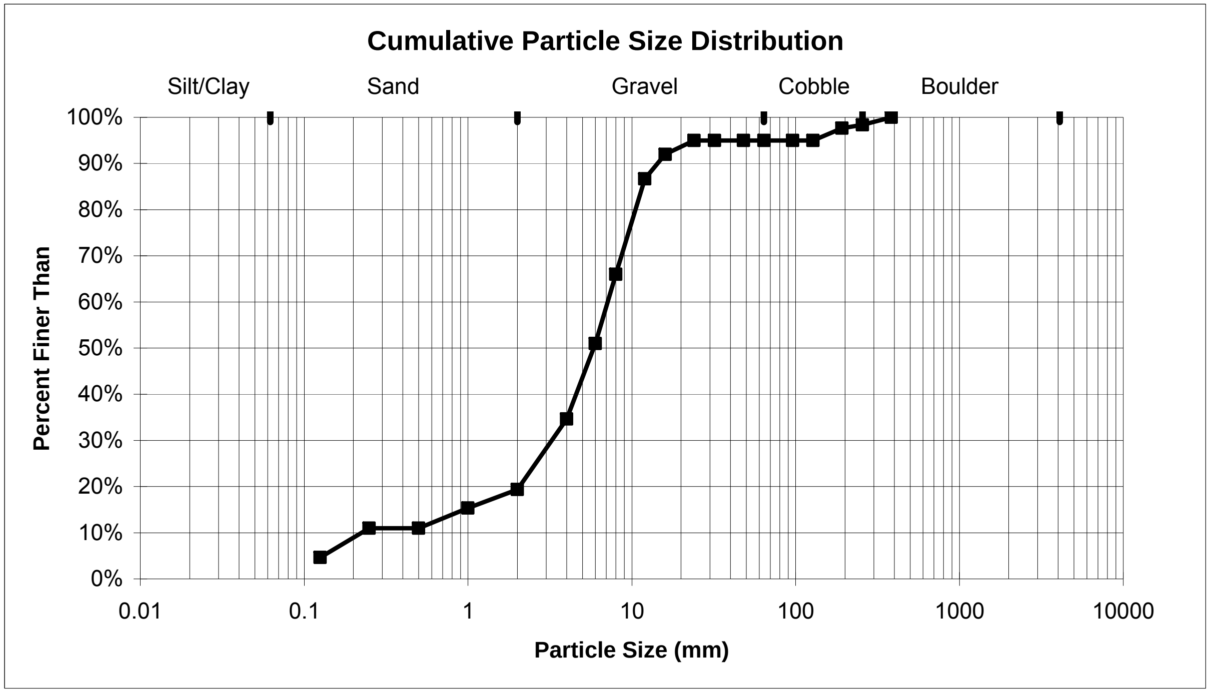
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	14	4.7%	
0.062 - 0.125	0	0.0%	5%
0.125 - 0.25	19	6.3%	11%
0.25 - .5	0	0.0%	11%
0.5 - 1.0	13	4.3%	15%
1 - 2	12	4.0%	19%
2 - 4	46	15.3%	35%
4 - 6	49	16.3%	51%
6 - 8	45	15.0%	66%
8 - 12	62	20.7%	87%
12 - 16	16	5.3%	92%
16 - 24	9	3.0%	95%
24 - 32	0	0.0%	95%
32 - 48	0	0.0%	95%
48 - 64	0	0.0%	95%
64 - 96	0	0.0%	95%
96 - 128	0	0.0%	95%
128 - 192	8	2.7%	98%
192 - 256	2	0.7%	98%
256 - 384	5	1.7%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Reach established upstream from confluence with Glen Cove Creek because of the transbasin diversion installed in Ski Creek

STREAM NAME: Pike's Peak Highway - South Catamount Creek Reach 3
ID NUMBER: SCAT3
DATE: 9/10/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.948	4.033	5.853	11.388	128.000	315.0



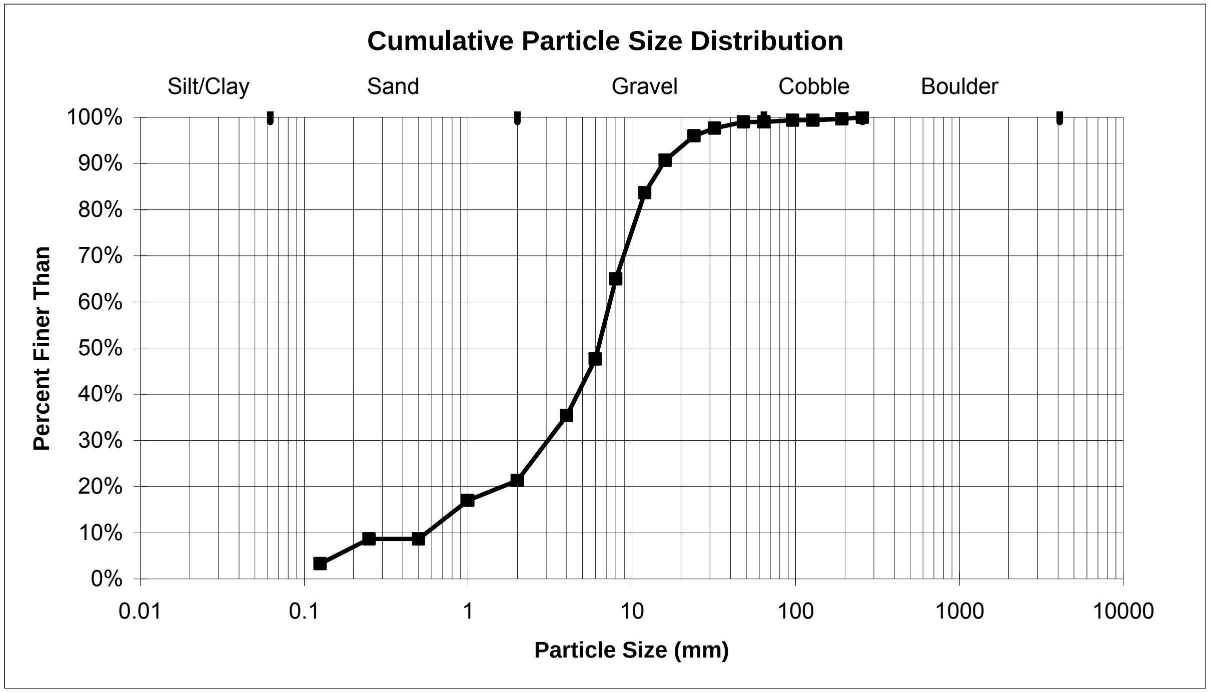
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	10	3.3%	
0.062 - 0.125	0	0.0%	3%
0.125 - 0.25	16	5.3%	9%
0.25 - .5	0	0.0%	9%
0.5 - 1.0	25	8.3%	17%
1 - 2	13	4.3%	21%
2 - 4	42	14.0%	35%
4 - 6	37	12.3%	48%
6 - 8	52	17.3%	65%
8 - 12	56	18.7%	84%
12 - 16	21	7.0%	91%
16 - 24	16	5.3%	96%
24 - 32	5	1.7%	98%
32 - 48	4	1.3%	99%
48 - 64	0	0.0%	99%
64 - 96	1	0.3%	99%
96 - 128	0	0.0%	99%
128 - 192	1	0.3%	100%
192 - 256	1	0.3%	100%
256 - 384			
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: About 0.2 miles upstream form ERO Study Site

STREAM NAME: Pike's Peak Highway - Ski Creek Reach 1
ID NUMBER: SKIC1
DATE: 9/24/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.847	3.935	6.237	12.166	22.243	235.0



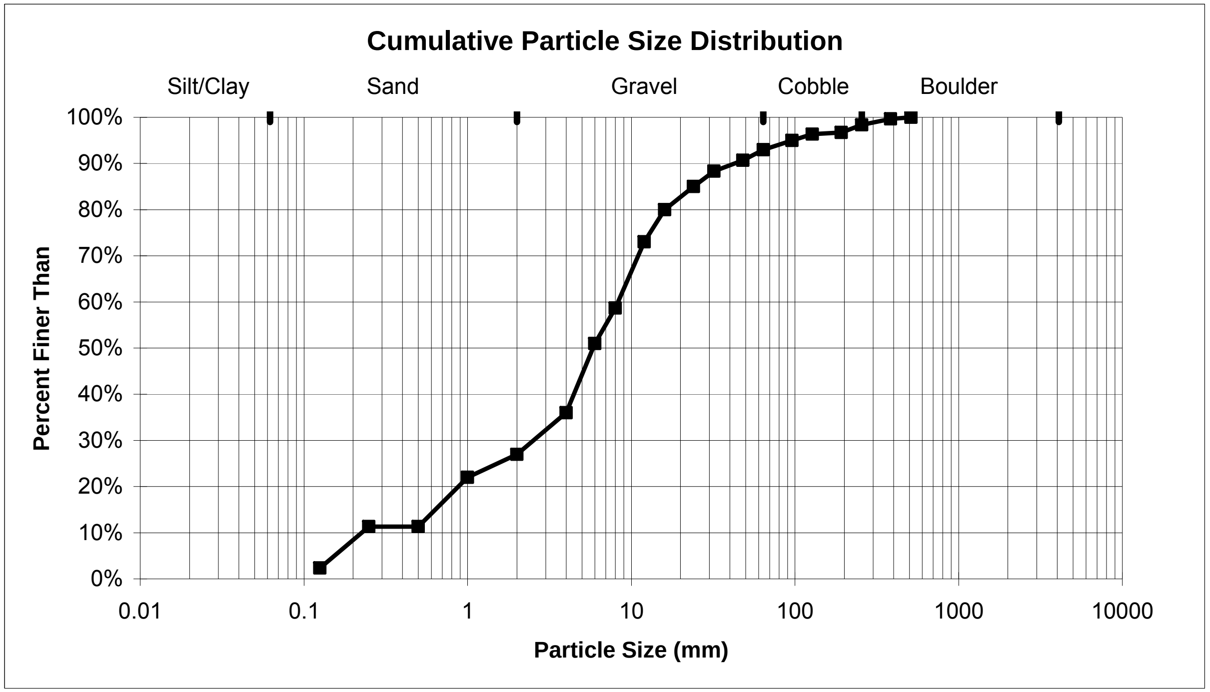
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	7	2.3%	
0.062 - 0.125	0	0.0%	2%
0.125 - 0.25	27	9.0%	11%
0.25 - .5	0	0.0%	11%
0.5 - 1.0	32	10.7%	22%
1 - 2	15	5.0%	27%
2 - 4	27	9.0%	36%
4 - 6	45	15.0%	51%
6 - 8	23	7.7%	59%
8 - 12	43	14.3%	73%
12 - 16	21	7.0%	80%
16 - 24	15	5.0%	85%
24 - 32	10	3.3%	88%
32 - 48	7	2.3%	91%
48 - 64	7	2.3%	93%
64 - 96	6	2.0%	95%
96 - 128	4	1.3%	96%
128 - 192	1	0.3%	97%
192 - 256	5	1.7%	98%
256 - 384	4	1.3%	100%
384 - 512	1	0.3%	100%
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach near mile marker 10 on Pike's Peak Highway

STREAM NAME: Pike's Peak Highway - Ski Creek Reach 2
ID NUMBER: SKIC2
DATE: 10/1/2008
CREW: Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.635	**3.703**	**5.840**	**22.131**	**96.000**	**480.0**



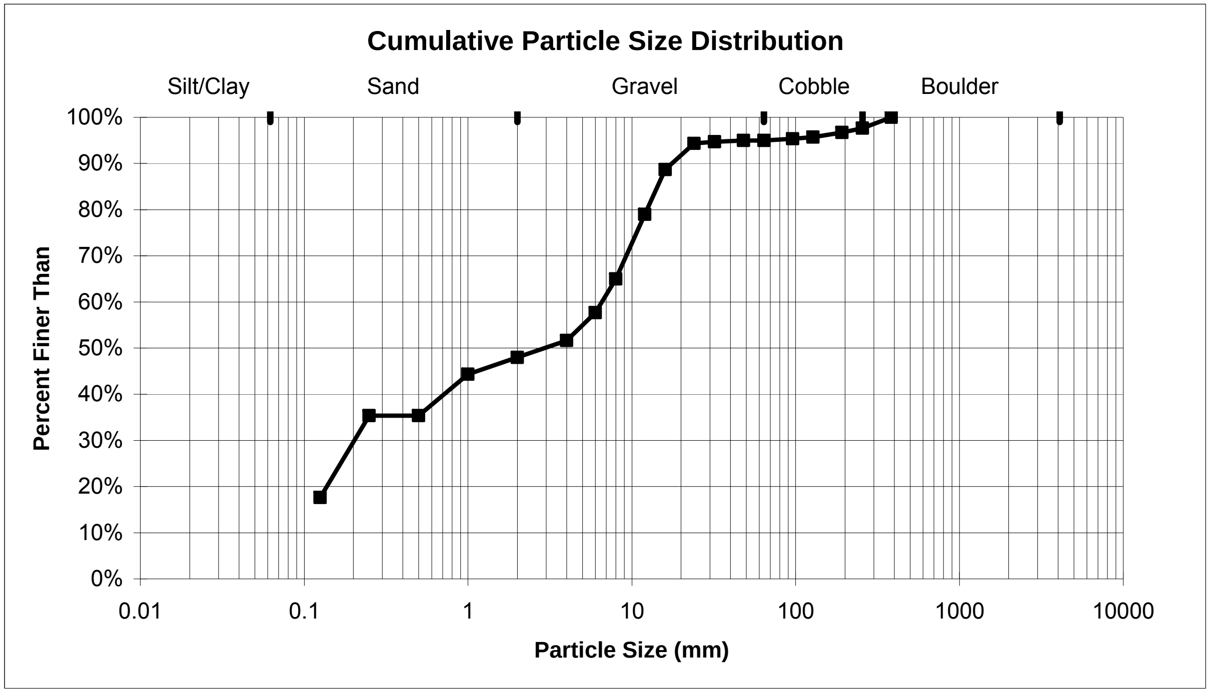
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	53	17.7%	
0.062 - 0.125	0	0.0%	18%
0.125 - 0.25	53	17.7%	35%
0.25 - .5	0	0.0%	35%
0.5 - 1.0	27	9.0%	44%
1 - 2	11	3.7%	48%
2 - 4	11	3.7%	52%
4 - 6	18	6.0%	58%
6 - 8	22	7.3%	65%
8 - 12	42	14.0%	79%
12 - 16	29	9.7%	89%
16 - 24	17	5.7%	94%
24 - 32	1	0.3%	95%
32 - 48	1	0.3%	95%
48 - 64	0	0.0%	95%
64 - 96	1	0.3%	95%
96 - 128	1	0.3%	96%
128 - 192	3	1.0%	97%
192 - 256	3	1.0%	98%
256 - 384	7	2.3%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Reach

STREAM NAME: Pike's Peak Highway - Severy Creek Reach1
ID NUMBER: SVRY1
DATE: 9/3/2008
CREW: Derengowski, LaPerriere, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.112	0.247	2.919	13.925	64.000	350.0



