Project Note

Subject: **CD5 Bank Erosion, Channel Bathymetry, and Bridge Bathymetry Monitoring**	
To: Lynn de George, ConocoPhillips and Maggie Valentine, Weston Solutions	
From: Jeff Baker and Garrett Yager	2/21/2014
2013 Colville River Delta Spring Breakup Monitoring and Hydrologic Assessment (A component of the CD5 Adaptive Management Strategy)	135141

Contents

1. Introduction

The U.S. Army Corps of Engineers permit to develop the CD5 infrastructure in the Colville River Delta requires ConocoPhillips Alaska, Inc. to implement a monitoring plan with an adaptive management strategy. The CD5 Monitoring Plan was developed to monitor changes in site conditions relating to the hydrologic functions of the Colville River Delta. Erosion Control Monitoring and Bridge Monitoring are components of the CD5 Monitoring Plan and require pre-construction (baseline) data collection in 2013.

2. Objectives

The Nigliq Channel and Nigliagvik pre-construction bank topography and channel bathymetry was surveyed to establish baseline data for the Erosion Control Monitoring component of the CD5 Monitoring Plan. In addition, pre-construction topographic and bathymetric surveys were performed at the Nigliq Channel, Lake L9341, and the Nigliagvik proposed CD5 bridge crossings to establish baseline data for the Bridge Monitoring component of the CD5 Monitoring Plan. A detailed edge of bank delineation was surveyed in close proximity to the Nigliq Channel and the Nigliagvik proposed CD5 bridge crossings for monitoring bank erosion associated with bridge hydraulics. The purpose of the detailed edge of bank delineation is to identify rapid rates of erosion near the bridges that may require mitigative action.

This project note includes the methods and results from the channel and bridge transect surveys and the detailed edge of bank delineation at the Nigliq Channel and Nigliagvik proposed CD5 bridge crossings. An explanation of how the edge of bank was determined and a detailed description of the pre-construction bank conditions near the Nigliq Channel and Nigliagvik proposed CD5 bridge crossings are also included.

3. Survey Extents

Bank topography and channel bathymetry associated with the Erosion Control Monitoring Study were collected at 14 predetermined transects on the Nigliq Channel and 18 predetermined transects on the Nigliagvik as specified in the CD5 Monitoring Plan and shown in Figure 3.1. Transect spacing is approximately 1,600 feet and extends approximately 9,000 feet upstream and downstream of the proposed bridge centerlines. The Bridge Monitoring study includes 1 additional transect downstream of the Nigliq Channel proposed CD5 bridge crossing, 4 transects at the Lake L9341 proposed CD5 bridge crossing, and 2 additional transects downstream of the Nigliagvik proposed CD5 bridge crossing (Figure 3.1). The detailed edge of bank delineation extends between transects 7 and 11 on the west bank of the Nigliq Channel, between transects 9 and 11 on the east bank of the Nigliq Channel, and between transects 23 and 28 on both banks of the Nigliagvik.

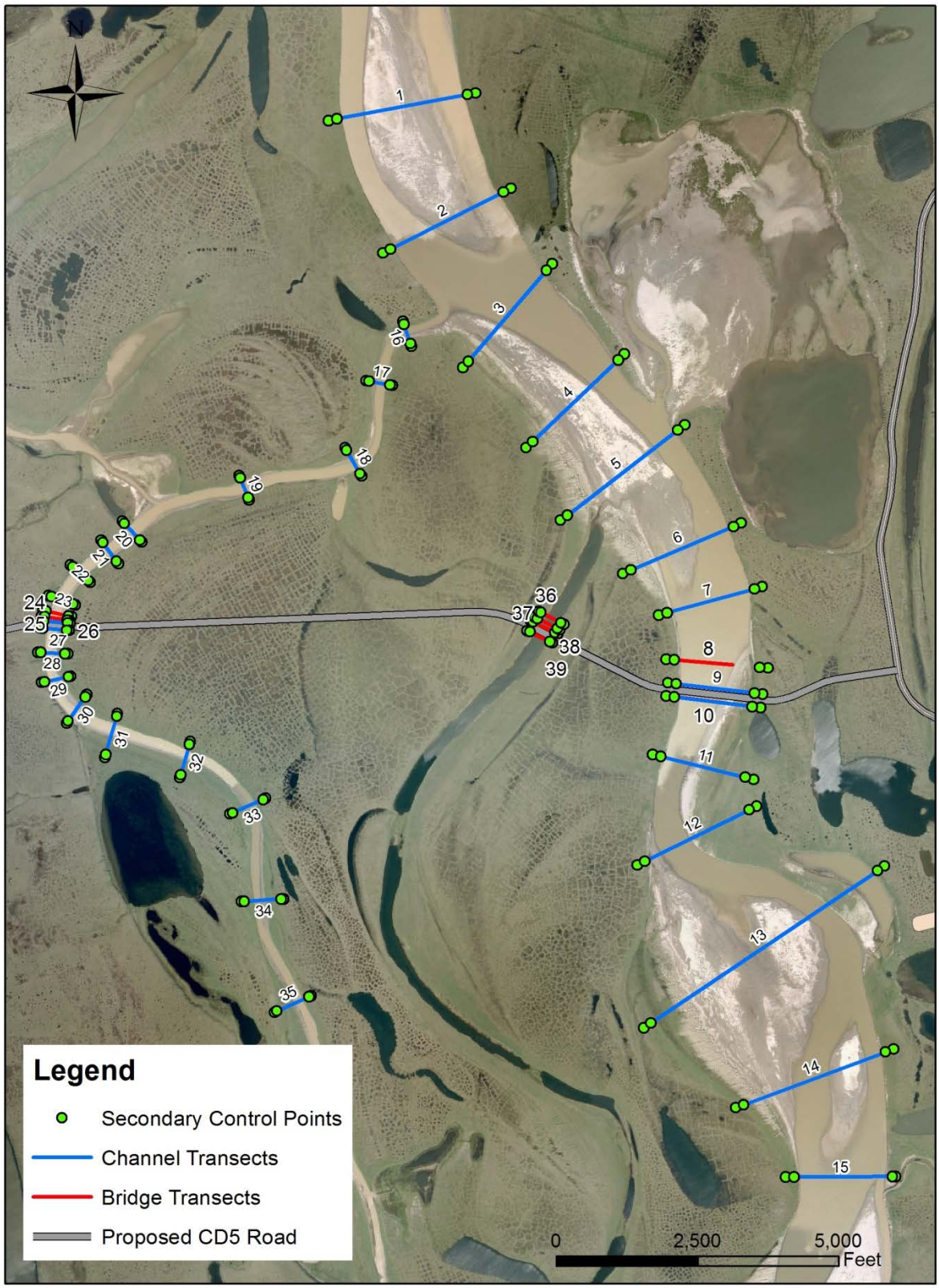

Figure 3.1: Transect Locations

4. Methods

4.1 Survey Control

LCMF used a combination of conventional leveling and static Global Positioning System (GPS) techniques to establish a broad primary control network that encompassed the entire project area. The static survey was then processed using GPS software and the Online Positioning User Service network to derive the North American Datum of 1983 (2011) coordinates. Leveled elevations from local benchmarks were used to bring the project's vertical datum to the desired British Petroleum Mean Sea Level. The carefully thought out location of the primary control points allowed LCMF to use GPS Real Time Kinematic (RTK) surveying techniques to set two secondary control points on each end of all transects and maintain the stringent horizontal and vertical tolerances required for the project. Secondary control points were setback 50 feet and 200 feet from channel banks on the Nigliq Channel and setback 50 feet and 100 feet from channel backs on the Nigliagvik (Figure 3.1).

4.2 Transects

Transects were surveyed by LCMF August 29 through September 18, 2013. Transect bathymetric and topographic data was collected at a minimum spacing of 100 feet in areas of consistent grade and at breaks in grade including the top and toe of the channel banks. Transect stationing was referenced to the 200 foot left bank secondary control point on the Nigliq Channel and the 100 foot left bank secondary control point on the Nigliagvik. Survey markers (pins or marking whiskers), were placed in the ground at survey points between the 50 foot secondary control point and the edge of the channel bank. Survey equipment used for the transect surveys was a combination of Trimble GPS RTK units and a Garmin 178C with a fathometer for the bathymetry portion. The careful planning put forth for the initial survey will allow LCMF to duplicate similar results over the life of the project.

4.3 Detailed Edge of Bank Delineation

The detailed edge of bank delineation survey was conducted by a Michael Baker Jr. Inc. (Baker) hydrologist and LCMF surveyors on August 21 and August 22, 2013. The detailed edge of bank delineation on the Nigliq Channel was referenced to a baseline connecting the 200 foot secondary control points between transects 7 and 11 on the west bank and transects 9 and 11 on the east bank (Figure 4.1). The detailed edge of bank delineation on the Nigliagvik was referenced to a baseline connecting the 100 foot secondary control points between transects 23 and 28 (Figure 4.2). 100 foot stationing was established along the detailed bank delineation baseline. Edge of bank topographic data was collected where a perpendicular projection of the 100 foot stationing intersects the edge of bank. Survey markers (whiskers) were placed in the ground at the survey points delineating the edge of the bank.

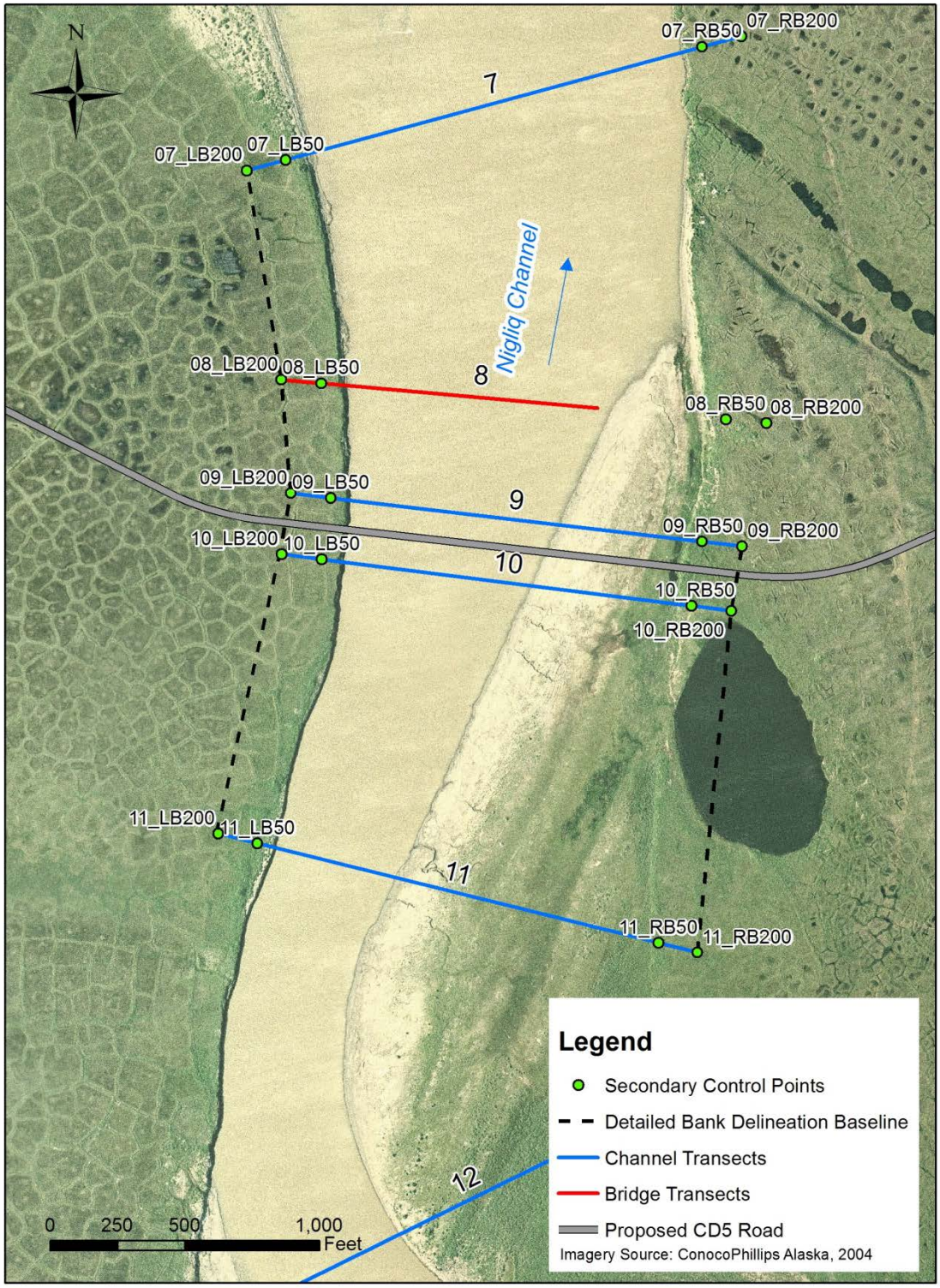

Figure 4.1: Baseline for Detailed Edge of Bank Delineation on the Nigliq Channel

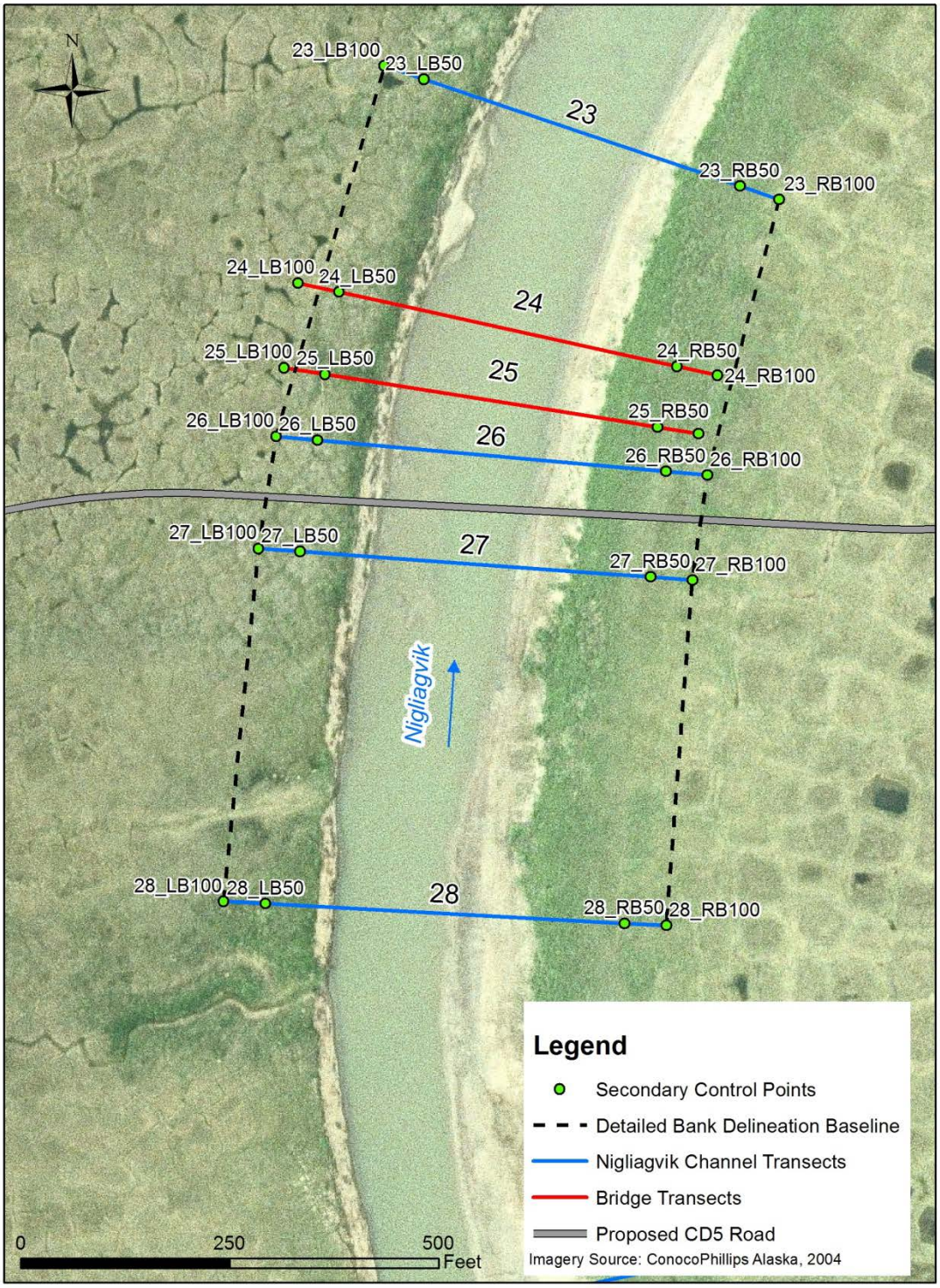

Figure 4.2: Baseline for Detailed Edge of Bank Delineation on the Nigliagvik

5. Transects

The channel and bridge transect survey results are included in Attachment A.

6. Detailed Edge of Bank Delineation

6.1 Nigliq Channel Proposed CD5 Bridge Crossing

1. West Bank

Top of bank composition downstream of the CD5 bridge crossing is patterned, wet sedge meadow tundra. Banks are characterized by active sloughing with prominent tension cracks. No exposed ice lenses or ice wedges were evident during the time of survey. No large block collapse or thermo-erosional niches were present. Sloughing bank faces were steep and moderately vegetated with scattered drift wood (Photo 6.1). Sloughing bank faces extended to the water line, lacking any exposed beach at the toe of the bank. Edge of bank survey points were positioned at the perimeter of the intact vegetation above the first major tension crack (Photo 6.2).

Bank indentations, formed by ground subsidence likely attributed to melting of underlying ice-wedges, give the bank a scalloped appearance near the proposed CD5 bridge crossing. At these locations, the edge of bank was established above the subsided ground (Photo 6.3).

Downstream of the proposed CD5 bridge crossing, the grade of the sloughing bank was moderate. A beach was observed at the toe as the bank transitioned from a cut bank to a depository bank (Photo 6.4). Tension cracks were evident and similar to the upstream delineation; survey points were established above the first major crack.

Photo 6.1: Sloughing of the Nigliq Channel west bank with scattered drift wood upstream of the proposed CD5 bridge crossing, looking south; August 22, 2013

Photo 6.2: Edge of bank survey point established above the first major tension crack upstream of the proposed CD5 bridge crossing on the west bank of the Nigliq Channel; August 22, 2013

Photo 6.3: Ground subsidence and defined edge of the Nigliq Channel west bank near the proposed CD5 bridge crossing; looking north; August 22, 2013

Photo 6.4: Nigliq Channel west bank with beach at toe, downstream of the proposed CD5 bridge crossing; looking southeast; August 22, 2013

2. East Bank

The east bank of the Nigliq Channel upstream of the proposed CD5 bridge crossing is defined as an extensive depository point bar. The point bar is composed of barren ground near the channel and transitions to partially vegetated grasses and dense low willows further from the channel. A gradual break in grade defines the bank from the point bar terrain. The edge of bank survey points were established at the top of the grade break (Photo 6.5).

A small lake basin, just upstream of the proposed CD5 bridge crossing, intersects the floodplain, and a break in grade was not distinguishable between the lake basin and the point bar terrain. At this location, the edge of bank was defined as the eastern edge of the lake. The edge of bank becomes more pronounced near the proposed CD5 bridge crossing as the bank transitions from a depository point bar to a cut bank. Survey points were not established downstream of the proposed CD5 bridge crossing because of restricted access. Visual observations showed the bank maintains a similar profile as the bank at the proposed CD5 bridge crossing for an additional 300 to 400 feet downstream before abruptly transitioning to a cut bank.

Additional visual inspections of the east bank, downstream of the proposed CD5 bridge crossing, were conducted from a boat. Active sloughing, similar to the west bank, was observed. Beyond the downstream extent of the detailed bank delineation limits, thermo-erosional niches (Photo 6.6) and ensuing block collapse (Photo 6.7) were prevalent along the bank.

Daily Field Reports are included in Attachment B and the Nigliq Channel Bank Surveys are located in Attachment C.

Photo 6.5: Edge of Nigliq Channel east bank defined as top of grade break on point bar, upstream of the CD5 bridge crossing, looking southwest; August 22, 2013

Photo 6.6: Exposed ice wedge and resulting thermo-erosional niche, west bank of the Nigliq Channel downstream of the proposed CD5 bridge crossing; August 22, 2013

Photo 6.7: Block collapse resulting from thermo-erosional niche, west bank of the Nigliq Channel downstream of the proposed CD5 bridge crossing; August 22, 2013

6.2 Nigliagvik Proposed CD5 Bridge Crossing

1. West Bank

The west bank of the Nigliagvik, upstream of the proposed CD5 bridge crossing, is characterized by steep, sandy bluffs with an overhanging mat of moist sedge-shrub tundra (Photo 6.8). Minor tension cracks were observed in the overhanging tundra mat. Survey points were established where the vegetative mat is anchored to the bluff (Photo 6.9).

Downstream of the proposed CD5 bridge crossing, the gradient of the west bluff becomes moderate. Vegetation is established on the bluff face (Photo 6.10). Survey points were collected at the break in grade defining the top of the bank. Bank indentations, formed by ground subsidence likely attributed to melting of underlying ice-wedges, were encountered downstream of the proposed CD5 bridge crossing. At these locations, the edge of bank was delineated above the subsiding ground (Photo 6.11).

Photo 6.8: Sandy bluffs and overhanging tundra mat on the east bank Nigliagvik, upstream of the proposed CD5 bridge crossing; looking south; August 21, 2013

Photo 6.9: Survey point established at anchored edge of the vegetative mat on the Nigliagvik west bluff, upstream of the proposed CD5 bridge crossing; August 21, 2013

Photo 6.10: Established vegetation on the bluff face of the west bank Nigliagvik, downstream of the proposed CD5 bridge crossing; looking south; August 21, 2013

Photo 6.11: Nigliagvik west bank indentation downstream of the proposed CD5 bridge crossing; looking south; August 21, 2013

2. East Bank

The east bank of the Nigliagvik is a narrow, muddy depository bank with barren terrain near the channel transitioning to sparsely vegetated mudflats and moist low willow shrub. A break in grade defining the top of bank was not identified. The edge of bank was determined to be at the distinct change in vegetation from sparse grass to dense willows (Photo 6.12). The east bank profile of the Nigliagvik was relatively uniform upstream and downstream of the proposed CD5 bridge crossing. Nigliagvik Bank Surveys are located in Attachment D.

Photo 6.12: East edge of Nigliagvik bank defined where willows are rooted, upstream of the proposed CD5 bridge crossing; looking northeast; August 21, 2013

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Attachment A ***Channel and Bridge Transect Survey Results***

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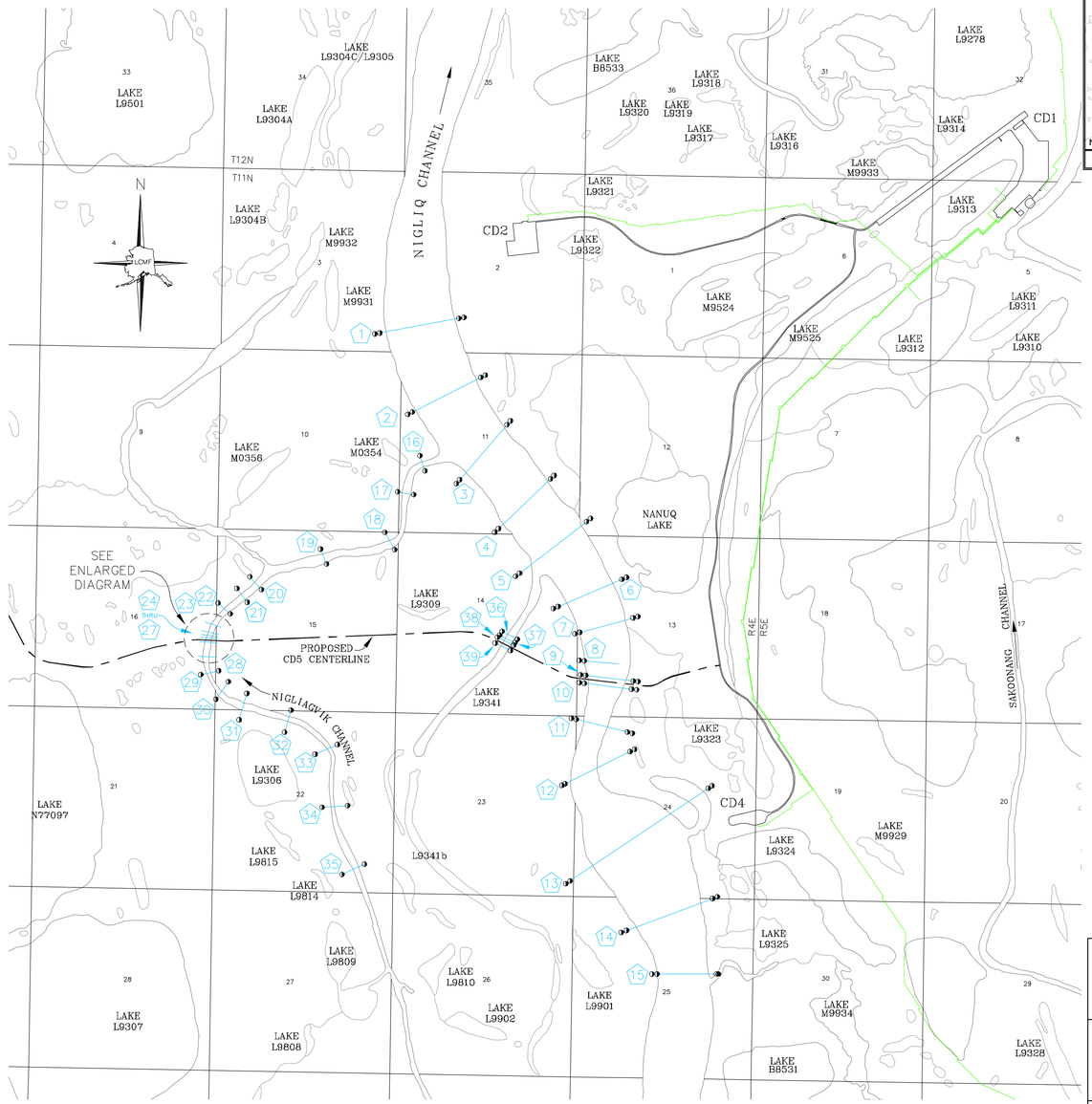
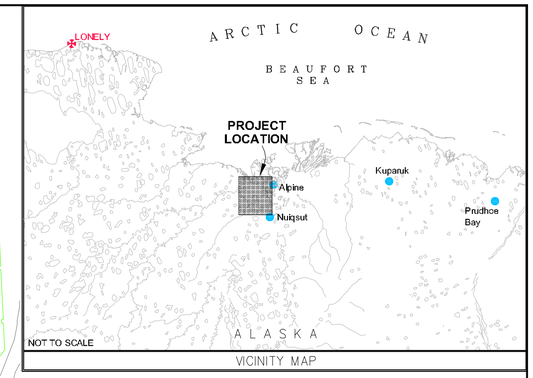
JOB NO:	SUB JOB NO:	DRAWING NO:
02-204	–	CE-CD50-1004

