

APPENDIX D – AUGUST 2015 MONITORING UPDATE

Ward, Cam

From: Neirinck, Brad
Sent: Friday, September 18, 2015 10:02 PM
To: Ward, Cam
Cc: Burmey, Darren
Subject: FW: Lyndale Drive Riverbank Stabilization - Post-Construction Monitoring Results
Attachments: PLOTS 2015-08-18 Lyndale Drive - Time Plots.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 1B Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 2B Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 3 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 4 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 5 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 6 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 7 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 8 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf; FIG 2015-07-22 Lyndale Drive SI Monitoring SI 9 Surveys 1 to 10 0_A_RJvR 0015-008-00.pdf

Here is another update on the Lyndale Monitoring.

Brad Neirinck, P. Eng.

Bridge Planning & Operations Engineer

The City of Winnipeg, Public Works Department
Engineering Division, BridgeOperations Branch
106-1155 Pacific Avenue, Winnipeg, Manitoba R3E 3P1

Ph: (204)986-7950 Fax: (204)986-5302 E: BNeirinck@winnipeg.ca

This communication is intended only for the person to whom it is addressed, and may contain information that is confidential. Any other use, distribution, copying or disclosure is strictly prohibited. If you have received this communication in error, please notify the sender immediately by phone (204.986.7950) or reply to the message and then delete and destroy any copies of it.

From: Michael Van Helden [mailto:mvanhelden@trekgeotechnical.ca]
Sent: Tuesday, August 18, 2015 9:47 AM
To: Thiessen, Kendall
Cc: Neirinck, Brad; Ken Skafffeld
Subject: RE: Lyndale Drive Riverbank Stabilization - Post-Construction Monitoring Results

Kendall,

Find attached monitoring results for Lyndale Drive up to mid-July:

- Time plots including piezometer and rivel level monitoring, as well as SI rate plots
- Complete results for each SI

A brief summary of the results is provided below. Please give me a call if you have any questions.

Regards,

Mike

SI-1B (upslope of wall in failed section) has stopped fully over the last monitoring period. SI-2B (upslope of rock columns) has significantly slowed is nearly stopped. In the upper bank, the piezometric levels in the till appear to have risen steadily since rock column construction stabilizing at levels of about 224 to 224.5 m, or within 0.5m of the SRL or about 1.2 m of WRL.

At the first section upstream, SI-3 (downslope of the wall) has seen gradual incremental movement at about Elev. 218.5m and does not appear sensitive to river levels. SI-4 while SI-4 (lower toe) has slowed over the last monitoring period likely due to elevated river levels, but exhibits incremental displacements also at about Elev. 218.5 m. Over the last 20 months, a total of about 20 to 25 mm of movement has been observed in SI-4.

At the central section upstream, SI-7 (lower toe) showed movements of about 12 mm from Fall to Spring, then no movement since March; incremental displacement in this SI is relatively shallow at Elev. 220 m. Farther upslope SI-6 (downslope of wall) showed gradual movements from March 2014 to March 2015 of about 30 mm although a majority of this movement is within the upper 2-3 m of the SI. It is possible that this SI is situated near the head scarp of a mid-bank slip surface that exits just beyond SI-7 in the lower toe. Additional incremental displacements of about 2 mm have been observed at about Elev. 218.5 m which may indicate relaxation of the bank and retaining wall due to the downslope movements, but is relatively small in magnitude so we do not believe the potential for a failure such as that observed in 2013 is likely. The results at SI-5 (upslope of the wall) support his conclusion with only about 8 mm of movement at ground surface since installation; the movement is a gradual tilting with no well-defined incremental displacement zone. Piezometric levels in the upper bank (VW5A/5B) appear to generally respond to river level fluctuations, however remain above the WRL by about 1.5 m in the till and by about 3 m in the clay. During the summer, the till generally follows the river level while the clay remains high at about 2 m above river level. In the lower bank (VW7A/7B) the till closely matches the river level during both winter and summer months, while the clay tends to be about 1.5 m above the WRL or just above SRL (excluding flood events).

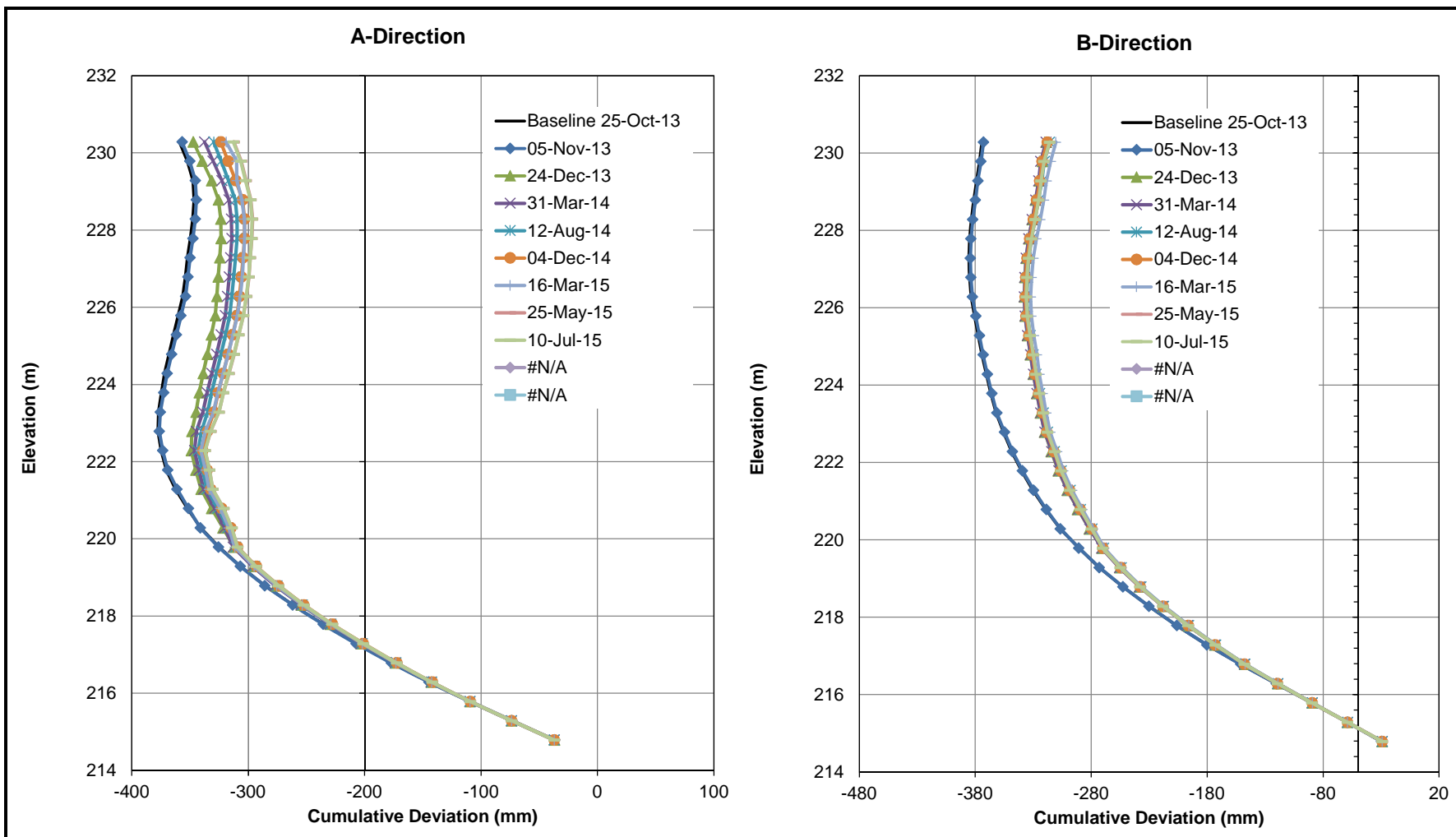
At the last upstream section, SI-9 (lower bank) exhibits an unusual shape which may be attributed to sliding of surface riprap or creep at shallow depths; increased movement has been observed over the last monitoring event. At SI8 (downslope of wall) small incremental movement has been observed at about Elev. 218.5 m, although no additional movement has been observed in recent monitoring periods.



SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-1B

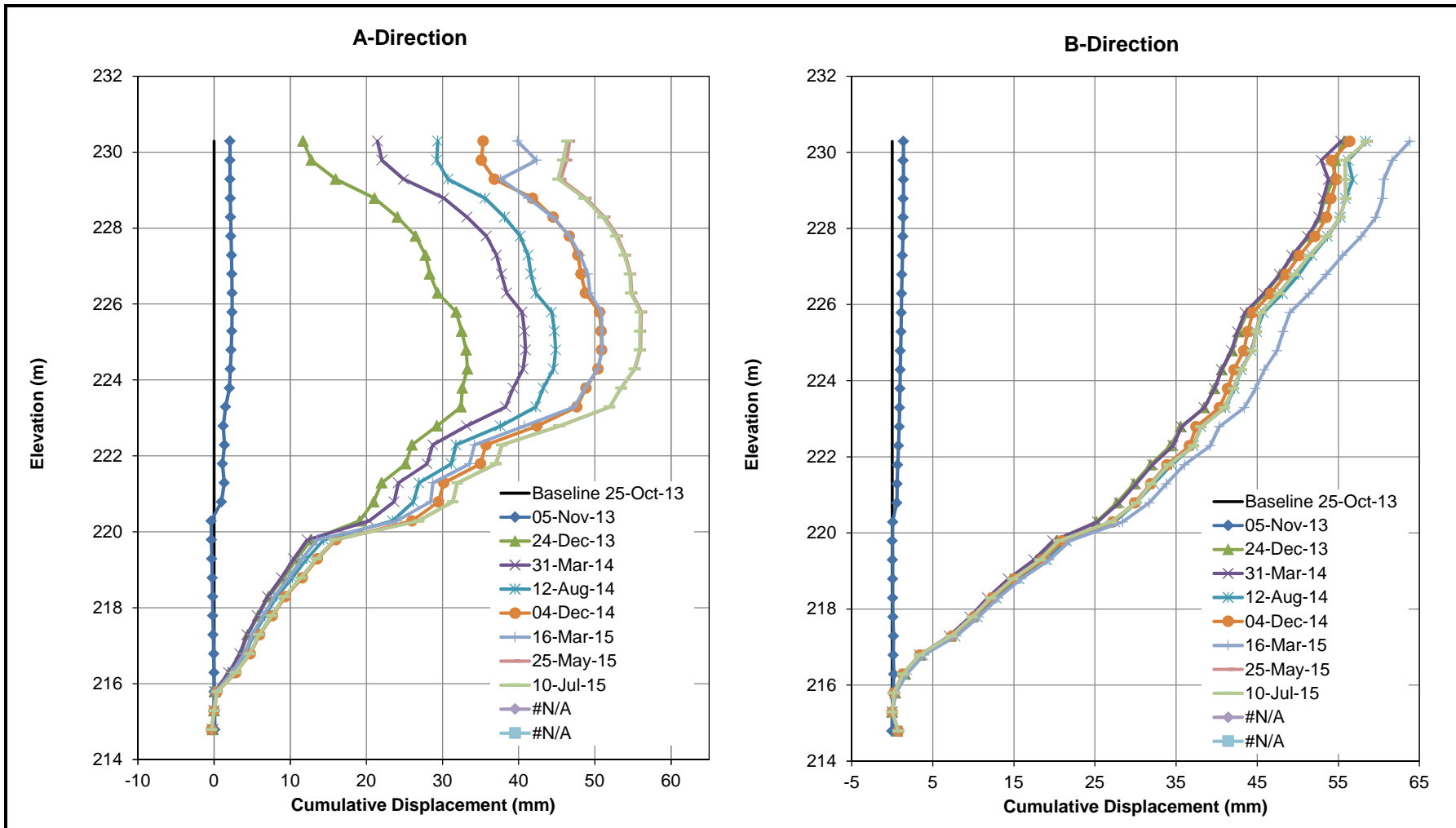




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-1B

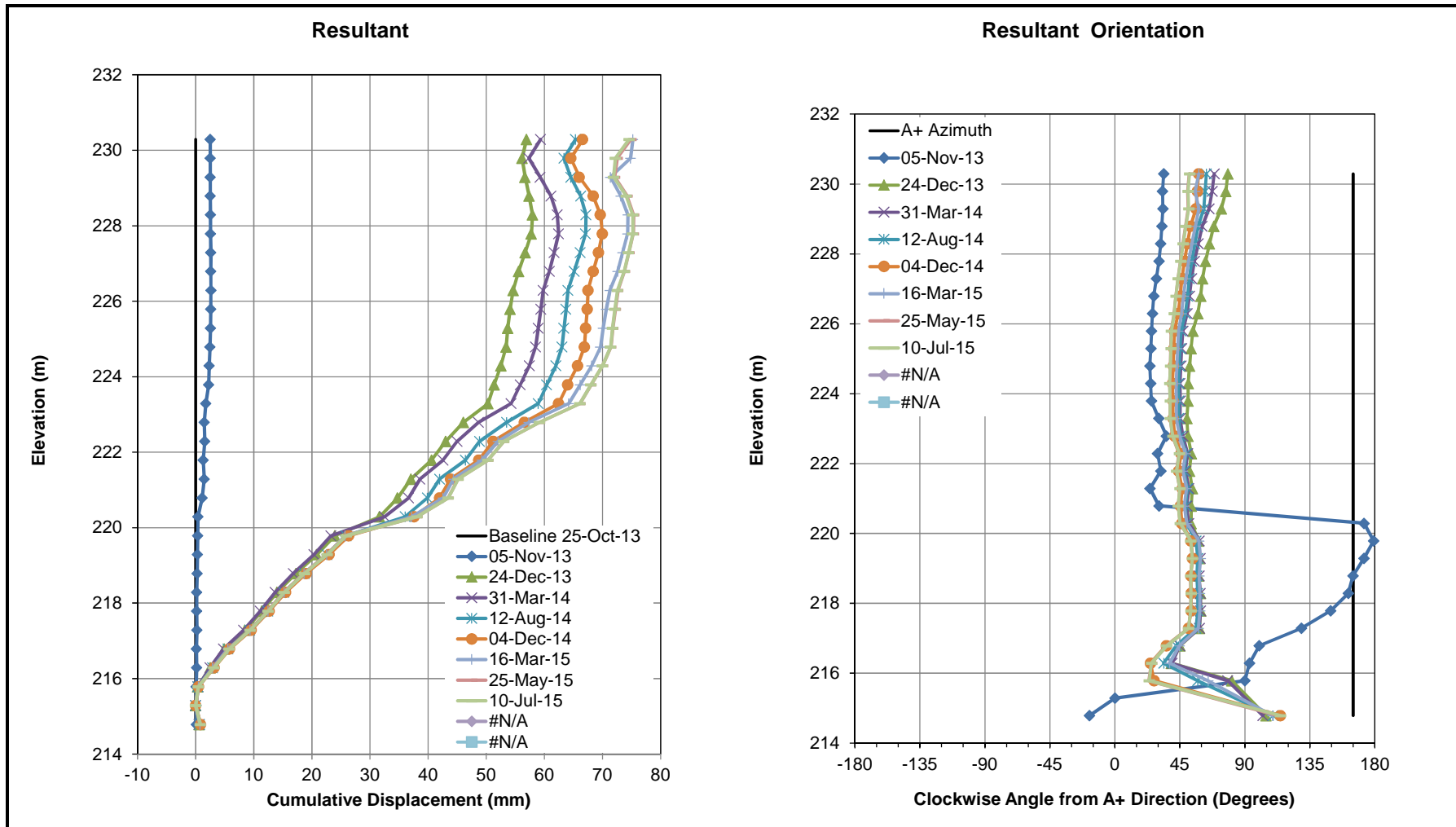




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-1B



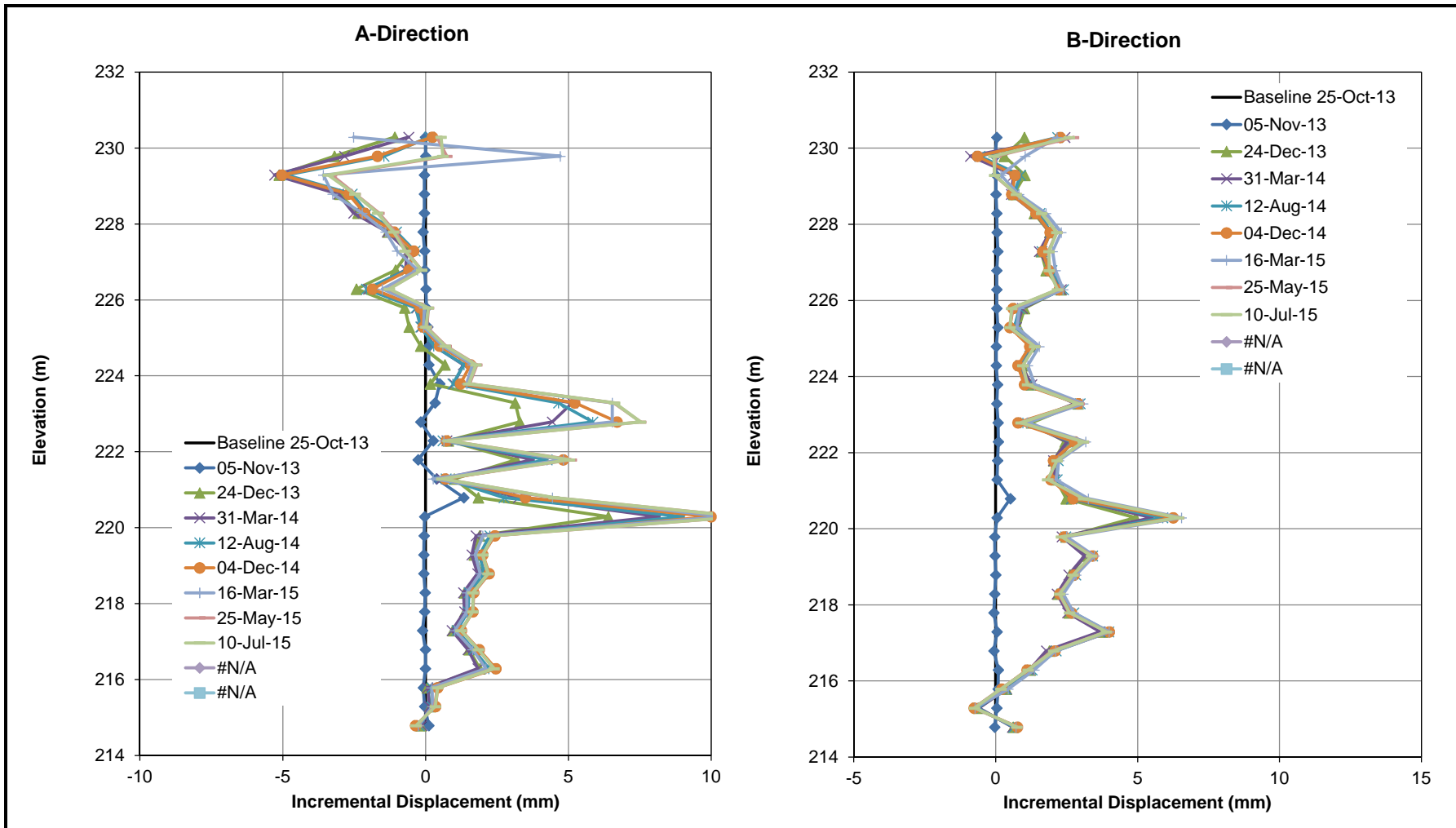


SLOPE INCLINOMETER WORKSHEET

Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-1B

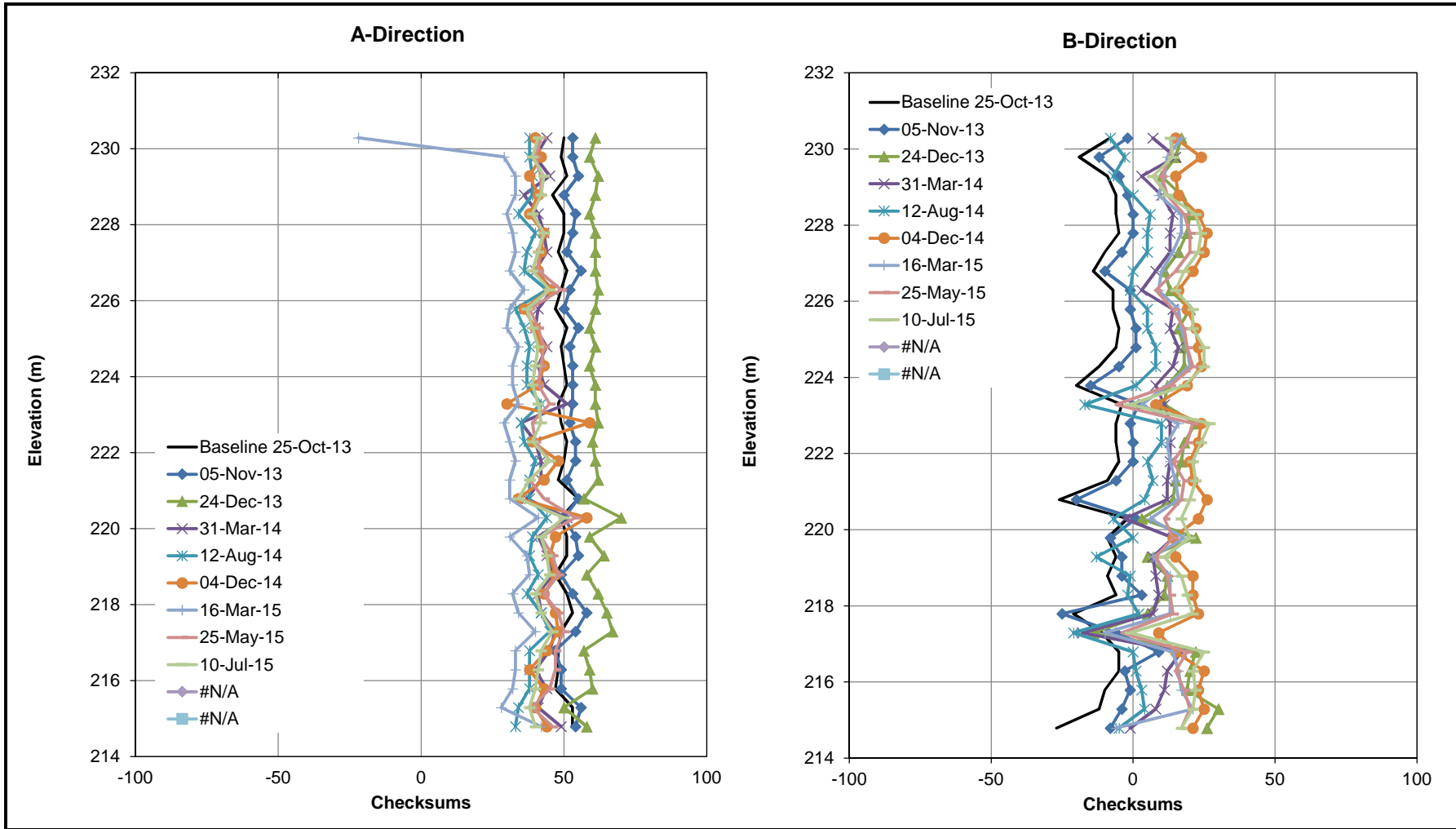




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-1B

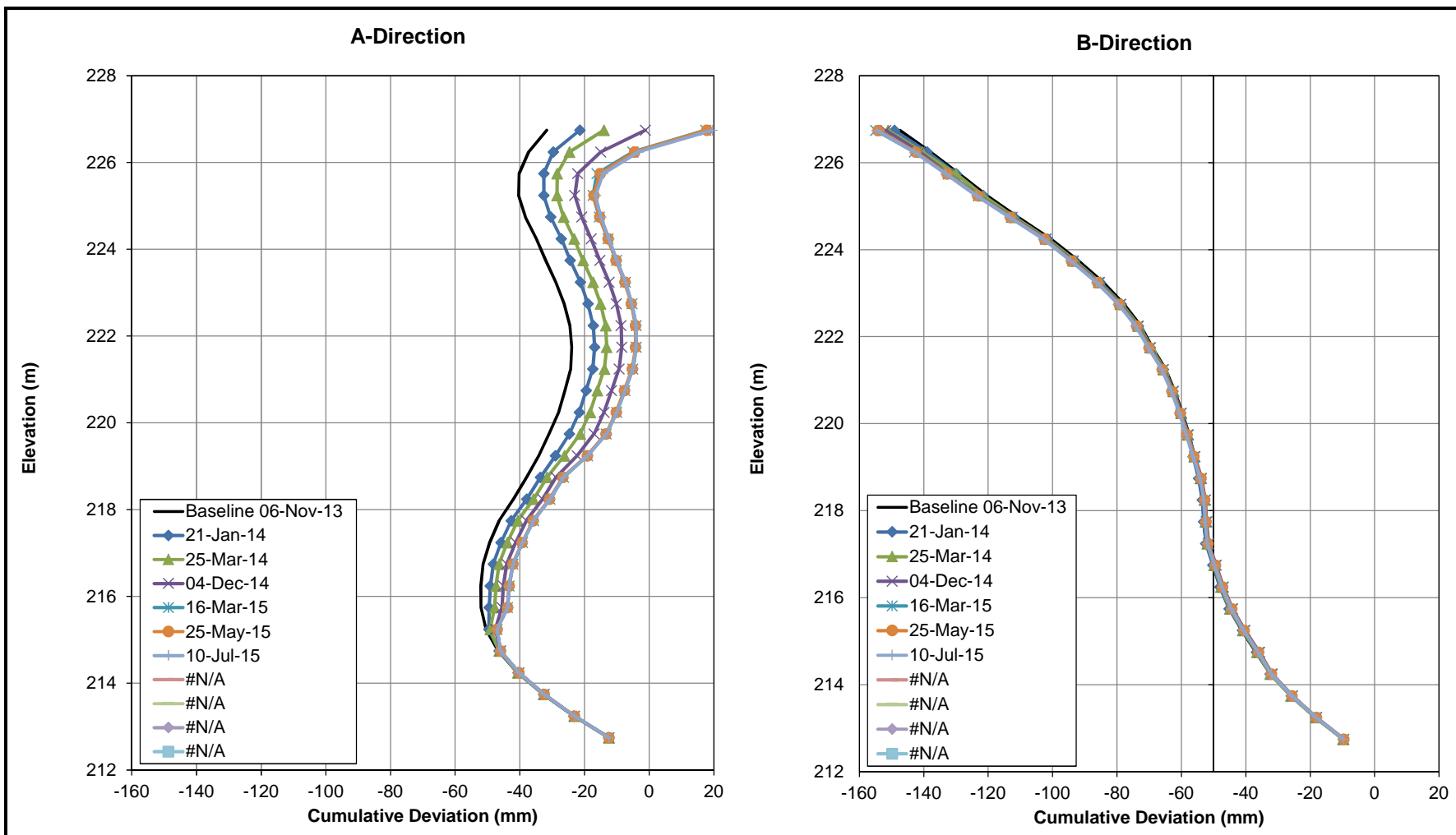




SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-2B

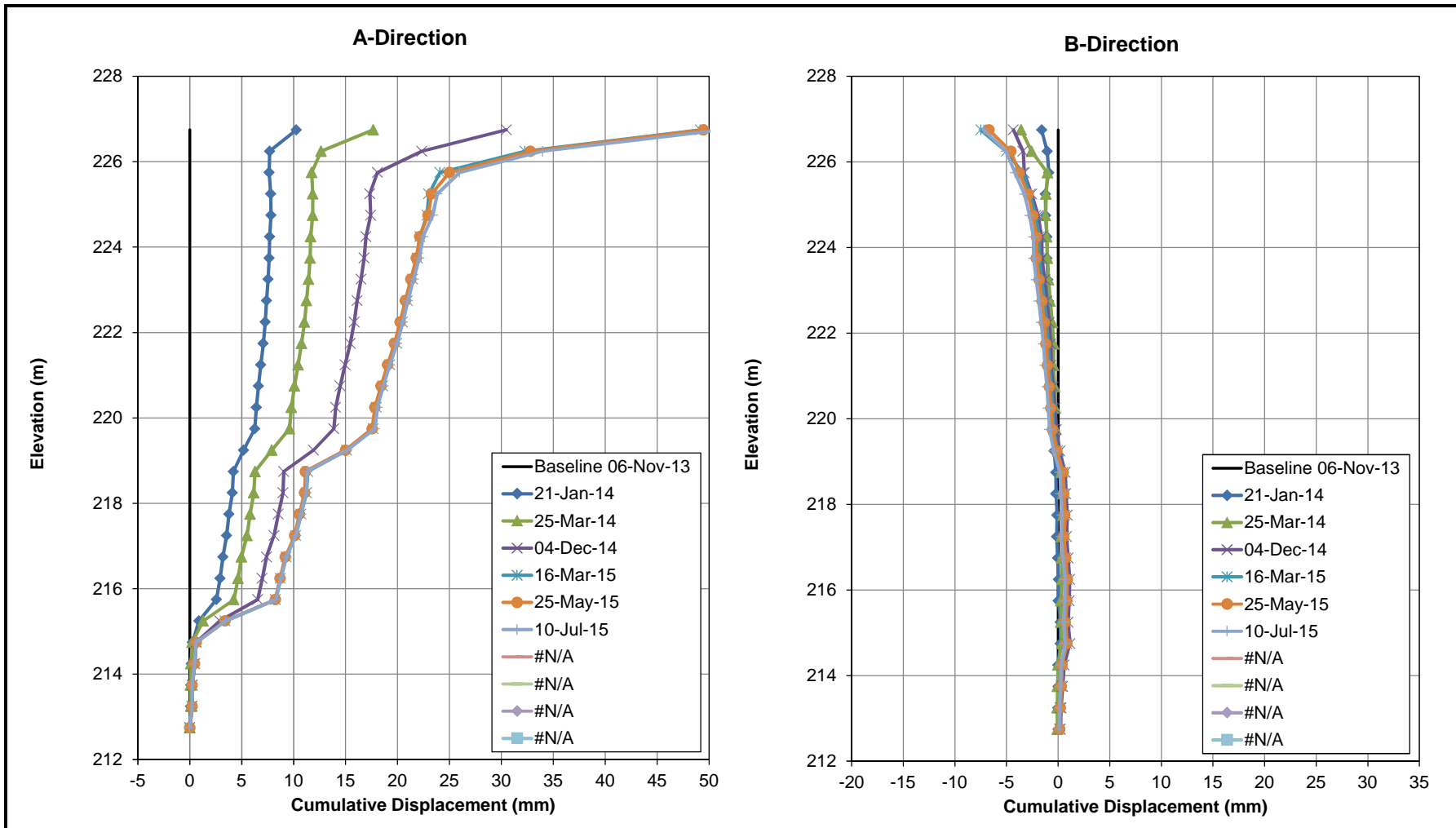




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-2B



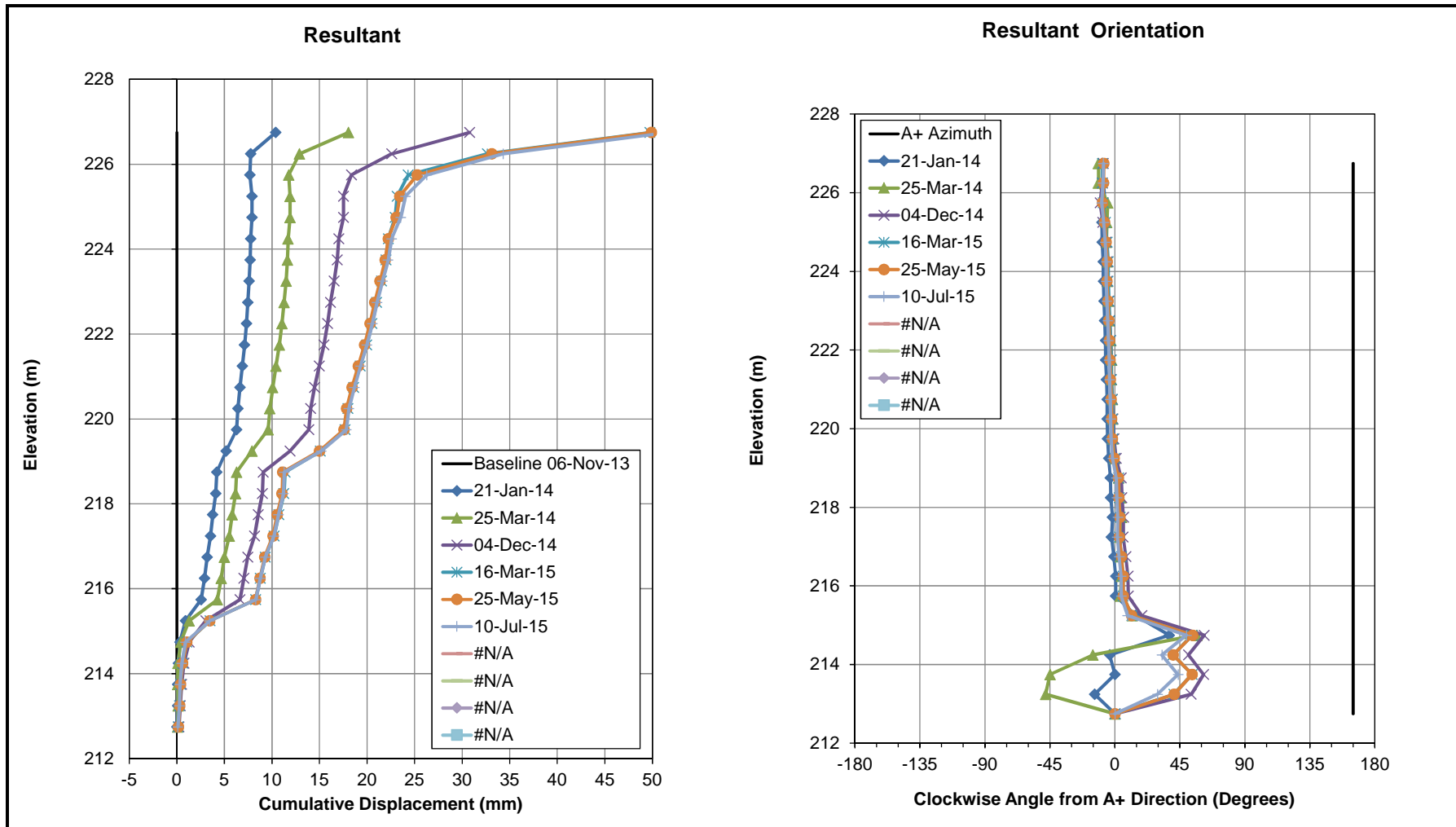


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-2B

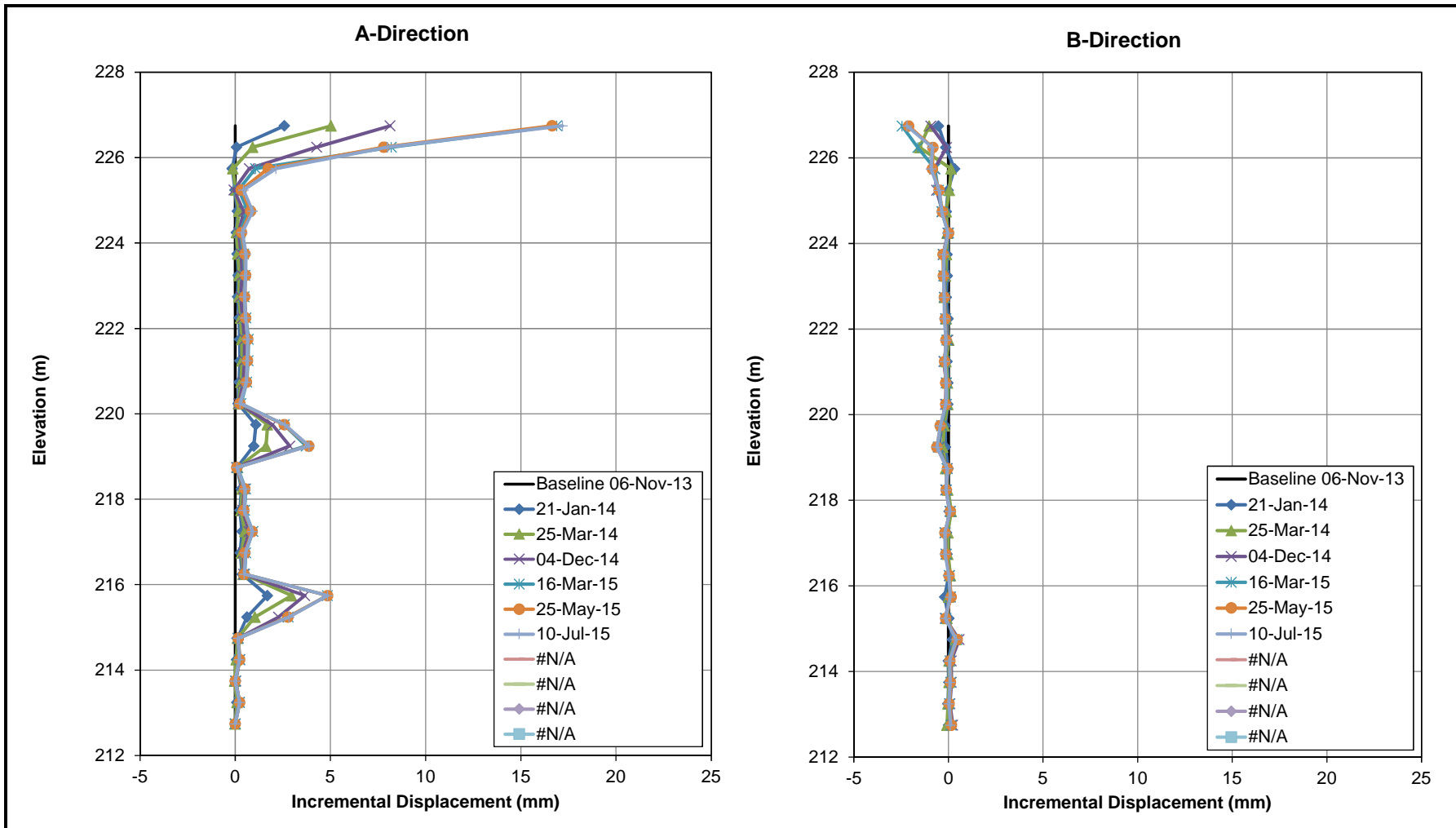




SLOPE INCLINOMETER WORKSHEET
Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-2B