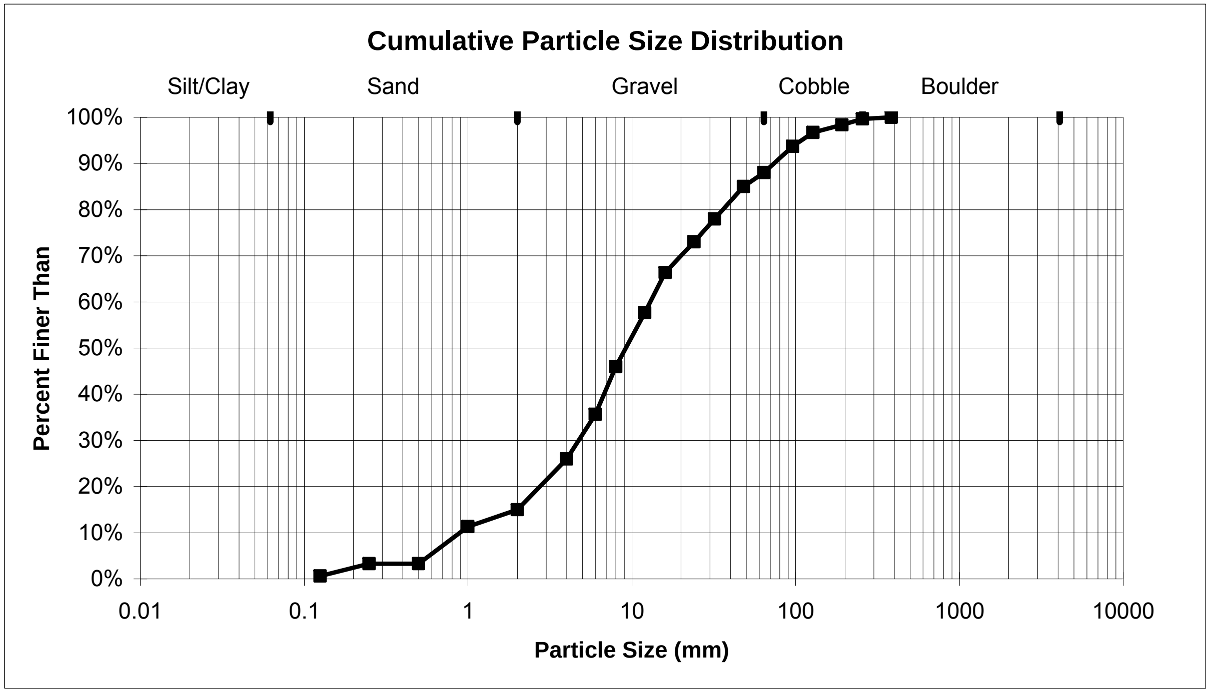
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	2	0.7%	
0.062 - 0.125	0	0.0%	1%
0.125 - 0.25	8	2.7%	3%
0.25 - .5	0	0.0%	3%
0.5 - 1.0	24	8.0%	11%
1 - 2	11	3.7%	15%
2 - 4	33	11.0%	26%
4 - 6	29	9.7%	36%
6 - 8	31	10.3%	46%
8 - 12	35	11.7%	58%
12 - 16	26	8.7%	66%
16 - 24	20	6.7%	73%
24 - 32	15	5.0%	78%
32 - 48	21	7.0%	85%
48 - 64	9	3.0%	88%
64 - 96	17	5.7%	94%
96 - 128	9	3.0%	97%
128 - 192	5	1.7%	98%
192 - 256	4	1.3%	100%
256 - 384	1	0.3%	100%
384 - 512			
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach 1000 ft upstream of ERO Reach

STREAM NAME: Pike's Peak Highway - Severy Creek Reach 2
ID NUMBER: SVRY2
DATE: 9/3/2008
CREW: Derengowski, LaPerriere, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	2.000	**5.835**	**9.193**	**45.299**	**109.094**	**257.0**



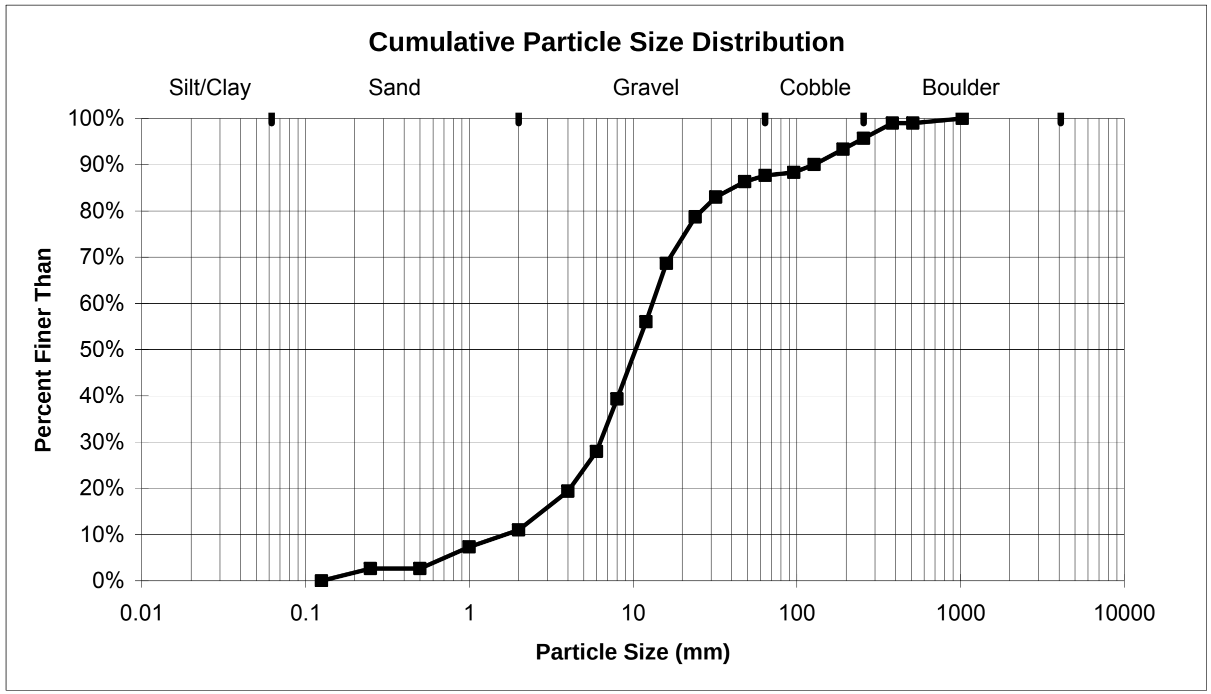
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	0	0.0%	
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	8	2.7%	3%
0.25 - .5	0	0.0%	3%
0.5 - 1.0	14	4.7%	7%
1 - 2	11	3.7%	11%
2 - 4	25	8.3%	19%
4 - 6	26	8.7%	28%
6 - 8	34	11.3%	39%
8 - 12	50	16.7%	56%
12 - 16	38	12.7%	69%
16 - 24	30	10.0%	79%
24 - 32	13	4.3%	83%
32 - 48	10	3.3%	86%
48 - 64	4	1.3%	88%
64 - 96	2	0.7%	88%
96 - 128	5	1.7%	90%
128 - 192	10	3.3%	93%
192 - 256	7	2.3%	96%
256 - 384	10	3.3%	99%
384 - 512	0	0.0%	99%
512 - 1024	3	1.0%	100%
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: ERO Reach

STREAM NAME: Pike's Peak Highway - West Fork Beaver Creek Reach 1
ID NUMBER: WBVR1
DATE: 9/18/2008
CREW: Derengowski, Hovermale, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	2.789	**7.167**	**10.370**	**36.139**	**235.800**	**300.0**



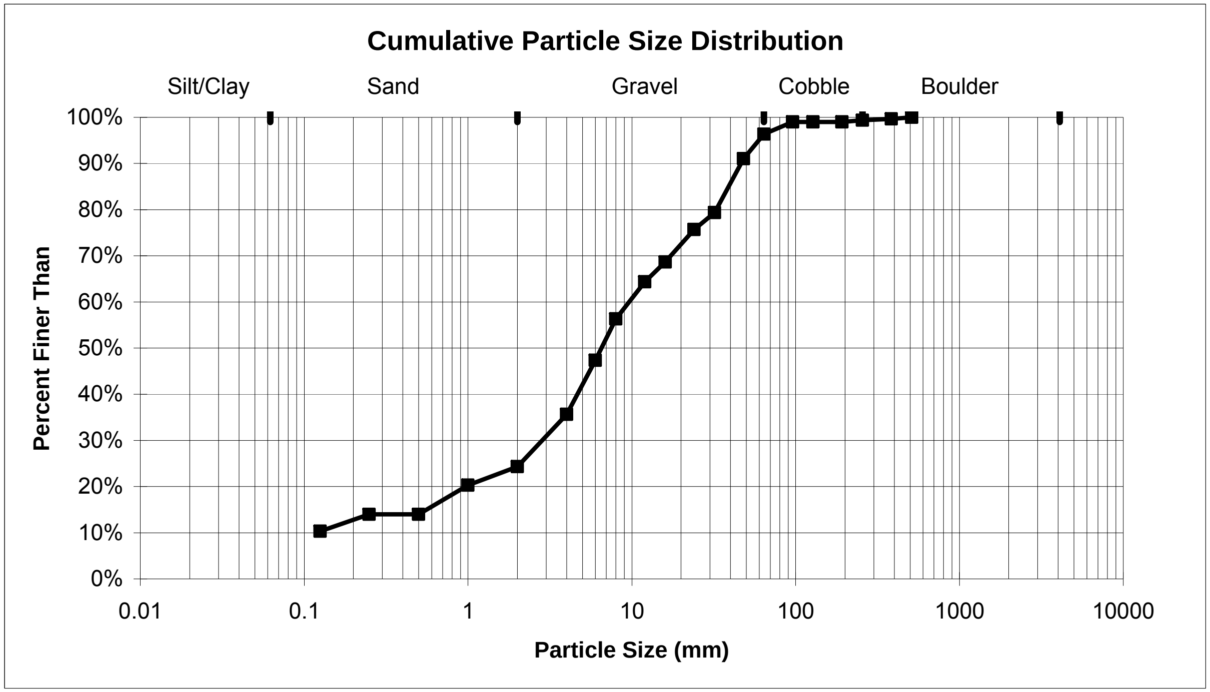
Pebble Count Worksheet

Particle Size (mm)	# in Size Class	% of Total	% Finer Than
<0.062	31	10.3%	
0.062 - 0.125	0	0.0%	10%
0.125 - 0.25	11	3.7%	14%
0.25 - .5	0	0.0%	14%
0.5 - 1.0	19	6.3%	20%
1 - 2	12	4.0%	24%
2 - 4	34	11.3%	36%
4 - 6	35	11.7%	47%
6 - 8	27	9.0%	56%
8 - 12	24	8.0%	64%
12 - 16	13	4.3%	69%
16 - 24	21	7.0%	76%
24 - 32	11	3.7%	79%
32 - 48	35	11.7%	91%
48 - 64	16	5.3%	96%
64 - 96	8	2.7%	99%
96 - 128	0	0.0%	99%
128 - 192	0	0.0%	99%
192 - 256	1	0.3%	99%
256 - 384	1	0.3%	100%
384 - 512	1	0.3%	100%
512 - 1024			
1024 - 2048			
2044 - 4096			
Total	300.00		

COMMENTS: Second reach 0.5 miles upstream of ERO Reach

STREAM NAME: Pike's Peak Highway - West Fork Beaver Creek Reach 2
ID NUMBER: WBVR2
DATE: 9/18/2008
CREW: Derengowski, Hovermale, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.558	3.840	6.534	37.635	59.559	386.0



Appendix N

Stream Bar Sample

Particle Size Distribution and Graphs

2008

Summary of Stream Channel Particle Size Distribution from Sieve Analysis of Bar Samples on Pikes Peak 2005–2007

			Particle Size Distribution–Grab Samples 2005–2007					
Site Name	**ID**	**Date**	**D15**	**D35**	**D50**	**D84**	**D95**	**D100**
Glen Cove Creek	GLEN1	10/1/2005	1.078	4.763	8.406	34.760	41.512	45.0
South Catamount Creek	SCAT3	10/1/2005	1.962	3.854	5.306	9.489	12.567	16.0
North Fork Crystal Creek	NCRY1	5/3/2006	0.741	4.056	4.897	7.603	10.724	17.0
North Fork Crystal Creek	NCRY2	5/3/2006	0.435	2.634	4.888	10.373	18.077	28.0
Severy Creek	SVRY2	9/20/2006	0.940	2.800	4.523	13.533	22.999	25.0
Boehmer Creek	BHMR1	9/12/2007	0.812	2.006	2.406	7.546	11.269	12.0
Boehmer Creek	BHMR2	9/12/2007	0.366	0.840	1.181	2.485	4.341	12.0
East Fork Beaver Creek	EBVR1	9/11/2007	1.102	2.678	3.662	6.846	9.226	15.0
East Fork Beaver Creek	EBVR2	9/11/2007	0.594	1.257	2.091	6.162	9.651	15.0
Glen Cove Creek	GLEN1	9/5/2007	0.801	2.900	4.906	10.438	14.452	19.0
North Fork Crystal Creek	NCRY1	9/5/2007	0.698	1.926	3.213	10.195	23.029	25.0
North Fork Crystal Creek	NCRY2	9/6/2007	0.917	3.174	5.175	14.938	23.189	24.0
South Catamount Creek	SCAT1	9/4/2007	0.638	4.792	10.046	31.519	43.216	50.0
South Catamount Creek	SCAT2	9/5/2007	0.249	1.318	2.823	10.075	17.064	22.0
South Catamount Creek	SCAT3	9/5/2007	1.096	2.932	4.357	8.701	11.293	14.0
Ski Creek	SKIC1	9/7/2007	0.056	1.023	3.595	13.044	19.211	24.0
Ski Creek	SKIC2	9/13/2007	0.020	0.180	0.632	3.369	6.825	13.0
Severy Creek	SVRY1	10/3/2007	0.092	1.016	1.851	6.415	11.731	22.0
Severy Creek	SVRY2	10/5/2007	0.782	2.387	4.267	33.262	40.944	45.0
West Fork Beaver Creek	WBVR1	9/21/2007	0.710	2.127	4.596	35.646	41.839	45.0
West Fork Beaver Creek	WBVR2	9/21/2007	4.536	8.288	11.503	49.521	53.226	55.0

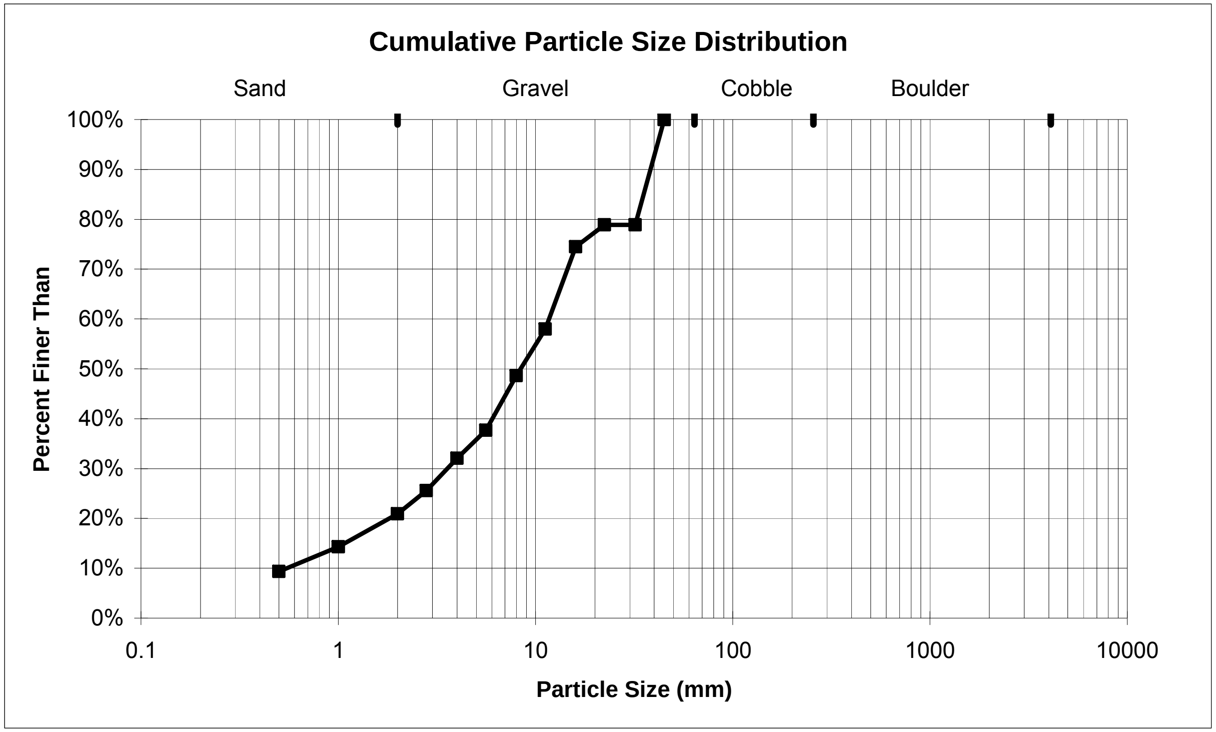
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	45.10	9.3%	
0.5	23.90	4.9%	9.3%
1.0	32.10	6.6%	14.3%
2.0	22.40	4.6%	20.9%
2.8	31.60	6.5%	25.6%
4.0	27.10	5.6%	32.1%
5.6	52.80	10.9%	37.7%
8.0	45.20	9.4%	48.6%
11.2	79.80	16.5%	58.0%
16.0	21.20	4.4%	74.5%
22.4	0	0.0%	78.9%
32.0	102.1	21.1%	78.9%
45.0			100.0%
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	483.30		

