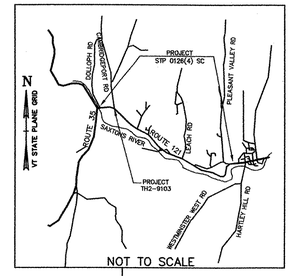
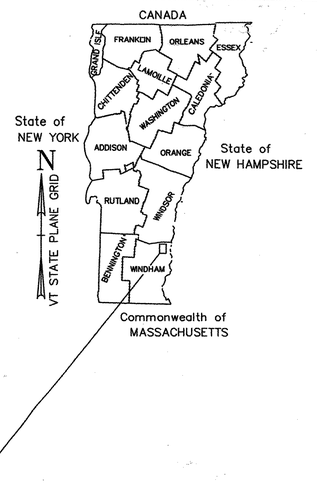
TOWNS OF GRAFTON & ROCKINGHAM
COUNTY OF WINDHAM
ROUTE 121 RECONSTRUCTION

GRAFTON–ROCKINGHAM STP 0126(4)S–CONTRACT 2
AND
ROCKINGHAM TH2–9103

CONTRACT (100%) PLANS

Metric





PROJECT LOCATION : LOCATED IN THE COUNTY OF WINDHAM IN THE TOWNS OF GRAFTON AND ROCKINGHAM.
THE PROJECT BEGINS 40 METERS EAST OF THE JUNCTION WITH ROUTE 35.
THE PROJECT ENDS 60 METERS WEST OF THE LEACH ROAD INTERSECTION.

PROJECT DESCRIPTION : WORK CONSISTS OF RECONSTRUCTION OF ROUTE 121 INCLUDING: PAVEMENT, SUBBASE, DRAINAGE, GUARDRAIL, LANDSCAPING, BRIDGE REPLACEMENT AT WEAVER BROOK, AND RETAINING WALL CONSTRUCTION.

LENGTH OF ROADWAY : 2800 METERS.
LENGTH OF PROJECT : 2812 METERS.

CONSTRUCTION IS TO BE CARRIED ON IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION DATED 2001, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION FOR USE ON THIS PROJECT, INCLUDING ALL SUBSEQUENT REVISIONS AND SUCH REVISED SPECIFICATIONS AND SPECIAL PROVISIONS AS ARE INCORPORATED IN THESE PLANS.

THE ROUTE 121 RECONSTRUCTION CONSISTS OF TWO PROJECTS: GRAFTON–ROCKINGHAM, STP 0126(4)S AND ROCKINGHAM, TH2–9103. THE GRAFTON–ROCKINGHAM PROJECT WAS DESIGNED, AND WILL BE CONSTRUCTED, IN METRIC UNITS. THE ROCKINGHAM PROJECT WAS DESIGNED, AND WILL BE CONSTRUCTED, IN ENGLISH UNITS.

INDEX OF SHEETS

1 TITLE SHEET

STP 0126(4)S
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19–27 PROFILES
28–35 SIGNING, PAVEMENT MARKING AND ALIGNMENT PLANS
36–42 TRAFFIC CONTROL PLANS
43–45 BANKING DIAGRAM
46–48 EROSION CONTROL PLANS
49–57 LANDSCAPE PLANS
58–105 CROSS SECTIONS
106–111 DRIVEWAY SECTIONS
112–116 RETAINING WALL #3

TH2–9103
1–38 WEAVER BROOK BRIDGE

RIGHT OF WAY
1R–15R RIGHT OF WAY PLANS

VTRANS STANDARD SHEETS

B–5M	JAN. 3, 2000
C–1M	JAN. 3, 2000
D–1M	JUNE 13, 1997
D–2M	JUNE 13, 1997
D–3M	JUNE 13, 1997
D–4M	JUNE 13, 1997
D–15M	JUNE 13, 1997
D–16M	JUNE 13, 1997
E–100M	JUNE 13, 1997
E–108M	JUNE 13, 1997
E–121M	JUNE 13, 1997
E–131M	JUNE 13, 1997
E–136CM	JUNE 13, 1997
E–142M	JUNE 13, 1997
E–151M	JUNE 13, 1997
E–154M	JUNE 13, 1997
E–155M	JUNE 13, 1997
E–193M	JUNE 13, 1997
G–1bM	JUNE 13, 1997
G–18M	JUNE 13, 1997
J–3M	JUNE 13, 1997
T–1M	JUNE 13, 1997
T–2M	JUNE 13, 1997

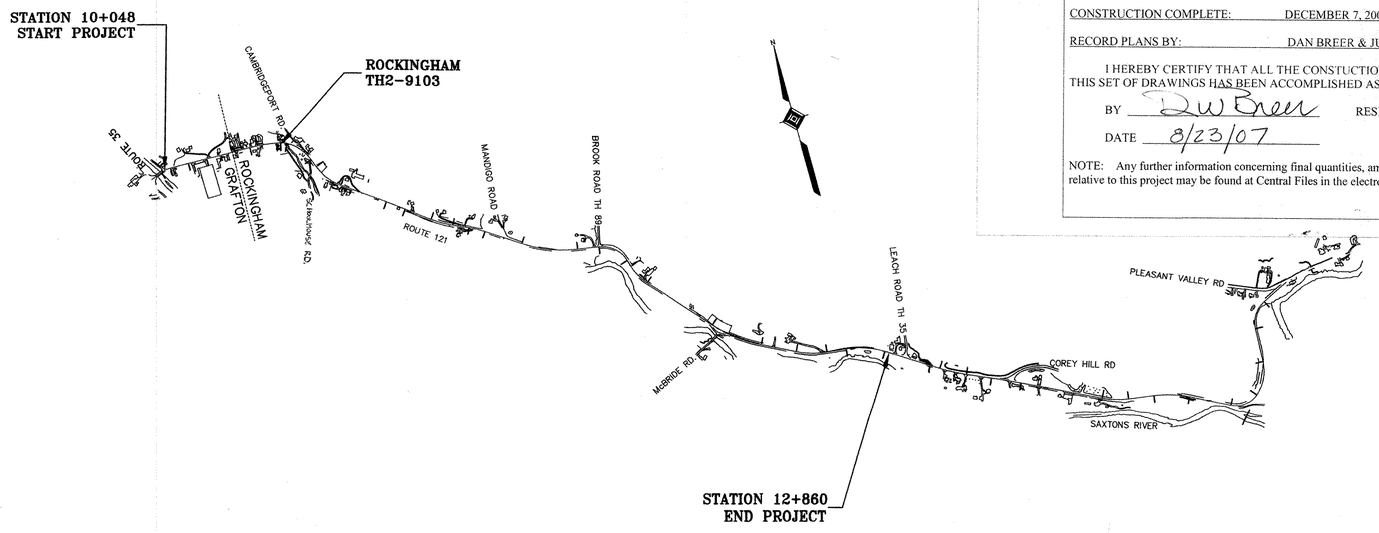
RECORD PLANS

CONTRACTOR: SCOTT'S CONSTUCTION, INC. – NEWPORT, VT
RESIDENT ENGINEER: DAN BREER
CONSTRUCTION BEGAN: MAY 7, 2004
CONSTRUCTION COMPLETE: DECEMBER 7, 2005
RECORD PLANS BY: DAN BREER & JUDY GILMORE

I HEREBY CERTIFY THAT ALL THE CONSTUCTION REQUIRED BY THIS SET OF DRAWINGS HAS BEEN ACCOMPLISHED AS INDICATED HEREIN.

BY D W Breer RESIDENT ENGINEER
DATE 8/23/07

NOTE: Any further information concerning final quantities, amounts or other details relative to this project may be found at Central Files in the electronic archives.



TRAFFIC DATA

2000 ADT:	2200
2020 ADT:	3000
2000 ADTT:	110
2020 ADTT:	100
2000 DHV:	310
2020 DHV:	420
%T:	2
%D:	50

TOTAL ESALS

2000 – 2020:	881,000
2000 – 2040:	2,198,000

DESIGN SPEED

10+048 – 10+880	50 km/h
10+900 – 12+860	60 km/h

CONVENTIONAL SIGNS

COUNTY LINE
TOWN LINE
LIMITS OF ACCESS
POINT OF ACCESS
FENCE LINE
STONE WALL
TRAVELED WAY
GUARD RAIL
RAILROAD
SURVEY LINE
CULVERT
UNDERGROUND TEL.
UTILITY POLE
TREES
HEDGE
CONTROL OF ACCESS
PROPERTY LINE
R.O.W. TAKING LINE
TOP OF CUT
TOE OF SLOPE
CLEAR ZONE

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

0 200 400 600
600 Meters

V: /1261/CADD/PLANS/TITLE2.DWG

Metric
UNLESS NOTED OTHERWISE
STATIONS ARE IN KILOMETERS
ELEVATIONS ARE IN METERS
DIMENSIONS ARE IN MILLIMETERS

STRUCTURAL PLANS PREPARED BY:
THE LOUIS BERGER GROUP, INC.
1001 ELM STREET, SUITE 300
MANCHESTER, NH 03101
BY: DATE: 1/30/04
STATE OF VERMONT JEFFREY P. CICERELLO NO. 8052 STRUCTURAL LICENSED PROFESSIONAL ENGINEER

ROADWAY PLANS PREPARED BY:
THE LOUIS BERGER GROUP, INC.
1001 ELM STREET, SUITE 300
MANCHESTER, NH 03101
BY: DATE: 1/30/04
STATE OF VERMONT ANTHONY M. PONTIN No. 7336 REGISTERED PROFESSIONAL ENGINEER

PROJECT: ROUTE 121 RECONSTRUCTION
PROJECT NO. : STP 0126(4) S & TH2–9103
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 1 OF 116

QUANTITY SHEET - STP 0126(4)S

Metric

SUMMARY OF ESTIMATED QUANTITIES

	EROSION CONTROL	WALL #3	ROADWAY	QUANTITIES GRAND TOTAL	UNIT	ITEMS	UNIT NUMBER	RND
	–	–	1	1	LS	CLEARING AND GRUBBING	201.10	–
	–	–	10	10	EA	REMOVING MEDIUM TREES	201.15	–
	–	–	10	10	EA	REMOVING LARGE TREES	201.16	–
	–	–	38,000	38,000	CM	COMMON EXCAVATION	203.15	–
	–	–	4,900	4,900	CM	SOLID ROCK EXCAVATION	203.16	–
	–	–	10,500	10,500	CM	SAND BORROW	203.31	–
	–	–	24,500	24,500	SM	FINE GRADING – SUBGRADE	203.40	–
	–	–	4,100	4,100	CM	TRENCH EXCAVATION OF EARTH	204.20	–
	–	–	250	250	CM	TRENCH EXCAVATION OF ROCK	204.21	–
	–	394	–	394	CM	GRANULAR BACKFILL FOR STRUCTURES	204.30	–
	–	–	900	900	SM	DRILLING AND BLASTING OF SOLID ROCK SUBGRADE	205.20	–
	–	231	–	231	CM	COFFERDAM EXCAVATION (EARTH)	208.30	–
	–	234	–	234	CM	COFFERDAM EXCAVATION (ROCK)	208.35	–
	–	1	–	1	LS	COFFERDAM	208.40	–
	–	–	60	60	SM	COLD PLANING – BITUMINOUS CONCRETE	210.10	–
	–	–	100	100	CM	SUBBASE OF GRAVEL	301.15	–
	–	–	14,500	14,500	CM	SUBBASE OF DENSE GRADED CRUSHED STONE	301.35	–
	–	–	300	300	CM	AGGREGATE SHOULDER, IN PLACE	402.10	–
	–	–	1,800	1,800	KG	EMULSIFIED ASPHALT	404.65	–
	–	–	8,140	8,140	TON	BITUMINOUS CONCRETE PAVEMENT	406.25	–
	–	–	1	1	LU	PRICE ADJUSTMENT, ASPHALT CEMENT **NOT A BID ITEM**	406.5	–
	–	110	80	190	CM	CONCRETE, CLASS B	501.25	–
	–	7,257	170	7,427	KG	REINFORCING STEEL	507.15	–
	–	–	0.3	0.3	CM	STRUCTURAL LUMBER AND TIMBER – TREATED (MOD)	522.25	–
	–	–	1	1	EA	REMOVAL OF STRUCTURE (MOD–RELOCATION OF BARN)	529.15	–
	–	–	92	92	M	375 mm RCP, CLASS III	601.0810	–
	–	–	356	356	M	450 mm RCP, CLASS III	601.0815	–
	–	–	135	135	M	600 mm RCP, CLASS III	601.0825	–
	–	–	20	20	M	750mm RCP, CLASS III	601.0835	–
	–	–	24	24	M	900mm RCP, CLASS III	601.0845	–
	–	–	34	34	M	1200mm RCP, CLASS III	601.0855	–
	–	–	18	18	M	1800mm RCP, CLASS III	601.0875	–
	–	–	45	45	M	375mm CPEP (SL)	601.2610	–
	–	–	230	230	M	600mm CPEP (SL)	601.2620	–
	–	–	38	38	M	750 mm CPEP (SL)	601.2625	–
	–	–	1	1	EA	900mm CSP END SECTION	601.6046	–
	–	–	1	1	EA	600 mm RCP END SECTION	601.6825	–
	–	–	1	1	EA	750 mm RCP END SECTION	601.6835	–
	–	63	–	63	SM	STONE MASONRY FACING	602.25	–

SUMMARY OF ESTIMATED QUANTITIES

	EROSION CONTROL	WALL #3	ROADWAY	QUANTITIES GRAND TOTAL	UNIT	ITEMS	UNIT NUMBER	RND
	–	–	29	29	EA	PRECAST REIN. CONC. CATCH BASIN W/CAST IRON GRATE	604.20	–
	–	–	3	3	EA	PRECAST REIN. CONC. PIPE DROP INLET W/CAST IRON GRATE	604.25	–
	–	–	1,900	1,900	M	150 mm UNDERDRAIN	605.10	–
	–	–	12	12	EA	UNDERDRAIN FLUSHING BASIN	605.95	–
	–	–	1	1	HR	BULLDOZER RENTAL, TYPE I **NOT A BID ITEM**	608.1	–
	–	–	1	1	HR	POWER GRADER RENTAL **NOT A BID ITEM**	608.15	–
	–	–	1	1	HR	ALL PURPOSE EXCAVATOR RENTAL, TYPE I **NOT A BID ITEM**	608.25	–
	–	–	1	1	HR	POWER BROOM RENTAL **NOT A BID ITEM**	608.30	–
	–	–	1	1	HR	TRUCK RENTAL **NOT A BID ITEM**	608.37	–
	–	–	2,000	2,000	CM	DUST CONTROL WITH WATER	609.10	–
	–	–	65	65	TON	DUST AND ICE CONTROL WITH CALCIUM CHLORIDE	609.15	–
	20	–	210	230	CM	STONE FILL, TYPE I	613.10	–
	–	–	160	160	CM	STONE FILL, TYPE II	613.11	–
	–	–	50	50	CM	STONE FILL, TYPE IV	613.13	–
	–	–	620	620	M	GRANITE SLOPE EDGING	616.20	–
	–	–	86	86	M	VERTICAL GRANITE CURB (MOD)	616.21	–
	–	–	11	11	EA	RELOCATE MAILBOX, SINGLE SUPPORT	617.10	–
	–	–	30	30	M	CHAIN LINK FENCE 1.8m (MOD–1.8m SOLID BOARD FENCE)	620.12	–
	–	–	40	40	M	CHAIN LINK FENCE 1.8m (MOD–1.8m FENCE FOR PARCEL 18)	620.12	–
	–	–	3	3	EA	GATE FOR CHAIN LINK FENCE, 1.2 m (MOD–METAL GATE)	620.15	–
	–	–	580	580	M	WOVEN WIRE FENCE WITH WOOD POSTS (MOD)	620.26	–
	–	–	20	20	EA	WOOD BRACE FOR WOVEN WIRE FENCE	620.41	–
	–	–	420	420	M	REMOVING AND RESETTING FENCE (MOD–RESET STONE WALLS)	620.50	–
	–	–	2,100	2,100	M	BOX BEAM GUARDRAIL	621.30	–
	–	–	10	10	M	REMOVING AND RESETTING GUARDRAIL	621.75	–
	–	–	500	500	M	TEMPORARY TRAFFIC BARRIER	621.90	–
	–	–	25	25	EA	ADJUST ELEVATION OF VALVE BOX (MOD–ADJUST ELEVATION OF MONITORING WELLS)	629.20	–
	–	–	10	10	M	SEAMLESS COPPER WATER TUBE (100 mm)	629.23	–
	–	–	800	800	HR	UNIFORMED TRAFFIC OFFICER	630.10	EST
	–	–	5,500	5,500	HR	FLAGGERS	630.15	EST
	–	–	1	1	LS	FIELD OFFICE – ENGINEERS	631.10	–
	–	–	1	1	LS	TESTING EQUIPMENT – CONCRETE	631.16	–

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_SHEET_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	
SURVEYED BY:	PLOT DATE: 12/08/03
SQUAD LEADER:	SURVEY DATE:
	DRAWN BY:
	SHEET: 2 OF 116

QUANTITY SHEET - STP 0126(4)S

Metric

SUMMARY OF ESTIMATED QUANTITIES

	EROSION CONTROL	WALL #3	ROADWAY	QUANTITIES GRAND TOTAL	UNIT	ITEMS	UNIT NUMBER	RND
	–	–	1	1	LS	TESTING EQUIPMENT – BITUMINOUS	631.17	
	–	–	1	1	LU	FIELD OFFICE TELEPHONE **NOT A BID ITEM**	631.25	–
	–	–	1	1	LS	MOBILIZATION	635.10	–
	–	–	1	1	LS	TRAFFIC CONTROL	641.10	–
	–	–	5,700	5,700	M	100 mm WHITE LINE	646.20	–
	–	–	6,200	6,200	M	DURABLE 100 mm YELLOW LINES	646.41	–
	–	–	30	30	M	DURABLE 600 mm STOP BARS	646.46	–
	–	–	2,600	2,600	M	TEMPORARY 100 mm WHITE LINES	646.60	–
	–	–	2,600	2,600	M	TEMPORARY 100 mm YELLOW LINE	646.61	–
	–	–	400	400	EA	LINE STRIPING TARGETS	646.76	–
	–	–	990	990	SM	GEOTEXTILE UNDER STONE FILL	649.31	–
	–	–	13,800	13,800	SM	GEOTEXTILE UNDER STONE FILL (MOD – GEOTEXTILE FOR STEEP SLOPES)	649.31	–
	400	–	3,800	4,200	SM	GEOTEXTILE FOR SILT FENCE	649.51	–
	–	–	250	250	KG	SEEDING	651.15	–
	–	–	0.5	0.5	KG	WILDFLOWER SEED	651.16	–
	5	–	50	55	KG	WINTER RYE	651.17	–
	–	–	1,800	1,800	KG	FERTILIZER	651.18	EST
	–	–	~~15~~	~~15~~	TON	AGRICULTURAL LIMESTONE	651.20	–
	–	–	15	15	TON	HAY MULCH	651.25	–
	130	–	1,300	1,430	EA	HAY BALES FOR EROSION CONTROL	651.26	–
	–	–	1,600	1,600	CM	TOPSOIL	651.35	–
	1	–	–	1	LS	EROSION AND SEDIMENT CONTROL PLAN	652.10	–
	120	–	–	120	HR	MONITORING EROSION AND SEDIMENT CONTROL PLAN	652.20	EST
	1	–	–	1	LU	FIELD MAINTENANCE OF EROSION AND SED. CONTROL PLAN **NOT A BID ITEM**	652.30	–
	–	–	1,700	1,700	SM	EROSION MATTING	654.10	–
	–	–	35	35	EA	EVERGREEN TREES	656.20	–
	–	–	30	30	EA	DECIDUOUS TREES	656.30	–
	–	–	115	115	EA	DECIDUOUS SHRUBS	656.35	–
	–	–	300	300	EA	DECIDUOUS SHRUBS (MOD–WETLAND BUFFER SHRUBS)	656.35	–
	–	–	230	230	EA	GROUND COVER AND VINES (MOD – LIVE STAKES)	656.40	–
	–	–	130	130	EA	GROUND COVER AND VINES (MOD – FASCINES)	656.40	–
	–	–	3,210	3,210	EA	GROUND COVER AND VINES (MOD – NATIVE WILLOW CUTTINGS)	656.40	–
	–	–	10	10	EA	TRANSPLANTING SHRUBS	656.50	–
	–	–	13	13	SM	TRAFFIC SIGNS (TYPE A)	675.20	–
	–	–	630	630	KG	FLANGED CHANNEL SIGN POSTS	675.30	–

SUMMARY OF ESTIMATED QUANTITIES

	EROSION CONTROL	WALL #3	ROADWAY	QUANTITIES GRAND TOTAL	UNIT	ITEMS	UNIT NUMBER	RND
	–	–	20	20	EA	REMOVING SIGNS	675.50	–
	–	–	10	10	EA	ERECTING SALVAGED SIGNS	675.60	–
	–	–	75	75	EA	DELINEATOR W/STEEL POSTS	676.10	–

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_SHEET_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: **GRAFTON--ROCKINGHAM, ROUTE 121**
PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 3 OF 116

EARTHWORKS - STP-0126(4)S

Metric

SUMMARY OF ESITIMATED QUANTITIES

		EARTH EXCAVATION		ROCK EXCAVATION		EMBANKMENT			
STATION km + m	DIST m	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3
10+000		0.0		–		–		–	
	20		0.0		–		–		–
10+020		0.0		–		–		–	
	20		0.0		–		–		–
10+040		0.0		–		–		–	
	20		77.9		–		–		–
10+060		7.8		–		–		–	
	20		151.7		–		–		–
10+080		7.4		–		–		–	
	20		142.4		–		–		–
10+100		6.9		–		–		–	
	20		142.4		–		–		–
10+120		7.4		–		–		–	
	20		146.3		–		1.6		–
10+140		7.3		–		0.2		–	
	20		137.3		–		9.1		–
10+160		6.5		–		0.8		–	
	20		131.1		–		20.8		–
10+180		6.6		–		1.3		–	
	20		129.6		–		18.3		–
10+200		6.3		–		0.5		–	
	20		129.7		–		5.0		–
10+220		6.6		–		–		–	
	20		139.7		–		–		–
10+240		7.3		–		–		–	
	20		144.9		–		–		–
10+260		7.2		–		–		–	
	20		135.3		–		0.6		–
10+280		6.4		–		0.1		–	
	20		148.0		–		1.7		–
10+300		8.4		–		0.1		–	
	20		164.7		–		1.1		–
10+320		8.0		–		–		–	
	20		156.5		–		–		–
10+340		7.6		–		–		–	
	20		139.1		–		4.3		–
10+360		6.3		–		0.4		–	
	20		125.9		–		13.9		–
10+380		6.3		–		1.0		–	
	20		125.9		–		9.6		–
10+400		6.3		–		–		–	
	20		127.7		–		0.6		–
10+420		6.5		–		0.1		–	
	20		127.7		–		1.7		–
10+440		6.3		–		0.1		–	
	20		122.6		–		6.9		–
10+460		6.0		–		0.6		–	
	20		115.0		–		7.0		–
10+480		5.5		–		0.1		–	
	20		55.4		–		1.2		–
10+500		0.0		–		0.0		–	
	20		70.6		–		38.9		–
10+520		7.1		0.0		3.9		–	
	20		155.5		69.2		68.8		–
10+540		8.5		6.9		3.0		–	
	20		244.6		69.2		29.9		–
10+560		16.0		–		–		–	
	20		244.1		–		–		–
10+580		8.4		–		–		–	
	20		150.0		–		–		–
10+600		6.6		0.0		–		–	
	20		120.1		46.9		–		–
10+620		5.5		4.7		–		–	
	20		142.6		211.6		–		–
10+640		8.8		16.5		–		–	
	20		202.0		307.2		–		–

		EARTH EXCAVATION		ROCK EXCAVATION		EMBANKMENT			
STATION km + m	DIST m	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3
10+660		11.4		14.3		–		–	
	20		353.1		142.5		–		–
10+680		23.9		–		–		–	
	20		384.5		–		–		–
10+700		14.5		–		–		–	
	20		294.0		–		–		–
10+720		14.9		–		–		–	
	20		380.3		–		–		–
10+740		23.2		–		–		–	
	20		329.0		–		–		–
10+760		9.7		–		–		–	
	20		161.1		–		–		–
10+780		6.4		–		–		–	
	20		97.9		–		–		–
10+800		3.4		–		–		–	
	20		78.1		–		–		–
10+820		4.4		–		–		–	
	20		120.4		–		–		–
10+840		7.7		–		–		–	
	20		196.5		–		–		–
10+860		12.0		–		–		–	
	20		233.0		–		–		–
10+880		11.3		–		–		–	
	20		113.0		–		–		–
10+900		0.0		–		–		–	
	20		140.4		–		–		–
10+920		14.0		–		–		–	
	20		279.7		–		–		–
10+940		13.9		–		–		–	
	20		229.3		–		–		–
10+960		9.0		–		0.0		–	
	20		144.1		–		2.5		–
10+980		5.4		–		0.3		–	
	20		94.0		–		55.2		–
11+000		4.0		–		5.3		–	
	20		94.7		–		74.2		–
11+020		5.5		–		2.2		–	
	20		175.7		–		21.5		–
11+040		12.1		–		–		–	
	20		286.6		–		–		–
11+060		16.6		–		–		–	
	20		318.8		–		–		–
11+080		15.3		–		0.0		–	
	20		242.0		–		48.6		–
11+100		8.9		0.0		4.9		–	
	20		253.3		11.8		92.1		–
11+120		16.4		1.2		4.4		–	
	20		401.9		27.2		43.5		–
11+140		23.8		1.5		–		–	
	20		518.7		57.7		–		–
11+160		28.1		4.2		0.0		–	
	20		514.3		88.2		1.1		–
11+180		23.3		4.6		0.1		–	
	20		436.8		45.9		23.8		–
11+200		20.4		–		2.3		–	
	20		295.0		–		24.6		–
11+220		9.1		–		0.2		–	
	20		199.7		–		1.9		–
11+240		10.8		–		0.0		–	
	20		205.5		–		17.5		–
11+260		9.7		–		1.8		–	
	20		164.3		–		104.4		–
11+280		6.7		–		8.7		–	
	20		143.0		–		186.0		–
11+300		7.6		–		9.9		–	
	20		145.6		–		146.2		–

		EARTH EXCAVATION		ROCK EXCAVATION		EMBANKMENT			
STATION km + m	DIST m	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3
11+320		7.0		–		4.7		–	
	20		146.9		–		78.5		–
11+340		7.7		–		3.1		–	
	20		148.8		–		42.9		–
11+360		7.2		–		1.2		–	
	20		180.7		–		11.5		–
11+380		10.9		–		–		–	
	20		232.3		–		–		–
11+400		12.3		–		–		–	
	20		226.5		–		–		–
11+420		10.3		–		–		–	
	20		258.1		–		–		–
11+440		15.5		–		–		–	
	20		533.2		–		–		–
11+460		37.8		–		0.0		–	
	20		580.5		–		18.8		–
11+480		20.2		–		1.9		–	
	20		350.1		–		27.0		–
11+500		14.8		–		0.8		–	
	20		344.7		–		23.9		–
11+520		19.7		–		1.6		–	
	20		1685.7		–		15.7		–
11+540		148.9		–		–		–	
	20		2481.0		–		–		–
11+560		99.2		–		–		–	
	20		1929.4		–		–		–
11+580		93.7		–		–		–	
	20		937.3		–		–		–
11+600		–		–		0.0		–	
	20		–		–		9.2		–
11+620		0.0		–		0.9		–	
	20		218.7		–		13.5		–
11+640		21.9		–		0.4		–	
	20		362.8		–		4.3		–
11+660		14.4		–		0.0		–	
	20		370.1		–		2.4		–
11+680		22.6		–		0.2		–	
	20		280.9		–		30.8		–
11+700		5.5		–		2.8		–	
	20		158.0		–		28.4		–
11+720		10.3		–		–		–	
	20		216.0		–		–		–
11+740		11.3		–		–		–	
	20		251.5		–		–		–
11+760		13.9		–		–		–	
	20		153.6		–		–		–
11+780		1.5		–		–		–	
	20		109.3		–		–		–
11+800		9.4		–		–		–	
	20		168.9		–		–		–
11+820		7.5		–		0.0		–	
	20		137.4		–		4.9		–
11+840		6.3		–		0.5		–	
	20		137.4		–		19.4		–
11+860		7.5		–		1.5		–	
	20		247.5		–		14.5		–
11+880		17.3		–		0.0		–	
	20		511.9		–		3.1		–
11+900		33.9		–		0.3		–	
	20		428.4		–		3.9		–
11+920		8.9		–		0.1		–	
	20		180.0		–		6.5		–
11+940		9.1		–		0.6		–	
	20		166.5		–		13.7		–
11+960		7.6		–		0.8		–	
	20		176.8		–		8.0		–

		EARTH EXCAVATION		ROCK EXCAVATION		EMBANKMENT			
STATION km + m	DIST m	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3	AREA m2	VOLUME m3
11+980		10.1		–		–		–	
	20		230.2		–		–		–
12+000		12.9		–		–		–	
	20		277.3		–		–		–
12+020		14.8		–		–		–	
	20		296.0		–		–		–
12+040		14.8		–		–		–	
	20		295.3		–		–		–
12+060		14.7		–		–		–	
	20		252.4		–		–		–
12+080		10.5		–		–		–	
	20		175.4		–		–		–
12+100		7.0		–		0.0		–	
	20		146.4		–		65.0		–
12+120		7.6		–		6.5		–	
	20		176.9		–		170.7		–
12+140		10.1		–		10.6		–	
	20		264.2		–		204.1		–
12+160		16.3		–		9.8		–	
	20		749.2		–		98.4		–
12+180		58.6		0.0		–		–	
	20		695.7		390.6		–		–
12+200		11.0		39.1		–		–	
	20		189.0		1042.4		–		–
12+220		7.9		65.2		–		–	
	20		179.7		1195.6		–		–
12+240		10.1		54.4		–		–	
	20		166.5		799.1		–		–
12+260		6.6		25.5		0.0		–	
	20		360.3		255.3		147.4		–
12+280		29.1		–		14.7		–	
	20		356.7		–		439.3		–
12+300		6.2		–		29.2		–	
	20		189.8		–		716.1		–
12+320		12.7		–		42.4		–	
	20		203.5		–		898.5		–
12+340		7.6		–		47.4		–	
	20		136.3		–		1146.5		–
12+360		6.0		–		67.2		–	
	20		60.3		–		1429.1		–
12+380		0.0		–		75.7		–	
	20		22.6		–		1540.5		–
12+400		2.3		–		78.4		–	
	20		37.3		–		1474.4		–
12+420		1.5		–		69.1		–	
	20		20.3		–		1171.5		–
12+440		0.6		–		48.1		–	
	20		43.4		–		1119.9		–
12+460		3.8		–		63.9		–	
	20		92.2		–		1035.0		–
12+480		5.4		–		39.6		–	
	20		140.1		–		928.9		–
12+500		8.6		–		53.3		–	
	20		180.5		–		1189.4		–
12+520		9.5		–		65.6		–	
	20		181.0		–		1332.4		–
12+540		8.6		–		67.6		–	
	20		163.8		–		1209.7		–
12+560		7.8		–		53.4		–	
	20		174.2		–		1097.2		–
12+580		9.7		–		56.4		–	
	20		184.6		–		987.8		–
12+600		8.8		–		42.6		–	
	20		181.4		–		433.9		–
12+620		9.3		–		1.0		–	
	20		245.1		–		9.7		–