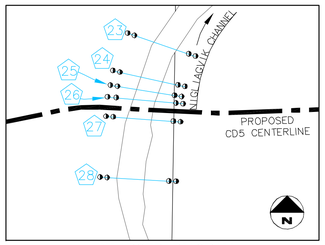
CD5 TRANSECT CONTROL

NORTHING	EASTING	ELEV	DESCRIPTION	NORTHING	EASTING	ELEV	DESCRIPTION
5,971,410.172	1,507,156.498	8.419	01–LB200 Al Cap Flush	5,963,935.690	1,503,847.826	7.458	20–RB100 Al Cap Flush
5,971,437.585	1,507,303.986	8.293	01–LB50 Al Cap Flush	5,963,972.576	1,503,814.200	7.417	20–RB50 Al Cap Flush
5,971,895.681	1,509,763.370	9.145	01–RB200 Al Cap Flush	5,963,970.128	1,503,127.995	24.412	21–LB100 Al Cap Flush
5,971,868.462	1,509,615.861	9.243	01–RB50 Al Cap Flush	5,963,930.056	1,503,197.752	20.803	21–LB50 Al Cap Flush
5,969,060.230	1,508,119.673	8.815	02–LB200 Al Cap Flush	5,963,562.391	1,503,430.566	8.697	21–RB100 Al Cap Flush
5,969,127.888	1,508,253.550	7.602	02–LB50 Al Cap Flush	5,963,602.565	1,503,400.675	9.087	21–RB50 Al Cap Flush
5,970,206.027	1,510,386.345	9.199	02–RB200 Al Cap Flush	5,963,540.647	1,502,578.266	26.015	22–LB110 Al Cap Flush
5,970,138.191	1,510,252.530	9.100	02–RB50 Al Cap Flush	5,963,500.955	1,502,623.070	23.980	22–LB50 Al Cap Flush
5,967,032.208	1,509,538.684	9.609	03–LB200 Al Cap Flush	5,963,224.555	1,502,936.088	8.555	22–RB100 Al Cap Flush
5,967,145.951	1,509,636.505	10.073	03–LB50 Al Cap Flush	5,963,257.687	1,502,898.557	9.083	22–RB50 Al Cap Flush
5,968,868.861	1,511,117.903	9.529	03–RB200 Al Cap Flush	5,962,989.577	1,502,198.675	25.176	23–LB100 Al Cap Flush
5,968,755.208	1,511,019.945	9.427	03–RB50 Al Cap Flush	5,962,973.595	1,502,246.059	25.141	23–LB50 Al Cap Flush
5,965,610.334	1,510,661.026	12.474	04–LB200 Al Cap Flush	5,962,828.922	1,502,671.946	10.028	23–RB100 Al Cap Flush
5,965,716.671	1,510,772.049	13.769	04–LB50 Al Cap 0.1' BGL	5,962,845.024	1,502,624.671	8.043	23–RB50 Al Cap Flush
5,967,272.757	1,512,396.890	10.300	04–RB200 Al Cap 0.2' BGL	5,962,728.638	1,502,095.588	26.467	24–LB100 Al Cap Flush
5,967,169.027	1,512,288.545	10.193	04–RB50 Al Cap Flush	5,962,717.892	1,502,144.420	27.045	24–LB50 Al Cap Flush
5,964,321.916	1,511,269.778	12.004	05–LB200 Al Cap Flush	5,962,617.894	1,502,598.227	9.107	24–RB100 Al Cap Flush
5,964,413.659	1,511,388.489	13.294	05–LB50 Al Cap Flush	5,962,628.649	1,502,549.420	8.314	24–RB50 Al Cap Flush
5,966,013.949	1,513,463.365	8.712	05–RB200 Al Cap Flush	5,962,627.162	1,502,078.344	27.446	25–LB100 Al Cap Flush
5,965,922.270	1,513,344.600	8.575	05–RB50 Al Cap Flush	5,962,619.301	1,502,127.772	26.188	25–LB50 Al Cap Flush
5,963,381.275	1,512,373.997	11.414	06–LB200 Al Cap Flush	5,962,547.931	1,502,575.394	8.171	25–RB100 Al Cap Flush
5,963,440.005	1,512,512.008	12.990	06–LB50 Al Cap Flush	5,962,555.825	1,502,525.976	8.195	25–RB50 Al Cap Flush
5,964,292.039	1,514,511.947	9.753	06–RB250 Al Cap Flush	5,962,545.484	1,502,058.928	27.484	26–LB110 Al Cap Flush
5,964,233.713	1,514,375.434	10.230	06–RB50 Al Cap Flush	5,962,539.978	1,502,118.584	27.711	26–LB50 Al Cap Flush
5,962,644.637	1,513,005.297	10.674	07–LB200 Al Cap Flush	5,962,497.866	1,502,585.674	9.555	26–RB100 Al Cap Flush
5,962,683.874	1,513,149.989	12.280	07–LB50 Al Cap Flush	5,962,502.417	1,502,535.991	8.293	26–RB50 Al Cap Flush
5,963,144.212	1,514,845.101	10.802	07–RB200 Al Cap Flush	5,962,410.033	1,502,047.844	26.997	27–LB100 Al Cap Flush
5,963,105.000	1,514,700.456	10.095	07–RB50 Al Cap Flush	5,962,406.342	1,502,097.705	27.070	27–LB50 Al Cap Flush
5,961,864.570	1,513,132.749	10.466	08–LB200 Al Cap Flush	5,962,371.997	1,502,567.626	9.566	27–RB100 Al Cap Flush
5,961,851.285	1,513,282.064	10.443	08–LB50 Al Cap Flush	5,962,375.740	1,502,517.809	8.014	27–RB50 Al Cap Flush
5,961,442.215	1,513,168.246	10.517	09–LB200 Al Cap Flush	5,961,986.435	1,502,006.076	21.011	28–LB100 Al Cap Flush
5,961,424.681	1,513,317.350	10.394	09–LB50 Al Cap Flush	5,961,983.639	1,502,055.975	21.172	28–LB50 Al Cap Flush
5,961,244.616	1,514,849.163	9.279	09–RB200 Al Cap Flush	5,961,959.919	1,502,486.658	8.400	28–RB50 Al Cap Flush
5,961,260.915	1,514,710.040	7.967	09–RB60 Al Cap Flush	5,961,957.165	1,502,536.545	9.177	28–RB100 Al Cap Flush
5,961,214.588	1,513,133.884	10.300	10–LB200 Al Cap Flush	5,961,446.941	1,502,073.292	24.206	29–LB100 Al Cap Flush
5,961,195.969	1,513,282.680	10.544	10–LB50 Al Cap Flush	5,961,457.435	1,502,122.177	23.598	29–LB50 Al Cap Flush
5,961,004.246	1,514,808.609	7.234	10–RB200 Al Cap Flush	5,961,559.109	1,502,597.016	9.800	29–RB100 Al Cap Flush
5,961,023.039	1,514,659.848	8.404	10–RB50 Al Cap Flush	5,961,548.659	1,502,548.070	8.629	29–RB50 Al Cap Flush
5,960,173.818	1,512,898.221	10.959	11–LB200 Al Cap Flush	5,960,727.368	1,502,515.791	23.658	30–LB100 Al Cap Flush
5,960,137.662	1,513,043.747	8.787	11–LB50 Al Cap Flush	5,960,768.276	1,502,544.696	23.216	30–LB50 Al Cap Flush
5,959,767.171	1,514,537.179	9.008	11–RB50 Al Cap 0.2' BGL	5,961,239.597	1,502,877.114	10.073	30–RB100 Al Cap Flush
5,958,209.502	1,512,625.605	11.011	12–LB200 Al Cap Flush	5,961,198.806	1,502,848.280	9.549	30–RB50 Al Cap Flush
5,958,253.951	1,512,715.217	11.300	12–LB100 Al Cap Flush	5,960,124.465	1,503,193.305	8.556	31–LB100 Al Cap Flush
5,959,260.248	1,514,746.096	10.244	12–RB200 Al Cap Flush	5,960,172.316	1,503,207.309	9.605	31–LB50 Al Cap Flush
5,959,193.539	1,514,611.534	8.799	12–RB50 Al Cap 0.3' BGL	5,960,896.154	1,503,418.934	10.757	31–RB100 Al Cap Flush
5,955,329.192	1,512,738.181	11.567	13–LB200 Al Cap Flush	5,960,848.113	1,503,404.835	11.123	31–RB50 Al Cap Flush
5,955,412.726	1,512,862.669	12.000	13–LB50 Al Cap Flush	5,959,762.590	1,504,523.209	8.369	32–LB100 Al Cap Flush
5,958,195.954	1,517,009.849	10.156	13–RB200 Al Cap Flush	5,959,810.483	1,504,537.155	7.694	32–LB50 Al Cap Flush
5,958,123.512	1,516,901.775	11.679	13–RB70 Al Cap Flush	5,960,406.262	1,504,711.395	10.790	32–RB100 Al Cap Flush
5,953,908.304	1,514,359.064	13.118	14–LB215 Al Cap Flush	5,960,358.154	1,504,697.383	11.437	32–RB50 Al Cap Flush
5,953,965.615	1,514,513.824	15.550	14–LB50 Al Cap 0.1' BGL	5,959,118.980	1,505,412.935	9.835	33–LB100 Al Cap Flush
5,954,950.395	1,517,166.201	9.597	14–RB200 Al Cap Flush	5,959,138.925	1,505,458.824	8.589	33–LB50 Al Cap Flush
5,954,898.238	1,517,025.621	9.608	14–RB50 Al Cap Flush	5,959,403.881	1,506,064.870	10.643	33–RB120 Al Cap Flush
5,952,688.522	1,515,254.050	13.908	15–LB200 Al Cap Flush	5,959,375.875	1,506,000.696	10.409	33–RB50 Al Cap Flush
5,952,688.752	1,515,404.121	16.582	15–LB50 Al Cap Flush	5,957,567.988	1,505,617.483	12.554	34–LB100 Al Cap Flush
5,952,691.471	1,517,145.169	12.616	15–RB50 Al Cap Flush	5,957,571.230	1,505,667.205	12.478	34–LB50 Al Cap Flush
5,952,691.489	1,517,195.117	12.432	15–RB100 Al Cap Flush	5,957,615.382	1,506,366.118	10.126	34–RB100 Al Cap Flush
5,967,852.367	1,508,476.551	10.009	16–LB100 Al Cap Flush	5,957,612.244	1,506,316.188	10.539	34–RB50 Al Cap Flush
5,967,804.938	1,508,492.145	9.412	16–LB50 Al Cap Flush	5,955,603.397	1,506,200.608	12.562	35–LB100 Al Cap Flush
5,967,407.545	1,508,622.063	9.108	16–RB100 Al Cap Flush	5,955,624.246	1,506,246.168	13.026	35–LB50 Al Cap Flush
5,967,455.122	1,508,606.515	8.774	16–RB50 Al Cap Flush	5,955,901.737	1,506,854.796	10.213	35–RB100 Al Cap Flush
5,966,795.100	1,507,822.749	8.513	17–LB100 Al Cap Flush	5,955,880.894	1,506,809.410	9.424	35–RB50 Al Cap Flush
5,966,786.380	1,507,871.976	8.246	17–LB50 Al Cap Flush	5,962,713.529	1,510,877.308	8.344	36–LB100 Al Cap Flush
5,966,712.363	1,508,294.902	8.485	17–RB100 Al Cap Flush	5,962,690.391	1,510,921.654	8.055	36–LB50 Al Cap Flush
5,966,720.830	1,508,245.661	8.457	17–RB50 Al Cap Flush	5,962,479.459	1,511,322.840	9.457	36–RB100 Al Cap Flush
5,965,609.725	1,507,451.169	8.512	18–LB100 Al Cap Flush	5,962,502.704	1,511,278.621	8.645	36–RB50 Al Cap Flush
5,965,566.257	1,507,475.942	8.621	18–LB50 Al Cap Flush	5,962,603.099	1,510,806.869	8.204	37–LB100 Al Cap Flush
5,965,103.267	1,507,739.379	7.676	18–RB100 Al Cap Flush	5,962,581.024	1,510,851.779	8.345	37–LB50 Al Cap Flush
5,965,146.802	1,507,714.587	7.539	18–RB50 Al Cap Flush	5,962,382.943	1,511,254.349	9.472	37–RB100 Al Cap Flush
5,965,119.470	1,505,573.359	8.506	19–LB100 Al Cap Flush	5,962,405.053	1,511,209.407	8.823	37–RB50 Al Cap Flush
5,965,073.111	1,505,592.239	8.506	19–LB50 Al Cap Flush	5,962,540.234	1,510,738.125	8.327	38–LB100 Al Cap Flush
5,964,684.565	1,505,750.603	8.083	19–RB100 Al Cap Flush	5,962,518.597	1,510,783.313	8.173	38–LB50 Al Cap Flush
5,964,730.797	1,505,731.738	8.636	19–RB50 Al Cap Flush	5,962,311.212	1,511,215.115	9.224	38–RB100 Al Cap Flush
5,964,307.477	1,503,508.726	13.755	20–LB100 Al Cap Flush	5,962,332.715	1,511,169.978	9.063	38–RB50 Al Cap Flush
5,964,270.626	1,503,542.452	15.545	20–LB50 Al Cap Flush	5,962,367.978	1,510,674.819	8.779	39–LB100 Al Cap Flush
				5,962,346.171	1,510,719.677	7.761	39–LB50 Al Cap Flush
				5,962,154.417	1,511,119.161	9.651	39–RB100 Al Cap Flush
				5,962,176.142	1,511,074.113	9.465	39–RB50 Al Cap Flush





VICINITY MAP



ENLARGED DIAGRAM

LEGEND:

◑ 2" ALUMINUM CAP ON 5/8" x 30" REBAR (TYPICAL 4 REBAR ON EACH TRANSECT)

NOTES:

1. DATE OF SURVEY: AUGUST 29 TO SEPTEMBER 18, 2013; OCTOBER 21, 2013.
2. COORDINATES SHOWN ARE ALASKA STATE PLANE, ZONE 4 N.A.D. 83, IN FEET. BASED ON THE 2013 CD-5 CONTROL SURVEY
3. ELEVATIONS SHOWN ARE BRITISH PETROLEUM MEAN SEA LEVEL (B.P.M.S.L.) DATUM.
4. SEE DOCUMENT RPT-CE-CD-113 FOR TRANSECT BASELINE SURVEY DATA.
5. REFERENCE FIELD BOOK LCMF 2013-18, PGS. 57-59, 67, 70-72. LCMF 2013-20 PGS. 4-14; LCMF 2013-21, PG. 29.
6. PROPOSED GRAVEL ROAD ALIGNMENT, AS SHOWN, BASED ON INFORMATION PROVIDED BY PND ENGINEERING, RECEIVED 9/25/2013.

KUUKPIK LCMF LLC
Alpine Survey Office

ConocoPhillips Alaska, Inc.

ALPINE | MODULE: CD50 | UNIT: CD

CD-5 ROAD
MONITORING PLAN BASELINES
ALPINE, ALASKA

REDRAWN FROM:
CONSTRUCTION SHEET OF

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

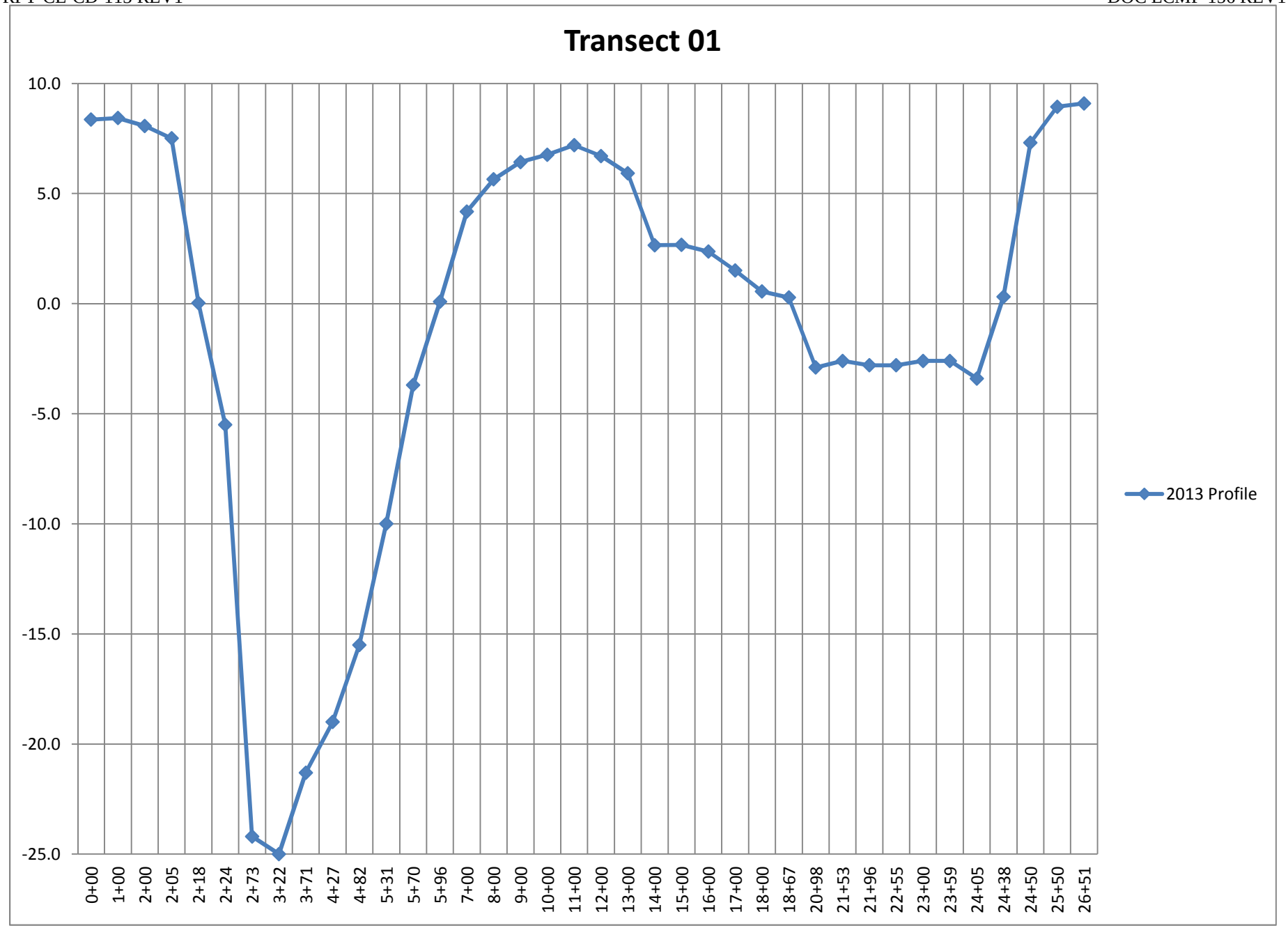
DATE: 8/26/13	DRAWN: CZ	DESIGN: –	ECM NO: –
SCALE: 1" = 2000'	CHECKED: DB		CC NO: –
	APPROVAL: –		CADD FILE NO. 13-08-07-1 –
JOB NO: 02-204	SUB JOB NO: –	DRAWING NO: CE-CD50-1004	PART: 1 OF –
			REV: 1

FORM: DSIZE

REFERENCE DWG NO/SHT NO:

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
1	10/22/13	ISSUED PER K130003ACS	AG	DB			

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.4												Ground Shot
1+00	8.4												Ground Shot
2+00	8.1												Ground Shot
2+05	7.5												Top of Bank
2+18	0.0												Toe of Bank/Edge of Water
2+24	-5.5												River Bottom
2+73	-24.2												River Bottom
3+22	-25.0												River Bottom
3+71	-21.3												River Bottom
4+27	-19.0												River Bottom
4+82	-15.5												River Bottom
5+31	-10.0												River Bottom
5+70	-3.7												River Bottom
5+96	0.1												Edge of Water
7+00	4.2												Sand Bar
8+00	5.6												Sand Bar
9+00	6.4												Sand Bar
10+00	6.8												Sand Bar
11+00	7.2												Sand Bar
12+00	6.7												Sand Bar
13+00	5.9												Sand Bar
14+00	2.7												Sand Bar
15+00	2.7												Sand Bar
16+00	2.4												Sand Bar
17+00	1.5												Sand Bar
18+00	0.6												Sand Bar
18+67	0.3												Edge of Water
20+98	-2.9												River Bottom
21+53	-2.6												River Bottom
21+96	-2.8												River Bottom
22+55	-2.8												River Bottom
23+00	-2.6												River Bottom
23+59	-2.6												River Bottom
24+05	-3.4												River Bottom
24+38	0.3												Edge of Water
24+50	7.3												Top of Bank
25+50	8.9												Ground Shot
26+51	9.1												Ground Shot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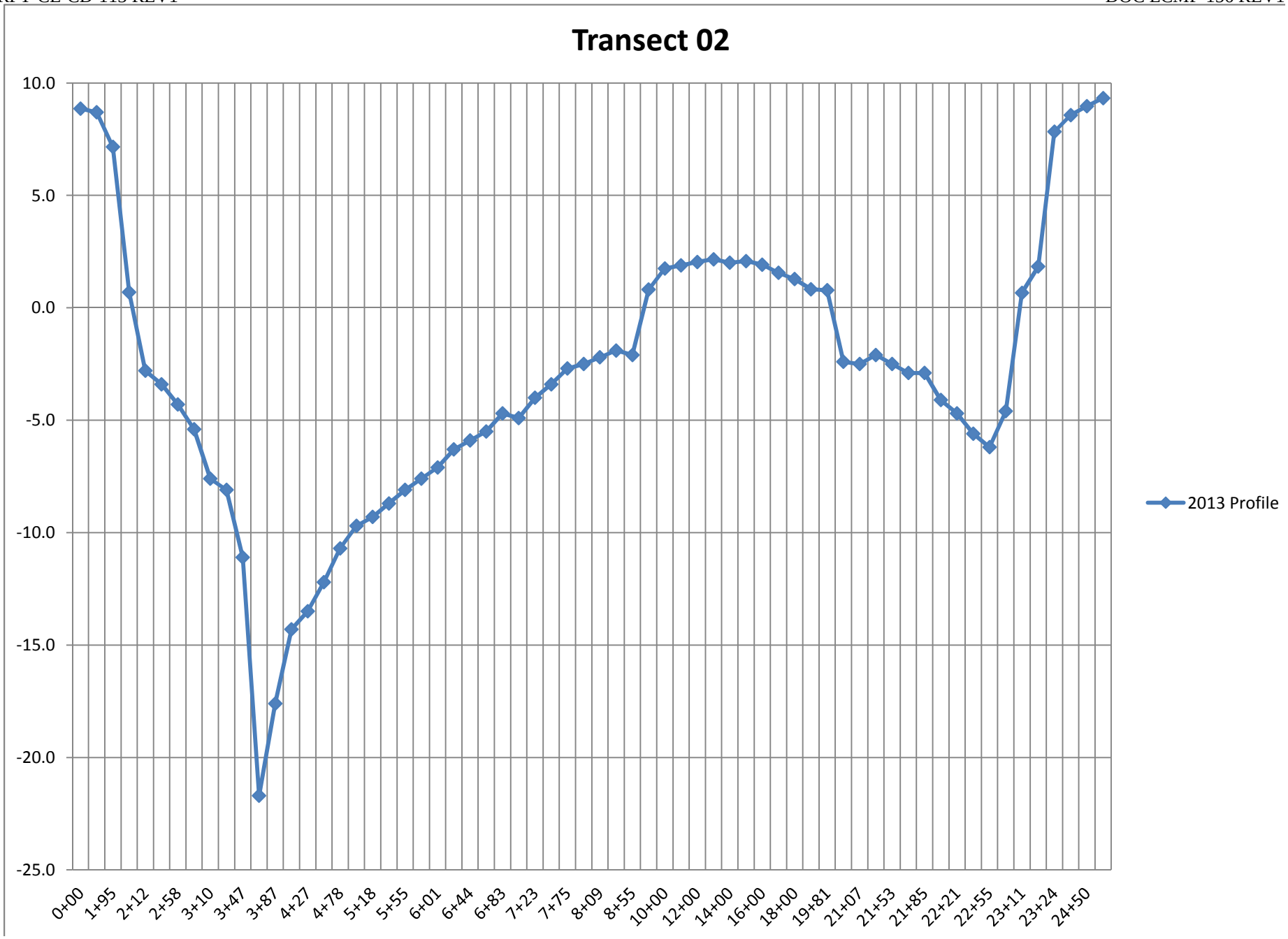
2+05
2+18
2+24
2+73
3+22
3+71
4+27
4+82
5+31
5+70
5+96
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
18+67
20+98
21+53
21+96
22+55
23+00
23+59
24+05
24+38
24+50
25+50
26+51
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.9												Ground Shot
1+00	8.7												Ground Shot
1+95	7.2												Top of Bank
2+06	0.7												Edge of Water
2+12	-2.8												River Bottom
2+35	-3.4												River Bottom
2+58	-4.3												River Bottom
2+81	-5.4												River Bottom
3+10	-7.6												River Bottom
3+27	-8.1												River Bottom
3+47	-11.1												River Bottom
3+67	-21.7												River Bottom
3+87	-17.6												River Bottom
4+07	-14.3												River Bottom
4+27	-13.5												River Bottom
4+46	-12.2												River Bottom
4+78	-10.7												River Bottom
4+98	-9.7												River Bottom
5+18	-9.3												River Bottom
5+35	-8.7												River Bottom
5+55	-8.1												River Bottom
5+81	-7.6												River Bottom
6+01	-7.1												River Bottom
6+24	-6.3												River Bottom
6+44	-5.9												River Bottom
6+64	-5.5												River Bottom
6+83	-4.7												River Bottom
7+03	-4.9												River Bottom
7+23	-4.0												River Bottom
7+55	-3.4												River Bottom
7+75	-2.7												River Bottom
7+92	-2.5												River Bottom
8+09	-2.2												River Bottom
8+38	-1.9												River Bottom
8+55	-2.1												River Bottom
8+95	0.8												Edge of Water
10+00	1.8												Sand Bar
11+00	1.9												Sand Bar
12+00	2.0												Sand Bar

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
13+00	2.2												Sand Bar
14+00	2.0												Sand Bar
15+00	2.1												Sand Bar
16+00	1.9												Sand Bar
17+00	1.6												Sand Bar
18+00	1.3												Sand Bar
19+00	0.8												Sand Bar
19+81	0.8												Edge of Water
20+84	-2.4												River Bottom
21+07	-2.5												River Bottom
21+36	-2.1												River Bottom
21+53	-2.5												River Bottom
21+72	-2.9												River Bottom
21+85	-2.9												River Bottom
22+01	-4.1												River Bottom
22+21	-4.7												River Bottom
22+38	-5.6												River Bottom
22+55	-6.2												River Bottom
22+75	-4.6												River Bottom
23+11	0.7												Edge of Water
23+16	1.8												Toe of Bank
23+24	7.8												Top of Bank
23+50	8.6												Ground Shot
24+50	9.0												Ground Shot
25+40	9.3												Ground Shot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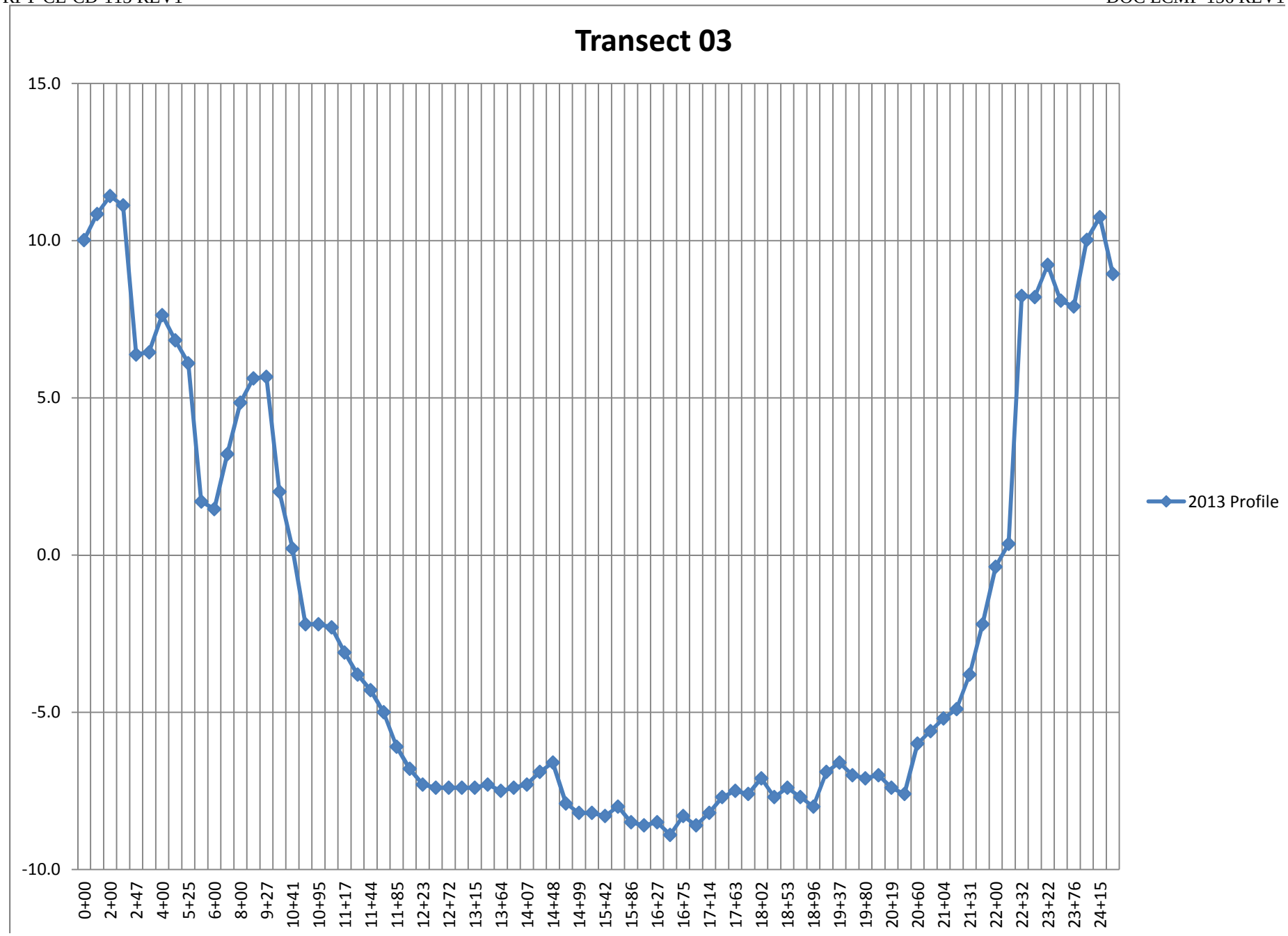
2+12
2+58
3+10
3+47
3+87
4+27
4+78
5+18
5+55
6+01
6+44
6+83
7+23
7+75
8+09
8+55
10+00
12+00
14+00
16+00
18+00
19+81
21+07
21+53
21+85
22+21
22+55
23+11
23+24
24+50
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.0												Ground Shot
1+00	10.8												Ground Shot
2+00	11.4												Ground Shot
2+17	11.1												Top of Bank
2+47	6.4												Toe of Bank
3+00	6.4												Ground Shot
4+00	7.6												Ground Shot
5+00	6.8												Ground Shot
5+25	6.1												Top of Bank
5+74	1.7												Toe of Bank
6+00	1.5												Sand Bar
7+00	3.2												Sand Bar
8+00	4.8												Sand Bar
9+00	5.6												Sand Bar
9+27	5.7												Top of Bank
9+40	2.0												Toe of Bank
10+41	0.2												Edge of Water
10+85	-2.2												River Bottom
10+95	-2.2												River Bottom
11+07	-2.3												River Bottom
11+17	-3.1												River Bottom
11+31	-3.8												River Bottom
11+44	-4.3												River Bottom
11+60	-5.0												River Bottom
11+85	-6.1												River Bottom
12+07	-6.8												River Bottom
12+23	-7.3												River Bottom
12+48	-7.4												River Bottom
12+72	-7.4												River Bottom
12+89	-7.4												River Bottom
13+15	-7.4												River Bottom
13+40	-7.3												River Bottom
13+64	-7.5												River Bottom
13+81	-7.4												River Bottom
14+07	-7.3												River Bottom
14+32	-6.9												River Bottom
14+48	-6.6												River Bottom
14+75	-7.9												River Bottom
14+99	-8.2												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
15+16	-8.2												River Bottom
15+42	-8.3												River Bottom
15+61	-8.0												River Bottom
15+86	-8.5												River Bottom
16+02	-8.6												River Bottom
16+27	-8.5												River Bottom
16+51	-8.9												River Bottom
16+75	-8.3												River Bottom
16+98	-8.6												River Bottom
17+14	-8.2												River Bottom
17+39	-7.7												River Bottom
17+63	-7.5												River Bottom
17+85	-7.6												River Bottom
18+02	-7.1												River Bottom
18+28	-7.7												River Bottom
18+53	-7.4												River Bottom
18+69	-7.7												River Bottom
18+96	-8.0												River Bottom
19+12	-6.9												River Bottom
19+37	-6.6												River Bottom
19+53	-7.0												River Bottom
19+80	-7.1												River Bottom
20+04	-7.0												River Bottom
20+19	-7.4												River Bottom
20+43	-7.6												River Bottom
20+60	-6.0												River Bottom
20+82	-5.6												River Bottom
21+04	-5.2												River Bottom
21+19	-4.9												River Bottom
21+31	-3.8												River Bottom
21+50	-2.2												River Bottom
22+00	-0.4												Edge fo Water
22+21	0.4												Toe of Bank
22+32	8.2												Top of Bank
23+00	8.2												Ground Shot
23+22	9.2												Top of Bank
23+36	8.1												Toe of Bank
23+76	7.9												Toe of Bank
23+91	10.0												Grade Break