COMMENTS: Bar Sample taken near Cross Section E (right bank)

SITE NAME: Pike's Peak Highway - Glen Cove Creek Reach 1
ID NUMBER: GLEN1
DATE: 10/1/2005
CREW: Belz, Howell, Nankervis, Phung

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	1.078	**4.763**	**8.406**	**34.760**	**41.512**	**45.0**



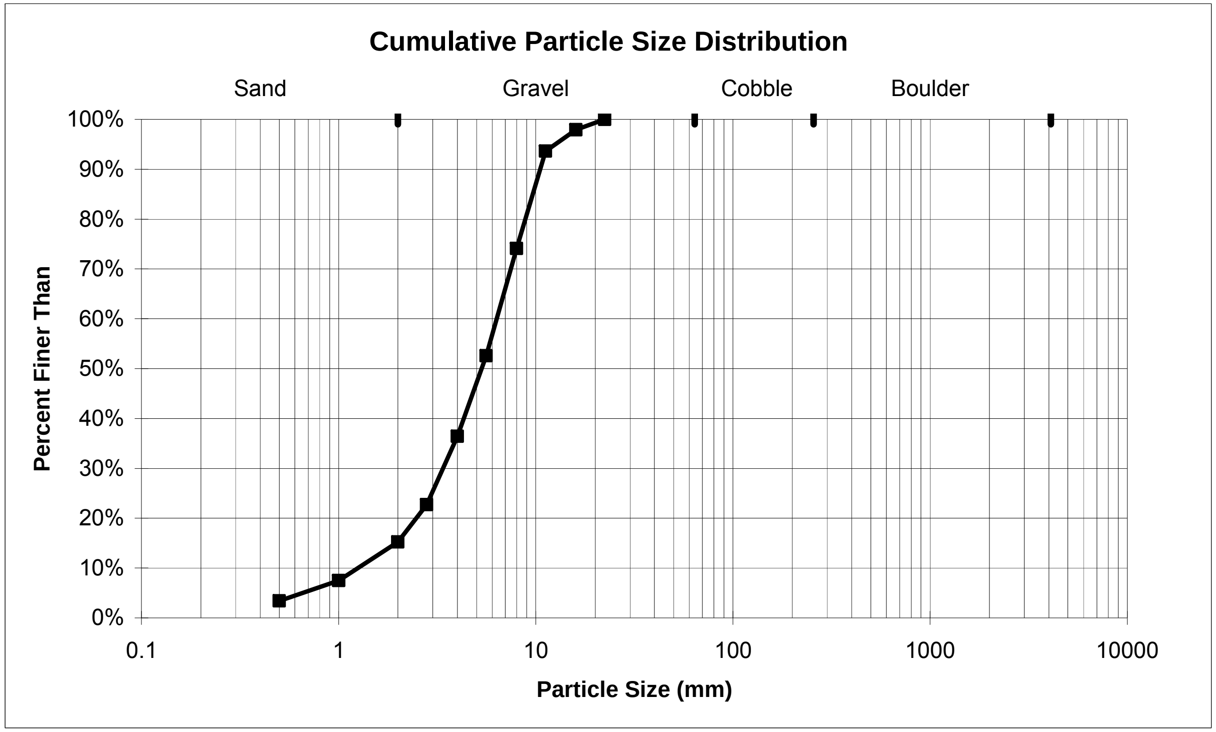
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	11.70	3.4%	
0.5	14.20	4.1%	3.4%
1.0	26.60	7.7%	7.5%
2.0	25.90	7.5%	15.2%
2.8	47.30	13.7%	22.7%
4.0	55.80	16.2%	36.4%
5.6	74.20	21.5%	52.6%
8.0	67.40	19.5%	74.1%
11.2	14.70	4.3%	93.6%
16.0	7.30	2.1%	97.9%
22.4			100.0%
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	345.10		

COMMENTS: Bar Sample taken between Cross Section C and D

SITE NAME: Pike's Peak Highway - South Catamont Creek Reach 3
ID NUMBER: SCAT3
DATE: 10/1/2005
CREW: Belz, Howell, Nankervis, Phung

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.962	**3.854**	**5.306**	**9.489**	**12.567**	**16.0**



Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	39.80	12.8%	
0.5	12.30	3.9%	12.8%
1.0	13.90	4.5%	16.7%
2.0	10.70	3.4%	21.2%
2.8	29.00	9.3%	24.6%
4.0	83.50	26.8%	33.9%
5.6	84.80	27.2%	60.7%
8.0	25.50	8.2%	87.9%
11.2	12.30	3.9%	96.1%
17.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	311.80		

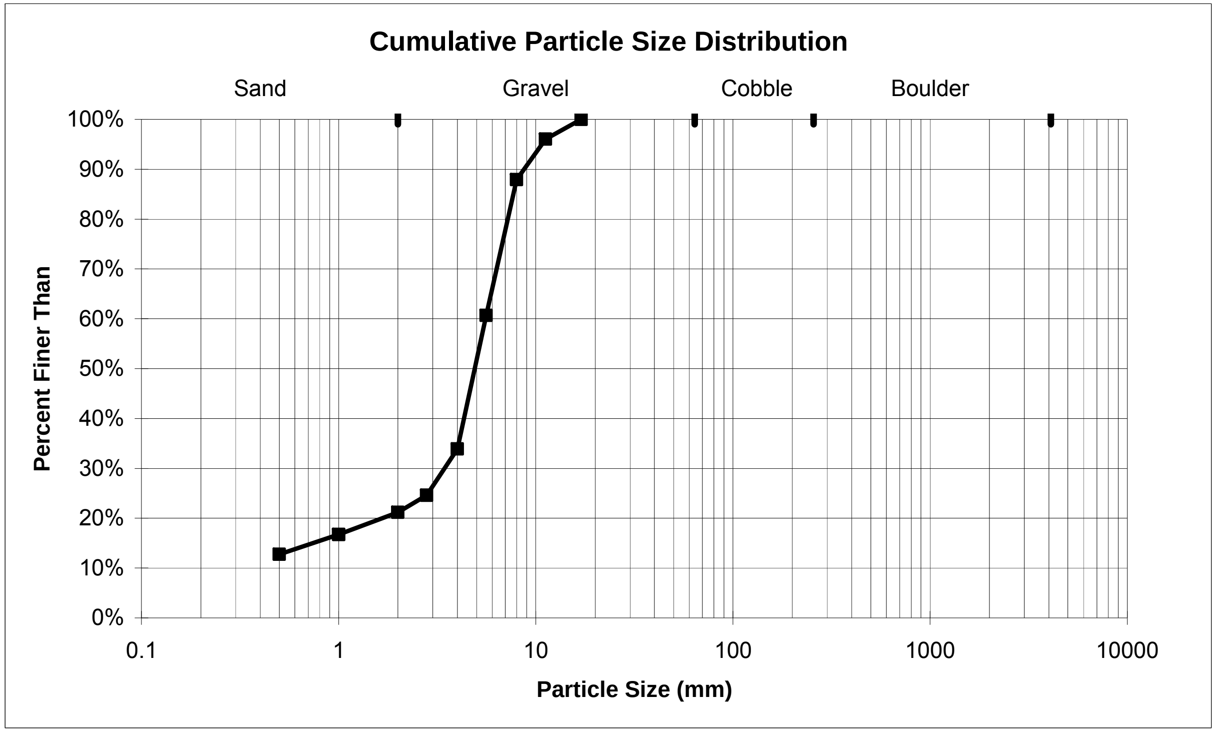
*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken 6 ft upstream of Cross Section C (right bank)

SITE NAME: Pike's Peak Highway - North Crystal Creek Reach 1
ID NUMBER: NCRY1
DATE: 5/3/2006
CREW: Belz, Howell, Nankervis, Waddell

Particle Size Distribution (mm)

D15	D35	D50	D84	D95	Lpart
0.741	4.056	4.897	7.603	10.724	17.0



Sieve Analysis Worksheet

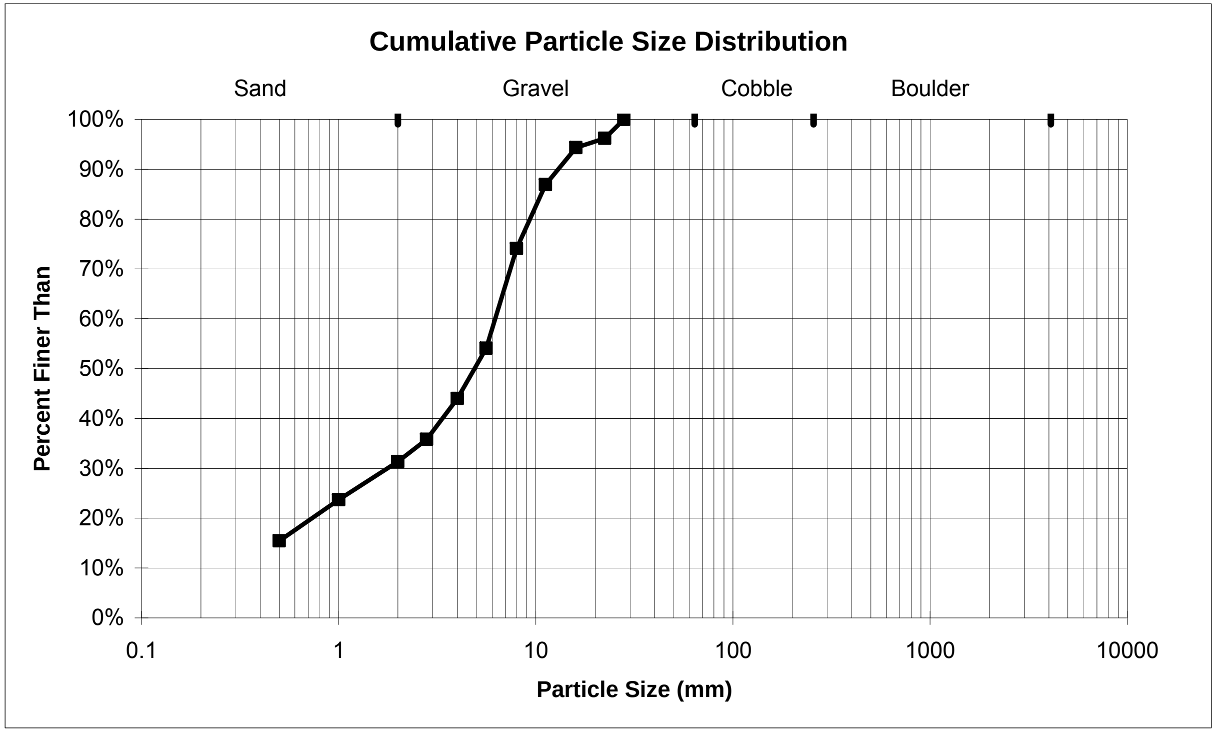
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	51.00	15.4%	
0.5	27.30	8.3%	15.4%
1.0	25.20	7.6%	23.7%
2.0	14.80	4.5%	31.3%
2.8	27.00	8.2%	35.8%
4.0	33.30	10.1%	44.0%
5.6	66.20	20.0%	54.1%
8.0	42.30	12.8%	74.1%
11.2	24.40	7.4%	86.9%
16.0	6.30	1.9%	94.3%
22.4	12.50	3.8%	96.2%
28.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	330.30		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken just upstream of Cross Section E

SITE NAME: Pike's Peak Highway - North Crystal Creek Reach 2
ID NUMBER: NCRY2
DATE: 5/3/2006
CREW: Belz, Howell, Nankervis, Waddell

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.435	2.634	4.888	10.373	18.077	28.0



Sieve Analysis Worksheet

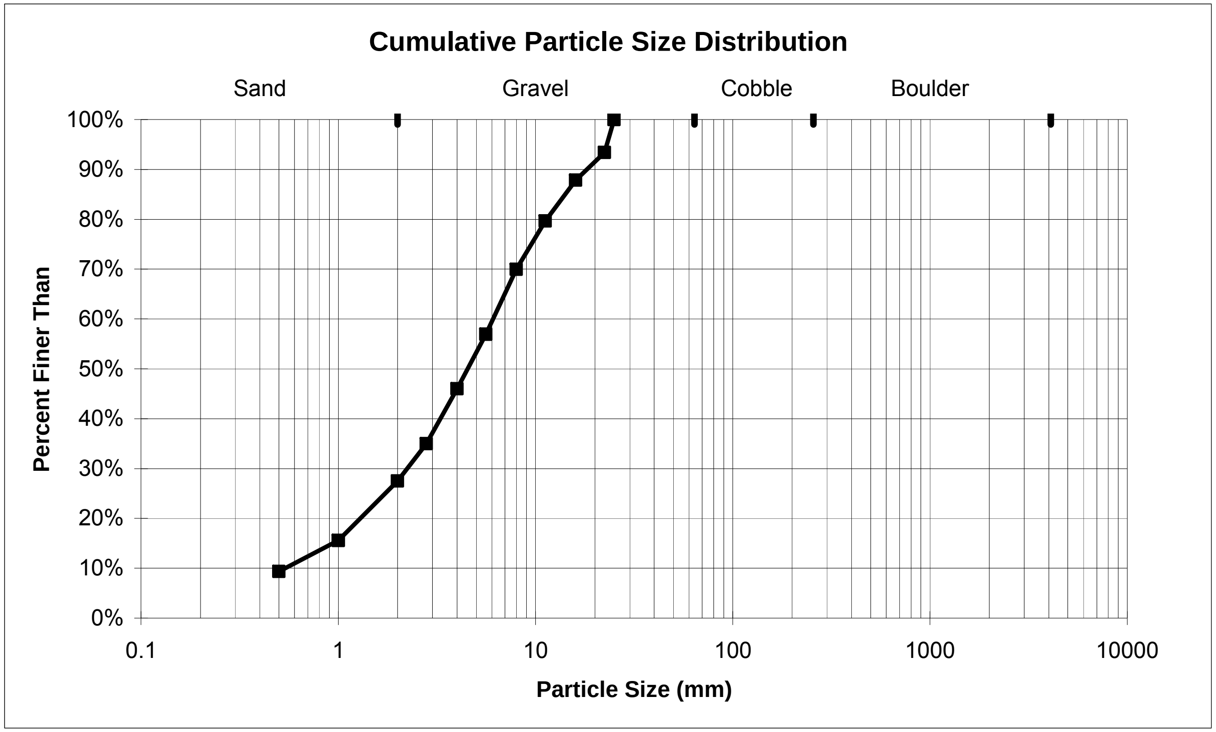
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	32.20	9.4%	
0.5	21.20	6.2%	9.4%
1.0	41.00	11.9%	15.6%
2.0	25.80	7.5%	27.5%
2.8	37.80	11.0%	35.0%
4.0	37.50	10.9%	46.0%
5.6	44.80	13.0%	56.9%
8.0	33.30	9.7%	70.0%
11.2	28.00	8.2%	79.7%
16.0	19.20	5.6%	87.8%
22.4	22.60	6.6%	93.4%
25.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	343.40		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken just upstream of Cross Section E

SITE NAME: Pike's Peak Highway - Severy Creek Reach 2
ID NUMBER: SVRY2
DATE: 9/20/2006
CREW: Howell, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.940	**2.800**	**4.523**	**13.533**	**22.999**	**25.0**