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

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THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON--ROCKINGHAM, ROUTE 121
PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 4 OF 116

Metric

EARTHWORKS - STP-0126(4)S

SUMMARY OF ESITIMATED QUANTITIES

STATION km + m	DIST m	EARTH EXCAVATION AREA m2	EARTH EXCAVATION VOLUME m3	ROCK EXCAVATION AREA m2	ROCK EXCAVATION VOLUME m3	EMBANKMENT AREA m2	EMBANKMENT VOLUME m3	AREA m2	VOLUME m3
12+640		15.2		–		–		–	
	20		259.3		–		–		–
12+660		10.8		–		–		–	
	20		206.1		–		–		–
12+680		9.9		–		–		–	
	20		251.3		–		–		–
12+700		15.3		–		–		–	
	20		321.0		–		–		–
12+720		16.8		–		–		–	
	20		368.7		–		–		–
12+740		20.1		–		–		–	
	20		443.7		–		–		–
12+760		24.3		–		–		–	
	20		394.2		–		–		–
12+780		15.1		–		–		–	
	20		332.5		–		–		–
12+800		18.2		–		–		–	
	20		334.7		–		–		–
12+820		15.3		–		–		–	
	20		277.0		–		–		–
12+840		12.4		–		–		–	
	20		223.4		–		–		–
12+860		10.0		–		–		–	
SCHOOL HOUSE ROAD									
–		–		–		–		–	
06+007		0.37		–		4.82		–	
	03		0.74		–		25.71		–
06+010		0.12		–		12.32		–	
	10		0.60		–		105.45		–
06+020		0		–		8.77		–	
	10		12.30		–		57.40		–
06+030		2.46		–		2.71		–	
	10		29.85		–		14.25		–
06+040		3.51		–		0.14		–	
	10		48.75		–		0.70		–
06+050		6.24		–		0		–	
MANDIGO ROAD									
–		–		–		–		–	
08+010		16.01		–		0		–	
	10		103.45		–		0.00		–
08+020		4.68		–		0		–	
	10		23.40		–		0.00		–
08+030		0		–		0		–	
McBRIDE ROAD WEST									
–		–		–		–		–	
01+030		0		–		0		–	
	10		48.75		–		1.70		–
01+040		9.75		–		0.34		–	
	10		109.15		–		1.70		–
01+050		12.08		–		0		–	
	10		112.60		–		0.00		–
01+060		10.44		–		0		–	
McBRIDE ROAD EAST									
–		–		–		–		–	
00+030		0		–		0		–	
	10		43.65		–		0.80		–
00+040		8.73		–		0.16		–	
	10		52.75		–		22.15		–
00+050		1.82		–		4.27		–	
	10		15.40		–		75.45		–
00+060		1.26		–		10.82		–	
	–		–		–		–		–

SUMMARY	
EARTH AND ROCK EXCAVATION	45,522
SOLID ROCK EXCAVATION	4,760
EARTH EXCAVATION	37,762
PLANIMETERED FILL	20,715
LESS FACTORED SOLID ROCK	–
LESS DISPLACEMENT OF LARGE STRUCTURES	–
NET PLANIMETERED FILL	20,715
FACTOR (X 0.15)	3,107
PLANIMETERED FILL INCLUDING FACTOR	23,822
MATERIALS AVAILABLE FOR FILL	
EARTH EXCAVATION	37,762
CHANNEL EXCAVATION	–
TRENCH EXCAVATION	4,115
STRUCTURE EXCAVATION	–
TOTAL MATERIAL AVAILABLE FOR FILL	41,877
TOTAL FILL INCLUDING FACTOR	23,822
TOTAL MATERIAL FOR FILL	41,877
BORROW	–
EXCESS EXCAVATION	18,055

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_EARTHWORKS_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 5 OF 116

SEE NEW DRAINAGE SUMMARY SHEET

DRAINAGE DETAIL SHEET - STP 0126(4)S

Metric

SUMMARY OF ESTIMATED QUANTITIES

STATION km + m	STATION km + m	POS.	ASKEW	INLET / OUTLET TYPE		DITCH		PIPE		PIPE ARCH			ALLOWABLE OPTIONS						PIPE ELBOW	ES	CB	TRCCL	DEPTH DI	CONC CL B	REINF STEEL	GRATE	CHAN ELEV	CRM	TRENCH EXCAVATION		COMM EXC	UNC CHAN EXC	STRUCT EXCAV	GRAN BKFILL STRUCT	GRAN BORR	EROS MATT	STONE FILL		GEO-TEXTILE	MARKER POSTS		(#)	REMARKS
				INLET	OUTLET	IN	OUT	D mm	L m	SPAN mm	RISE mm	L m	PCCSP mm	CAAP mm	RCP CL	CSP mm	CPEP SL	CPEP ✓	NO. DEG	EA.	EA.		mm	m^3	kg	TYPE	EA.	m^3	EARTH m^3	ROCK m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	TYPE	MAT. m^2	LT ea.	RT ea.		
10+197	10+257	RT	–	CB	CB	–	–	450	59	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	56.1	–	–	–	–	–	–	–	–	–	–	–	1	–
10+257	10+300	RT	–	CB	CB	–	–	450	42	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	41.5	–	–	–	–	–	–	–	–	–	–	–	1A	–
10+300	10+300	LT/RT	–	CB	CB	–	–	450	6.5	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	13.0	–	–	–	–	–	–	–	–	–	–	–	2	–
10+300	10+350	RT	–	CB	CB	–	–	450	49	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	50.6	–	–	–	–	–	–	–	–	–	–	–	3	–
10+340	10+350	LT/RT	–	CB	CB	–	–	450	12	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	17.7	–	–	–	–	–	–	–	–	–	–	–	4A	NO SUMP ON CATCH BASIN
10+350	10+400	RT	–	CB	CB	–	–	450	49	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	50.6	–	–	–	–	–	–	–	–	–	–	–	4	–
10+400	10+459	RT	–	CB	CB	–	–	450	58	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	59.2	–	–	–	–	–	–	–	–	–	–	–	4B	–
10+459	10+476	RT	–	CB	CB	–	–	450	17	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	29.8	–	–	–	–	–	–	–	–	–	–	–	5	1.5m DIAMETER CATCH BASIN
10+450	10+459	LT/RT	–	CB	CB	–	–	450	6.2	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	15.8	–	–	–	–	–	–	–	–	–	–	–	5A	–
10+476	10+498	RT	–	CB	–	–	–	450	21	–	–	–	–	–	III	–	–	–	–	1	–	–	–	–	E	–	–	30.2	–	–	–	–	–	–	–	–	–	–	–	6	–
10+591	10+581	LT/RT	–	CB	HDW	–	–	600	–	–	–	–	–	–	–	–	24	–	–	–	1	–	–	2.0	5.6	B	–	–	100.1	–	–	–	–	–	–	–	0.9	I	2.9	–	–	8	–
10+810	10+825	LT	–	CB	–	–	–	375	–	–	–	–	–	–	–	–	15	–	–	–	1	–	–	–	–	E	–	–	26.7	–	–	–	–	–	–	–	–	–	–	–	9	–
10+940	10+940	LT/RT	–	CB	HDW	–	–	600	–	–	–	–	–	–	–	–	17.2	–	–	–	1	–	–	2.0	5.6	A	–	–	50.7	–	–	–	–	–	–	–	0.9	I	2.9	–	–	10	–
11+000	11+004	LT/RT	–	HDW	HDW	–	–	1200	17.8	–	–	–	–	–	III	–	–	–	–	–	–	–	–	12.5	41.0	–	–	–	54.8	–	–	–	–	–	–	–	4.8	II	8	–	–	11	–
11+009	11+004	RT	–	DI	HDW	–	–	375	4.0	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	–	E	–	–	8.8	–	–	–	–	–	–	–	4.8	II	8	–	–	11A	–
11+025	11+006	LT	–	–	–	–	–	375	–	–	–	–	–	–	–	–	17	–	–	–	–	–	–	–	–	–	–	–	14.0	–	–	–	–	–	–	–	–	–	–	–	12	–
11+195	11+209	LT	–	CB	–	–	–	375	13	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	–	B	–	–	16.2	–	–	–	–	–	–	–	–	–	–	–	13	–
11+211	11+220	LT	–	RCP	–	YES	YES	375	9	–	–	–	–	–	III	–	–	–	–	–	–	–	–	–	–	–	–	–	7.4	–	–	–	–	–	–	–	–	–	–	–	13A	–
11+277	11+283.5	LT/RT	–	HDW	RCP	YES	YES	1800	18	–	–	–	–	–	III	–	–	–	–	–	–	–	–	23.4	74.4	–	–	–	160.1	–	–	–	–	–	–	–	48	IV	48.0	–	–	14	–
11+255	11+255	RT	–	DI	–	–	–	375	–	–	–	–	–	–	–	–	2.2	–	–	–	–	1	–	–	–	E	–	–	4.0	–	–	–	–	–	–	–	1.2	I	4.0	–	–	14A	–
11+370	11+370	LT/RT	–	CB	ES	–	–	600	–	–	–	–	–	–	–	–	17.9	–	–	1	1	–	–	–	–	A	–	–	69.8	–	–	–	–	–	–	–	1.7	II	2.9	–	–	15	–
11+552	11+552	LT/RT	–	CB	HDW	–	–	600	–	–	–	–	–	–	–	–	11.9	–	–	–	1	–	–	2.0	5.6	B	–	–	30.8	–	–	–	–	–	–	–	0.9	I	2.9	–	–	16A	–
11+600	11+650	LT	–	CB	CB	–	–	600	–	–	–	–	–	–	–	–	47.6	–	–	–	1	–	–	–	–	B	–	–	88.7	–	–	–	–	–	–	–	–	–	–	–	16	–
11+650	11+653	LT/RT	–	CB	HDW	–	–	600	–	–	–	–	–	–	–	–	9.1	–	–	–	1	–	–	–	–	B	–	–	24.4	–	–	–	–	–	–	–	–	–	–	–	17	–
11+680	11+697	LT	–	CB	–	–	–	375	16.7	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	–	B	–	–	35.4	–	–	–	–	–	–	–	–	–	–	–	18	–
11+698	11+698	LT/RT	–	HDW	HDW	YES	–	1200	15.9	–	–	–	–	–	III	–	–	–	–	–	–	–	–	11.8	18.6	–	–	–	65.2	–	–	–	–	–	–	–	3.5	II	5.8	–	–	19	–
11+720	11+700	LT	–	RCP	–	YES	–	375	20.0	–	–	–	–	–	III	–	–	–	–	–	–	–	–	–	–	–	–	–	16.5	–	–	–	–	–	–	–	–	–	–	–	20	–
11+750	11+750	RT	–	DI	–	YES	–	375	–	–	–	–	–	–	–	–	4.1	–	–	–	–	1	–	–	–	B	–	–	5.1	–	–	–	–	–	–	–	5.8	II	–	–	–	20A	–
11+849	11+849	LT/RT	–	RCP	HDW	–	–	450	16.0	–	–	–	–	–	III	–	–	–	–	–	–	–	–	1.3	5.6	–	–	–	28.4	–	–	–	–	–	–	–	0.9	I	2.9	–	–	21	–

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1281\CADD\PLANS\SUMMARY_DRAINAGE_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121
PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 6 OF 116

Metric

DRAINAGE DETAIL SHEET - STP 0126(4)S

SUMMARY OF ESTIMATED QUANTITIES

STATION km + m	STATION km + m	POS.	ASKEW	INLET / OUTLET TYPE		DITCH		PIPE		PIPE ARCH			ALLOWABLE OPTIONS						PIPE ELBOW	ES	CB	PRCCDT	DEPTH DI	CONC CL B	REINF STEEL	GRATE	CHAN ELEV	CRM	TRENCH EXCAVATION		COMM EXC	UNC CHAN EXC	STRUCT EXCAV	GRAN BKFILL STRUCT	GRAN BORR	EROS MATT	STONE FILL		GEO-TEXTILE	MARKER POSTS		(#)	REMARKS
				INLET	OUTLET	IN	OUT	D mm	L m	SPAN mm	RISE mm	L m	PCCSP mm	CAAP mm	RCP CL	CSP mm	CPEP SL	CPEP ✓	NO. DEG	EA.	EA.		mm	m^3	kg	TYPE	EA.	m^3	EARTH m^3	ROCK m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	TYPE	MAT. m^2	LT ea.	RT ea.		
11+907	11+927	LT	–	RCP	–	YES	YES	375	20.0	–	–	–	–	–	III	–	–	–	–	–	–	–	–	–	–	–	–	16.5	–	–	–	–	–	–	–	–	II	–	–	–	22	–
12+110	12+112	LT/RT	–	HDW	HDW	–	–	750	13.2	–	–	–	–	–	III	–	–	–	–	–	–	–	6.2	14.8	–	–	–	15.6	–	–	–	–	–	–	–	28.8	II	48.0	–	–	23	–
12+200	12+200	LT/RT	–	CB	CB	–	–	600	10.9	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	B	–	–	30.9	–	–	–	–	–	–	–	–	–	–	–	–	24	–
12+200	1+040	RT/LT	–	CB	CB	–	–	600	34.3	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	E	–	–	126.9	–	–	–	–	–	–	–	–	–	–	–	–	24A	–
1+040	1+040	LT	–	CB	HDW	–	–	750	3.6	–	–	–	–	–	III	–	–	–	–	–	1	–	2.6	7.4	E	–	–	47.2	–	–	–	–	–	–	–	12.0	II	20.0	–	–	24B	
12+280	12+280	LT/RT	–	CB	CB	–	–	600	9.2	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	B	–	–	24.9	–	–	–	–	–	–	–	–	–	–	–	–	25A	–
12+280	1+040	RT/LT	–	CB	CB	–	–	600	46.8	–	–	–	–	–	III	–	–	–	–	–	1	–	–	–	E	–	–	150.8	–	–	–	–	–	–	–	–	–	–	–	–	25B	–
12+449	12+463	LT/RT	–	ES	HDW	YES	YES	900	21.5	–	–	–	–	–	III	–	–	–	–	1	–	–	3.6	7.4	–	–	–	34.6	–	–	–	–	–	–	–	55.2	II	92.0	–	–	27	–
12+580	12+600	LT	–	ES	CB	YES	–	750	–	–	–	–	–	–	–	–	19.4	–	–	1	–	–	–	–	–	–	–	22.0	–	–	–	–	–	–	–	–	–	–	–	–	28	–
12+600	12+600	LT/RT	–	CB	HDW	NO	YES	750	–	–	–	–	–	–	–	–	16.2	–	–	–	1	–	–	2.6	7.4	B	–	–	35.4	–	–	–	–	–	–	–	38.4	II	64.0	–	–	28A	–
12+781	12+781	RT	–	CB	CB	YES	YES	600	–	–	–	–	–	–	–	–	79.8	–	–	–	1	–	–	–	–	B	–	–	296.9	–	–	–	–	–	–	–	–	–	–	–	–	29B	–
12+781	12+781	LT/RT	–	CB	HDW	–	YES	600	13.7	–	–	–	–	–	–	–	2.5	–	–	–	1	–	–	2.0	5.6	B	–	–	35.8	–	–	–	–	–	–	–	7.2	I	24.0	–	–	29D	–
12+636	12+644	LT	–	RCP	–	YES	YES	450	8	–	–	–	–	–	III	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	30	–

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_DRAINAGE_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: **GRAFTON--ROCKINGHAM, ROUTE 121**

PROJECT NO. : **STP 0126(4)S**

DESIGN FILE NAME:

IPARM FILE NAME:

SURVEYED BY:

SQUAD LEADER:

PLOT DATE: 12/08/03

SURVEY DATE:

DRAWN BY:

SHEET: 7 OF 116

Metric

DRAINAGE DETAIL SHEET - STP 0126(4)S

SUMMARY OF ESTIMATED QUANTITIES

STATION km + m	STATION km + m	POS.	ASKEW	INLET / OUTLET TYPE		DITCH		PIPE		PIPE ARCH			ALLOWABLE OPTIONS					PIPE ELBOW	ES	CB	PRCDI	DEPTH DI	CONC CL B	REINF STEEL	GRATE	CHAN ELEV	CRM	TRENCH EXCAVATION		COMM EXC	UNC CHAN EXC	STRUCT EXCAV	GRAN BKFILL STRUCT	GRAN BORR	EROS MATT	STONE FILL		GEO-TEXTILE	MARKER POSTS		#	REMARKS
				INLET	OUTLET	IN	OUT	D mm	L m	SPAN mm	RISE mm	L m	PCCSP mm	CAAP mm	RCP CL	CSP mm	CPEP SL	CPEP ✓	NO. DEG	EA.	EA.		mm	m^3	kg	TYPE	EA.	m^3	EARTH m^3	ROCK m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	TYPE	m^2	LT ea.	RT ea.		
UNDERDRAIN																																									
10+592	10+509.5	LT	–	–	–	–	–	150	81.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	65.04	–	–	–	–	–	–	–	–	–	–	–	U1	–
10+650	10+592	LT	–	–	–	–	–	150	56.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	63.62	–	–	–	–	–	–	–	–	–	–	–	U2	CONSTRUCT 1 FLUSHING BASIN
10+728	10+650	LT	–	–	–	–	–	150	76.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	116.74	–	–	–	–	–	–	–	–	–	–	–	U3	CONSTRUCT 1 FLUSHING BASIN
10+728	10+810	LT	–	–	–	–	–	150	82	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	164.00	–	–	–	–	–	–	–	–	–	–	–	U4	–
10+845	10+940	LT	–	–	–	–	–	150	93.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	82.54	–	–	–	–	–	–	–	–	–	–	–	U5	CONSTRUCT 1 FLUSHING BASIN
11+100	11+000	LT	–	–	–	–	–	150	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	56.00	–	–	–	–	–	–	–	–	–	–	–	U6	CONSTRUCT 1 FLUSHING BASIN
11+195	11+100	LT	–	–	–	–	–	150	95	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	106.40	–	–	–	–	–	–	–	–	–	–	–	U7	–
11+230	11+277	LT	–	–	–	–	–	150	47	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	37.60	–	–	–	–	–	–	–	–	–	–	–	U8	CONSTRUCT 1 FLUSHING BASIN
11+352	11+277	LT	–	–	–	–	–	150	75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	84.00	–	–	–	–	–	–	–	–	–	–	–	U9	CONSTRUCT 1 FLUSHING BASIN
11+450	11+370	LT	–	–	–	–	–	150	80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	96.00	–	–	–	–	–	–	–	–	–	–	–	U10	CONSTRUCT 1 FLUSHING BASIN
11+450	11+552	LT	–	–	–	–	–	150	102	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	89.76	–	–	–	–	–	–	–	–	–	–	–	U11	–
11+552	11+600	LT	–	–	–	–	–	150	48	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	49.92	–	–	–	–	–	–	–	–	–	–	–	U12	–
11+600	11+650	LT	–	–	–	–	–	150	50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	52.00	–	–	–	–	–	–	–	–	–	–	–	U13	–
11+650	11+680	LT	–	–	–	–	–	150	30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	43.20	–	–	–	–	–	–	–	–	–	–	–	U14	–
12+120	12+200	LT	–	–	–	–	–	150	80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	76.80	–	–	–	–	–	–	–	–	–	–	–	U15	CONSTRUCT 1 FLUSHING BASIN
12+280	12+200	LT	–	–	–	–	–	150	80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	70.40	–	–	–	–	–	–	–	–	–	–	–	U16	–
12+380	12+280	LT	–	–	–	–	–	150	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	104.00	–	–	–	–	–	–	–	–	–	–	–	U17	CONSTRUCT 1 FLUSHING BASIN
12+438	12+380	LT	–	–	–	–	–	150	58	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	64.96	–	–	–	–	–	–	–	–	–	–	–	U18	CONSTRUCT 1 FLUSHING BASIN
12+455	12+530	LT	–	–	–	–	–	150	75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	84.00	–	–	–	–	–	–	–	–	–	–	–	U19	CONSTRUCT 1 FLUSHING BASIN
12+530	12+600	LT	–	–	–	–	–	150	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	67.20	–	–	–	–	–	–	–	–	–	–	–	U20	CONSTRUCT 1 FLUSHING BASIN
12+600	12+700	LT	–	–	–	–	–	150	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	96.00	–	–	–	–	–	–	–	–	–	–	–	U21	–
12+700	12+781	LT	–	–	–	–	–	150	81	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	97.20	–	–	–	–	–	–	–	–	–	–	–	U22	–
12+781	12+860	LT	–	–	–	–	–	150	79	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	82.16	–	–	–	–	–	–	–	–	–	–	–	U23	–

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_DRAINAGE_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121

PROJECT NO. : STP 0126(4)S

DESIGN FILE NAME:

IPARM FILE NAME:

SURVEYED BY:

SQUAD LEADER:

PLOT DATE: 12/08/03

SURVEY DATE:

DRAWN BY:

SHEET: 8 OF 116

Metric

DRAINAGE DETAIL SHEET - STP 0126(4)S

SUMMARY OF ESTIMATED QUANTITIES

STATION km + m	STATION km + m	POS.	ASKEW	INLET / OUTLET TYPE		DITCH		PIPE		PIPE ARCH			ALLOWABLE OPTIONS						PIPE ELBOW	ES	CB	PRCCO	DEPTH DI	CONC CL B	REINF STEEL	GRATE	CHAN ELEV	CRM	TRENCH EXCAVATION		COMM EXC	UNC CHAN EXC	STRUCT EXCAV	GRAN BKFILL STRUCT	GRAN BORR	EROS MATT	STONE FILL		GEO-TEXTILE	MARKER POSTS		#	REMARKS
				INLET	OUTLET	IN	OUT	D mm	L m	SPAN mm	RISE mm	L m	PCCSP mm	CAAP mm	RCP CL	CSP mm	CPEP SL	CPEP ✓	NO. DEG	EA.	EA.		mm	m^3	kg	TYPE	EA.	m^3	EARTH m^3	ROCK m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	TYPE	MAT. m^2	LT ea.	RT ea.		
REMOVAL OF EXISTING DRAINAGE																																										
10+592	10+581	LT/RT	–	–	–	–	–	300	23	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	50	–
10+881	10+882	LT/RT	–	–	–	–	–	300	9.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	51	–
11+006	11+025	LT	–	–	–	–	–	300	19	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	52	–
11+000	11+004	LT/RT	–	–	–	–	–	300	11.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	53	–
11+277	11+283.5	LT/RT	–	–	–	–	–	1200	18	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	54	–
11+372	11+370	LT/RT	–	–	–	–	–	450	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	55	–
11+488	11+489	LT/RT	–	–	–	–	–	150	12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6.9	–	–	–	–	–	–	–	–	–	–	56	–
11+552	11+552	LT/RT	–	–	–	–	–	300	11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	57	–
11+648	11+655	LT/RT	–	–	–	–	–	375	11.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	58	–
11+698	11+698	LT/RT	–	–	–	–	–	375	12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	59	–
11+704	11+715	LT	–	–	–	–	–	375	12.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6.5	–	–	–	–	–	–	–	–	–	–	60	–
11+792	11+788	LT/RT	–	–	–	–	–	300	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	13.7	–	–	–	–	–	–	–	–	–	–	61	–
11+849	11+851	LT/RT	–	–	–	–	–	450	10.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	62	–
12+112	12+113	LT/RT	–	–	–	–	–	375	13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	13.4	–	–	–	–	–	–	–	–	–	–	63	–
12+172	12+171	LT/RT	–	–	–	–	–	375	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.1	–	–	–	–	–	–	–	–	–	–	64	–
12+435	12+448	LT	–	–	–	–	–	600	13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.3	–	–	–	–	–	–	–	–	–	–	65	–
12+448	12+461	LT/RT	–	–	–	–	–	750	21	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	66	–
12+611	12+611	LT/RT	–	–	–	–	–	300	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.9	–	–	–	–	–	–	–	–	–	–	67	–
12+691	12+691	LT/RT	–	–	–	–	–	300	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.6	–	–	–	–	–	–	–	–	–	–	68	–

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_DRAINAGE_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121
PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 8A OF 116

Metric

DETAIL SHEET - STP 0126(4)S

SIGN SUMMARY

DESCRIPTION	MUTCD CODE	AREA PER SIGN (M2)	NO. OF SIGNS	TOTAL AREA (M2)	NOTE
"STOP"	R1-1	0.56	5	2.80	SEE STANDARD E-121M
"SPEED LIMIT XX"	R2-1	0.45	3	1.35	SEE STANDARD E-142M
ROUTE "121"	–	0.45	1	0.45	SEE STANDARD E-136CM
"EAST"	–	0.18	1	0.18	SEE STANDARD E-136CM
"T" INTERSECTION	W2-2	0.56	8	4.48	SEE STANDARD E-155M
"Y" INTERSECTION	W2-3	0.56	2	1.12	–
"ROAD NARROWS"	W5-1	0.81	1	0.81	SEE STANDARD E-154M
"ENTERING VILLAGE"	–	0.41	1	0.41	SEE STANDARD E-131M
"YIELD"	R1-2	0.18	2	0.36	–

GUARDRAIL SUMMARY

LOCATION	DESCRIPTION	LENGTH	PAY ITEM
3+068.3 TO 3+012.2,LT	BOX BEAM	48.0	621.30
3+068.3, LT	TYPE II END	8.3	621.30
10+512.0 TO 10+565.9, RT	BOX BEAM	54.0	621.30
10+565.9, RT	TYPE I END	1.1	621.30
6+006.0 TO 6+019.2, RT	BOX BEAM	11.0	621.30
6+006.0, RT	TYPE I END	1.1	621.30
6+019.2, RT	TYPE I END	1.1	621.30
10+968.7 TO 11+220.2, RT	BOX BEAM	245.2	621.30
10+968.7, RT	TYPE II END	8.3	621.30
11+220.2, RT	TYPE II END	8.3	621.30
PARCEL 26	BOX BEAM	87.9	621.30
PARCEL 26	2 TYPE I END	2.2	621.30
11+249.0 TO 11+908.0, RT	BOX BEAM	642.3	621.30
11+249.0, RT	TYPE II END	8.3	621.30
11+908.0, RT	TYPE II END	8.3	621.30
11+920.0 TO 12+238.0, RT	BOX BEAM	310.0	621.30
11+920.0, RT	TYPE I END	1.1	621.30
12+238.0, RT	TYPE I END	1.1	621.30
12+256.0 TO 12+850.0, RT	BOX BEAM	594.0	621.30
12+256.0, RT	TYPE I END	1.1	621.30
12+850.0 TO 12+860.0, RT	REMOVE AND RESET	10.0	621.90

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:\1261\CADD\PLANS\SUMMARY_MISC_C2.DWG

THE LOUIS BERGER GROUP, INC.

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 88 OF 116

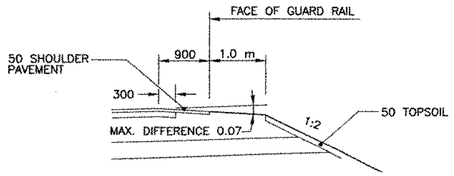
Metric

TYPICAL SECTIONS

145 mm BITUMINUOUS CONCRETE PAVEMENT
(PLACED IN TWO (2) LIFTS CONSISTING OF 50 mm TYPE III AND 95 mm TYPE I)
450 mm SUBBASE OF CRUSHED STONE
300 mm SAND BORROW
SHOULDERS: 50 mm BITUMINOUS CONCRETE PAVEMENT

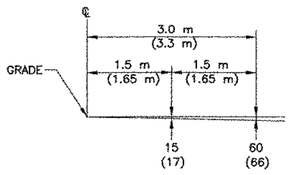
TACK COAT–EMULSIFIED ASPHALT IS TO BE APPLIED AT A RATE OF 0.07 L/m2 BETWEEN SUCCESSIVE COURSES OF PAVEMENT AS DIRECTED BY THE ENGINEER.

BITUMINOUS CONCRETE PAVEMENT REQUIRES THE USE OF PERFORMANCE GRADED ASPHALT, 58–28.



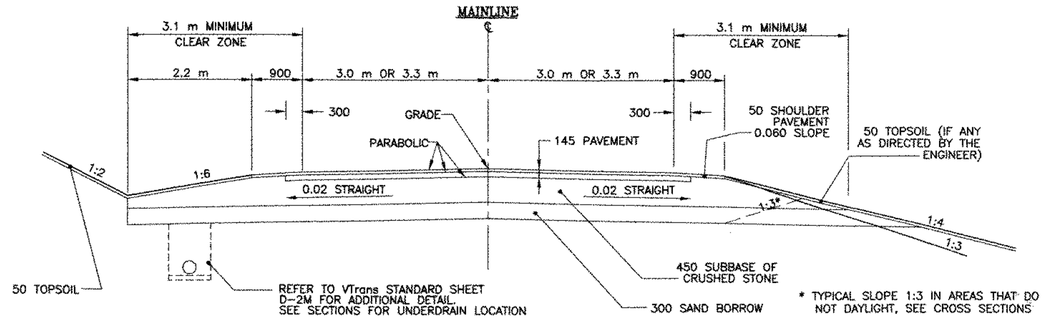
DETAIL OF GUARDRAIL ON HIGH SIDE OF BANKED SECTION

SCALE = 1:50



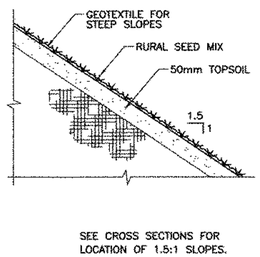
PARABOLIC DETAIL

SCALE = 1:50



NORMAL SECTION

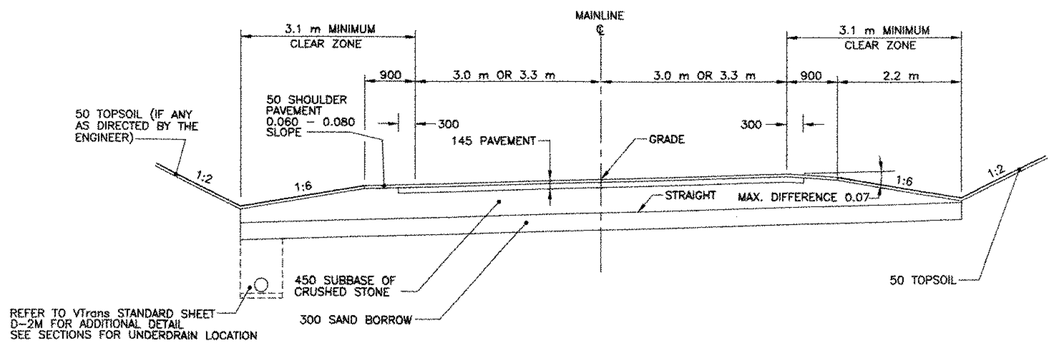
NOTE: FOR SLOPES IN SOLID ROCK EXCAVATION, DRILLING AND BLASTING OF SOLID ROCK SUBGRADE, SEE STANDARD A–61M.