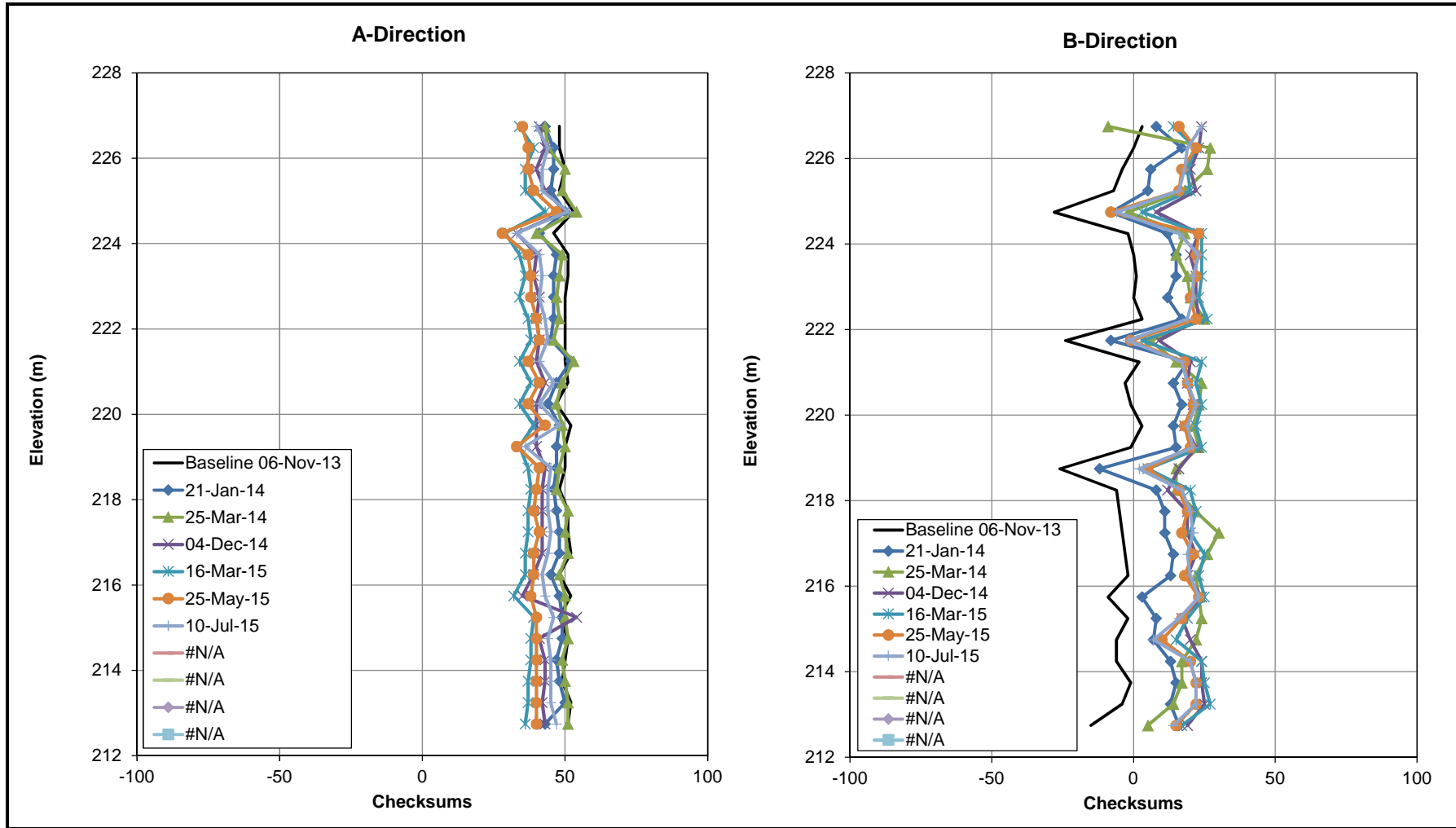




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-2B



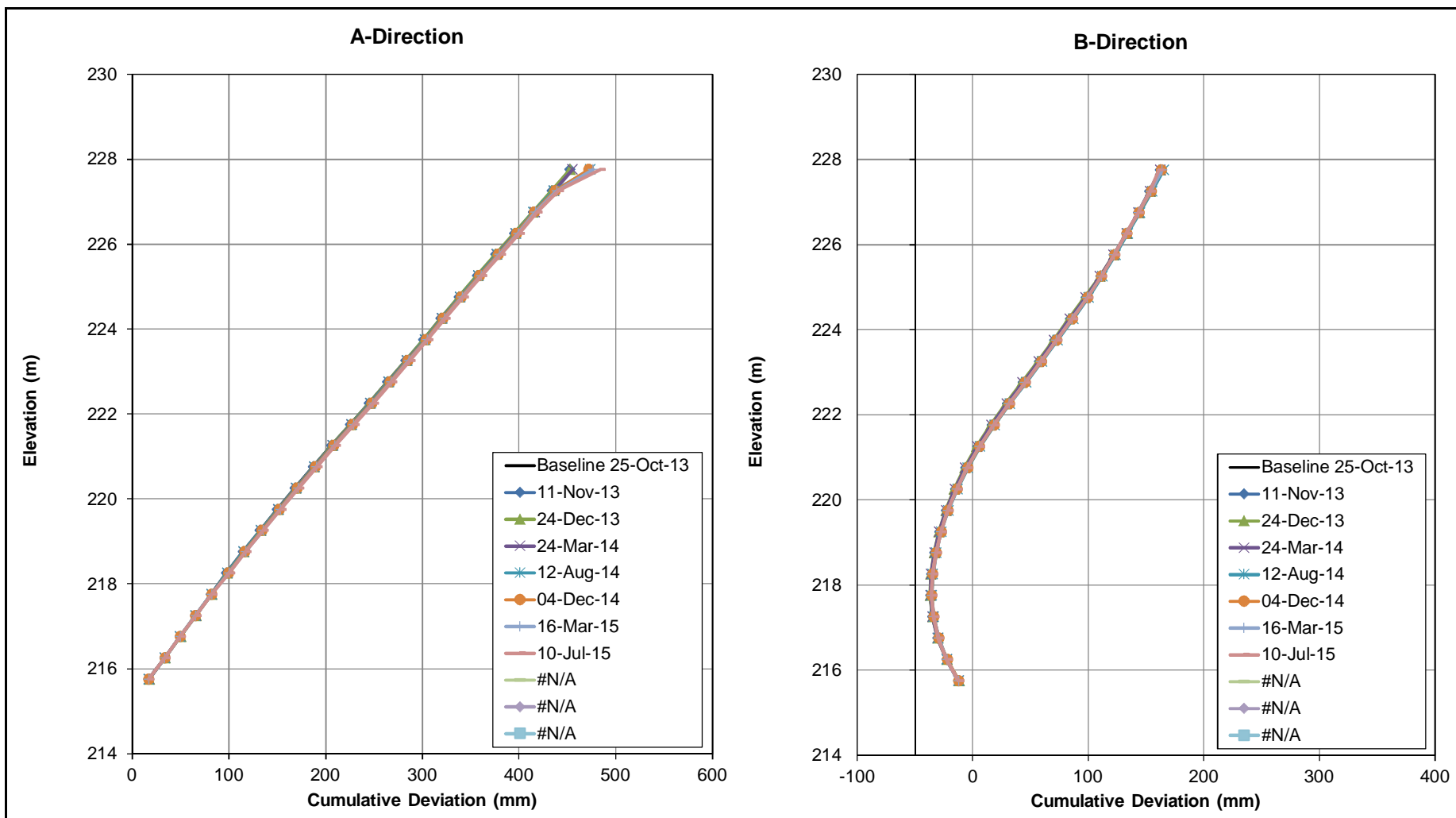


SLOPE INCLINOMETER WORKSHEET

Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-3

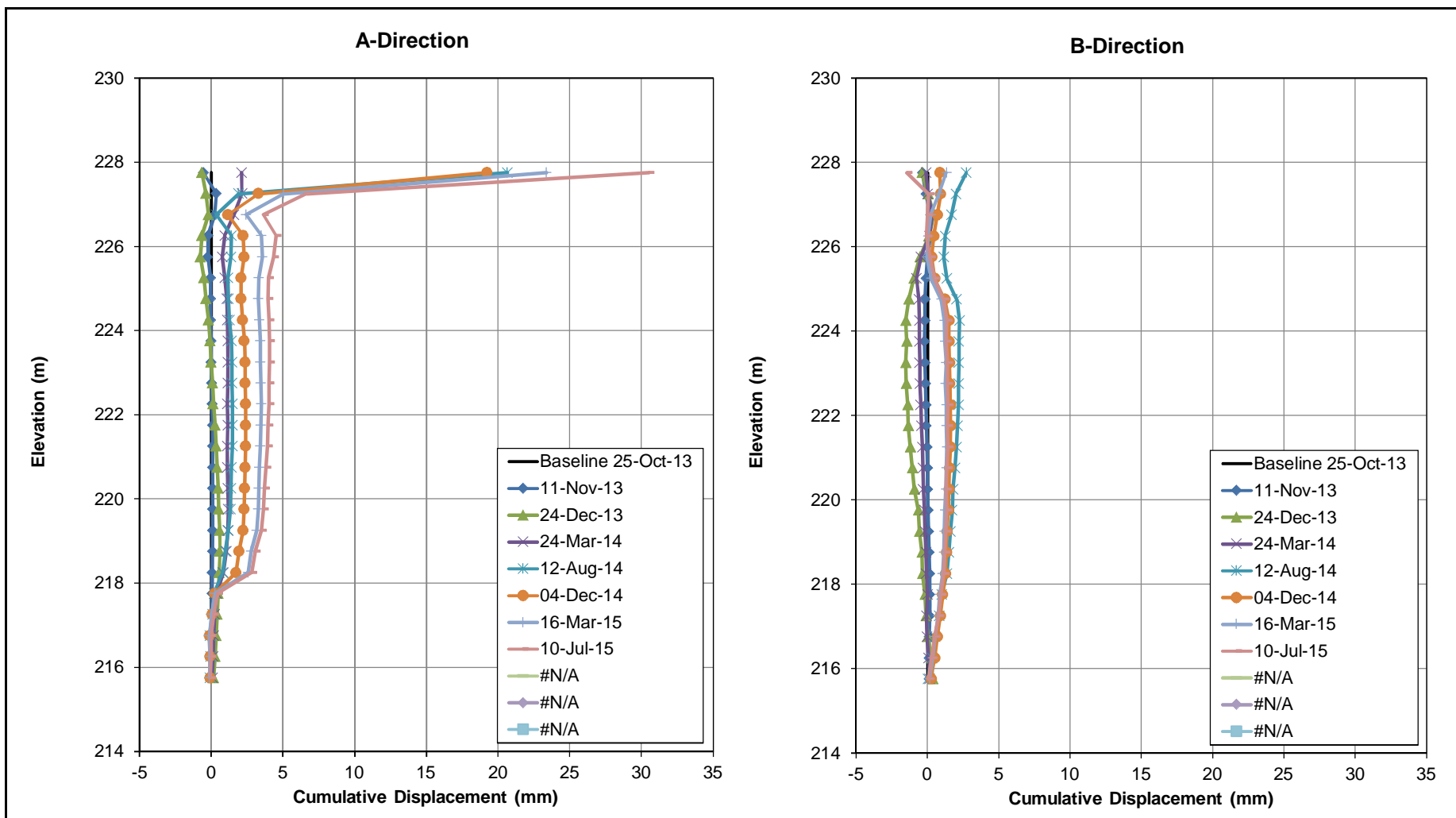




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-3

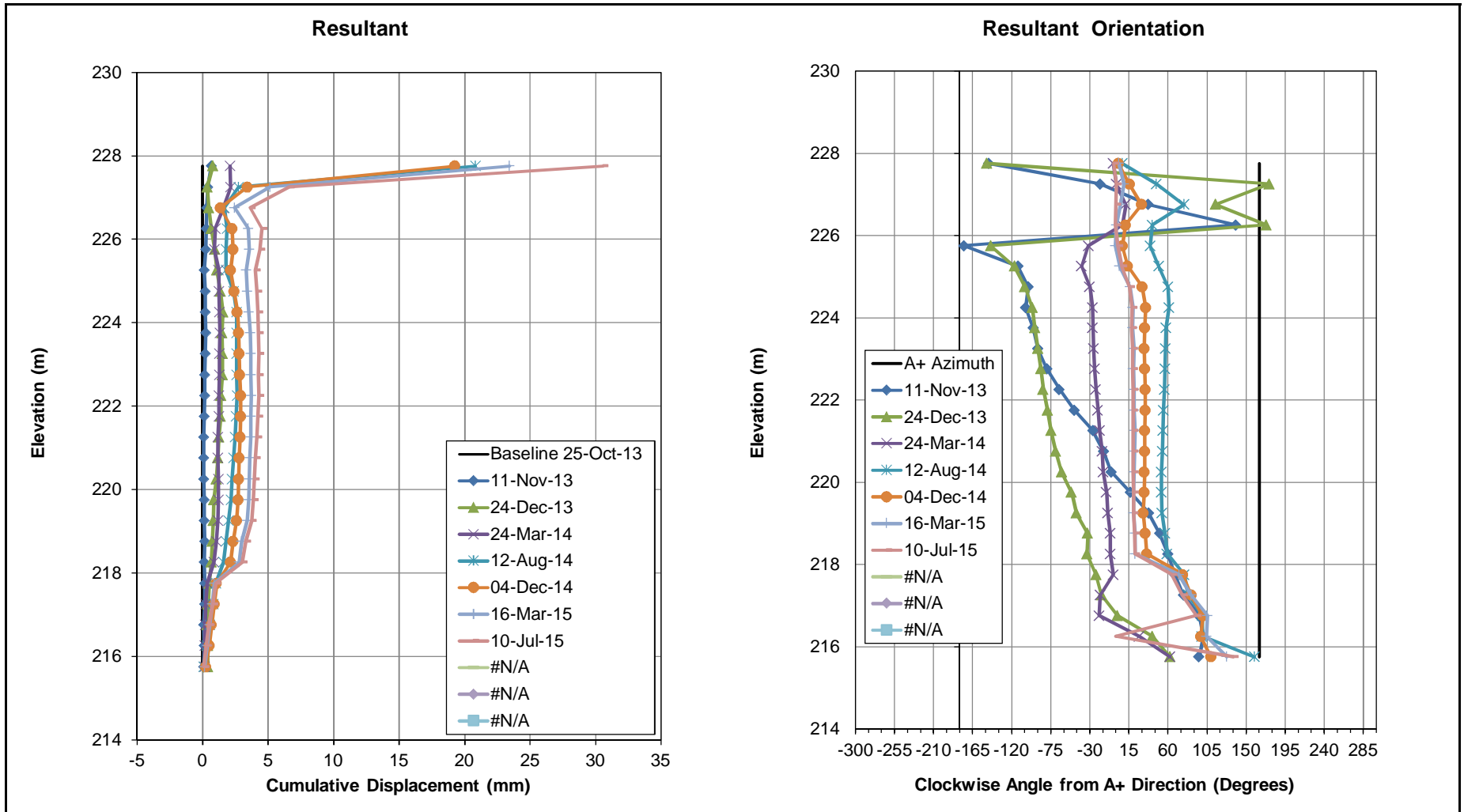




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-3



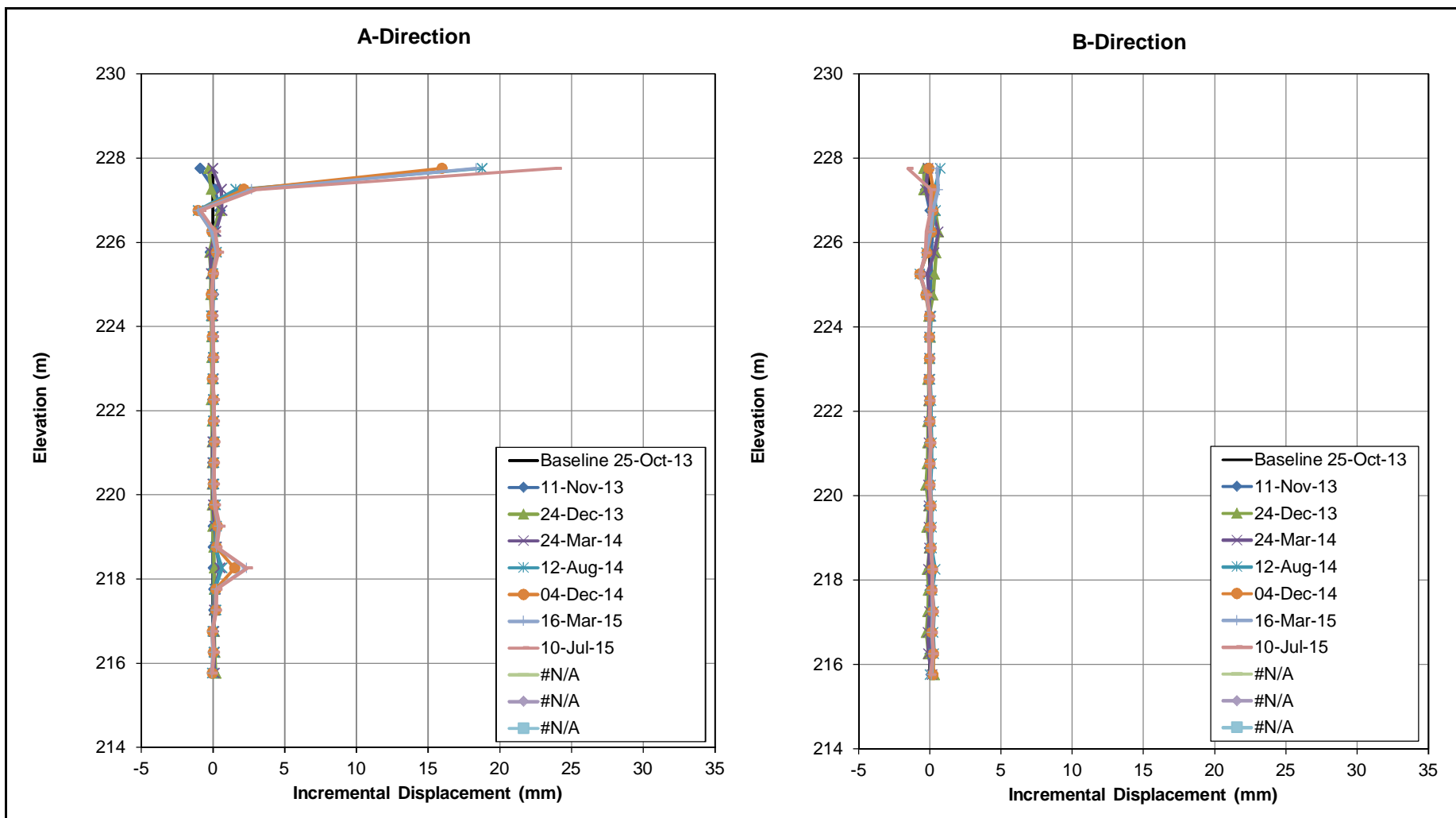


SLOPE INCLINOMETER WORKSHEET

Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-3

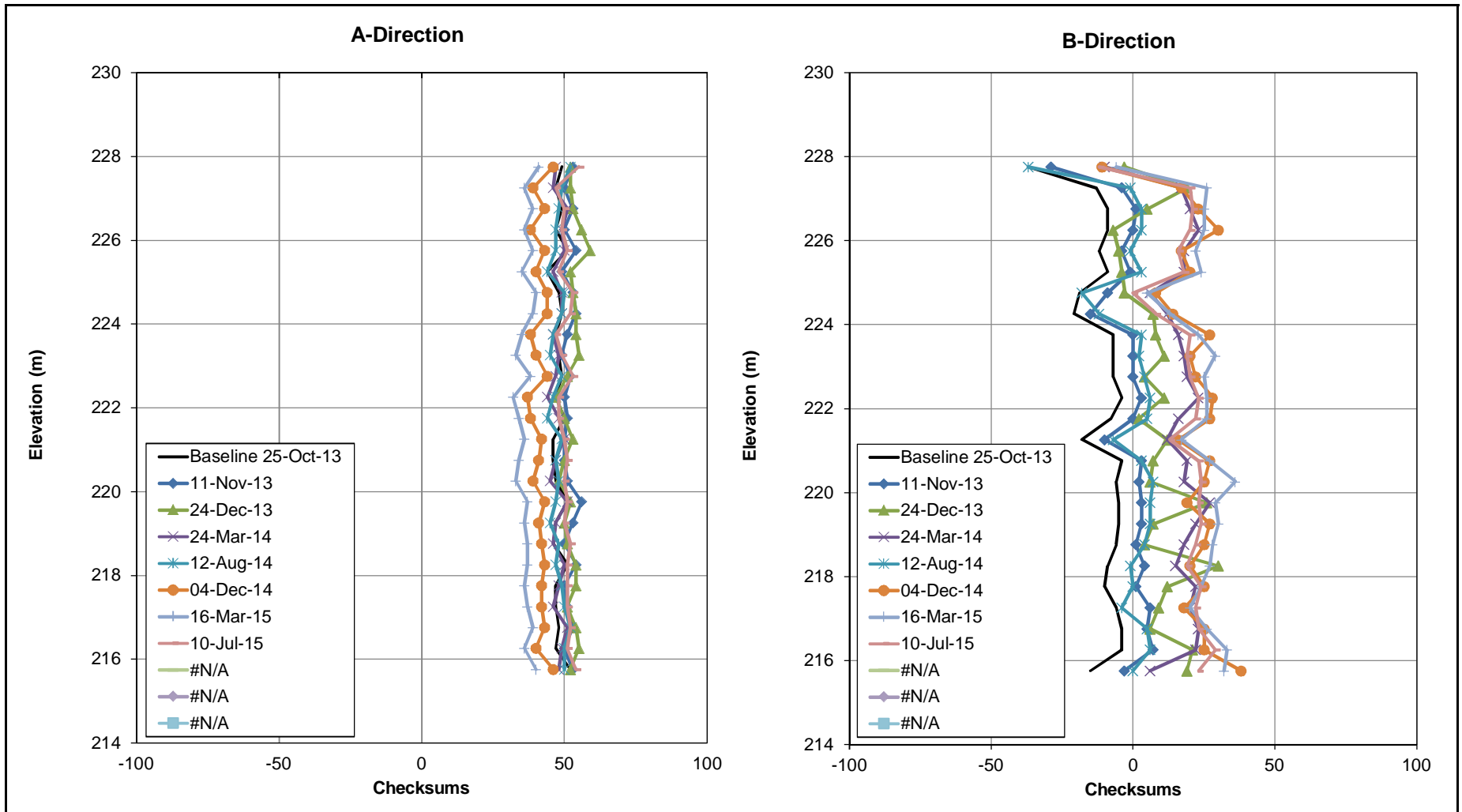




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-3



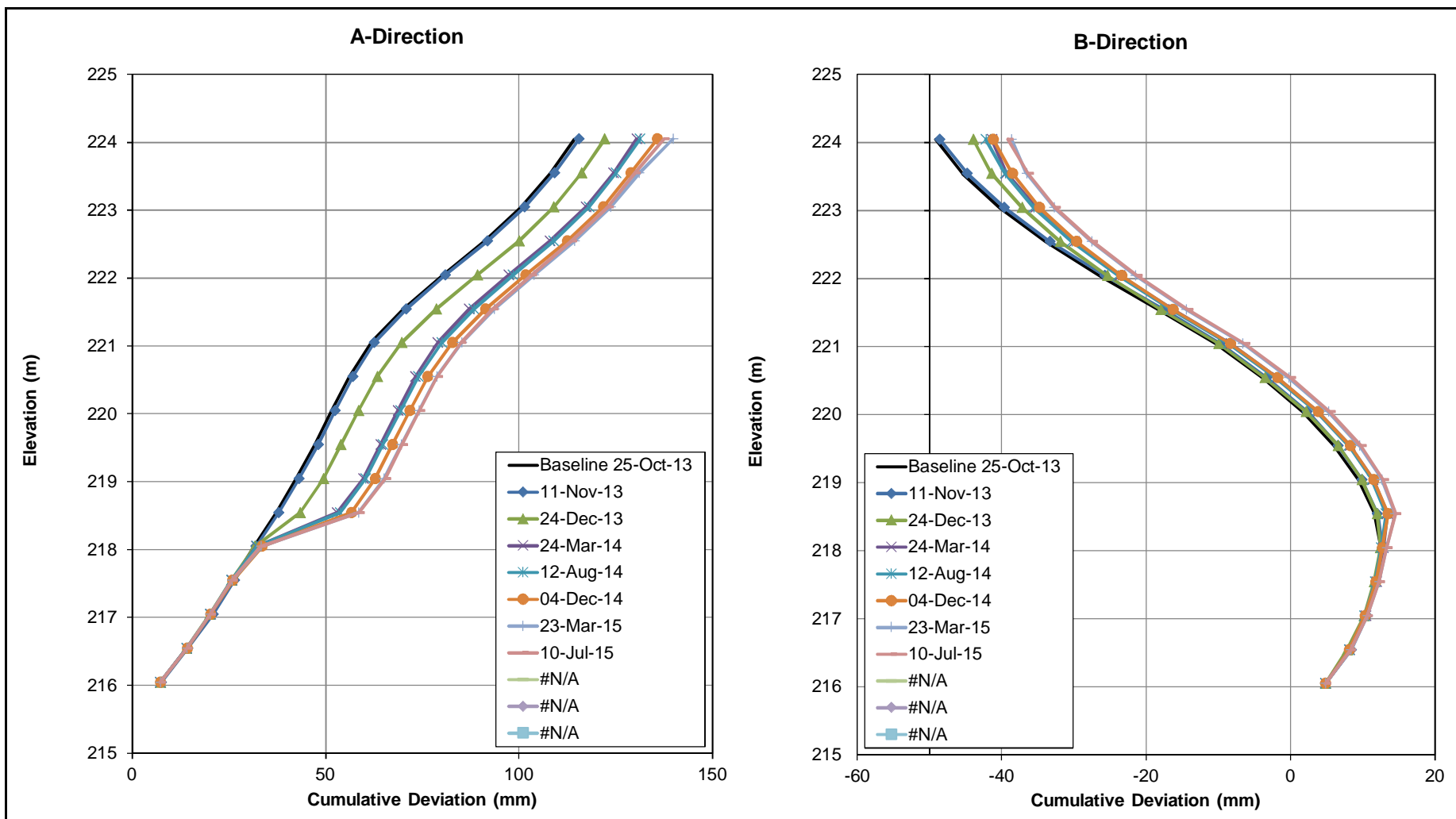


SLOPE INCLINOMETER WORKSHEET

Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-4

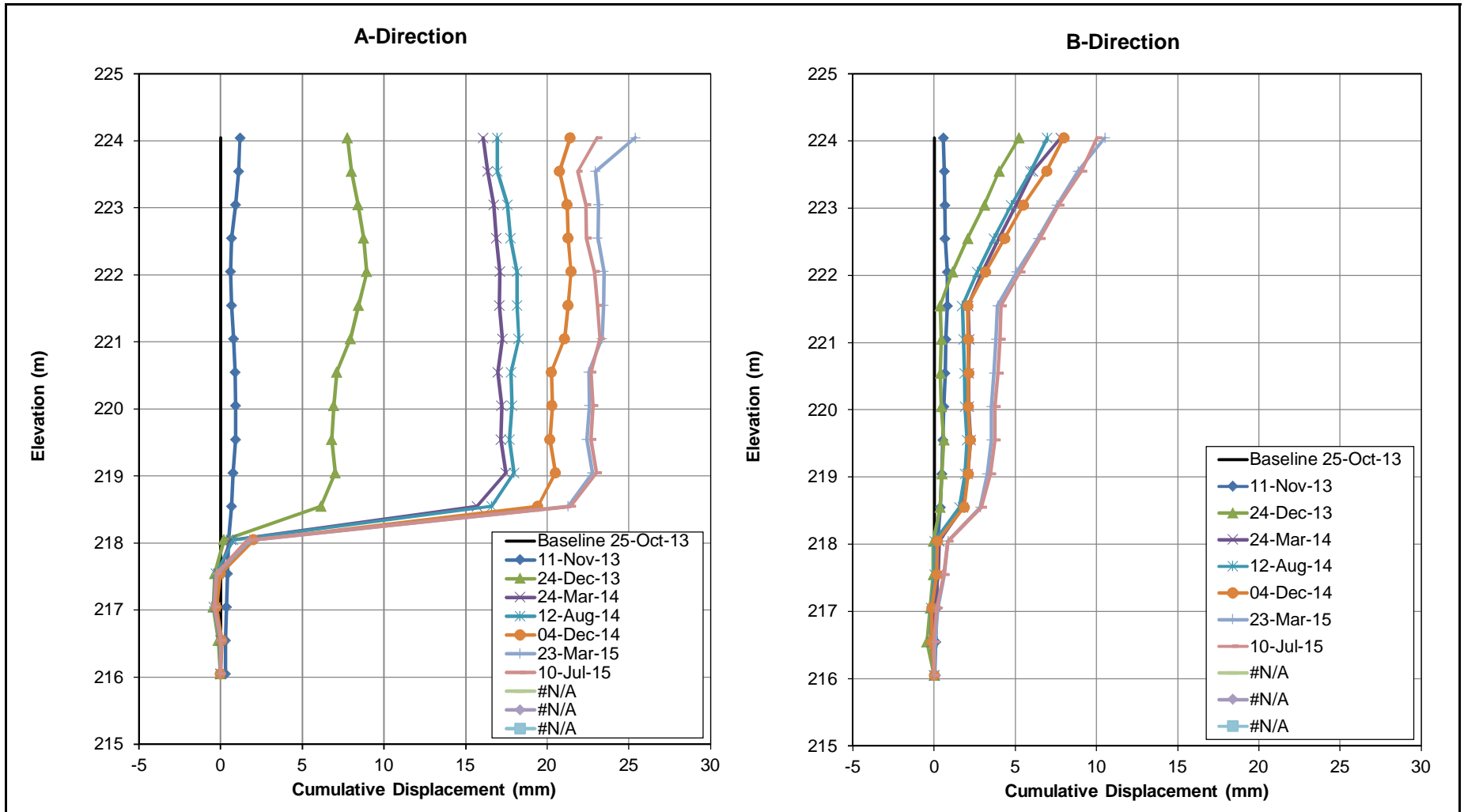




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinerometer No. SI-4



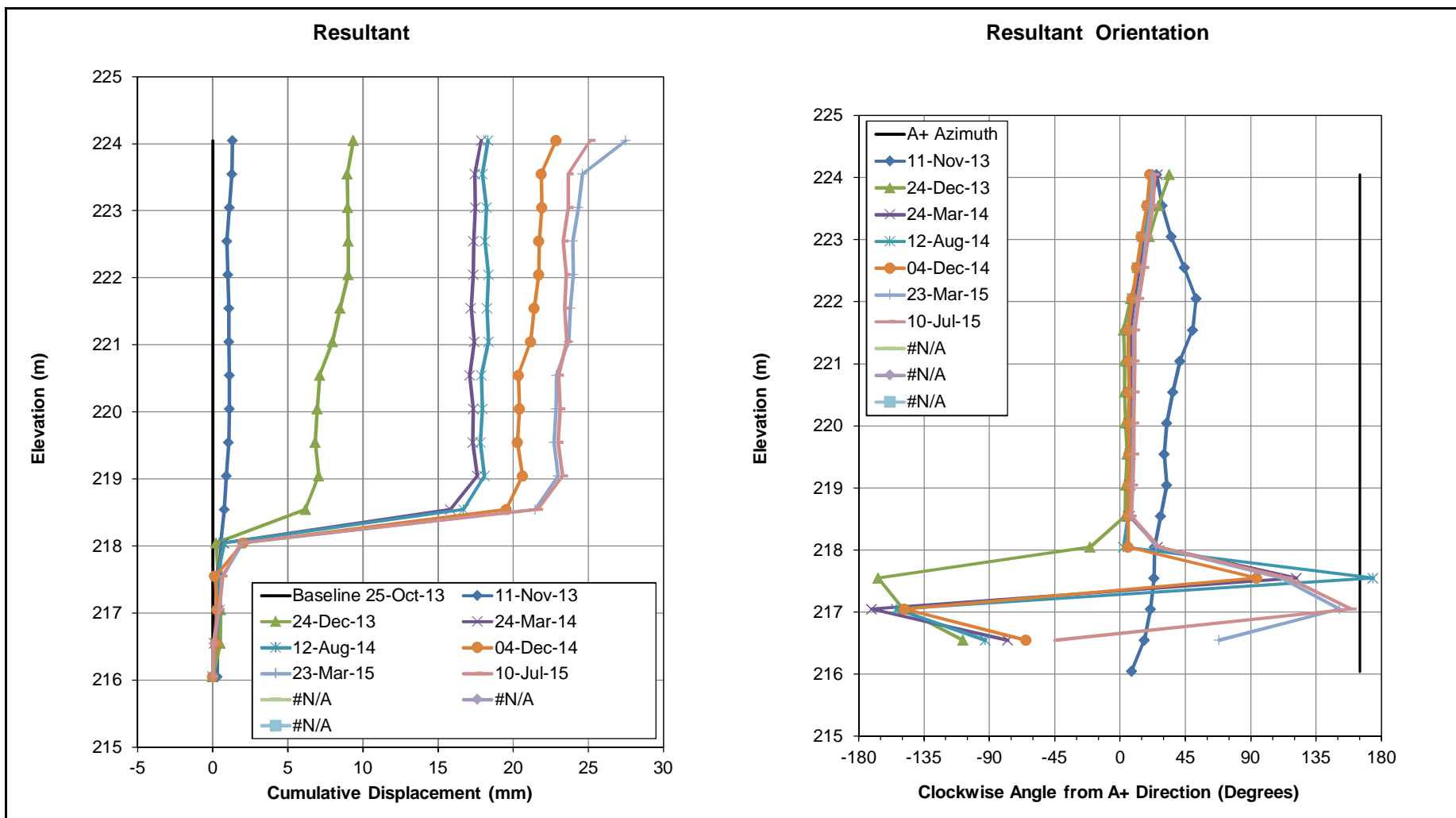


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-4

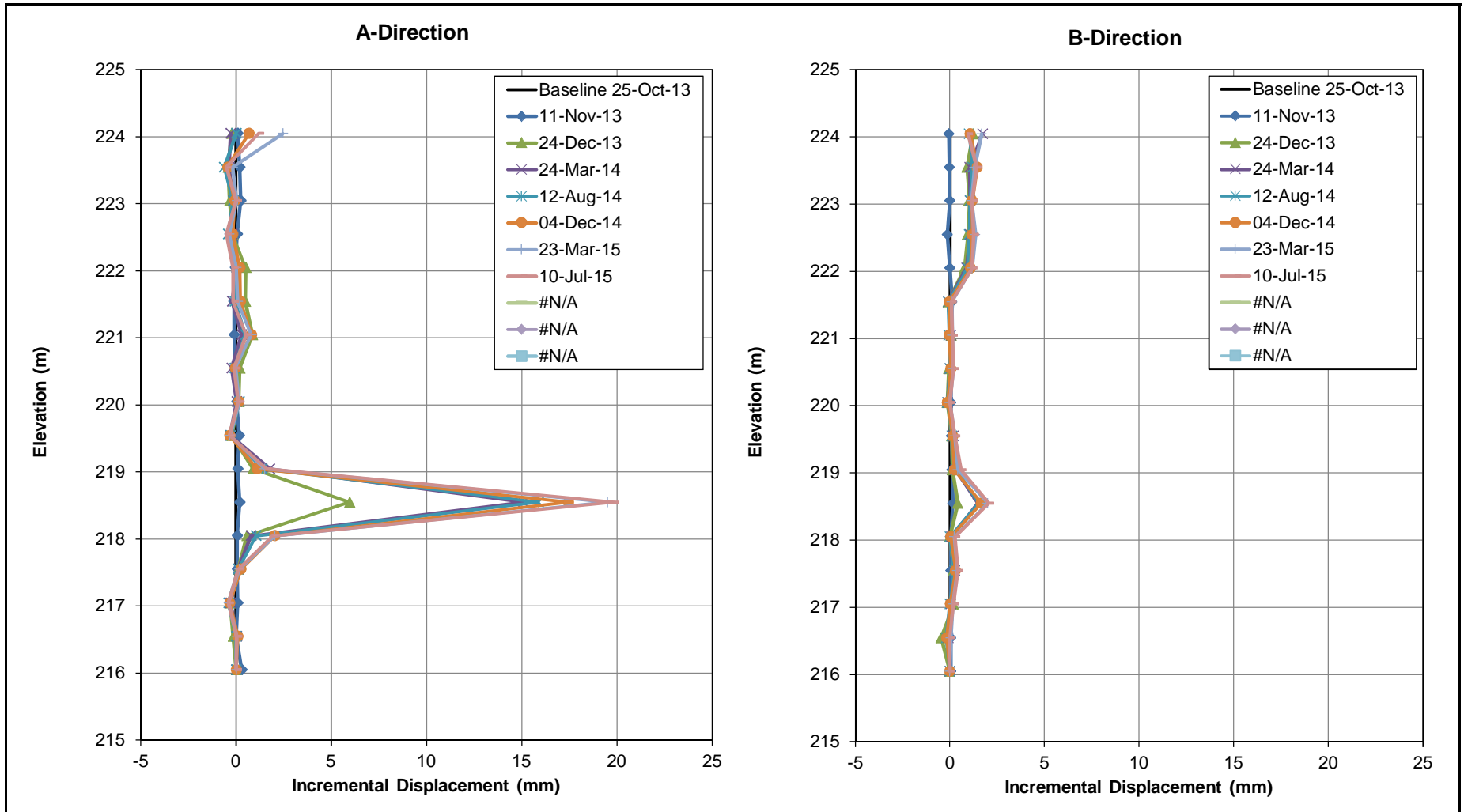




SLOPE INCLINOMETER WORKSHEET
Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-4