Sieve Analysis Worksheet

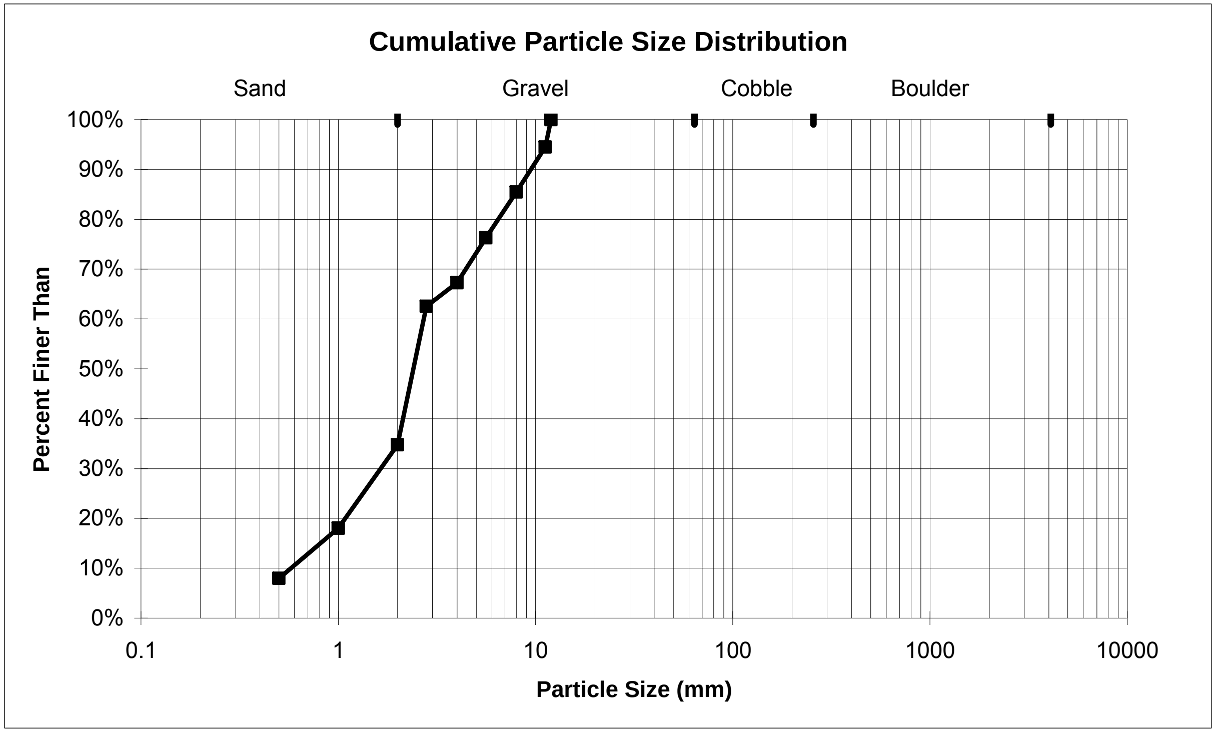
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	43.60	8.0%	
0.5	54.90	10.0%	8.0%
1.0	91.30	16.7%	18.0%
2.0	151.90	27.8%	34.7%
2.8	25.80	4.7%	62.5%
4.0	49.50	9.1%	67.3%
5.6	50.20	9.2%	76.3%
8.0	49.20	9.0%	85.5%
11.2	30.00	5.5%	94.5%
12.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	546.40		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar sample taken downstream from Cross Section E

SITE NAME: Pike's Peak Highway - Boehmer Creek Reach 1
ID NUMBER: BHMR1
DATE: 9/12/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.812	2.006	2.406	7.546	11.269	12.0



Sieve Analysis Worksheet

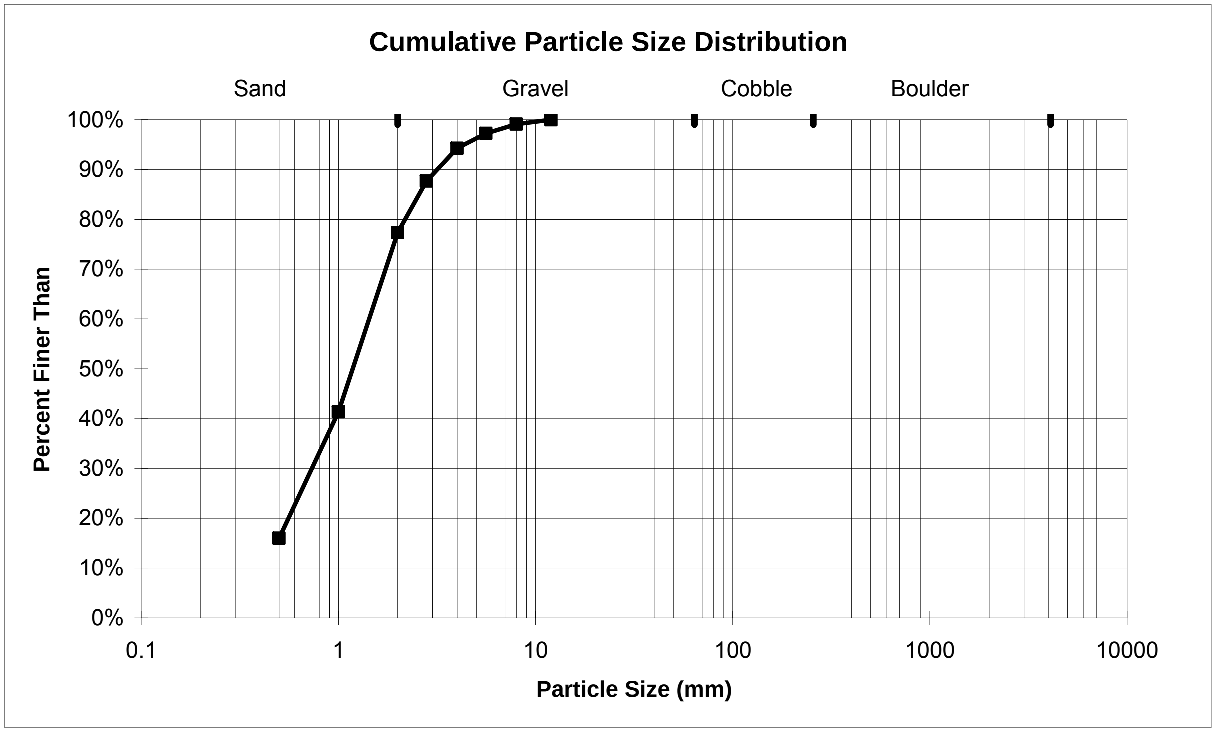
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	87.40	16.0%	
0.5	138.10	25.3%	16.0%
1.0	196.00	36.0%	41.4%
2.0	56.50	10.4%	77.3%
2.8	36.00	6.6%	87.7%
4.0	16.20	3.0%	94.3%
5.6	10.10	1.9%	97.2%
8.0	4.90	0.9%	99.1%
12.0	*		100.0%
16.0			-
22.4			
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	545.20		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar sample taken 18 ft upstream of Cross Section B

SITE NAME: Pike's Peak Highway - Boehmer Creek Reach 2
ID NUMBER: BHMR2
DATE: 9/12/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.366	**0.840**	**1.181**	**2.485**	**4.341**	**12.0**



Sieve Analysis Worksheet

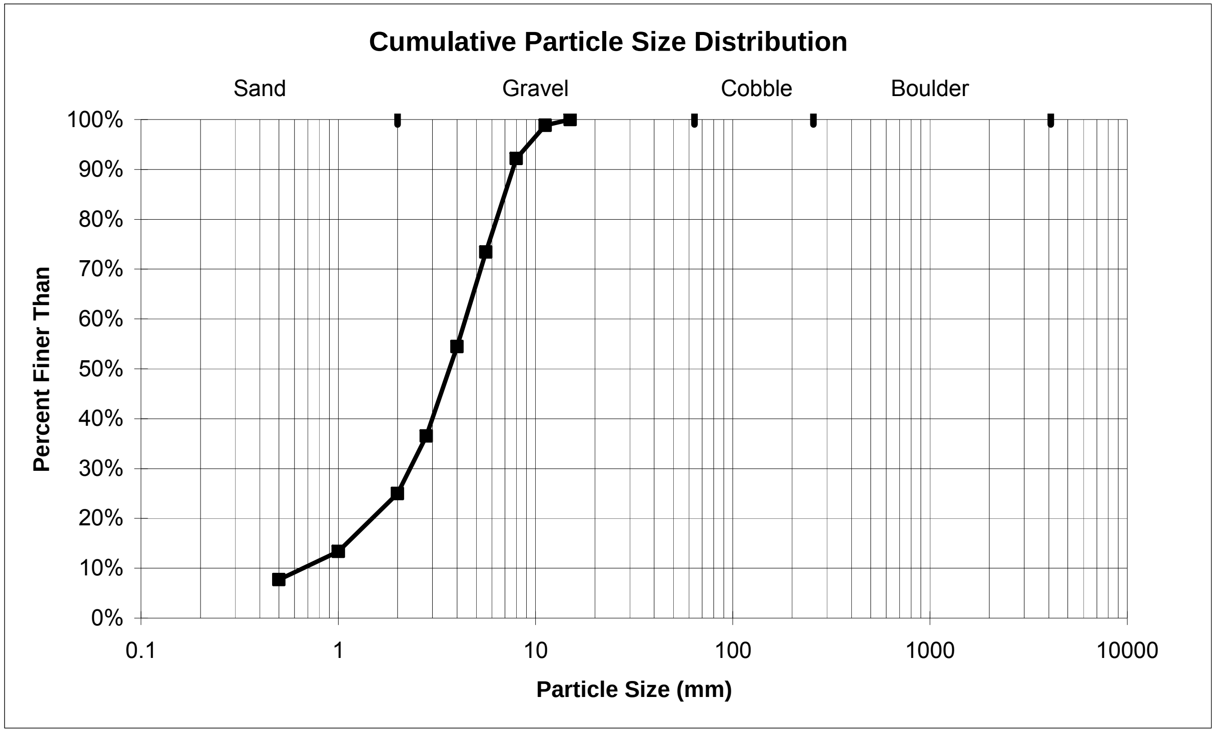
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	31.40	7.7%	
0.5	23.20	5.7%	7.7%
1.0	47.50	11.6%	13.4%
2.0	47.10	11.5%	25.0%
2.8	73.10	17.9%	36.5%
4.0	77.60	19.0%	54.4%
5.6	76.60	18.8%	73.4%
8.0	27.10	6.6%	92.2%
11.2	4.80	1.2%	98.8%
15.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	408.40		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken downstream of Cross Section B

SITE NAME: Pike's Peak Highway - East Fork Beaver Creek Reach 1
ID NUMBER: EBVR1
DATE: 9/11/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.102	2.678	3.662	6.846	9.226	15.0



Sieve Analysis Worksheet

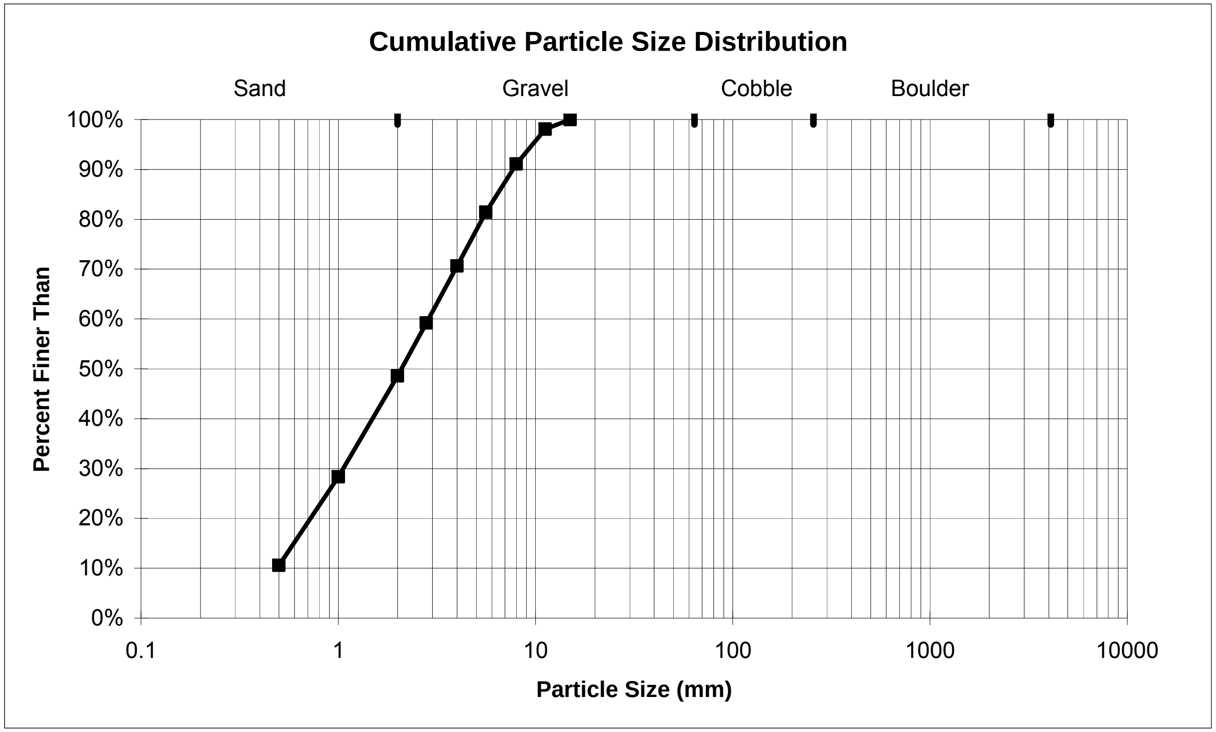
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	54.20	10.6%	
0.5	91.00	17.7%	10.6%
1.0	104.00	20.3%	28.3%
2.0	54.20	10.6%	48.6%
2.8	58.70	11.4%	59.2%
4.0	55.30	10.8%	70.6%
5.6	49.80	9.7%	81.4%
8.0	35.80	7.0%	91.1%
11.2	9.80	1.9%	98.1%
15.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	512.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken 6 ft upstream of Cross Section E

SITE NAME: Pike's Peak Highway - East Fork Beaver Creek Reach 2
ID NUMBER: EBVR2
DATE: 9/11/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.594	1.257	2.091	6.162	9.651	15.0



Sieve Analysis Worksheet

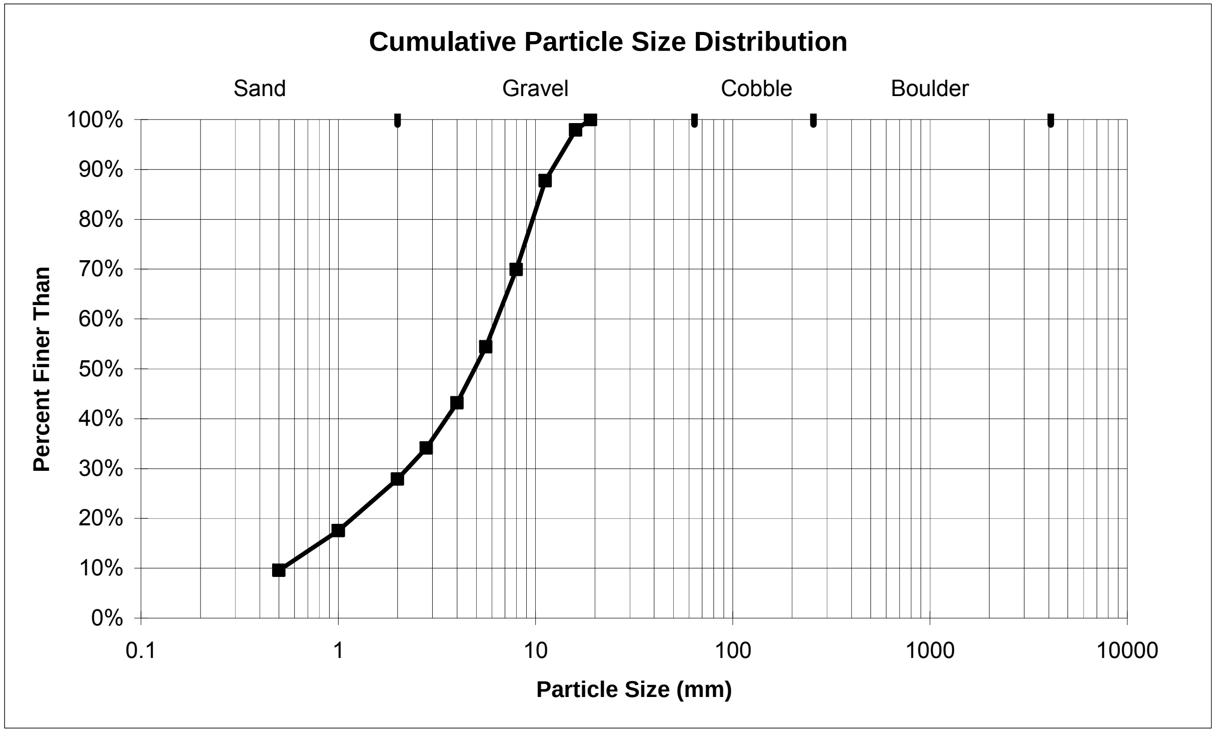
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	45.10	9.6%	
0.5	37.80	8.0%	9.6%
1.0	48.70	10.3%	17.6%
2.0	29.30	6.2%	27.9%
2.8	42.90	9.1%	34.1%
4.0	52.90	11.2%	43.2%
5.6	73.20	15.5%	54.4%
8.0	84.00	17.8%	69.9%
11.2	48.00	10.2%	87.7%
16.0	9.90	2.1%	97.9%
19.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	471.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken at Cross Section E