SEE CROSS SECTIONS FOR LOCATION OF 1.5:1 SLOPES.

SLOPE EROSION TREATMENT DETAIL

NOT TO SCALE



BANKED SECTION

NOTE: 3.0 m LANE USED AT STA. 10+048 – 10+880

MATERIAL ITEM	THICKNESS TOLERANCE
PAVEMENT (TOTAL DEPTH)	5 mm
SUBBASE	30 mm
SAND BORROW	30 mm

GENERAL NOTES
SEEDING FORMULA

RURAL AREAS

% WT.	kg/ha	NAME	PUR.%	GERM.%
5.0	4	RED TOP	95	90
37.5	26	CREEPING RED FESCUE	98	85
15.0	10	BIRDSFOOT TREFOIL (VAR. EMPIRE)	98	85
37.5	26	TALL FESCUE	95	90
5.0	4	ANNUAL RYEGRASS	95	85
100.0	70			

URBAN AREAS

% WT.	kg/ha	NAME	PUR.%	GERM.%
42.5	38	CREEPING RED FESCUE (VAR. PENNLAWN)	98	85
42.5	38	KENTUCKY BLUEGRASS (COMMON)	85	85
10.0	9	PERENNIAL RYEGRASS (VAR. PENNFINE)	95	90
5.0	5	ANNUAL RYEGRASS	95	85
100.0	90			

THE SEED MIXTURE SHALL NOT HAVE WEED CONTENT EXCEEDING 0.40% BY WEIGHT AND SHALL BE FREE FROM ALL NOXIOUS WEED SEED.

SEED – TO BE APPLIED PER SEEDING FORMULAS DIRECTED BY THE ENGINEER.

FERTILIZER – FORMULA 10–20–10 TO BE USED WITH SEED, APPLIED AT THE RATE OF 560 kg/ha.

AGRICULTURAL LIMESTONE – TO BE APPLIED AT RATE OF 4500 kg/ha OR AS DIRECTED BY THE ENGINEER.

HAY MULCH – TO BE PLACED ON EARTH SLOPES AT THE RATE OF 4500 kg/ha OR AS DIRECTED BY THE ENGINEER.

TOPSOIL – TO BE USED WITH SEED, AS INDICATED ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.

MARKER POSTS – TO BE PLACED AS DIRECTED BY THE ENGINEER.

SLOPE ROUNDING – ALL CUT SLOPES TO BE ROUNDED IN ACCORDANCE WITH STANDARD SHEET B–5M OR AS SHOWN IN THE SECTIONS.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/TYPICAL SECTIONS C2.DWG

THE LOUIS BERGER GROUP, INC.

TYPICAL SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 9 OF 116

Metric

TYPICAL SECTIONS

145 mm BITUMINUOUS CONCRETE PAVEMENT
(PLACED IN TWO (2) LIFTS CONSISTING OF 50 mm TYPE III AND 95 mm TYPE I)
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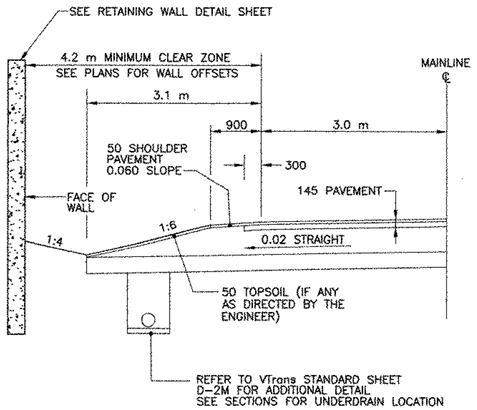
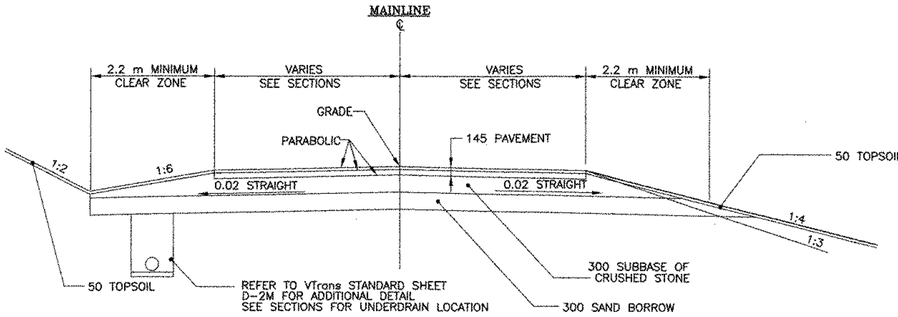
BITUMINOUS CONCRETE PAVEMENT REQUIRES THE USE OF PERFORMANCE GRADED ASPHALT, 58-28

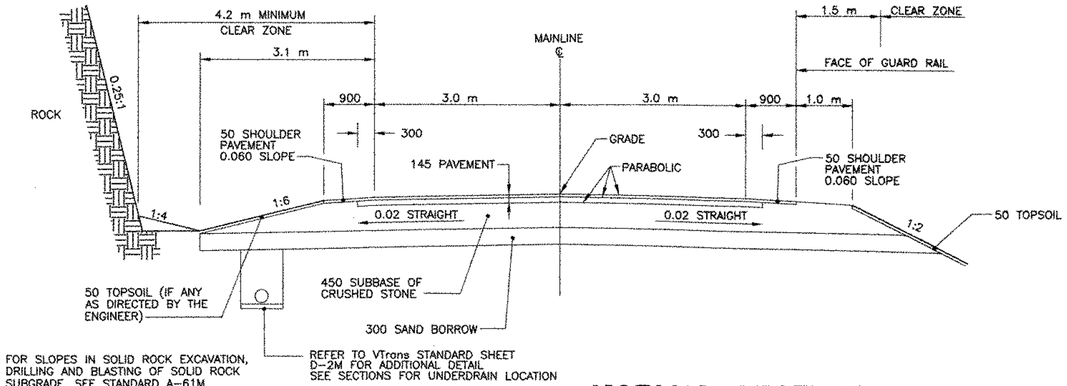
MATERIAL ITEM	THICKNESS TOLERANCE
PAVEMENT (TOTAL DEPTH)	5 mm
SUBBASE	30 mm
SAND BORROW	30 mm



WALL SECTION



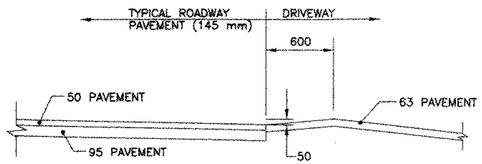
NORMAL SECTION SIDE ROADS



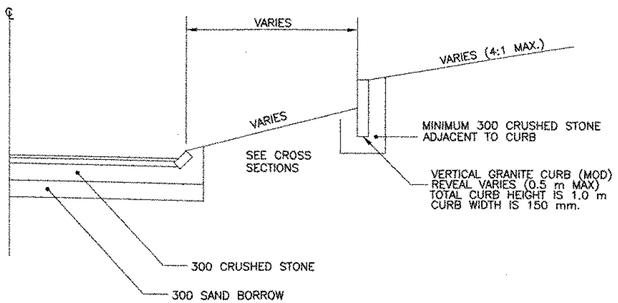
NOTE: FOR SLOPES IN SOLID ROCK EXCAVATION, DRILLING AND BLASTING OF SOLID ROCK SUBGRADE, SEE STANDARD A-61M.

NORMAL SECTION IN ROCK CUT

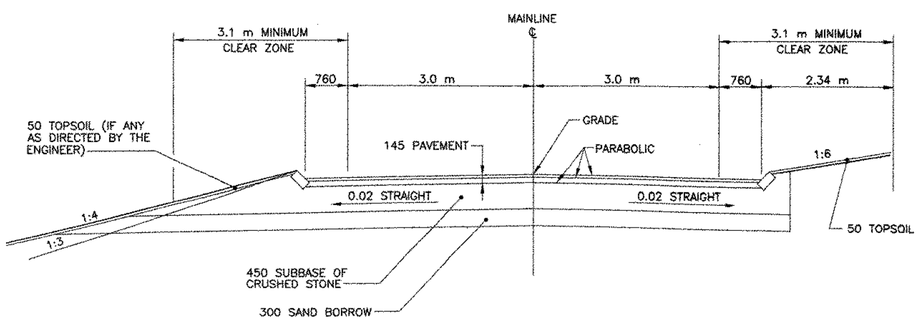
NORMAL SECTION WITH GUARDRAIL



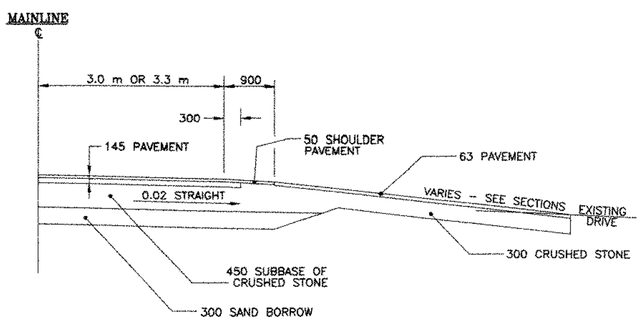
DRIVEWAY DETAIL DRIVEWAYS IN AREAS WITH EDGING



VERTICAL GRANITE CURB (MOD)
STA. 10+746 TO STA. 10+788, LT
STA. 11+875 TO STA. 11+910, LT



SPECIAL SECTION WITH GRANITE SLOPED EDGING
STA. 10+048 TO STA. 10+500



DRIVEWAY DETAIL

NOTE:
DRIVES AND SIDEROADS WILL BE PAVED TO THE LIMIT OF EXCAVATION AND TO THE WIDTHS INDICATED ON THE PLANS.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/TYPICAL SECTIONS C2.DWG

THE LOUIS BERGER GROUP, INC.

TYPICAL SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON--ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 10 OF 116

Metric

CONSTRUCT DRIVE	
LEFT	RIGHT
10+053	10+090
10+220	10+160
10+269	10+203
10+300	10+263
10+344	10+286
10+374	10+371
10+395	

Granite Slope Edging
Sta 10+095.5 to 10+150.7, RT
Sta 10+168.1 to 10+198.7, RT
Sta 10+209.3 to 10+258.1, RT
Sta 10+228.5 to ~~10+263.7~~, LT
Sta 10+267.8 to 10+281.1, RT
Sta 10+274.0 to 10+302.2, LT
Sta 10+292.5 to 10+313.6, RT
Sta 10+324.8 to 10+365.4, RT
Sta 10+349.6 to ~~10+368.3~~, LT
Sta 10+377.4 to 10+389.8, LT
Sta 10+377.4 to 10+405.0, RT
10+256 - 10+263.4 LT
10+359 - 10+368.0 LT

N
10+250.7
10+357.8

TBM-CHISLED SQUARE
NW CORNER
ELEV. 184.468

EXISTING RIGHT-OF-WAY

PARKER HILL ROAD TH 12

JAMES & DIANE SMITH
BK30/PG427

CRAIG MOORE
BK26/PG499

Retain
Save stone wall, if possible.
Retain
Retain
Proposed utility pole (by others)

STEVEN AIKEN
BK33/PG602
Proposed utility pole (by others)

DANIEL & ROBIN WELLS
BK185/PG104

COMMUNITY CHRISTIAN CHURCH OF ATHENS
BK214/PG223

JOYCE KENNETT
BK160/PG174

Remove
D & R GENERAL STORE

Retain
Retain

10+100
10+200

ROUTE 121

SEE WATER LINE SKETCH BELOW

10+000

EXISTING RIGHT-OF-WAY

PT = 10+142.819

PC = 10+142.819

JH MEMORIAL DRIVE

Retain
Save trees, if possible
pavement parking lot
Retain

PT = 10+197.744

EXISTING RIGHT-OF-WAY

PC = 10+318.198

Approx. existing pipe waterline

E.R.E. ASSOCIATES LTD
BK36/PG583

FREDERICK & GRACE WHITE
BK31/PG201

THOMAS & KATHLEEN SULLIVAN
BK33/PG3

Relocate existing rocks towards house, if necessary (Item 204.21).

ELWYN & NANCY MILLETT
BK30/PG449

ROSE AVENIA
BK265/PG309

BRUCE SIMONDS
BK252/PG441

GRAFTON

ROCKINGHAM

1 STA 10+197, 3.8m RT TO STA 10+257, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~59m~~ X 450mm RCP 58.52m
GRATE ELEV.=182.25
INV. 450mm (OUT)=180.80

1A STA 10+257, 3.6m RT TO STA 10+300, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~42m~~ X 450mm RCP 42.1m
GRATE ELEV.=181.90
INV. 450mm (IN)=180.50
INV. 450mm (OUT)=180.50

2 STA 10+300, 3.6m LT TO STA 10+300, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~6.8m~~ X 450mm RCP 7.0m
GRATE ELEV.=181.54
INV. 450mm (OUT)=180.10

3 STA 10+300, 3.6m RT TO STA 10+350, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT 49m X 450mm RCP
GRATE ELEV.=181.54
INV. 450mm (IN LEFT)=180.06
INV. 450mm (IN BACK)=180.06
INV. 450mm (OUT)=180.06

4 STA 10+350, 3.6m RT TO STA 10+400, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~49m~~ X 450mm RCP 48.77m
GRATE ELEV.=181.17
INV. 450mm (IN LEFT)=179.70
INV. 450mm (IN BACK)=179.70
INV. 450mm (OUT)=179.70

4A STA 10+340, 5.0m LT TO STA 10+350, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN (NO SUMP)
CONSTRUCT ~~12m~~ X 450mm RCP 12.19m
GRATE ELEV.=181.14
INV. 450mm (OUT)=179.78

WATER LINE SLEEVE (TIES)
10+375 RT - 10+380 LT

POLE
52
10
77

12 HOUSE

23.5 FT
32 FT
51 FT
4" PVC
18 FT
46 FT

11 HOUSE #990

ROUTE 121 LAYOUT PLAN – 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON--ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 11 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

NOTE:
THE RELOCATION OF UTILITIES (POLES, ANCHORS, ETC.) WILL BE PERFORMED BY THE UTILITY COMPANY. THE EXISTING UNDERGROUND TELEPHONE LINE WILL BE ABANDONED IN PLACE. REMOVAL AND DISPOSAL OF LINES WILL BE THE CONTRACTORS RESPONSIBILITY.

V:/1261/CADD/PLANS/PLAN--C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

Metric

Box Beam Guardrail
Sta 3+068.3 to 3+012.0, LT
Sta 10+512.0 to 10+565.9, RT
Sta 6+008.0 to 6+019.2, RT

Type I End
Sta 10+565.9, RT
Sta 6+006.0 RT
Sta 6+019.2, RT

Type II End
Sta 3+068.3, LT

Granite Slope Edging
Sta 10+417.3 to ~~10+460.8,~~ RT 10+436.9
~~Sta 10+418.9 to 10+459.0, LT~~
Sta 10+474.8 to 10+492.2, RT
Sta 10+580.5 to 10+607.4, RT
Sta 10+723.8 to 10+751.4, RT
Sta 10+690.0 to 10+735.4, LT
~~Sta 10+761.6 to 10+772.8, RT~~
Sta 10+744.2 to 10+811.8, LT
STA. 10+419.0 TO 10+451.7 LT
STA. 10+760.0 TO 10+774.8 RT
STA. 10+441.7 TO 10+460.7 RT

U1 STA 10+592, 6.7m LT TO STA 10+509.5, 10.0m LT
CONSTRUCT ~~81.3m~~ X 150mm UNDERDRAIN 81.11m
CONNNECT TO PROPOSED CATCH BASIN AT 10+592
INV. IN AT CATCH BASIN=183.90
CONNNECT TO PROPOSED CATCH BASIN AT 10+509.5
INV. OUT AT CATCH BASIN=179.60

U2 STA 10+650, 6.7m LT TO STA 10+592, 5.0m LT
CONSTRUCT ~~56.8m~~ X 150mm UNDERDRAIN 62.9m
CONSTRUCT FLUSHING BASIN AT 10+650
INV. OUT AT FLUSHING BASIN=185.25
CONNNECT TO PROPOSED CATCH BASIN AT 10+592
INV. IN AT CATCH BASIN=183.90

U3 STA 10+728, 5.0m LT TO STA 10+650, 5.0m LT
CONSTRUCT ~~76.8m~~ X 150mm UNDERDRAIN 74.34m
CONSTRUCT FLUSHING BASIN AT 10+728
INV. OUT AT FLUSHING BASIN=~~187.90~~ 188.90
CONNNECT TO PROPOSED FLUSHING BASIN AT 13+650
INV. IN AT FLUSHING BASIN=185.25

U4 STA 10+728, 5.0m LT TO STA 10+810, 5.0m LT
CONSTRUCT ~~82m~~ X 150mm UNDERDRAIN 84.5m
INV. OUT AT FLUSHING BASIN=~~187.90~~ 188.90
CONNNECT TO PROPOSED CATCH BASIN AT 10+810
INV. IN AT CATCH BASIN=~~184.60~~ 186.80

CONSTRUCT DRIVE	
LEFT	RIGHT
10+411	10+411
10+584	10+467
10+740	10+475
	10+715
	10+727
	10+756
	10+780

(16) CLAIRE MERCHANT BK238/PG286
(19) TOBY LAMPERT JENNIFER MEEHL BK192/PG492
(20) KENNETH & DORIS BAILEY BK251/PG237
(14) MARIO & SUSAN HERNANDEZ BK261/PG664
(21) ANN WISNESKI BK228/PG391
(18) LYNNE de JONG BECKER BK271/PG541
(5) RODNEY & BEVERLY WELLS BK218/PG152
(13) MARIO & SUSAN HERNANDEZ BK189/PG430
(17) JAMES & CAMILLA ROBERTS BK208/PG203
(18A) ROLAND & URSULA EDWARDS BK95/PG153
(22) WILLIAM & ELIZABETH ARMSTRONG BK172/PG73
(23) PATRICK ZISELBERGER BK263/PG563
(24) HELEN KELTON REVOCABLE FAMILY TRUST BK238/PG149

Sta 3+020 End Project TH2-9103
Begin Project STP 0126(4)S
EXISTING RIGHT-OF-WAY
STA 10+504.824 ROUTE 121 =
STA 3+000.000 CAMBRIDGEPORT ROAD
CAMBRIDGEPORT ROAD TH 4
PT = 3+063.360
Proposed utility pole and anchor (by others)
Construct gravel drive
Pave to property line
Retain steps
Remove
Retain existing pole proposed anchor
Sta 10+480 End Project STP 0126(4)S
Begin Project TH2-9103
Retain
Proposed utility pole and anchor (by others)
Reset existing stone wall
STA. 10+614.912 ROUTE 121 =
STA. 9+999.830 SCHOOL HOUSE ROAD
Remove
LEDGE
PRCC = 10+646.408
Retain existing stone wall, grade to bottom of wall.
PCC = 10+704.842
Save trees if possible. If not, remove trees (item 201.16) and replace with maple trees (item 856.30).
Remove exisitng steps. Construct granite steps utilizing Special Granite Curbing. Construct 3 steps: 1.2m wide, 0.18m rise, 0.3m tread. See cross section (station 10+770) for additional detail.
Special granite curbing
Proposed utility pole and anchor (by others)
Save trees
Sta 10+520 End Project TH2-9103
Begin Project STP 0126(4)S
Match to existing drive
Approx. existing culvert
Remove
EXISTING RIGHT-OF-WAY
PC = 6+042.298
PT = 6+081.298
PC = 6+042.822
PT = 6+082.822
SCHOOLHOUSE ROAD TH 35
Proposed utility pole and anchor (by others)
TBM-SPIKE IN POLE ELEV.=190.499
STA BACK 10+739.46
STA AHEAD 10+741.41
Retain
Save trees
EXISTING RIGHT-OF-WAY
10+700
10+600
10+800
Save stone walkway, remove only portion necessary for construction (item 204.21)

48 STA 10+400, 3.6m RT TO STA 10+459, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT 58m X 450mm RCP
GRATE ELEV.=180.77
INV. 450mm (IN)=179.27
INV. 450mm (OUT)=179.27

5 STA 10+459, 3.6m RT TO STA 10+478, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN (1.5 DIA.)
CONSTRUCT ~~17m~~ X 450mm RCP 16.0m
GRATE ELEV.=180.37
INV. 450mm (IN)=178.77 (WEST)
INV. 450mm (IN)=178.77 (NORTH)
INV. 450mm (OUT)=~~178.62~~ 178.68

5A STA 10+450, 3.6m LT TO STA 10+459, 3.6m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~6.2m~~ X 450mm RCP 11.0m
GRATE ELEV.=180.47
INV. 450mm (OUT)=178.80

EXISTING DRAINAGE
50 300mm CMP -- REMOVE

6 STA 10+476, 3.6m RT TO STA 10+497.8, 5.0m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~21m~~ X 450mm RCP 21.94m
GRATE ELEV.=180.36
INV. 450mm (IN)=~~178.68~~ 178.62
INV. 450mm (OUT)=178.53
INV. @ BRIDGE ABUTMENT=178.30

7 SEE WEAVER BROOK BRIDGE PLAN

8 STA 10+591, 6.1m LT TO STA 10+581, 16.3m RT
CONSTRUCT CONCRETE CATCH BASIN
CONSTRUCT ~~24.0m~~ X 600mm CPEP (SL) 23.0m
GRATE ELEV.=184.62
INV. 150mm (IN)=183.90
INV. 150mm (OUT)=183.90
INV. 600mm (OUT)=183.46
CONSTRUCT CONCRETE HEADWALL
INV. AT HEADWALL=182.30
CONSTRUCT STONE FILL TYPE I

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

NOTE:
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V: /1261/CADD/PLANS/PLAN-02.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 40 60
1 : 500

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN - 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 12 OF 116

Metric

Box Beam Guardrail
10+980 Sta ~~10+968.7~~ to 11+220.2, RT
Dibernardo Driveway, LT

Type I End
2 – Dibernardo Driveway, LT

Type II End
Sta ~~10+968.7, RT~~
10+980 RT

CONSTRUCT DRIVE
LEFT RIGHT
11+015 –

01.15)

granite
ng,
m rise,
ation

(21) ANN WISNESKI
BK228/PG391

(25) LILLIAN FITZGERALD
BK259/PG419

(26) SARAH DIBERNARDO
BK267/PG112

PC = 11+082.615

Approx. location of existing leach field

Reset existing stone wall

Proposed utility pole and anchor (by others)

Construct gate

Remove

EXISTING RIGHT-OF-WAY

Reset existing stone wall

Remove

Proposed utility pole and anchor (by others)

Existing well

Remove

Retain existing pole, proposed anchor

Remove

Remove

Reset existing stone wall

Proposed utility pole and anchor (by others)

Construct gate

Proposed utility pole and anchor (by others)

Relocate existing barn, see foundation detail below.

Proposed utility pole and anchor (by others)

EXISTING RIGHT-OF-WAY

Construct gate

9 U5 10 U6 12 U7 13 11 11A 51 52 53

10+555.627 10+900 ROUTE 121 11+000 11+100 11+200

PC = 10+925.253 PT = 11+013.989

NEW DRAINAGE

(9) STA 10+810, 3.6m LT TO STA 10+825, 6.1m LT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT 15m X 375mm CPEP (SL)
GRATE ELEV=187.92
INV. 150mm (IN)=186.80
INV. 375mm (OUT)=186.65
INV. @ END OF PIPE=186.60

(10) STA 10+940, 7.2m LT TO STA 10+940, 10.5m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~17.2m~~ X 600mm CPEP (SL) 17.22m
GRATE ELEV.=184.95
INV. 600mm (OUT)=183.6
INV. 150mm (IN)=184.0
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. AT HEADWALL=183.6
CONSTRUCT STONE FILL TYPE I AT HEADWALL

(11) STA 11+000, 7.0m LT TO STA 11+004, 7.2m RT
CONSTRUCT CONCRETE HEADWALL AT INLET
CONSTRUCT ~~17.8m~~ X 1200mm RCP 14.63m
INV. 1200mm (IN)=183.40
INV. 150mm (IN)=183.50
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. 1200mm (OUT)=183.26
CONSTRUCT STONE FILL TYPE II

(11A) STA 11+009, 3.9m RT TO STA 11+004, 7.2m RT
CONSTRUCT DROP INLET
CONSTRUCT ~~4.0m~~ X 375mm RCP 4.88m
GRATE ELEV.=185.32
INV. 375mm (OUT)=183.85
CONNECT TO HEADWALL
INV. AT HEADWALL=183.70
CONSTRUCT STONE FILL TYPE II AT HEADWALL

(12) STA 11+025, 6.5m LT TO STA 11+006, 9.5m LT
CONSTRUCT ~~17m~~ X 375mm CPEP (SL) 22.55m
INV. 375mm (IN)=184.65
INV. 375mm (OUT)=184.00

(21A) ANN WISNESKI
BK 228 P 391

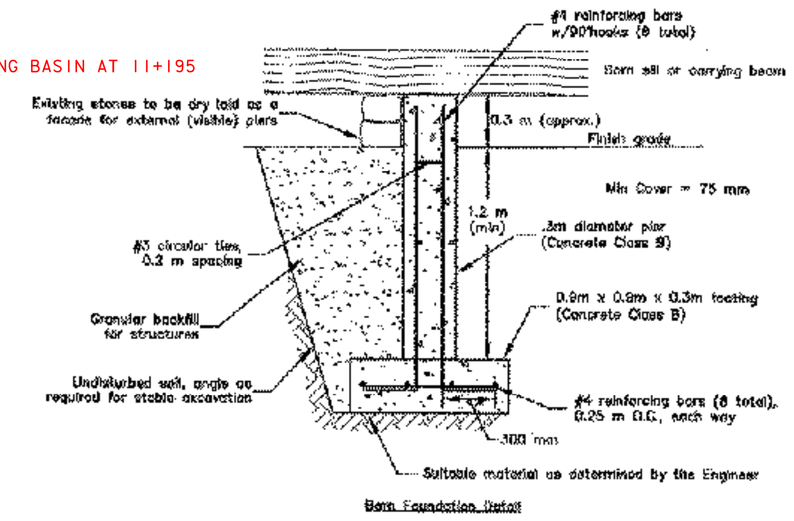
EXISTING DRAINAGE

(51) 300mm — REMOVE
(52) 300mm — REMOVE
(53) 300mm — REMOVE

(U5) STA 10+845, 5.0m LT TO STA 10+940, 7.2m LT
CONSTRUCT ~~93.8m~~ X 150mm UNDERDRAIN 95.37m
CONSTRUCT FLUSHING BASIN AT 10+845
INV. OUT AT FLUSHING BASIN=184.60
CONNNECT TO PROPOSED CATCH BASIN AT 10+940
INV. AT CATCH BASIN=184.00

(U6) STA 11+100, 5.0m LT TO STA 11+000, 7.0m LT
CONSTRUCT ~~100m~~ X 150mm UNDERDRAIN 99.34m
CONSTRUCT FLUSHING BASIN AT 11+100
INV. OUT AT FLUSHING BASIN=184.90
CONNNECT TO PROPOSED CONCRETE HEADWALL AT 11+000
INV. AT HEADWALL=183.50

(U7) STA 11+195, 5.0m LT TO STA 11+100, 5.0m LT
CONSTRUCT ~~95m~~ X 150mm UNDERDRAIN 95m
CONNECT TO PROPOSED ~~CATCH BASIN AT 11+195~~ FLUSHING BASIN AT 11+195
CONNNECT TO PROPOSED FLUSHING BASIN AT 11+100
INV. IN AT CATCH BASIN=184.90



Barn Foundation Detail

BARBED WIRE FENCE – ITEM 620.25
STA 10+790 – 10+965, RT ALONG RIGHT OF WAY, RETURN SOUTH ALONG DRIVEWAY TO RELOCATED BARN
STA 10+975 – 11+175, RT FROM BARN NORTH TO RIGHT OF WAY, EAST ALONG RIGHT OF WAY TO PROPERTY LINE.
STA 10+820 – 11+005, LT ALONG RIGHT OF WAY

GATES – ITEM 620.15
STA 10+850, LT
STA 10+860, RT
STA 10+967, RT

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GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PLAN-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN – 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
RPARM FILE NAME:	PLOT DATE: 12/05/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 13 OF 116

Metric

Reset existing stone wall at approximate station 11+221 to approximate station 11+252 to the right-of-way line from approximate station 11+221 to approximate station 11+252

Reset existing stone wall at approximate station 11+260 to approximate station 11+297 to the right-of-way line from approximate station 11+260 to approximate station 11+297

(29) RICHARD D. EDELSTEIN EVE CRIST NESS BK193/PG232

(28) JAMES & LISA CRITCHFIELD BK238/PG26
Approx. location of existing leachfield

Proposed utility pole (by others)

Remove

Proposed utility pole and anchor (by others)

Proposed utility pole and anchor (by others)

Proposed utility pole and anchor (by others)

Remove

Remove

Remove

Remove

Remove

Remove

Retain

ADDED UNDERDRAIN

MANDIGO ROAD TH-50

BRIDGE TREES

POWER POLE

PC = 11+340.38

PT = 11+460.384

PC = 11+216.252

EXISTING RIGHT-OF-WAY

Widen existing driveway 0.6m

TRM-SPIKE IN POLE ELEV.=190.458

Save second row of trees, if possible. Replace with Evergreens as shown on the Landscape Plans. Remove first row of trees immediately prior to construction on property.