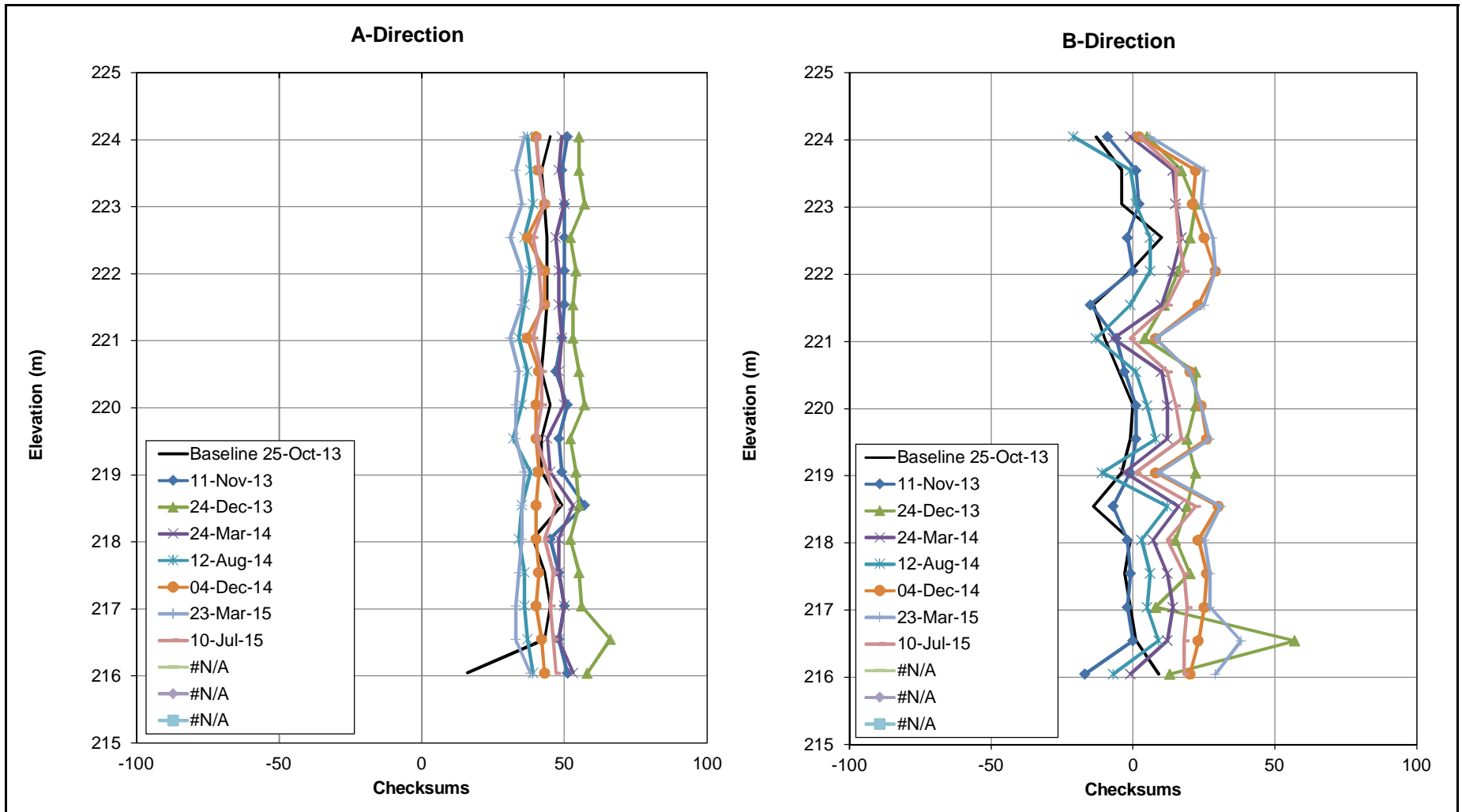




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-4



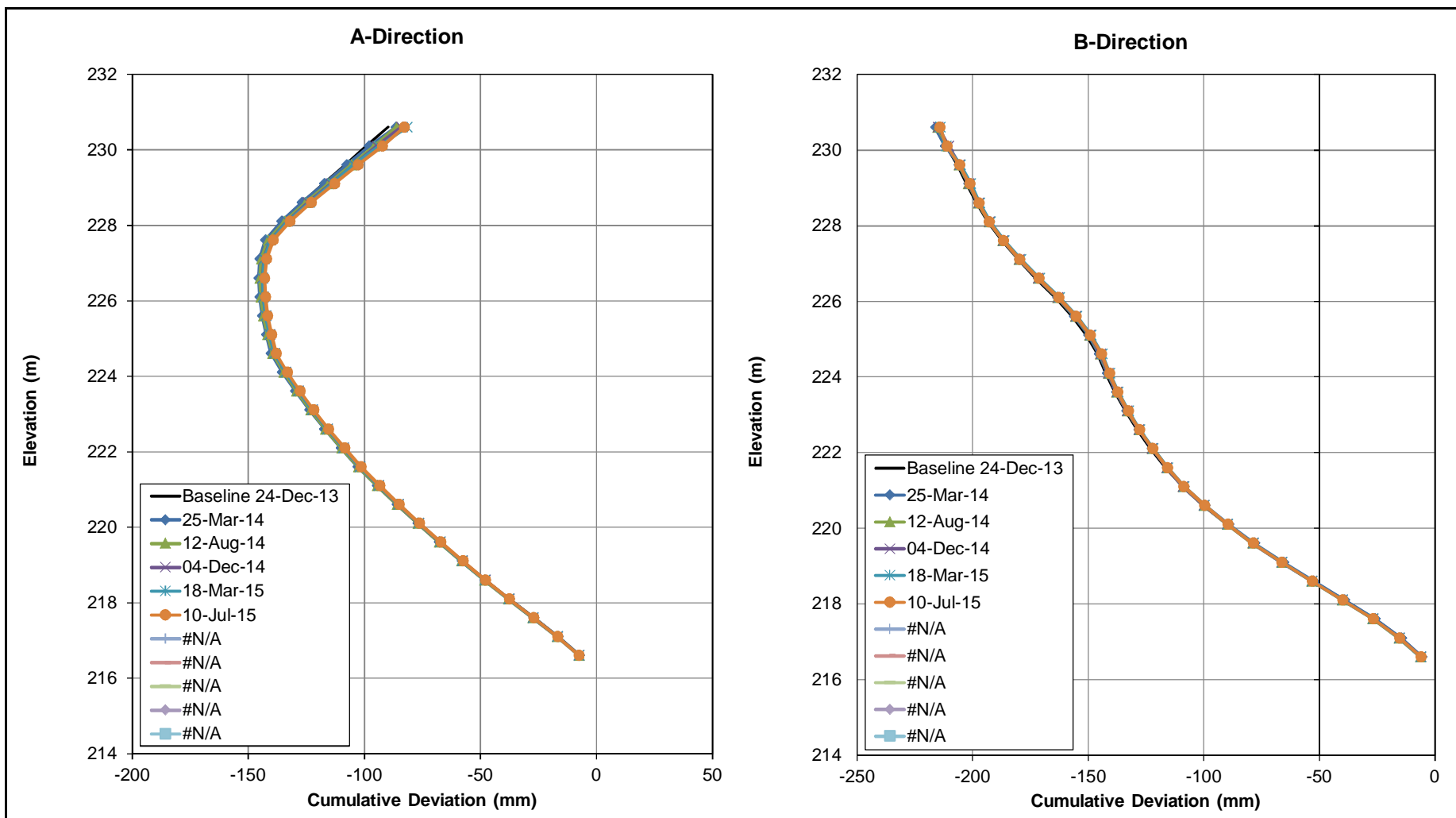


SLOPE INCLINOMETER WORKSHEET

Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-5

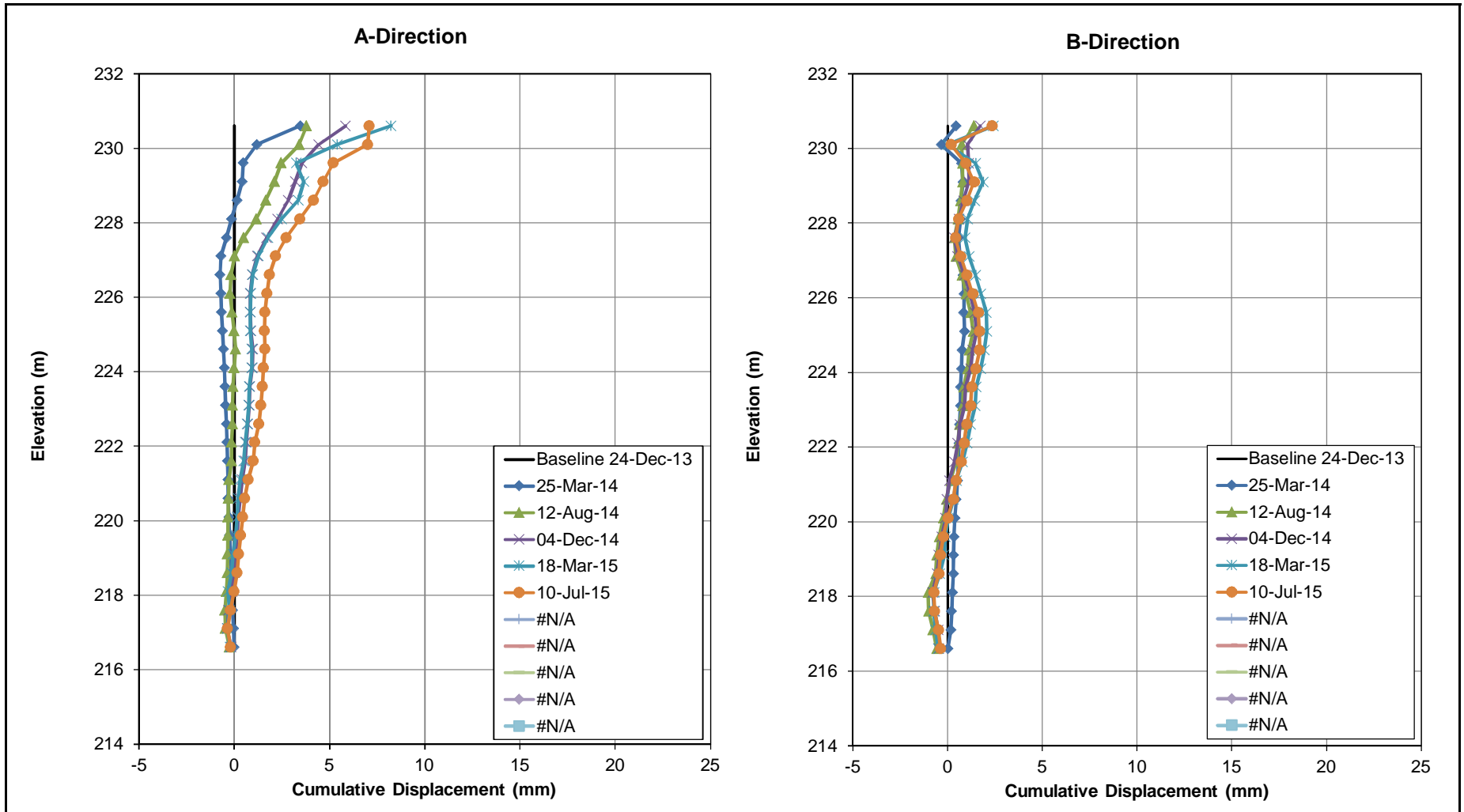




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-5



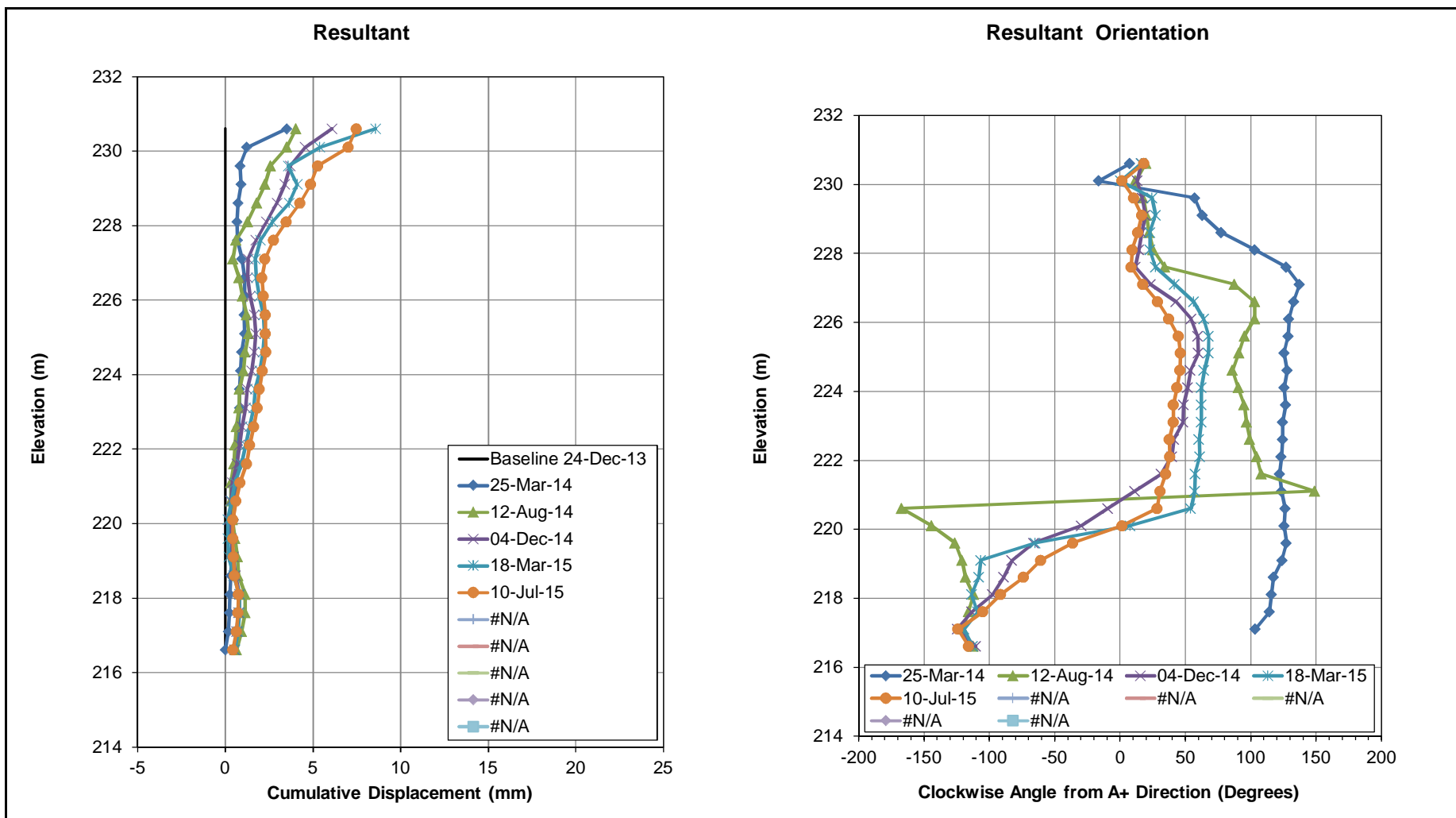


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-5



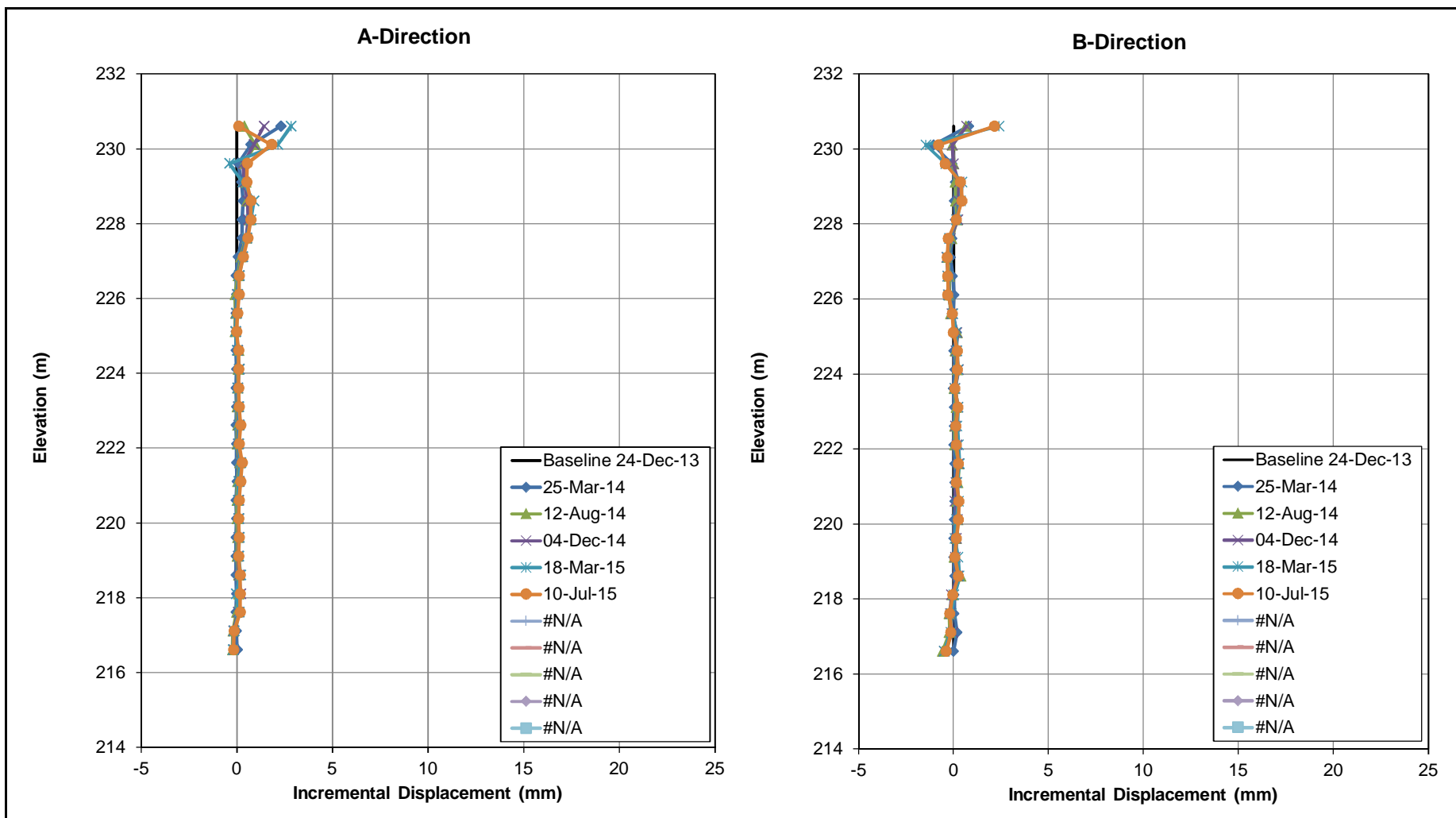


SLOPE INCLINOMETER WORKSHEET

Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-5

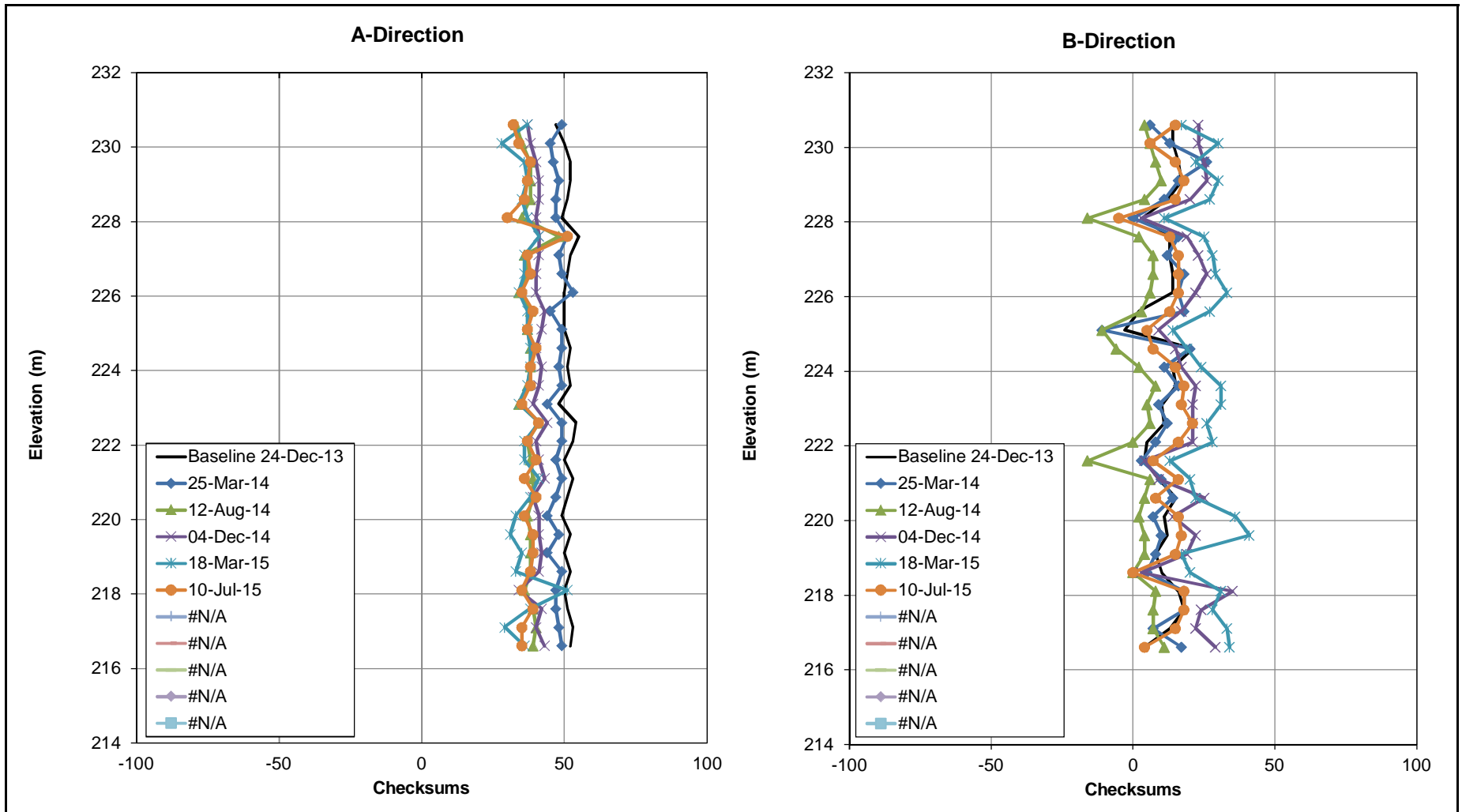




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-5

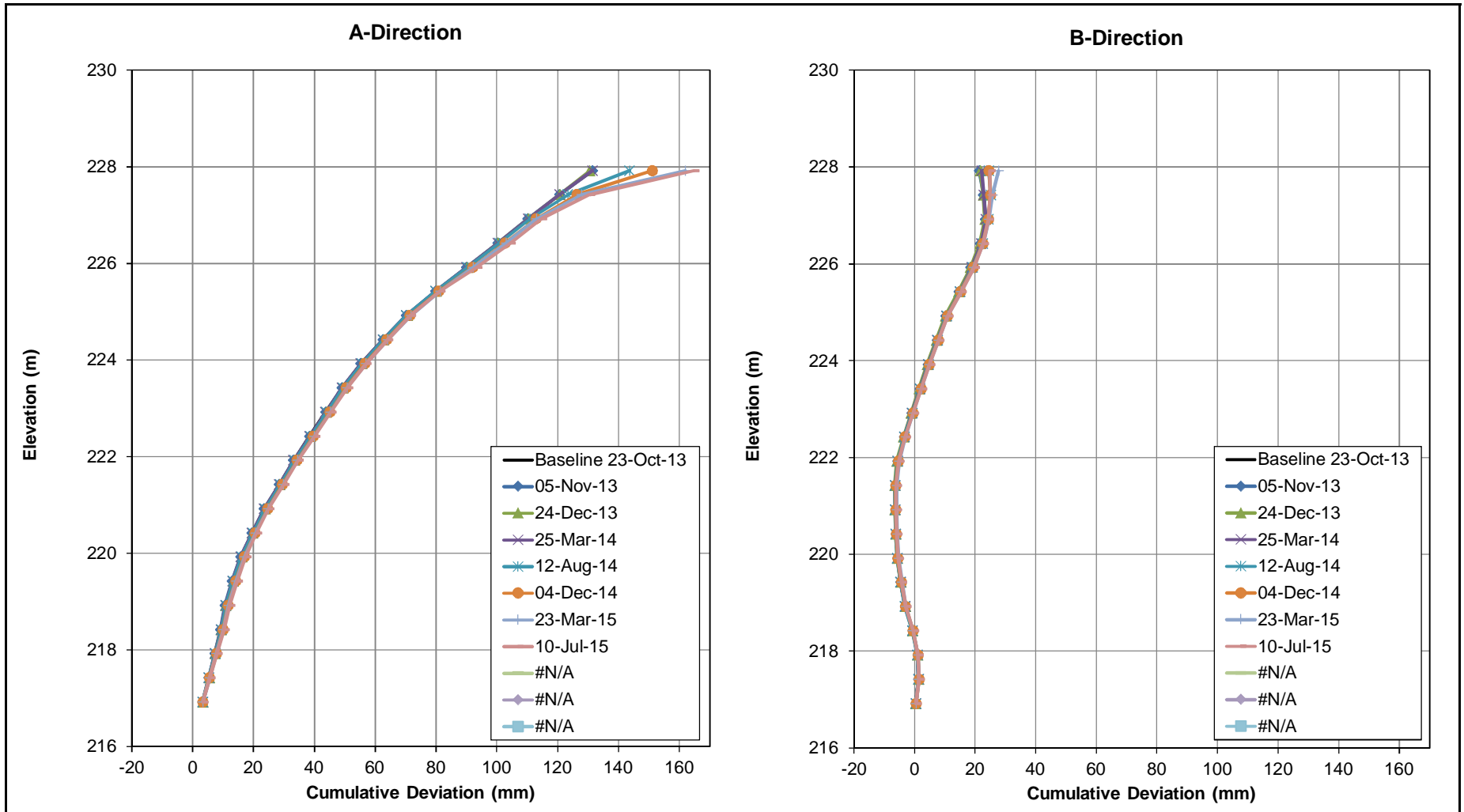




SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-6

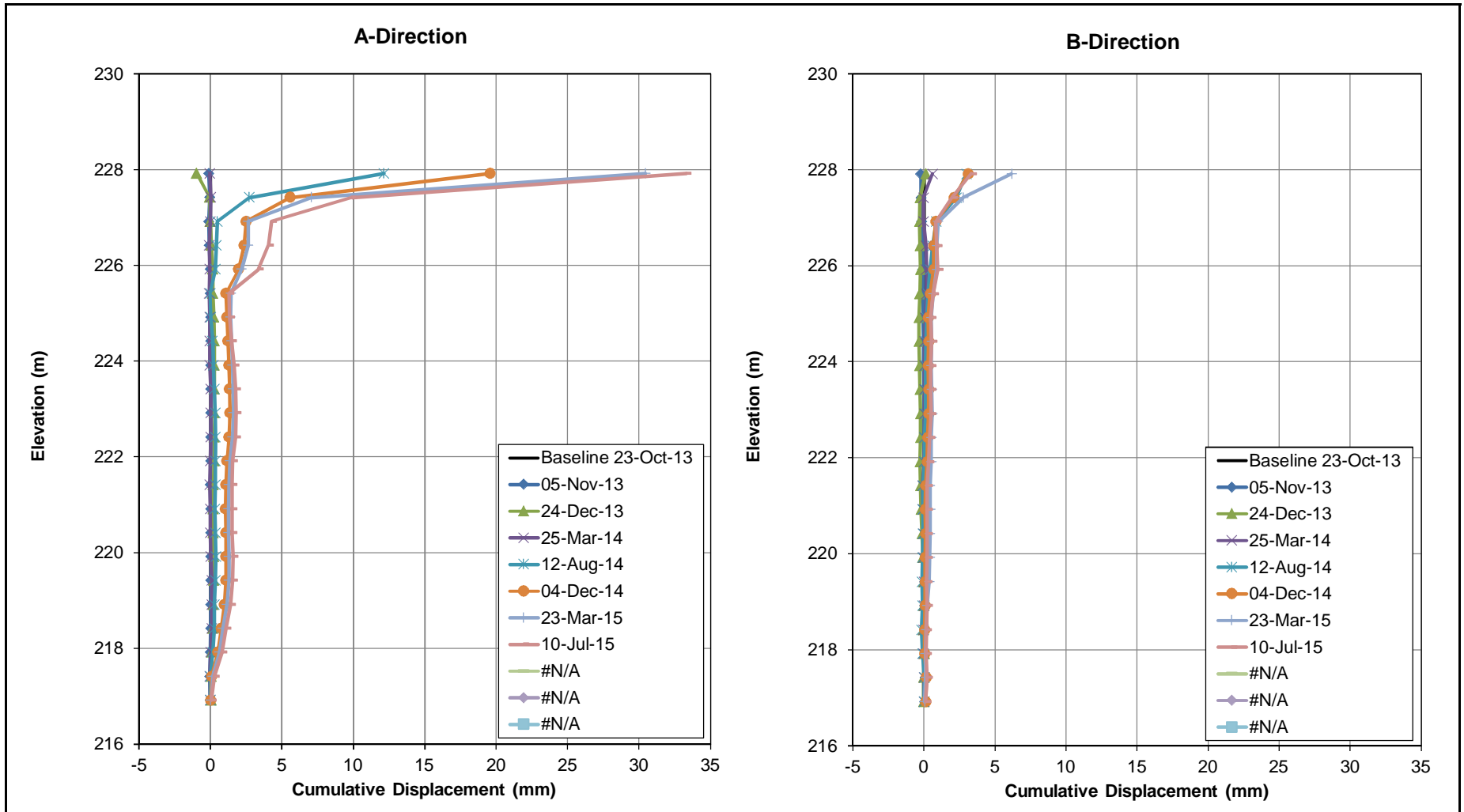