SITE NAME: Pike's Peak Highway - Glen Cove Creek Reach 1
ID NUMBER: GLEN1
DATE: 9/5/2007
CREW: Belz, Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.801	**2.900**	**4.906**	**10.438**	**14.452**	**19.0**



Sieve Analysis Worksheet

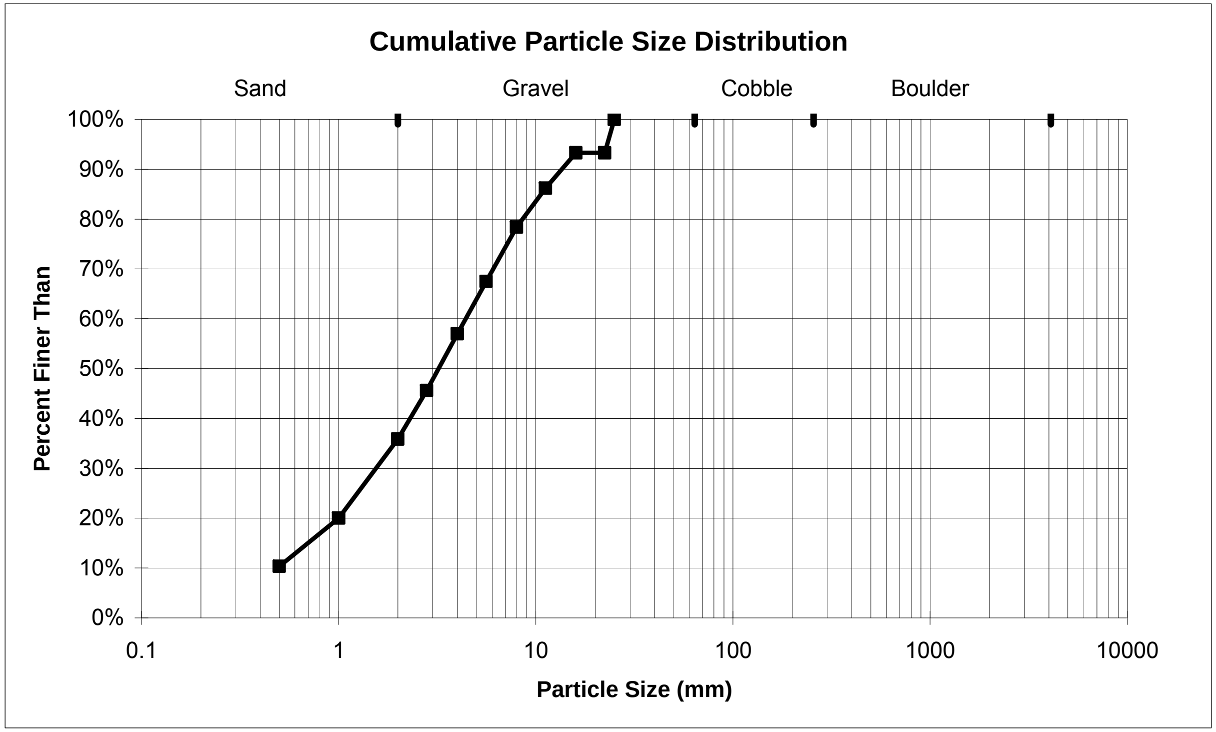
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	46.20	10.4%	
0.5	43.00	9.6%	10.4%
1.0	70.70	15.9%	20.0%
2.0	43.40	9.7%	35.9%
2.8	50.80	11.4%	45.6%
4.0	46.80	10.5%	57.0%
5.6	48.50	10.9%	67.5%
8.0	34.80	7.8%	78.4%
11.2	31.80	7.1%	86.2%
16.0	0.00	0.0%	93.3%
22.4	29.80	6.7%	93.3%
25.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	445.80		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar sample taken at Cross Section A

SITE NAME: Pike's Peak Highway - North Fork Crystal Creek Reach 1
ID NUMBER: NCRY1
DATE: 9/5/2007
CREW: Belz, Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.698	1.926	3.213	10.195	23.029	25.0



Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	42.00	8.9%	
0.5	33.20	7.0%	8.9%
1.0	45.50	9.6%	15.9%
2.0	29.00	6.1%	25.5%
2.8	45.70	9.6%	31.6%
4.0	54.10	11.4%	41.3%
5.6	60.50	12.8%	52.7%
8.0	61.10	12.9%	65.5%
11.2	33.10	7.0%	78.4%
16.0	21.90	4.6%	85.3%
22.4	47.50	10.0%	90.0%
24.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	473.60		

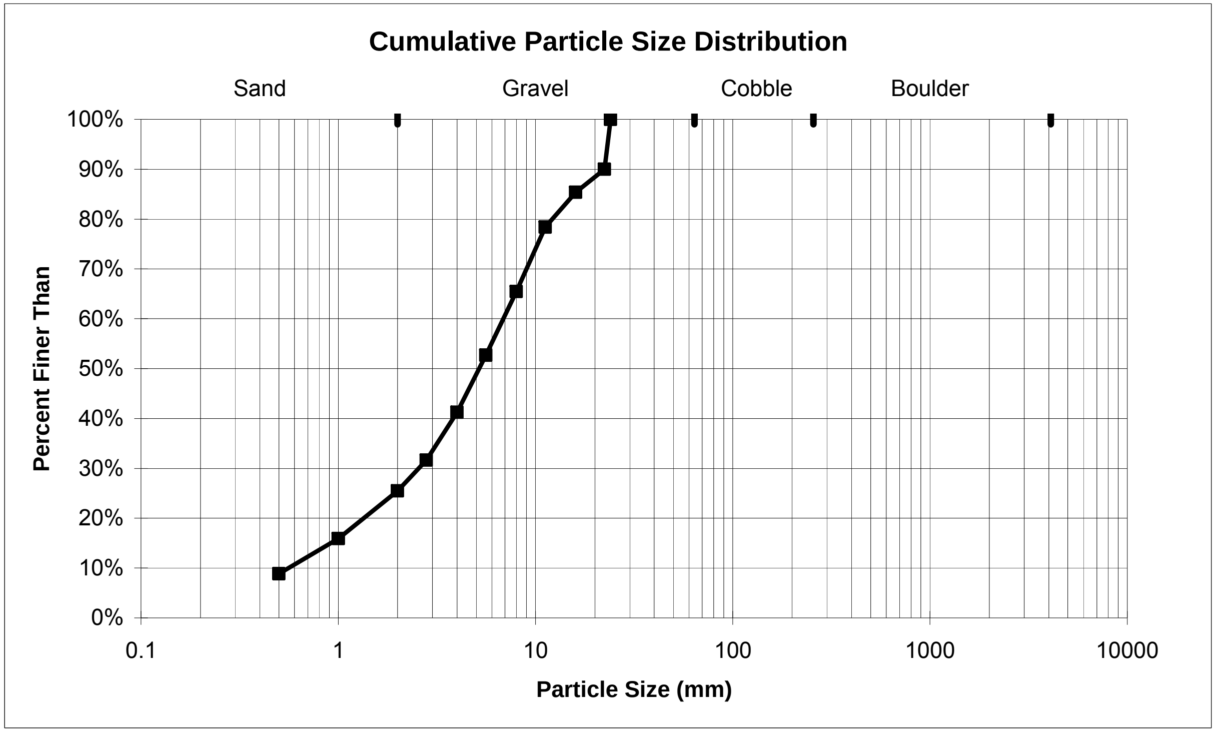
*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken just upstream of Cross Section E

SITE NAME: Pike's Peak Highway - North Fork Crystal Creek Reach 2
ID NUMBER: NCRY2
DATE: 9/6/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)

D15	D35	D50	D84	D95	Lpart
0.917	3.174	5.175	14.938	23.189	24.0



Sieve Analysis Worksheet

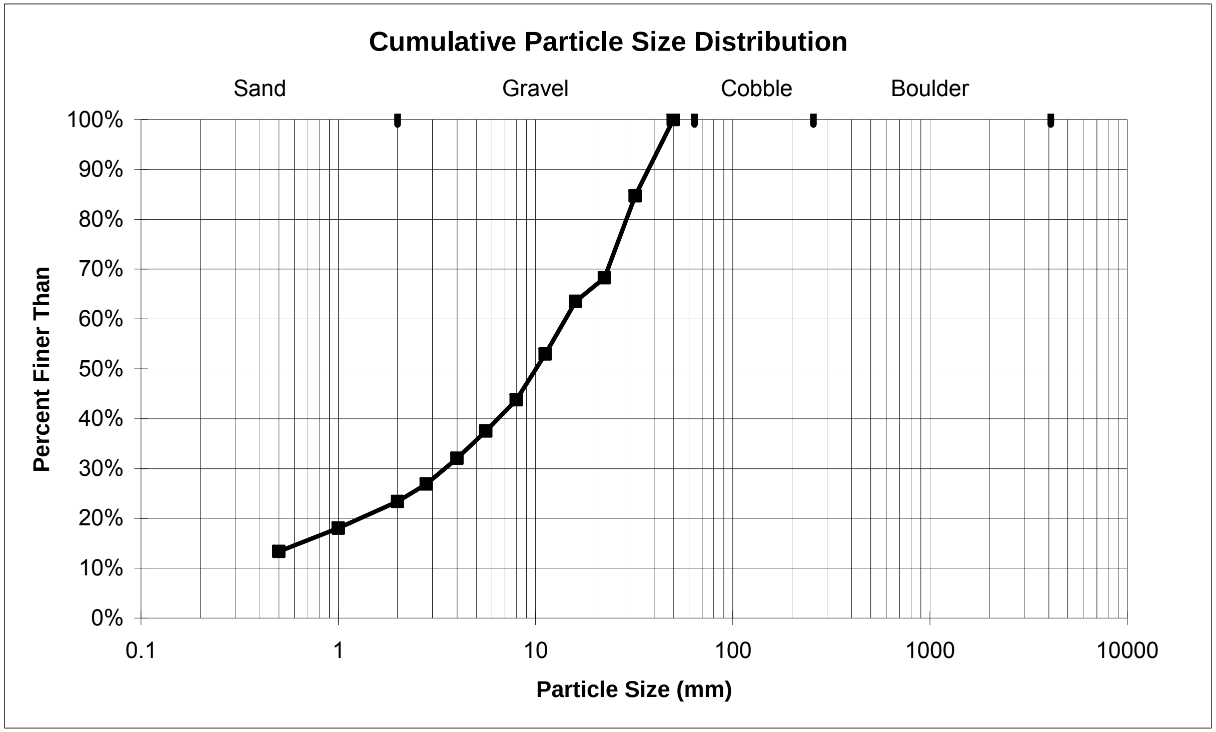
COMMENTS: Bar Sample taken 40 ft downstream of Cross Section A

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	60.20	13.4%	
0.5	21.10	4.7%	13.4%
1.0	24.20	5.4%	18.0%
2.0	15.90	3.5%	23.4%
2.8	23.20	5.1%	26.9%
4.0	24.60	5.5%	32.1%
5.6	28.10	6.2%	37.5%
8.0	41.60	9.2%	43.8%
11.2	47.50	10.5%	53.0%
16.0	21.40	4.7%	63.5%
22.4	74.10	16.4%	68.3%
32.0	69.00	15.3%	84.7%
50.0	*		100.0%
64.0			-
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	450.90		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - South Catamount Creek Reach 1
ID NUMBER: SCAT1
DATE: 9/4/2007
CREW: Belz, Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.638	**4.792**	**10.046**	**31.519**	**43.216**	**50.0**



Sieve Analysis Worksheet

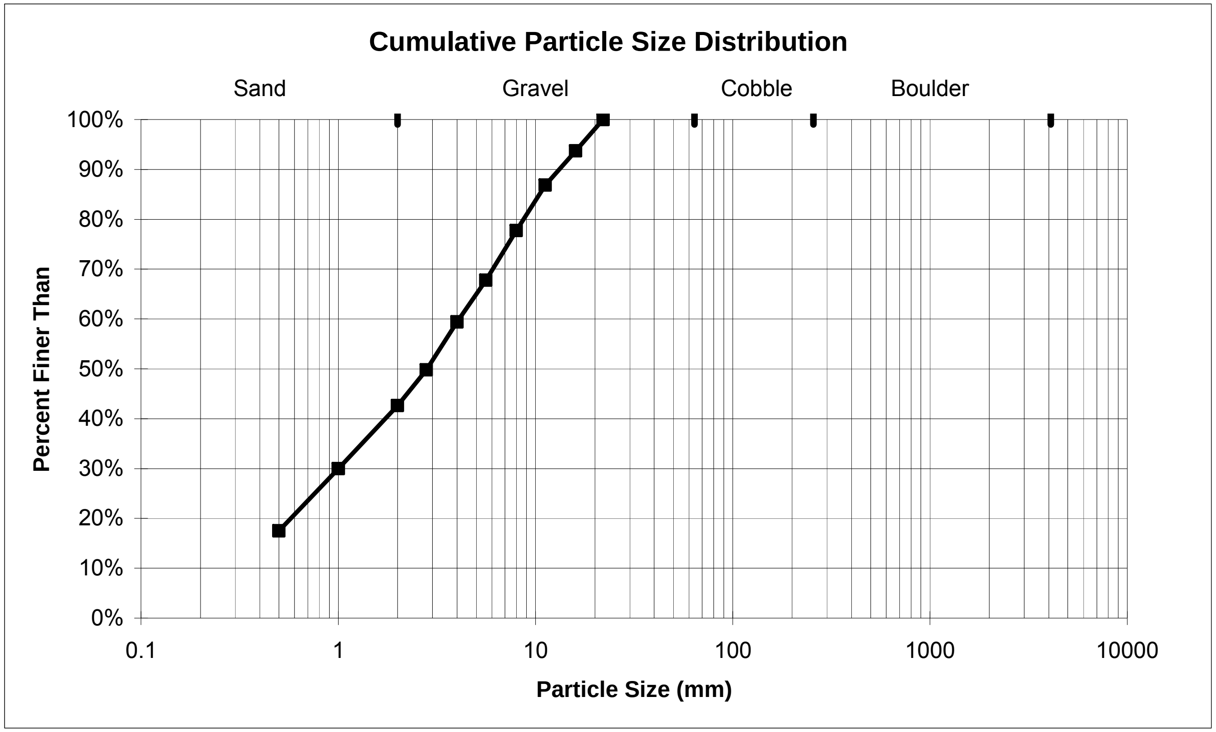
COMMENTS: Bar Sample taken 15 ft upstream of Cross Section E