(27) DAVID & JEAN COTTON BK208/PG390

CONSTRUCT DRIVE	
LEFT	RIGHT
11+207	11+240
11+216	

STA 11+360.106 ROUTE 121=
STA 8+000.000
MANDIGO ROAD

PCC = 11+460.904

(30) JOHN RAYMOND ESTATE BK270/PG16

Reset existing stone wall at approximate station 11+441 to approximate station 11+463 to the right-of-way line from approximate station 11+441 to approximate station 11+463

Station 11+540 to Station 11+600 construct 2.4m wide bench stone fill type I, 0.3m thick

EXISTING RIGHT-OF-WAY

Proposed utility pole and anchor (by others)

(27) DAVID & JEAN COTTON BK208/PG390

Box Beam Guardrail
~~Sta 11+249.0 to 11+908.0, RT~~
STA. 11+248 - 11+900 RT

Type II End
Sta 11+220.~~2~~, RT
Sta ~~11+249.0~~, RT
11+248

TREATED TIMBER CURB
STA. 11+255 - 11+345 RT

NEW DRAINAGE

(13) STA 11+195, 6.4m LT TO STA 11+209, 6.4m LT
~~CONSTRUCT PRECAST CATCH BASIN~~ ELIMINATED C BASIN
CONSTRUCT ~~13m~~ X 375mm RCP 14.6m
GRATE ELEV.=186.60
~~INV. 150mm (IN)=185.90~~
INV. 375mm (OUT)=185.90
INV. AT END OF PIPE=185.85

(13A) STA 11+211, 6.4m LT TO STA 11+220, 6.4m LT
CONSTRUCT ~~0m~~ X 375mm RCP 9.75m
INV. 375mm (IN)=185.85
INV. 375mm (OUT)=185.80

(14) STA 11+277, 8.5m LT TO STA 11+283.5, 9.3m RT
CONSTRUCT CONCRETE HEADWALL AT INLET
CONSTRUCT ~~18m~~ X 1800mm RCP 19.5m
INV. AT HEADWALL (IN)=~~183.70~~ 183.50
INV. 150mm (IN)=184.00 (WEST)
INV. 150mm (IN)=184.00 (EAST)
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. AT HEADWALL (OUT)=~~183.56~~ 182.00
CONSTRUCT STONE FILL TYPE IV AT HEADWALL

(14A) STA 11+255, 3.9m RT TO STA 11+255, 6.7m RT
CONSTRUCT PRECAST DROP INLET
CONSTRUCT ~~2.2m~~ X 375mm CPEP (SL) 3.9m
GRATE ELEV.=186.057
INV. 375mm (IN)=184.65
INV. AT END OF PIPE=184.55
CONSTRUCT STONE FILL TYPE I

(15) STA 11+370, 9.6m LT TO STA 11+370, 9.5m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~17.9m~~ X 600mm CPEP (SL) 18.6m
GRATE ELEV.=~~188.90~~ 189.30
INV. 600mm (OUT)=187.70
INV. 150mm (IN)=188.00
~~CONSTRUCT 600mm RCP END SECTION~~ ELMINATED
INV. AT END SECTION (OUT)=187.50
CONSTRUCT STONE FILL TYPE II

(16A) STA 11+552, 6.4m LT TO STA 11+552, 6.7m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~11.9m~~ X 600mm CPEP (SL) 14.5m
GRATE ELEV.=186.46
INV. 600mm (OUT)=187.30
INV. 150mm (IN)=187.70 (WEST)
INV. 150mm (IN)=187.70 (EAST)
CONSTRUCT CONCRETE HEADWALL
INV. AT HEADWALL=187.20
CONSTRUCT STONE FILL TYPE I

EXISTING DRAINAGE

(54) 1200mm --- REMOVE

(55) 450mm --- REMOVE

(56) 150mm --- REMOVE

(57) 300mm --- REMOVE

(U8) STA 11+230, 5.0m LT TO STA 11+277, 8.5m LT
CONSTRUCT ~~47m~~ X 150mm UNDERDRAIN 46.07m
CONSTRUCT FLUSHING BASIN AT 11+230
CONNNECT TO PROPOSED CONCRETE HEADWALL AT 11+277
INV. AT HEADWALL=184.00

(U9) STA 11+352, 5.0m LT TO STA 11+277, 8.5m LT
CONSTRUCT ~~75m~~ X 150mm UNDERDRAIN 75.83m
CONSTRUCT FLUSHING BASIN AT 11+352
INV. OUT AT FLUSHING BASIN=186.98
CONNNECT TO PROPOSED CONCRETE HEADWALL AT 11+277
INV. AT HEADWALL=184.00

(U10) STA 11+450, 5.0m LT TO STA 11+370, 9.8m LT
CONSTRUCT ~~80m~~ X 150mm UNDERDRAIN 81.05m
CONSTRUCT FLUSHING BASIN AT 11+450
INV. OUT AT FLUSHING BASIN=188.75
CONNNECT TO PROPOSED CATCH BASIN AT 11+370
INV. IN AT CATCH BASIN=188.00

(U11) STA 11+450, 5.0m LT TO STA 11+552, 6.4m LT
CONSTRUCT ~~102m~~ X 150mm UNDERDRAIN 102.29m
INV. OUT AT FLUSHING BASIN=188.75
CONNNECT TO PROPOSED CATCH BASIN AT 11+552
INV. IN AT CATCH BASIN=187.70

(U12) STA 11+552, 6.4m LT TO STA 11+600, 6.4m LT
CONSTRUCT ~~48m~~ X 150mm UNDERDRAIN 49.23m
INV. OUT AT CATCH BASIN=187.70
CONNNECT TO PROPOSED CATCH BASIN AT 11+600
INV. IN AT CATCH BASIN=185.60

(U24) 8+005 LT/RT
16.79m x 150mm UNDERDRAIN
INV (OUT) 186.98
INV (IN) 188.20

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

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V:/1261/CADD/PLANS/PLAN-C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 40 60
1 : 500

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN — 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 14 OF 116

Metric

BOX BEAM GUARDRAIL
STA. 11+248 TO 11+900 RT
STA. 11+912 TO 12+198 RT

~~Box Beam Guardrail~~
~~Sta 11+249.0 to 11+908.0, RT~~
~~Sta 11+920.0 to 12+238.0, RT~~

Type B End
Sta ~~11+908.0~~, RT 11+900
Sta ~~11+920.0~~, RT 11+912

CONSTRUCT DRIVE	
LEFT	RIGHT
11+690	11+915
11+710	

EXISTING RIGHT-OF-WAY

BROCK ROAD TH 89

Reset existing stone wall at approximate station 11+592 to approximate station 11+630 to the right-of-way line from approximate station 11+592 to approximate station 11+630

(32) FRANKLIN & BEATRICE PERRY BK152/PG36

TBM-CHISELED SQUARE ELEV.=183.578

Remove existing stone walls on parcel 32 only

Remove

Taper with gravel to match existing roadway

(33) ALAN & CONSTANCE LANCASTER BK189/PG391

Remove

Construct gravel pull out

Retain

(U13) STA 11+600, 6.4m LT TO STA 11+650, 6.4m LT
CONSTRUCT ~~50m~~ X 150mm UNDERDRAIN 50.4m
INV. OUT AT CATCH BASIN=185.80
CONNNECT TO PROPOSED CATCH BASIN AT 11+650
INV. IN AT CATCH BASIN=183.30

(U14) STA 11+650, 6.4m LT TO STA 11+680, 6.5m LT
CONSTRUCT ~~30m~~ X 150mm UNDERDRAIN 28.96m
INV. OUT AT CATCH BASIN=183.30
CONNNECT TO PROPOSED CATCH BASIN AT 11+680
INV. IN AT CATCH BASIN=182.60

Proposed utility pole and anchor Remove existing (by others)

Proposed utility pole and anchor Remove existing (by others)

Proposed utility pole (by others)

EXISTING RIGHT-OF-WAY

(31) THOMAS & DIANE COLDING BK248/PG103

Save trees, if possible. If not remove trees (Item 201.16).

Special ~~granite~~ curbing

ELMINATED
REBUILT WITH FIELD STONE

Reset existing sign, if necessary (Items 675.50 and 675.60)

(34) THOMAS & DIANE GOLDING BK248/PG103

PT = 11+932.647

(31) THOMAS & DIANE GOLDING BK248/PG103

NEW DRAINAGE

(16) STA 11+600, 6.4m LT TO STA 11+650, 6.4m LT
CONSTRUCT PRECAST CONCRETE CATCH BASIN
GRATE ELEV.=186.45
CONSTRUCT 0.15m HIGH X 1m WIDE BERM IN DITCH DOWNSTREAM OF BASIN (SEE CROSS SECTIONS)
CONSTRUCT ~~47.6m~~ X 600mm CPEP (SL) 48.2m
INV. 600mm (OUT)=185.00
INV. 150mm (WEST)(IN)=185.60
INV. 150mm (EAST)(IN)=185.60

(17) STA 11+650, 6.4m LT TO STA 11+653, 3.8m RT
CONSTRUCT PRECAST CONCRETE CATCH BASIN
GRATE ELEV.=184.40
CONSTRUCT 0.3m HIGH X 1m WIDE BERM IN DITCH DOWNSTREAM OF BASIN (SEE CROSS SECTIONS)
CONSTRUCT ~~13m~~ X 600mm CPEP (SL) 13.64m
INV. 600mm (IN)=183.15
INV. 600mm (OUT)=183.00
INV. 150mm (WEST)(IN)=183.30
INV. 150mm (EAST)(IN)=183.30
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. AT HEADWALL (OUT)=182.90
CONSTRUCT STONE FILL AT HEADWALL

(18) STA 11+680, 6.5m LT TO STA 11+697, 9.5m LT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~16.7m~~ X 375mm RCP 17.0m
GRATE ELEV.=183.50
INV. AT CATCH BASIN (OUT)=182.00
INV. 375mm (OUT)=181.80
INV. 150mm (IN)=182.60

(19) STA 11+695, 7.0m LT TO STA 11+698, 9.4m RT
CONSTRUCT CONCRETE HEADWALL AT INLET
CONSTRUCT ~~15.9m~~ X 1200mm RCP 17.07m
INV. 1200mm (IN)=181.50
INV. 1200mm (OUT)=179.85
CONSTRUCT CONCRETE HEADWALL AT OUTLET
CONSTRUCT STONE FILL TYPE II AT HEADWALL

(20) STA 11+720, 9.0m LT TO STA 11+700, 9.5m LT
CONSTRUCT ~~20.0m~~ X 375mm RCP 19.51m
INV. (IN)=182.40
INV. (OUT)=181.80

(20A) STA 11+750, 3.9m RT TO STA 11+750, 8.6m RT
CONSTRUCT PRECAST DROP INLET
CONSTRUCT ~~4.1m~~ X 375mm CPEP (SL) 4.88m
GRATE ELEV.=182.94
INV. 375mm (OUT)=181.60
INV. AT OUTLET=181.25
CONSTRUCT STONE FILL TYPE II

(21) STA 11+849, 9.3m LT TO STA 11+849, ~~6.7m~~ RT 7.0m
CONSTRUCT ~~16.0m~~ X 450mm RCP 17.07m
INV. 450mm (IN)=180.63
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. 450mm (OUT)=~~180.53~~ 180.38m
CONSTRUCT STONE FILL TYPE I AT HEADWALL

(22) STA 11+907, 6.4m LT TO STA 11+927, 6.4m LT
CONSTRUCT ~~20.0m~~ X 375mm RCP 19.51m
INV. (IN)=180.30
INV. (OUT)=180.05

EXISTING DRAINAGE

(58)	375mm -- REMOVE
(59)	375mm -- REMOVE
(60)	375mm -- REMOVE
(61)	300mm -- REMOVE
(62)	450mm -- REMOVE

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

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GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN - 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 15 OF 116

V:/1261/CADD/PLANS/PLAN-02.DWG

Metric

NEW DRAINAGE

(23) STA 12+110, 6.4m LT TO STA 12+113, 6.8m RT
CONSTRUCT ~~13.2m~~ X 750mm RCP 14.63m
CONSTRUCT CONCRETE HEADWALL AT INLET
INV. AT HEADWALL =173.40
CONSTRUCT CONCRETE HEADWALL AT OUTLET
INV. AT HEADWALL=172.98
CONSTRUCT STONE FILL TYPE 2 AT HEADWALL

(24) STA 12+200, 6.4m LT TO STA 12+200, 8.1m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~10.9m~~ X 600mm RCP 12.19m
GRATE ELEV.=172.80
INV. 600mm (OUT)=171.45
INV. 150mm (WEST)(IN)=171.80
INV. 150mm (EAST)(IN)=171.80

(24A) STA 12+200, 5.76m RT TO STA 1+040, 1.8m LT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~34.3m~~ X 600mm RCP 33.844m
GRATE ELEV.=173.38
INV. 600mm (IN)=171.40
INV. 600mm (OUT)=171.38

(24B) STA 1+040, 1.8m LT TO STA 1+040, 6.0m LT
CONSTRUCT PRECAST CATCH BASIN (1.5 DIA.)
CONSTRUCT ~~3.6m~~ X 750mm RCP 4.57m CPEP
GRATE ELEV.=171.02
INV. 600mm (IN)=168.26 (W)
INV. 600mm (IN)=168.26 (E)
INV. 750mm (OUT)=168.00
~~CONSTRUCT CONCRETE HEADWALL~~ ELMINATED
INV. AT HEADWALL=167.92
CONSTRUCT STONE FILL TYPE 2

(25A) STA 12+280, 6.4m LT TO STA 12+280, 4.0m RT
CONSTRUCT PRECAST CATCH BASIN
GRATE ELEV.=173.85
CONSTRUCT 0.3m HIGH X 1m WIDE BERM IN DITCH
DOWNSTREAM OF BASIN (SEE CROSS SECTIONS)
CONSTRUCT ~~9.2m~~ X 600mm RCP 9.75m
INV. 600mm (IN)=172.65
INV. 600mm (OUT)=172.60
INV. 150mm (WEST)(IN)=173.00
INV. 150mm (EAST)(IN)=~~173.10~~ 173.00

(25B) STA 12+280, 4.0m RT TO STA 1+040, 1.8m LT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~46.8m~~ X 600mm RCP 48.77m
GRATE ELEV.=174.61
INV. 600mm (IN)=172.50
INV. 600mm (OUT)=172.35

(34) THOMAS & DIANE GOLDING
BK248/PG103

Proposed utility pole and anchor Remove existing (by others)

EXISTING RIGHT-OF-WAY

STA 1+088.057 McBRIDE WEST=
STA 12+188.803 ROUTE 121

(63) Proposed utility pole and anchor Remove existing (by others)

(37) STANLEY & SHARON BUDZIK
BK192/PG286

STA 0+084.064 McBRIDE EAST=
STA 12+286.758 ROUTE 121

Proposed utility pole and anchor (by others)

EXISTING RIGHT-OF-WAY

PT = 12+383.006

Remove

Retain

Remove

Retain

Proposed utility pole and anchor (by others)

Proposed utility pole and anchor (by others)

PC = 14+028.4413

PT = 0+039.1480

PC = 0+030.2202

PT = 0+040.8787

Proposed utility pole (by others)

(36) BRONY BUDZIK
BK121/PG436

(35) McQUIDE
BK

McBRIDE ROAD

EXISTING DRAINAGE

(63) 375mm --- REMOVE

(64) 375mm --- REMOVE

(31) THOMAS & DIANE GOLDING
BK248/PG103

(U15) STA 12+120, 5.0m LT TO STA 12+200, 6.4m LT
CONSTRUCT ~~80m~~ X 150mm UNDERDRAIN 80.92m
CONSTRUCT FLUSHING BASIN AT 12+120
INV. OUT AT FLUSHING BASIN=172.20
CONNNECT TO PROPOSED CATCH BASIN AT 12+200
INV. IN AT CATCH BASIN=171.80

(U16) STA 12+280, 6.4m LT TO STA 12+200, 6.4m LT
CONSTRUCT 80m X 150mm UNDERDRAIN
INV. OUT AT CATCH BASIN=173.00
CONNNECT TO PROPOSED CATCH BASIN AT 12+200
INV. IN AT CATCH BASIN=171.80

(U17) STA 12+380, 5.0m LT TO STA 12+280, 6.4m LT
CONSTRUCT ~~100m~~ X 150mm UNDERDRAIN 101.78m
CONSTRUCT FLUSHING BASIN AT 12+380
INV. OUT AT FLUSHING BASIN=174.35
CONNNECT TO PROPOSED CATCH BASIN AT 12+280
INV. IN AT CATCH BASIN=~~173.10~~ 173.00

Box Beam Guardrail
11+912 Sta ~~11+920.0~~ to 12+238.0, RT
Sta 12+256.0 to 12+850.0, RT

Type I End
Sta 12+238.0, RT
Sta 12+256.0, RT

TREATED TIMBER CURB
McBRIDE ROAD WEST

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

NOTE:
THE RELOCATION OF UTILITIES (POLES,ANCHORS, ETC.) WILL BE PERFORMED BY THE UTILITY COMPANY. THE EXISTING UNDERGROUND TELEPHONE LINE WILL BE ABANDONED IN PLACE. REMOVAL AND DISPOSAL OF LINES WILL BE THE CONTRACTORS RESPONSIBILITY.

V: /1261/CADD/PLANS/PLAN-C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN – 100% DESIGN

PROJECT: GRAFTON--ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 16 OF 116

Metric

U18 STA 12+438, 5.0m LT TO STA 12+380, 5.0m LT
CONSTRUCT ~~58m~~ X 150mm UNDERDRAIN 59.67m
CONSTRUCT FLUSHING BASIN AT 12+438
INV. OUT AT FLUSHING BASIN=174.950
CONNNECT TO PROPOSED FLUSHING BASIN AT 12+380
INV. IN AT FLUSHING BASIN=174.350

U19 STA 12+465, 5.0m LT TO STA 12+530, 5.0m LT
CONSTRUCT ~~75m~~ X 150mm UNDERDRAIN 76.93m
CONSTRUCT FLUSHING BASIN AT 12+455
INV. OUT AT FLUSHING BASIN=174.950
CONNNECT TO PROPOSED FLUSHING BASIN AT 12+530
INV. IN AT FLUSHING BASIN=173.56

U20 STA 12+530, 5.0m LT TO STA 12+600, 6.4m LT
CONSTRUCT ~~70m~~ X 150mm UNDERDRAIN 70.57m
CONSTRUCT FLUSHING BASIN AT 12+530
INV. OUT AT FLUSHING BASIN=173.50
CONNNECT TO PROPOSED CATCH BASIN AT 12+600
INV. IN AT CATCH BASIN=~~172.80~~ 172.50

U21 STA 12+600, 6.4m LT TO STA 12+700, 6.4m LT
CONSTRUCT ~~100m~~ X 150mm UNDERDRAIN 97.53m
INV. OUT AT CATCH BASIN=~~173.00~~ 171.75
CONNNECT TO PROPOSED CATCH BASIN AT 12+700
INV. IN AT CATCH BASIN=172.50

U22 STA 12+700, 6.4m LT TO STA 12+781, 5.0m LT
CONSTRUCT ~~81m~~ X 150mm UNDERDRAIN 81.68m
INV. OUT AT CATCH BASIN=~~172.50~~ 171.75
CONNNECT TO PROPOSED CATCH BASIN AT ~~12+800~~ 12+781
INV. IN AT CATCH BASIN=~~170.60~~ 171.00

EXISTING DRAINAGE

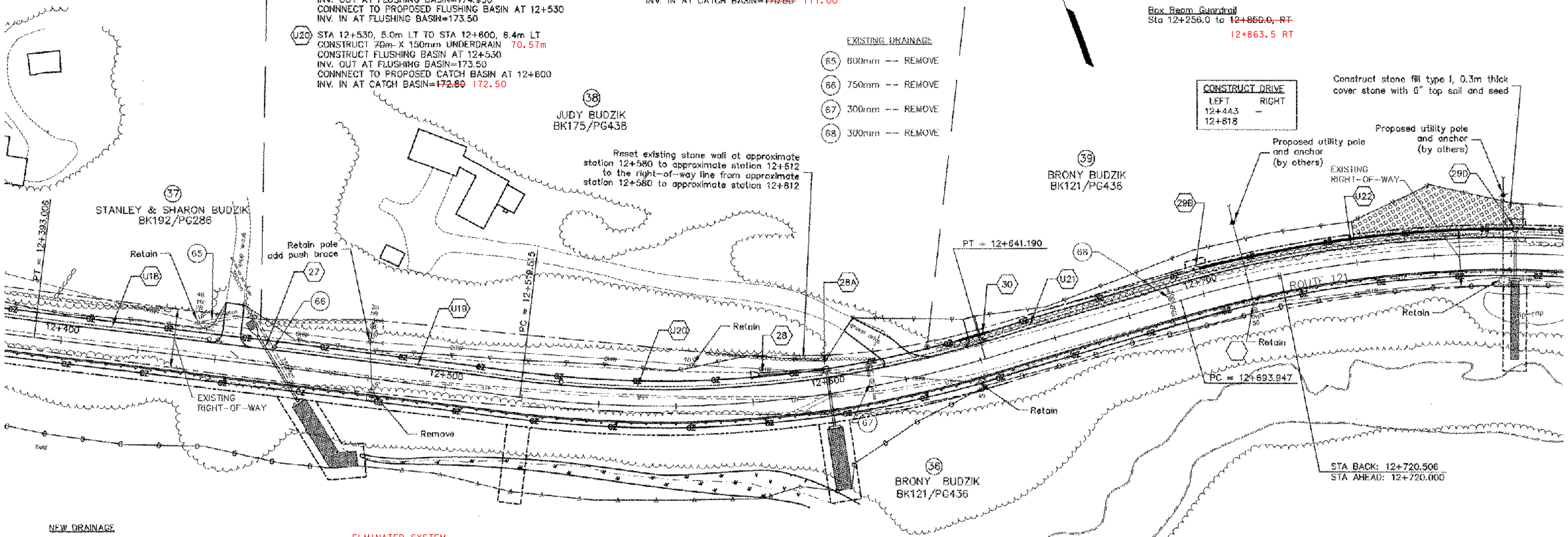
65 600mm — REMOVE
66 750mm — REMOVE
67 300mm — REMOVE
68 300mm — REMOVE

Box Beam Guardrail
Sta 12+256.0 to ~~12+850.0, RT~~
12+863.5 RT

CONSTRUCT DRIVE

LEFT	RIGHT
12+443	–
12+818	

Construct stone fill type 1, 0.3m thick cover stone with 6" top soil and seed



NEW DRAINAGE

26 NOT USED

27 STA 12+449, 9.0m LT TO STA 12+483, 8.5m RT
~~CONSTRUCT END SECTION~~ ELMINATED
CONSTRUCT ~~21.5m~~ X 900mm RCP 21.95m
INV. 900mm (OUT)=175.40
~~CONSTRUCT CONCRETE HEADWALL AT OUTLET~~ ELMINATED
INV. AT HEADWALL=175.18
CONSTRUCT STONE FILL TYPE II AT OUTLET

ELMINATED SYSTEM

~~28 STA 12+580, 6.9m LT TO STA 12+600, 6.4m LT~~
~~CONSTRUCT 750mm CONCRETE END SECTION~~
~~CONSTRUCT 19.4m X 750mm CPEP (SL)~~
~~INV. AT END SECTION=174.10~~

28A STA 12+600, 6.4m LT TO STA 12+600, 11.0m RT
CONSTRUCT PRECAST CATCH BASIN
CONSTRUCT ~~16.2m~~ X 750mm CPEP (SL) 14.33m
GRATE ELEV.=173.98
INV. 750mm (IN)=172.50
INV. 750mm (OUT)=172.35
INV. 150mm (WEST)(IN)=172.50
INV. 150mm (EAST)(IN)=172.50
CONSTRUCT CONCRETE HEADWALL
INV. AT HEADWALL=171.90
CONSTRUCT STONE FILL TYPE II AT OUTLET

29B STA 12+700, 6.4m LT TO STA 12+781, 6.4m LT
CONSTRUCT PRECAST CATCH BASIN
GRATE ELEV.=173.23
CONSTRUCT 0.3m HIGH X 1m WIDE BERM IN DITCH
DOWNSTREAM OF BASIN (SEE CROSS SECTIONS)
CONSTRUCT ~~79.8m~~ X 600mm CPEP (SL) 81.08m
INV. 150mm (OUT)(EAST)=171.75
INV. 150mm (IN)(WEST)=171.75
INV. 600mm (OUT)=171.50

29D STA 12+781, 6.7m LT TO STA 12+781, 7.0m RT
CONSTRUCT PRECAST CATCH BASIN
GRATE ELEV.=172.50
CONSTRUCT 0.3m HIGH X 1m WIDE BERM IN DITCH
DOWNSTREAM OF BASIN (SEE CROSS SECTIONS)
CONSTRUCT ~~13.7m~~ X 600mm CPEP (SL) 15.24m
INV. 600mm (IN)=171.00
INV. 600mm (OUT)=170.90
INV. 150mm (OUT)(EAST)=~~170.80~~ 171.00
INV. 150mm (IN)(WEST)=~~170.80~~ 171.00
CONSTRUCT CONCRETE HEADWALL
INV. AT HEADWALL=170.60
CONSTRUCT STONE FILL TYPE I AT OUTLET

30 STA 12+636, 6.4m LT TO STA 12+644, 6.4m LT
CONSTRUCT ~~8m~~ x 450 mm RCP 9.75m
INV (IN)=173.66
INV (OUT)=173.50

NOTE:
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GRAPHIC SCALE
(IN METRES)
10 0 5 10 20 30 40 50
1 : 500

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PLAN-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN – 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 17 OF 116

Metric

Box Beam Guardrail
Sta 12+256.0 to 12+850.0, RT

Remove and Reset Guardrail
Sta 12+850.0 to 12+860.0, RT

(39)
BRONY BUDZIK
BK125/PG212

STA 12+860
LIMIT OF FULL DEPTH CONSTRUCTION
MATCH TO CONTRACT 1

EXISTING
RIGHT-OF-WAY

LEACH ROAD TH 5

EXISTING
RIGHT-OF-WAY

PT = 5+040.615

PC = 5+028.545

(U23)

garden

(40)
BRONY BUDZIK
MARION C. BUDZIK
BK147/PG492

(65)
NATHANIEL I. SKORSTAD
BK254/PG558

App

12+900

13+000

13+014.502

PT = 12+846.805

Approx existing pipe from sewer system

STA 12+922.599 ROUTE 121 =
STA 5+000.000 LEACH ROAD

(38)
BRONY BUDZIK
BK121/PG436

(41)
RONALD & JOYCE DAVIS
BK172/PG155

Drainage constructed in contract 1

(U23) STA 12+781, 3.9m LT TO STA 12+860, 6.4m LT
CONSTRUCT ~~79.0m~~ X 150mm UNDERDRAIN 77.42m
CONNECT TO PROPOSED CATCH BASIN AT 12+781, 3.9m LT
INV. OUT AT PROPOSED CATCH BASIN=~~170.80~~ 171.00
CONNECT TO EXISTING CATCH BASIN AT 12+860
INV. IN AT CATCH BASIN=~~168.80~~ 169.50

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

NOTE:
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V: /1261/CADD/PLANS/PLAN-C2.DWG

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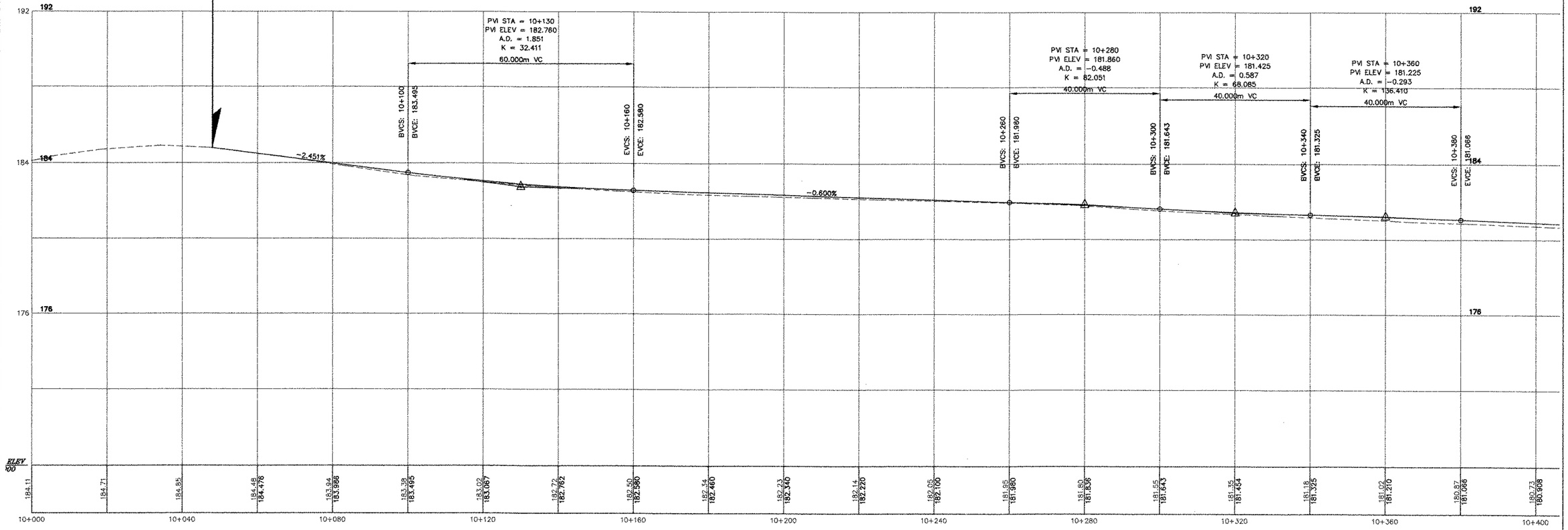
THE LOUIS BERGER GROUP, INC.