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
24+15	10.7												Top of Bank
24+22	8.9												Toe of Bank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2+47
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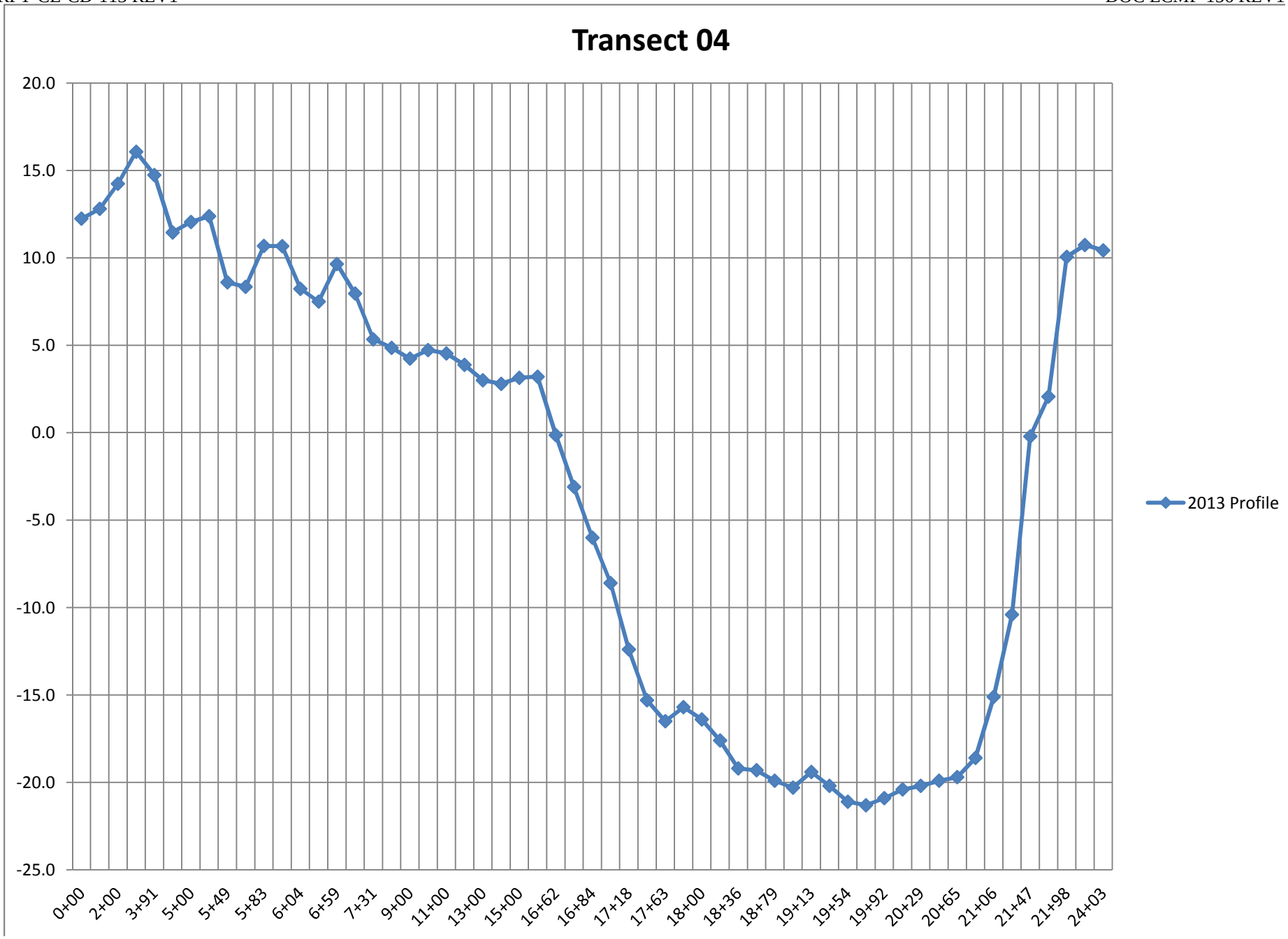
5+25
6+00
8+00
9+27
10+41
10+95
11+17
11+44
11+85
12+23
12+72
13+15
13+64
14+07
14+48
14+99
15+42
15+86
16+27
16+75
17+14
17+63
18+02
18+53
18+96
19+37
19+80
20+19
20+60
21+04
21+31
22+00
22+32
23+22
23+76
24+15
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	12.2												Ground Shot
1+00	12.8												Ground Shot
2+00	14.2												Ground Shot
3+00	16.1												Ground Shot
3+91	14.7												Top of Bank
4+24	11.5												Toe of Bank
5+00	12.1												Ground Shot
5+12	12.4												Top of Bank
5+49	8.6												Toe of Bank
5+74	8.3												Toe of Bank
5+83	10.7												Top of Bank
5+91	10.7												Top of Bank
6+04	8.2												Toe of Bank
6+47	7.5												Toe of Bank
6+59	9.7												Top of Bank
7+05	8.0												Top of Bank
7+31	5.3												Toe of Bank
8+00	4.9												Sand Bar
9+00	4.2												Sand Bar
10+00	4.7												Sand Bar
11+00	4.5												Sand Bar
12+00	3.9												Sand Bar
13+00	3.0												Sand Bar
14+00	2.8												Sand Bar
15+00	3.1												Sand Bar
16+00	3.2												Sand Bar
16+62	-0.1												Edge of Water
16+70	-3.1												River Bottom
16+84	-6.0												River Bottom
17+01	-8.6												River Bottom
17+18	-12.4												River Bottom
17+42	-15.3												River Bottom
17+63	-16.5												River Bottom
17+80	-15.7												River Bottom
18+00	-16.4												River Bottom
18+21	-17.6												River Bottom
18+36	-19.2												River Bottom
18+55	-19.3												River Bottom
18+79	-19.9												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
18+96	-20.3												River Bottom
19+13	-19.4												River Bottom
19+37	-20.2												River Bottom
19+54	-21.1												River Bottom
19+75	-21.3												River Bottom
19+92	-20.9												River Bottom
20+12	-20.4												River Bottom
20+29	-20.2												River Bottom
20+48	-19.9												River Bottom
20+65	-19.7												River Bottom
20+84	-18.6												River Bottom
21+06	-15.1												River Bottom
21+15	-10.4												River Bottom
21+47	-0.2												Edge of Water
21+91	2.1												Toe of Bank
21+98	10.1												Top of Bank
23+00	10.7												Ground Shot
24+03	10.4												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3+91
5+00
5+49
5+83
6+04
6+59
7+31
9+00
11+00
13+00
15+00
16+62
16+84
17+18
17+63
18+00
18+36
18+79
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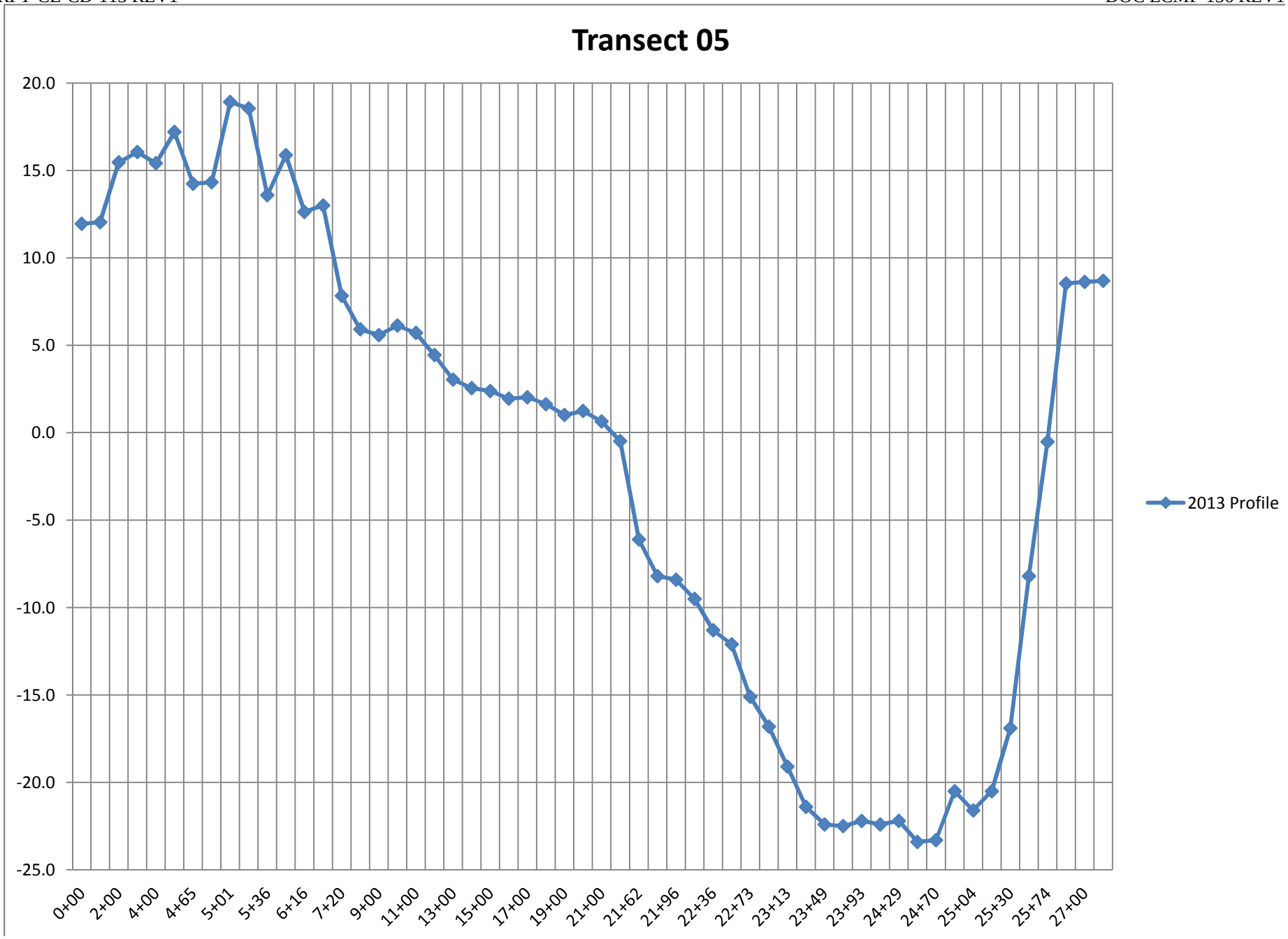
19+92
20+29
20+65
21+06
21+47
21+98
24+03
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	11.9												Ground Shot
1+00	12.0												Ground Shot
2+00	15.5												Ground Shot
3+00	16.1												Ground Shot
4+00	15.4												Ground Shot
4+56	17.2												Top of Bank
4+65	14.2												Toe of Bank
4+81	14.3												Toe of Bank
5+01	18.9												Top of Bank
5+08	18.5												Top of Bank
5+36	13.6												Toe of Bank
5+82	15.9												Top of Bank
6+16	12.6												Toe of Bank
6+92	13.0												Top of Bank
7+20	7.8												Toe of Bank
8+00	5.9												Sand Bar
9+00	5.6												Sand Bar
10+00	6.1												Sand Bar
11+00	5.7												Sand Bar
12+00	4.4												Sand Bar
13+00	3.0												Sand Bar
14+00	2.5												Sand Bar
15+00	2.4												Sand Bar
16+00	1.9												Sand Bar
17+00	2.0												Sand Bar
18+00	1.6												Sand Bar
19+00	1.0												Sand Bar
20+00	1.2												Sand Bar
21+00	0.6												Sand Bar
21+51	-0.5												Edge of Water
21+62	-6.1												River Bottom
21+79	-8.2												River Bottom
21+96	-8.4												River Bottom
22+17	-9.5												River Bottom
22+36	-11.3												River Bottom
22+53	-12.1												River Bottom
22+73	-15.1												River Bottom
22+93	-16.8												River Bottom
23+13	-19.1												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
23+30	-21.4												River Bottom
23+49	-22.4												River Bottom
23+73	-22.5												River Bottom
23+93	-22.2												River Bottom
24+10	-22.4												River Bottom
24+29	-22.2												River Bottom
24+53	-23.4												River Bottom
24+70	-23.3												River Bottom
24+87	-20.5												River Bottom
25+04	-21.6												River Bottom
25+18	-20.5												River Bottom
25+30	-16.9												River Bottom
25+47	-8.2												River Bottom
25+74	-0.5												Edge of Water/Toe of Bank
25+87	8.5												Top of Bank
27+00	8.6												Ground Shot
27+70	8.7												Ground Shot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13+00
15+00
17+00
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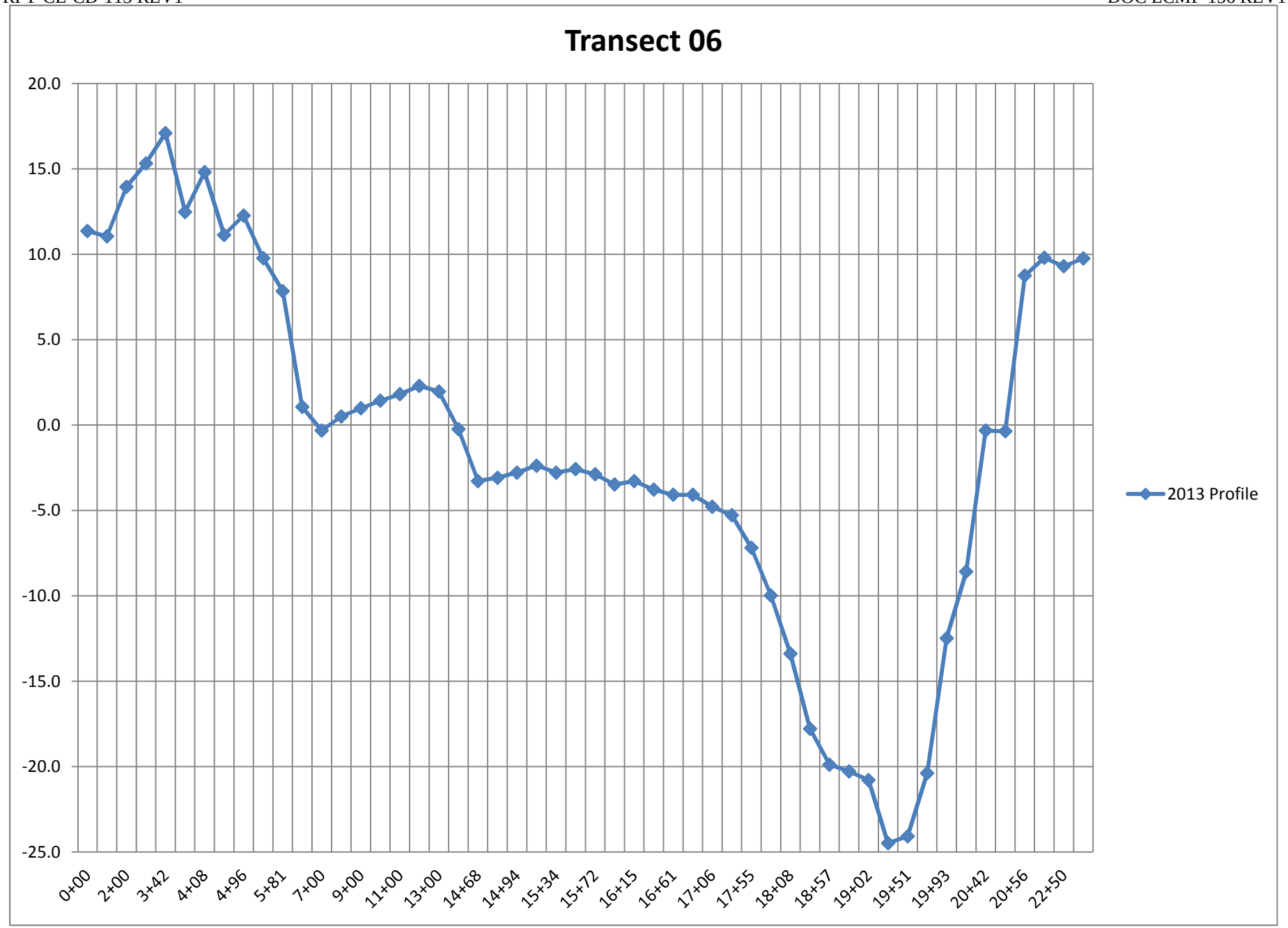
21+96
22+36
22+73
23+13
23+49
23+93
24+29
24+70
25+04
25+30
25+74
27+00
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	11.4												Ground Shot
1+00	11.0												Ground Shot
2+00	14.0												Ground Shot
3+00	15.3												Ground Shot
3+42	17.1												Top of Bank
3+59	12.5												Toe of Bank
4+08	14.8												Top of Bank
4+23	11.1												Toe of Bank
4+96	12.3												Top of Bank
5+11	9.8												Toe of Bank
5+81	7.8												Top of Bank
6+31	1.1												Toe of Bank
7+00	-0.3												Sand Bar
8+00	0.5												Sand Bar
9+00	1.0												Sand Bar
10+00	1.4												Sand Bar
11+00	1.8												Sand Bar
12+00	2.3												Sand Bar
13+00	2.0												Sand Bar
14+24	-0.2												Edge of Water
14+68	-3.3												River Bottom
14+78	-3.1												River Bottom
14+94	-2.8												River Bottom
15+14	-2.4												River Bottom
15+34	-2.8												River Bottom
15+49	-2.6												River Bottom
15+72	-2.9												River Bottom
15+95	-3.5												River Bottom
16+15	-3.3												River Bottom
16+38	-3.8												River Bottom
16+61	-4.1												River Bottom
16+87	-4.1												River Bottom
17+06	-4.8												River Bottom
17+29	-5.3												River Bottom
17+55	-7.2												River Bottom
17+82	-10.0												River Bottom
18+08	-13.4												River Bottom
18+31	-17.8												River Bottom
18+57	-19.9												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
18+80	-20.3												River Bottom
19+02	-20.8												River Bottom
19+28	-24.5												River Bottom
19+51	-24.1												River Bottom
19+74	-20.4												River Bottom
19+93	-12.5												River Bottom
20+10	-8.6												River Bottom
20+42	-0.3												Edge of Water
20+45	-0.4												Toe of Bank
20+56	8.8												Top of Bank
21+50	9.8												Ground Shot
22+50	9.3												Ground Shot
23+24	9.8												Ground Shot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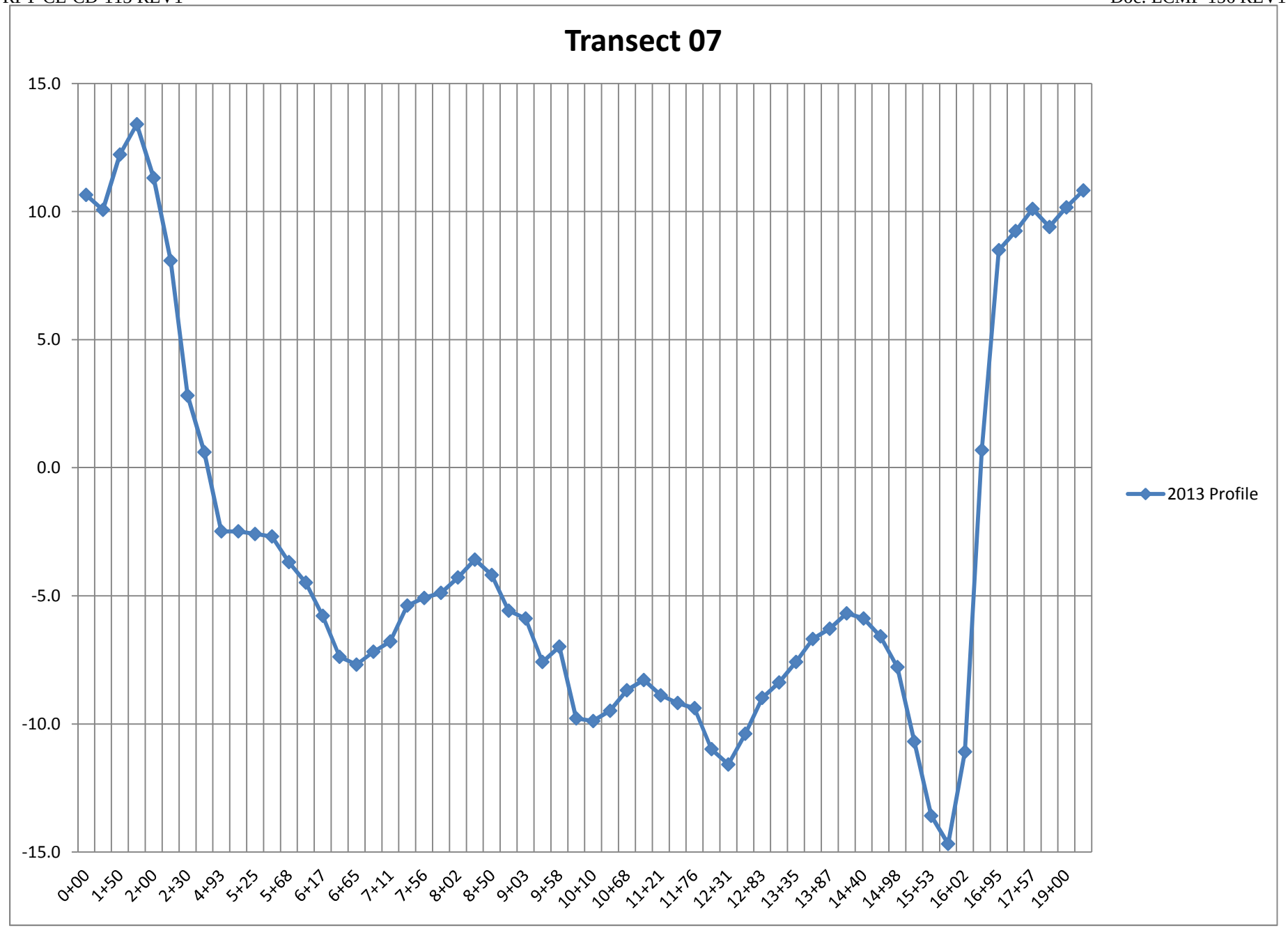
3+42
4+08
4+96
5+81
7+00
9+00
11+00
13+00
14+68
14+94
15+34
15+72
16+15
16+61
17+06
17+55
18+08
18+57
19+02
19+51
19+93
20+42
20+56
22+50
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.6												Ground Shot
1+00	10.1												Ground Shot
1+50	12.2												Ground Shot
1+77	13.4												Grade Break
2+00	11.3												Ground Shot
2+23	8.1												Top of Bank
2+30	2.8												Toe of Bank
2+47	0.6												Edge of Water
4+93	-2.5												River Bottom
5+06	-2.5												River Bottom
5+25	-2.6												River Bottom
5+45	-2.7												River Bottom
5+68	-3.7												River Bottom
5+91	-4.5												River Bottom
6+17	-5.8												River Bottom
6+42	-7.4												River Bottom
6+65	-7.7												River Bottom
6+88	-7.2												River Bottom
7+11	-6.8												River Bottom
7+37	-5.4												River Bottom
7+56	-5.1												River Bottom
7+82	-4.9												River Bottom
8+02	-4.3												River Bottom
8+25	-3.6												River Bottom
8+50	-4.2												River Bottom
8+74	-5.6												River Bottom
9+03	-5.9												River Bottom
9+32	-7.6												River Bottom
9+58	-7.0												River Bottom
9+84	-9.8												River Bottom
10+10	-9.9												River Bottom
10+39	-9.5												River Bottom
10+68	-8.7												River Bottom
10+91	-8.3												River Bottom
11+21	-8.9												River Bottom
11+50	-9.2												River Bottom
11+76	-9.4												River Bottom
12+02	-11.0												River Bottom
12+31	-11.6												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
12+57	-10.4												River Bottom
12+83	-9.0												River Bottom
13+09	-8.4												River Bottom
13+35	-7.6												River Bottom
13+64	-6.7												River Bottom
13+87	-6.3												River Bottom
14+17	-5.7												River Bottom
14+40	-5.9												River Bottom
14+69	-6.6												River Bottom
14+98	-7.8												River Bottom
15+24	-10.7												River Bottom
15+53	-13.6												River Bottom
15+79	-14.7												River Bottom
16+02	-11.1												River Bottom
16+84	0.7												Edge of Water
16+95	8.5												Top of Bank
17+00	9.2												Ground Shot
17+57	10.1												Ground Shot
18+00	9.4												Ground Shot
19+00	10.2												Ground Shot
19+07	10.8												Ground Shot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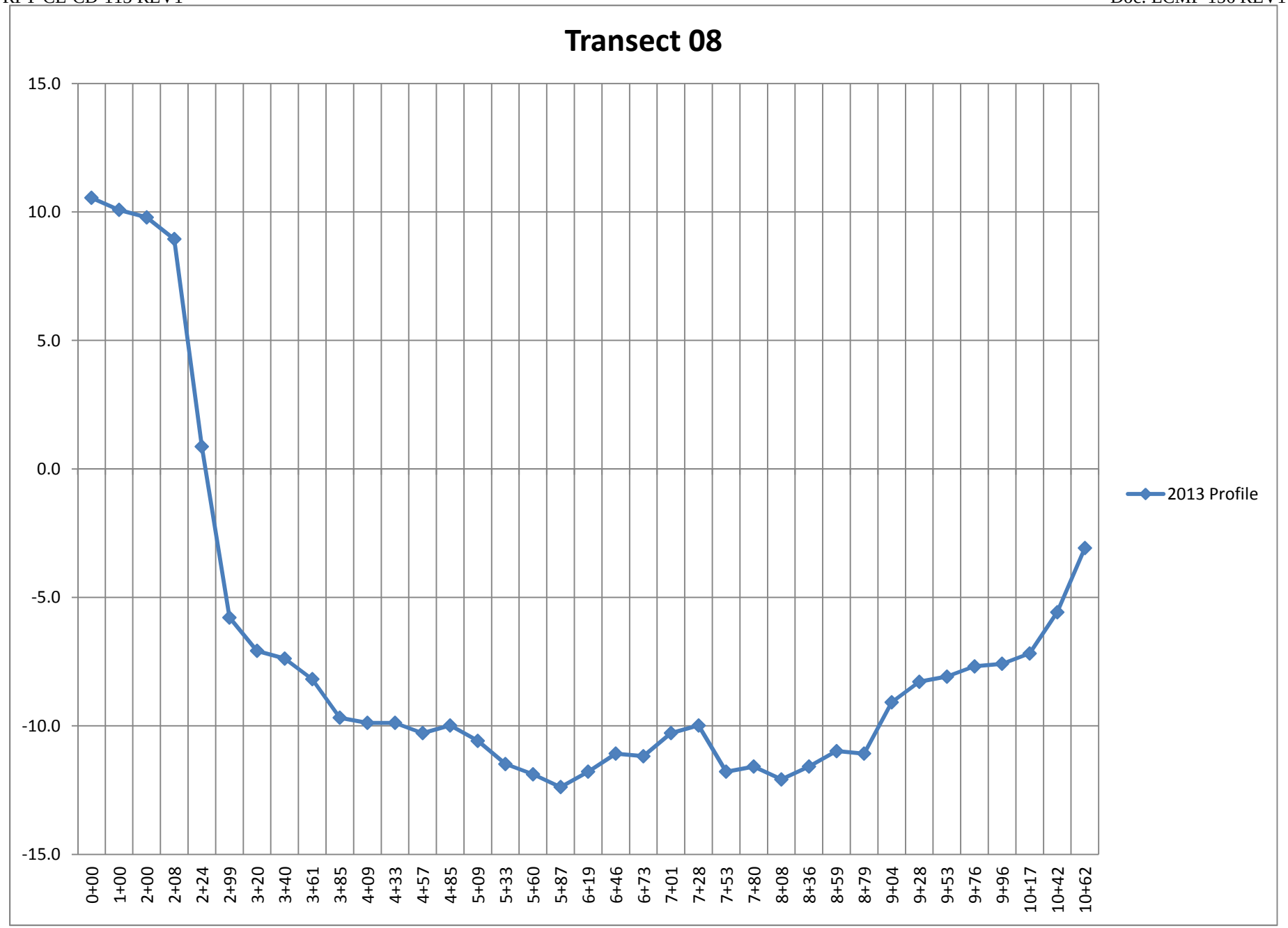
2+00
2+30
4+93
5+25
5+68
6+17
6+65
7+11
7+56
8+02
8+50
9+03
9+58
10+10
10+68
11+21
11+76
12+31
12+83
13+35
13+87
14+40
14+98
15+53
16+02
16+95
17+57
19+00
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.6												Ground Shot
1+00	10.1												Ground Shot
2+00	9.8												Ground Shot
2+08	8.9												Top of Bank
2+24	0.9												Edge of Water
2+99	-5.8												River Bottom
3+20	-7.1												River Bottom
3+40	-7.4												River Bottom
3+61	-8.2												River Bottom
3+85	-9.7												River Bottom
4+09	-9.9												River Bottom
4+33	-9.9												River Bottom
4+57	-10.3												River Bottom
4+85	-10.0												River Bottom
5+09	-10.6												River Bottom
5+33	-11.5												River Bottom
5+60	-11.9												River Bottom
5+87	-12.4												River Bottom
6+19	-11.8												River Bottom
6+46	-11.1												River Bottom
6+73	-11.2												River Bottom
7+01	-10.3												River Bottom
7+28	-10.0												River Bottom
7+53	-11.8												River Bottom
7+80	-11.6												River Bottom
8+08	-12.1												River Bottom
8+36	-11.6												River Bottom
8+59	-11.0												River Bottom
8+79	-11.1												River Bottom
9+04	-9.1												River Bottom
9+28	-8.3												River Bottom
9+53	-8.1												River Bottom
9+76	-7.7												River Bottom
9+96	-7.6												River Bottom
10+17	-7.2												River Bottom
10+42	-5.6												River Bottom
10+62	-3.1												River Bottom


Transect 08
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0+00
1+00
2+00
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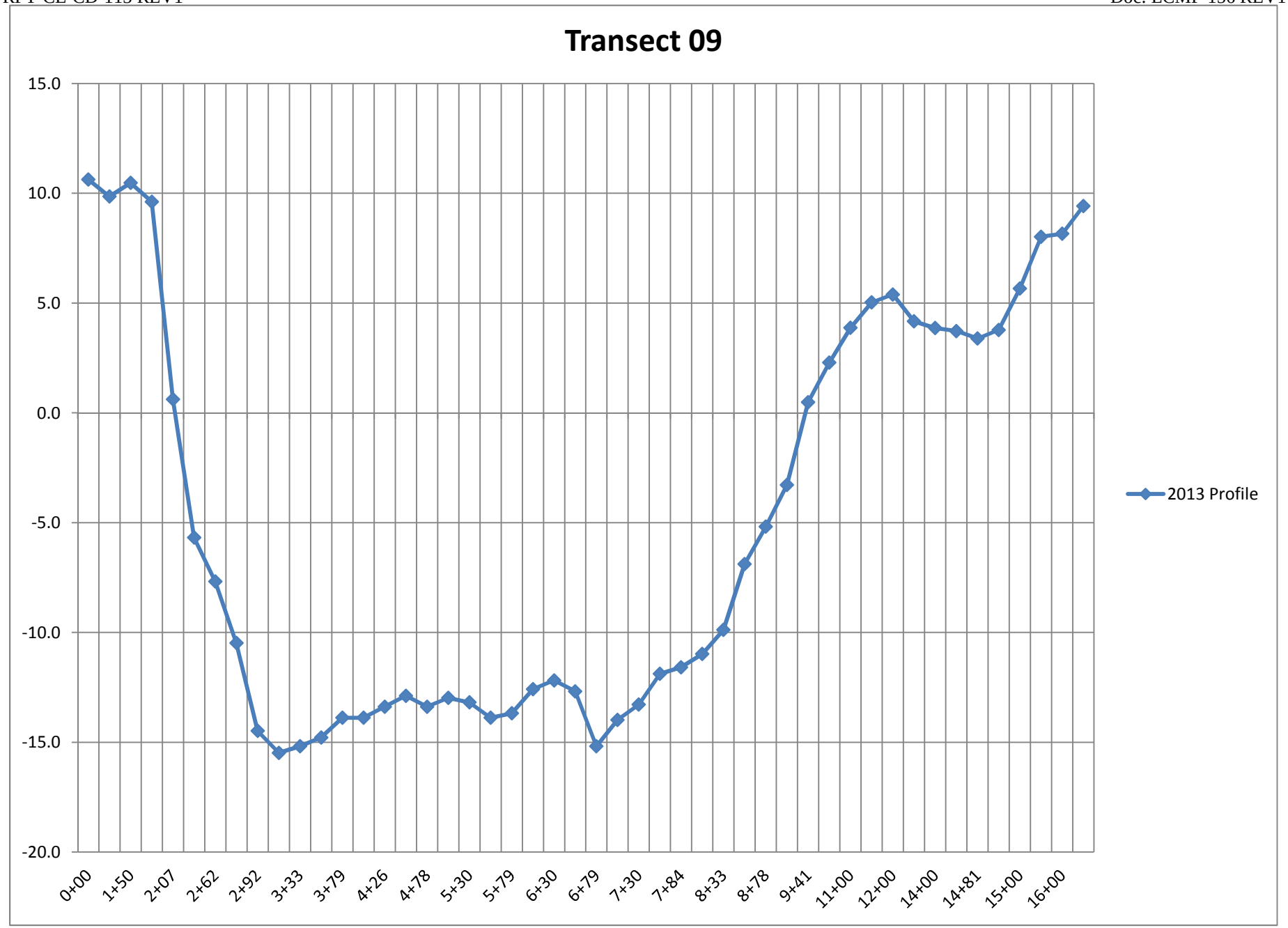
3+20
3+40
3+61
3+85
4+09
4+33
4+57
4+85
5+09
5+33
5+60
5+87
6+19
6+46
6+73
7+01
7+28
7+53
7+80
8+08
8+36
8+59
8+79
9+04
9+28
9+53
9+76
9+96
10+17
10+42
10+62
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.6												Ground Shot
1+00	9.9												Ground Shot
1+50	10.5												Ground Shot
1+92	9.6												Top of Bank
2+07	0.6												Edge of Water
2+48	-5.7												River Bottom
2+62	-7.7												River Bottom
2+78	-10.5												River Bottom
2+92	-14.5												River Bottom
3+13	-15.5												River Bottom
3+33	-15.2												River Bottom
3+58	-14.8												River Bottom
3+79	-13.9												River Bottom
4+03	-13.9												River Bottom
4+26	-13.4												River Bottom
4+54	-12.9												River Bottom
4+78	-13.4												River Bottom
5+02	-13.0												River Bottom
5+30	-13.2												River Bottom
5+54	-13.9												River Bottom
5+79	-13.7												River Bottom
6+02	-12.6												River Bottom
6+30	-12.2												River Bottom
6+55	-12.7												River Bottom
6+79	-15.2												River Bottom
7+06	-14.0												River Bottom
7+30	-13.3												River Bottom
7+57	-11.9												River Bottom
7+84	-11.6												River Bottom
8+08	-11.0												River Bottom
8+33	-9.9												River Bottom
8+58	-6.9												River Bottom
8+78	-5.2												River Bottom
8+91	-3.3												River Bottom
9+41	0.5												Edge of Water
10+00	2.3												Sand Bar
11+00	3.9												Sand Bar
11+52	5.0												Edge of Vegetation
12+00	5.4												Ground Shot
13+00	4.2												Ground Shot