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-6

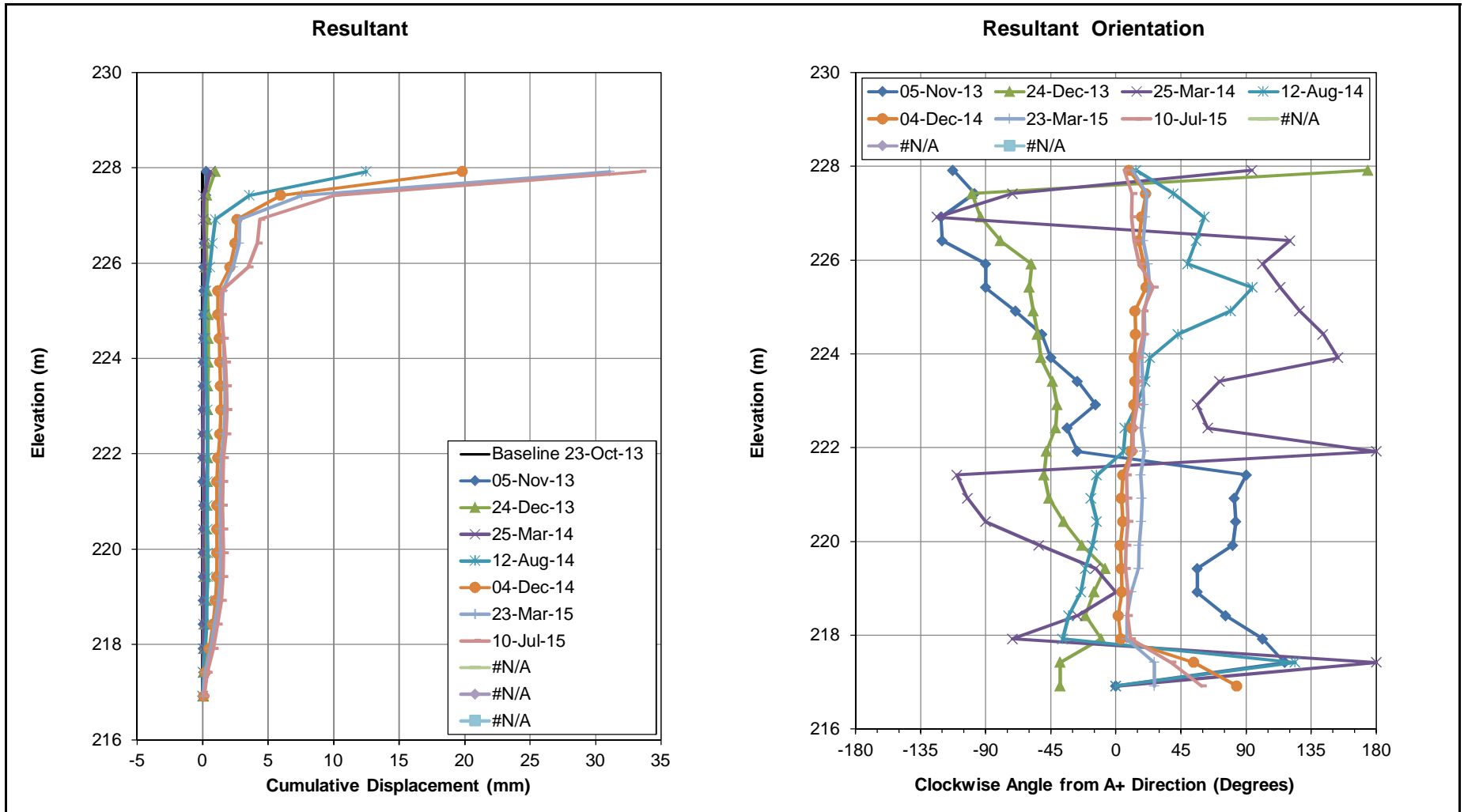




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-6

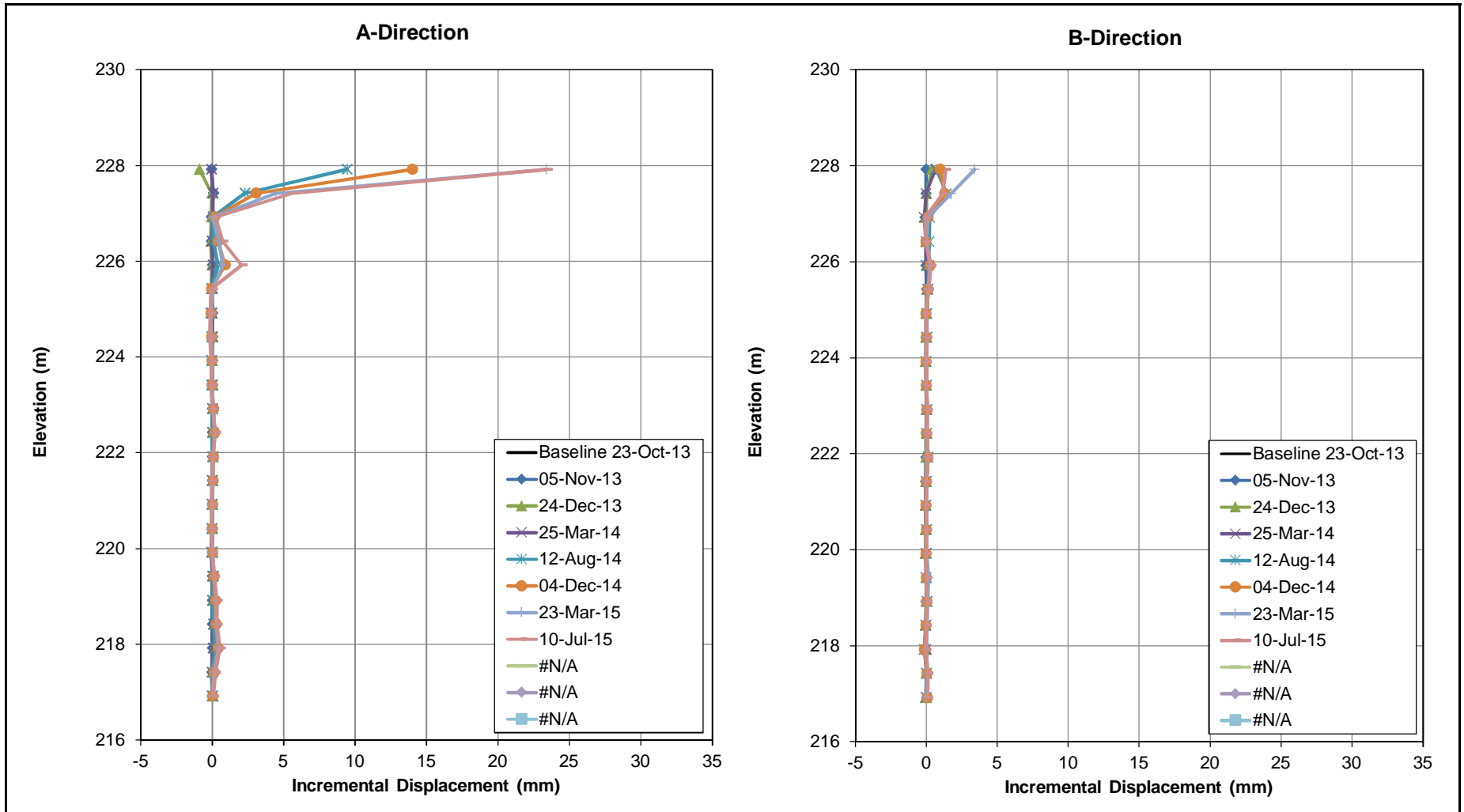




SLOPE INCLINOMETER WORKSHEET
Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-6



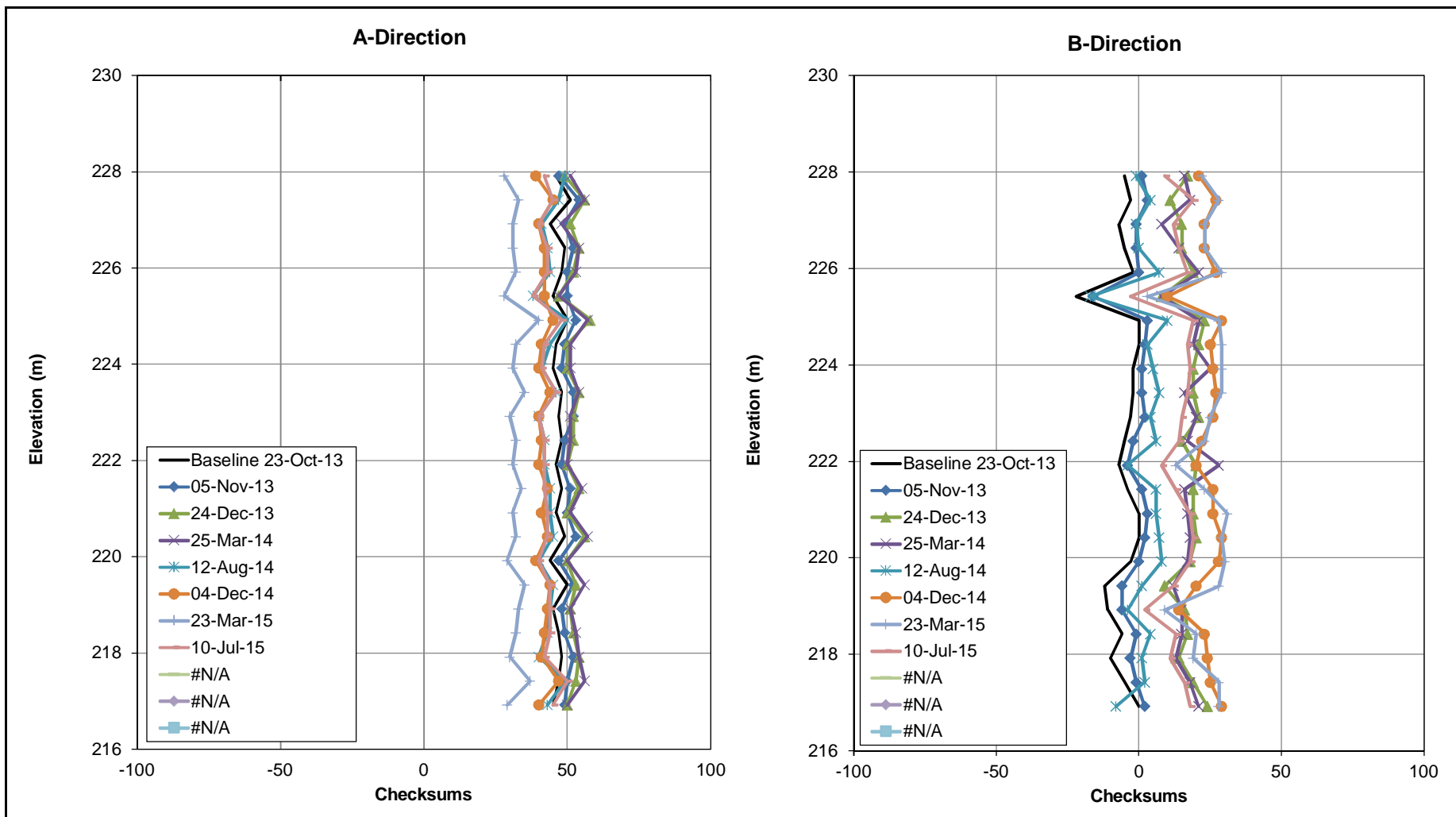


SLOPE INCLINOMETER WORKSHEET

Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-6

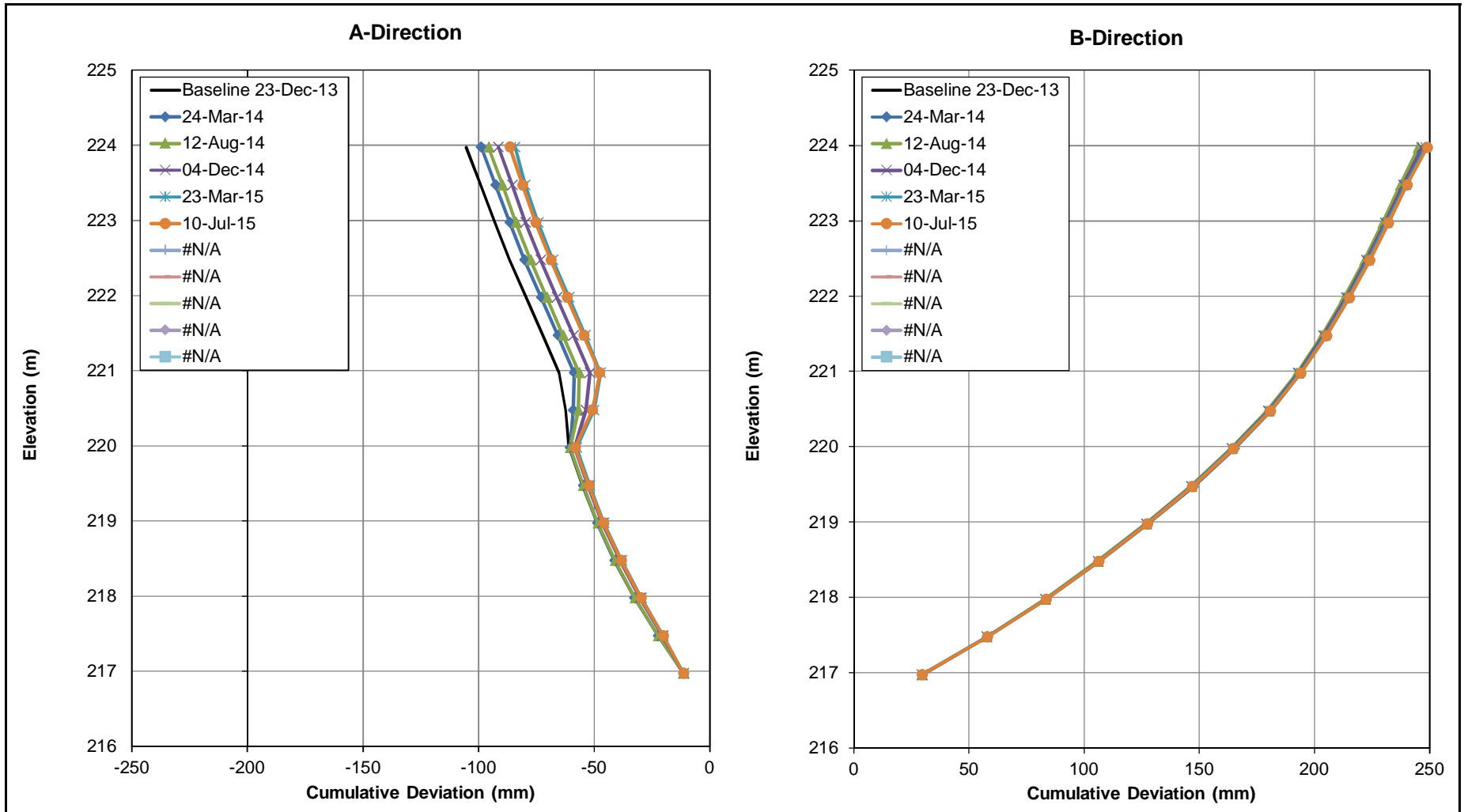




SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-7



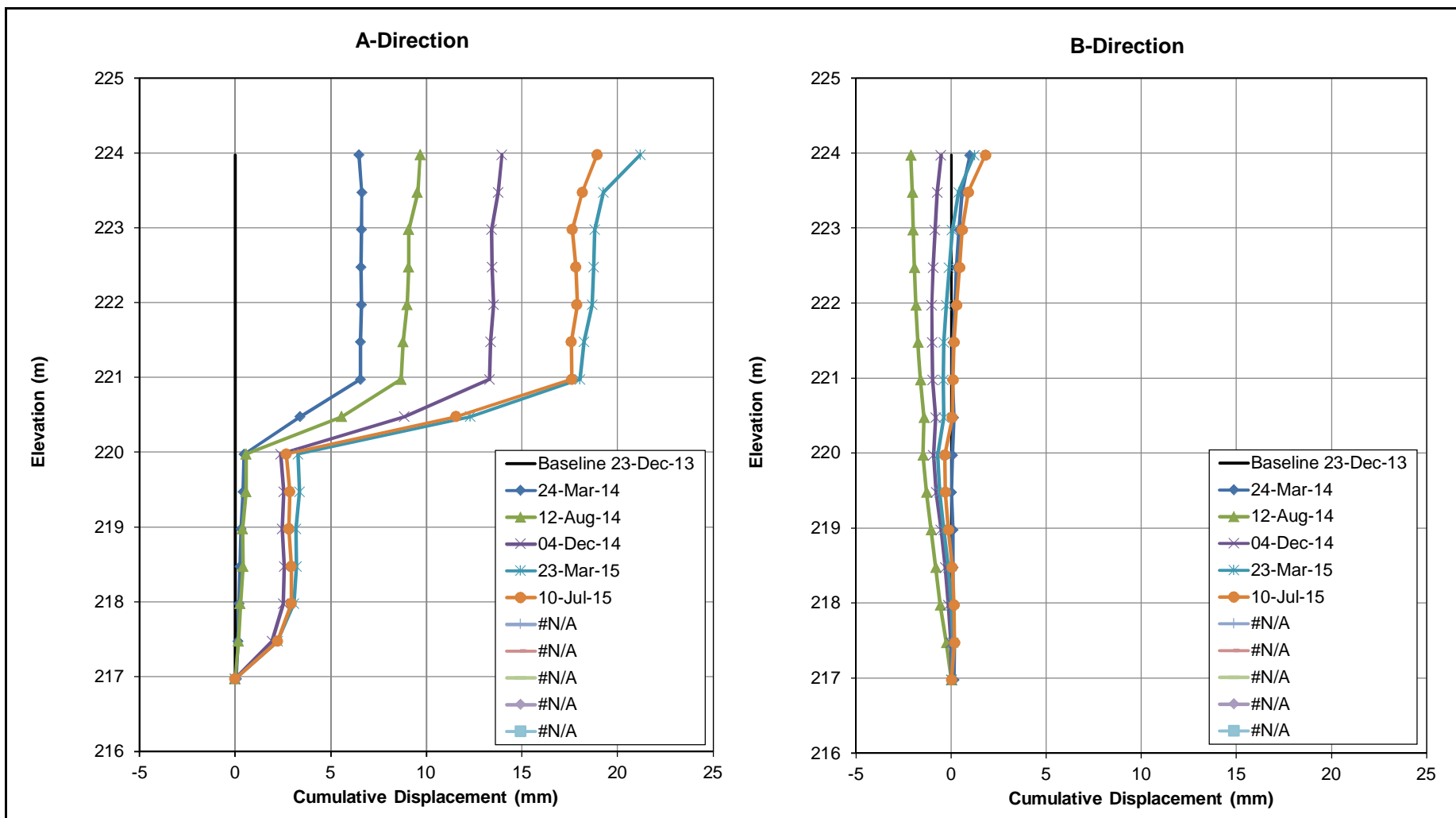


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-7

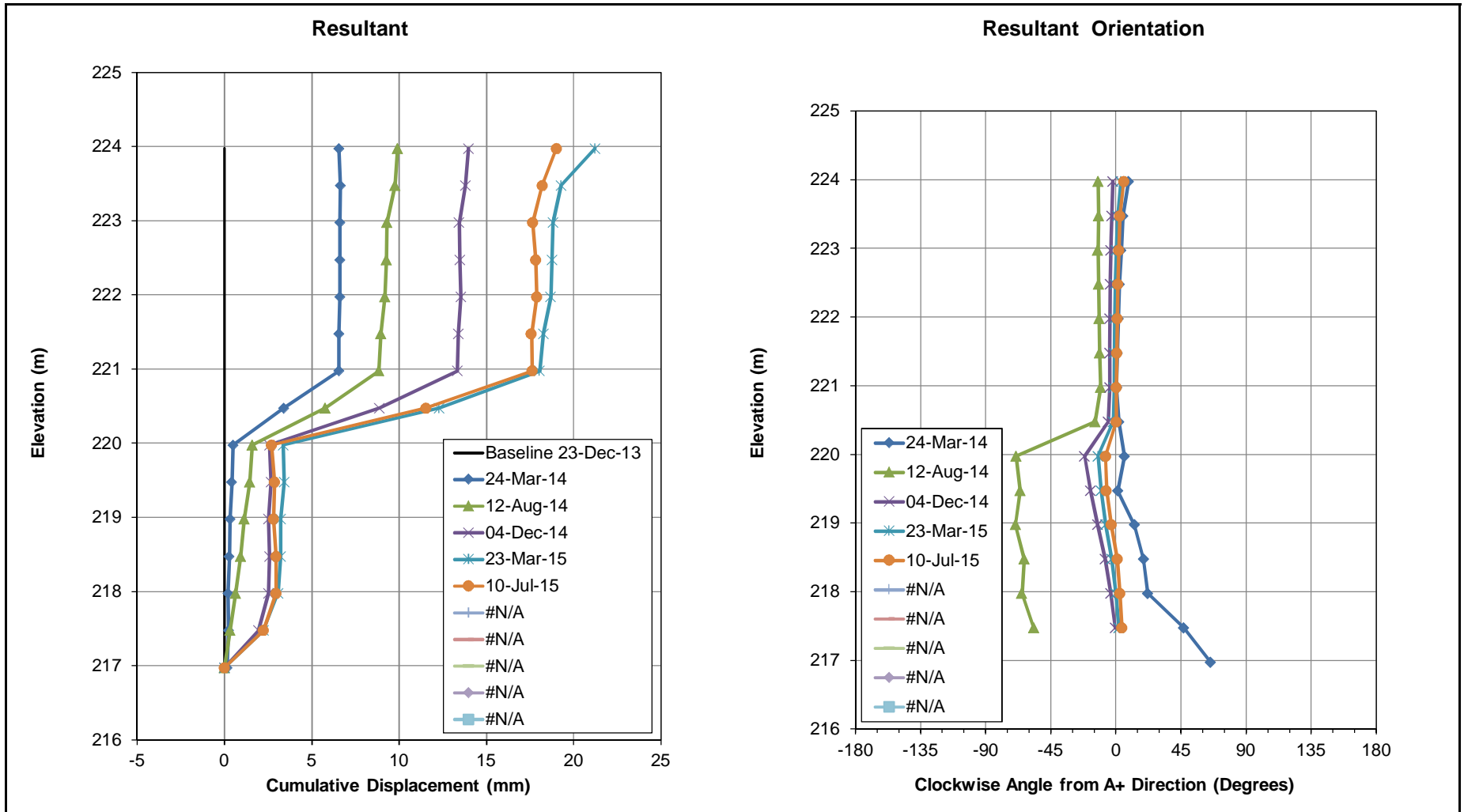




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinerometer No. SI-7

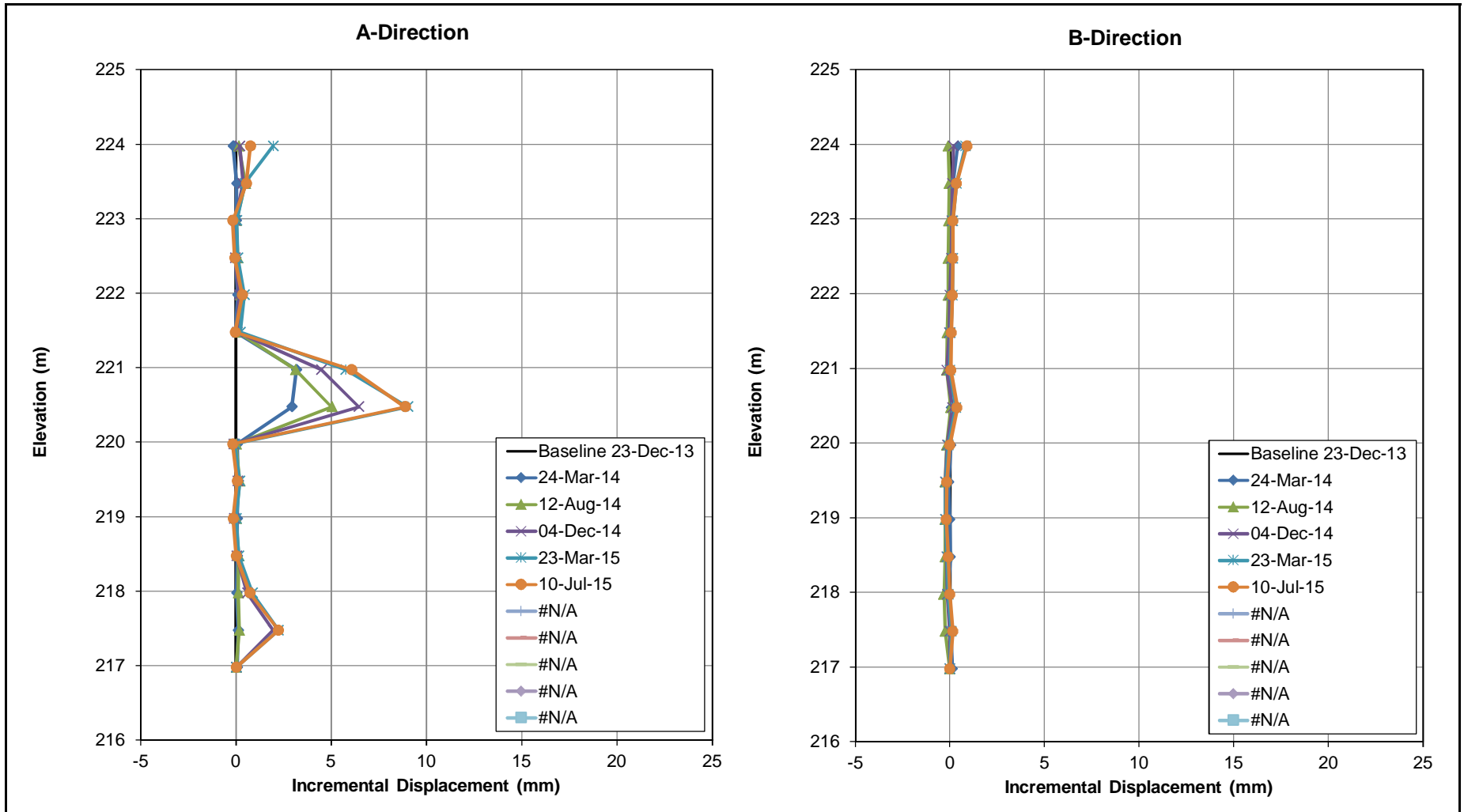




SLOPE INCLINOMETER WORKSHEET
Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-7