ROUTE 121 LAYOUT PLAN – 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 18 OF 116

Metric

STA. 10+048.000
LIMIT OF WORK



GRAPHIC SCALE
(IN METERS)

1:500 Horizontal

1:100 Vertical

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

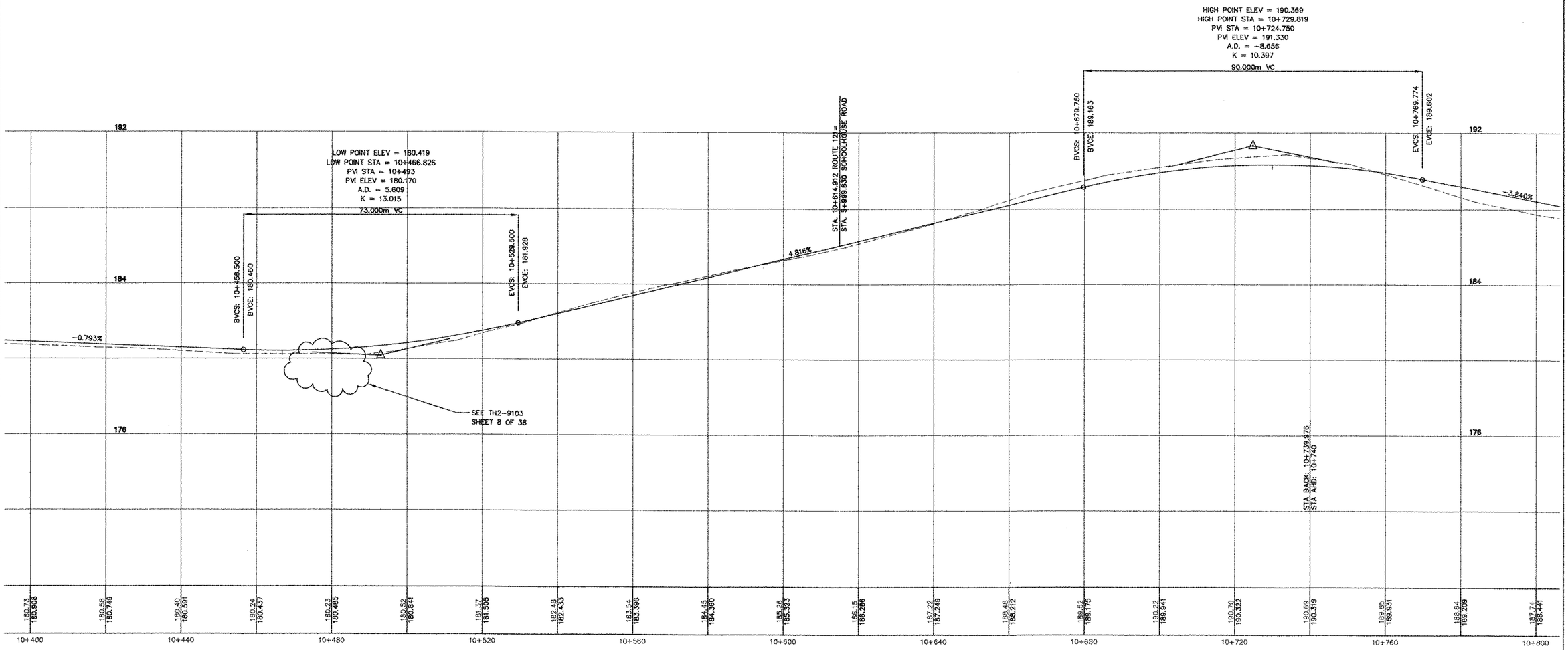
ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 19 OF 116

Metric



GRAPHIC SCALE

(IN METERS)

10 0 5 10 20 30 40 50 — 1:500 Horizontal

2 0 1 2 4 6 8 10 — 1:100 Vertical

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

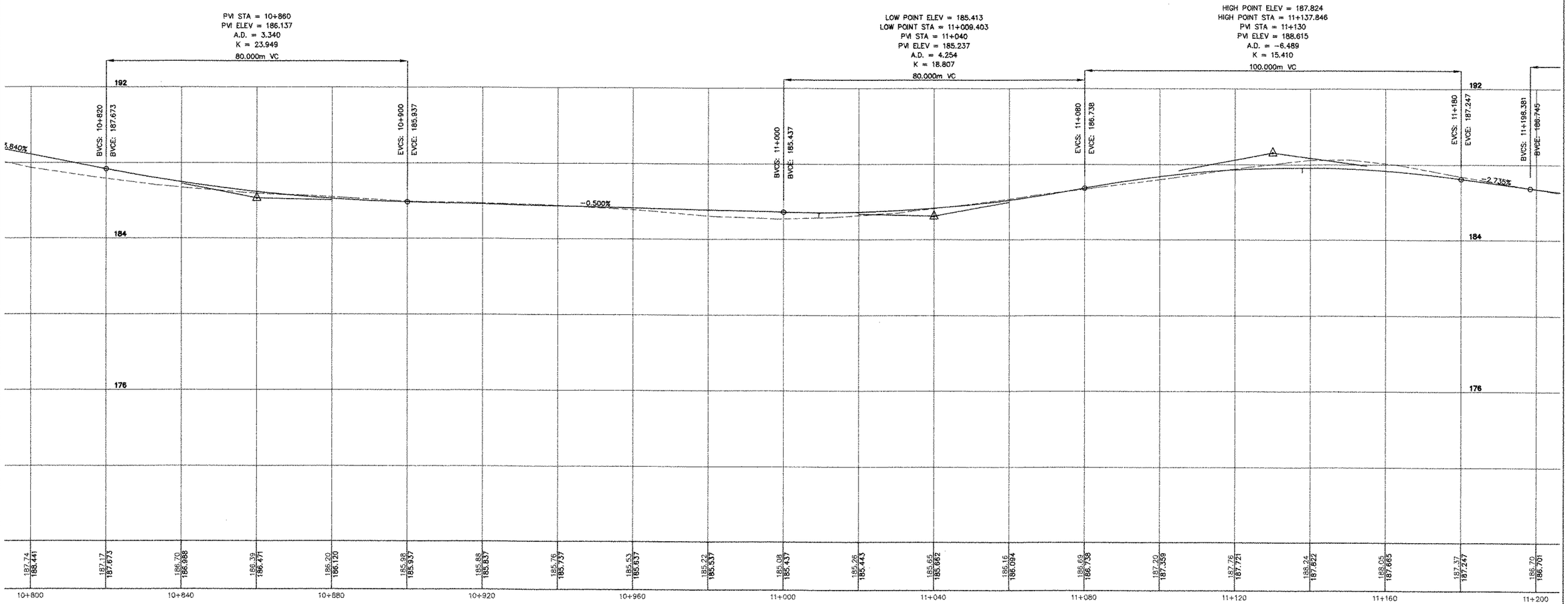
THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 20 OF 116

Metric



GRAPHIC SCALE

(IN METERS)

10 0 5 10 20 30 40 50 — 1:500 Horizontal

2 0 1 2 4 6 8 10 — 1:100 Vertical

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 21 OF 116

Metric

LOW POINT ELEV = 186.141
LOW POINT STA = 11+242.541
PVI STA = 11+253.381
PVI ELEV = 185.240
A.D. = 6.814
K = 16.144
110.000m VC

HIGH POINT ELEV = 190.968
HIGH POINT STA = 11+432.346
PVI STA = 11+410.290
PVI ELEV = 191.639
A.D. = -5.822
K = 18.894
110.000m VC

PVI STA = 11+562.341
PVI ELEV = 188.988
A.D. = -3.256
K = 18.425
60.000m VC

BVCS: 11+198.381
BVCE: 186.745

EVCS: 11+308.381
EVCE: 187.483

BVCS: 11+355.290
BVCE: 189.396
STA. 11+360.106 ROUTE 121=
STA. 8+900.000 MANDIGO ROAD

EVCS: 11+465.290
EVCE: 190.680

BVCS: 11+532.341
BVCE: 189.511

EVCS: 11+592.341
EVCE: 187.488

4.078%

-1.744%

192
184
176

11+200	11+240	11+280	11+320	11+360	11+400	11+440	11+480	11+520	11+560	11+600
186.70	186.27	186.08	186.23	186.47	187.04	187.72	188.61	189.57	190.32	190.77	190.94	190.97	190.71	190.37	190.03	189.67	189.32	188.82	188.10	187.25
186.701	186.298	186.143	186.235	186.575	187.183	187.957	188.773	189.583	190.243	190.691	190.927	190.952	190.765	190.424	190.075	189.727	189.362	188.821	188.064	187.105

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50 1:500 Horizontal
2 0 1 2 4 6 8 10 1:100 Vertical

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

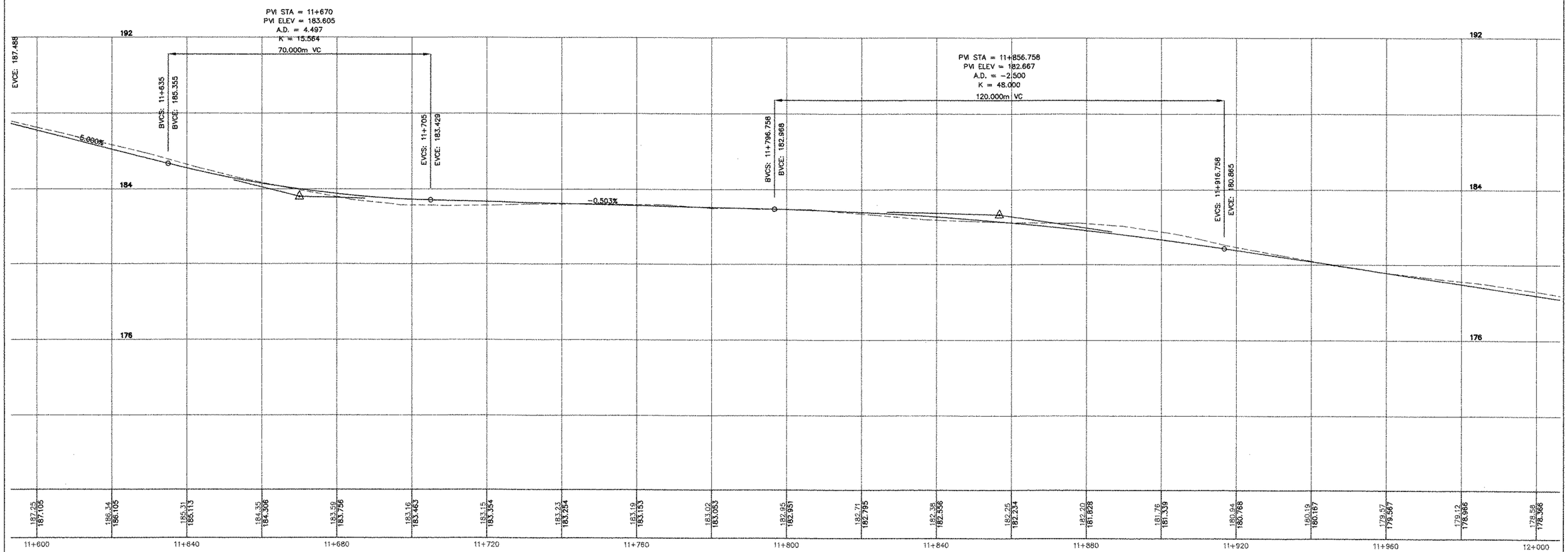
V:/1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 22 OF 116

Metric



GRAPHIC SCALE

(IN METERS)

10 0 5 10 20 30 40 50 — 1:500 Horizontal

2 0 1 2 4 6 8 10 — 1:100 Vertical

THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 23 OF 116

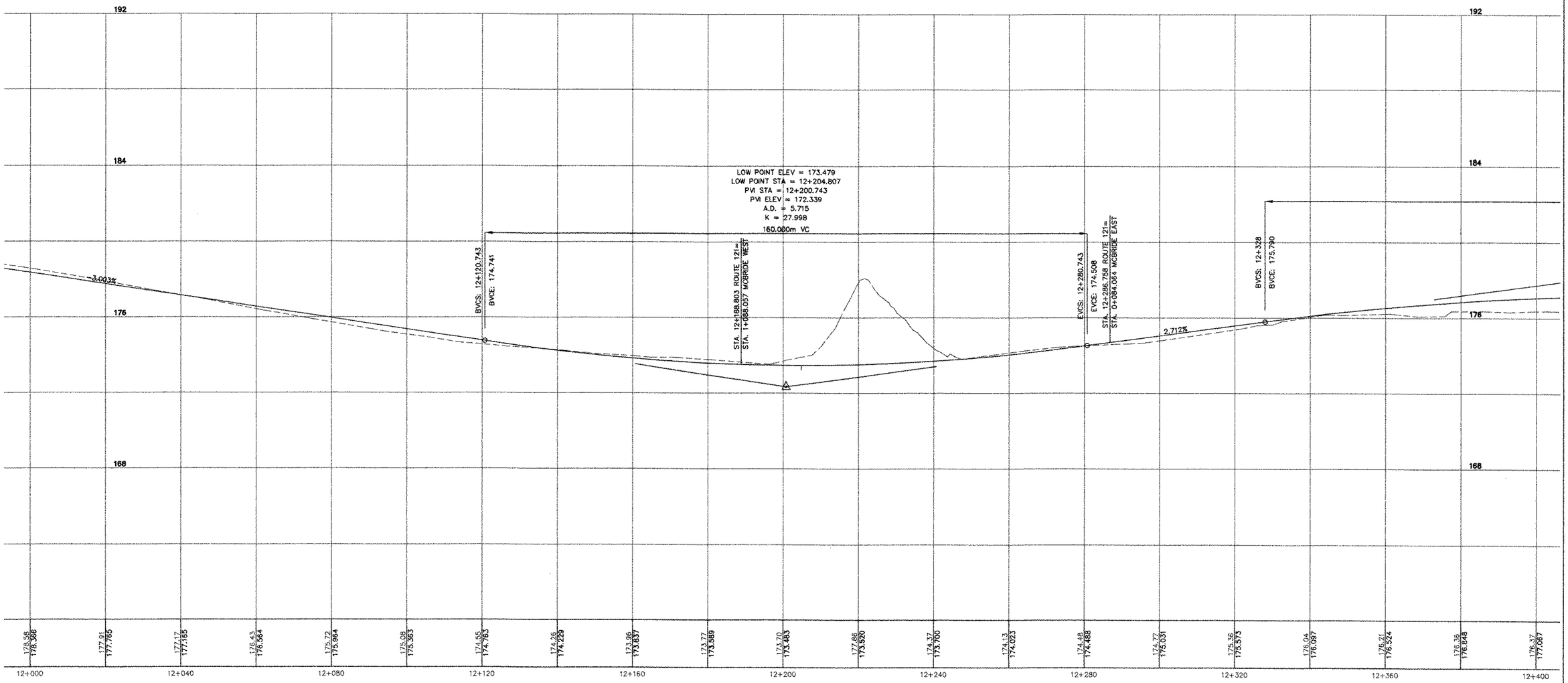
DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PROFILE–ROUTE 121–C2.DWG

Metric



GRAPHIC SCALE

(IN METERS)

10 0 5 10 20 30 40 50 — 1:500 Horizontal

2 0 1 2 4 6 8 10 — 1:100 Vertical

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

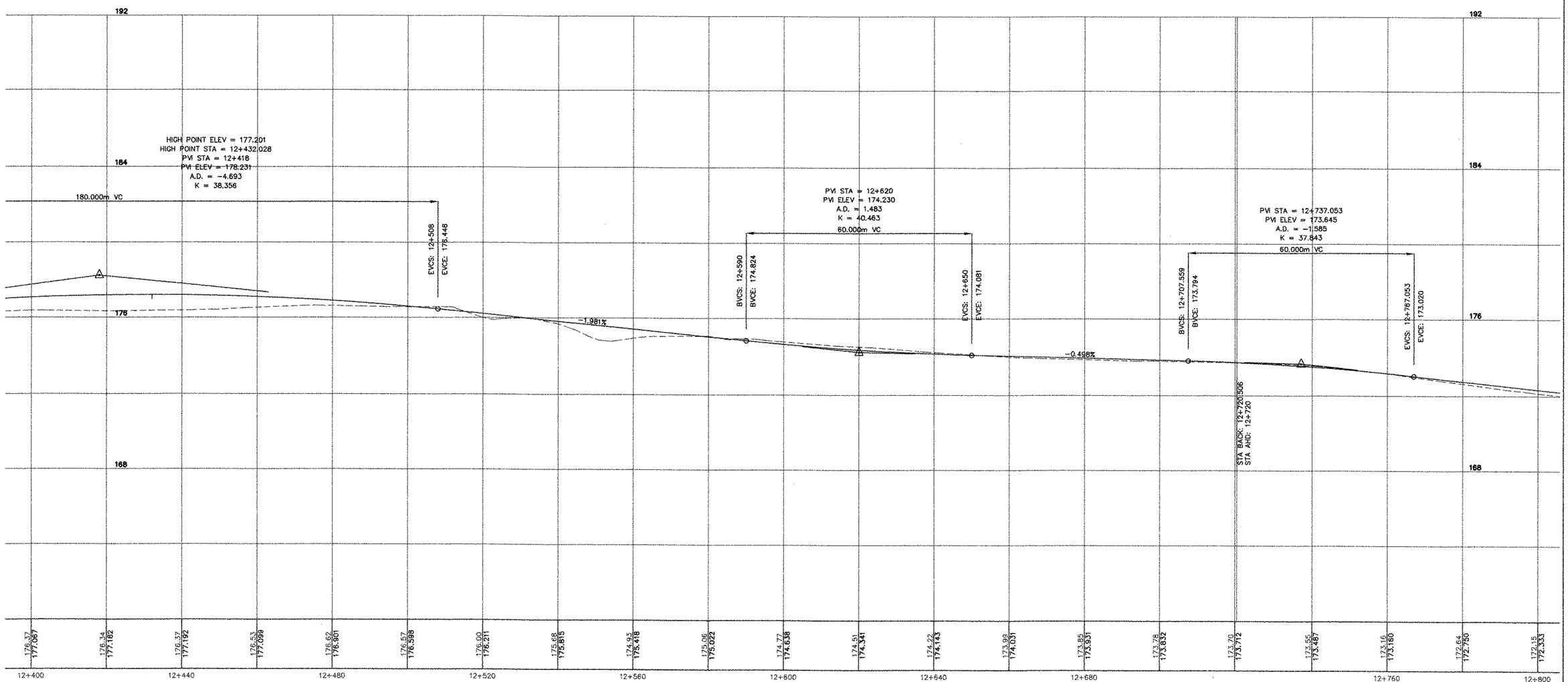
V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON--ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 24 OF 116

Metric



GRAPHIC SCALE

(IN METERS)

1:500 Horizontal

1:100 Vertical

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

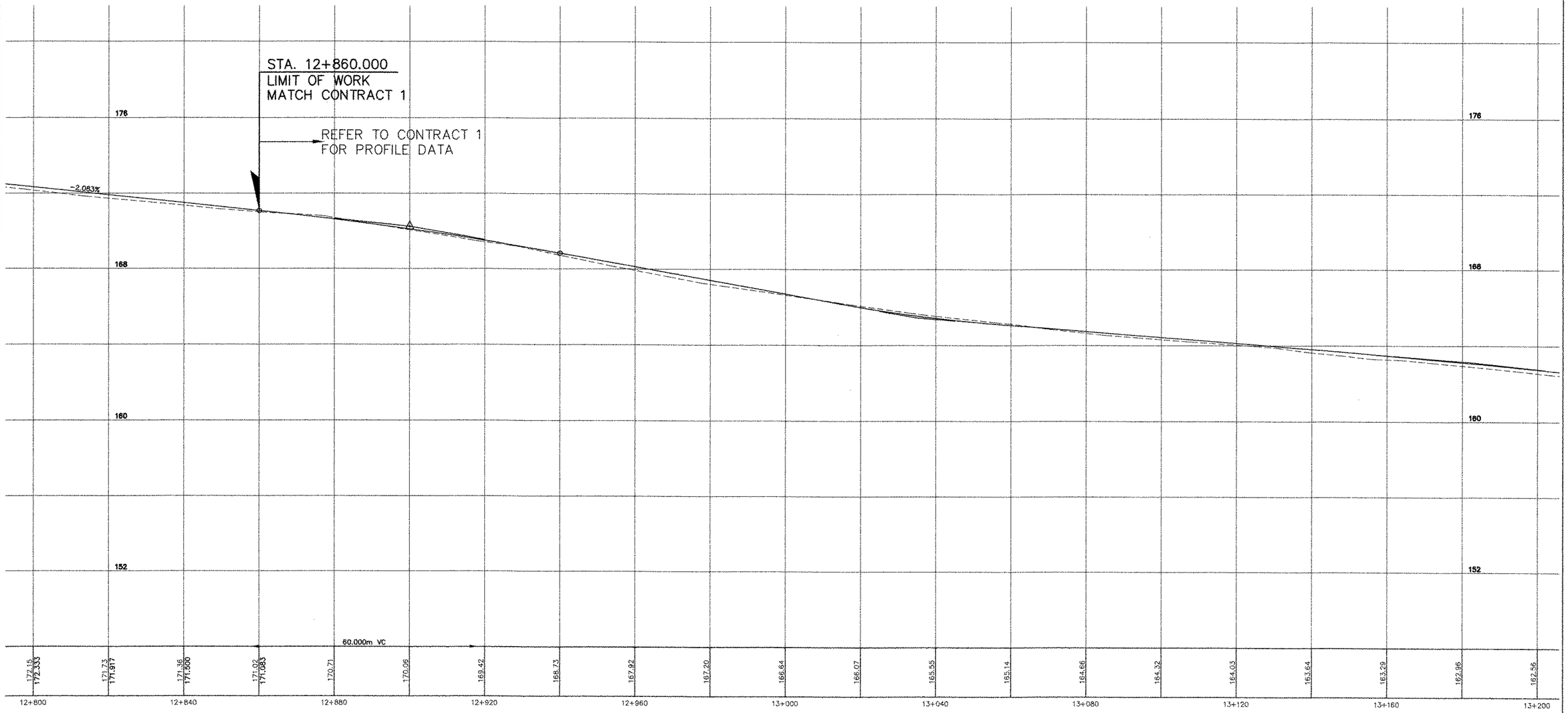
V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 25 OF 116

Metric



GRAPHIC SCALE

(IN METERS)

10 0 5 10 20 30 40 50 — 1:500 Horizontal

2 0 1 2 4 6 8 10 — 1:100 Vertical

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

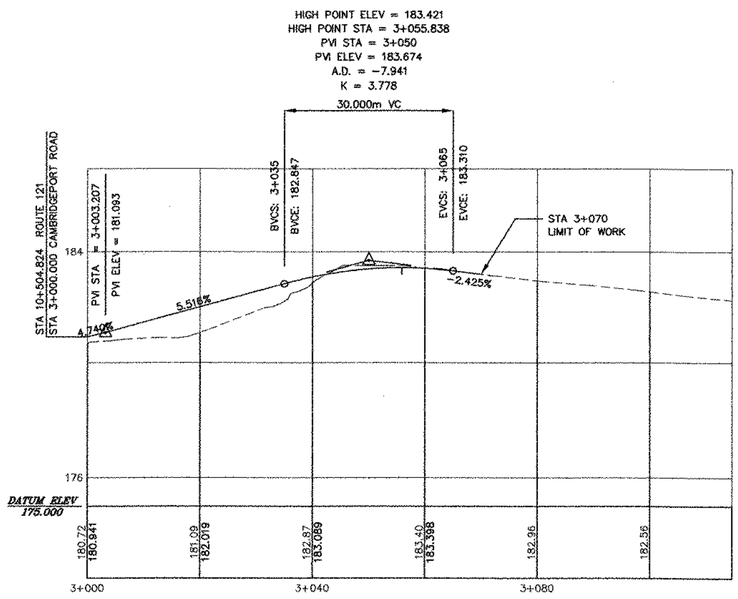
V: /1261/CADD/PLANS/PROFILE-ROUTE 121-C2.DWG

THE LOUIS BERGER GROUP, INC.

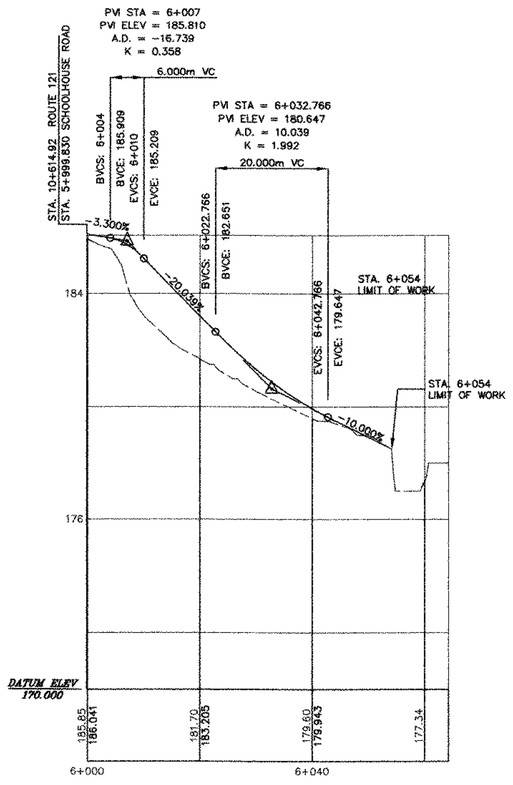
ROUTE 121 PROFILE

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 26 OF 116

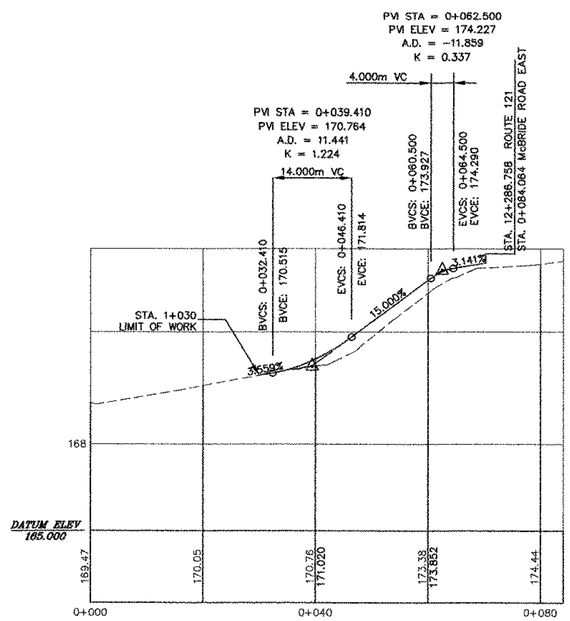
Metric



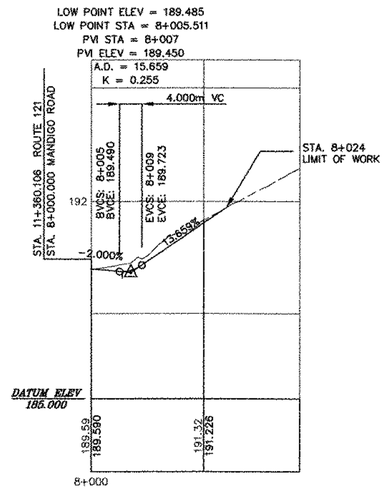
CAMBRIDGEPORT ROAD PROFILE



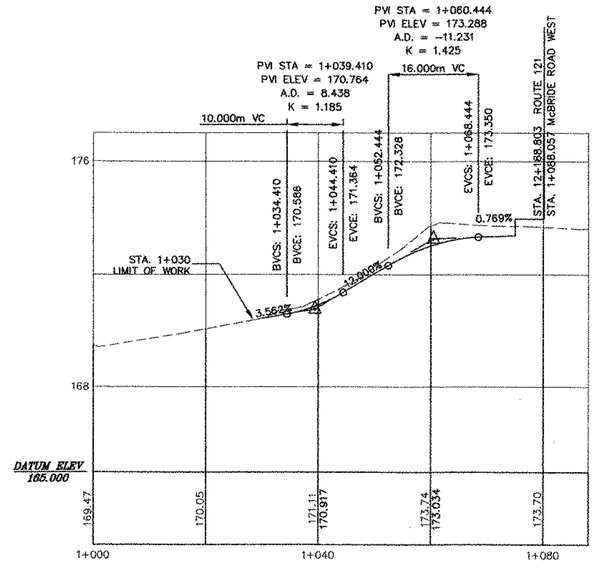
SCHOOLHOUSE ROAD PROFILE



MCBRIDE ROAD EAST PROFILE



MANDIGO ROAD PROFILE



MCBRIDE ROAD WEST PROFILE

SCHOOLHOUSE ROAD PROFILE
MANDIGO ROAD PROFILE
McBRIDE ROAD WEST PROFILE
McBRIDE ROAD EAST PROFILE

PROJECT: GRAFTON--ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 27 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/PROFILE SIDE ROADS C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric

EXISTING RIGHT-OF-WAY

CONSTR. CL STA. 10+048 RT
R1-1 STOP SIGN
SEE VTRANS STD DWG E-121M

R=10.0m

CONSTR. CL STA.
STOP BAR SEE VTRANS
STD DWG E-193M (300mm)

CONSTR. CL STA. 10+081.000 LT
BEGIN WHITE EDGELINE (100mm)

CONSTR. CL STA. 10+081.000 CL
BEGIN DOUBLE YELLOW
CENTERLINE (100mm)

CENTERLINE CURVE #2
Included angle = 00-23-36
Radius = 8000.000m
Tangent length = 27.463m
Arc length = 54.925m
Chord length = 54.925m
External secant = 0.047m
Mid ordinate = 0.047m
Bank = N.C.

CENTERLINE CURVE #3
Included angle = 08-50-36
Radius = 1000.000m
Tangent length = 77.326m
Arc length = 154.344m
Chord length = 154.191m
External secant = 2.985m
Mid ordinate = 2.976m
Bank = N.C.

N: 72339.398
E: 495047.508

N: 72345.277
E: 495081.855

CONSTR. CL STA. 10+100.00
W2-2 T INTERSECTION SIGN

N: 72343.289
E: 495202.453

N: 72340.664
E: 495322.879

N: 72344.297
E: 495147.538

N: 72324.811
E: 495008.033

10+000

N68°43'09"E
42.084m

S89°08'42"E
65.691m

S88°45'06"E
120.454m

PT = 10+077.189

PC = 10+142.819

PT = 10+197.744

PC = 10+318.198

R=3.0m
R=2.0m
R=5.0m
R=4.0m
R=1.3m

0.9m
3.0m
3.6m

EXISTING RIGHT-OF-WAY

CONSTR. CL STA. 10+048.0 RT
BEGIN WHITE EDGE LINE (100mm)

CONSTR. CL STA. ~~10+045.0~~ 10+065 RT
VERMONT 121 EAST
SEE STD. E-136 CM

CONSTR. CL STA. ~~10+065.0~~ 10+100 RT
R2-1 SPEED LIMIT SIGN
(30 MPH)

CONSTR. CL STA. 10+120 RT
ENTERING VILLAGE
SEE STM E-131M

CENTERLINE CURVE #1
Included angle = 21-08-09
Radius = 95.000m
Tangent length = 17.724m
Arc length = 35.044m
Chord length = 34.846m
External secant = 1.639m
Mid ordinate = 1.611m
Bank = N.C.

paved parking lot

gravel drive

ROCKINGHAM

GRAFTON

NOTE:
1) ALL SIGNS TO BE SET ARE NEW. ALL EXISTING SIGNS ARE TO BE REMOVED AND SALVAGED TO THE TOWN OF ROCKINGHAM.

2) ALL SIGNS AND PLACEMENT SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

3) ALL DOUBLE YELLOW CENTERLINES AND STOP BARS SHALL BE DURABLE PAVEMENT MARKINGS. WHITE EDGE LINES SHALL BE PAINT PAVEMENT MARKINGS.