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
14+00	3.9												Ground Shot
14+39	3.7												Edge of Water
14+81	3.4												Edge of Water
14+84	3.8												Toe of Bank
15+00	5.7												Top of Bank
15+52	8.0												Ground Shot
16+00	8.2												Ground Shot
16+92	9.4												Ground Shot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-10.0
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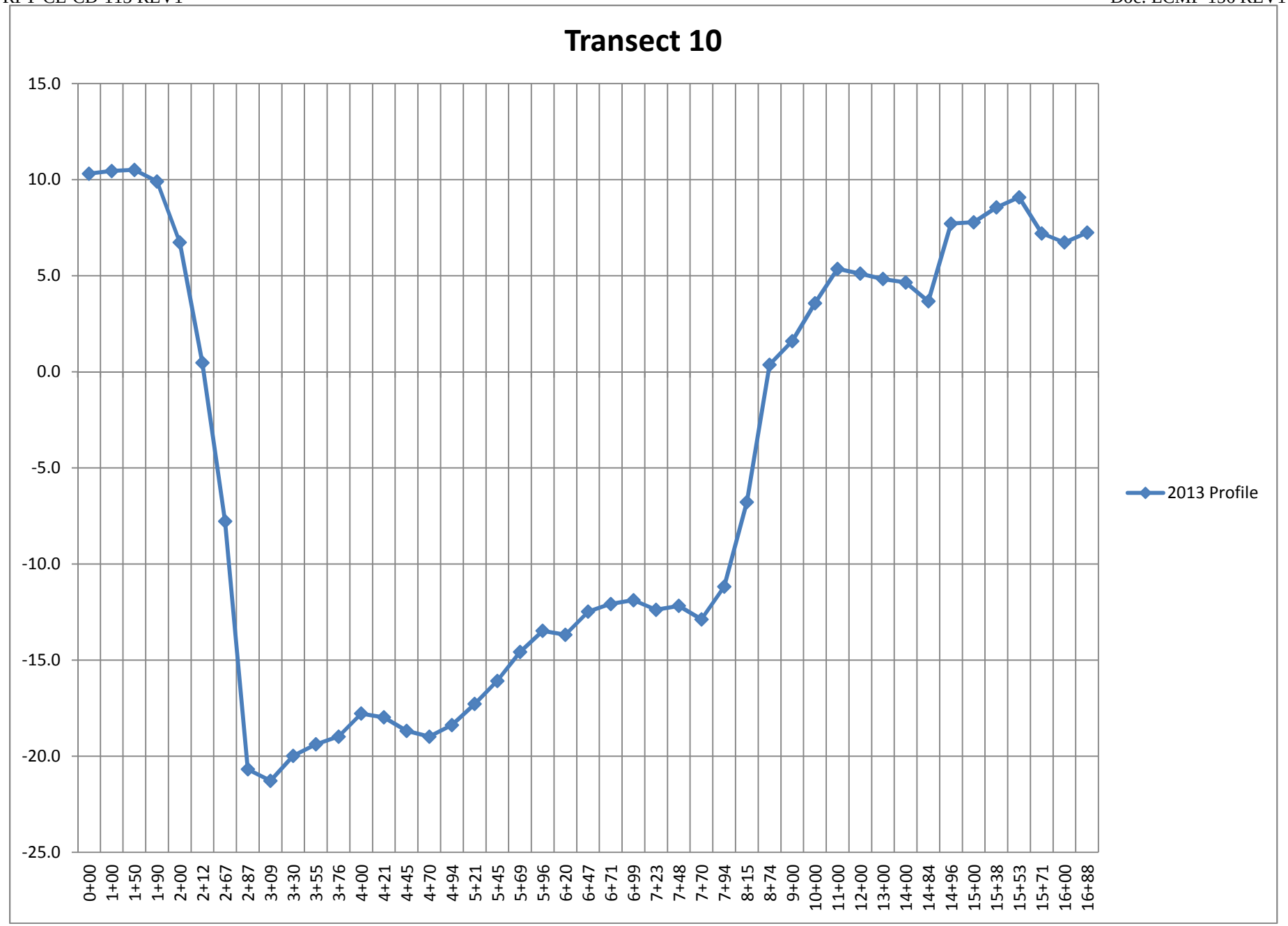
-20.0
0+00
1+50
2+07
2+62
2+92
3+33
3+79
4+26
4+78
5+30
5+79
6+30
6+79
7+30
7+84
8+33
8+78
9+41
11+00
12+00
14+00
14+81
15+00
16+00
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.3												Ground Shot
1+00	10.4												Ground Shot
1+50	10.5												Ground Shot
1+90	9.9												Top of Bank
2+00	6.7												Ground Shot
2+12	0.5												Edge of Water
2+67	-7.8												River Bottom
2+87	-20.7												River Bottom
3+09	-21.3												River Bottom
3+30	-20.0												River Bottom
3+55	-19.4												River Bottom
3+76	-19.0												River Bottom
4+00	-17.8												River Bottom
4+21	-18.0												River Bottom
4+45	-18.7												River Bottom
4+70	-19.0												River Bottom
4+94	-18.4												River Bottom
5+21	-17.3												River Bottom
5+45	-16.1												River Bottom
5+69	-14.6												River Bottom
5+96	-13.5												River Bottom
6+20	-13.7												River Bottom
6+47	-12.5												River Bottom
6+71	-12.1												River Bottom
6+99	-11.9												River Bottom
7+23	-12.4												River Bottom
7+48	-12.2												River Bottom
7+70	-12.9												River Bottom
7+94	-11.2												River Bottom
8+15	-6.8												River Bottom
8+74	0.4												Edge of Water
9+00	1.6												Sand Bar
10+00	3.6												Sand Bar
11+00	5.4												Edge of Vegetation
12+00	5.1												Ground Shot
13+00	4.8												Ground Shot
14+00	4.6												Ground Shot
14+84	3.7												Toe of Bank
14+96	7.7												Top of Bank
15+00	7.8												Ground Shot

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
15+38	8.6												Ground Shot
15+53	9.1												Grade Break
15+71	7.2												Grade Break
16+00	6.7												Ground Shot
16+88	7.2												Ground Shot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7+70
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10+00
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14+00
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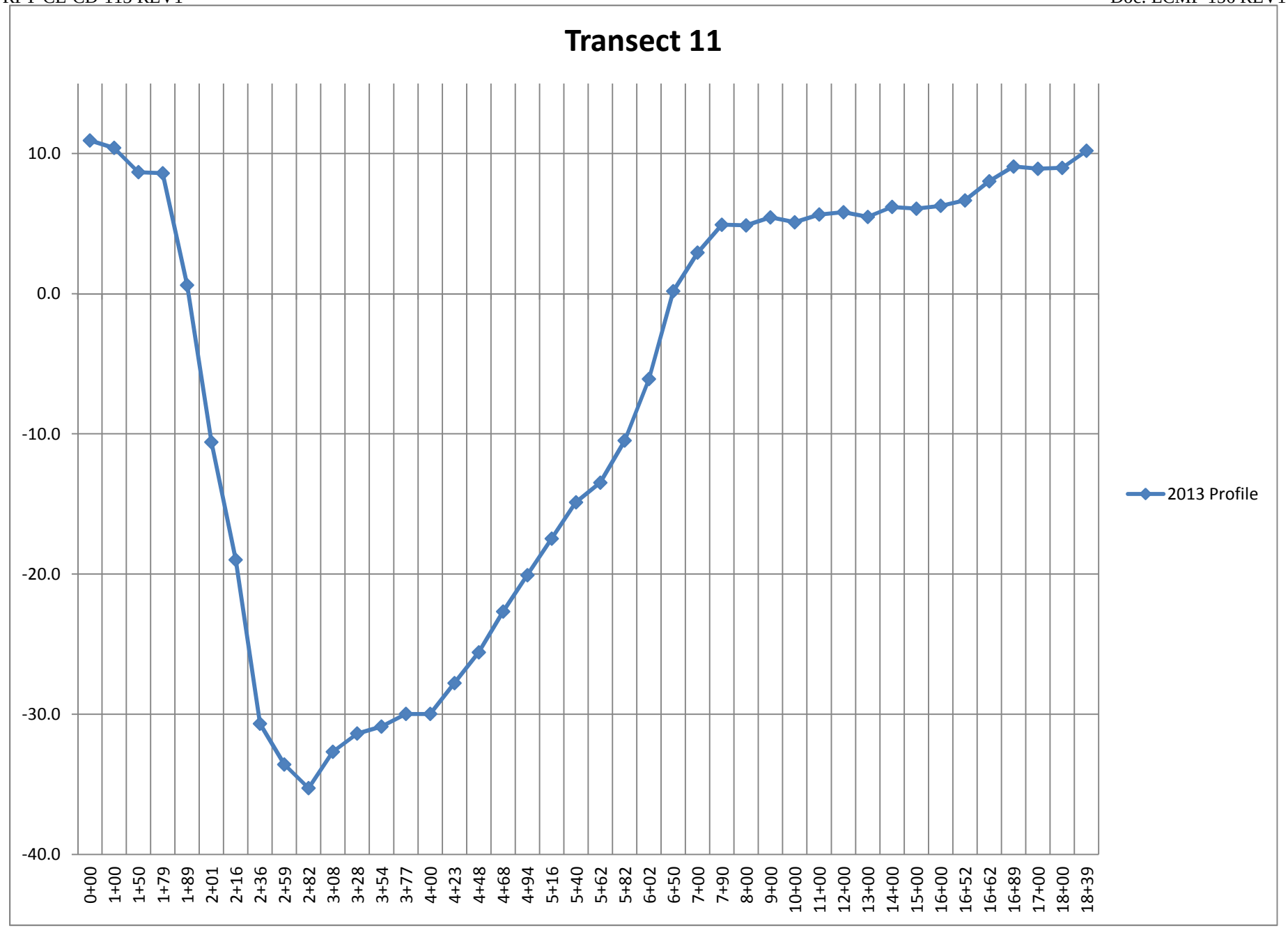
14+96
15+00
15+38
15+53
15+71
16+00
16+88
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.9												Ground Shot
1+00	10.4												Ground Shot
1+50	8.7												Ground Shot
1+79	8.6												Top of Bank
1+89	0.6												Edge of Water
2+01	-10.6												River Bottom
2+16	-19.0												River Bottom
2+36	-30.7												River Bottom
2+59	-33.6												River Bottom
2+82	-35.3												River Bottom
3+08	-32.7												River Bottom
3+28	-31.4												River Bottom
3+54	-30.9												River Bottom
3+77	-30.0												River Bottom
4+00	-30.0												River Bottom
4+23	-27.8												River Bottom
4+48	-25.6												River Bottom
4+68	-22.7												River Bottom
4+94	-20.1												River Bottom
5+16	-17.5												River Bottom
5+40	-14.9												River Bottom
5+62	-13.5												River Bottom
5+82	-10.5												River Bottom
6+02	-6.1												River Bottom
6+50	0.2												Edge of Water
7+00	2.9												Sand Bar
7+90	4.9												Edge of Vegetation
8+00	4.9												Ground Shot
9+00	5.5												Ground Shot
10+00	5.1												Ground Shot
11+00	5.6												Ground Shot
12+00	5.8												Ground Shot
13+00	5.5												Ground Shot
14+00	6.2												Ground Shot
15+00	6.1												Ground Shot
16+00	6.3												Edge of Vegetation
16+52	6.7												Grade Break
16+62	8.0												Grade Break
16+89	9.1												Ground Shot

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
17+00	8.9												Ground Shot
18+00	9.0												Ground Shot
18+39	10.2												Ground Shot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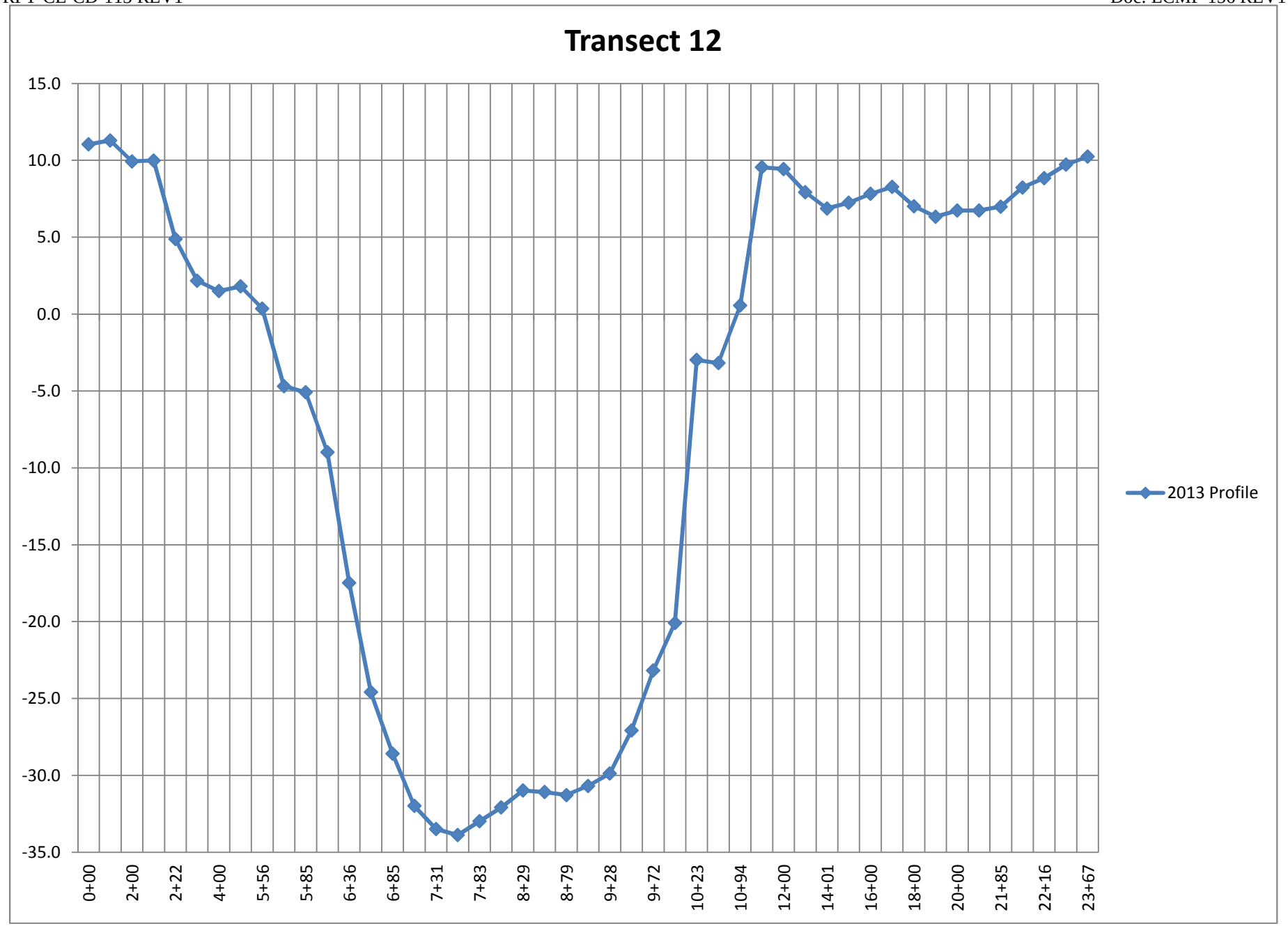
1+89
2+01
2+16
2+36
2+59
2+82
3+08
3+28
3+54
3+77
4+00
4+23
4+48
4+68
4+94
5+16
5+40
5+62
5+82
6+02
6+50
7+00
7+90
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00
16+00
16+52
16+62
16+89
17+00
18+00
18+39
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	11.0												Ground Shot
1+00	11.3												Ground Shot
2+00	9.9												Ground Shot
2+08	10.0												Top of Bank
2+22	4.9												Toe of Bank
3+00	2.2												Sand Bar
4+00	1.5												Sand Bar
5+00	1.8												Sand Bar
5+56	0.4												Edge of Water
5+79	-4.7												River Bottom
5+85	-5.1												River Bottom
6+10	-9.0												River Bottom
6+36	-17.5												River Bottom
6+54	-24.6												River Bottom
6+85	-28.6												River Bottom
7+08	-32.0												River Bottom
7+31	-33.5												River Bottom
7+57	-33.9												River Bottom
7+83	-33.0												River Bottom
8+06	-32.1												River Bottom
8+29	-31.0												River Bottom
8+56	-31.1												River Bottom
8+79	-31.3												River Bottom
9+02	-30.7												River Bottom
9+28	-29.9												River Bottom
9+51	-27.1												River Bottom
9+72	-23.2												River Bottom
10+00	-20.1												River Bottom
10+23	-3.0												River Bottom
10+43	-3.2												River Bottom
10+94	0.6												Edge of Water
11+05	9.5												Top of Bank
12+00	9.4												Ground Shot
13+00	7.9												Edge of Vegetation
14+01	6.9												Ground Shot
15+01	7.2												Ground Shot
16+00	7.8												Ground Shot
17+01	8.3												Ground Shot
18+00	7.0												Ground Shot
19+00	6.3												Ground Shot

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
20+00	6.7												Ground Shot
21+00	6.7												Ground Shot
21+85	7.0												Toe of Bank
22+00	8.2												Top of Bank
22+16	8.8												Ground Shot
23+00	9.7												Ground Shot
23+67	10.2												Ground Shot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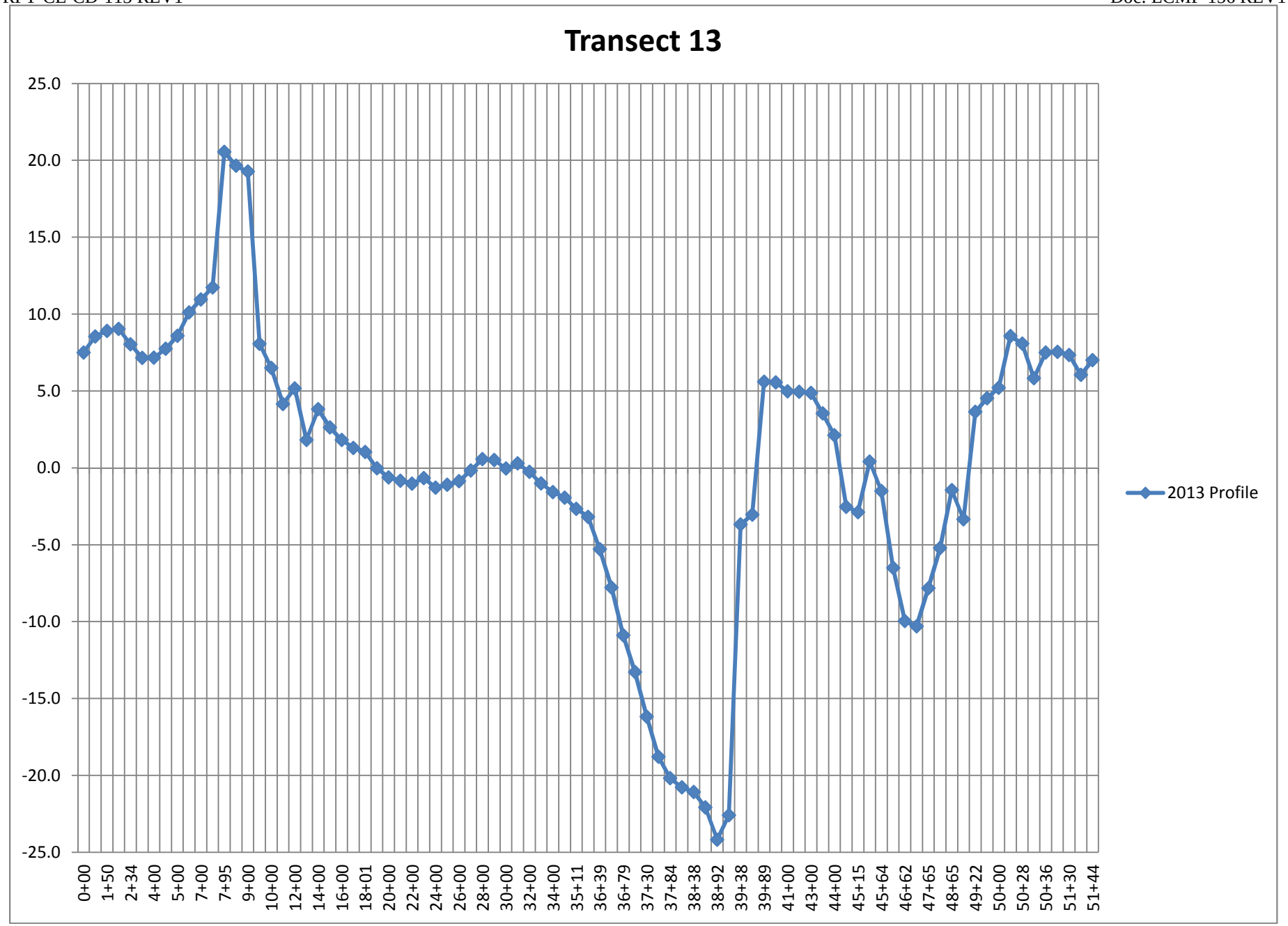
4+00
5+56
5+85
6+36
6+85
7+31
7+83
8+29
8+79
9+28
9+72
10+23
10+94
12+00
14+01
16+00
18+00
20+00
21+85
22+16
23+67
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	7.5												Ground Shot
1+00	8.5												Ground Shot
1+50	8.9												Ground Shot
2+00	9.0												Ground Shot
2+34	8.0												Edge of Vegetation
3+00	7.2												Ground Shot
4+00	7.2												Ground Shot
4+36	7.7												Edge of Vegetation
5+00	8.6												Ground Shot
6+00	10.1												Ground Shot
7+00	10.9												Ground Shot
7+11	11.7												Grade Break
7+95	20.5												Grade Break
8+00	19.6												Ground Shot
9+00	19.3												Top of Bank
9+67	8.1												Toe of Bank
10+00	6.5												Sand Bar
11+00	4.2												Sand Bar
12+00	5.2												Sand Bar
13+00	1.8												Sand Bar
14+00	3.8												Sand Bar
15+00	2.6												Sand Bar
16+00	1.8												Sand Bar
17+00	1.3												Sand Bar
18+01	1.0												Sand Bar
19+00	0.0												Sand Bar
20+00	-0.6												Sand Bar
21+00	-0.8												Sand Bar
22+00	-1.0												Sand Bar
23+00	-0.7												Sand Bar
24+00	-1.3												Sand Bar
25+00	-1.1												Sand Bar
26+00	-0.9												Sand Bar
27+00	-0.2												Sand Bar
28+00	0.6												Sand Bar
29+00	0.5												Sand Bar
30+00	0.0												Sand Bar
31+00	0.3												Sand Bar
32+00	-0.3												Sand Bar
33+00	-1.0												Sand Bar

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
34+00	-1.6												Sand Bar
35+00	-1.9												Sand Bar
35+11	-2.7												Edge of Water
36+19	-3.2												River Bottom
36+39	-5.3												River Bottom
36+59	-7.8												River Bottom
36+79	-10.9												River Bottom
37+07	-13.3												River Bottom
37+30	-16.2												River Bottom
37+59	-18.8												River Bottom
37+84	-20.2												River Bottom
38+16	-20.8												River Bottom
38+38	-21.1												River Bottom
38+70	-22.1												River Bottom
38+92	-24.2												River Bottom
39+21	-22.6												River Bottom
39+38	-3.7												River Bottom
39+77	-3.0												Edge of Water
39+89	5.6												Top of Bank
40+00	5.6												Ground Shot
41+00	5.0												Ground Shot
42+00	4.9												Ground Shot
43+00	4.9												Ground Shot
43+53	3.5												Edge of Vegetation
44+00	2.1												Top of Bank
45+00	-2.5												Sand Bar
45+15	-2.9												Edge of Water
45+19	0.4												River Bottom
45+64	-1.5												River Bottom
46+13	-6.5												River Bottom
46+62	-10.0												River Bottom
47+14	-10.3												River Bottom
47+65	-7.8												River Bottom
48+13	-5.2												River Bottom
48+65	-1.5												River Bottom
49+17	-3.3												Edge of Water
49+22	3.6												Top of Bank
49+53	4.5												Grade Break
50+00	5.2												Ground Shot
50+14	8.57												Ground Shot

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
50+28	8.09												Grade Break
50+33	5.84												Grade Break
50+36	7.50												Grade Break
51+00	7.55												Ground Shot
51+30	7.35												Grade Break
51+34	6.05												Grade Break
51+44	7.01												Ground Shot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7+00
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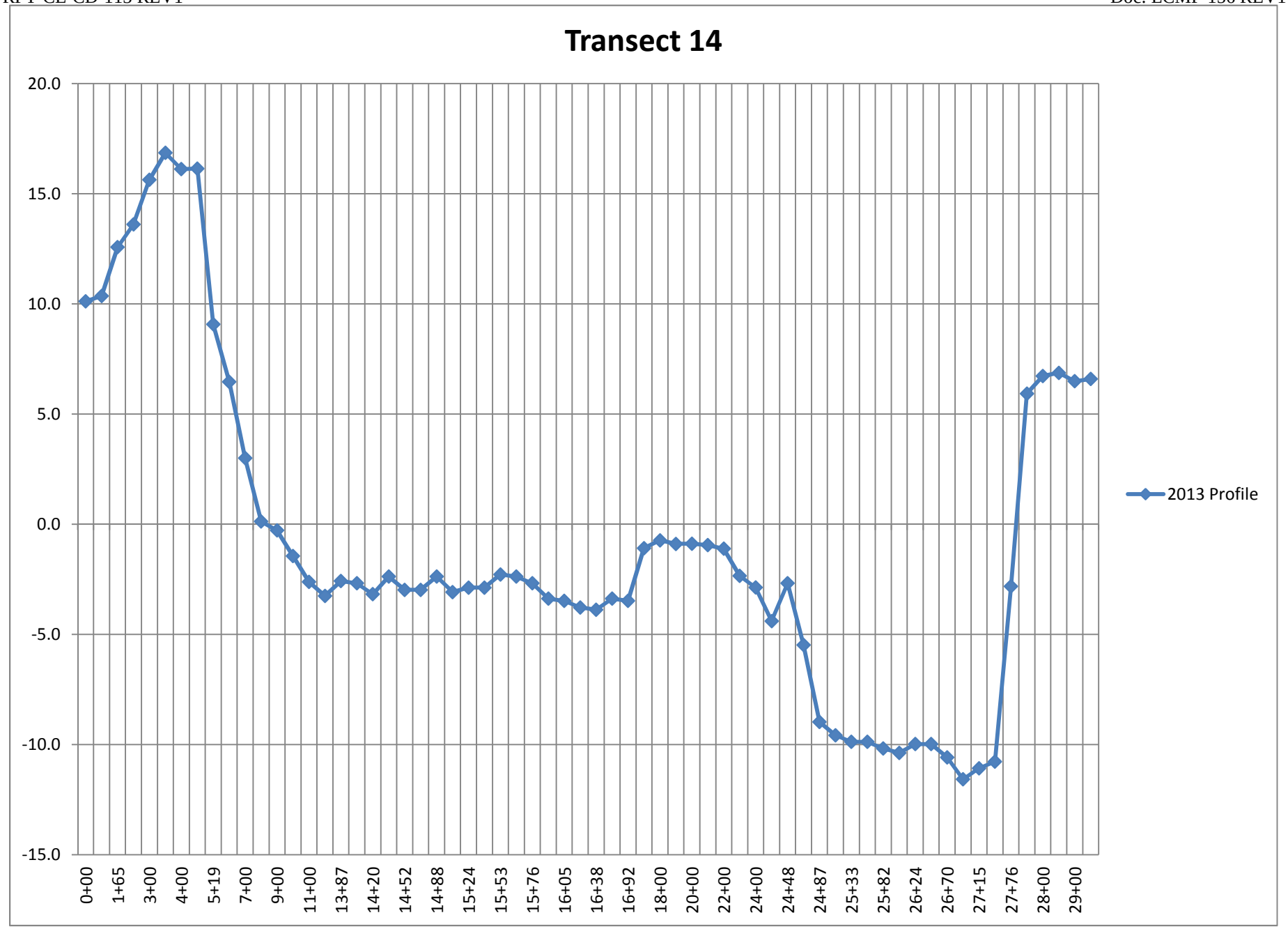
9+00
10+00
12+00
14+00
16+00
18+01
20+00
22+00
24+00
26+00
28+00
30+00
32+00
34+00
35+11
36+39
36+79
37+30
37+84
38+38
38+92
39+38
39+89
41+00
43+00
44+00
45+15
45+64
46+62
47+65
48+65
49+22
50+00
50+28
50+36
51+30
51+44
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.1												Ground Shot
1+00	10.4												Ground Shot
1+65	12.6												Ground Shot
2+00	13.6												Ground Shot
3+00	15.6												Ground Shot
3+67	16.9												Ground Shot
4+00	16.1												Ground Shot
4+76	16.1												Top of Bank
5+19	9.1												Toe of Bank
6+00	6.5												Edge of Vegetation
7+00	3.0												Edge of Vegetation
8+00	0.1												Sand Bar
9+00	-0.3												Sand Bar
10+00	-1.5												Sand Bar
11+00	-2.6												Sand Bar
11+24	-3.3												Edge of Water
13+87	-2.6												River Bottom
14+03	-2.7												River Bottom
14+20	-3.2												River Bottom
14+36	-2.4												River Bottom
14+52	-3.0												River Bottom
14+68	-3.0												River Bottom
14+88	-2.4												River Bottom
15+04	-3.1												River Bottom
15+24	-2.9												River Bottom
15+36	-2.9												River Bottom
15+53	-2.3												River Bottom
15+66	-2.4												River Bottom
15+76	-2.7												River Bottom
15+89	-3.4												River Bottom
16+05	-3.5												River Bottom
16+18	-3.8												River Bottom
16+38	-3.9												River Bottom
16+54	-3.4												River Bottom
16+92	-3.5												Edge of Water
17+31	-1.1												Sand Bar
18+00	-0.7												Sand Bar
19+00	-0.9												Sand Bar
20+00	-0.9												Sand Bar
21+01	-1.0												Sand Bar

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
22+00	-1.1												Sand Bar
23+00	-2.4												Sand Bar
24+00	-2.9												Sand Bar
24+35	-4.4												Edge of Water
24+48	-2.7												River Bottom
24+64	-5.5												River Bottom
24+87	-9.0												River Bottom
25+10	-9.6												River Bottom
25+33	-9.9												River Bottom
25+56	-9.9												River Bottom
25+82	-10.2												River Bottom
26+01	-10.4												River Bottom
26+24	-10.0												River Bottom
26+50	-10.0												River Bottom
26+70	-10.6												River Bottom
26+89	-11.6												River Bottom
27+15	-11.1												River Bottom
27+35	-10.8												River Bottom
27+76	-2.8												Edge of Water
27+87	5.9												Top of Bank
28+00	6.7												Ground Shot
28+44	6.9												Ground Shot
29+00	6.5												Ground Shot
29+94	6.6												Ground Shot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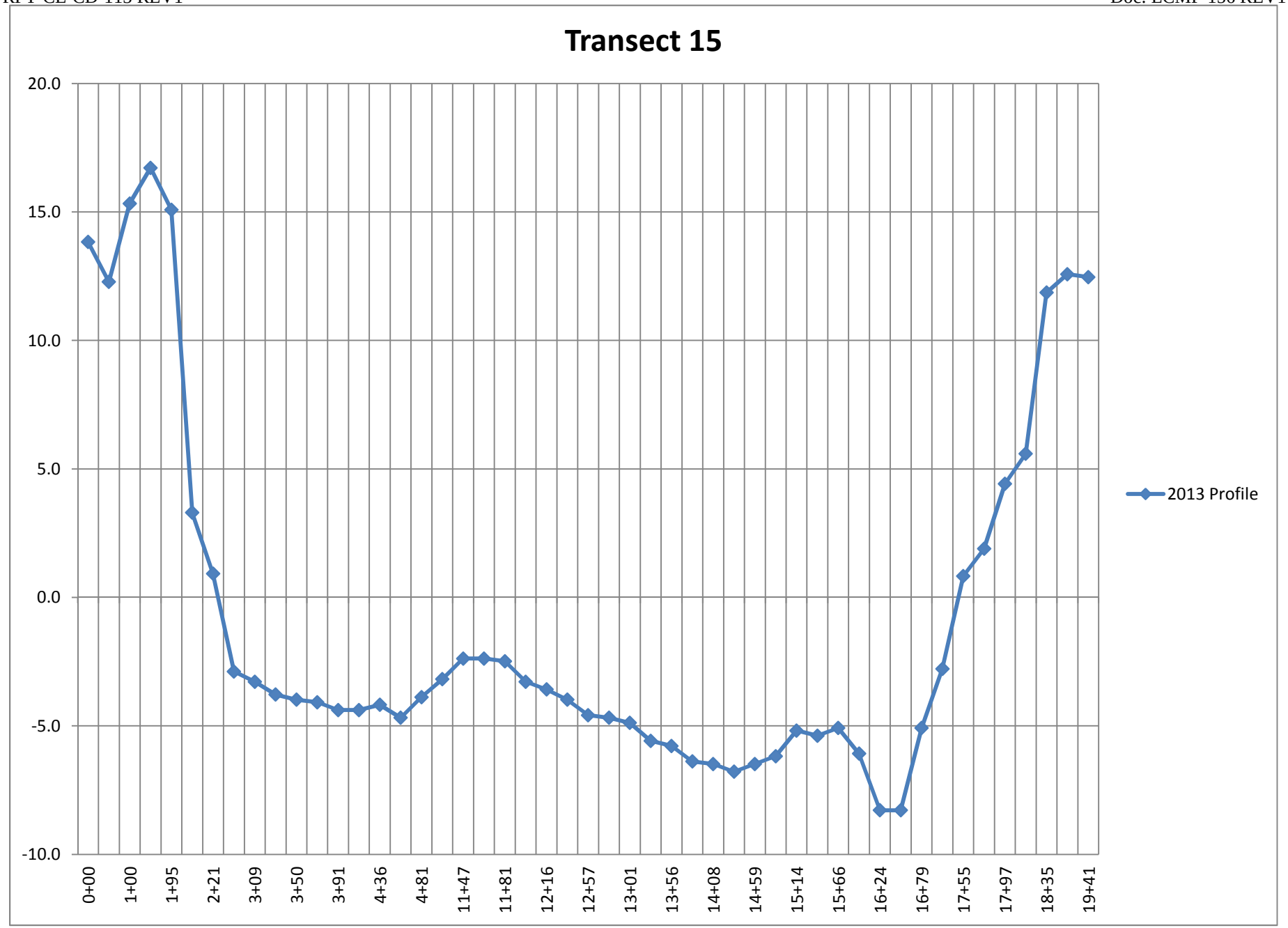
4+00
5+19
7+00
9+00
11+00
13+87
14+20
14+52
14+88
15+24
15+53
15+76
16+05
16+38
16+92
18+00
20+00
22+00
24+00
24+48
24+87
25+33
25+82
26+24
26+70
27+15
27+76
28+00
29+00
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	13.8												Ground Shot
1+00	12.3												Ground Shot
1+00	15.3												Ground Shot
1+50	16.7												Ground Shot
1+95	15.1												Top of Bank
2+11	3.3												Toe of Bank
2+21	0.9												Edge of Water
2+88	-2.9												River Bottom
3+09	-3.3												River Bottom
3+30	-3.8												River Bottom
3+50	-4.0												River Bottom
3+71	-4.1												River Bottom
3+91	-4.4												River Bottom
4+12	-4.4												River Bottom
4+36	-4.2												River Bottom
4+57	-4.7												River Bottom
4+81	-3.9												River Bottom
5+01	-3.2												River Bottom
11+47	-2.4												River Bottom
11+64	-2.4												River Bottom
11+81	-2.5												River Bottom
11+98	-3.3												River Bottom
12+16	-3.6												River Bottom
12+36	-4.0												River Bottom
12+57	-4.6												River Bottom
12+77	-4.7												River Bottom
13+01	-4.9												River Bottom
13+29	-5.6												River Bottom
13+56	-5.8												River Bottom
13+80	-6.4												River Bottom
14+08	-6.5												River Bottom
14+35	-6.8												River Bottom
14+59	-6.5												River Bottom
14+87	-6.2												River Bottom
15+14	-5.2												River Bottom
15+42	-5.4												River Bottom
15+66	-5.1												River Bottom
15+93	-6.1												River Bottom
16+24	-8.3												River Bottom
16+52	-8.3												River Bottom