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	62.30	17.5%	
0.5	44.30	12.5%	17.5%
1.0	45.00	12.6%	30.0%
2.0	25.50	7.2%	42.6%
2.8	34.30	9.6%	49.8%
4.0	29.70	8.3%	59.4%
5.6	35.50	10.0%	67.8%
8.0	32.50	9.1%	77.7%
11.2	24.40	6.9%	86.9%
16.0	22.30	6.3%	93.7%
22.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	355.80		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - South Catamount Creek Reach 2
ID NUMBER: SCAT2
DATE: 9/5/2007
CREW: Belz, Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.249	1.318	2.823	10.075	17.064	22.0



Sieve Analysis Worksheet

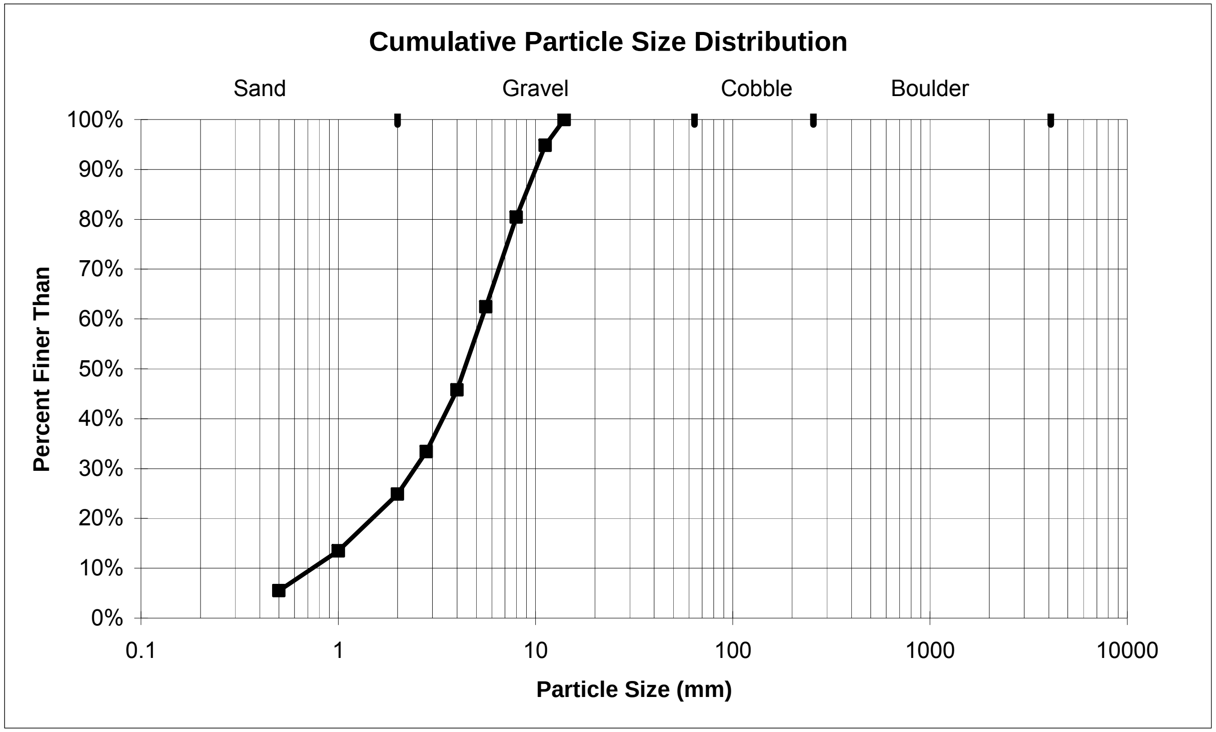
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	32.30	5.5%	
0.5	47.00	8.0%	5.5%
1.0	66.70	11.4%	13.5%
2.0	50.20	8.5%	24.9%
2.8	72.60	12.4%	33.4%
4.0	97.70	16.6%	45.8%
5.6	105.70	18.0%	62.4%
8.0	84.60	14.4%	80.4%
11.2	30.50	5.2%	94.8%
14.0	*		100.0%
20.0			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	587.30		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken between Cross Section D and E

SITE NAME: Pike's Peak Highway - South Catamount Creek Reach 3
ID NUMBER: SCAT3
DATE: 9/5/2007
CREW: Belz, Derengowski, VonLoh, Winkler

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	1.096	2.932	4.357	8.701	11.293	14.0



Sieve Analysis Worksheet

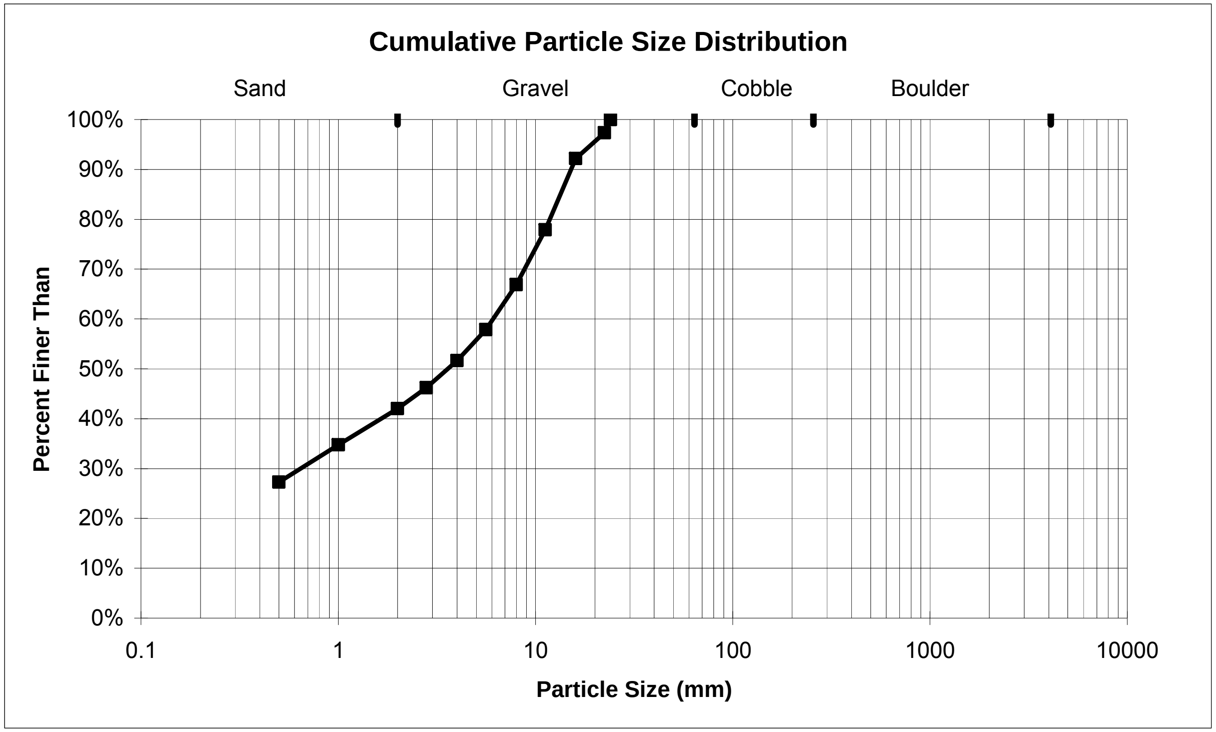
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	129.70	27.3%	
0.5	35.60	7.5%	27.3%
1.0	34.40	7.2%	34.8%
2.0	19.90	4.2%	42.0%
2.8	25.90	5.4%	46.2%
4.0	29.60	6.2%	51.6%
5.6	42.90	9.0%	57.9%
8.0	52.40	11.0%	66.9%
11.2	67.90	14.3%	77.9%
16.0	24.70	5.2%	92.2%
22.4	12.50	2.6%	97.4%
24.0	*		100.0%
45.0			-
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	475.50		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar sample taken 10 ft downstream of Cross Section D

SITE NAME: Pike's Peak Highway - Ski Creek Reach 1
ID NUMBER: SKIC1
DATE: 9/7/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.056	1.023	3.595	13.044	19.211	24.0



Sieve Analysis Worksheet

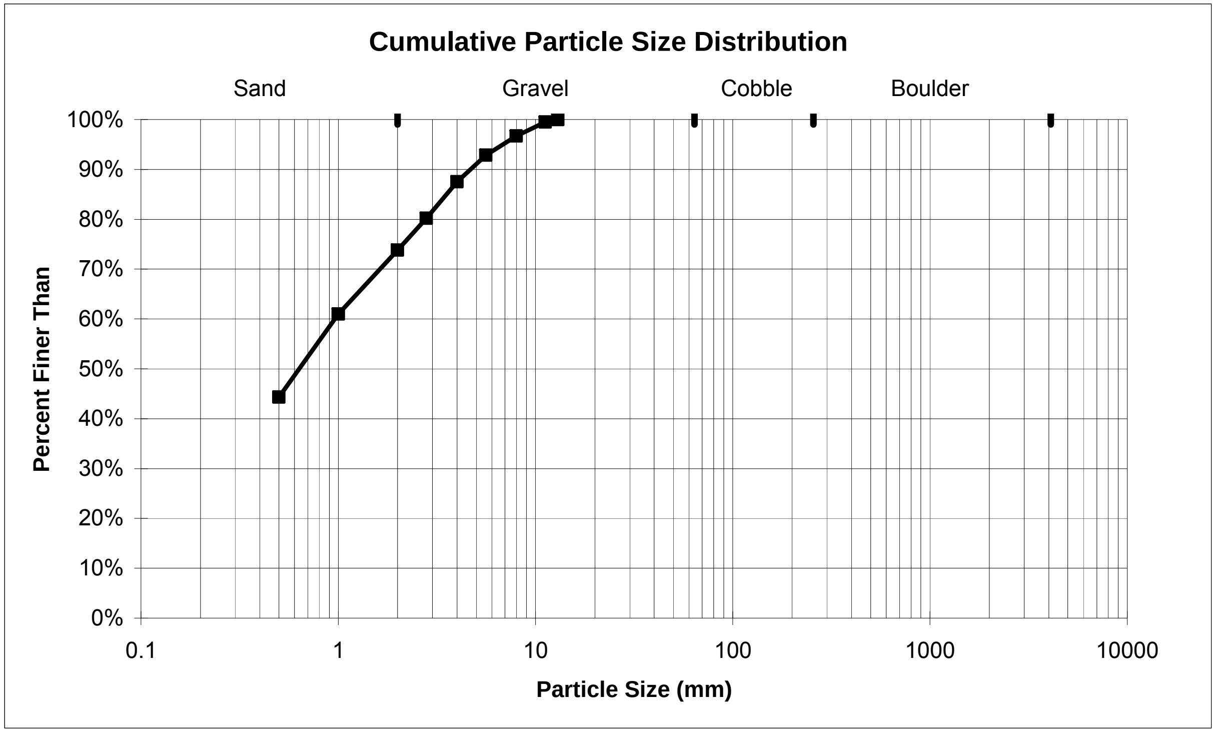
COMMENTS: Bar Sample taken 6 ft upstream of Cross Section B

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	193.20	44.3%	
0.5	72.70	16.7%	44.3%
1.0	55.80	12.8%	61.0%
2.0	27.70	6.4%	73.8%
2.8	32.00	7.3%	80.2%
4.0	23.20	5.3%	87.5%
5.6	16.80	3.9%	92.9%
8.0	12.10	2.8%	96.7%
11.2	2.20	0.5%	99.5%
13.0	*		100.0%
22.4			-
32.0			
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	435.70		

*Measured value of the largest particle in the sample and not a sieve weight

SITE NAME: Pike's Peak Highway - Ski Creek Reach 2
ID NUMBER: SKIC2
DATE: 9/13/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.020	**0.180**	**0.632**	**3.369**	**6.825**	**13.0**



Sieve Analysis Worksheet

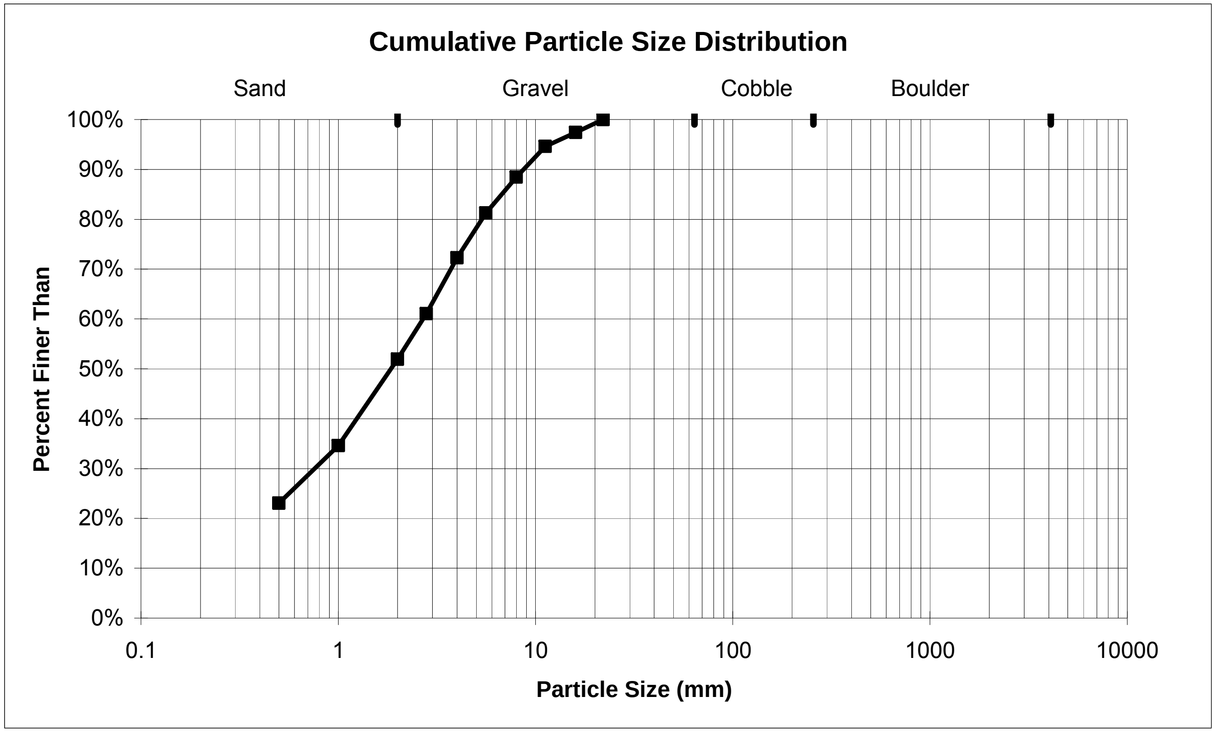
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	83.80	23.1%	
0.5	42.00	11.6%	23.1%
1.0	63.00	17.3%	34.6%
2.0	33.10	9.1%	51.9%
2.8	40.90	11.3%	61.0%
4.0	32.60	9.0%	72.3%
5.6	26.10	7.2%	81.3%
8.0	22.50	6.2%	88.4%
11.2	10.20	2.8%	94.6%
16.0	9.30	2.6%	97.4%
22.0	*		100.0%
32.0			-
45.0			
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	363.50		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken at Cross Section A

SITE NAME: Pike's Peak Highway - Severy Creek Reach 1
ID NUMBER: SVRY1
DATE: 10/3/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.092	1.016	1.851	6.415	11.731	22.0