4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/MARKS-C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0128(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 28 OF 116

Metric

CAMBRIDGEPORT ROAD CENTERLINE

TANGENT #1
Bearing = S7°33'19"W
Distance = 6.855m

CURVE #1
Included angle = 19-02-39
Radius = 170.000m
Tangent length = 28.516m
Arc length = 56.505m
Chord length = 56.246m
External secant = 2.375m
Mid ordinate = 2.342m

TANGENT #2
Bearing = N11°29'20"W
Distance = 51.265m

N: = 72377.794
E: = 495505.615

EXISTING RIGHT-OF-WAY

CONSTR. CL STA. 3+007 RT
R1-1 STOP SIGN
SEE VTRANS STD DWG E-121M

Reset street sign

CONSTR. CL STA. 10+495.000 LT
END WHITE EDGELINE (100mm)

N: = 72325.430
E: = 495476.316

S79°50'07"E
45.476m

CONSTR. CL STA. 10+455.000
W2-2 T INTERSECTION SIGN

CONSTR. CL STA.
STOP BAR SEE VTRANS
STD DWG E-193M (300mm)

N: = 72321.581
E: = 495507.545

STA 10+504.824 ROUTE 121=
STA 3+000.000
CAMBRIDGEPORT ROAD

CONSTR. CL STA. 10+510.000 CL
BEGIN DOUBLE YELLOW
CENTERLINE (100mm)

CONSTR. CL STA. 10+518.000 LT
BEGIN WHITE EDGELINE (100mm)

CONSTR. CL STA. 10+555.000 LT
W2-2 T INTERSECTION SIGN

Approx. existing dry well

N: = 72232.701
E: = 495575.125

CONSTR. CL STA. 10+550.000 RT
W2-2 T INTERSECTION SIGN

CONSTR. CL STA. 10+499.000 CL
END DOUBLE YELLOW
CENTERLINE (100mm)

CONSTR. CL STA. 10+609.000 CL
END DOUBLE YELLOW
CENTERLINE (100mm)

CONSTR. CL STA. 10+608.000 RT
END WHITE EDGELINE (100mm)

CONSTR. CL STA.6+005.000
STOP BAR SEE VTRANS
STD DWG E-193M (300mm)

CONSTR. CL STA. 6+005.000 RT
R1-1 STOP SIGN
SEE VTRANS STD DWG E-121M

CONSTR. CL STA. 10+621.000 RT
END WHITE EDGELINE (100mm)

N: = 72305.403
E: = 495520.838

CENTERLINE CURVE #4
Included angle = 28-15-25
Radius = 100.000m
Tangent length = 25.171m
Arc length = 49.318m
Chord length = 48.819m
External secant = 3.119m
Mid ordinate = 3.025m
Bank = 0.040

CENTERLINE CURVE #5
Included angle = 37-33-30
Radius = 190.000m
Tangent length = 64.604m
Arc length = 124.548m
Chord length = 122.330m
External secant = 10.683m
Mid ordinate = 10.114m
Bank = 0.034

CENTERLINE CURVE #6
Included angle = 33-28-49
Radius = 100.000m
Tangent length = 30.078m
Arc length = 58.434m
Chord length = 57.606m
External secant = 4.425m
Mid ordinate = 4.238m
Bank = 0.040

STA. 10+614.912 ROUTE 121 =
STA. 5+999.830 SCHOOL HOUSE ROAD

CONSTR. CL STA. 10+621.000 CL
BEGIN DOUBLE YELLOW
CENTERLINE (100mm)

CONSTR. CL STA. 10+680.000 LT
W2-2 T INTERSECTION SIGN

N: = 72202.660
E: = 495587.235

N: = 72218.077
E: = 495583.005

N: = 72153.195
E: = 495616.760

N: = 72196.885
E: = 495556.853

N: = 72189.332
E: = 495555.504

N: = 72178.671
E: = 495547.969

EXISTING RIGHT-OF-WAY

SCHOOLHOUSE ROAD CENTERLINE

TANGENT #1
Bearing = N68°00'00" E
Distance = 1.678m

CURVE #1
Included angle = 56-41-50
Radius = 20.000m
Tangent length = 10.791m
Arc length = 19.791m
Chord length = 18.993m
External secant = 2.725m
Mid ordinate = 2.399m

TANGENT #2
Bearing = S11°18'09"W
Distance = 21.539m

CURVE #2
Included angle = 23-56-58
Radius = 20.000m
Tangent length = 4.242m
Arc length = 8.360m
Chord length = 8.299m
External secant = 0.445m
Mid ordinate = 0.435m

TANGENT #3
Bearing = N35°15'07"E
Distance = 13.055m

NOTE:
1) ALL SIGNS TO BE SET ARE NEW. ALL EXISTING SIGNS ARE TO BE REMOVED AND SALVAGED TO THE TOWN OF ROCKINGHAM.
2) ALL SIGNS AND PLACEMENT SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3) ALL DOUBLE YELLOW CENTERLINES AND STOP BARS SHALL BE DURABLE PAVEMENT MARKINGS. WHITE EDGE LINES SHALL BE PAINT PAVEMENT MARKINGS.
4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V:/1261/CADD/PLANS/MARKS-C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 29 OF 116

Metric

CENTERLINE CURVE #7
Included angle = 09-24-55
Radius = 1100.000m
Tangent length = 90.584m
Arc length = 180.761m
Chord length = 180.557m
External secant = 3.723m
Mid ordinate = 3.711m
Bank = N.C.

CENTERLINE CURVE #9
Included angle = 12-56-32
Radius = 400.000m
Tangent length = 45.370m
Arc length = 90.353m
Chord length = 90.161m
External secant = 2.565m
Mid ordinate = 2.548m
Bank = 0.047

CONSTR. CL STA. 10+840 RT
ENTERING VILAGE
SEE STM E-131M

CONSTR. CL STA. 10+900.000 LT
R2-1 SPEED LIMIT SIGN
(30 MPH)

CONSTR. CL STA. 10+920.000 LT
W5-1 ROAD NARROWS SIGN

SINGLE WHITE EDGELINE (100mm)

DOUBLE YELLOW CENTERLINE (100mm)

Approx. location of existing leach field

PC = 11+082.615

R=15.0m

EXISTING RIGHT-OF-WAY

10+855.827

0.9m

3.0m
3.3m
3.3m
3.0m
0.9m

S59°59'19"E
39.626m

Existing well

Buried

R=5.0m

11+068

N51°54'36"W
58.727m

11+186

S64°51'08"E
37.284m

EXISTING RIGHT-OF-WAY

N: = 72042.732
E: = 495759.584

CONSTR. CL STA. 10+900.000 ~~LT~~ RT
R2-1 SPEED LIMIT SIGN
(40 MPH)

PC = 10+925.253

SINGLE WHITE EDGELINE (100mm)

PT = 11+013.889

N: = 71969.625
E: = 495864.904

N: = 71927.228
E: = 495918.995

N: = 71879.980
E: = 495895.772

EXISTING RIGHT-OF-WAY

CENTERLINE CURVE #8
Included angle = 05-04-42
Radius = 1000.000m
Tangent length = 44.347m
Arc length = 88.635m
Chord length = 88.606m
External secant = 0.983m
Mid ordinate = 0.982m
Bank = 0.022

NOTE:
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2) ALL SIGNS AND PLACEMENT SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

3) ALL DOUBLE YELLOW CENTERLINES AND STOP BARS SHALL BE DURABLE PAVEMENT MARKINGS. WHITE EDGE LINES SHALL BE PAINT PAVEMENT MARKINGS.

4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/MARKS-02.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 30 OF 116

Metric

MANDIGO ROAD CENTERLINE

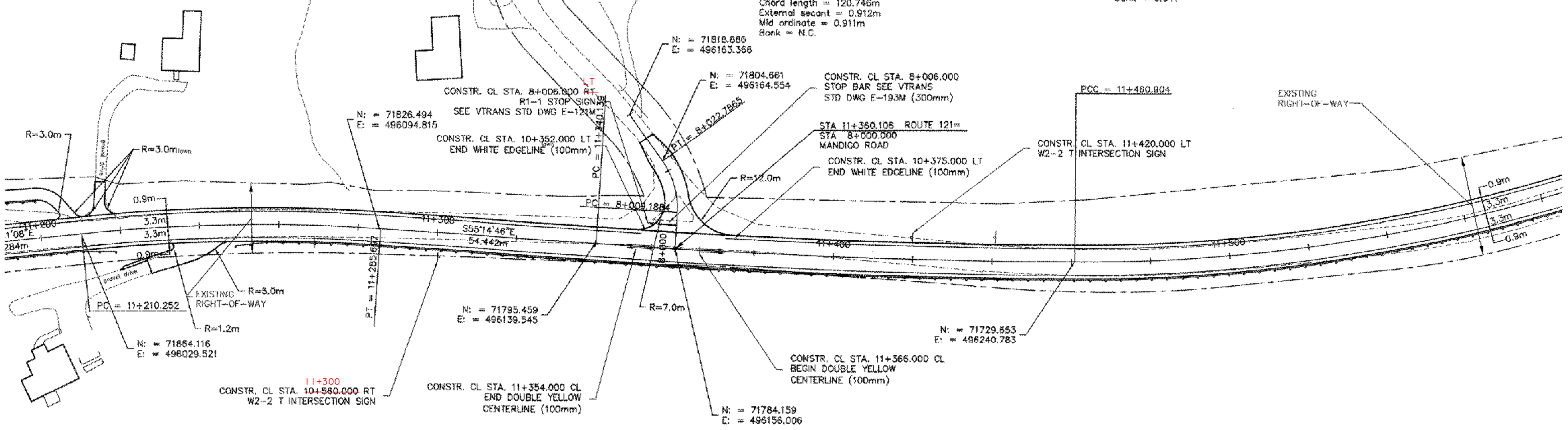
TANGENT #1
Bearing = N34°10'54"E
Distance = 9.188m

CURVE #1
Included angle = 38-57-20
Radius = 20.000m
Tangent length = 7.074m
Arc length = 13.598m
Chord length = 13.338m
External secant = 1.214m
Mid ordinate = 1.145m

TANGENT #2
Bearing = S04°46'26"E
Distance = 14.275m

CENTERLINE CURVE #11
Included angle = 03-27-35
Radius = 2000.000m
Tangent length = 60.401m
Arc length = 120.764m
Chord length = 120.746m
External secant = 0.912m
Mid ordinate = 0.911m
Bank = N.C.

CENTERLINE CURVE #12
Included angle = 22-18-34
Radius = 415.000m
Tangent length = 81.832m
Arc length = 161.590m
Chord length = 160.571m
External secant = 7.991m
Mid ordinate = 7.840m
Bank = 0.041



CENTERLINE CURVE #10
Included angle = 09-36-22
Radius = 450.000m
Tangent length = 37.811m
Arc length = 75.445m
Chord length = 75.357m
External secant = 1.586m
Mid ordinate = 1.580m
Bank = 0.051

NOTE:
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3) ALL DOUBLE YELLOW CENTERLINES AND STOP BARS SHALL BE DURABLE PAVEMENT MARKINGS. WHITE EDGE LINES SHALL BE PAINT PAVEMENT MARKINGS.

4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/MARKS-C2.DWG

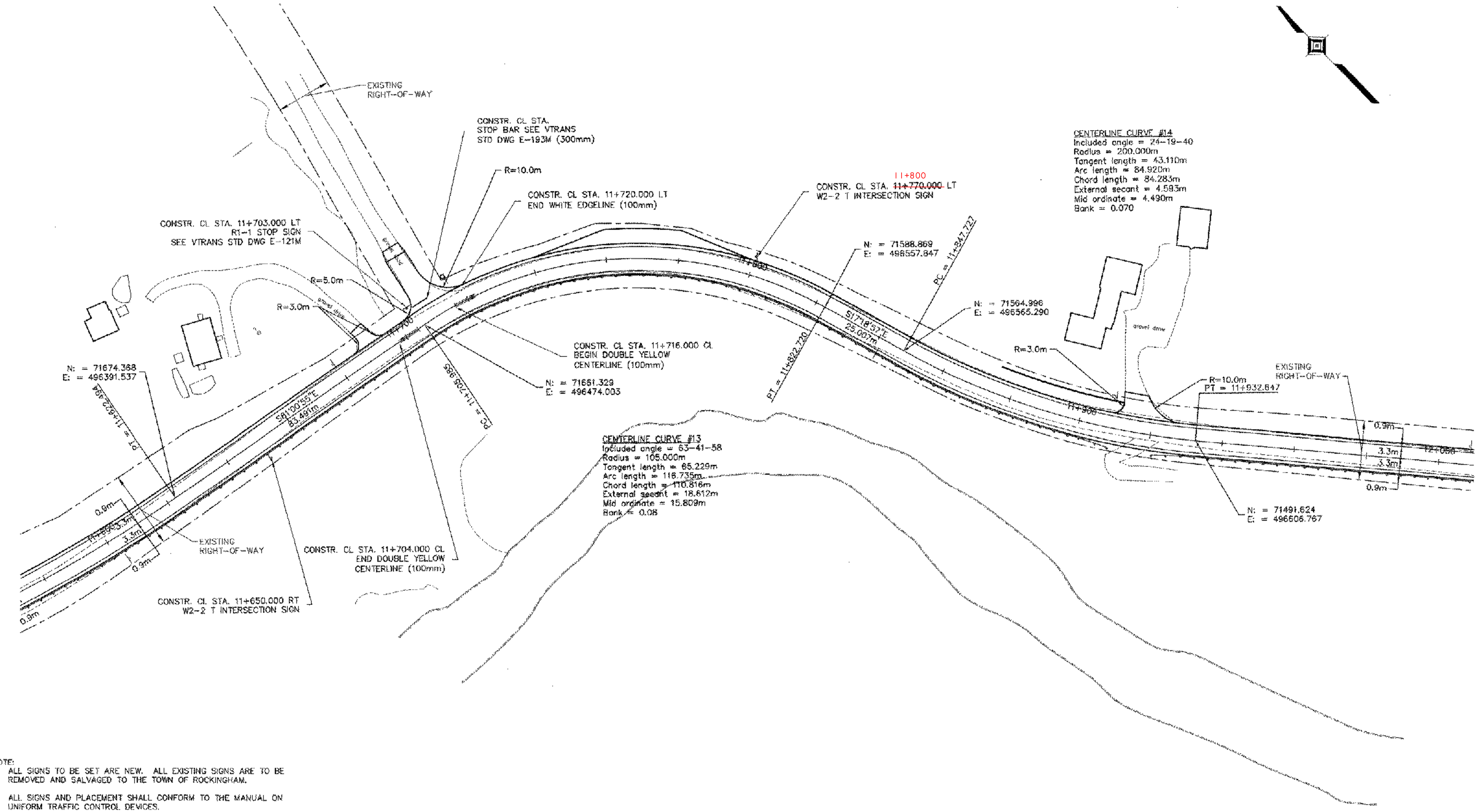
GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0128(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 31 OF 116

Metric



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4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/MARKS-C2.DWG

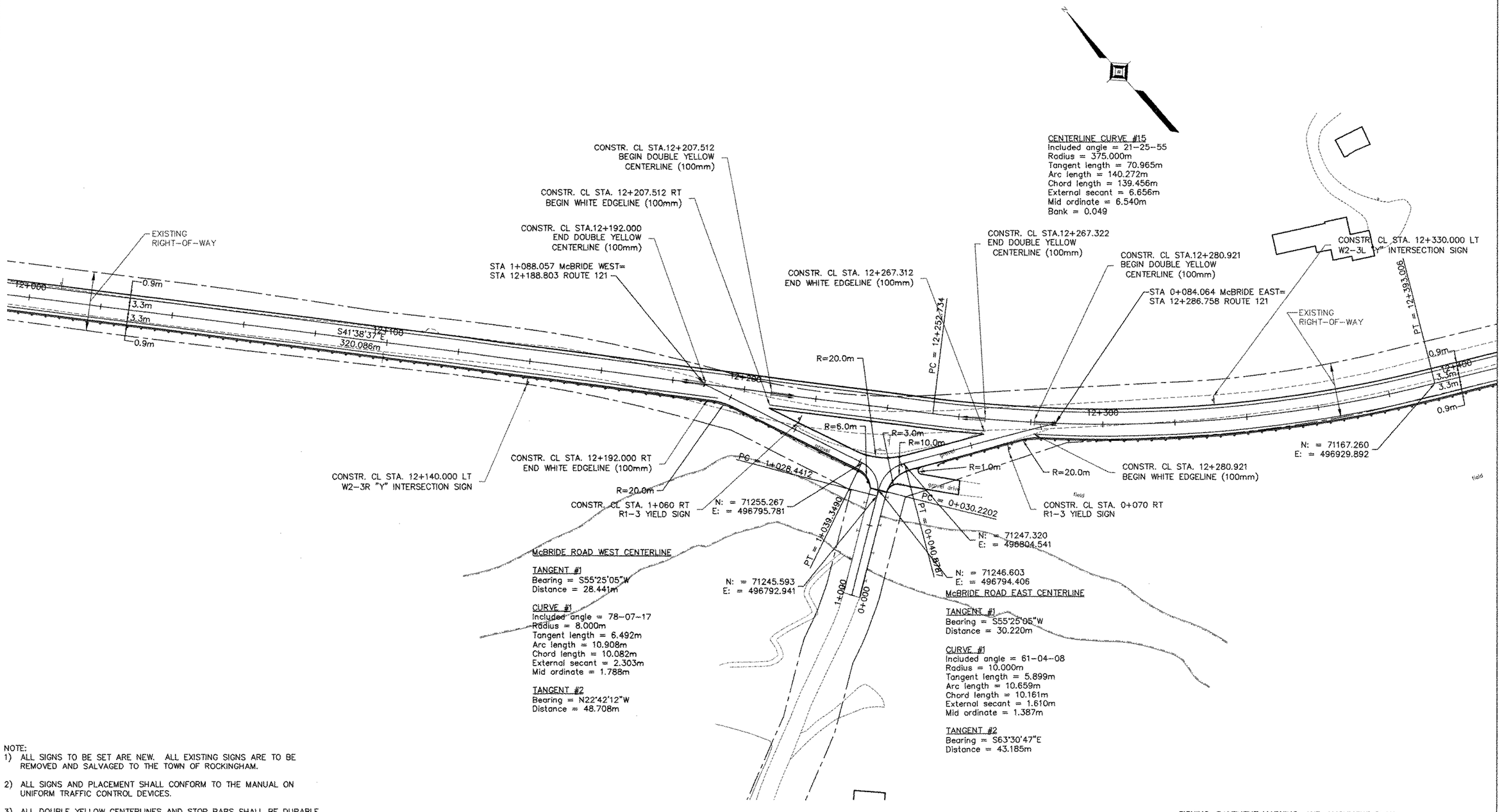
GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 32 OF 116

Metric



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4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/MARKS-C2.DWG

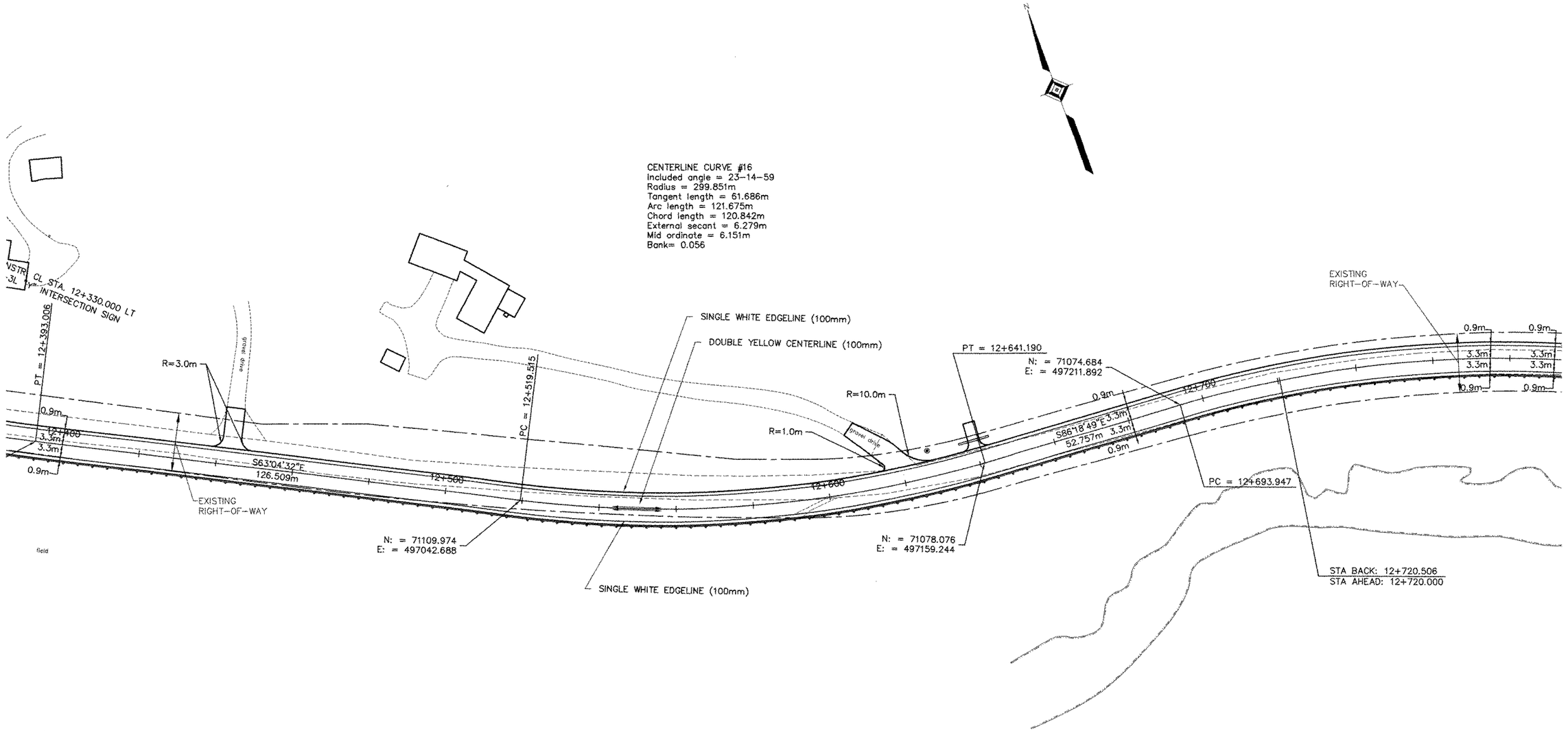
GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 33 OF 116

Metric



NOTE:
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4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/MARKS-C2.DWG

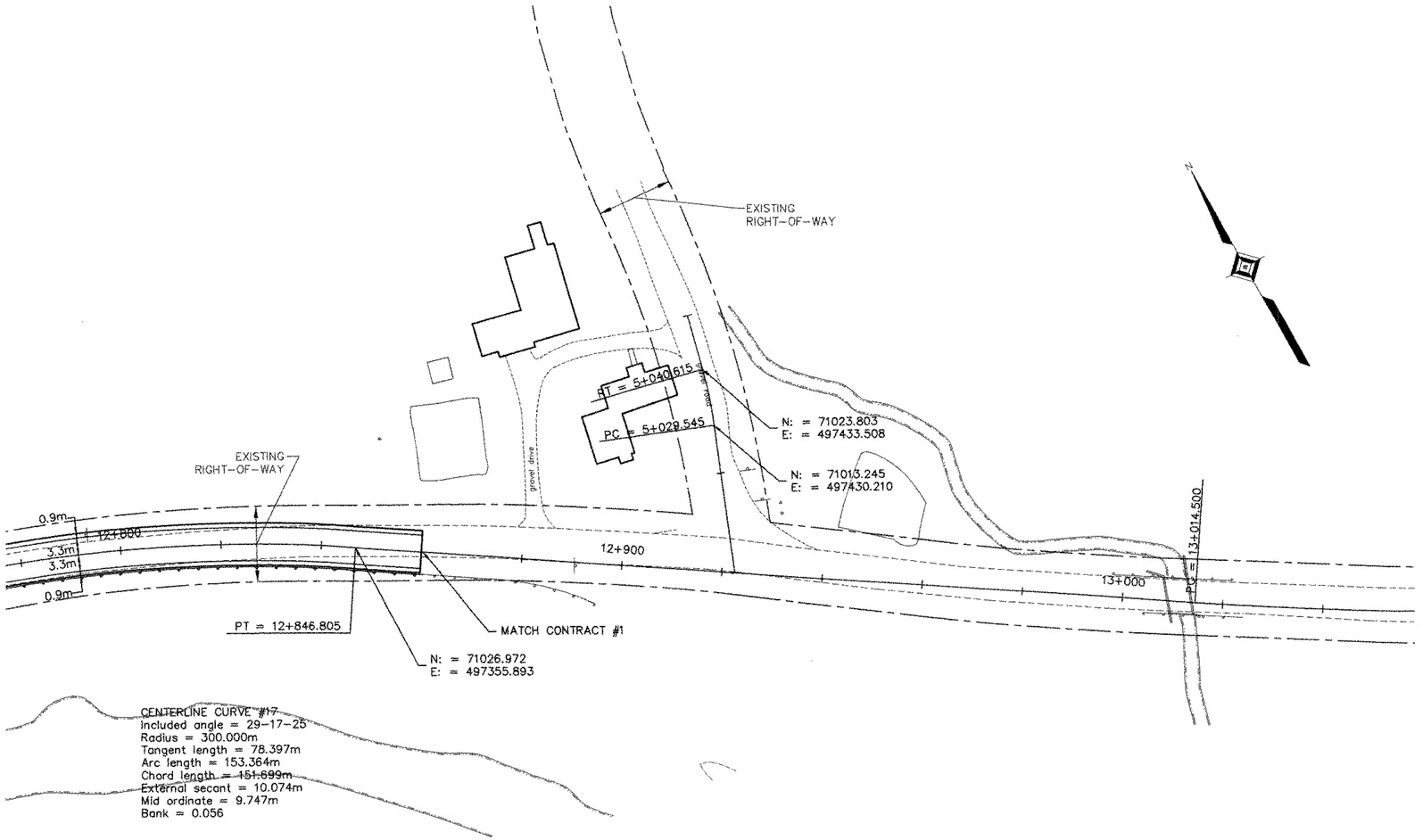
GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 34 OF 116

Metric



NOTE:
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4) MATCH WIDTH OF EXISTING DRIVEWAYS AT LIMITS OF PROPOSED DRIVEWAY.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/MARKS–C2.DWG

GRAPHIC SCALE
(IN METERS)
10 0 5 10 20 30 40 50
1 : 500

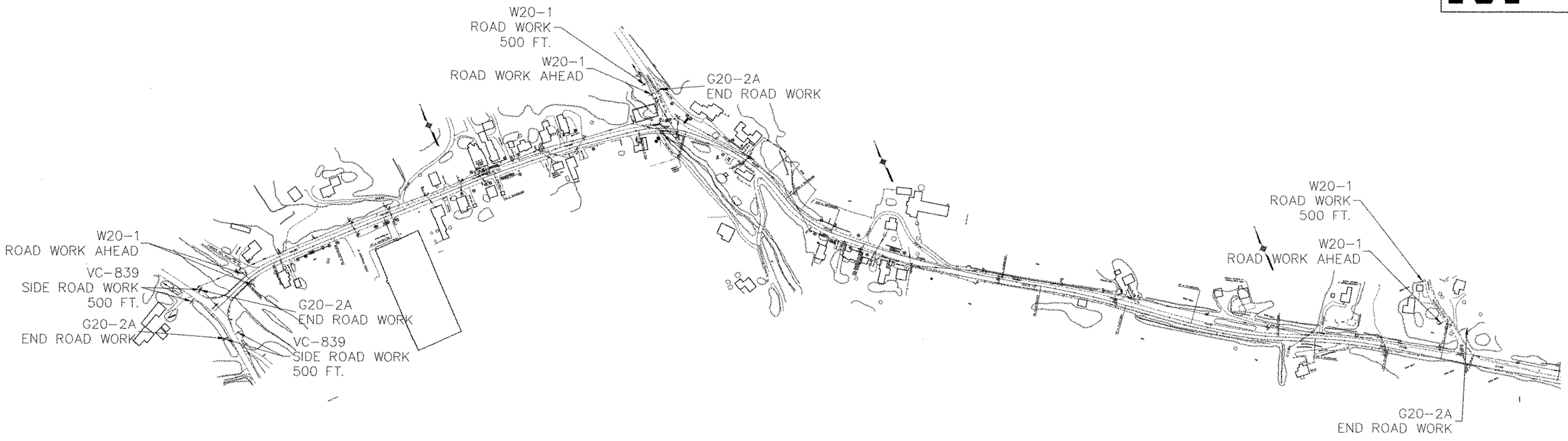
THE LOUIS BERGER GROUP, INC.

SIGNING, PAVEMENT MARKING, AND ALIGNMENT PLAN

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 35 OF 116

Metric



NOTE

1) TRAFFIC CONTROL SIGNS AT THE END OF CONTRACT #2 ARE TO BE INSTALLED UPON COMPLETION OF CONTRACT #1.

2) REFER TO VTRANS DESIGN STANDARD E-100M FOR ADDITIONAL DETAIL.

GRAPHIC SCALE
(IN METERS)
40 0 20 40 80 120 160 200
1:2000

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/TCP-SIGNS-C2.DWG

THE LOUIS BERGER GROUP, INC.