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
16+79	-5.1												River Bottom
17+03	-2.8												River Bottom
17+55	0.8												Edge of Water
17+79	1.9												Sand Bar
17+97	4.4												Sand Bar
18+19	5.6												Toe of Bank
18+35	11.9												Top of Bank
18+91	12.6												Ground Shot
19+41	12.5												Ground Shot


Transect 15
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5.0
0.0
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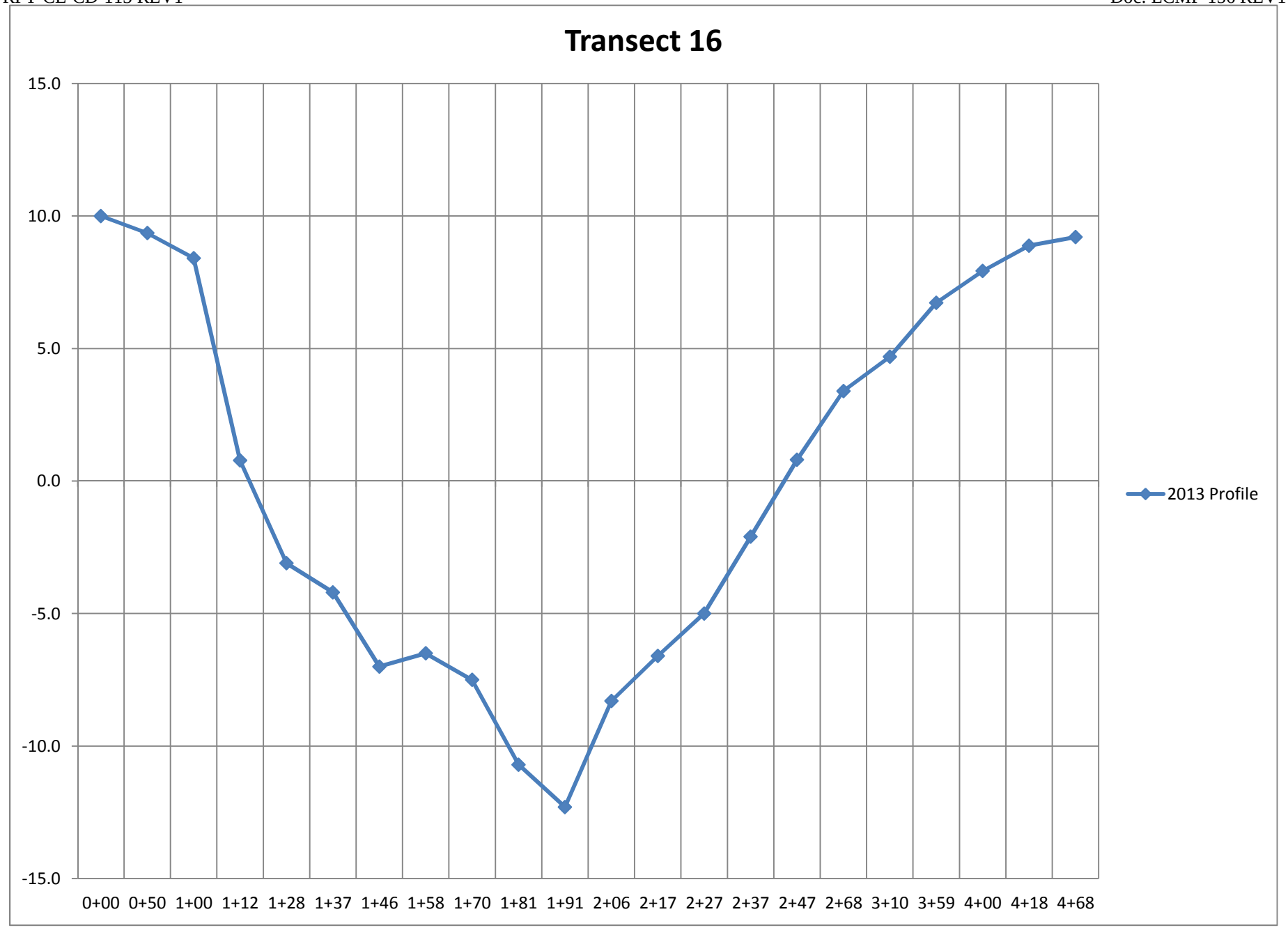
-10.0
0+00
1+00
1+95
2+21
3+09
3+50
3+91
4+36
4+81
11+47
11+81
12+16
12+57
13+01
13+56
14+08
14+59
15+14
15+66
16+24
16+79
17+55
17+97
18+35
19+41
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	10.0												Ground Shot
0+50	9.4												Ground Shot
1+00	8.4												Top of Bank
1+12	0.8												Edge of Water
1+28	-3.1												River Bottom
1+37	-4.2												River Bottom
1+46	-7.0												River Bottom
1+58	-6.5												River Bottom
1+70	-7.5												River Bottom
1+81	-10.7												River Bottom
1+91	-12.3												River Bottom
2+06	-8.3												River Bottom
2+17	-6.6												River Bottom
2+27	-5.0												River Bottom
2+37	-2.1												River Bottom
2+47	0.8												Edge of Water
2+68	3.4												Sand Bar
3+10	4.7												Edge of Vegetation
3+59	6.7												Edge of Vegetation
4+00	7.9												Ground Shot
4+18	8.9												Ground Shot
4+68	9.2												Ground Shot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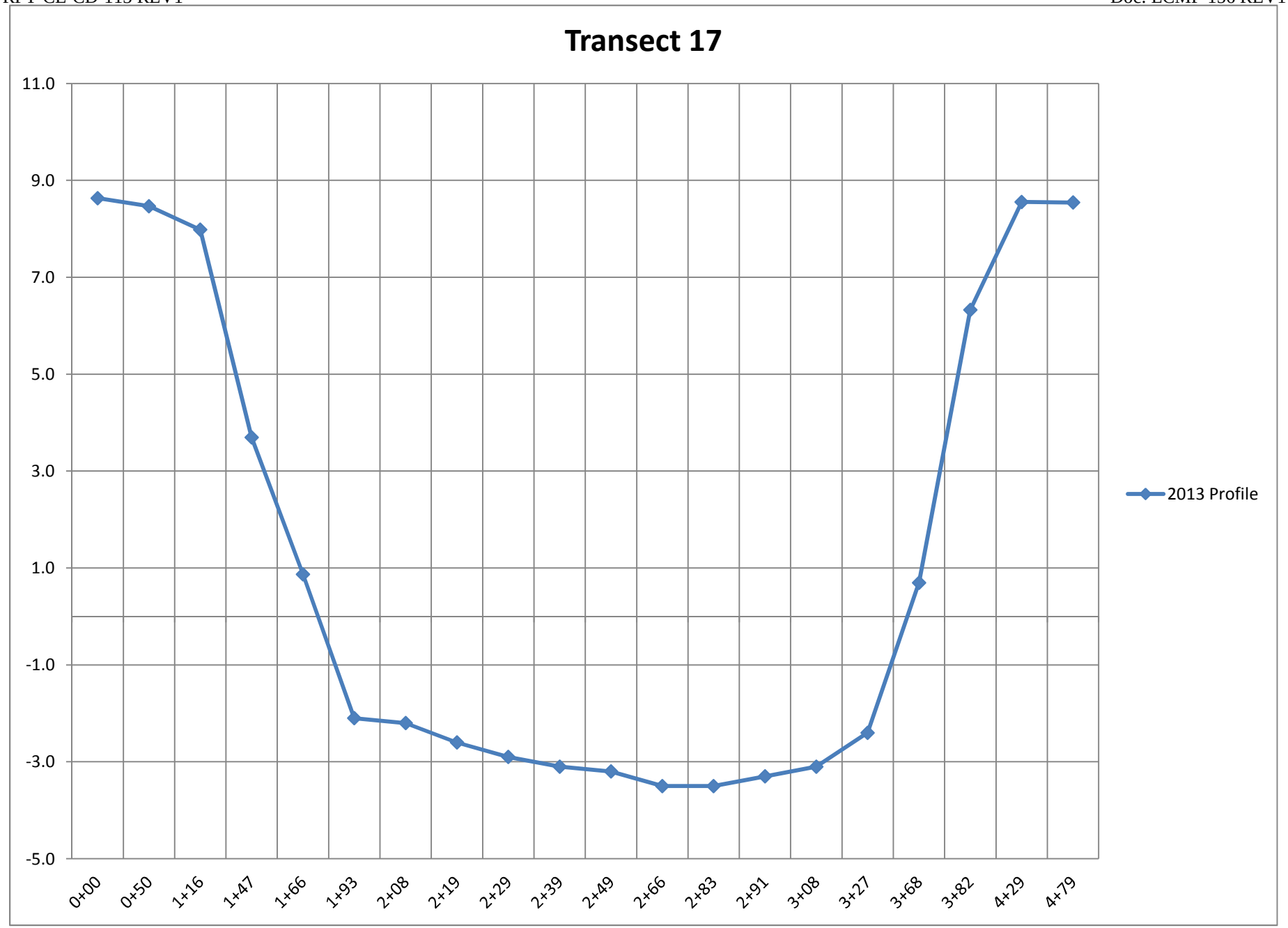
-10.0
-15.0
0+00
0+50
1+00
1+12
1+28
1+37
1+46
1+58
1+70
1+81
1+91
2+06
2+17
2+27
2+37
2+47
2+68
3+10
3+59
4+00
4+18
4+68
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.6												Ground Shot
0+50	8.5												Ground Shot
1+16	8.0												Top of Bank
1+47	3.7												Edge of Vegetation
1+66	0.9												Edge of Water
1+93	-2.1												River Bottom
2+08	-2.2												River Bottom
2+19	-2.6												River Bottom
2+29	-2.9												River Bottom
2+39	-3.1												River Bottom
2+49	-3.2												River Bottom
2+66	-3.5												River Bottom
2+83	-3.5												River Bottom
2+91	-3.3												River Bottom
3+08	-3.1												River Bottom
3+27	-2.4												River Bottom
3+68	0.7												Edge of Water
3+82	6.3												Top of Bank
4+29	8.6												Ground Shot
4+79	8.5												Ground Shot


Transect 17
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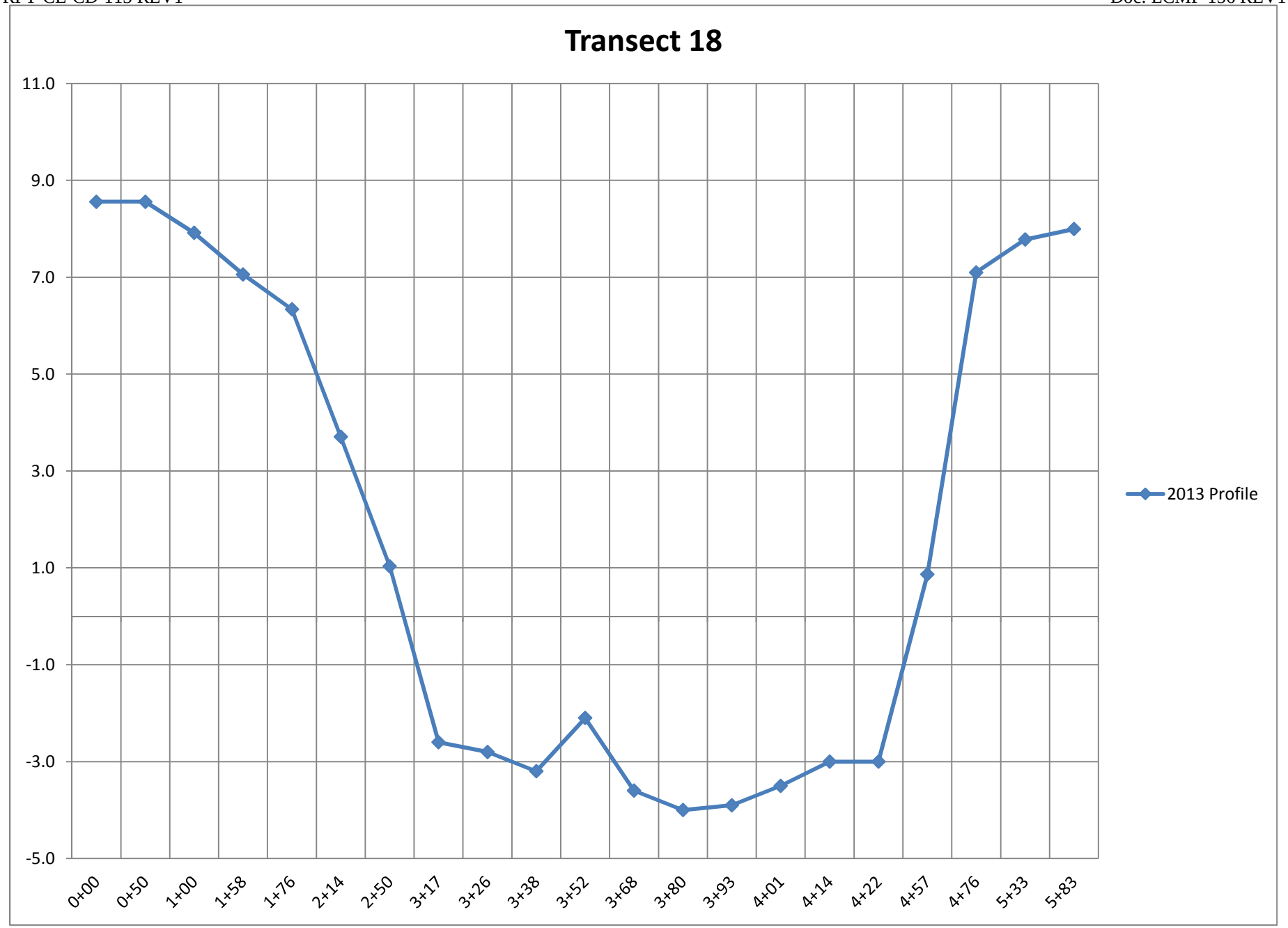
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
0+00
0+50
1+16
1+47
1+66
1+93
2+08
2+19
2+29
2+39
2+49
2+66
2+83
2+91
3+08
3+27
3+68
3+82
4+29
4+79
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.6												Ground Shot
0+50	8.6												Ground Shot
1+00	7.9												Ground Shot
1+58	7.1												Top of Bank
1+76	6.3												Edge of Vegetation
2+14	3.7												Edge of Vegetation
2+50	1.0												Edge of Water
3+17	-2.6												River Bottom
3+26	-2.8												River Bottom
3+38	-3.2												River Bottom
3+52	-2.1												River Bottom
3+68	-3.6												River Bottom
3+80	-4.0												River Bottom
3+93	-3.9												River Bottom
4+01	-3.5												River Bottom
4+14	-3.0												River Bottom
4+22	-3.0												River Bottom
4+57	0.9												Edge of Water
4+76	7.1												Top of Bank
5+33	7.8												Ground Shot
5+83	8.0												Ground Shot


Transect 18
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9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
0+00
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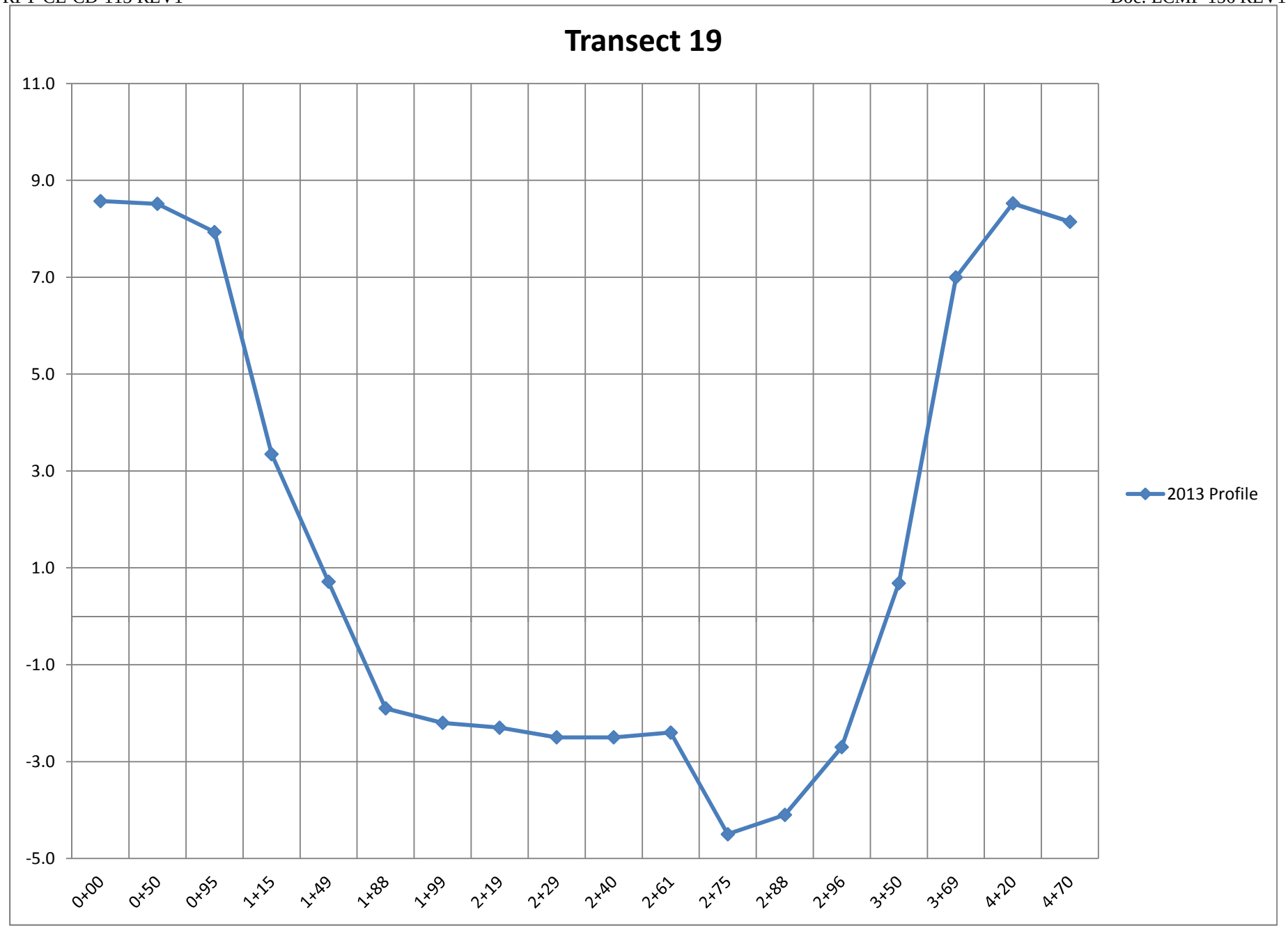
1+00
1+58
1+76
2+14
2+50
3+17
3+26
3+38
3+52
3+68
3+80
3+93
4+01
4+14
4+22
4+57
4+76
5+33
5+83
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.6												Ground Shot
0+50	8.5												Ground Shot
0+95	7.9												Top of Bank
1+15	3.3												Edge of Vegetation
1+49	0.7												Edge of Water
1+88	-1.9												River Bottom
1+99	-2.2												Edge of Water
2+19	-2.3												River Bottom
2+29	-2.5												Edge of Water
2+40	-2.5												River Bottom
2+61	-2.4												Edge of Water
2+75	-4.5												River Bottom
2+88	-4.1												Edge of Water
2+96	-2.7												River Bottom
3+50	0.7												Edge of Water
3+69	7.0												Top of Bank
4+20	8.5												Ground Shot
4+70	8.1												Ground Shot


Transect 19
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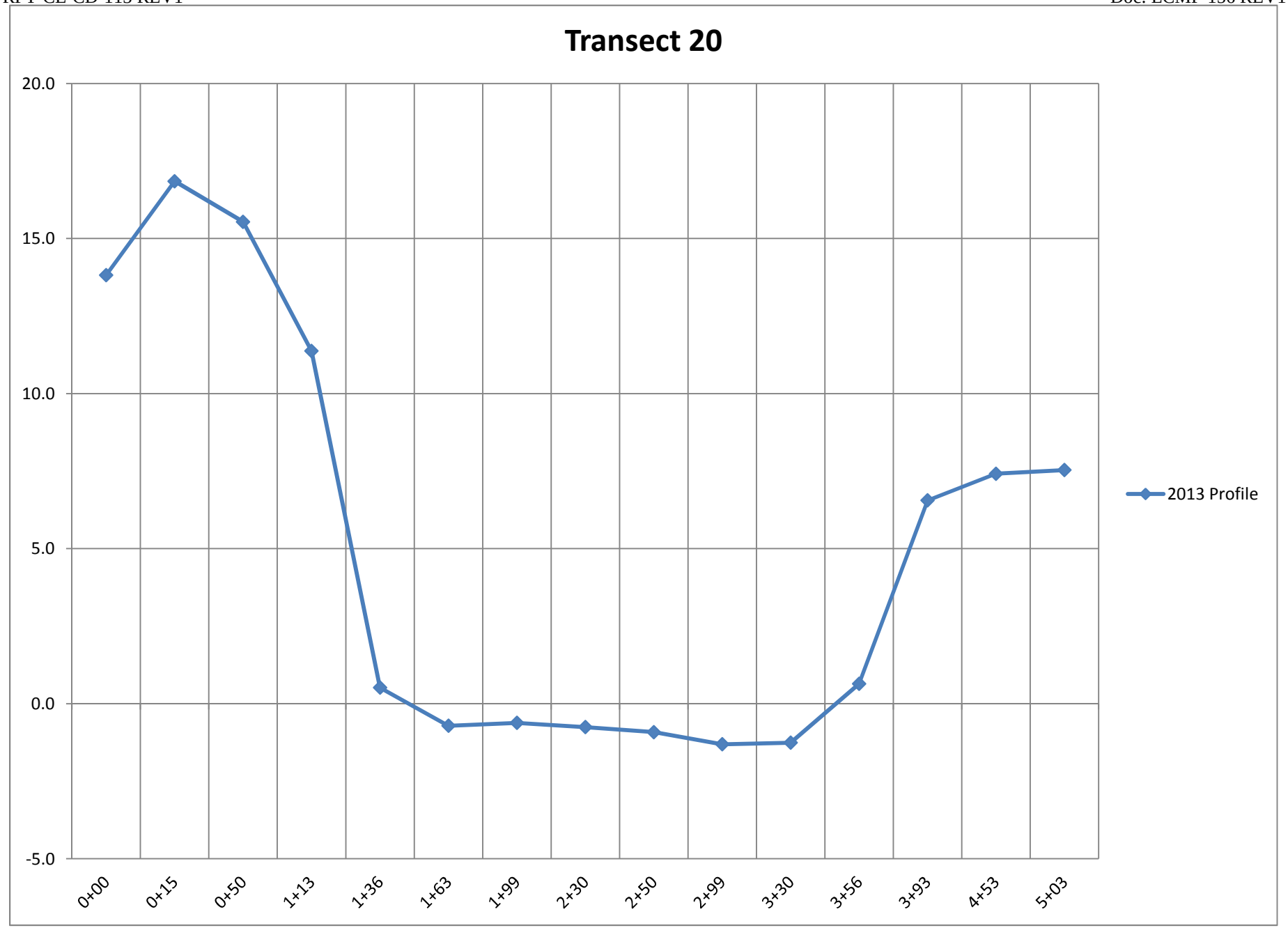
1.0
-1.0
-3.0
-5.0
0+00
0+50
0+95
1+15
1+49
1+88
1+99
2+19
2+29
2+40
2+61
2+75
2+88
2+96
3+50
3+69
4+20
4+70
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	13.8												Ground Shot
0+15	16.8												Ground Shot
0+50	15.5												Ground Shot
1+13	11.4												Top of Bank
1+36	0.5												Edge of Water
1+63	-0.7												River Bottom
1+99	-0.6												River Bottom
2+30	-0.8												River Bottom
2+50	-0.9												River Bottom
2+99	-1.3												River Bottom
3+30	-1.3												River Bottom
3+56	0.6												Edge of Water
3+93	6.6												Top of Bank
4+53	7.4												Ground Shot
5+03	7.5												Ground Shot


Transect 20
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15.0
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0.0
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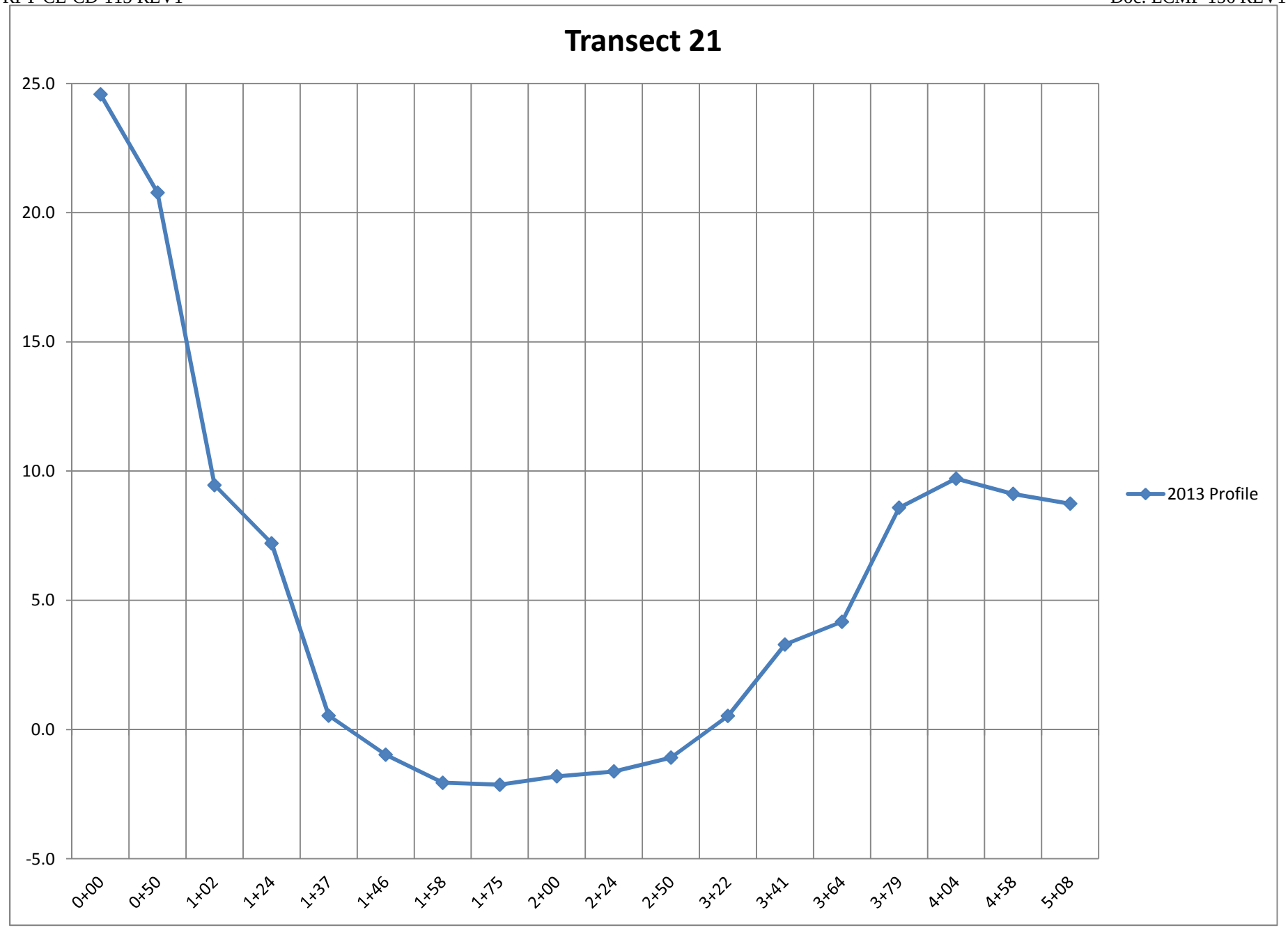
0+00
0+15
0+50
1+13
1+36
1+63
1+99
2+30
2+50
2+99
3+30
3+56
3+93
4+53
5+03
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	24.6												Ground Shot
0+50	20.8												Ground Shot
1+02	9.5												Ground Shot
1+24	7.2												Top of Bank
1+37	0.5												Edge of Water
1+46	-1.0												River Bottom
1+58	-2.1												River Bottom
1+75	-2.1												River Bottom
2+00	-1.8												River Bottom
2+24	-1.6												River Bottom
2+50	-1.1												River Bottom
3+22	0.5												Edge of Water
3+41	3.3												Grade Break
3+64	4.2												Toe of Bank
3+79	8.6												Top of Bank
4+04	9.7												Grade Break
4+58	9.1												Ground Shot
5+08	8.7												Ground Shot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-5.0
0+00
0+50
1+02
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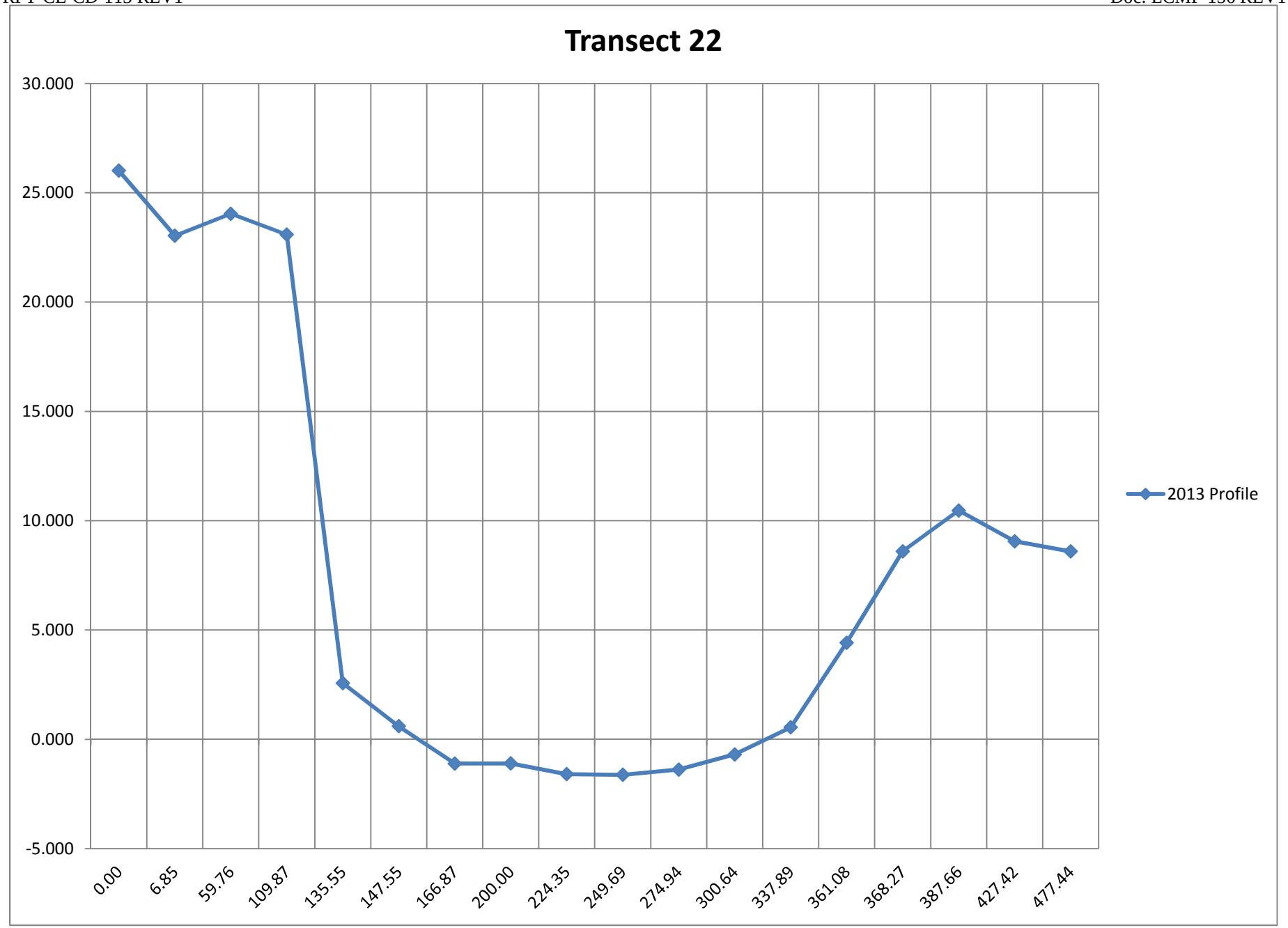
1+37
1+46
1+58
1+75
2+00
2+24
2+50
3+22
3+41
3+64
3+79
4+04
4+58
5+08
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0.00	26.017												Ground Shot
6.85	23.035												Ground Shot
59.76	24.037												Ground Shot
109.87	23.087												Top of Bank
135.55	2.572												Toe of Bank
147.55	0.599												Edge of Water
166.87	-1.109												River Bottom
200.00	-1.103												River Bottom
224.35	-1.593												River Bottom
249.69	-1.621												River Bottom
274.94	-1.382												River Bottom
300.64	-0.692												River Bottom
337.89	0.551												Edge of Water
361.08	4.418												Toe of Bank
368.27	8.600												Top of Bank
387.66	10.466												Ground Shot
427.42	9.059												Ground Shot
477.44	8.593												Ground Shot