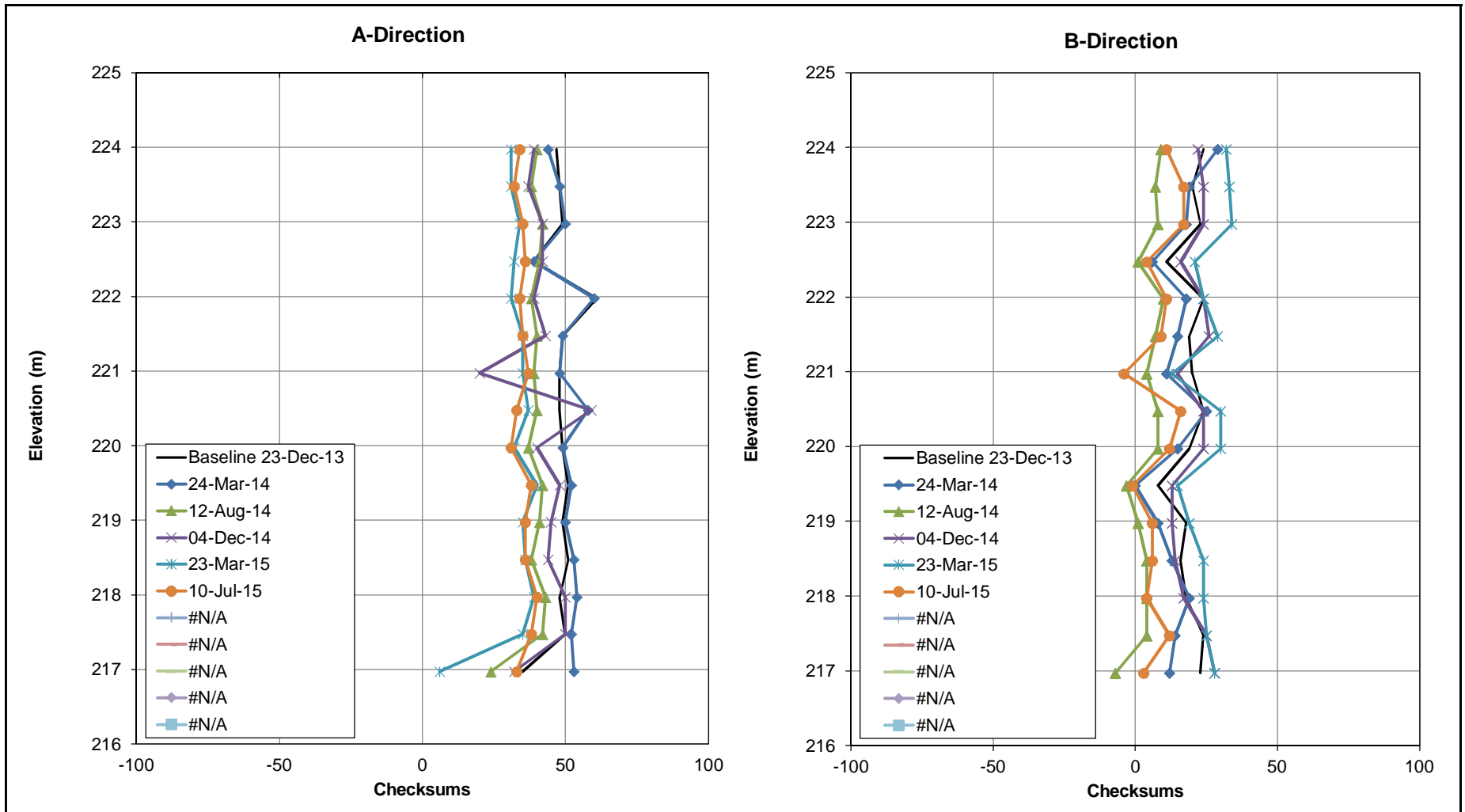




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-7

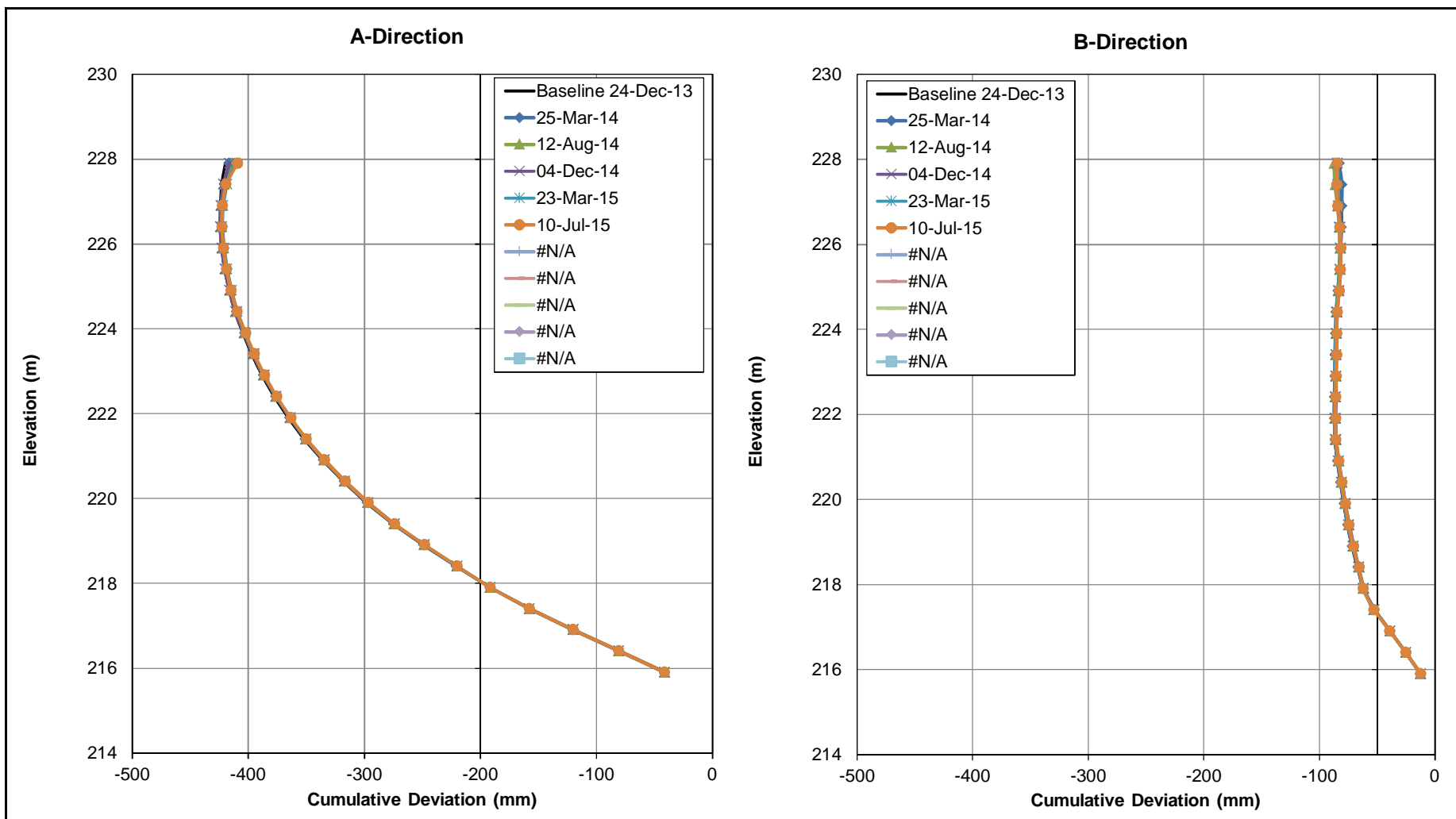




SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-8

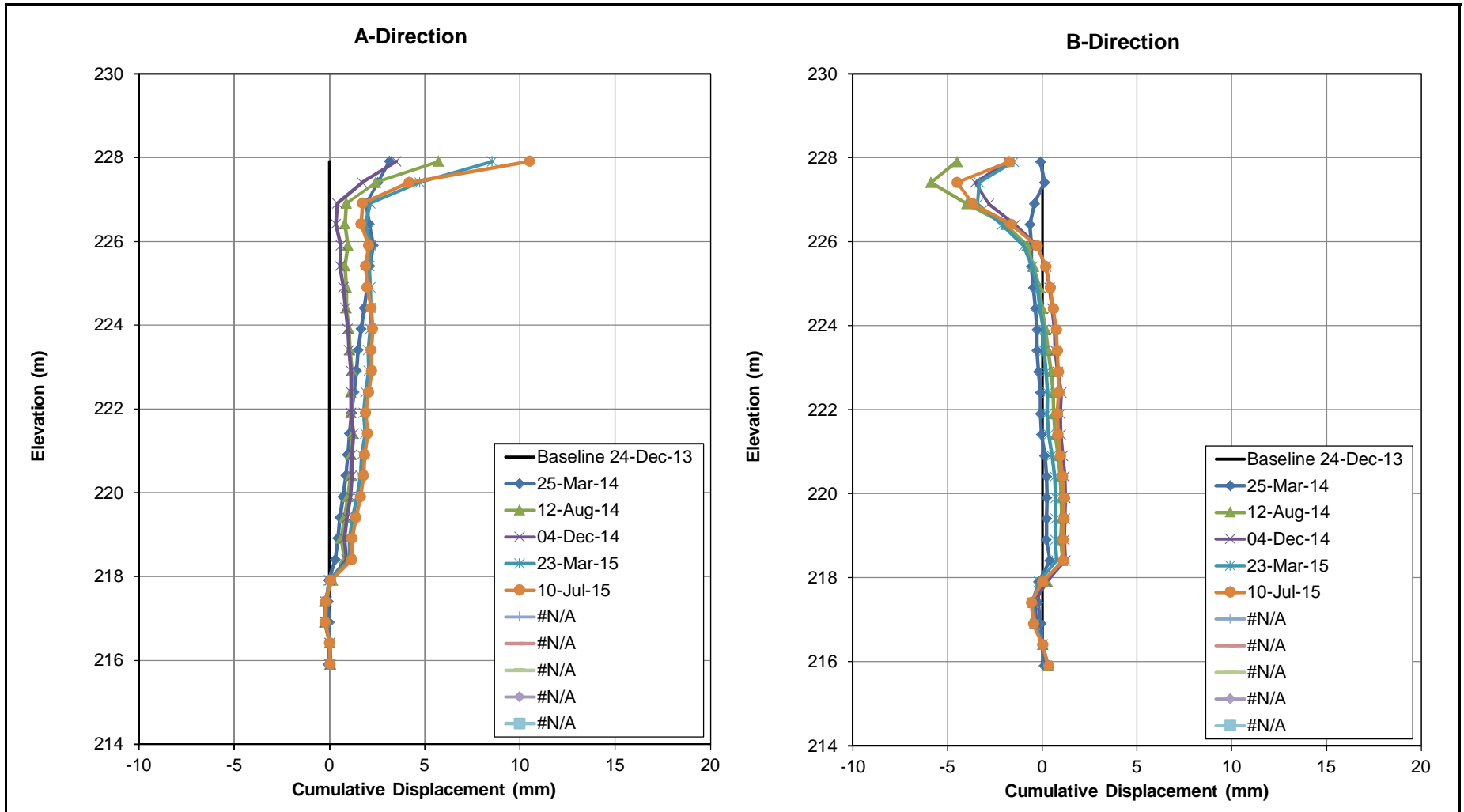




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-8



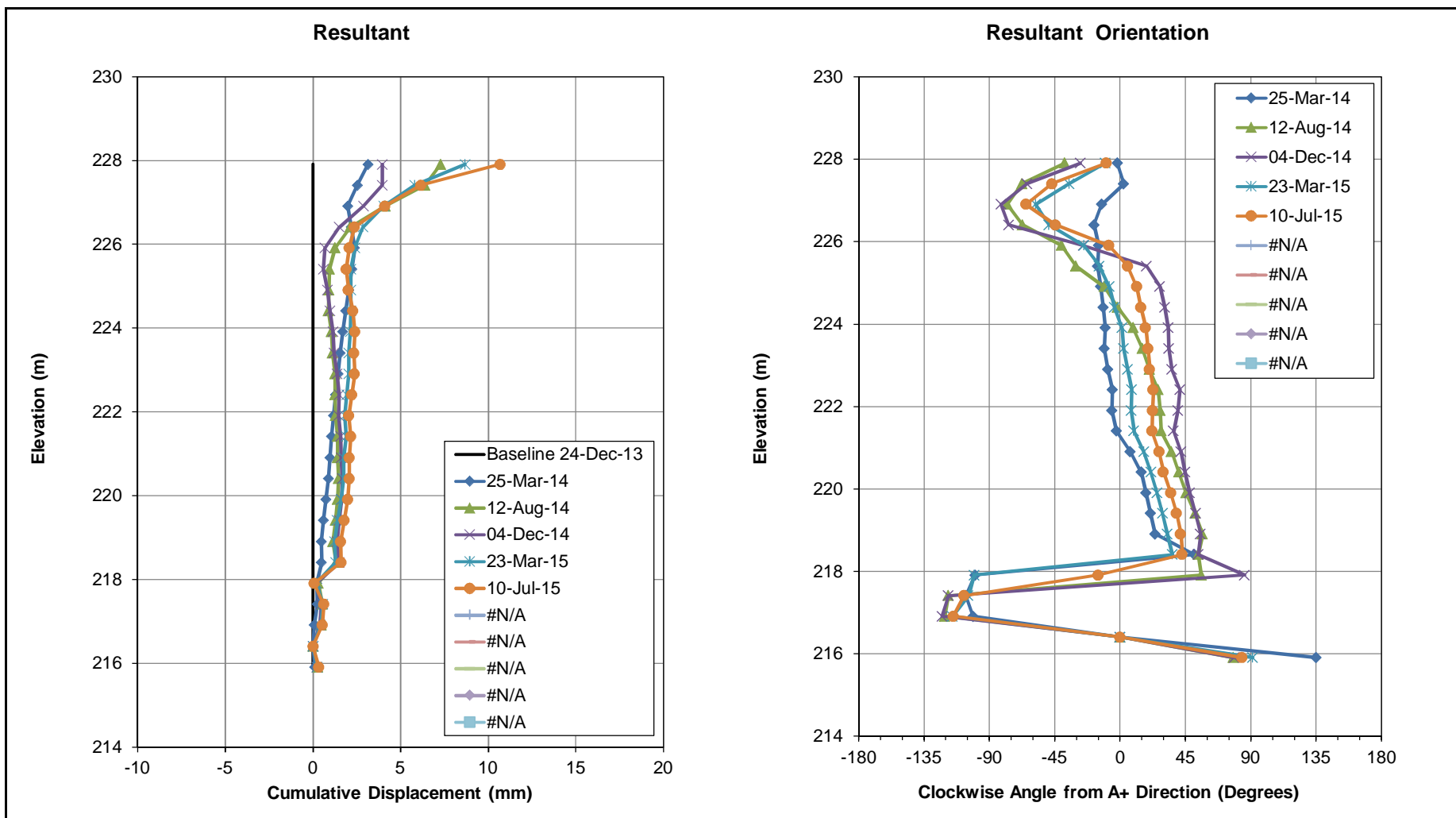


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-8



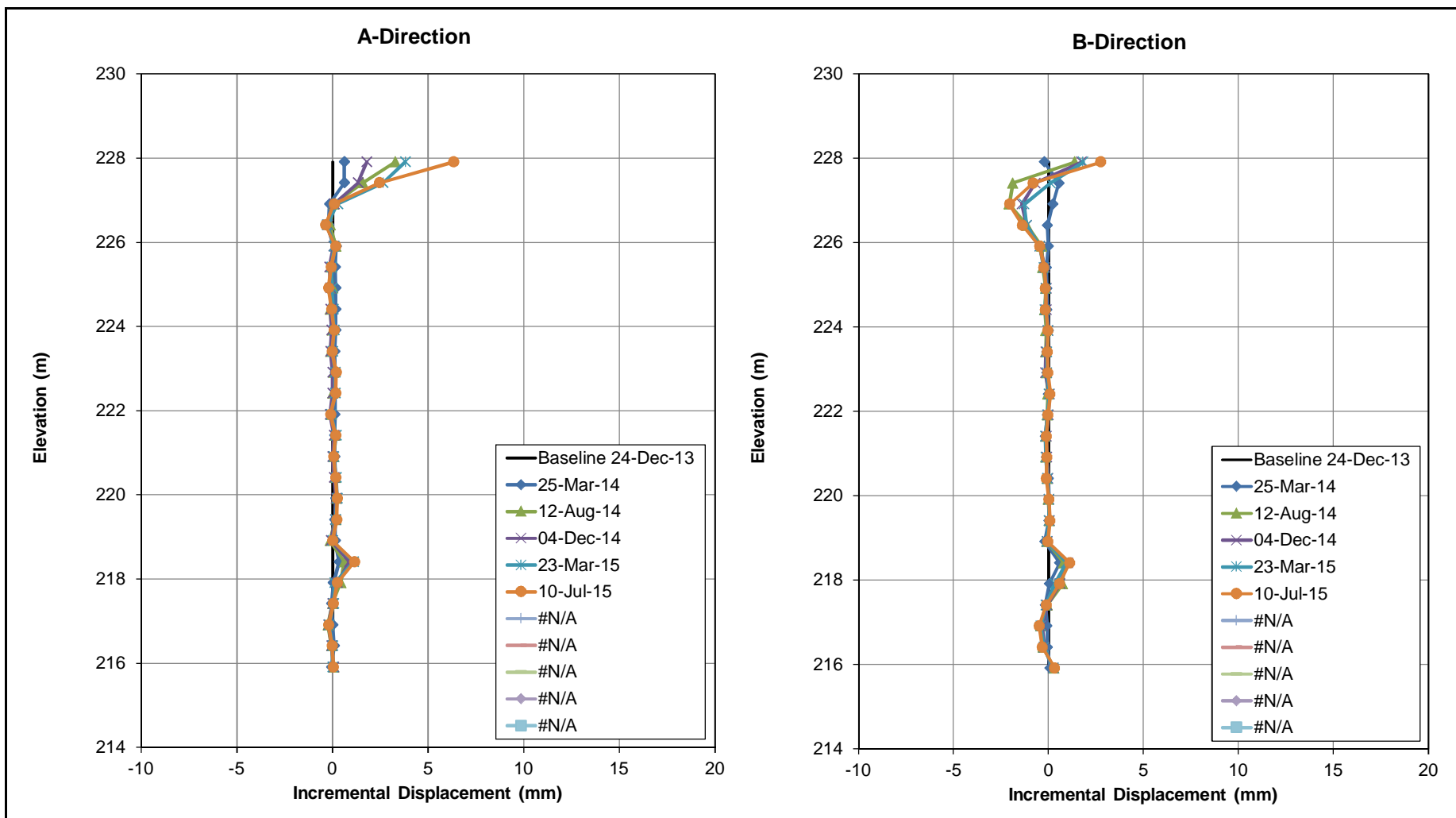


SLOPE INCLINOMETER WORKSHEET

Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-8

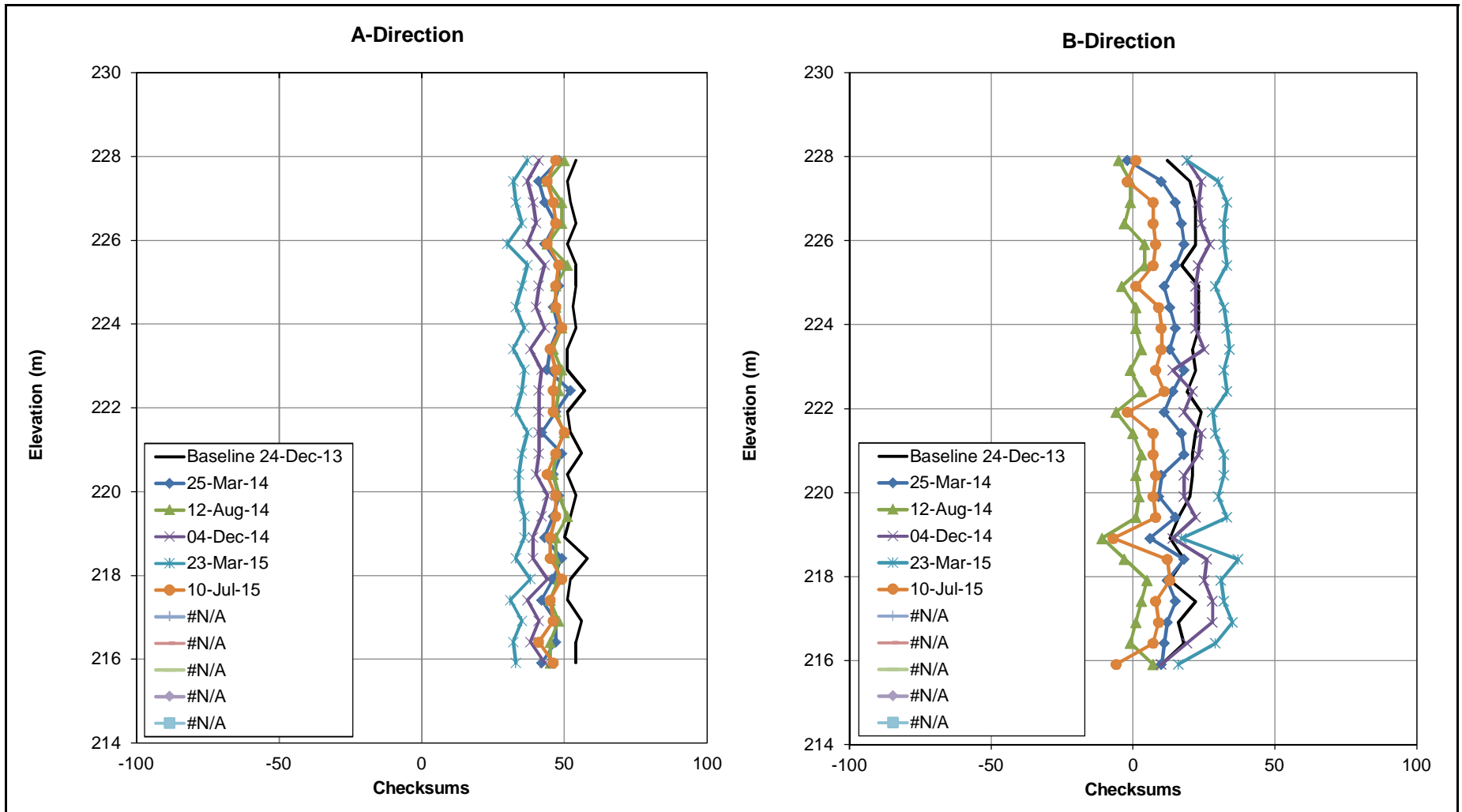




SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-8

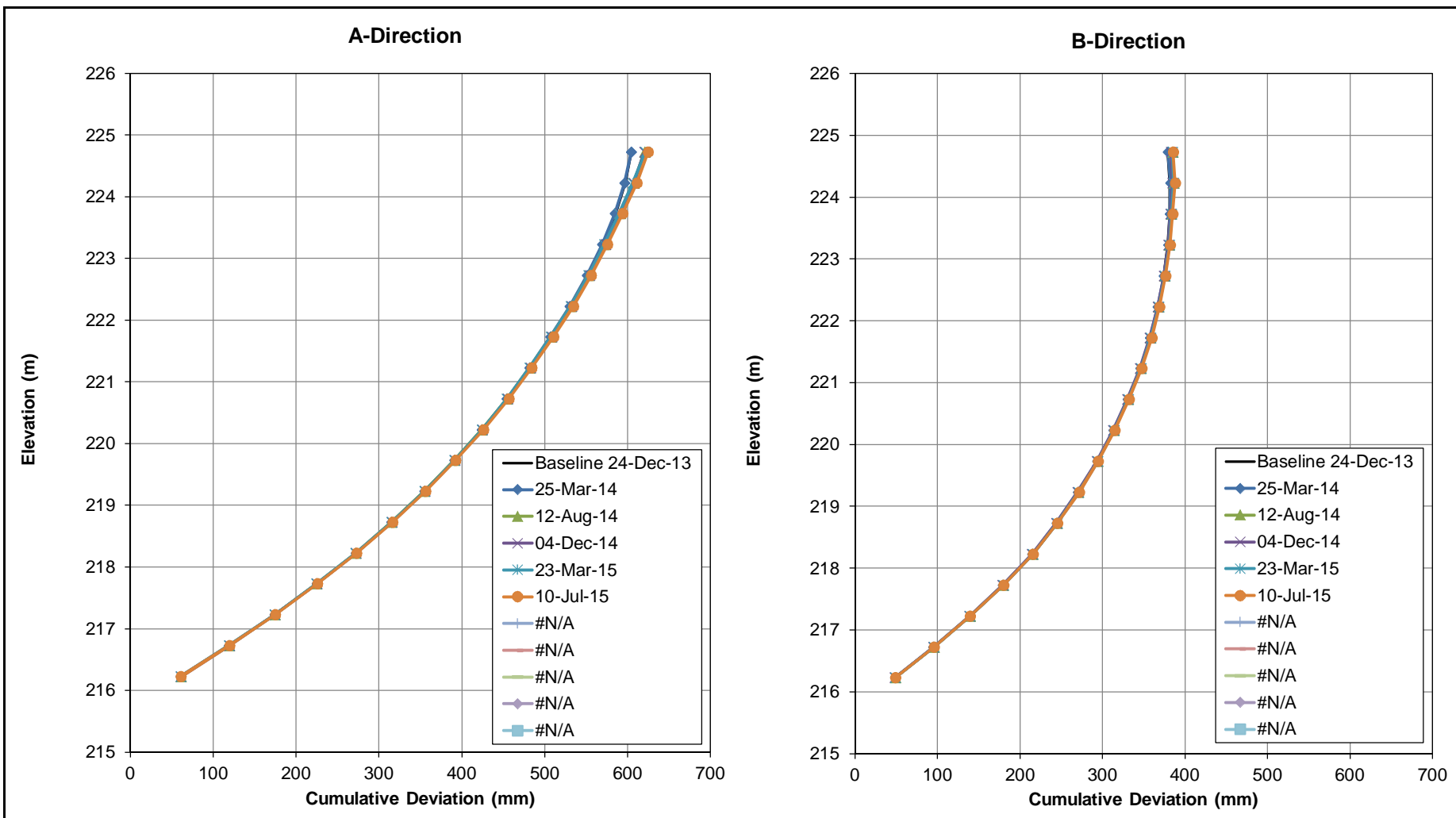




SLOPE INCLINOMETER WORKSHEET
Cumulative Deviation in A and B Directions (Casing Shape)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-9



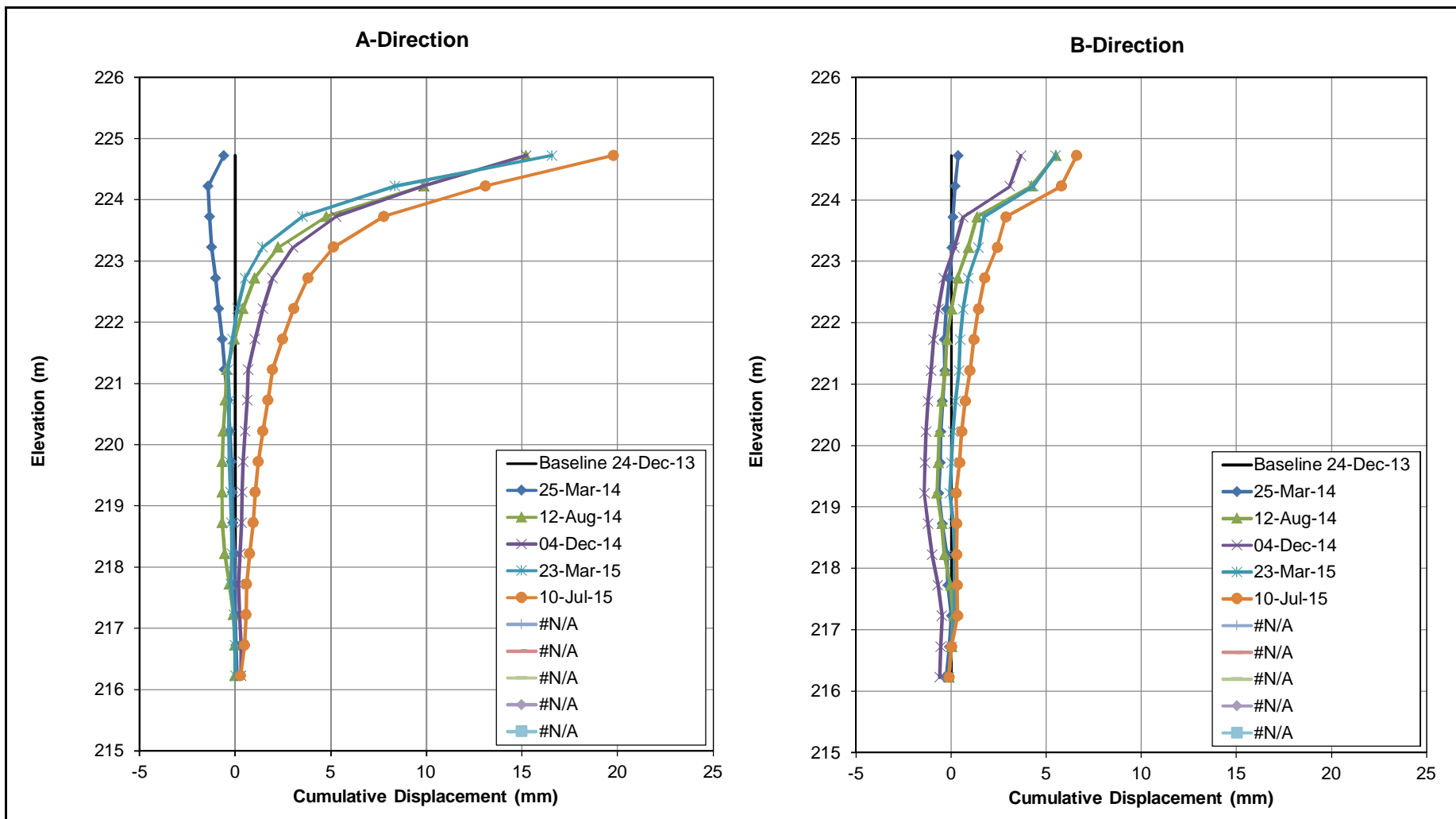


SLOPE INCLINOMETER WORKSHEET

Cumulative Displacement in A and B Directions (Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinator No. SI-9