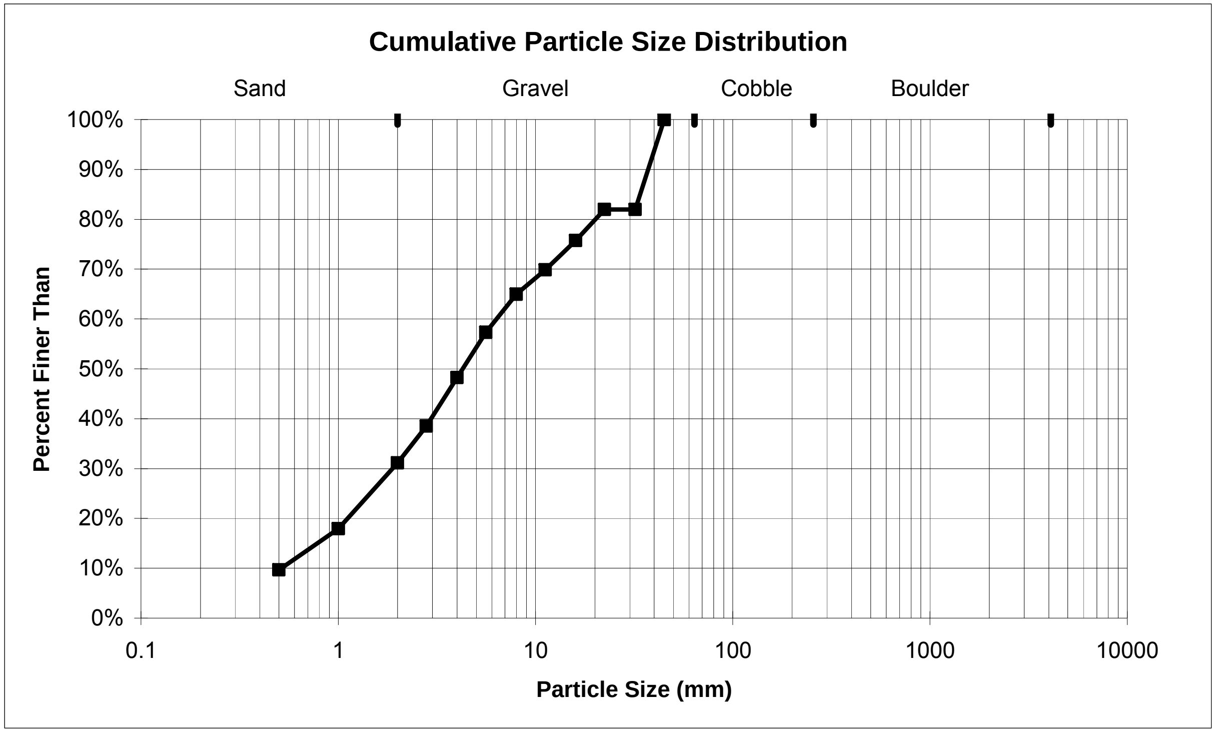
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	33.40	9.7%	
0.5	28.50	8.3%	9.7%
1.0	45.50	13.2%	17.9%
2.0	25.50	7.4%	31.1%
2.8	33.70	9.8%	38.5%
4.0	31.30	9.1%	48.3%
5.6	26.40	7.6%	57.3%
8.0	16.80	4.9%	65.0%
11.2	20.30	5.9%	69.8%
16.0	21.50	6.2%	75.7%
22.4	0	0.0%	82.0%
32.0	62.30	18.0%	82.0%
45.0			100.0%
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	345.20		

COMMENTS: Bar Sample taken downstream of Cross Section E

SITE NAME: Pike's Peak Highway - Severy Creek Reach 2
ID NUMBER: SVRY2
DATE: 10/3/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	D15	D35	D50	D84	D95	Lpart
	0.782	2.387	4.267	33.262	40.944	45.0



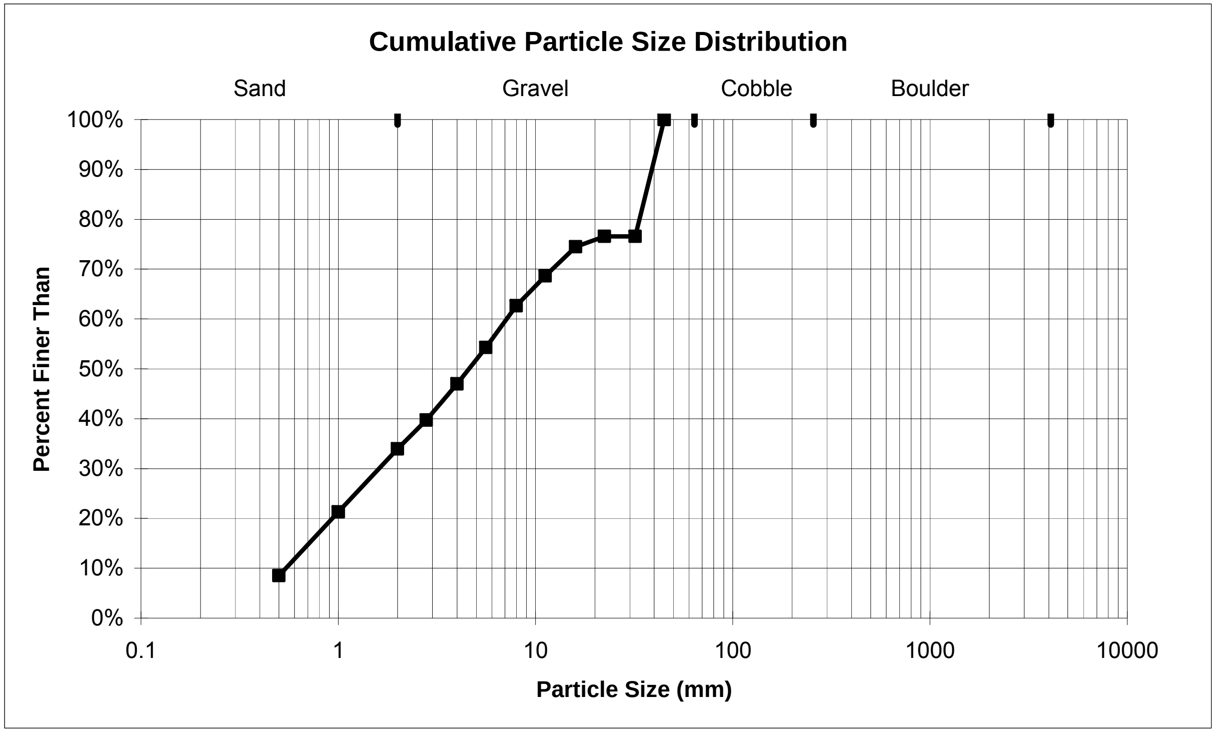
Sieve Analysis Worksheet

Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	35.30	8.5%	
0.5	53.00	12.8%	8.5%
1.0	52.40	12.6%	21.3%
2.0	23.80	5.7%	34.0%
2.8	30.20	7.3%	39.7%
4.0	30.30	7.3%	47.0%
5.6	34.70	8.4%	54.3%
8.0	24.70	6.0%	62.7%
11.2	24.30	5.9%	68.6%
16.0	8.70	2.1%	74.5%
22.4	0	0.0%	76.6%
32.0	97.00	23.4%	76.6%
45.0			100.0%
64.0			
90			
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	414.40		

COMMENTS: Bar Sample taken between Cross Section D and E

SITE NAME: Pike's Peak Highway - West Fork Beaver Creek Reach 1
ID NUMBER: WBVR1
DATE: 9/21/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	0.710	**2.127**	**4.596**	**35.646**	**41.839**	**45.0**



Sieve Analysis Worksheet

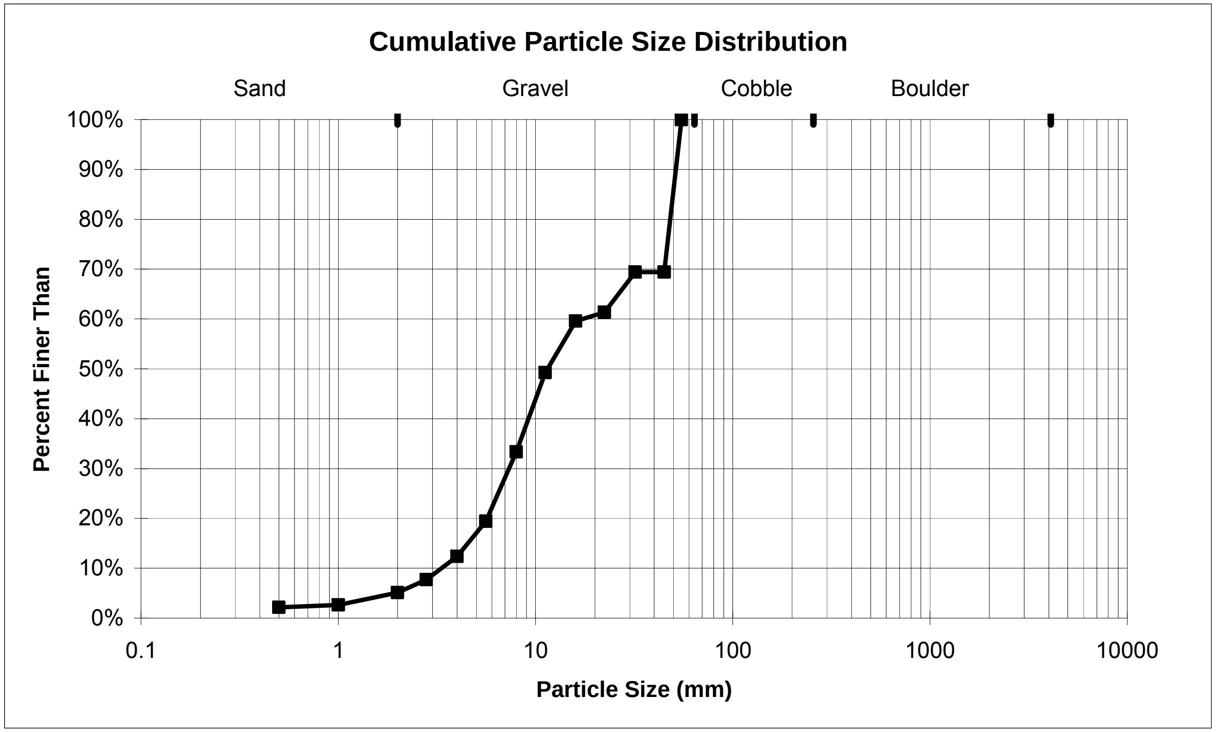
Size Finer Than (mm)	Wt. on Sieve	% of Total	% Finer Than
Pan	10.40	2.1%	
0.5	2.50	0.5%	2.1%
1.0	12.20	2.5%	2.6%
2.0	12.60	2.6%	5.1%
2.8	23.00	4.7%	7.7%
4.0	34.50	7.0%	12.4%
5.6	68.30	13.9%	19.4%
8.0	78.00	15.9%	33.3%
11.2	50.80	10.4%	49.2%
16.0	8.70	1.8%	59.6%
22.4	39.50	8.1%	61.4%
32.0	0	0.0%	69.4%
45.0	150.10	30.6%	69.4%
55.0	*		100.0%
90			-
128			
181			
256			
362			
512			
1024			
2048			
4096			
Total	490.60		

*Measured value of the largest particle in the sample and not a sieve weight

COMMENTS: Bar Sample taken between Cross Section B and C

SITE NAME: Pike's Peak Highway - West Fork Beaver Creek Reach 2
ID NUMBER: WBVR2
DATE: 9/21/2007
CREW: Derengowski, VonLoh

Particle Size Distribution (mm)	**D15**	**D35**	**D50**	**D84**	**D95**	**Lpart**
	4.536	**8.288**	**11.503**	**49.521**	**53.226**	**55.0**



Appendix O

Riparian Vegetation Summary

2008

Riparian Vegetation Summary Pikes Peak, 2008

Site ID	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	9/25/08	OLYMPUS STYLUS	A (24.36)	Downstream from XSE	Left	11.2	1.0	85	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	A		Right	13.4	10.5	50	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	B (31.95)		Left	6.5	10.8	35	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	B		Right	9.9	5.8	60	grass, forb
BHMR1		OLYMPUS STYLUS	C (16.81)		Left	8.2	13.0	20	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	C		Right	11.8	7.5	55	moss, grass, sedge, forb
BHMR1		OLYMPUS STYLUS	D (20.28)		Left	7.4	11.0	75	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	D		Right	11.2	7.0	70	grass, sedge, forb
BHMR1		OLYMPUS STYLUS	E (34.42)		Left	21.8	27.0	75	moss, grass, forb
BHMR1		OLYMPUS STYLUS	E		Right	27.6	22.3	60	grass, sedge, forb
BHMR2	9/25/08	OLYMPUS STYLUS	A (25.43)	18' Upstream from XSB	Left	11.5	6.0	25	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	A		Right	4.9	10.0	60	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	B (17.59)		Left	2.9	5.6	35	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	B		Right	13.9	11.1	40	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	C (18.46)		Left	6.0	10.0	80	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	C		Right	10.3	6.0	20	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	D (30.44)		Left	15.5	19.0	35	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	D		Right	22.0	17.0	35	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	E (43.02)		Left	16.1	11.5	45	grass, sedge, forb
BHMR2		OLYMPUS STYLUS	E		Right	11.0	16.0	75	grass, sedge, forb
EBVR1	9/25/08	OLYMPUS STYLUS	A (20.70)	2' Downstream from XSB left bank	Left	1.3	5.0	0	rock

Site ID	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	A		Right	17.1	13.6	10	sedge, shrub
EBVR1		OLYMPUS STYLUS	B (24.53)		Left	3.0	5.0	70	sedge, forb, shrub
EBVR1		OLYMPUS STYLUS	B		Right	13.5	9.0	30	sedge, forb, shrub
EBVR1		OLYMPUS STYLUS	C (29.05)		Left	6.8	11.0	30	sedge, shrub
EBVR1		OLYMPUS STYLUS	C		Right	17.0	12.0	20	forb, shrub
EBVR1		OLYMPUS STYLUS	D (12.77)		Left	1.9	6.5	40	moss, sedge, forb, shrub
EBVR1		OLYMPUS STYLUS	D		Right	10.1	5.0	0	sediment
EBVR1		OLYMPUS STYLUS	E (18.48)		Left	8.3	11.0	15	sedge, shrub
EBVR1		OLYMPUS STYLUS	E		Right	14.2	10.0	60	moss, sedge, shrub
EBVR2	9/25/08	OLYMPUS STYLUS	A (37.63)	6' Upstream from XSE	Left	14.3	19.0	50	grass, sedge, forb
EBVR2		OLYMPUS STYLUS	A		Right	20.0	16.0	75	grass, sedge
EBVR2		OLYMPUS STYLUS	B (21.24)		Left	9.2	15.0	15	grass, sedge
EBVR2		OLYMPUS STYLUS	B		Right	14.3	11.0	40	sedge
EBVR2		OLYMPUS STYLUS	C (20.46)		Left	9.2	13.0	15	grass, sedge, forb
EBVR2		OLYMPUS STYLUS	C		Right	13.4	11.0	15	sedge
EBVR2		OLYMPUS STYLUS	D (17.45)		Left	7.7	12.5	30	sedge, forb
EBVR2		OLYMPUS STYLUS	D		Right	13.2	10.0	60	grass, sedge, forb
EBVR2		OLYMPUS STYLUS	E (19.66)		Left	9.8	14.0	40	grass, sedge, forb
EBVR2		OLYMPUS STYLUS	E		Right	14.6	11.0	65	sedge, forb
GLEN1	9/24/05	OLYMPUS STYLUS	A (20.03)	at XSE	Left	9.5	12.9	15	moss, grass, sedge, forb
GLEN1		OLYMPUS STYLUS	A		Right	13.0	8.5	35	moss, sedge, forb
GLEN1		OLYMPUS STYLUS	B(16.57)		Left	6.3	9.5	15	grass, sedge, forb
GLEN1		OLYMPUS STYLUS	B		Right	11.5	5.7	15	sedge
GLEN1		OLYMPUS STYLUS	B (2)		Right	9.0	5.0	5	sedge, shrub