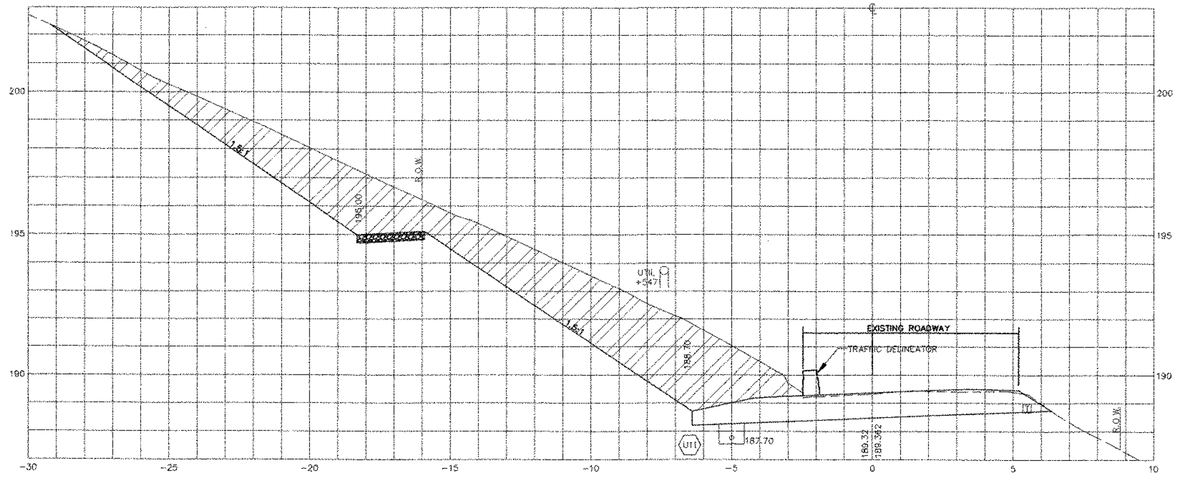
TRAFFIC CONTROL SIGNS - CONTRACT #2

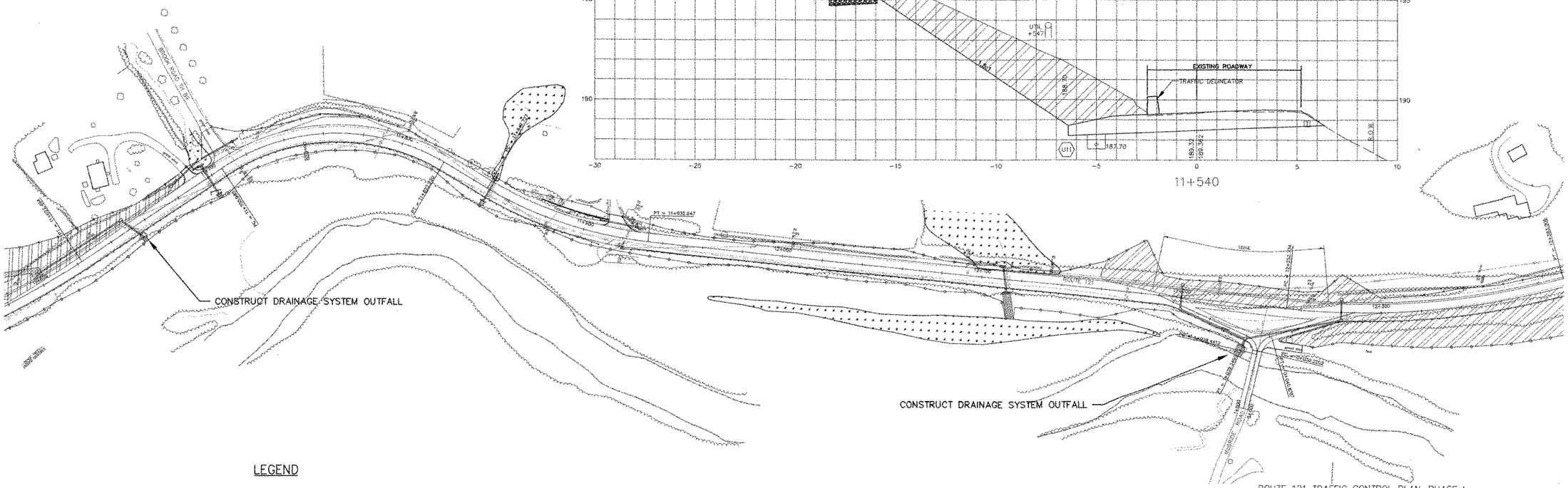
PROJECT:	PROJECT NO. :
GRAFTON--ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 36 OF 116

Metric

REFER TO WEAVER BROOK BRIDGE PLANS
ROUTE 121
PT = 10+197.748
PC = 10+142.858
PT = 3+083.360
PC = 10+846.400
PC = 10+758.192
PC = 10+758.192
PC = 10+758.192

Metric





LEGEND

Construction to be completed in Phase 1

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

ROUTE 121 TRAFFIC CONTROL PLAN–PHASE I

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 38 OF 116

DATUM

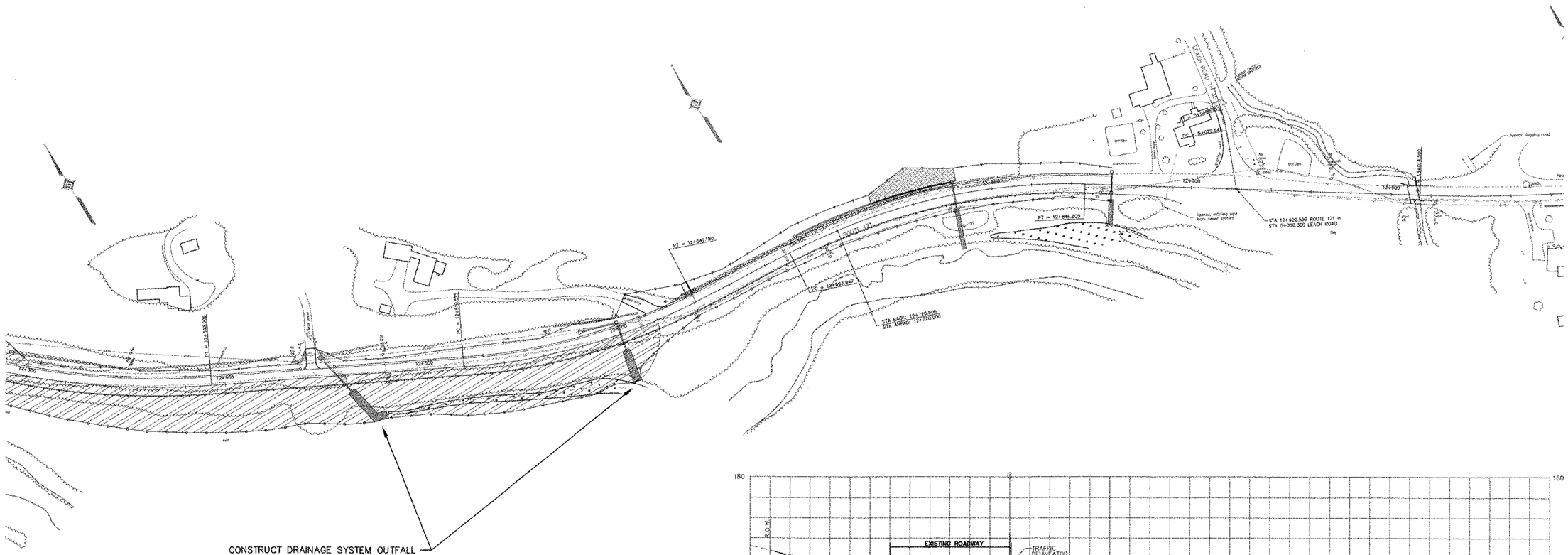
VERTICAL NGVD 1929

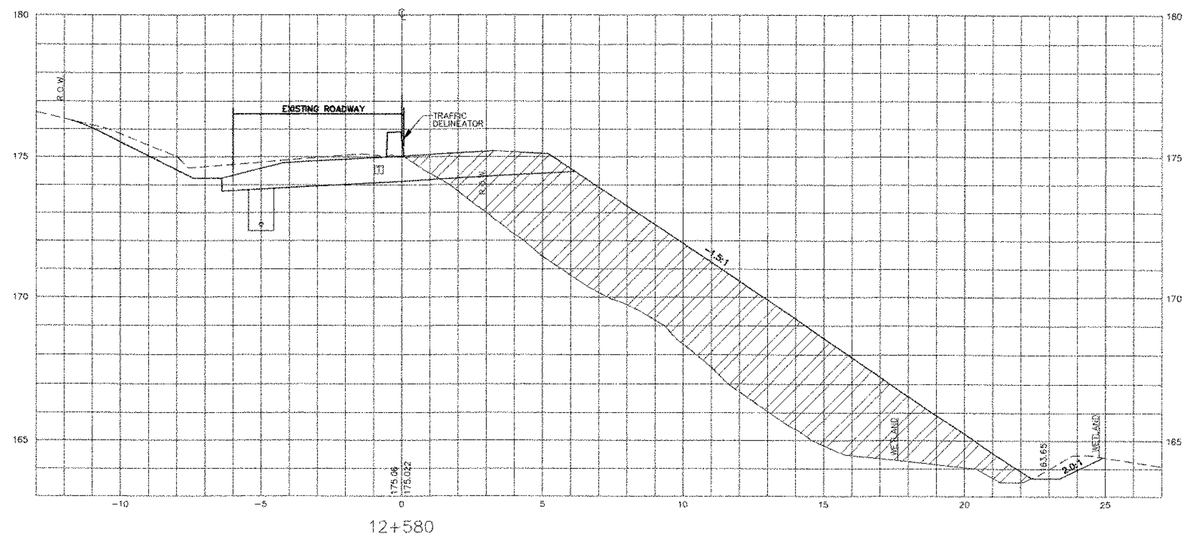
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/TCP–C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric





LEGEND

Construction to be completed in Phase 1

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

THE LOUIS BERGER GROUP, INC.

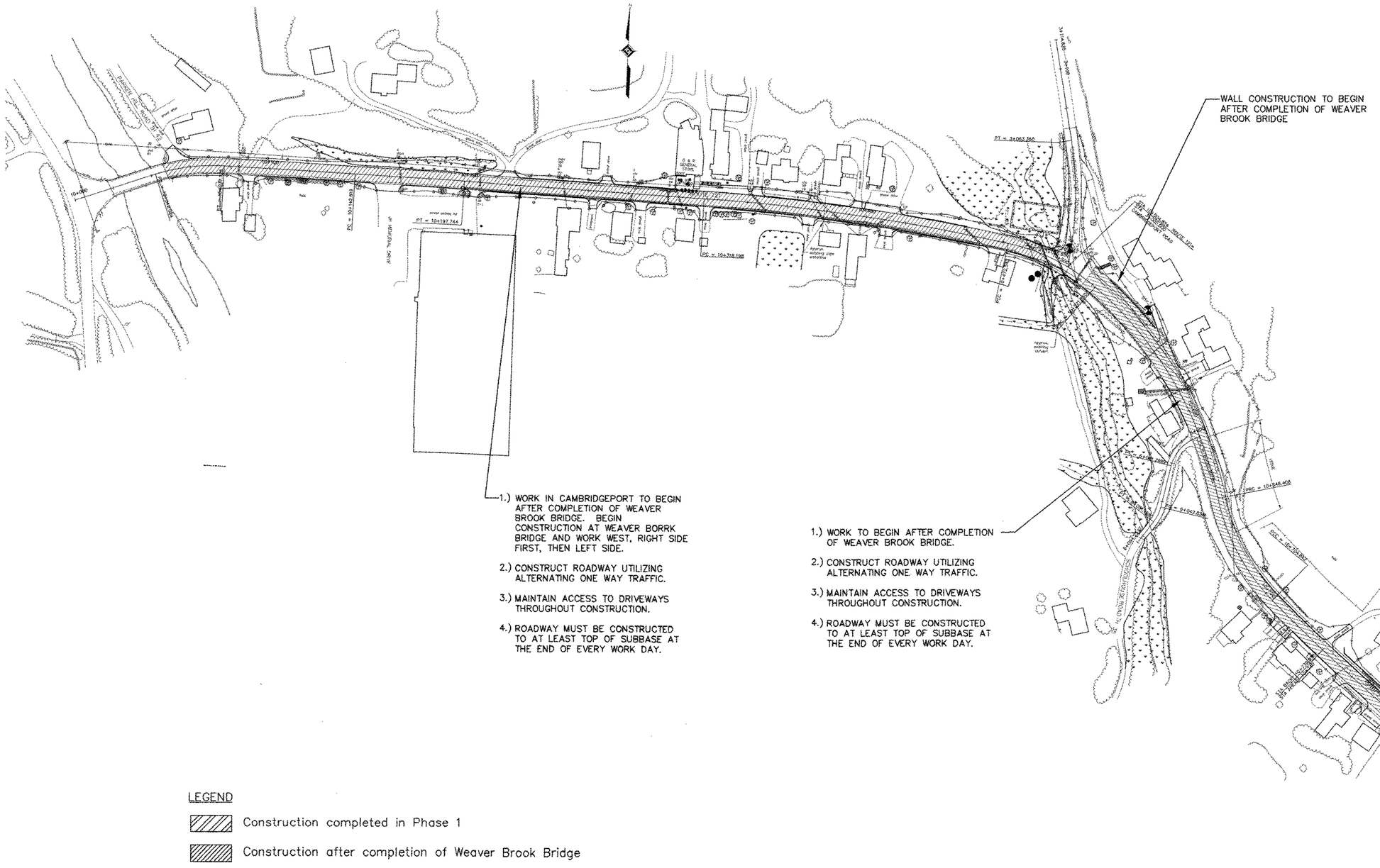
ROUTE 121 TRAFFIC CONTROL PLAN

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 39 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/TCP-C2.DWG

Metric



LEGEND

- Construction completed in Phase 1
- Construction after completion of Weaver Brook Bridge
- Construction concurrent with Weaver Brook Bridge

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/TCP-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 TRAFFIC CONTROL PLAN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 40 OF 116

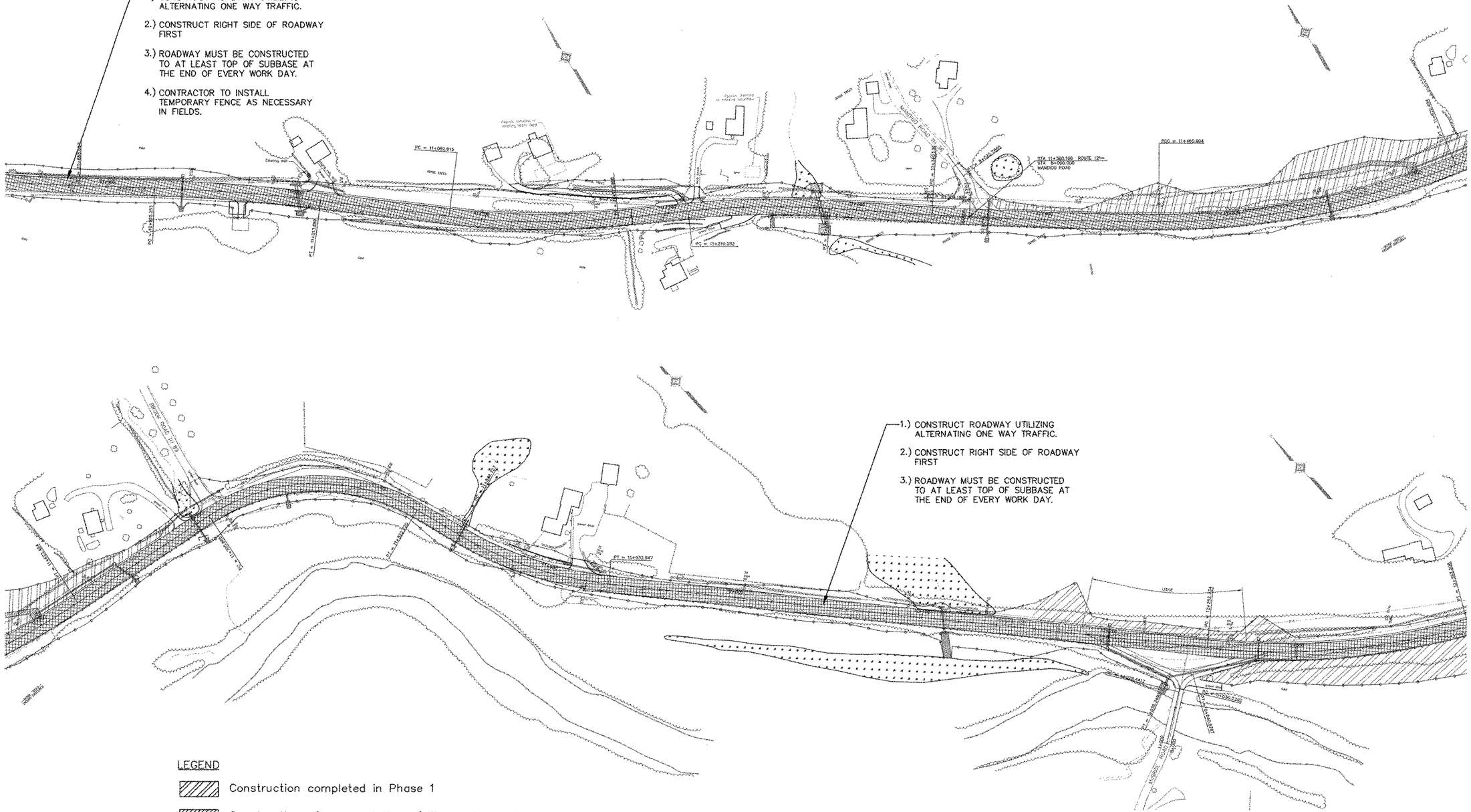
Metric

1.) CONSTRUCT ROADWAY UTILIZING ALTERNATING ONE WAY TRAFFIC.

2.) CONSTRUCT RIGHT SIDE OF ROADWAY FIRST

3.) ROADWAY MUST BE CONSTRUCTED TO AT LEAST TOP OF SUBBASE AT THE END OF EVERY WORK DAY.

4.) CONTRACTOR TO INSTALL TEMPORARY FENCE AS NECESSARY IN FIELDS.



LEGEND

- Construction completed in Phase 1
- Construction after completion of Weaver Brook Bridge
- Construction concurrent with Weaver Brook Bridge

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

ROUTE 121 TRAFFIC CONTROL PLAN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 41 OF 116

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

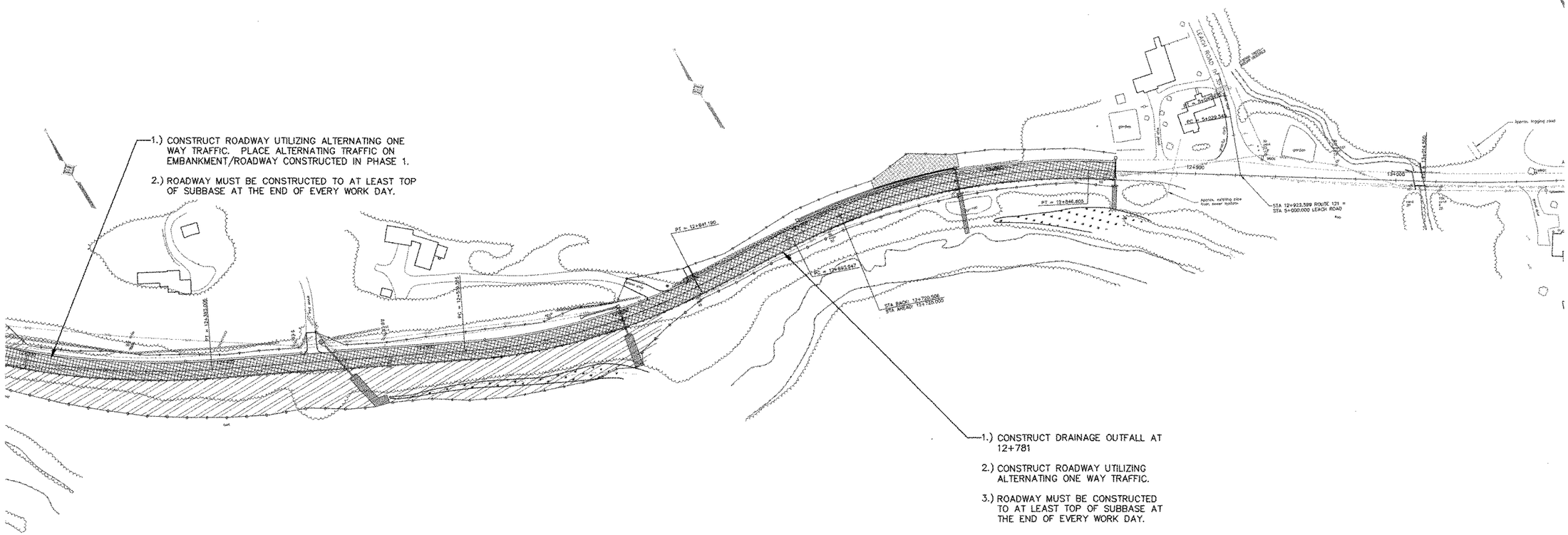
V: /1261/CADD/PLANS/TCP-C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric

1.) CONSTRUCT ROADWAY UTILIZING ALTERNATING ONE WAY TRAFFIC. PLACE ALTERNATING TRAFFIC ON EMBANKMENT/ROADWAY CONSTRUCTED IN PHASE 1.

2.) ROADWAY MUST BE CONSTRUCTED TO AT LEAST TOP OF SUBBASE AT THE END OF EVERY WORK DAY.



1.) CONSTRUCT DRAINAGE OUTFALL AT 12+781

2.) CONSTRUCT ROADWAY UTILIZING ALTERNATING ONE WAY TRAFFIC.

3.) ROADWAY MUST BE CONSTRUCTED TO AT LEAST TOP OF SUBBASE AT THE END OF EVERY WORK DAY.

LEGEND

- Construction completed in Phase 1
- Construction after completion of Weaver Brook Bridge
- Construction concurrent with Weaver Brook Bridge

GRAPHIC SCALE
(IN METERS)
20 0 10 20 40 80 80 100
1 : 1000

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

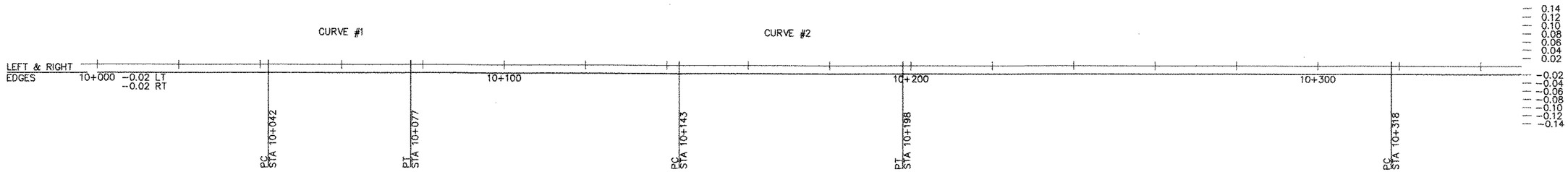
V: /1261/CADD/PLANS/TCP-C2.DWG

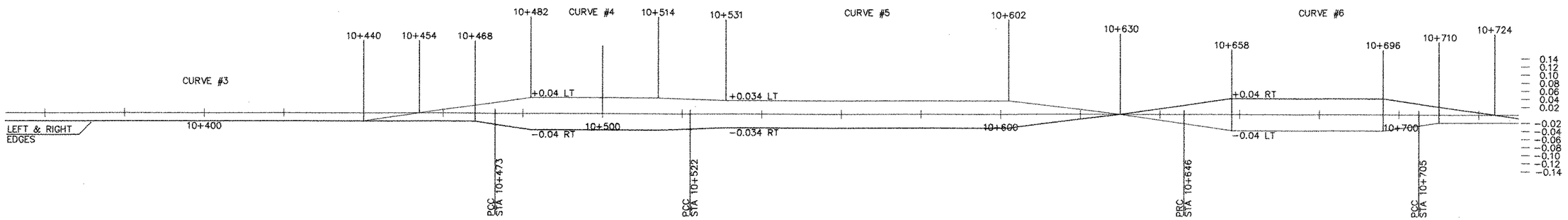
THE LOUIS BERGER GROUP, INC.

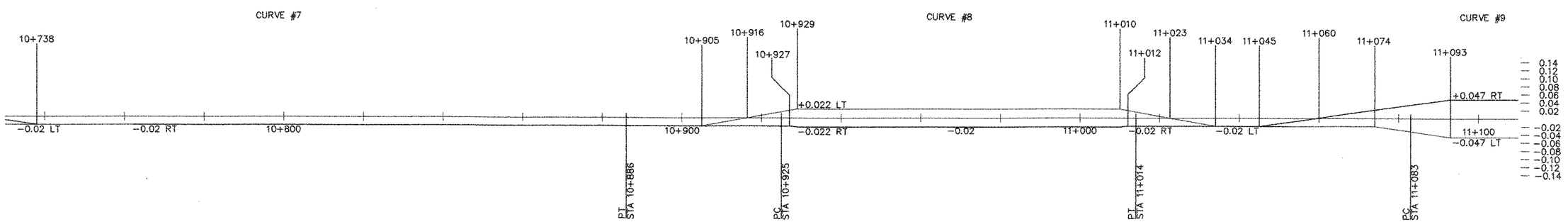
ROUTE 121 TRAFFIC CONTROL PLAN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0128(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 42 OF 116

Metric







BANKING DIAGRAM

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0124(6)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 43 OF 116

DATUM

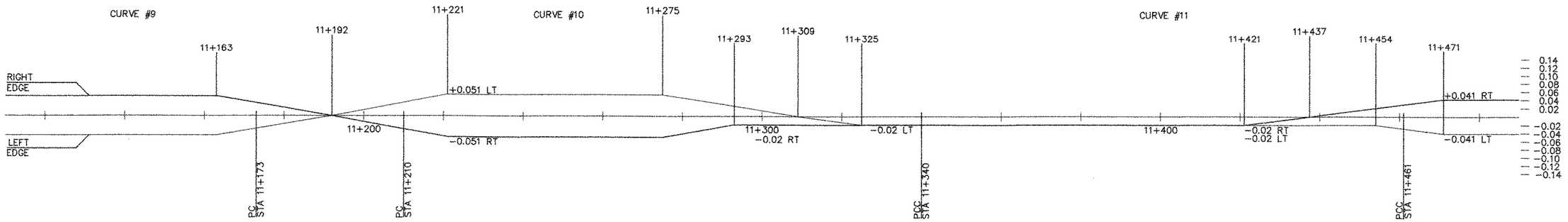
VERTICAL NGVD 1929

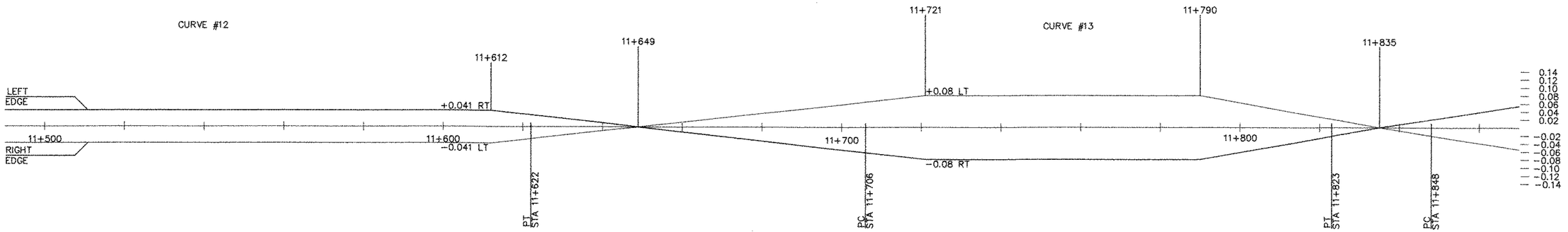
HORIZONTAL NAD 1927

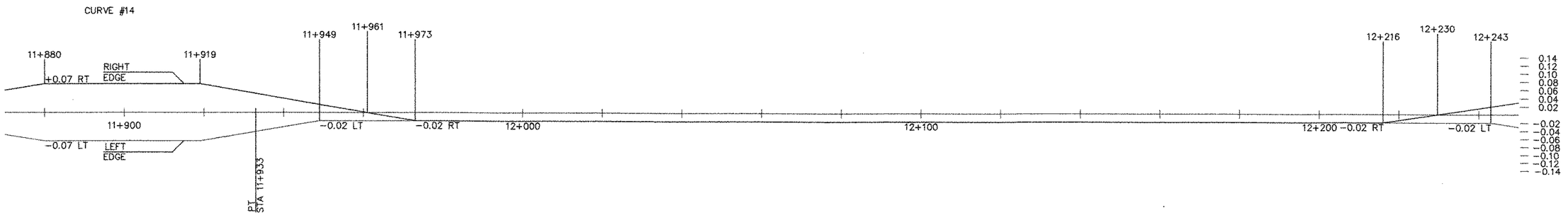
V: /1261/CADD/PLANS/BANKING_DIAGRAM-C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric







BANKING DIAGRAM

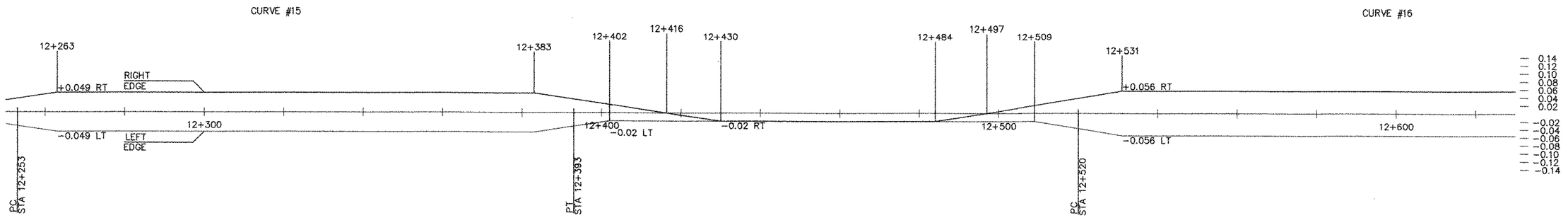
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0124(6)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 44 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

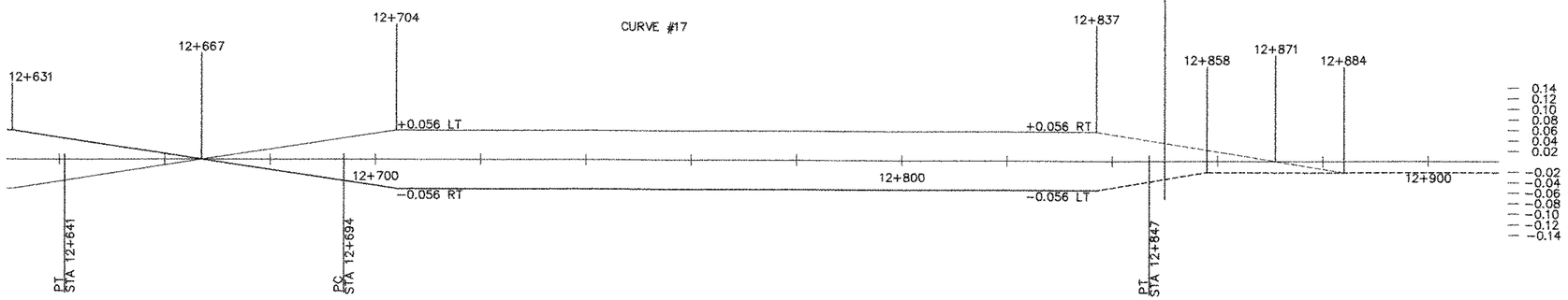
V: /1261/CADD/PLANS/BANKING_DIAGRAM–C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric



CONTRACT 2 ← → MATCH TO CONTRACT 1



BANKING DIAGRAM

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0124(6)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 45 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/BANKING_DIAGRAM-C2.DWG

THE LOUIS BERGER GROUP, INC.