Transect 22
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10.000
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0.000
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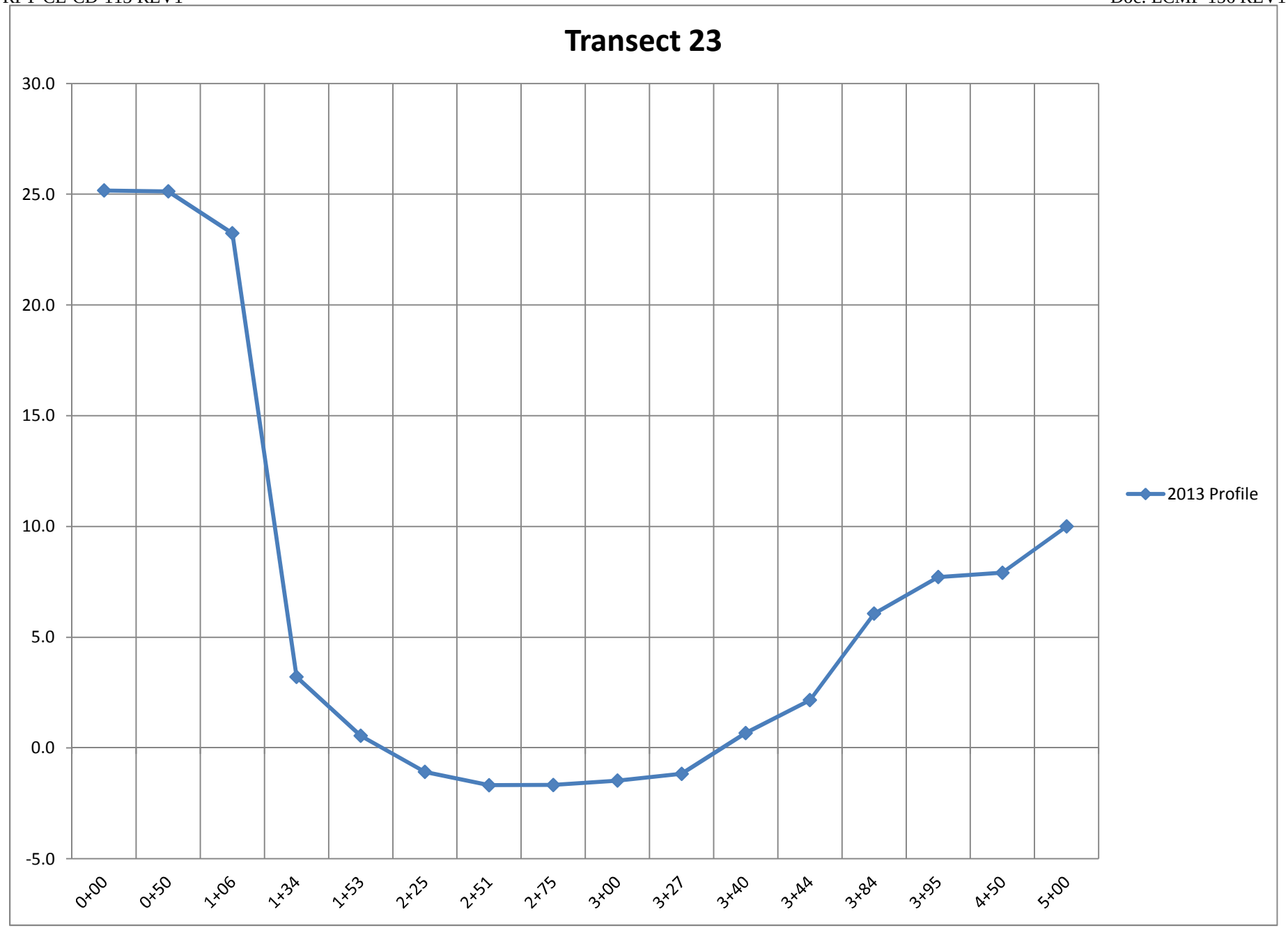
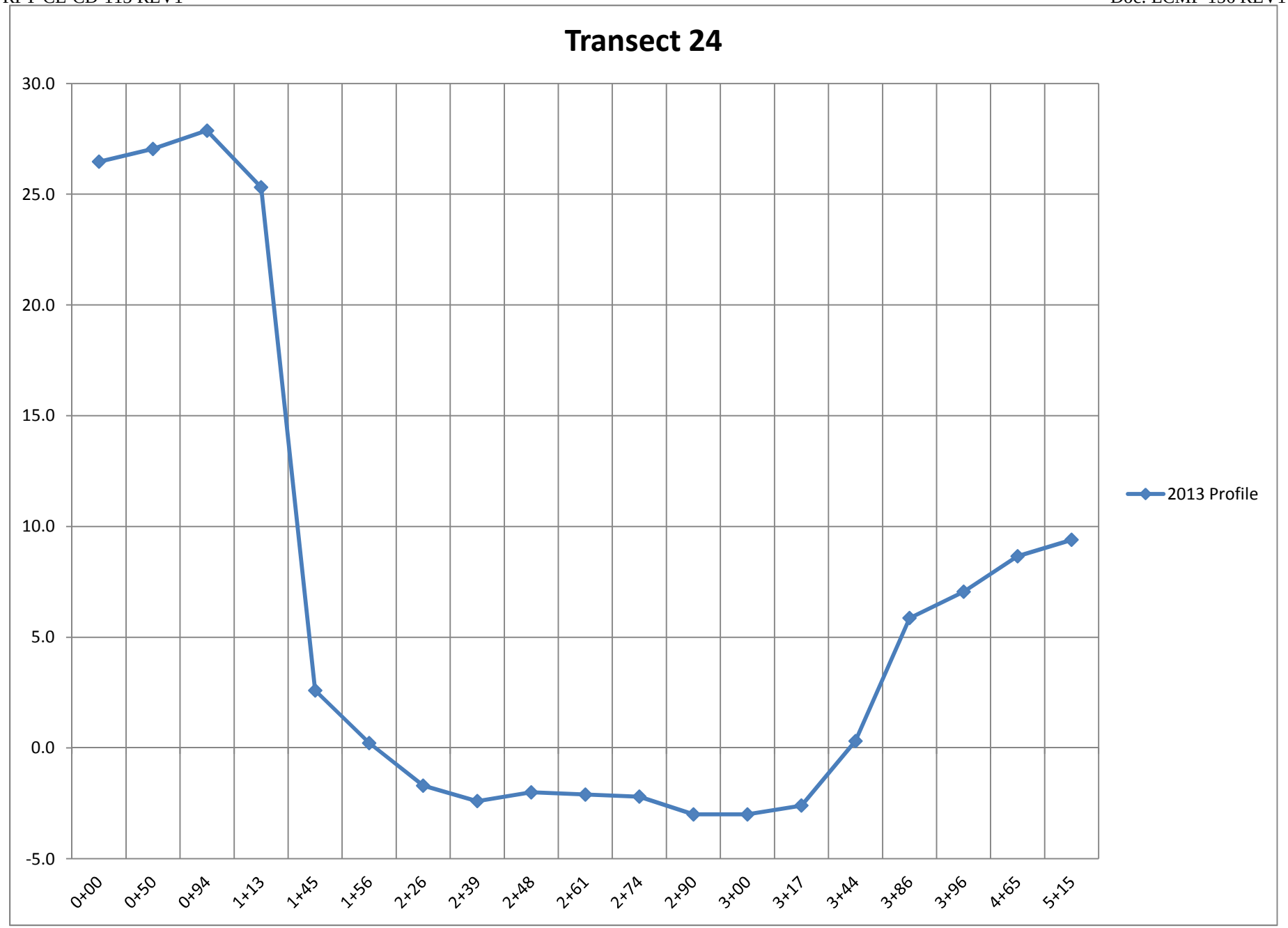
0.00
6.85
59.76
109.87
135.55
147.55
166.87
200.00
224.35
249.69
274.94
300.64
337.89
361.08
368.27
387.66
427.42
477.44
2013 Profile

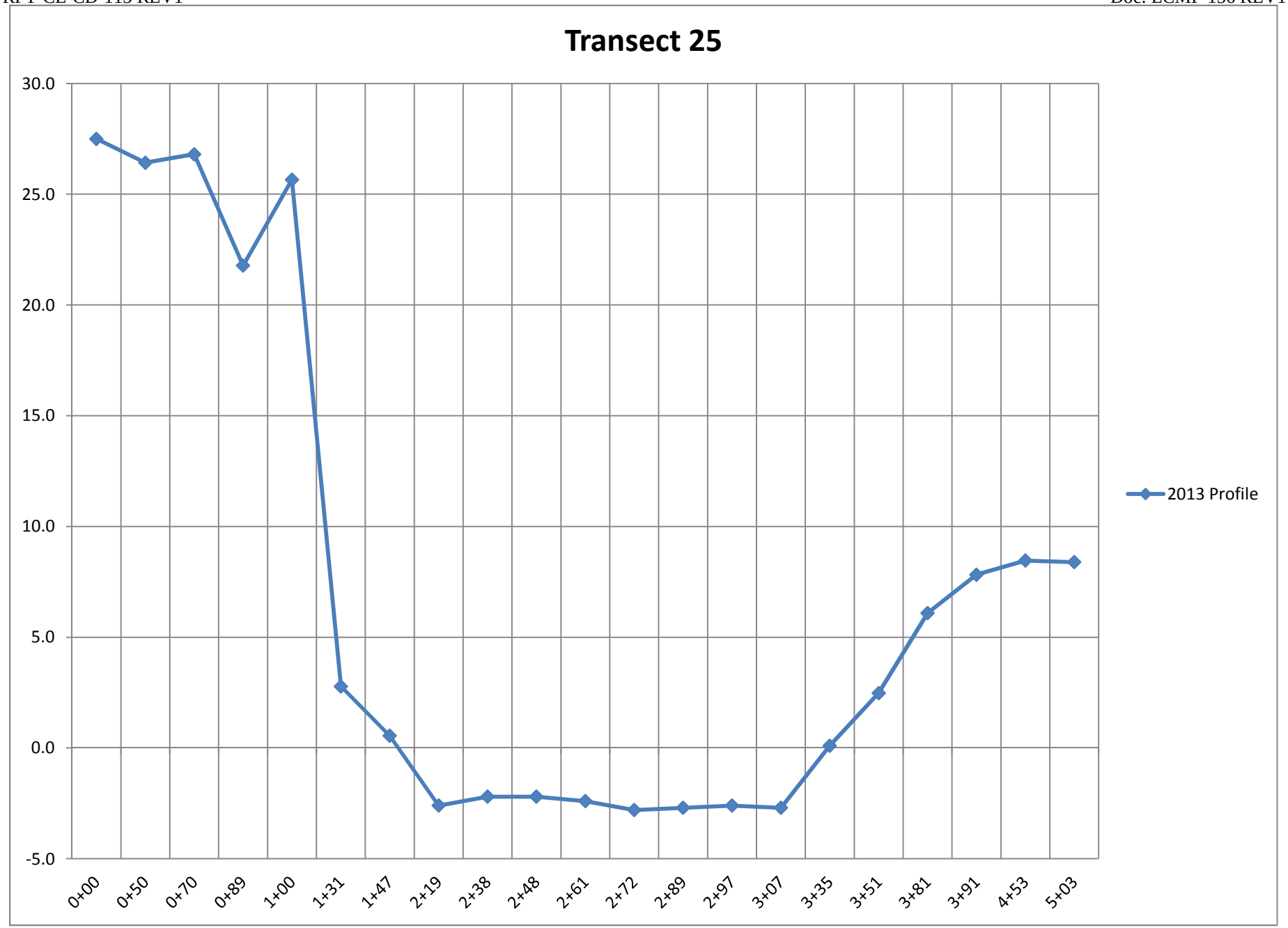
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	25.2												Ground Shot
0+50	25.1												Ground Shot
1+06	23.2												Top of Bank
1+34	3.2												Toe of Bank
1+53	0.5												Edge of Water
2+25	-1.1												River Bottom
2+51	-1.7												River Bottom
2+75	-1.7												River Bottom
3+00	-1.5												River Bottom
3+27	-1.2												River Bottom
3+40	0.7												Edge of Water
3+44	2.2												Grade Break
3+84	6.1												Edge of Vegetation
3+95	7.7												Top of Bank
4+50	7.9												Ground Shot
5+00	10.0												Ground Shot


Transect 23
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+50
1+06
1+34
1+53
2+25
2+51
2+75
3+00
3+27
3+40
3+44
3+84
3+95
4+50
5+00
2013 Profile

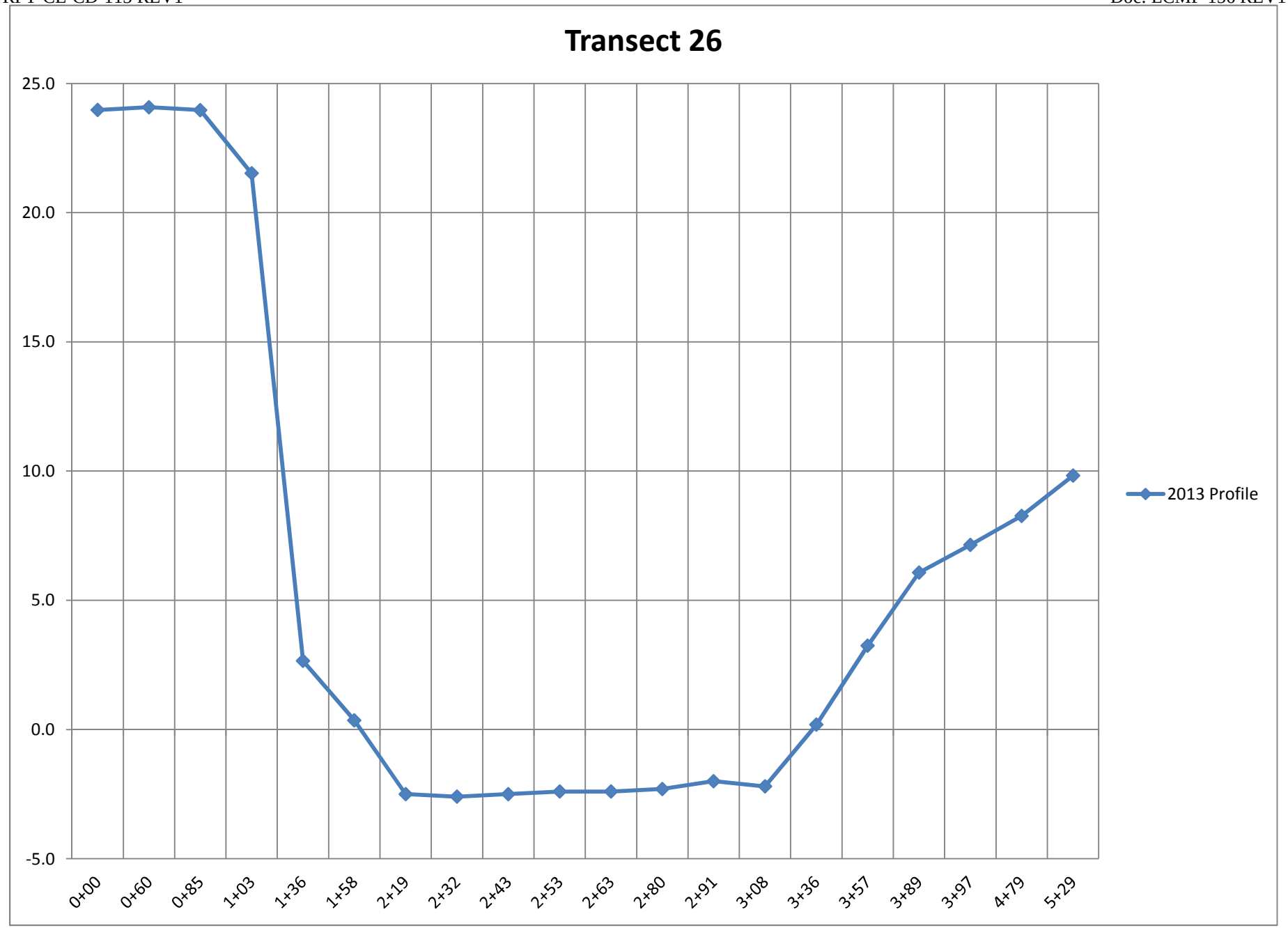
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	26.5												Ground Shot
0+50	27.0												Ground Shot
0+94	27.9												Ground Shot
1+13	25.3												Top of Bank
1+45	2.6												Toe of Bank
1+56	0.2												Edge of Water
2+26	-1.7												River Bottom
2+39	-2.4												River Bottom
2+48	-2.0												River Bottom
2+61	-2.1												River Bottom
2+74	-2.2												River Bottom
2+90	-3.0												River Bottom
3+00	-3.0												River Bottom
3+17	-2.6												River Bottom
3+44	0.3												Edge of Water
3+86	5.9												Edge of Vegetation
3+96	7.1												Top of Bank
4+65	8.7												Ground Shot
5+15	9.4												Ground Shot


Transect 24
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+50
0+94
1+13
1+45
1+56
2+26
2+39
2+48
2+61
2+74
2+90
3+00
3+17
3+44
3+86
3+96
4+65
5+15
2013 Profile

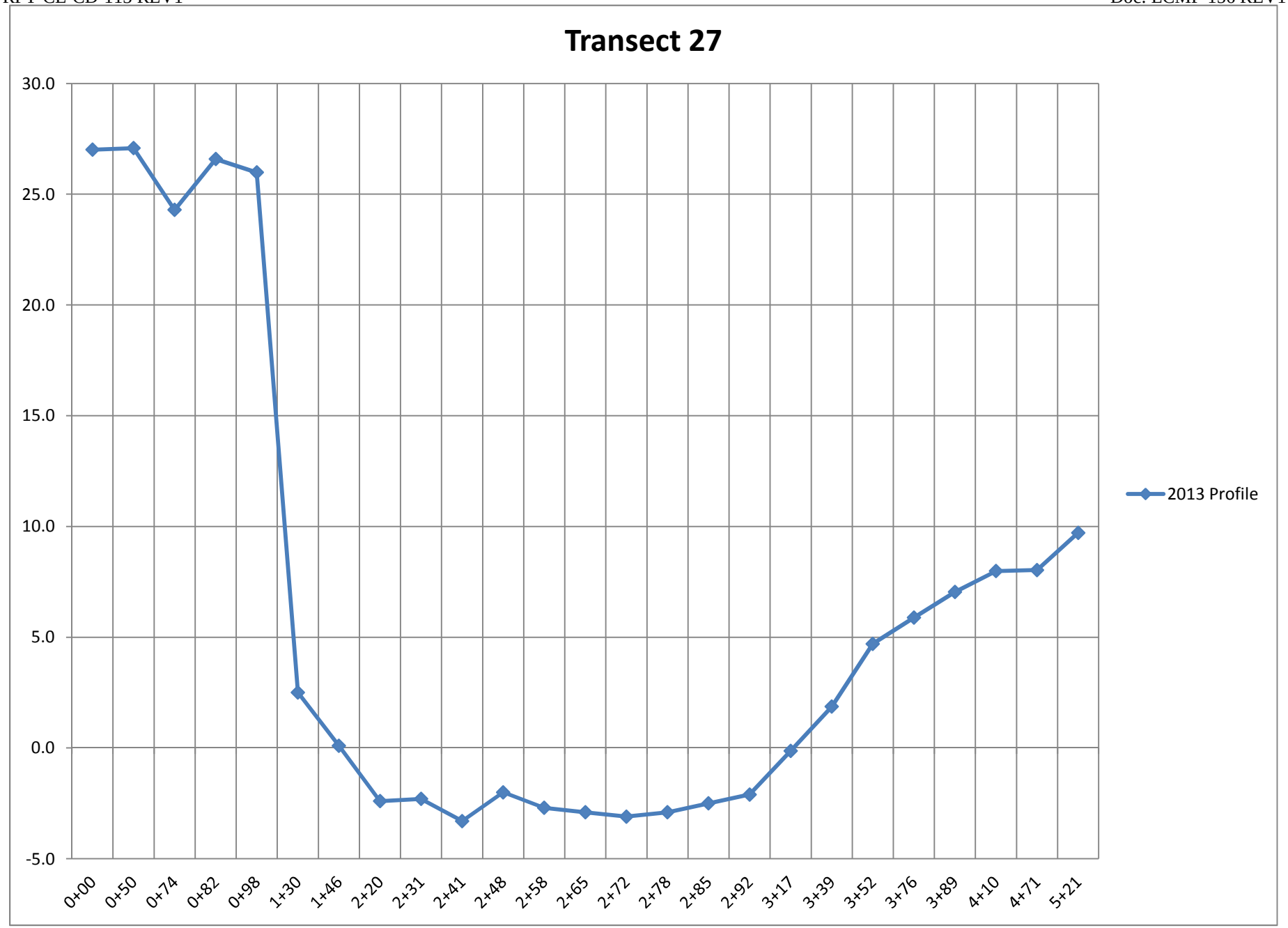
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	27.5												Ground Shot
0+50	26.4												Ground Shot
0+70	26.8												Ground Shot
0+89	21.8												Grade Break
1+00	25.7												Top of Bank
1+31	2.8												Toe of Bank
1+47	0.6												Edge of Water
2+19	-2.6												River Bottom
2+38	-2.2												River Bottom
2+48	-2.2												River Bottom
2+61	-2.4												River Bottom
2+72	-2.8												River Bottom
2+89	-2.7												River Bottom
2+97	-2.6												River Bottom
3+07	-2.7												River Bottom
3+35	0.1												Edge of Water
3+51	2.5												Ground Shot
3+81	6.1												Edge of Vegetation
3+91	7.8												Top of Bank
4+53	8.5												Ground Shot
5+03	8.4												Ground Shot


Transect 25
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+50
0+70
0+89
1+00
1+31
1+47
2+19
2+38
2+48
2+61
2+72
2+89
2+97
3+07
3+35
3+51
3+81
3+91
4+53
5+03
2013 Profile

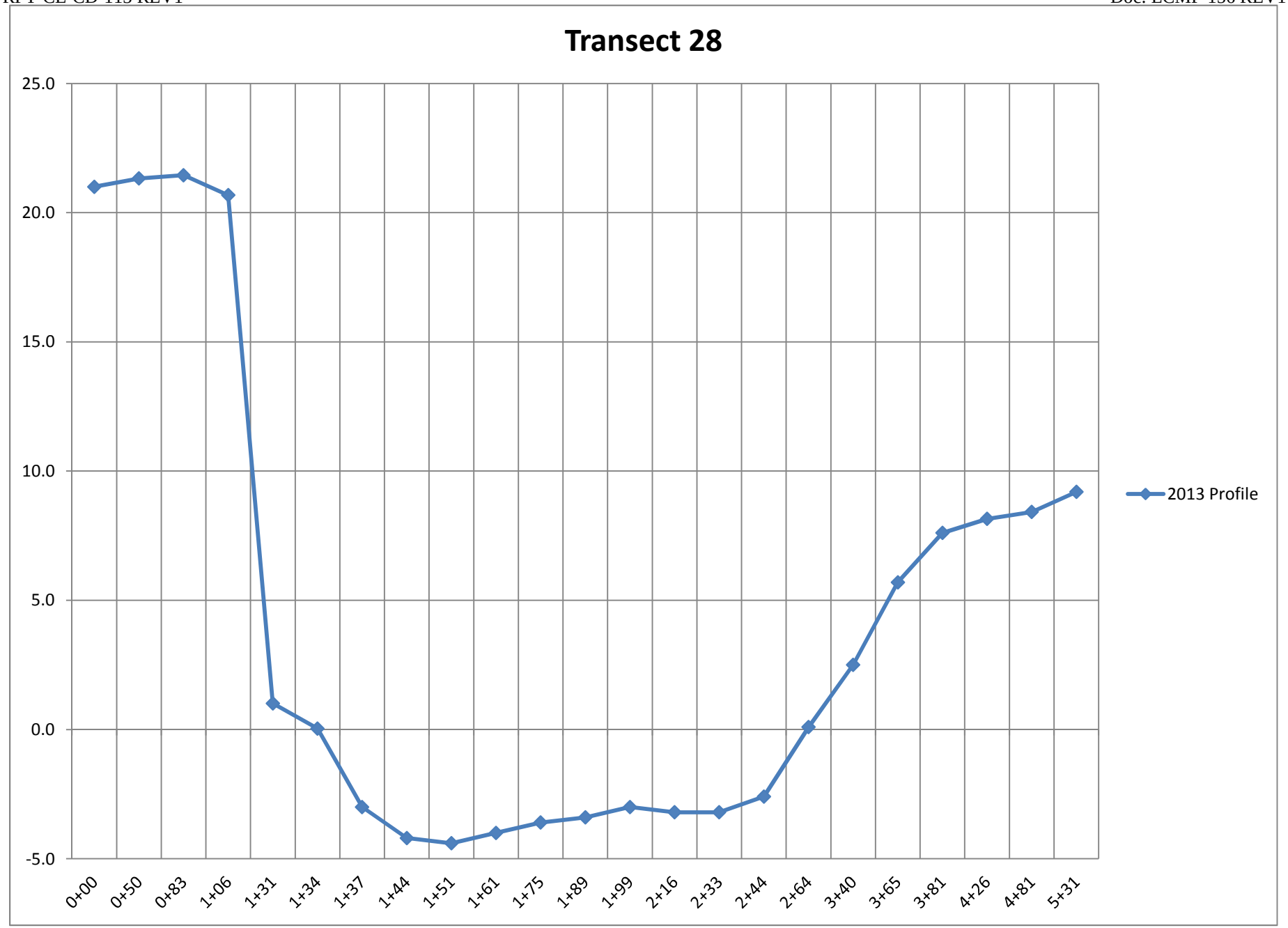
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	24.0												Ground Shot
0+60	24.1												Ground Shot
0+85	24.0												Ground Shot
1+03	21.5												Grade Break
1+36	2.7												Top of Bank
1+58	0.4												Toe of Bank
2+19	-2.5												Edge of Water
2+32	-2.6												River Bottom
2+43	-2.5												River Bottom
2+53	-2.4												River Bottom
2+63	-2.4												River Bottom
2+80	-2.3												River Bottom
2+91	-2.0												River Bottom
3+08	-2.2												River Bottom
3+36	0.2												River Bottom
3+57	3.2												Edge of Water
3+89	6.1												Ground Shot
3+97	7.1												Edge of Vegetation
4+79	8.3												Top of Bank
5+29	9.8												Ground Shot
													Ground Shot


Transect 26
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+60
0+85
1+03
1+36
1+58
2+19
2+32
2+43
2+53
2+63
2+80
2+91
3+08
3+36
3+57
3+89
3+97
4+79
5+29
2013 Profile

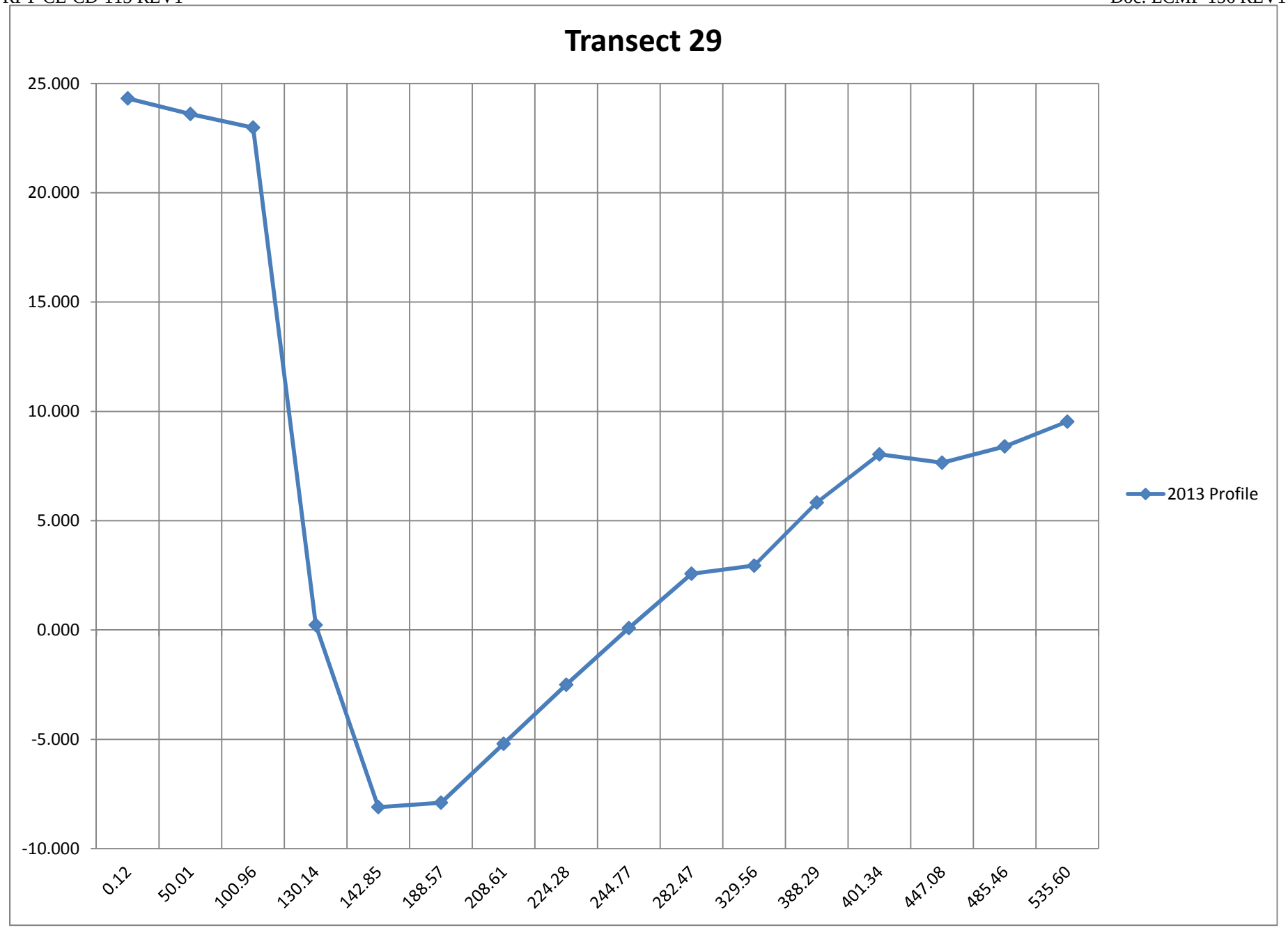
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	27.0												Ground Shot
0+50	27.1												Ground Shot
0+74	24.3												Grade Break
0+82	26.6												Grade Break
0+98	26.0												Top of Bank
1+30	2.5												Toe of Bank
1+46	0.1												Edge of Water
2+20	-2.4												River Bottom
2+31	-2.3												River Bottom
2+41	-3.3												River Bottom
2+48	-2.0												River Bottom
2+58	-2.7												River Bottom
2+65	-2.9												River Bottom
2+72	-3.1												River Bottom
2+78	-2.9												River Bottom
2+85	-2.5												River Bottom
2+92	-2.1												River Bottom
3+17	-0.1												Edge of Water
3+39	1.9												Ground Shot
3+52	4.7												Ground Shot
3+76	5.9												Edge of Vegetation
3+89	7.0												Top of Bank
4+10	8.0												Ground Shot
4+71	8.0												Ground Shot
5+21	9.7												Ground Shot