Site ID	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	C (17.31)		Left	5.9	9.9	20	sedge, shrub
GLEN1		OLYMPUS STYLUS	C		Right	9.3	5.0	15	sedge, forb
GLEN1		OLYMPUS STYLUS	D (49.99)		Left	15.1	19.9	10	sedge, forb
GLEN1		OLYMPUS STYLUS	D (2)		Left	18.0	21.0	5	moss, grass
GLEN1		OLYMPUS STYLUS	D		Right	31.1	27.2	30	tree
GLEN1		OLYMPUS STYLUS	D (2)		Right	24.5	21.0	5	grass, forb
GLEN1		OLYMPUS STYLUS	E (24.29)		Left	8.0	15.5	5	sedge
GLEN1		OLYMPUS STYLUS	E		Right	19.7	16.0	5	sedge, forb
NCAT1	8/28/08	OLYMPUS STYLUS	A (57.53)	XSB <> XSC	Left	12.5	17.0	10	grass, forb, shrub
NCAT1		OLYMPUS STYLUS	A	right bank	Right	16.5	12.0	25	grass, sedge, forb
NCAT1		OLYMPUS STYLUS	B (58.83)		Left	46.0	50.0	30	sedge
NCAT1		OLYMPUS STYLUS	B		Right	48.8	45.0	25	sedge
NCAT1		OLYMPUS STYLUS	C (38.85)		Left	16.7	21.5	10	grass, sedge, shrub
NCAT1		OLYMPUS STYLUS	C		Right	30.3	26.0	5	grass, sedge
NCAT1		OLYMPUS STYLUS	D (44.77)		Left	26.0	30.0	15	sedge, forb, shrub
NCAT1		OLYMPUS STYLUS	D		Right	32.5	29.3	30	sedge
NCAT1		OLYMPUS STYLUS	E (60.78)		Left	42.8	47.0	5	sedge
NCAT1		OLYMPUS STYLUS	E		Right	45.1	41.0	5	sedge
NCAT2	8/28/08	OLYMPUS STYLUS	A (29.17)	3' Downstream from XSB	Left	12.0	16.5	5	grass, sedge, forb
NCAT2		OLYMPUS STYLUS	A		Right	16.2	12.0	15	sedge, forb
NCAT2		OLYMPUS STYLUS	B (40.59)		Left	8.8	13.0	20	grass, sedge, forb
NCAT2		OLYMPUS STYLUS	B		Right	11.8	8.0	10	grass, sedge, forb
NCAT2		OLYMPUS STYLUS	C (42.34)		Left	12.4	17.0	15	grass, sedge, forb
NCAT2		OLYMPUS STYLUS	C		Right	16.4	11.5	5	grass, sedge, forb
NCAT2		OLYMPUS STYLUS	D (29.78)		Left	6.4	10.5	5	sedge
NCAT2		OLYMPUS STYLUS	D		Right	9.7	5.0	5	sedge, forb, shrub

Site ID	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
NCAT2		OLYMPUS STYLUS	E (34.25)		Left	10.5	14.0	10	grass, sedge, forb, shrub
NCAT2		OLYMPUS STYLUS	E		Right	13.1	9.5	25	grass, sedge, forb
NCRY1	9/17/08	OLYMPUS STYLUS	A (54.53)	at XSA	Left	31.7	35.0	5	sedge, shrub
NCRY1		OLYMPUS STYLUS	A (2)	left bank	Left	35.5	39.0	5	grass, sedge, forb
NCRY1		OLYMPUS STYLUS	A		Right	38.8	36.0	5	grass, sedge
NCRY1		OLYMPUS STYLUS	B (51.31)		Left	39.2	42.0	5	moss, forb, tree
NCRY1		OLYMPUS STYLUS	B		Right	41.5	38.0	5	grass, shrub
NCRY1		OLYMPUS STYLUS	C (43.61)		Left	26.7	29.0	50	moss, grass, forb, tree
NCRY1		OLYMPUS STYLUS	C		Right	28.7	25.0	25	moss, forb
NCRY1		OLYMPUS STYLUS	D (41.53)		Left	30.0	32.8	5	moss, grass, sedge
NCRY1		OLYMPUS STYLUS	D		Right	31.5	29.5	5	moss, sedge
NCRY1		OLYMPUS STYLUS	E (37.98)		Left	30.0	33.7	15	sedge
NCRY1		OLYMPUS STYLUS	E		Right	34.3	31.0	35	moss, sedge, forb, shrub
NCRY2	9/17/08	OLYMPUS STYLUS	A (24.23)	Upstream from XSE	Left	11.0	15.5	5	moss, shrub
NCRY2		OLYMPUS STYLUS	A		Right	20.6	15.0	30	moss, grass, forb, shrub
NCRY2		OLYMPUS STYLUS	B (35.00)		Left	21.4	25.0	30	moss, grass, forb
NCRY2		OLYMPUS STYLUS	B		Right	30.0	26.0	20	moss, forb
NCRY2		OLYMPUS STYLUS	C (33.82)		Left	19.3	24.0	25	moss, grass, shrub
NCRY2		OLYMPUS STYLUS	C		Right	27.4	23.0	20	moss, grass, forb
NCRY2		OLYMPUS STYLUS	D (28.71)		Left	14.5	18.3	15	moss, grass, forb, tree
NCRY2		OLYMPUS STYLUS	D		Right	22.9	19.3	5	moss

Site ID	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
NCRY2		OLYMPUS STYLUS	E (34.35)		Left	5.3	7.1	5	grass, shrub, tree
NCRY2		OLYMPUS STYLUS	E		Right	18.4	15.6	60	moss
OILC1	10/2/08	OLYMPUS STYLUS	A (43.95)	4' downstream from XSA	Left	5.4	11.0	30	sedge, forb, shrub
OILC1		OLYMPUS STYLUS	A		Right	12.4	8.0	25	sedge, shrub
OILC1		OLYMPUS STYLUS	B (41.34)		Left	5.9	12.0	15	grass, sedge, forb, shrub
OILC1		OLYMPUS STYLUS	B		Right	15.6	6.0	20	grass, sedge, forb, shrub
OILC1		OLYMPUS STYLUS	C (32.67)		Left	15.7	19.5	20	moss, grass, sedge
OILC1		OLYMPUS STYLUS	C		Right	20.9	6.0	75	moss, grass, sedge, shrub
OILC1		OLYMPUS STYLUS	D (33.98)		Left	5.8	11.0	25	grass, sedge, forb, shrub
OILC1		OLYMPUS STYLUS	D		Right	32.3	8.0	30	moss, grass, forb, sedge
OILC1		OLYMPUS STYLUS	E (38.35)		Left	8.9	12.0	15	grass, sedge, shrub
OILC1		OLYMPUS STYLUS	E		Right	16.7	9.0	15	sedge, shrub
SVRY1	9/3/08	OLYMPUS STYLUS	A (13.70)	at XSA	Left	2.0	7.0	25	sedge, forb
SVRY1		OLYMPUS STYLUS	A		Right	7.8	4.0	15	sedge, shrub
SVRY1		OLYMPUS STYLUS	B (11.83)		Left	5.0	8.0	5	sedge, shrub
SVRY1		OLYMPUS STYLUS	B		Right	8.9	7.0	15	sedge
SVRY1		OLYMPUS STYLUS	C (14.82)		Left	4.9	8.0	20	sedge, forb, shrub
SVRY1		OLYMPUS STYLUS	C		Right	7.8	5.0	10	sedge, forb, shrub
SVRY1		OLYMPUS STYLUS	D (12.09)		Left	4.6	8.0	10	sedge, forb
SVRY1		OLYMPUS STYLUS	D		Right	8.6	5.2	60	moss, forb, shrub
SVRY1		OLYMPUS STYLUS	E (9.57)		Left	2.7	7.0	25	sedge, forb, shrub

Site ID	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
SVRY1		OLYMPUS STYLUS	E		Right	6.6	4.0	75	moss, sedge, forb, shrub
SVRY2	9/3/08	OLYMPUS STYLUS	A (95.72)	Downstream from XSE	Left	20.2	28.0	0	sediment
SVRY2		OLYMPUS STYLUS	A		Right	44.3	37.0	0	sediment
SVRY2		OLYMPUS STYLUS	B (116.96)		Left	32.0	35.0	0	sediment
SVRY2		OLYMPUS STYLUS	B (2)		Left	17.0	28.0	0	sediment
SVRY2		OLYMPUS STYLUS	B		Right	46.3	41.0	0	sediment
SVRY2		OLYMPUS STYLUS	C (158.61)		Left	59.2	65.0	0	sediment
SVRY2		OLYMPUS STYLUS	C		Right	75.8	74.0	0	sediment
SVRY2		OLYMPUS STYLUS	D (156.58)		Left	75.9	79.0	0	sediment
SVRY2		OLYMPUS STYLUS	D		Right	90.1	87.0	0	sediment
SVRY2		OLYMPUS STYLUS	E (211.52)		Left	80.0	83.0	0	sediment
SVRY2		OLYMPUS STYLUS	E		Right	85.0	81.0	0	sediment
SKIC1	9/24/08	OLYMPUS STYLUS	A (15.04)	10' Downstream from XSD	Left	6.2	8.0	25	moss, sedge, forb
SKIC1		OLYMPUS STYLUS	A		Right	11.1	8.5	15	moss, sedge, forb
SKIC1		OLYMPUS STYLUS	B (14.15)		Left	4.9	7.0	5	moss, forb
SKIC1		OLYMPUS STYLUS	B		Right	10.5	7.5	5	moss, grass, forb, tree
SKIC1		OLYMPUS STYLUS	C (16.60)		Left	4.1	7.0	15	moss, grass, sedge, forb
SKIC1		OLYMPUS STYLUS	C		Right	12.2	9.0	25	sedge, forb, tree
SKIC1		OLYMPUS STYLUS	D (33.57)		Left	16.4	19.5	10	grass, forb
SKIC1		OLYMPUS STYLUS	D		Right	23.2	19.5	5	forb, tree
SKIC1		OLYMPUS STYLUS	E (21.78)		Left	19.2	15.0	35	moss, grass, sedge, forb
SKIC1		OLYMPUS STYLUS	E		Right	14.5	17.5	30	moss, forb

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SKIC2	10/1/08	OLYMPUS STYLUS	A (50.70)	6' Upstream from XSB	Left	32.8	36.0	5	moss, grass, forb
SKIC2		OLYMPUS STYLUS	A		Right	40.7	35.0	20	moss, grass, forb, shrub
SKIC2		OLYMPUS STYLUS	B (46.73)		Left	29.4	35.5	5	shrub
SKIC2		OLYMPUS STYLUS	B		Right	35.1	32.5	5	moss, forb, shrub
SKIC2		OLYMPUS STYLUS	C (29.76)		Left	2.6	6.0	15	moss, grass, forb
SKIC2		OLYMPUS STYLUS	C		Right	10.6	7.0	5	moss, forb
SKIC2		OLYMPUS STYLUS	D (28.31)		Left	4.3	11.0	5	moss
SKIC2		OLYMPUS STYLUS	D		Right	11.5	8.0	0	
SKIC2		OLYMPUS STYLUS	E (41.90)		Left	24.9	31.0	5	forb
SKIC2		OLYMPUS STYLUS	E		Right	31.1	26.0	5	moss, tree
SCAT1	10/1/08	OLYMPUS STYLUS	A (22.96)	40' downstream from XSA	Left	6.4	11.5	20	moss, grass, forb, shrub
SCAT1		OLYMPUS STYLUS	A		Right	11.7	8.9	75	moss, grass
SCAT1		OLYMPUS STYLUS	B (20.83)		Left	10.5	14.0	20	moss, sedge, forb
SCAT1		OLYMPUS STYLUS	B		Right	18.3	14.0	10	moss, sedge, forb
SCAT1		OLYMPUS STYLUS	C (21.86)		Left	4.8	10.0	5	moss, forb
SCAT1		OLYMPUS STYLUS	C		Right	13.7	9.6	15	moss, sedge, forb
SCAT1		OLYMPUS STYLUS	D (18.12)		Left	5.5	12.0	10	grass, sedge, forb
SCAT1		OLYMPUS STYLUS	D		Right	11.7	6.0	40	moss, grass
SCAT1		OLYMPUS STYLUS	E (24.02)		Left	8.8	16.0	25	moss, sedge, forb
SCAT1		OLYMPUS STYLUS	E		Right	15.5	10.0	70	moss, grass, forb, shrub
SCAT2	9/10/08	OLYMPUS STYLUS	A (28.57)	10" Upstream from XSE	Left	3.9	9.0	10	grass, sedge, forb
SCAT2		OLYMPUS STYLUS	A	left bank	Right	15.0	9.5	5	moss, forb

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SCAT2		OLYMPUS STYLUS	B (17.05)		Left	3.0	7.0	10	grass, forb
SCAT2		OLYMPUS STYLUS	B		Right	11.3	7.0	10	moss, grass, forb
SCAT2		OLYMPUS STYLUS	C (19.81)		Left	2.2	6.0	5	grass, sedge, forb
SCAT2		OLYMPUS STYLUS	C		Right	13.2	9.0	20	moss, grass, forb
SCAT2		OLYMPUS STYLUS	D (38.50)		Left	15.4	12.7	25	moss, grass, forb
SCAT2		OLYMPUS STYLUS	D		Right	7.6	11.0	5	grass, forb, tree
SCAT2		OLYMPUS STYLUS	E (18.95)		Left	3.8	7.0	55	moss, grass, sedge, forb
SCAT2		OLYMPUS STYLUS	E		Right	11.2	8.0	35	moss, sedge, forb
SCAT3	9/10/08	OLYMPUS STYLUS	A (44.32)	10' Downstream from XSD	Left	26.0	29.4	5	sedge
SCAT3		OLYMPUS STYLUS	A	right bank	Right	29.2	25.2	5	moss, sedge, forb
SCAT3		OLYMPUS STYLUS	B (32.19)		Left	12.1	16.0	5	sedge, forb
SCAT3		OLYMPUS STYLUS	B		Right	15.5	12.7	20	grass, sedge
SCAT3		OLYMPUS STYLUS	C (15.79)		Left	3.0	6.8	5	sedge, forb, shrub
SCAT3		OLYMPUS STYLUS	C		Right	6.8	3.1	5	grass, sedge, forb
SCAT3		OLYMPUS STYLUS	D (19.60)		Left	8.2	11.6	25	sedge
SCAT3		OLYMPUS STYLUS	D		Right	10.8	8.1	5	sedge
SCAT3		OLYMPUS STYLUS	E (18.48)		Left	5.1	8.2	15	sedge, forb, shrub
SCAT3		OLYMPUS STYLUS	E		Right	6.5	3.8	10	sedge, shrub
WBVR1	9/18/08	OLYMPUS STYLUS	A (36.64)	XSD <> XSE	Left	15.9	21.0	15	sedge, forb
WBVR1		OLYMPUS STYLUS	A		Right	31.0	27.0	10	grass, sedge
WBVR1		OLYMPUS STYLUS	B (20.98)		Left	4.3	10.0	25	grass, forb, shrub
WBVR1		OLYMPUS STYLUS	B		Right	15.5	11.0	10	sedge, shrub
WBVR1		OLYMPUS STYLUS	C (28.83)		Left	4.0	9.0	40	moss, sedge, forb, shrub
WBVR1		OLYMPUS STYLUS	C		Right	17.0	11.0	10	sedge, shrub

Site ID	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
WBVR1		OLYMPUS STYLUS	D (34.18)		Left	9.7	14.0	0	gravel
WBVR1		OLYMPUS STYLUS	D		Right	25.0	20.0	25	sedge, shrub
WBVR1		OLYMPUS STYLUS	E (29.56)		Left	6.0	12.0	15	moss
WBVR1		OLYMPUS STYLUS	E		Right	20.0	16.0	30	sedge
WBVR2	9/18/08	OLYMPUS STYLUS	A (44.40)	XSB <> XSC	Left	7.5	16.0	25	moss, shrub
WBVR2		OLYMPUS STYLUS	A	left bank	Right	24.0	19.0	0	gravel
WBVR2		OLYMPUS STYLUS	B (90.60)		Left	21.0	26.0	0	gravel
WBVR2		OLYMPUS STYLUS	B		Right	37.0	31.0	0	gravel
WBVR2		OLYMPUS STYLUS	C (151.93)		Left	100.5	107.0	0	gravel
WBVR2		OLYMPUS STYLUS	C		Right	123.0	119.0	0	gravel
WBVR2		OLYMPUS STYLUS	D (149.43)		Left	104.5	108.0	5	gravel
WBVR2		OLYMPUS STYLUS	D		Right	118.0	114.0	0	gravel
WBVR2		OLYMPUS STYLUS	E (96.25)		Left	33.4	39.0	5	moss, grass, sedge, forb, shrub
WBVR2		OLYMPUS STYLUS	E		Right	48.9	43.0	0	gravel