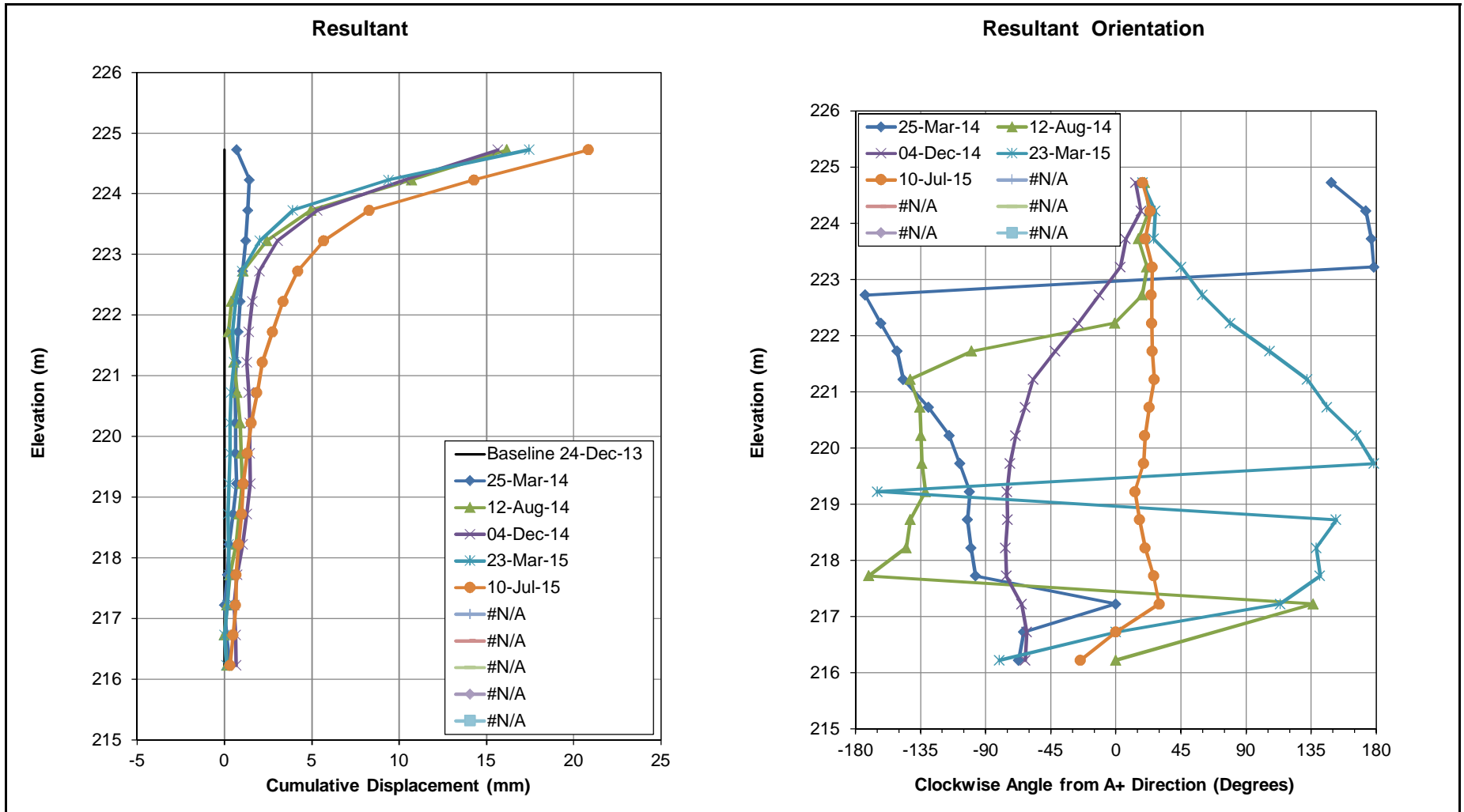




SLOPE INCLINOMETER WORKSHEET
Cumulative Displacement Resultant and Orientation Azimuth

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Inclinerometer No. SI-9

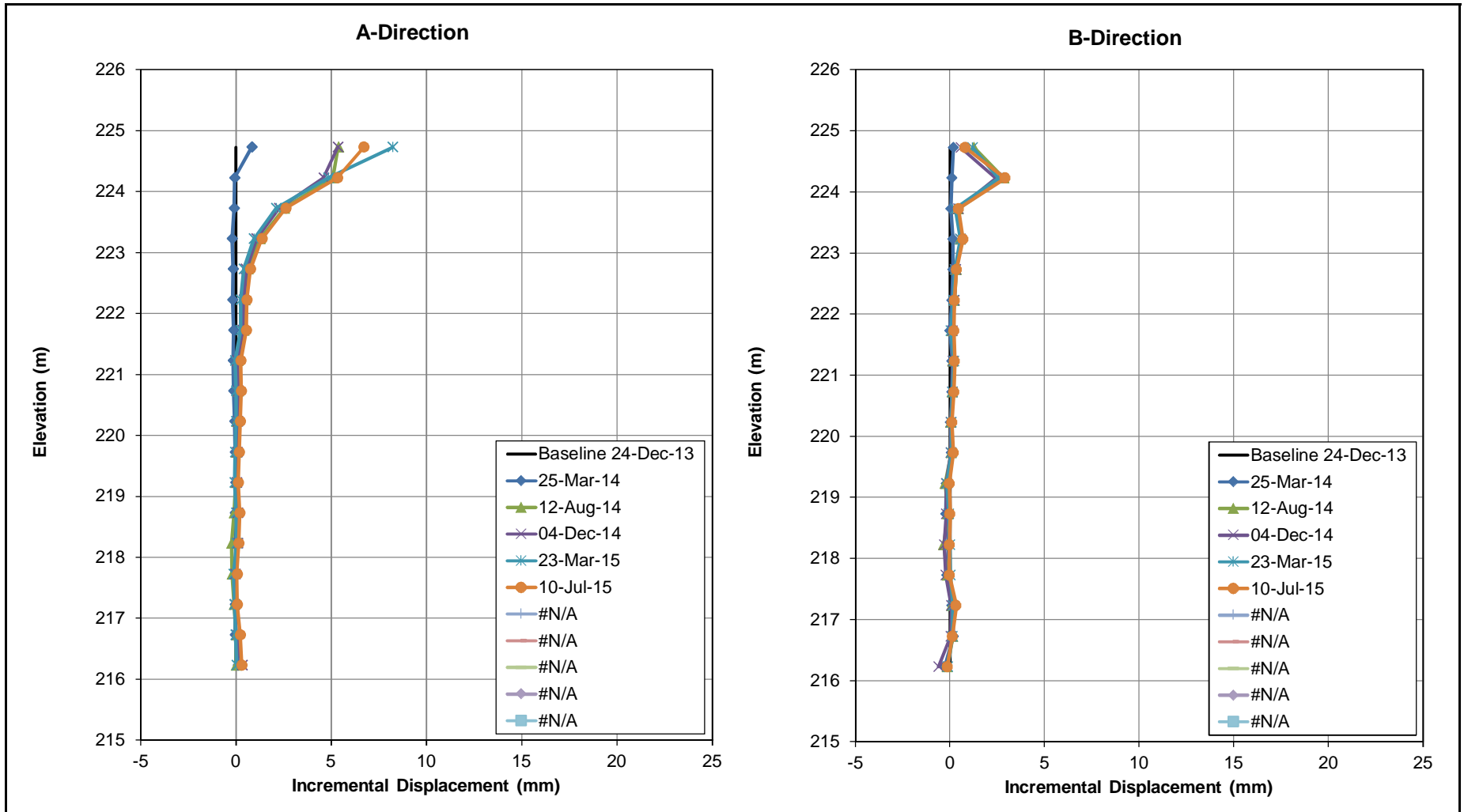




SLOPE INCLINOMETER WORKSHEET
Incremental Displacement in A and B Directions (Zones of Movement)

INSTALLATION DATA

Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-9

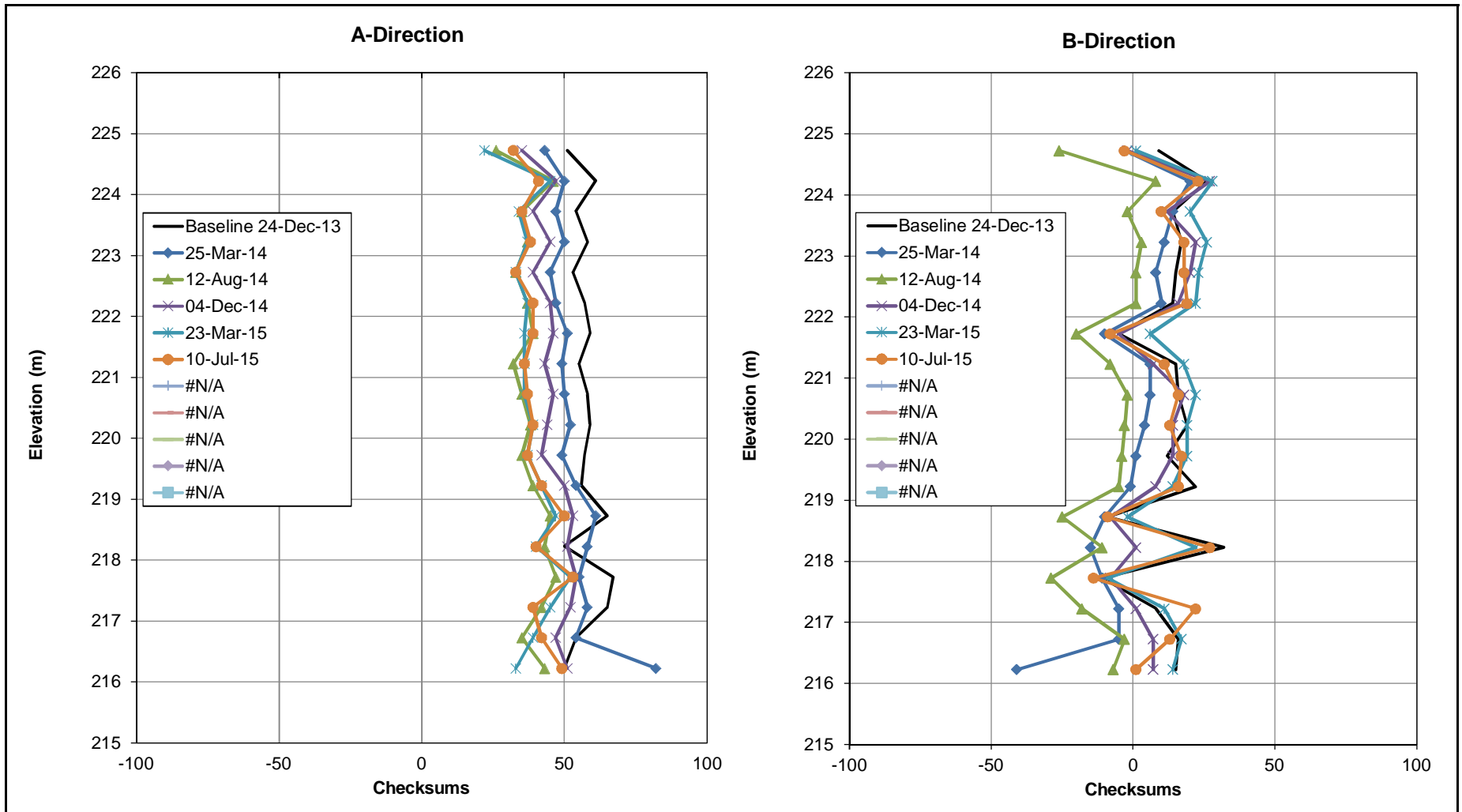




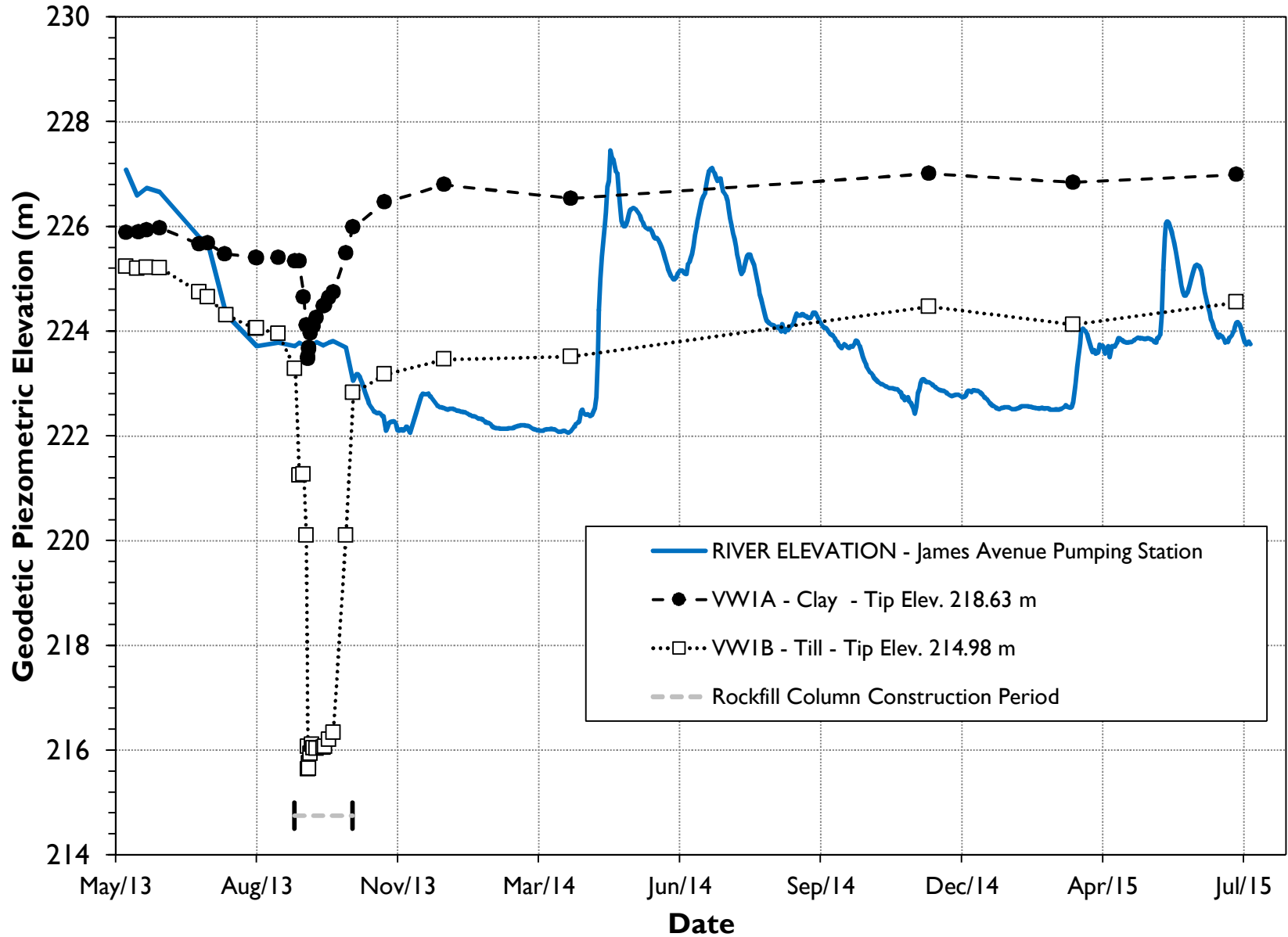
SLOPE INCLINOMETER WORKSHEET
Checksums in A and B Directions

INSTALLATION DATA

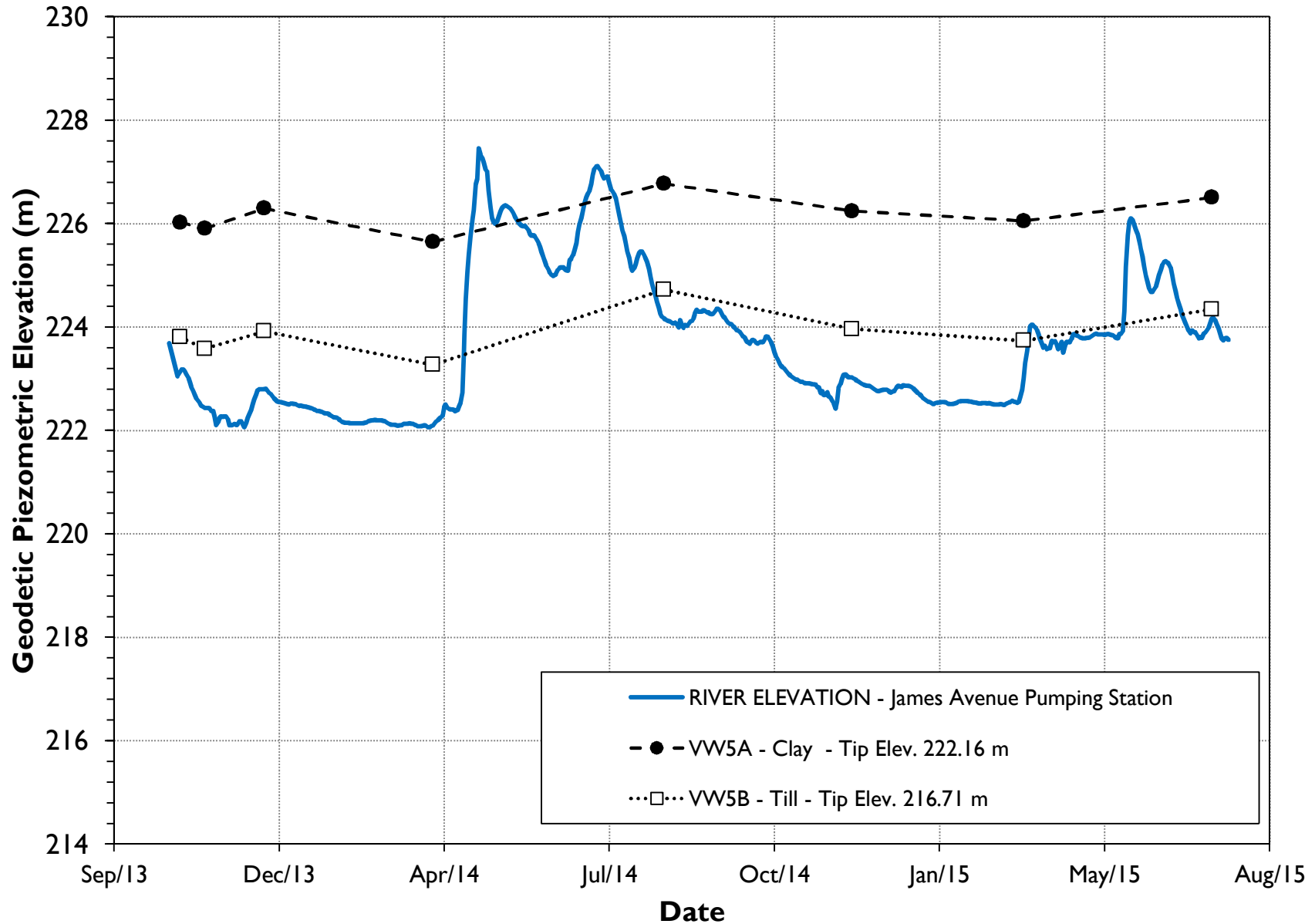
Project No. 0015 008 00
Project Title Lyndale Drive Retaining Wall Assessment
Client City of Winnipeg
Slope Incliner No. SI-9



GROUNDWATER MONITORING REPORT
Lyndale Drive Retaining Wall Assessment
Piezometer Summary Plot (TH13-01)

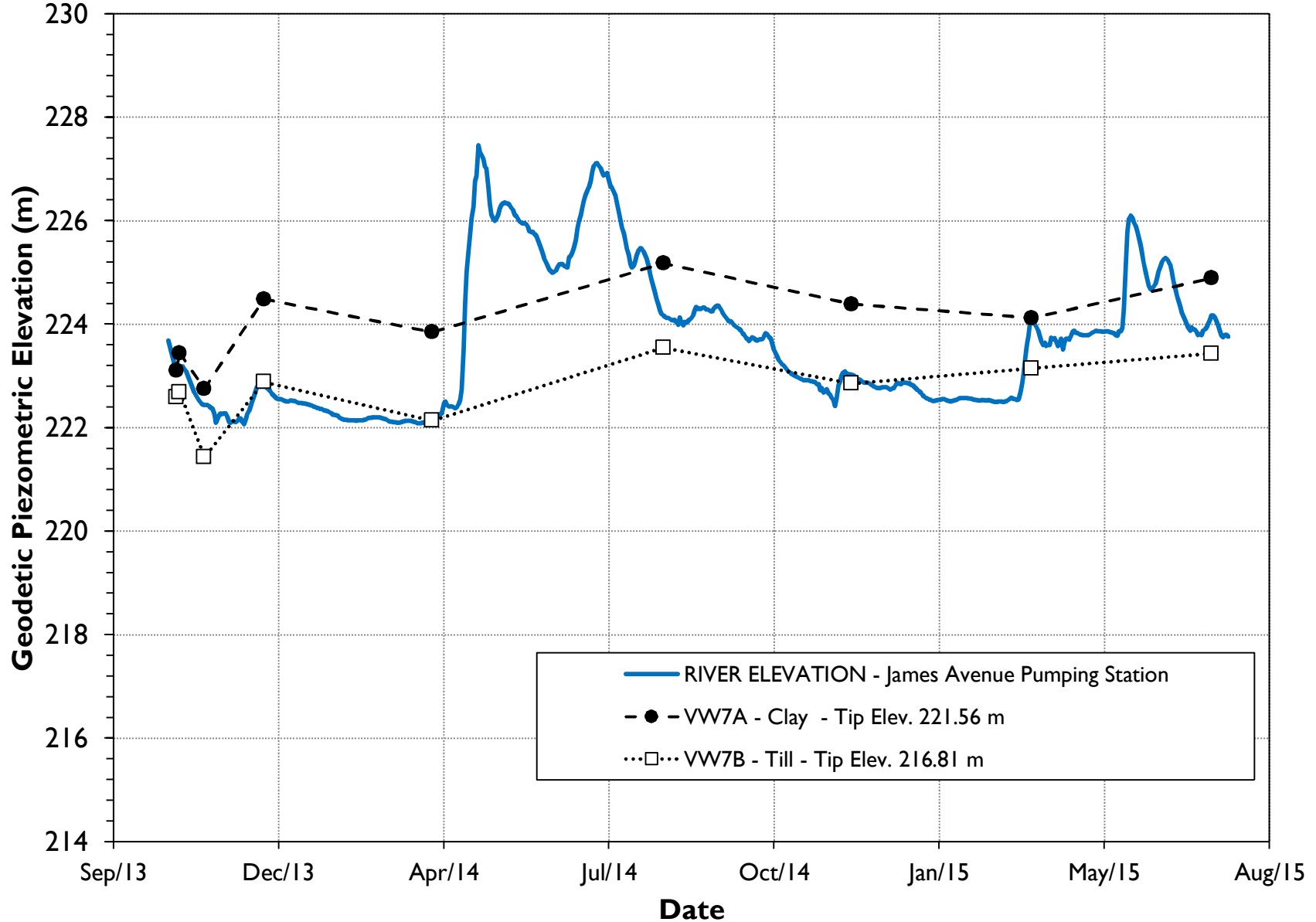


GROUNDWATER MONITORING REPORT
Lyndale Drive Retaining Wall Assessment
Piezometer Summary Plot (TH13-05)



GROUNDWATER MONITORING REPORT

Lyndale Drive Retaining Wall Assessment
Piezometer Summary Plot (TH13-07)





SLOPE INCLINOMETER WORKSHEET

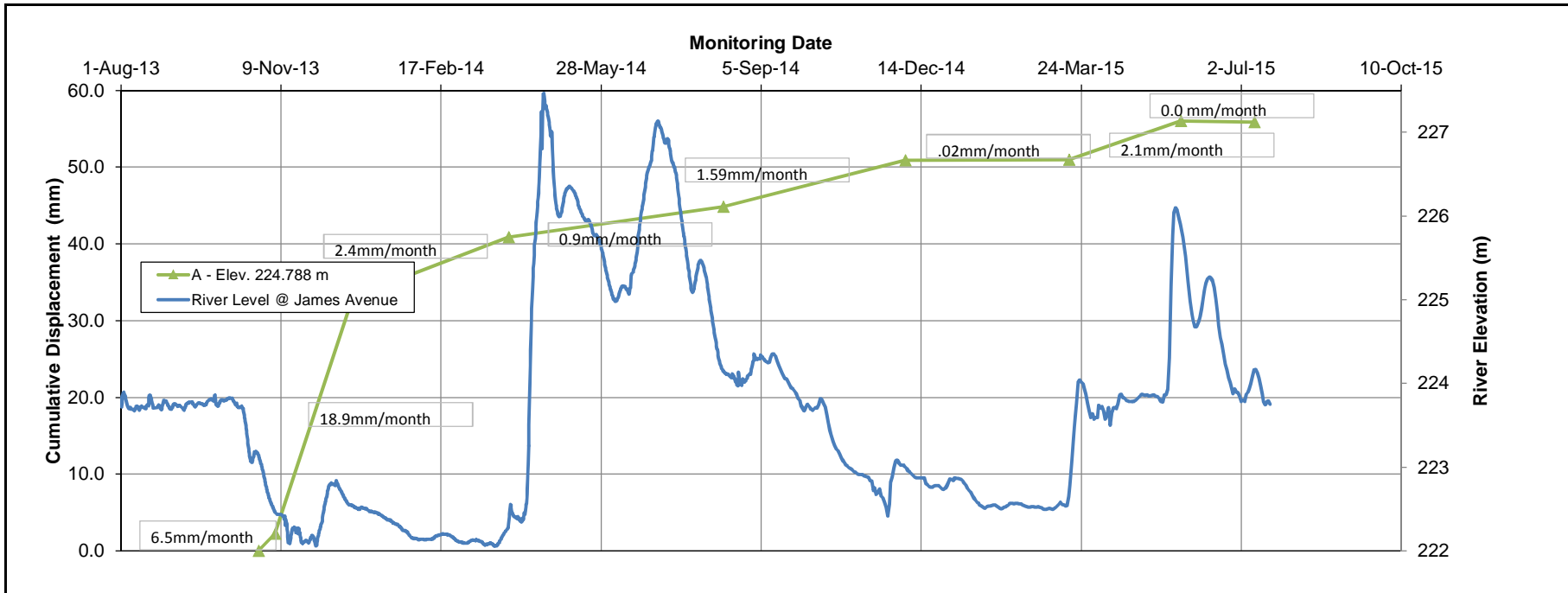
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Incliner No. SI-1B