Transect 27
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+50
0+74
0+82
0+98
1+30
1+46
2+20
2+31
2+41
2+48
2+58
2+65
2+72
2+78
2+85
2+92
3+17
3+39
3+52
3+76
3+89
4+10
4+71
5+21
2013 Profile

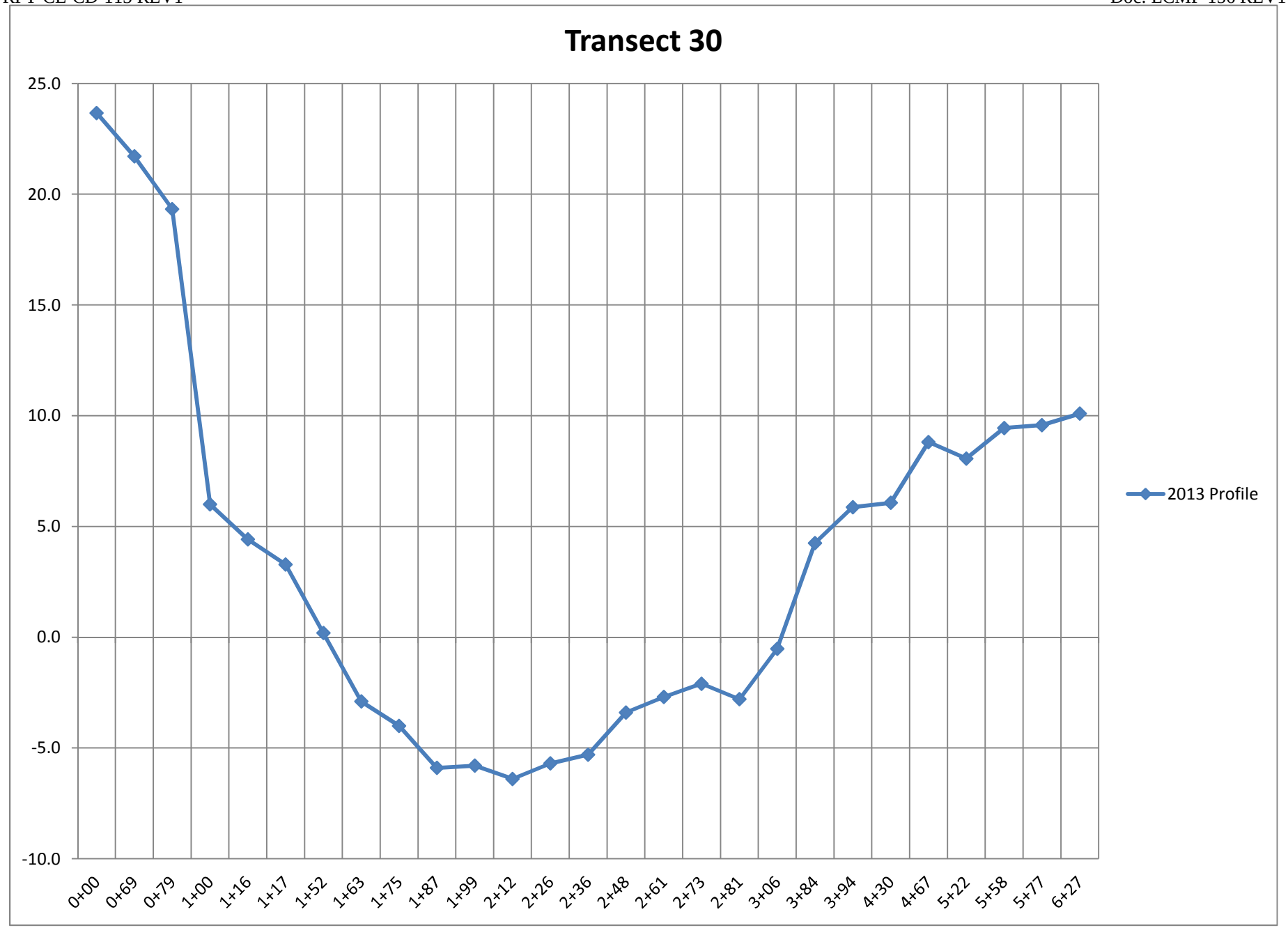
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	21.0												Ground Shot
0+50	21.3												Ground Shot
0+83	21.5												Ground Shot
1+06	20.7												Top of Bank
1+31	1.0												Toe of Bank
1+34	0.0												Edge of Water
1+37	-3.0												River Bottom
1+44	-4.2												River Bottom
1+51	-4.4												River Bottom
1+61	-4.0												River Bottom
1+75	-3.6												River Bottom
1+89	-3.4												River Bottom
1+99	-3.0												River Bottom
2+16	-3.2												River Bottom
2+33	-3.2												River Bottom
2+44	-2.6												River Bottom
2+64	0.1												Edge of Water
3+40	2.5												Ground Shot
3+65	5.7												Edge of Vegetation
3+81	7.6												Top of Bank
4+26	8.2												Ground Shot
4+81	8.4												Ground Shot
5+31	9.2												Ground Shot


Transect 28
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0+00
0+50
0+83
1+06
1+31
1+34
1+37
1+44
1+51
1+61
1+75
1+89
1+99
2+16
2+33
2+44
2+64
3+40
3+65
3+81
4+26
4+81
5+31
2013 Profile

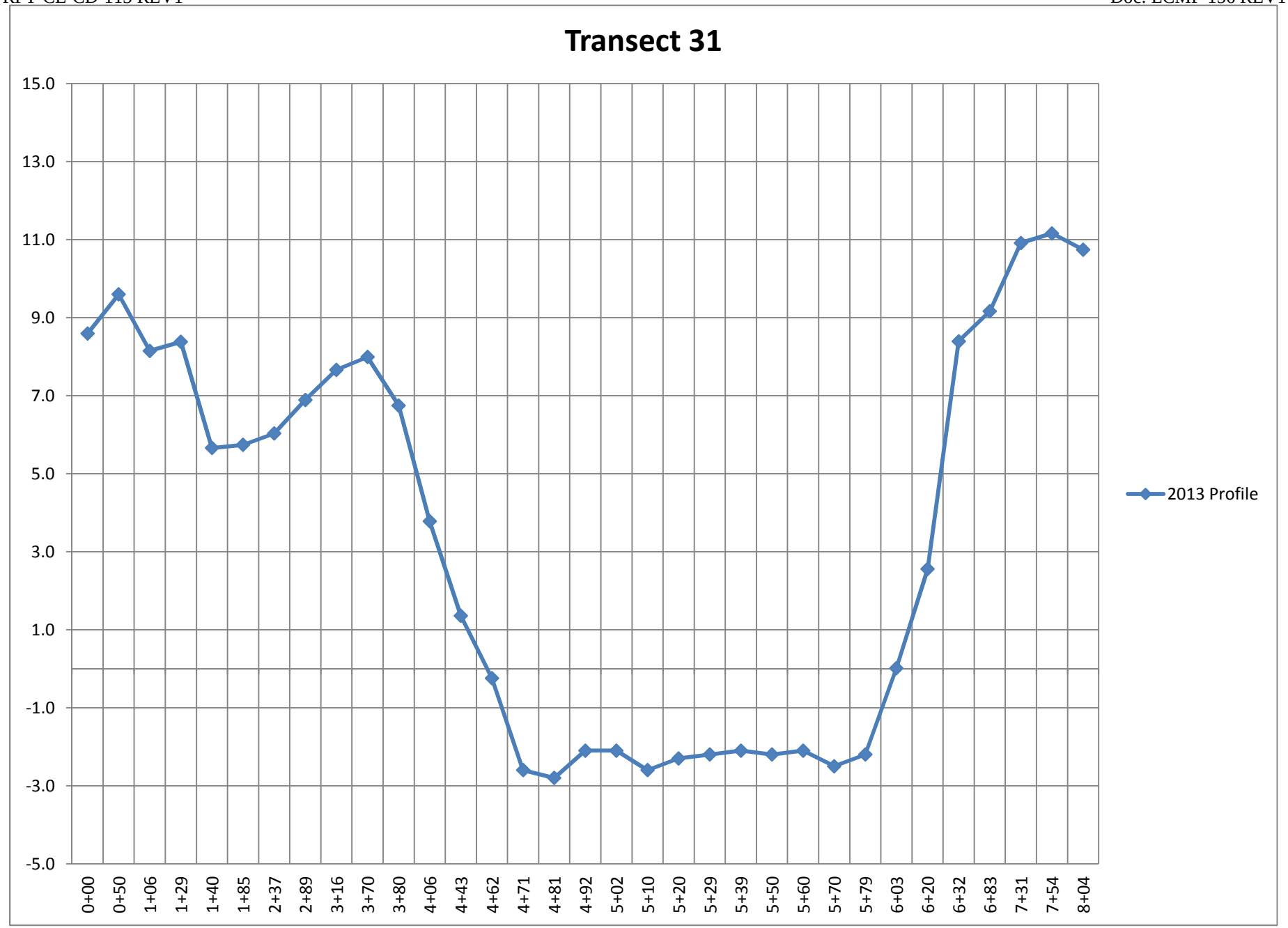
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0.12	24.314												Ground Shot
50.01	23.604												Ground Shot
100.96	22.981												Top of Bank
130.14	0.233												Edge of Water
142.85	-8.100												River Bottom
188.57	-7.900												River Bottom
208.61	-5.200												River Bottom
224.28	-2.500												River Bottom
244.77	0.090												Edge of Water
282.47	2.575												Ground Shot
329.56	2.945												Ground Shot
388.29	5.835												Edge of Vegetation
401.34	8.033												Top of Bank
447.08	7.653												Ground Shot
485.46	8.397												Ground Shot
535.60	9.537												Ground Shot


Transect 29
25.000
20.000
15.000
10.000
5.000
0.000
-5.000
-10.000
0.12
50.01
100.96
130.14
142.85
188.57
208.61
224.28
244.77
282.47
329.56
388.29
401.34
447.08
485.46
535.60
2013 Profile

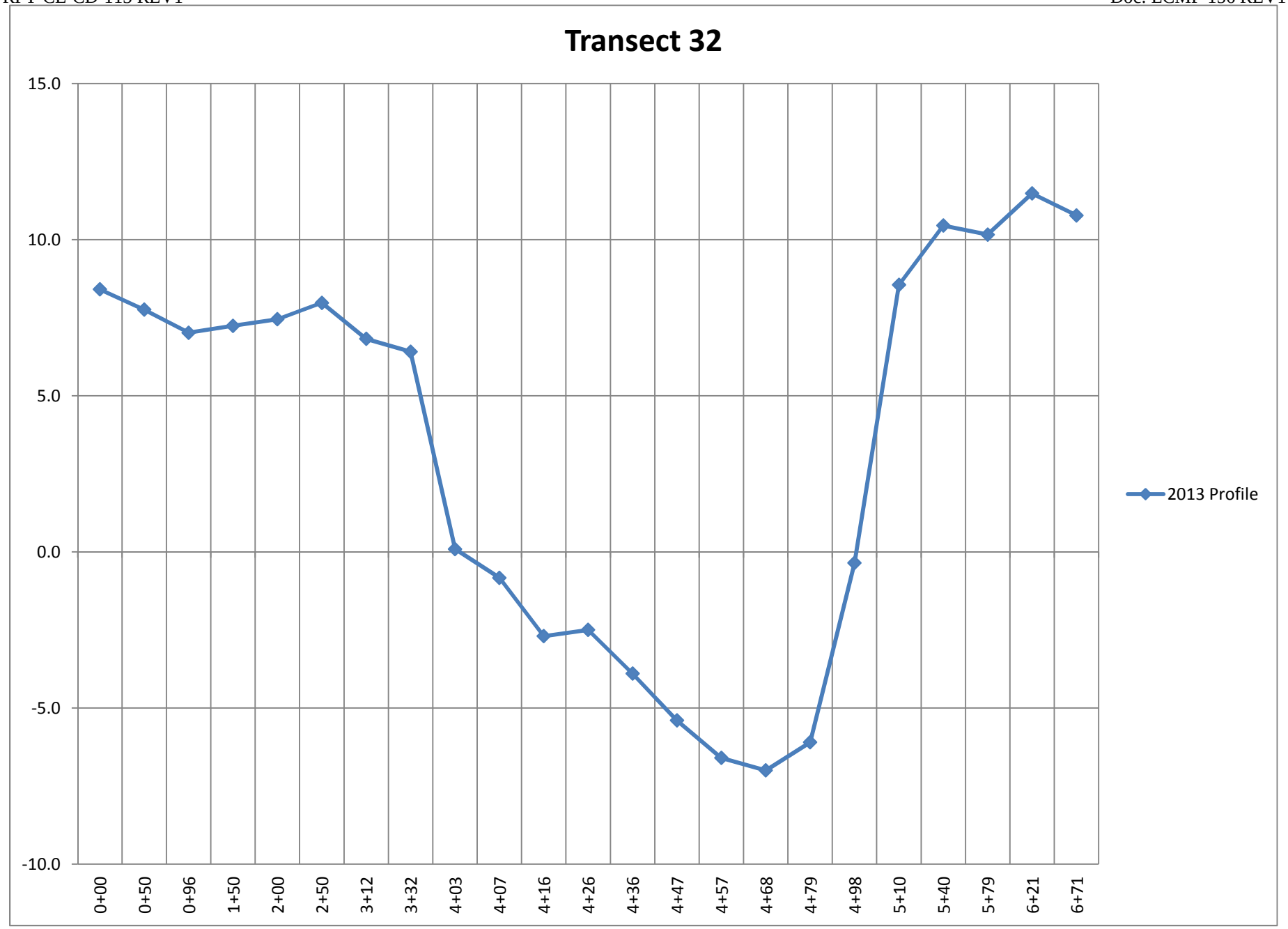
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	23.7												Ground Shot
0+69	21.7												Top of Bank
0+79	19.3												Grade Break
1+00	6.0												Toe of Bank
1+16	4.4												Top of Bank
1+17	3.3												Toe of Bank
1+52	0.2												Edge of Water
1+63	-2.9												River Bottom
1+75	-4.0												River Bottom
1+87	-5.9												River Bottom
1+99	-5.8												River Bottom
2+12	-6.4												River Bottom
2+26	-5.7												River Bottom
2+36	-5.3												River Bottom
2+48	-3.4												River Bottom
2+61	-2.7												River Bottom
2+73	-2.1												River Bottom
2+81	-2.8												River Bottom
3+06	-0.5												Edge of Water
3+84	4.3												Sand Bar
3+94	5.9												Grade Break
4+30	6.1												Edge of Vegetation
4+67	8.8												Grade Break
5+22	8.1												Grade Break
5+58	9.4												Grade Break/Edge of Veg
5+77	9.6												Ground Shot
6+27	10.1												Ground Shot


Transect 30
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
0+00
0+69
0+79
1+00
1+16
1+17
1+52
1+63
1+75
1+87
1+99
2+12
2+26
2+36
2+48
2+61
2+73
2+81
3+06
3+84
3+94
4+30
4+67
5+22
5+58
5+77
6+27
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.6												Ground Shot
0+50	9.6												Ground Shot
1+06	8.1												Edge of Vegetation
1+29	8.4												Top of Bank
1+40	5.7												Toe of Bank
1+85	5.7												Ground Shot
2+37	6.0												Ground Shot
2+89	6.9												Ground Shot
3+16	7.7												Ground Shot
3+70	8.0												Top of Bank
3+80	6.7												Grade Break/Edge of Veg
4+06	3.8												Sand Bar
4+43	1.4												Grade Break
4+62	-0.2												Edge of Water
4+71	-2.6												River Bottom
4+81	-2.8												River Bottom
4+92	-2.1												River Bottom
5+02	-2.1												River Bottom
5+10	-2.6												River Bottom
5+20	-2.3												River Bottom
5+29	-2.2												River Bottom
5+39	-2.1												River Bottom
5+50	-2.2												River Bottom
5+60	-2.1												River Bottom
5+70	-2.5												River Bottom
5+79	-2.2												River Bottom
6+03	0.0												Edge of Water
6+20	2.6												Toe of Bank
6+32	8.4												Top of Bank
6+83	9.2												Grade Break
7+31	10.9												Edge of Vegetation
7+54	11.2												Ground Shot
8+04	10.7												Ground Shot


Transect 31
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
0+00
0+50
1+06
1+29
1+40
1+85
2+37
2+89
3+16
3+70
3+80
4+06
4+43
4+62
4+71
4+81
4+92
5+02
5+10
5+20
5+29
5+39
5+50
5+60
5+70
5+79
6+03
6+20
6+32
6+83
7+31
7+54
8+04
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.4												Ground Shot
0+50	7.8												Ground Shot
0+96	7.0												Ground Shot
1+50	7.2												Ground Shot
2+00	7.4												Ground Shot
2+50	8.0												Ground Shot
3+12	6.8												Edge of Vegetation
3+32	6.4												Top of Bank
4+03	0.1												Edge of Water
4+07	-0.8												River Bottom
4+16	-2.7												River Bottom
4+26	-2.5												River Bottom
4+36	-3.9												River Bottom
4+47	-5.4												River Bottom
4+57	-6.6												River Bottom
4+68	-7.0												River Bottom
4+79	-6.1												River Bottom
4+98	-0.4												Edge of Water
5+10	8.5												Top of Bank
5+40	10.4												Ground Shot
5+79	10.2												Ground Shot
6+21	11.5												Ground Shot
6+71	10.8												Ground Shot


Transect 32
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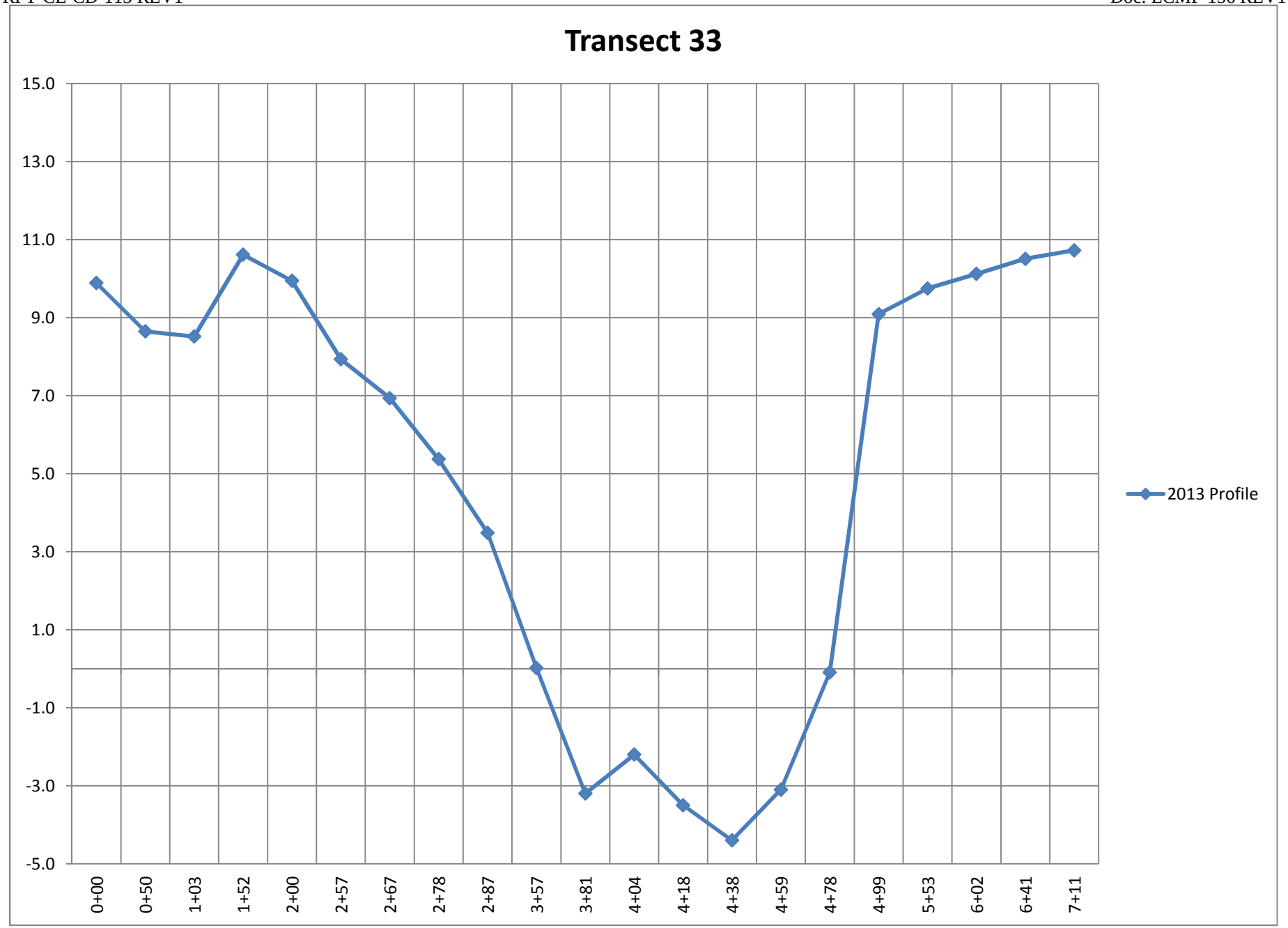
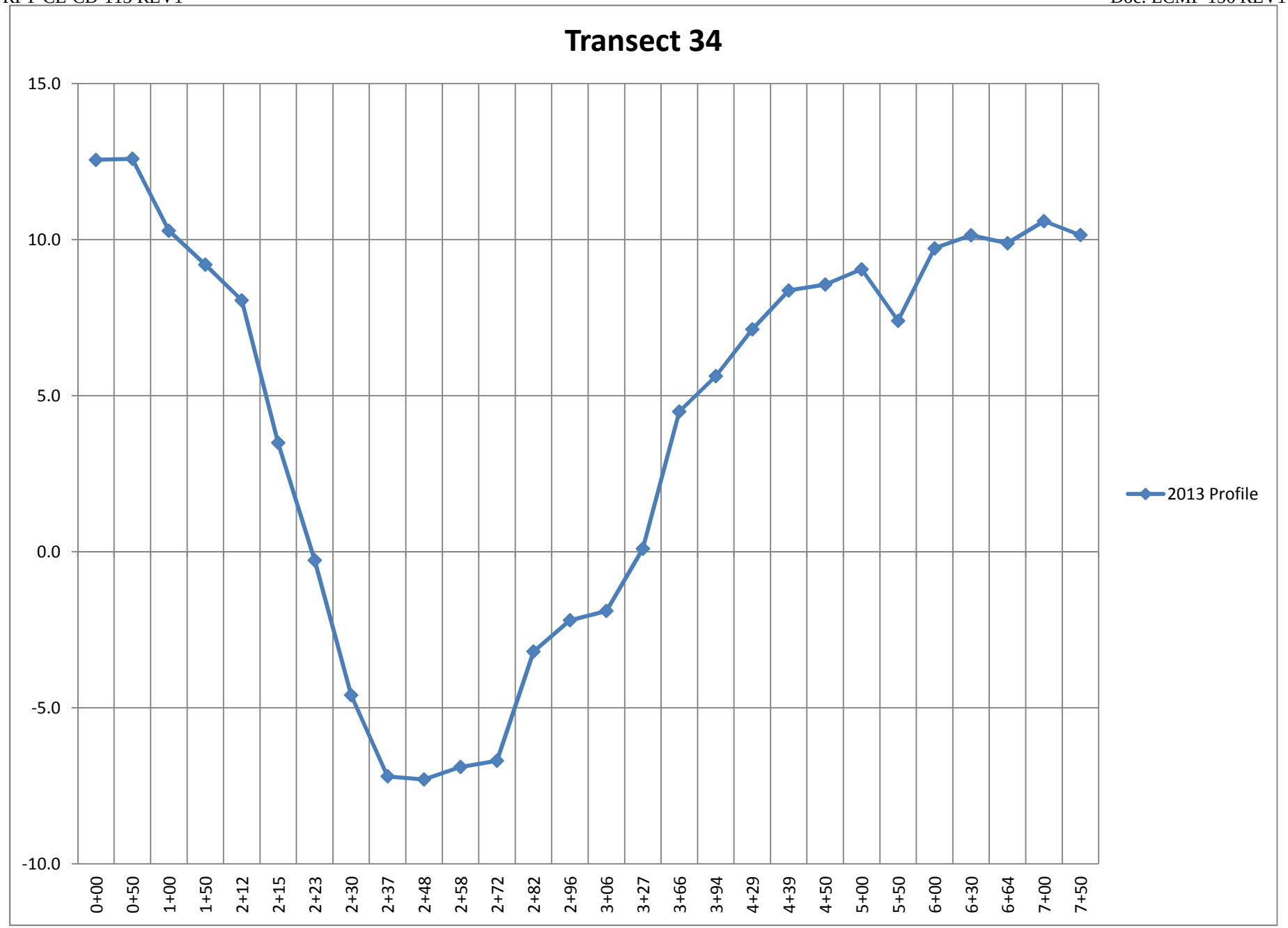
10.0
5.0
0.0
-5.0
-10.0
0+00
0+50
0+96
1+50
2+00
2+50
3+12
3+32
4+03
4+07
4+16
4+26
4+36
4+47
4+57
4+68
4+79
4+98
5+10
5+40
5+79
6+21
6+71
2013 Profile

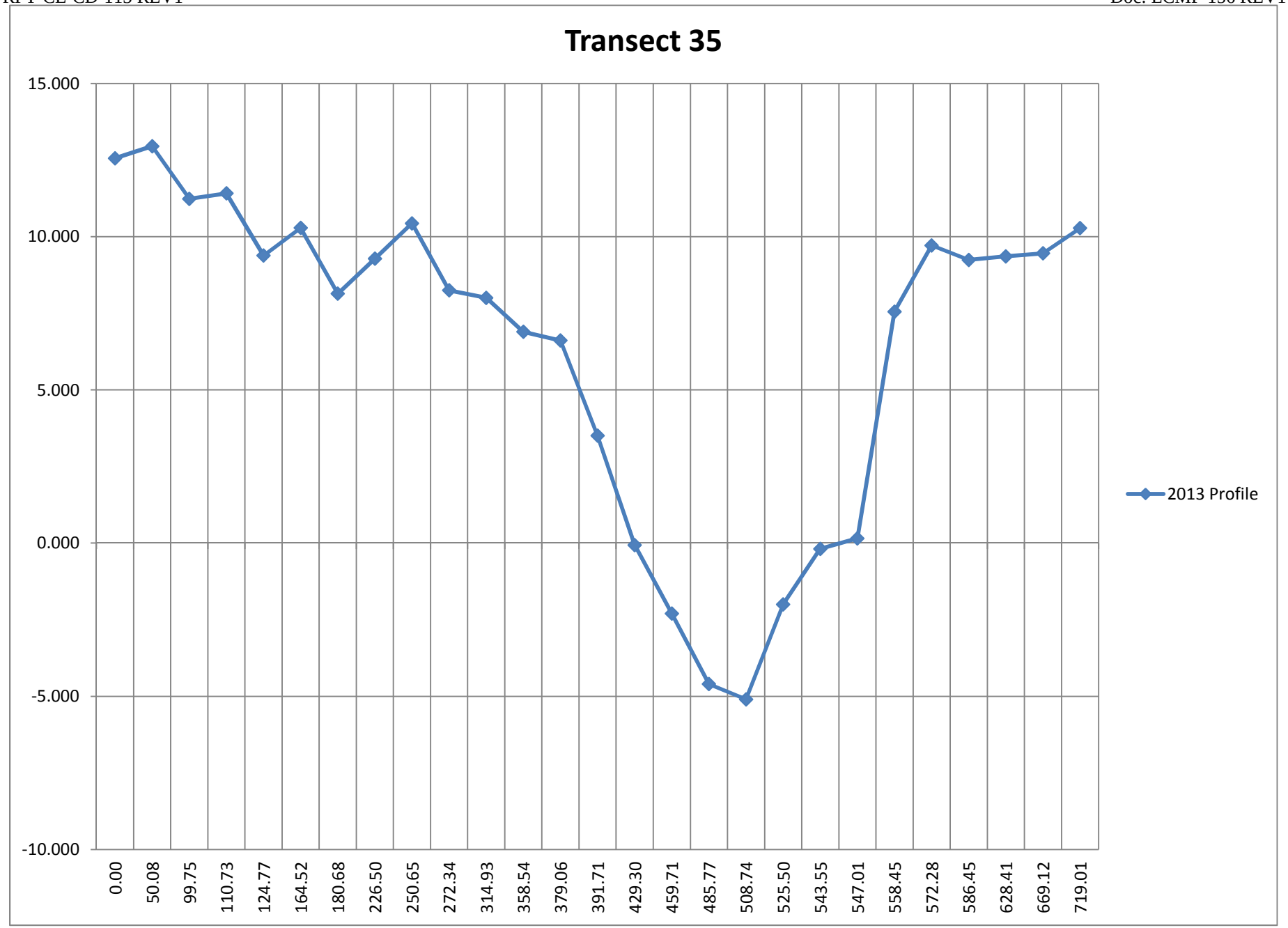
STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	9.9												Ground Shot
0+50	8.6												Ground Shot
1+03	8.5												Edge of Vegetation
1+52	10.6												Grade Break
2+00	9.9												Ground Shot
2+57	7.9												Top of Bank
2+67	6.9												Edge of Vegetation
2+78	5.4												Sand Bar
2+87	3.5												Grade Break
3+57	0.0												Edge of Water
3+81	-3.2												River Bottom
4+04	-2.2												River Bottom
4+18	-3.5												River Bottom
4+38	-4.4												River Bottom
4+59	-3.1												River Bottom
4+78	-0.1												Edge of Water
4+99	9.1												Top of Bank
5+53	9.7												Edge of Vegetation
6+02	10.1												Ground Shot
6+41	10.5												Ground Shot
7+11	10.7												Ground Shot


Transect 33
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
0+00
0+50
1+03
1+52
2+00
2+57
2+67
2+78
2+87
3+57
3+81
4+04
4+18
4+38
4+59
4+78
4+99
5+53
6+02
6+41
7+11
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	12.6												Ground Shot
0+50	12.6												Ground Shot
1+00	10.3												Ground Shot
1+50	9.2												Ground Shot
2+12	8.1												Top of Bank
2+15	3.5												Toe of Bank
2+23	-0.3												Edge of Water
2+30	-4.6												River Bottom
2+37	-7.2												River Bottom
2+48	-7.3												River Bottom
2+58	-6.9												River Bottom
2+72	-6.7												River Bottom
2+82	-3.2												River Bottom
2+96	-2.2												River Bottom
3+06	-1.9												River Bottom
3+27	0.1												Edge of Water
3+66	4.5												Grade Break
3+94	5.6												Sand Bar
4+29	7.1												Edge of Vegetation
4+39	8.4												Top of Bank
4+50	8.6												Ground Shot
5+00	9.0												Ground Shot
5+50	7.4												Ground Shot
6+00	9.7												Ground Shot
6+30	10.1												Edge of Vegetation
6+64	9.9												Ground Shot
7+00	10.6												Ground Shot
7+50	10.1												Ground Shot


Transect 34
15.0
10.0
5.0
0.0
-5.0
-10.0
0+00
0+50
1+00
1+50
2+12
2+15
2+23
2+30
2+37
2+48
2+58
2+72
2+82
2+96
3+06
3+27
3+66
3+94
4+29
4+39
4+50
5+00
5+50
6+00
6+30
6+64
7+00
7+50
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0.00	12.558												Ground Shot
50.08	12.952												Ground Shot
99.75	11.233												Ground Shot
110.73	11.411												Grade Break
124.77	9.384												Grade Break
164.52	10.284												Grade Break
180.68	8.140												Grade Break
226.50	9.279												Grade Break
250.65	10.434												Grade Break
272.34	8.248												Grade Break
314.93	8.003												Grade Break
358.54	6.895												Edge of Vegetation
379.06	6.609												Top of Bank
391.71	3.505												Sand Bar
429.30	-0.066												Edge of Water
459.71	-2.300												River Bottom
485.77	-4.600												River Bottom
508.74	-5.100												River Bottom
525.50	-2.000												River Bottom
543.55	-0.188												Edge of Water
547.01	0.152												Toe of Bank
558.45	7.551												Top of Bank
572.28	9.715												Grade Break
586.45	9.239												Edge of Vegetation
628.41	9.358												Ground Shot
669.12	9.455												Ground Shot
719.01	10.276												Ground Shot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0.000
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-10.000
0.00
50.08
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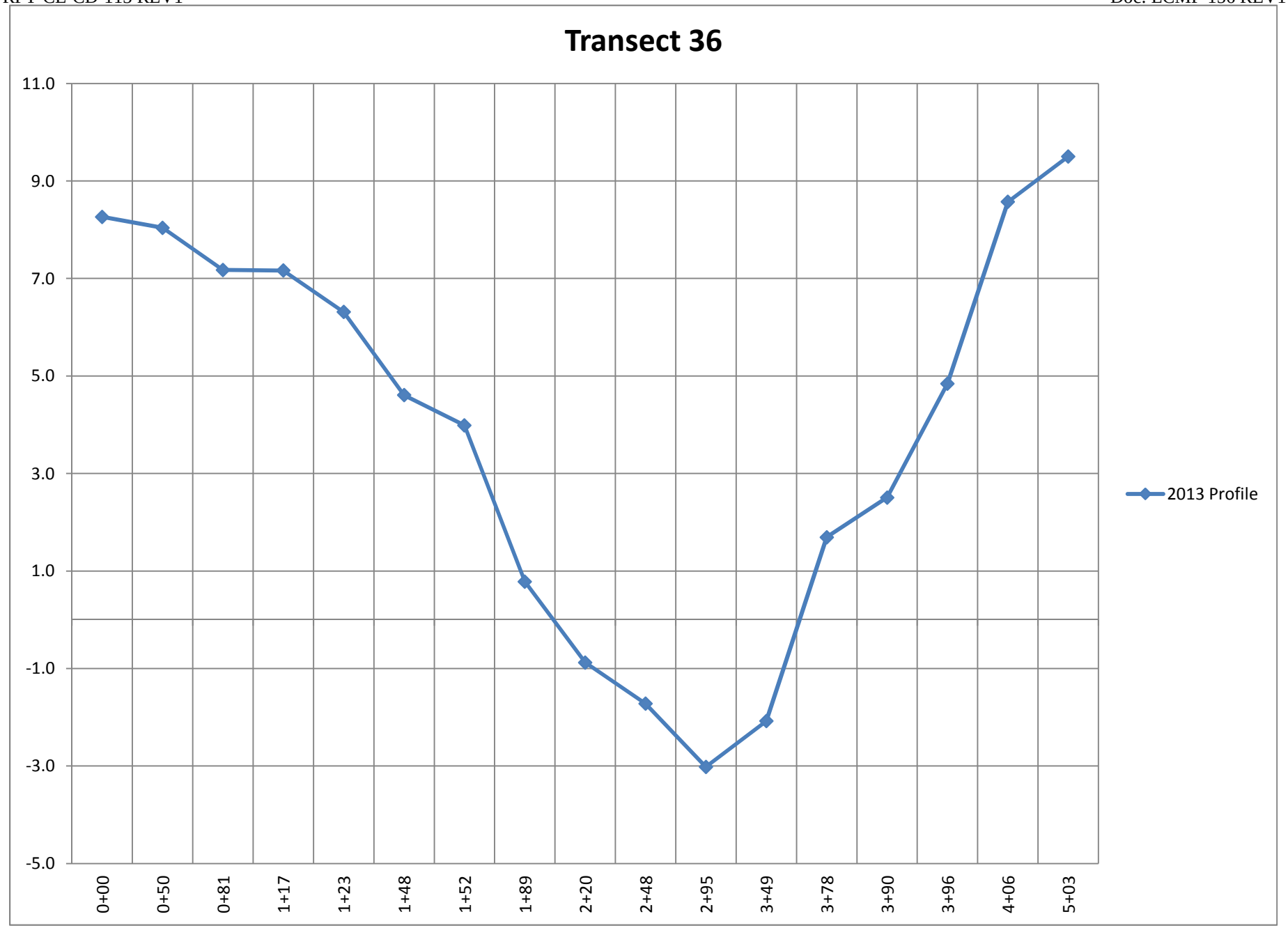
124.77
164.52
180.68
226.50
250.65
272.34
314.93
358.54
379.06
391.71
429.30
459.71
485.77
508.74
525.50
543.55
547.01
558.45
572.28
586.45
628.41
669.12
719.01
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.3												Ground Shot
0+50	8.0												Ground Shot
0+81	7.2												Ground Shot
1+17	7.2												Top of Bank
1+23	6.3												Edge of Vegetation
1+48	4.6												Edge of Water
1+52	4.0												River Bottom
1+89	0.8												River Bottom
2+20	-0.9												River Bottom
2+48	-1.7												River Bottom
2+95	-3.0												River Bottom
3+49	-2.1												River Bottom
3+78	1.7												River Bottom
3+90	2.5												River Bottom
3+96	4.8												Edge of Water
4+06	8.6												Top of Bank
5+03	9.5												Ground Shot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5.0
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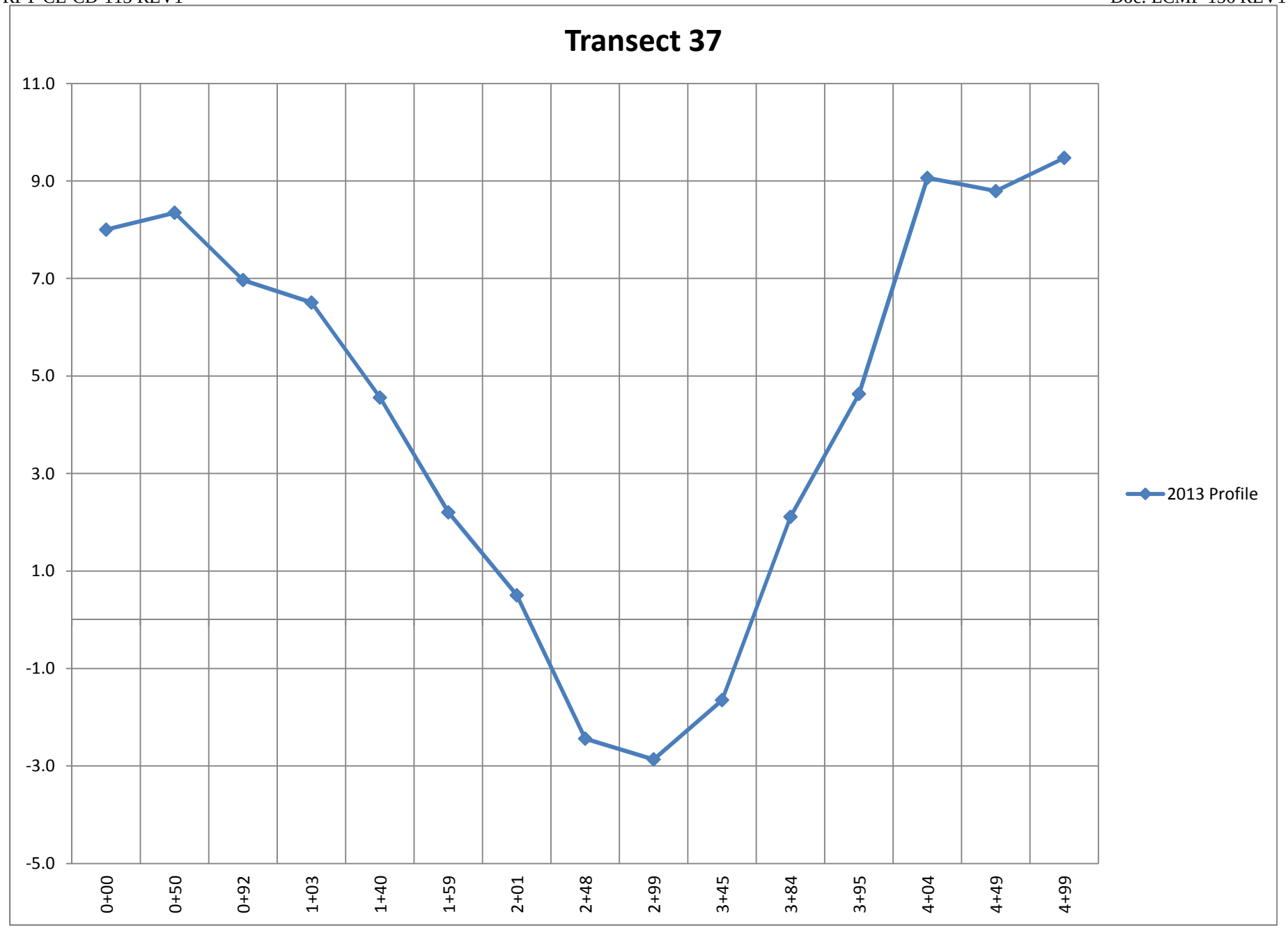
-5.0
0+00
0+50
0+81
1+17
1+23
1+48
1+52
1+89
2+20
2+48
2+95
3+49
3+78
3+90
3+96
4+06
5+03
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.0												Ground Shot
0+50	8.3												Ground Shot
0+92	7.0												Top of Bank
1+03	6.5												Edge of Vegetation
1+40	4.6												Edge of Water
1+59	2.2												River Bottom
2+01	0.5												River Bottom
2+48	-2.4												River Bottom
2+99	-2.9												River Bottom
3+45	-1.6												River Bottom
3+84	2.1												River Bottom
3+95	4.6												Edge of Water
4+04	9.1												Top of Bank
4+49	8.8												Ground Shot
4+99	9.5												Ground Shot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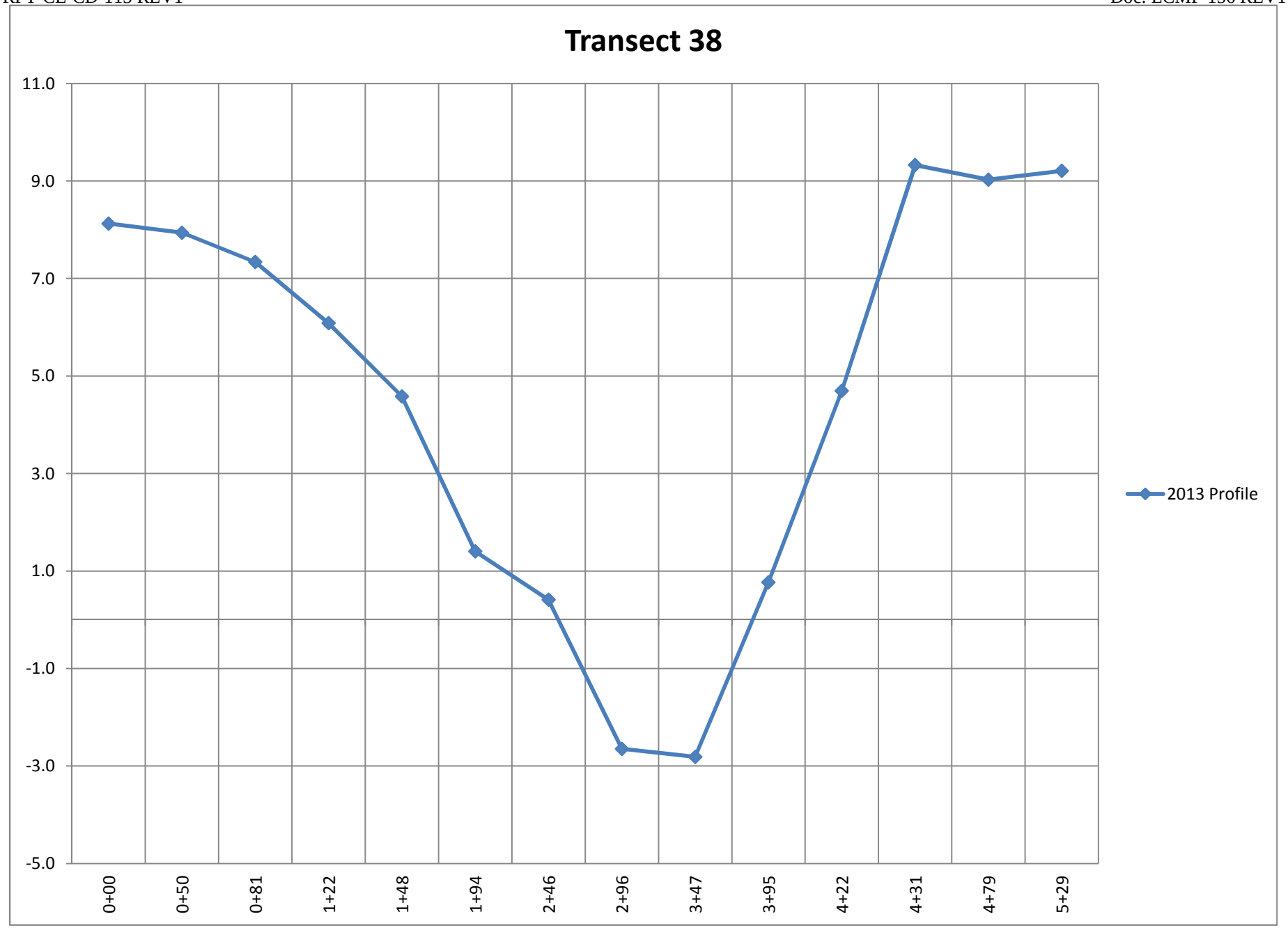
-5.0
0+00
0+50
0+92
1+03
1+40
1+59
2+01
2+48
2+99
3+45
3+84
3+95
4+04
4+49
4+99
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.1												Ground Shot
0+50	7.9												Ground Shot
0+81	7.3												Top of Bank
1+22	6.1												Edge of Vegetation
1+48	4.6												Edge of Water
1+94	1.4												River Bottom
2+46	0.4												River Bottom
2+96	-2.6												River Bottom
3+47	-2.8												River Bottom
3+95	0.8												River Bottom
4+22	4.7												Edge of Water
4+31	9.3												Top of Bank
4+79	9.0												Ground Shot
5+29	9.2												Ground Shot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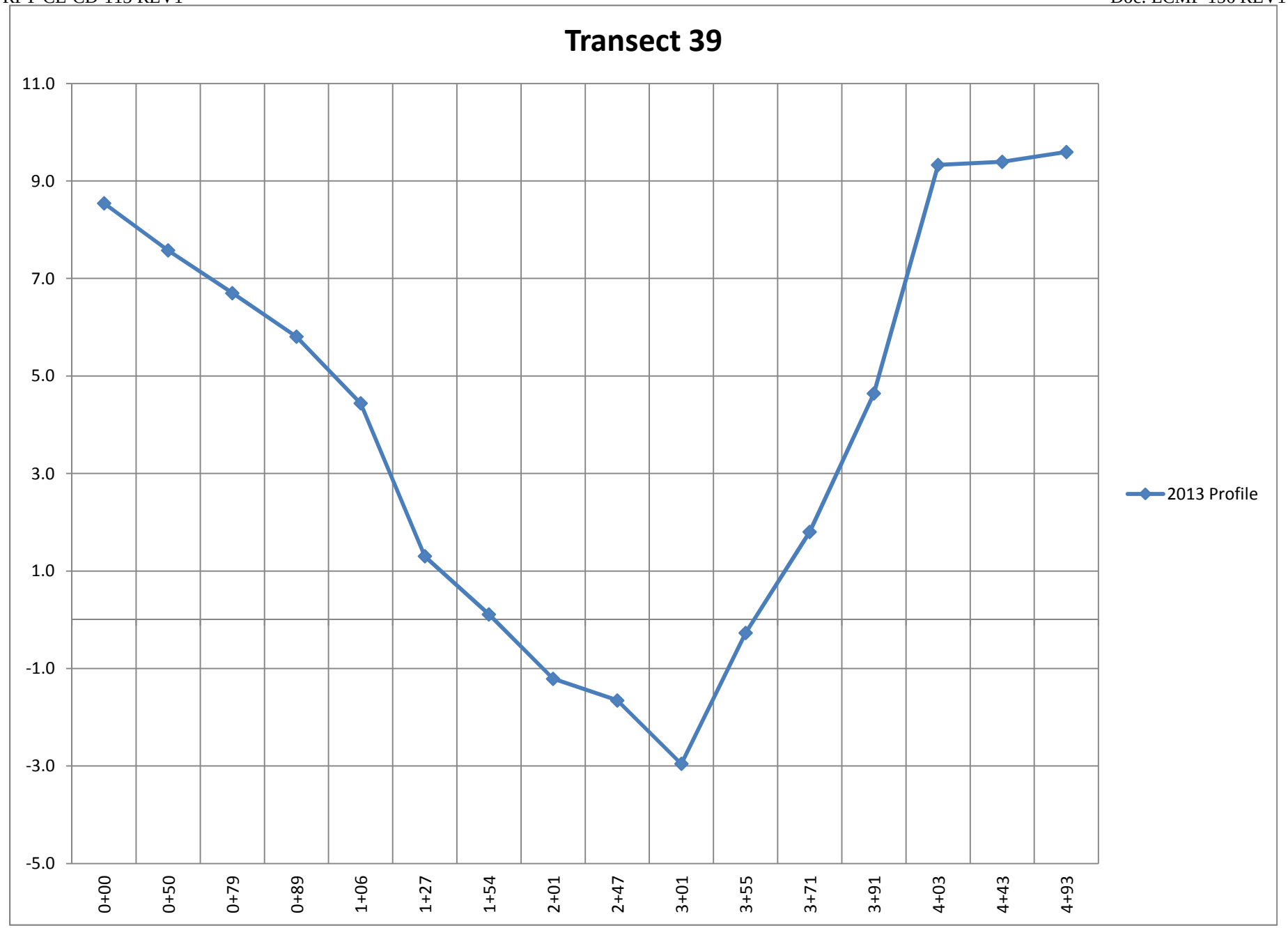
3.0
1.0
-1.0
-3.0
-5.0
0+00
0+50
0+81
1+22
1+48
1+94
2+46
2+96
3+47
3+95
4+22
4+31
4+79
5+29
2013 Profile

STA	2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Description
0+00	8.5												Ground Shot
0+50	7.6												Ground Shot
0+79	6.7												Top of Bank
0+89	5.8												Edge of Vegetation
1+06	4.4												Edge of Water
1+27	1.3												River Bottom
1+54	0.1												River Bottom
2+01	-1.2												River Bottom
2+47	-1.7												River Bottom
3+01	-3.0												River Bottom
3+55	-0.3												River Bottom
3+71	1.8												River Bottom
3+91	4.6												Edge of Water
4+03	9.3												Top of Bank
4+43	9.4												Ground Shot
4+93	9.6												Ground Shot


Transect 39
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5.0
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1.0
-1.0
-3.0
-5.0
0+00
0+50
0+79
0+89
1+06
1+27
1+54
2+01
2+47
3+01
3+55
3+71
3+91
4+03
4+43
4+93
2013 Profile

Attachment B ***Daily Field Reports***

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08-21-2013 Daily Field Summary

Project Name(s)	2013 ASDP Water Quality Monitoring/CD5 Bank Erosion Survey	**Date**	**2013-08-21**
Project Number(s)	**136068/135141**	**Document No.**	
Submitted by	Garrett Yager		
Field Personnel	Garrett Yager, Sarah Case		
Subcontractor	Bristow, LCMF		
Afternoon Check-In	1400	**Contact Person**	Helicopter Coordinator
Evening Check-In	1930	**Contact Person**	Karen Brown

Wind	**Temperature**	**Sky**
Calm	40°F	Partly Cloudy

Health & Safety

A Baker Tailgate and Task Hazard Assessment meeting was conducted at 0700 hours. A Helicopter Toolbox meeting was conducted at 1300 hours.

Summary of Events

Garrett Yager and Sarah Case demobilized the ASDP Water Quality Monitoring project. Ms. Case departed Alpine for Anchorage at 1600 hours. Mr. Yager departed CD2 via helicopter at 1400 hours for a rendezvous with LCMF at the Nigliagvik CD5 crossing. A detailed bank delineation survey of the CD5 crossing was completed at the upstream, downstream, east bank, and west bank locations. Mr. Yager traveled back by boat to CD4 with LCMF.

Challenges

None

Comments

Water samples are being stored in the refrigerator space at the waste water treatment plant.

Planned for Next Field Day

Mr. Yager will remain at Alpine to work on CD5 erosion monitoring tasks on the Nigliq Channel before departing for Anchorage.

Daily Photo (s)

Photo 1: Whisker placed at the edge of the west bank on the Nigliagvik; August 21, 2013

Photo 2: Surveying the edge of the west bank of the Nigliagvik with Real Time Kinematic GPS; August 21, 2013

08-22-2013 Daily Field Summary

Project Name(s)	2013 ASDP Water Quality Monitoring/CD5 Bank Erosion Survey	**Date**	**2013-08-22**
Project Number(s)	**136068/135141**	**Document No.**	
Submitted by	Garrett Yager		
Field Personnel	Garrett Yager		
Subcontractor	LCMF		
Afternoon Check-In	1100	**Contact Person**	Alpine Security
Evening Check-In	1600	**Contact Person**	Alpine Security

Wind	**Temperature**	**Sky**
7 mph, WNW	35°F	Overcast

Health & Safety

Safety meeting 0600 hours: LCMF Safety Meeting and Float Plan.

Summary of Events

ASDP water samples were packaged and checked-in as baggage for Mr. Yager's return flight to Anchorage. At 1100 hours, Mr. Yager accompanied LCMF to the Nigliq Channel CD5 crossing via boat. The detailed bank delineation survey was completed at the Nigliq Channel crossing. The west bank of the Nigliq Channel upstream and downstream of the proposed CD5 crossing was surveyed. The east bank of the Nigliq Channel downstream of the proposed CD5 crossing was surveyed. The east bank survey was limited to the downstream section because of restricted access upstream of the proposed CD5 crossing.

Challenges

Water samples were scrutinized by the Transportation Security Administration and Shared Services because of unknown quantities of the acid preservative in the sample bottles. The samples were eventually cleared for the flight back to Anchorage.

Comments

None

Planned for Next Field Day

Drop ASDP water samples off at SGS laboratory.

Daily Photo (s)

Photo 1: Surveying the edge of the west bank of the Nigliq Channel with Real Time Kinematic GPS; August 22, 2013

Photo 2: The east bank of the Nigliq Channel downstream of the proposed CD5 crossing; August 22, 2013

Attachment C ***Nigliq Channel Bank Surveys***

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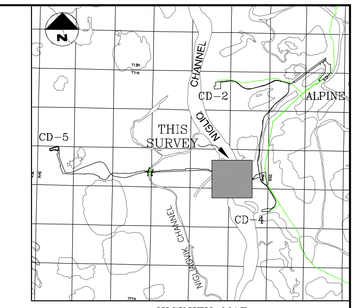
JOB NO:	SUB JOB NO:	DRAWING NO:
02-204	–	CE-AP00-1126



VICINITY MAP

NOTES:

1. DATE OF SURVEY: AUG. 22, 2013.
2. REFERENCE FIELD BOOK: LCMF 2013-19, PG. 24.
3. TOP OF BANK DEFINED BY: MICHAEL BAKER JR.
4. SEE DOCUMENT RPT-CE-CD-112 FOR BANK EROSION BASELINE SURVEY DATA.

LEGEND:

◑ 5/8" REBAR SET WTH 2"ALUMINUM CAP

TOP OF BANK 8/21/2013

KUUKPIK LCMF LLC
Alpine Survey Office

ConocoPhillips Alaska, Inc.

ALPINE | MODULE: AP | UNIT: AP00

CD-5 MONITORING
TOP OF BANK SURVEY
NIGLIQ CHANNEL

REDRAWN FROM:

CONSTRUCTION SHEET OF

1 2 3 4 5 6

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

FORM: DSIZE

REFERENCE DWG NO/SHT NO:

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
1	8/29/13	ISSUED PER K130003ACS	AG	GD			

DATE: 8/29/13	DRAWN: AG	DESIGN: –	ECM NO: K130003ACS
	CHECKED: GD		CC NO: K130003ACS
SCALE: 1" = 80'	APPROVAL: –		CADD FILE NO. 13-08-07-1 8/29/13
JOB NO: 02-204	SUB JOB NO: –	DRAWING NO: CE-AP00-1126	PART: 2 OF 2 / REV: 1

Alpine AP00
East Bank Nigliq
Streambank Monitor

Baseline	East Bank Monitor - Top of Bank Locations											Description
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/22/2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
0+00	169.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
1+00	174.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
2+00	178.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
3+00	191.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
4+00	188.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
5+00	196.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
6+00	201.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
East Bank Nigliq
Streambank Monitor

Baseline	East Bank Monitor - Top of Bank Locations											Description
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/22/2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
7+00	208.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
8+00	199.8											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
9+00	406.2											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
10+00	280.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
11+00	192.2											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
12+00	100.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
13+00	192.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
East Bank Nigliq
Streambank Monitor

Baseline	**East Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/22/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
14+00	210.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
15+00	192.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
15+56	195.4											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

*****Note:** Survey completed on 8/22/13 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine AP00
West Bank Nigliq
Streambank Monitor

Baseline	**West Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
0+00	180.2											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
1+00	191.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
2+00	193.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
3+00	189.2											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
4+00	192.2											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
5+00	202.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
6+00	224.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
West Bank Nigliq
Streambank Monitor

Baseline	**West Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
7+00	228.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
8+00	232.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
9+00	220.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
10+00	216.8											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
11+00	209.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
12+00	199.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
13+00	192.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
West Bank Nigliq
Streambank Monitor

Baseline	**West Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
14+00	200.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
15+00	190.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
16+00	211.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
17+00	204.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
18+00	212.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
19+00	221.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
20+00	232.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
West Bank Nigliq
Streambank Monitor

Baseline	West Bank Monitor - Top of Bank Locations											Description
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
21+00	233.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
22+00	237.8											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
23+00	237.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
24+00	229.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
25+00	214.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
25+11	213.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

*****Note:** Survey completed on 8/22/13 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Attachment D ***Nigliagvik Bank Surveys***

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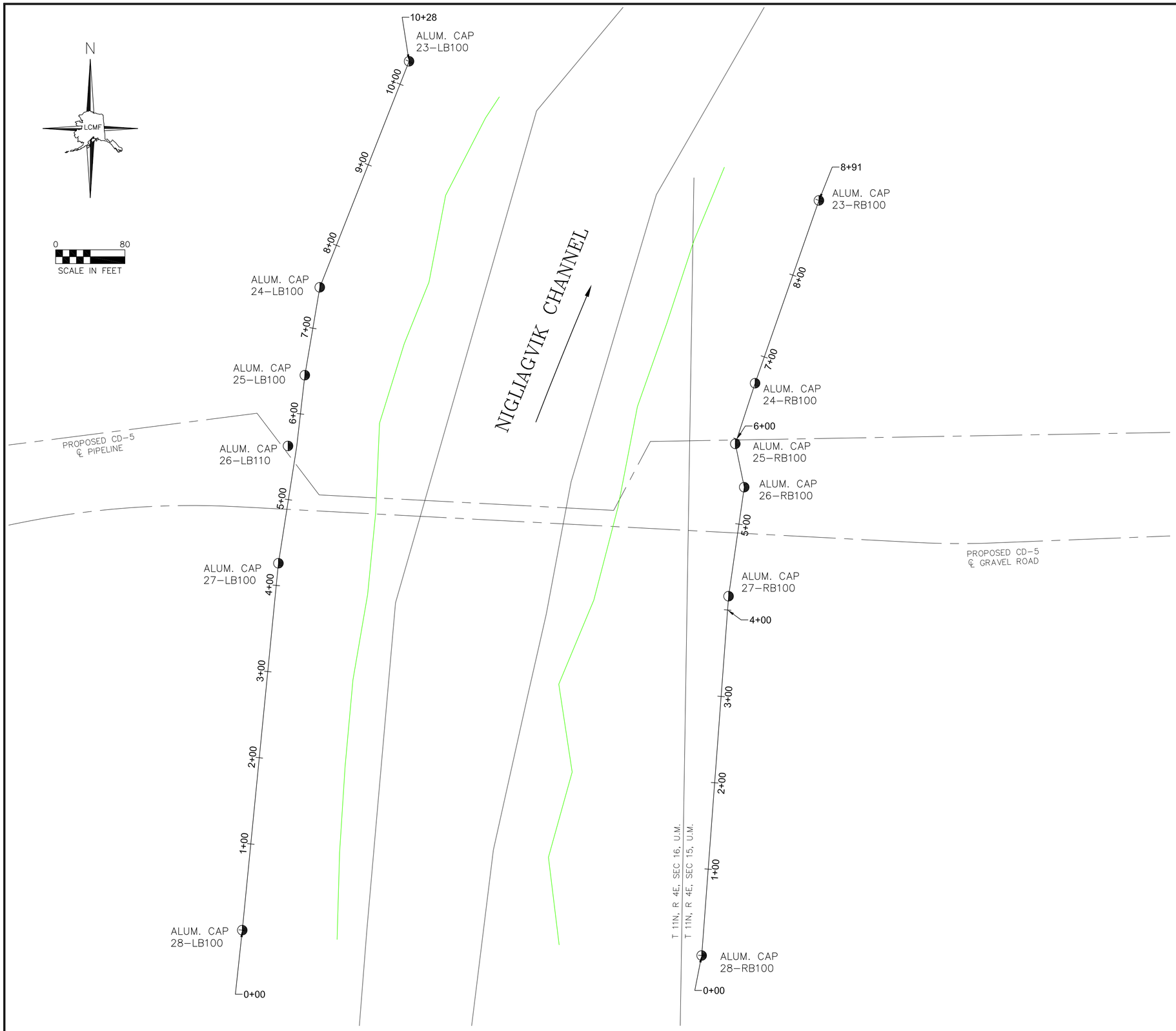

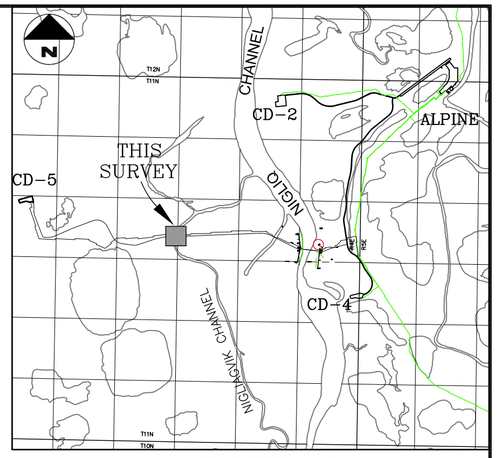

VICINITY MAP

NOTES:

1. DATE OF SURVEY: AUG. 21, 2013.
2. REFERENCE FIELD BOOK: LCMF 2013-19, PG. 22-23.
3. TOP OF BANK DEFINED BY: MICHAEL BAKER JR.
4. SEE DOCUMENT RPT-CE-CD-111 FOR BANK EROSION BASELINE SURVEY DATA.

LEGEND:

◑ 5/8" REBAR SET WTH 2"ALUMINUM CAP

TOP OF BANK 8/21/2013

KUUKPIK LCMF LLC
Alpine Survey Office

FORM: CSIZE

REFERENCE DWG NO:	REV	DATE	REVISION	BY	CHK	JOB	PROJ
	1	8/29/13	ISSUED PER K130003ACS	AG	GD		

DRAWN: AG	DESIGN: –	ECM NO: K130003ACS	
CHECKED: GD	APPROVAL: –	CC NO: K130003ACS	
SCALE: 1" = 80'	DATE: 8/29/13	CADD FILENAME: 13-08-07-1 8/29/2013	

ConocoPhillips Alaska, Inc.

ALPINE — MODULE: AP — UNIT: AP00

CD-5 MONITORING
TOP OF BANK SURVEY
NIGLIAGVIK CHANNEL

JOB NO:	SUB JOB NO:	DRAWING NO:	PART:	REV:
02-204	02-204	CE-AP00-1126	1 OF 2	1

Alpine AP00
East Bank Nigliagvik
Streambank Monitor

Baseline	East Bank Monitor - Top of Bank Locations											Description
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	Future	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
0+00	165.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
1+00	185.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
2+00	165.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
3+00	188.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
4+00	154.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
5+00	141.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
6+00	120.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
East Bank Nigliagvik
Streambank Monitor

Baseline	**East Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
7+00	119.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
8+00	120.9											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
8+91	115.7											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

*****Note:** Survey completed on 8/21/13 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine AP00
West Bank Nigliagvik
Streambank Monitor

Baseline	**West Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
0+00	110.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
1+00	103.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
2+00	99.6											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
3+00	98.8											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
4+00	106.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
5+00	102.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
6+00	92.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

Alpine AP00
West Bank Nigliagvik
Streambank Monitor

Baseline	**West Bank Monitor - Top of Bank Locations**											**Description**
Station	See Drawing CE-AP00-1126 Rev 1 for Survey Baseline Location											
	8/21/2013	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
7+00	107.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
8+00	115.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
9+00	96.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
10+00	106.1											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change
10+28	112.0											Baseline Offset (In Feet)
												Incremental Change
												Cumulative Change

*****Note:** Survey completed on 8/21/13 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.