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	25-Oct-13	5-Nov-13	24-Dec-13	31-Mar-14	12-Aug-14	4-Dec-14	16-Mar-15	25-May-15	10-Jul-15		
Top	224.8	A	0.0	2.2	33.1	40.9	44.8	50.9	51.0	56.0	55.9		
		B	0.0	1.0	41.9	41.8	44.3	43.3	47.4	44.4	44.4		
		Resultant	0.0	2.5	53.4	58.5	63.0	66.9	69.6	71.4	71.4		
Bot	214.9	A											
		B											
		Resultant											





SLOPE INCLINOMETER WORKSHEET

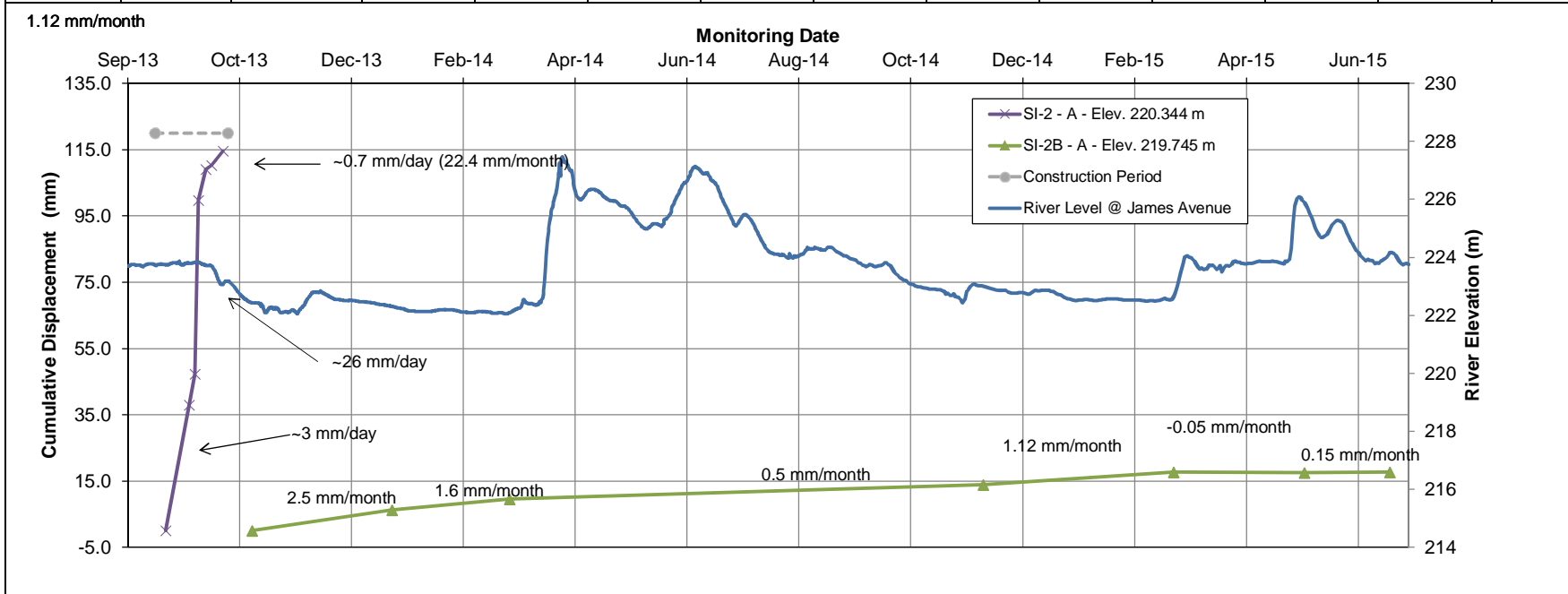
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinerometer No. SI-2 & SI-2B

Elevation Range (m)		Axis	Cumulative Displacement (mm) vs. Monitoring Date SI-2 (during construction)						
Upper Movement			21-Sep-13	4-Oct-13	7-Oct-13	9-Oct-13	13-Oct-13	16-Oct-13	22-Oct-13
220.3		A	0.0	37.9	47.3	99.7	109.0	110.2	114.6
		B	0.0	-3.0	-3.4	1.8	0.8	0.5	-0.8
		Resultant	0.0	38.1	47.4	99.7	109.0	110.2	114.6

Elevation Range (m)		Axis	Cumulative Displacement (mm) vs. Monitoring Date SI-2B (post-construction)						
Upper Movement			6-Nov-13	21-Jan-14	25-Mar-14	4-Dec-14	16-Mar-15	25-May-15	10-Jul-15
219.7		A	0.0	6.3	9.6	13.9	17.7	17.6	17.8
		B	0.0	-0.6	-0.2	-0.2	-0.4	-0.6	-0.8
		Resultant	0.0	6.3	9.6	13.9	17.7	17.6	17.8





SLOPE INCLINOMETER WORKSHEET

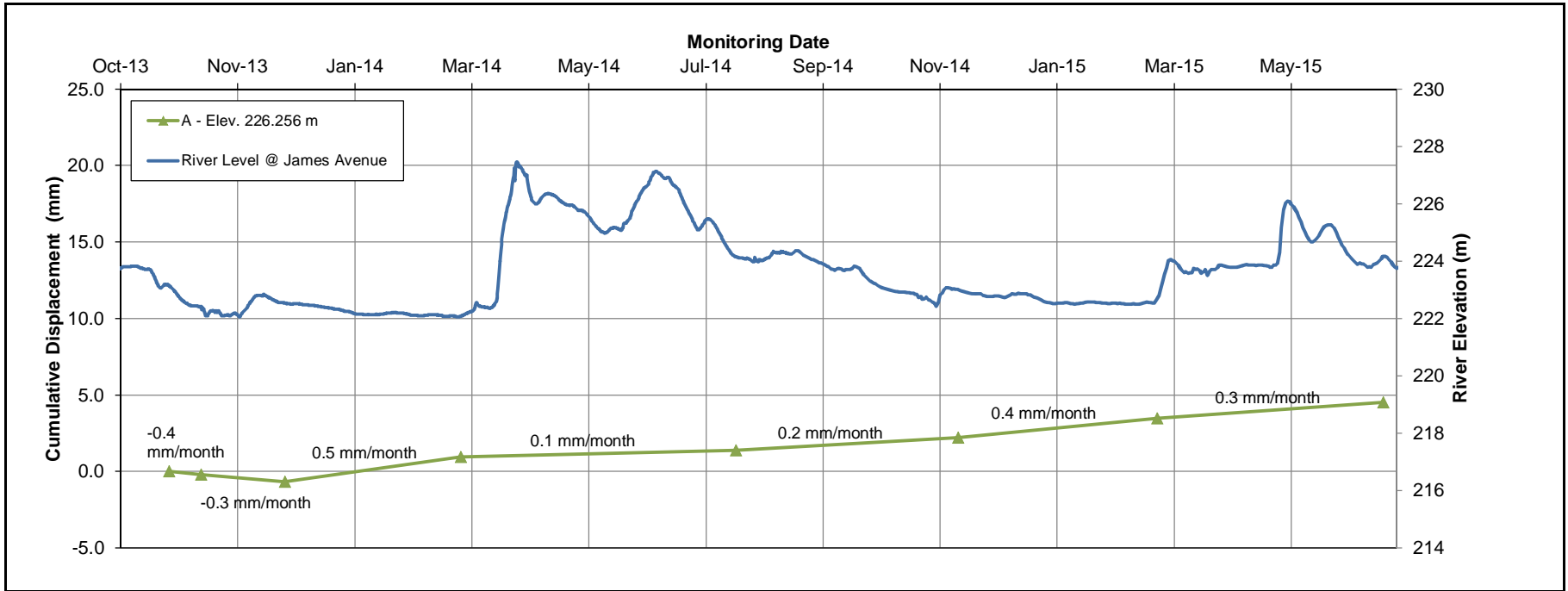
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Incliner No. SI-3

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	25-Oct-13	11-Nov-13	24-Dec-13	24-Mar-14	12-Aug-14	4-Dec-14	16-Mar-15	10-Jul-15		
Bot	226.3	A	0.0	-0.2	-0.7	1.0	1.4	2.2	3.5	4.5		
		B	0.0	0.2	0.1	0.1	1.3	0.4	0.0	-0.1		
		Resultant	0.0	0.3	0.7	1.0	1.9	2.2	3.5	4.5		





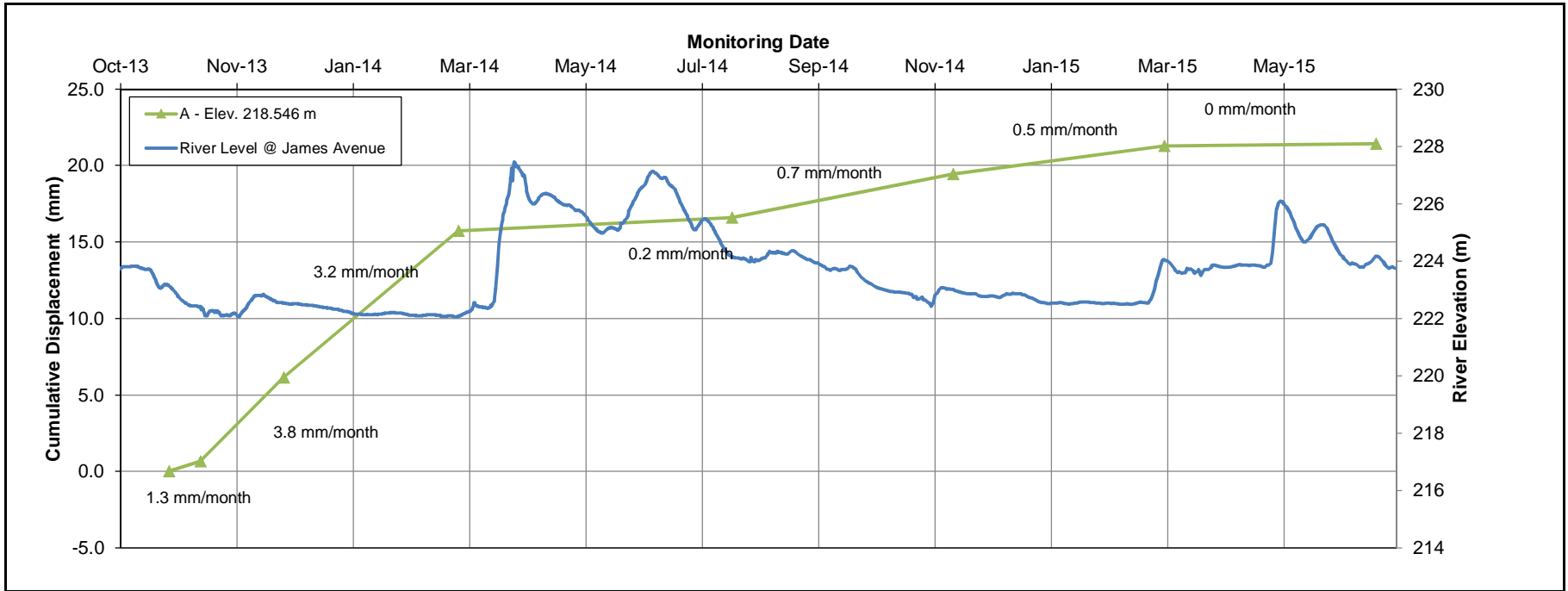
SLOPE INCLINOMETER WORKSHEET

Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No.	0015 008 00	
Project Title	Lyndale Drive Retaining Wall Assessment	0.092477064
Client	City of Winnipeg	0.010275229
Slope Inclinator No.	SI-4	0.00146789

Elevation Range (m)		Axis	Cumulative Displacement (mm) vs. Monitoring Date									
218.5			25-Oct-13	11-Nov-13	24-Dec-13	24-Mar-14	12-Aug-14	4-Dec-14	23-Mar-15	10-Jul-15		
Mid	218.5	A	0.0	0.7	6.2	15.7	16.6	19.4	21.3	21.4		
		B	0.0	0.4	0.4	1.8	1.6	1.8	2.8	2.9		
		Resultant	0.0	0.8	6.2	15.8	16.7	19.5	21.5	21.6		





SLOPE INCLINOMETER WORKSHEET

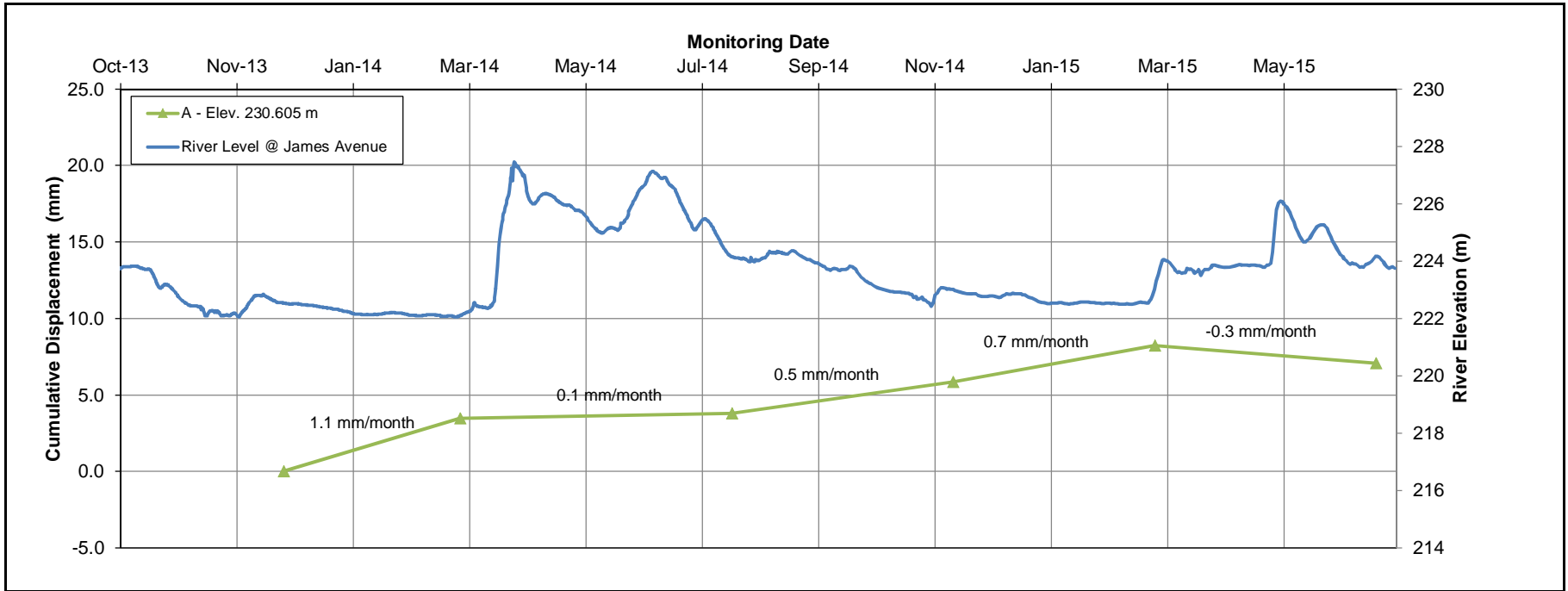
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Incliner No. SI-5

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	24-Dec-13	25-Mar-14	12-Aug-14	4-Dec-14	18-Mar-15	10-Jul-15				
Top	230.6	A	0.0	3.5	3.8	5.8	8.2	7.1				
		B	0.0	0.4	1.4	1.7	2.4	2.3				
		Resultant	0.0	3.5	4.0	6.1	8.6	7.5				





SLOPE INCLINOMETER WORKSHEET

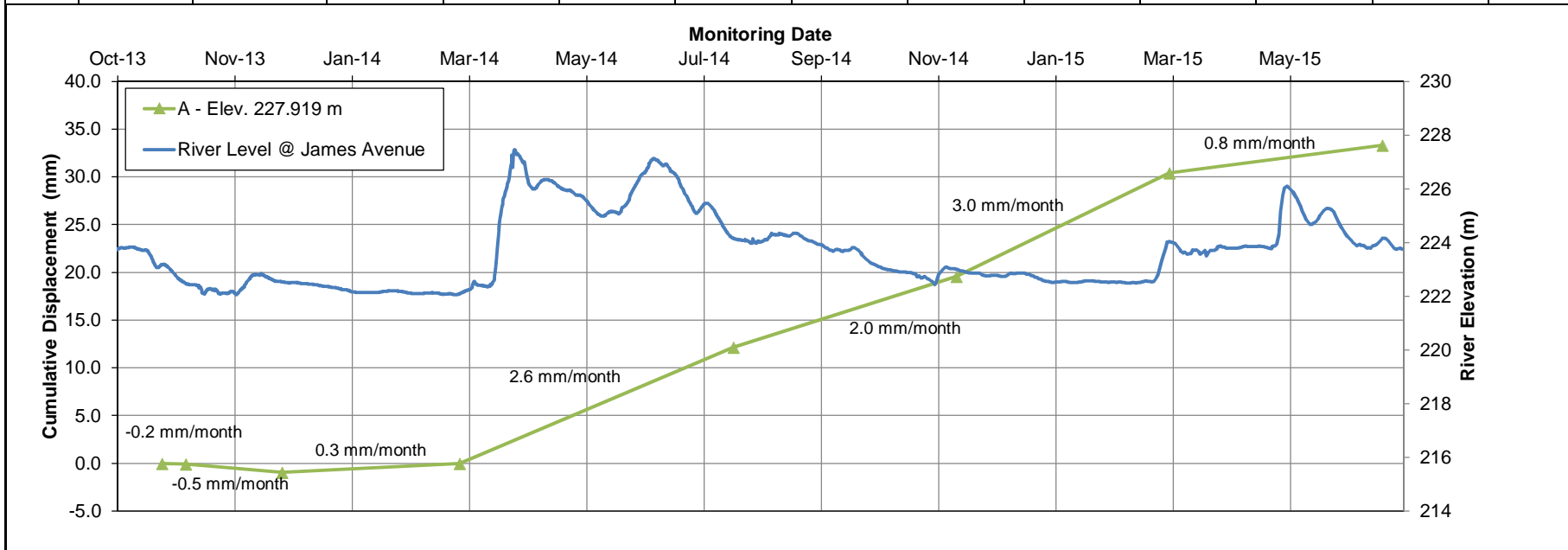
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinator No. SI-6

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	23-Oct-13	5-Nov-13	24-Dec-13	25-Mar-14	12-Aug-14	4-Dec-14	23-Mar-15	10-Jul-15		
Top	227.9	A	0.0000	-0.1000	-0.9600	-0.0400	12.1	19.6	30.4	33.3		
		B	0.0	-0.2	0.1	0.6	3.0	3.1	6.2	3.3		
		Resultant	0.0	0.3	1.0	0.6	12.5	19.8	31.1	33.5		





SLOPE INCLINOMETER WORKSHEET

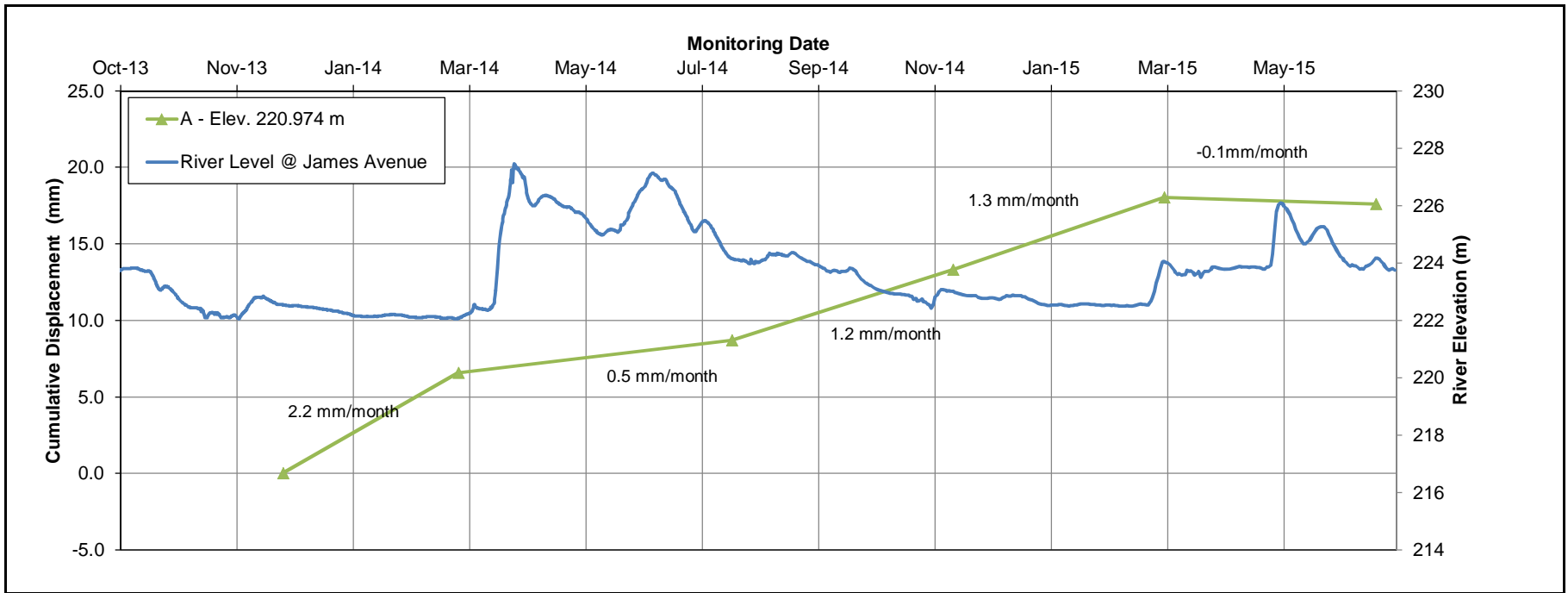
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Incliner No. SI-7

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	23-Dec-13	24-Mar-14	12-Aug-14	4-Dec-14	23-Mar-15	10-Jul-15				
Top	221.0	A	0.0	6.6	8.7	13.3	18.0	17.6				
		B	0.0	0.0	-1.6	-1.0	-0.4	0.1				
		Resultant	0.0	6.6	8.8	13.3	18.0	17.6				





SLOPE INCLINOMETER WORKSHEET

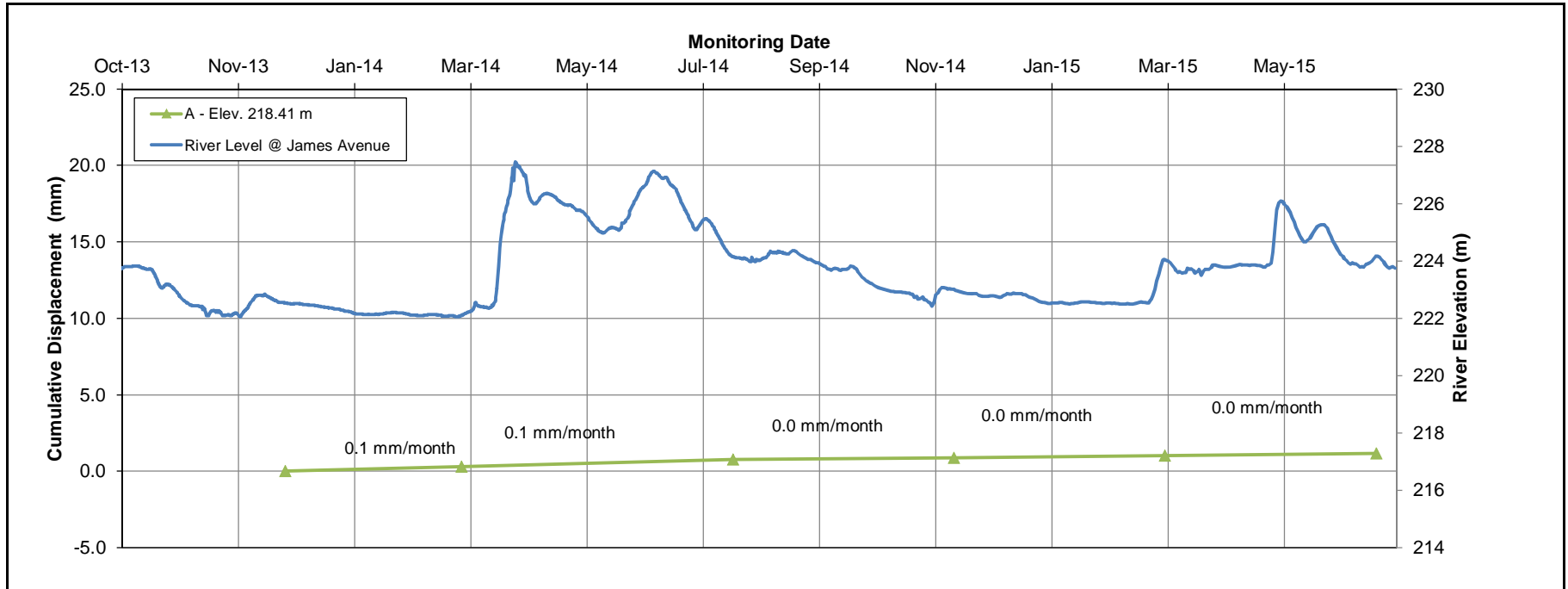
Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinator No. SI-8

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	24-Dec-13	25-Mar-14	12-Aug-14	4-Dec-14	23-Mar-15	10-Jul-15				
Bot	218.4	A	0.0	0.3	0.8	0.9	1.0	1.2				
		B	0.0	0.4	1.1	1.2	0.8	1.1				
		Resultant	0.0	0.5	1.3	1.5	1.3	1.6				





SLOPE INCLINOMETER WORKSHEET

Deflection Rate Plots (All Axes Combined, Relative to Casing Bottom)

INSTALLATION DATA

Project No. 0015 008 00
 Project Title Lyndale Drive Retaining Wall Assessment
 Client City of Winnipeg
 Slope Inclinator No. SI-9

Cumulative Displacement (mm) vs. Monitoring Date

Elevation Range (m)		Axis	24-Dec-13	25-Mar-14	12-Aug-14	4-Dec-14	23-Mar-15	10-Jul-15				
Top	224.7	A	0.0	-0.6	15.2	15.2	16.6	19.8				
		B	0.0	0.4	5.5	3.6	5.5	6.6				
		Resultant	0.0	0.7	16.2	15.7	17.5	20.8				