Metric

LEGEND

SILT FENCE

HAY BALES

GEOTEXTILE FOR STEEP SLOPE

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

THE LOUIS BERGER GROUP, INC.

ROUTE 121 EROSION CONTROL PLAN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 46 OF 116

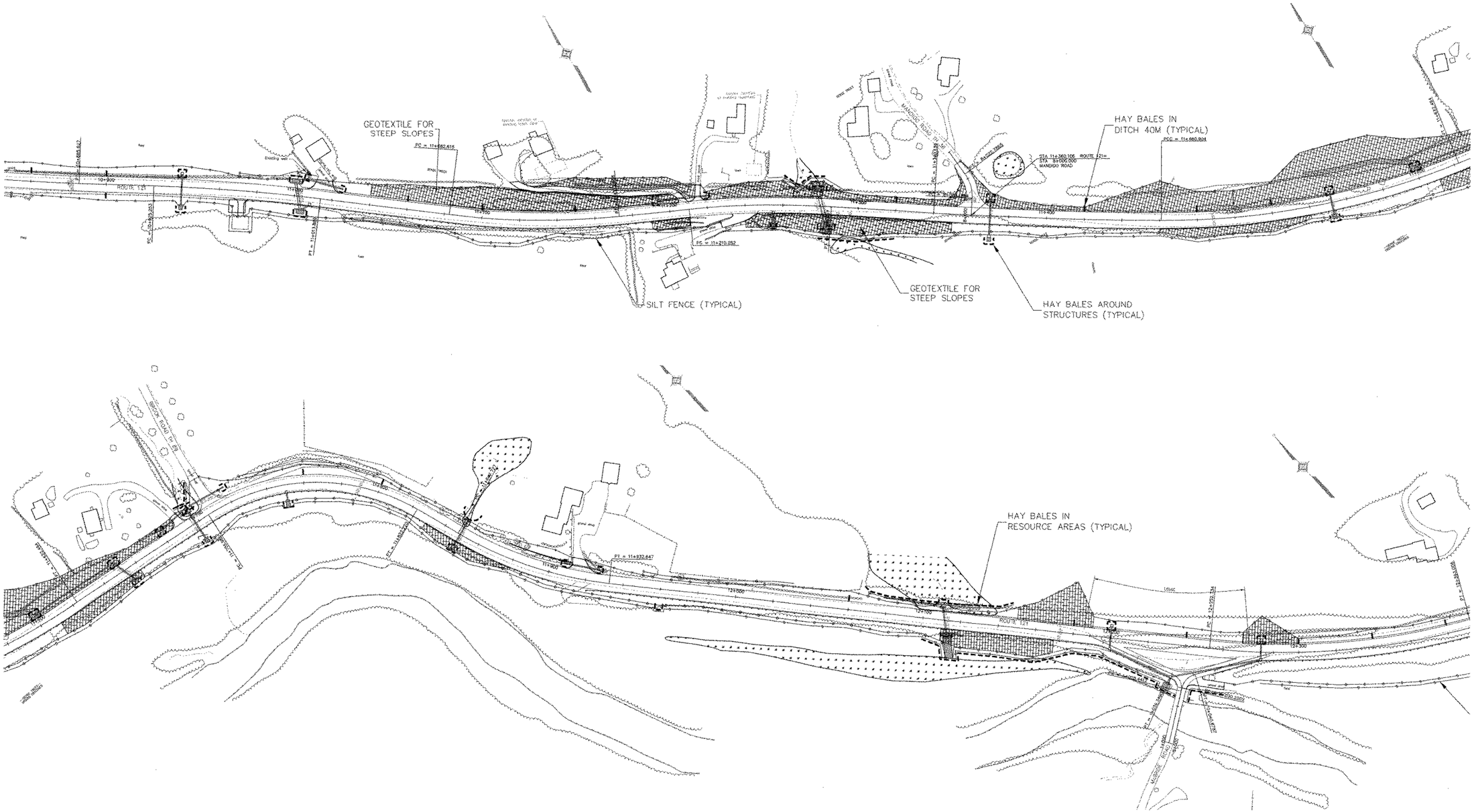
DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/EROSION_CONTROL-C2.DWG

Metric



LEGEND

S——S—— SILT FENCE

▬▬▬▬ HAY BALES

▨ GEOTEXTILE FOR STEEP SLOPE

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

THE LOUIS BERGER GROUP, INC.

ROUTE 121 EROSION CONTROL PLAN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME: IPARM FILE NAME: SURVEYED BY: SQUAD LEADER:	PLOT DATE: 12/08/03 SURVEY DATE: DRAWN BY: SHEET: 47 OF 116

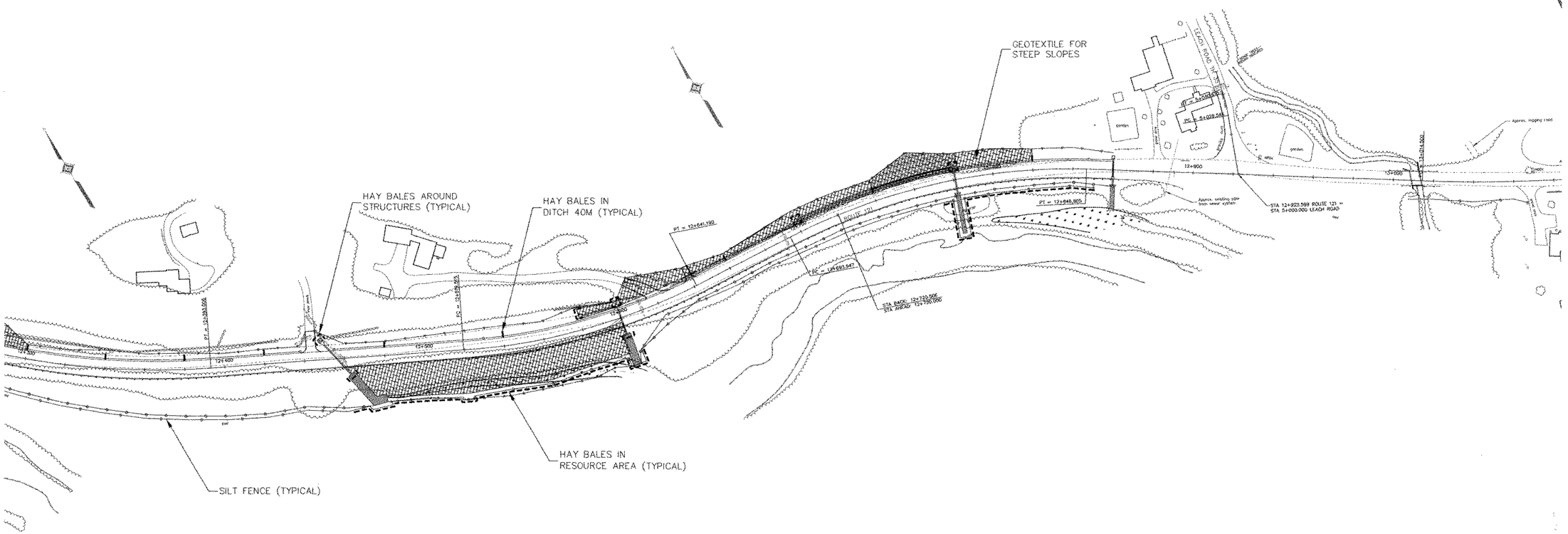
DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/EROSION_CONTROL-C2.DWG

Metric



LEGEND

- SILT FENCE
- HAY BALES
- GEOTEXTILE FOR STEEP SLOPE

GRAPHIC SCALE

(IN METERS)

20 0 10 20 40 60 80 100

1 : 1000

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/EROSION_CONTROL-C2.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 EROSION CONTROL PLAN

PROJECT:	PROJECT NO. :
GRAFTON--ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 48 OF 116

Metric

PARKER HILL ROAD TH 42

gravel road

10+000

BEGIN OF CONTRACT #2

1 ELWYN & NANCY MILLETT BK30/PG449

2 JAMES & DIANE SMITH BK30/PG427

3 CRAIG & INEZ MOORE BK26/PG499

4 E.R.E. ASSOCIATES LTD BK36/PG583

5 STEVEN & JUNE AIKEN BK33/PG602

6 FREDERICK & GRACE WHITE BK31/PG201

7 THOMAS & KATHLEEN SULLIVAN BK33/PG3

8 ROSE AVENIA BK265/PG309

9 DANIEL & ROBIN WELLS BK185/PG104

10 JOYCE KENNETT BK160/PG174

11 BRUCE SIMONDS BK252/PG441

12 COMMUNITY CHRISTIAN CHURCH OF ATHENS BK214/PG223

D & R GENERAL STORE

10+100 10+200 10+300 10+400

ROUTE 121

JH MEMORIAL DRIVE

GRAFTON

ROCKINGHAM

field

paved parking lot

gravel drive

pavement

DATUM
VERTICAL
HORIZONTAL

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500

0 10m 20m 40m 60m

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO.: STP 0126(4)S
DESIGN FILE NAME: CONTRACT2.DGN	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY: JTO
	SHEET: 45 OF 116

Metric

(19) TOBY LAMPERT
JENNIFER MEEHL
BK192/PG492

(20) KENNETH & DORIS BAILEY
BK251/PG237

(16) CLAIRE MERCHANT
BK238/PG286

(14) MARIO & SUSAN HERNANDEZ
BK261/PG664

CAMBRIDGE-HERTROAD TH 34

SEE LOT 19 PLANTING BED DETAIL BELOW

NEW 6' HIGH STOCKADE FENCE (SEE WRITTEN SPECS FOR DETAILS)

REMOVE AND REPLACE ROSE BUSHES

(15) SF SHRUBS SET BEHIND FENCE AND STONE WALL - ALTERNATE COLORS

NEW 6' HIGH STOCKADE FENCE WITH 10' WIDE GATE (SEE WRITTEN SPECS FOR DETAILS)

(4) AS SHADE TREES SET 8m APART AND ALONG THE ROW

(21) ANN WINESKI
BK228/PG391

(2) AS SHADE TREES SET 1m BEHIND TOP OF WALL

(1) ROWAN TREE AT LOCATION OF PREVIOUS ONE

REMOVE, STORE AND REPLANT ROSE-OF-SHARON

10+500

10+600

10+700

10+800

10+400

(2) FA SHADE TREES SET 3m BEHIND GUARDRAIL

(2) AS SHADE TREES SET 3m BEHIND GUARDRAIL

(1) AS SHADE TREES SET AT END OF DRIVEWAY

(1) MM SHADE TREES SET BETWEEN HOUSE AND CULVERT

PROTECT EXISTING MAPLE TREES AT TOE OF SLOPE

(15) RODNEY & BEVERLY WELLS
BK218/PG152

(18) ROCKINGHAM AREA COMMUNITY LAND TRUST
BK218/PG0

(13) MARIO & SUSAN HERNANDEZ
BK189/PG430

(17) JAMES & CAMILLA ROBERTS
BK208/PG203

(18A) ROLAND & URSULA EDWARDS
BK95/PG153

(11) BRUCE SIMONDS
BK252/PG441

SCHOOLHOUSE ROAD TH 35

(22) WILLIAM & ELIZABETH ARMSTRONG
BK172/PG73

(23) PATRICK ZISELBERGER
BK263/PG563

(24) HELEN KELTON REVOCABLE FAMILY TRUST
BK238/PG149

6" OF PINE BARK MULCH TO BE INSTALLED IN BED

(2) CC AS SHOWN

(10) EA AS SHOWN

HOUSE

DRIVEWAY

(8) VC AS SHOWN

(2) CC AS SHOWN

(63) RR AS SHOWN

GRASS

NEW WALL

RELOCATE EXIST. VC

RELOCATE EXIST. CC

(2) CC AS SHOWN

(1) CC AS SHOWN

LOT 19 PLANTING BED DETAIL
1:200

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500
0 10m 20m 40m 60m

DATUM
VERTICAL
HORIZONTAL

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT: GRAFTON-ROCKINGHAM, ROUTE 121	PROJECT NO.: STP 0126(4)S
DESIGN FILE NAME: CONTRACT2.DGN	PLOT DATE: 12/08/03
IPARM FILE NAME:	SURVEY DATE:
SURVEYED BY:	DRAWN BY: JTO
SQUAD LEADER:	SHEET 50 OF 116

Metric

(21)
ANN WINESKI
BK228/PG391

(25)
LILLIAN FITZGERALD
BK259/PG419

(26)
SARAH DIBERNARDO
BK267/PG112

AN TREE AT
N OF PREVIOUS ONE

REMOVE, STORE
AND REPLANT
ROSE-OF-SHARON

REMOVE, STORE, AND
REPLANT EXISTING LILACS

DENSE TREES

10+800
10+900
11+000
11+100
11+200

field

(2) AS SHADE TREES SET
AT ROW ON EITHER SIDE
OF DRIVEWAY AS SHOWN

(17)
ANN WINESKI
BK 228 P 391

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500
0 10m 20m 40m 60m

DATUM
VERTICAL
HORIZONTAL

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 51 OF 116

Metric

(29)
RICHARD D. EDELSTEIN
EVE CRIST NESS
BK193/PG232

(28)
JAMES & LISA
CRITCHFIELD
BK238/PG26
Approx. location
existing leachfield

MANDIGO ROAD TH 36

(30)
JOHN RAYMOND
BK270/PG16

(27)
DAVID & JEAN COTTON
BK208/PG390

11+200
11+300
11+400
11+500

ELMINATED SOLID BOARD FENCE
~~29.3 LIN. METERS OF SOLID BOARD FENCE~~
~~SET BETWEEN NEW TREES AND EXISTING~~
~~LOWER ROW OF TREES~~
~~SEE DETAIL~~ 57

(2) ROWS OF (13) EVERGREENS.
PLACE BETWEEN EXISTING TREES
AND THE BACK OF THE GUARDRAIL
ALTERNATE SPECIES BETWEEN AB AND TO

(27)
DAVID & JEAN COTTON
BK208/PG390

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VERMONT "ORGANIC" GRASS MIX
	B	VERMONT "ROADSIDE" GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500
0 10m 20m 40m 60m

DATUM
VERTICAL
HORIZONTAL

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(14)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 52 OF 116

Metric

BROOK ROAD TH 89

(32) FRANKLIN & BEATRICE PERRY BK152/PG36

(33) ALAN & CONSTANCE LANCASTER BK189/PG391

(34) THOMAS & DIANE GOLDING BK248/PG103

(31) THOMAS & DIANE GOLDING BK248/PG103

(31) THOMAS & DIANE GOLDING BK248/PG103

EXIST. TREES TO REMAIN

(4) AS SHADE TREES SPACED 8.5m APART, AND 5m OFF THE EDGE OF PAVEMENT

(8) AS SHADE TREES SPACED 8m APART AND 3M OFF OF THE STONE WALL

(4) SV SHRUBS SET ALONG DRIVEWAY AS SHOWN

gravel drive

gravel road

grass

DHW

11+600

11+700

11+900

12+000

—DENSE TREES— GROUND OBSCURED

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING W STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500

0 10m 20m 40m 60m

DATUM

VERTICAL _____

HORIZONTAL _____

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 53 OF 116

Metric

GOLDING
03

(34)
THOMAS & DIANE GOLDING
BK248/PG103

(37)
STANLEY & SHARON BUDZIK
BK192/PG286

STANLEY &
BK

12+000
12+100
12+200
12+300
12+400

LEDGE

OHW

gravel drive

field

(31)
THOMAS & DIANE GOLDING
BK248/PG103

(36)
BRONY & MARIAN BUDZIK
BK121/PG436

McBRIDE ROAD

0+000
1+000

(35)
MCQUIDE
BK

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS)
0 10m 20m 40m 100m

THE LOUIS BERGER GROUP, INC.

DATUM
VERTICAL _____
HORIZONTAL _____

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 54 OF 116

Metric

(37) STANLEY & SHARON BUDZIK
BK192/PG286

(38) ALLEN & JUDY BUDZIK
BK175/PG438

(39) BRONY & MARIAN BUDZIK
BK121/PG436

(36) BRONY & MARIAN BUDZIK
BK121/PG436

12+400 12+500 12+600 12+700 12+800

field

PLACE FACINES ALONG TOE OF SLOPE

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

GRAPHIC SCALE (IN METERS) 1:500

0 10m 20m 40m 60m

DATUM
VERTICAL _____
HORIZONTAL _____

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 55 OF 116

Metric

(39)
BRONY BUDZIK
MARION G. BUDZIK
BK125/PG212

LEACH ROAD TH #5

DENSE TREES--GROUND OBSCURED

PT = 5+044.615

PC = 5+029.545

garden

gravel drive

Curb to curb

(40)
BRONY BUDZIK
MARION G. BUDZIK
BK147/PG492

garden

(65)
NATHANIEL I. SKORSTAD
BK254/PG558

(42)
MARGOT E. FREEDMAN
BK206/PG484

PC = 13+014.500

PT = 13+125.743

Approx. limit of cornfield

MBOX

OHW

UP

12+800

12+900

13+000

13+100

A

B

C

rip-rap

END OF CONTRACT #2

field

(36)
BRONY & MARIAN BUDZIK
BK121/PG436

(41)
RONALD & JOYCE DAVIS
BK172/PG155

(43)
LEWIS & MARGARET CLARK
BK160/PG108

RONNIE
CL
BK20

Hatch	Letter	KEY TO REVEGETATION TYPES
	A	VTRANS 'URBAN' GRASS MIX
	B	VTRANS 'RURAL' GRASS MIX
	C	BIOENGINEERING IN STONE RIP RAP
	D	WILDFLOWERS
	E	WETLAND BUFFERS
	F	WETLANDS

DATUM
VERTICAL _____
HORIZONTAL _____

GRAPHIC SCALE (IN METERS) 1:500
0 10m 20m 40m 60m

THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME: CONTRACT2.DGN
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY: JTO
SHEET: 56 OF 116

Metric

DESCRIPTION OF REVEGETATION AREAS

KEY TO REVEGETATION TYPES

(A) VTRANS 'URBAN' GRASS MIX:
Typical VTRANS mix is intended to blend with existing lawns.
SOIL APPLICATION: Minimum depth 50mm screened topsoil to match properties of adjacent soils.
SEED MIX: See 'Typical Sections' sheet in design plans.

(B) VTRANS 'RURAL' GRASS MIX:
Typical VTrans mix is applicable to much of the corridor where revegetation will blend with existing native grass areas, meadows, and field edges, as well as to stabilize future wooded slopes.
SOIL APPLICATION: Minimum depth 50mm screened topsoil to match properties of adjacent soils. SEED MIX: See 'Typical Sections' sheet in design plans.

(C) BIOENGINEERING IN STONE RIP RAP:
To further stabilize rip-rap, Live willow stakes will be applied between the rip-rap stone after installation. PLANT MATERIAL MIX: Live stakes of native materials cut on location such as black willow and purple osier.

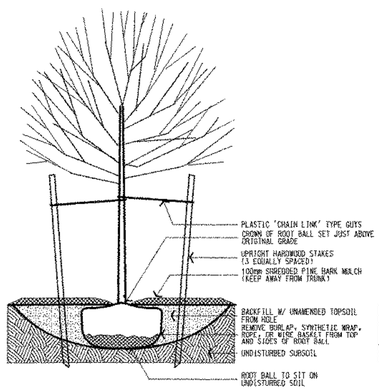
(D) WILDFLOWERS
The areas delinigated shall be planted with wildflowers per VTrans specifications.

(E) WETLAND BUFFERS:
On the fill slope immediately above wetlands, wet loving shrubs will be installed. Along the toe of the slopes, facines of willow and dogwood will be installed.
REPLACEMENT OF NATIVE SOILS: Existing soils shall be stripped and stockpiled for reuse on the corridor project by area and soil types. As much as possible, the importation of new soils should be minimized and only to ensure proper soil depth.
PLANT MATERIAL MIX: Native woody plant seedlings: Native shrubs including the following species shall be provided and installed over the graded slopes after the installation of geotextile: pagoda dogwood, serviceberry, red osier dogwood, and highbush cranberry.
STABILIZING GRASS: VTRANS 'Rural' Seed Mix (Type B above)
INSTALLATION NOTE: Cut openings for woody plants in geotextile (if required)

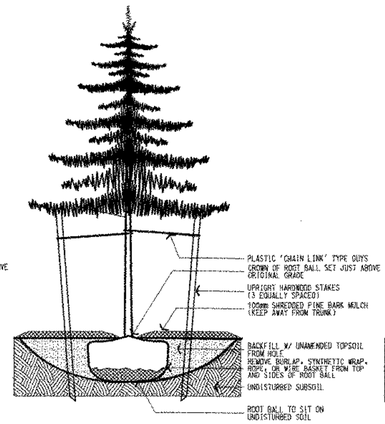
(F) WETLANDS:
Dogwood and Willow live stakes will be installed throughout this zone.
REPLACEMENT OF NATIVE SOILS: Existing wetland soils removed for construction should be stockpiled for use in these areas.

PLANT LIST

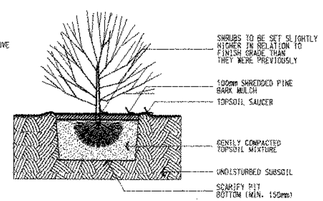
Symbol	Description	Key	Bot. Name	Common Name	Size	Quantity	Density	Notes	Pay Item	Unit
	DECIDUOUS (SHADE) TREES	AS	Acer saccharum	Sugar Maple	50 - 62mm cal.	23	N.A.	B&B (Balled & Burlapped)	656.30	Each
		FA	Fraxinus americana	White Ash	50 - 62mm cal.	2	N.A.	B&B (Balled & Burlapped)	"	"
		MM	Malus "macintosh"	Apple "macintosh"	50 - 62mm cal.	1	N.A.	B&B (Balled & Burlapped)	"	"
	SHRUBS	SV	Syringa vulgaris	Common Lilac	0.9 - 1.2m hgt.	4	N.A.	B&B or bare root	656.35	Each
		SF	Syringa vulgaris "french"	French Hybrid Lilac	0.9 - 1.2m hgt.	15	N.A.	B&B or bare root Equal Colors - Blue,Pink,Red	656.35	Each
		CC	Cotinus coggygria	Smokebush	0.9 - 1.2m hgt.	7	N.A.	B&B or bare root	656.35	Each
		VC	Vaccinium corymbosum	Highbush Blueberry	0.9 - 1.2m hgt.	8	N.A.	B&B or bare root	656.35	Each
		EA	Euonymus alata	Burning Bush	0.9 - 1.2m hgt.	10	N.A.	B&B or bare root	656.35	Each
		RR	Rosa ragosa	Beach Plum	0.9 - 1.2m hgt.	63	N.A.	B&B or bare root	656.35	Each
	EVERGEEN SCREENS	AB	ABIES BALSAMEA	Balsam Fir	1.8 - 2.4m hgt.	13	N.A.	B&B	656.20	Each
		TO	Thuja Occidentalis	White Cedar	0.9 - 1.2m hgt.	13	N.A.	B&B	"	"
(A)	Vtrans 'Urban' Grass Mix					42	70 Kg. per Hectare		651.15	Kg.
(B)	Vtrans 'Rural' Grass Mix					170	70 Kg. per Hectare		651.15	Kg.
(C)	BIOENGINEERING IN STONE RIP-RAP	NW	Salix sp.	Native Willow cuttings	1.2-1.8m long cuttings 12-18mm diam.	3,210	5 stakes per S.M.		656.40 (MOD)	Each
(D)	WILDFLOWER SEED					0.5	25 Kg. per Hectare		651.16	Kg
(E)	WETLAND BUFFERS	CA	Cornus alternifolia	Pagoda Dogwood	0.6 - 0.9m hgt.	75	0.375	B&B or bare root	656.35 (MOD)	Each
		VT	Viburnum trilobum	Am. Cranberry Viburnum	0.6 - 0.9m hgt.	75	0.375	B&B or bare root	"	"
		AC	Amelanchier canadensis	Serviceberry	0.6 - 0.9m hgt.	75	0.375	B&B or bare root	"	"
		CST	Cornus stolonifera	Red - osier Dogwood	0.6 - 0.9m hgt.	75	0.375	B&B or bare root	"	"
	Fascines	SSP	Salix sp.	Purple willow	1.2-1.8m long cuttings 12-18mm diam.	62 Lin. m of bundles		Cuttings in bundles containing a minimum of 12 stems each. Place bundles end to end and alternate facine species.	656.40 (MOD)	Lin. Meter
		CST	Cornus stolonifera	Red - osier Dogwood	1.2-1.8m long cuttings 12-18mm diam.	62 Lin. m of bundles			"	"
(F)	WETLANDS									
	Live Stakes	CST	Cornus stolonifera	Red - osier Dogwood	300-450mm long cuttings 18-36mm diam.	112	0.5	cuttings	656.40 (MOD)	Each
		NW	Salix sp.	Native Willow cuttings	300-450mm long cuttings 18-36mm diam.	112	0.5	cuttings	"	"



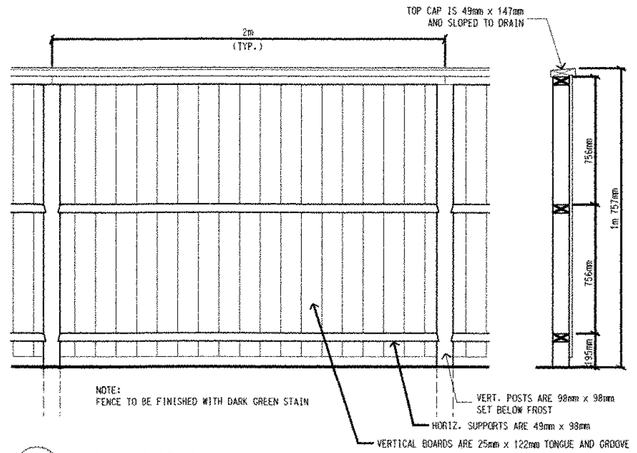
TYP. DEC. TREE PLANTING DETAIL
NTS



TYP. CON. TREE PLANTING DETAIL



TYP. BARE ROOT PLANTING DETAIL
NTS



1/57 SOLID BOARD FENCE DETAIL
N.T.S. PAY ITEM 620.12 (MOD)

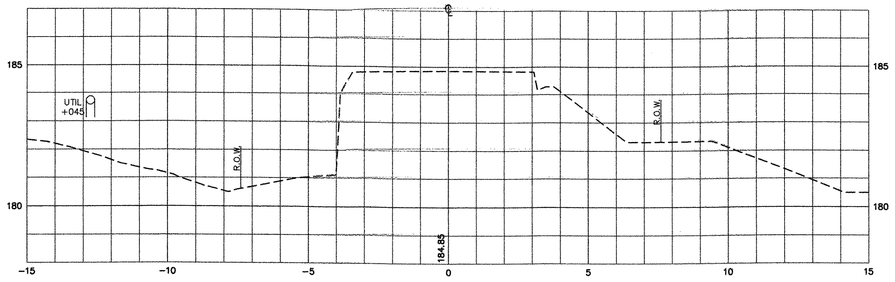
"DEERFIELD" CEDAR FENCE
SEE SPECIFICATION FOR ITEM 620.12 - (MOD-1.8M FENCE FOR PARCEL 18)

DATUM
VERTICAL _____
HORIZONTAL _____

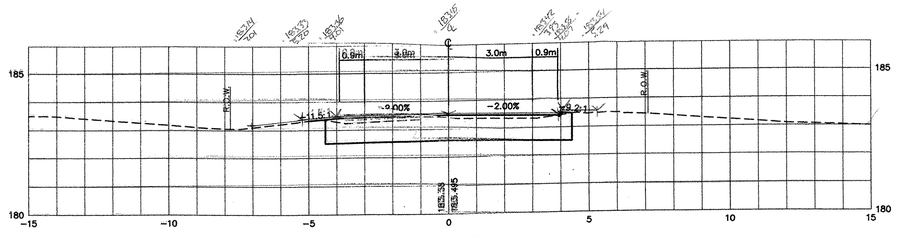
THE LOUIS BERGER GROUP, INC.

ROUTE 121 LANDSCAPE PLAN - 100% DESIGN

PROJECT:	PROJECT NO.:
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME: CONTRACT2.DGN	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY: JTO
	SHEET: 57 OF 116

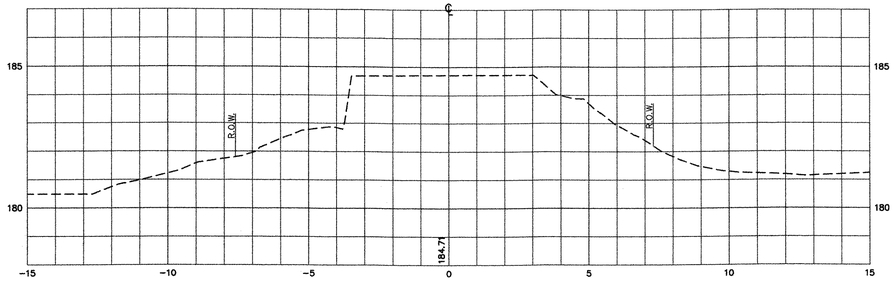


10+040

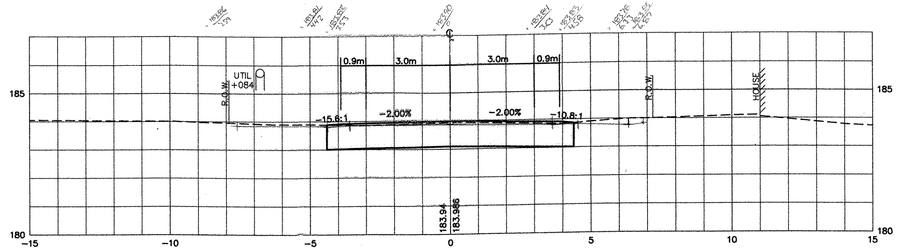


10+100

7.30
7.39
7.25
3 / 21.94 = 7.31 sq.m.

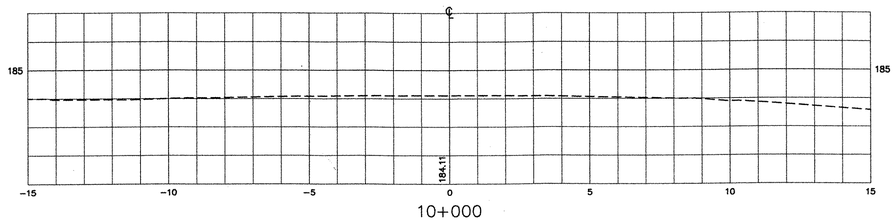


10+020

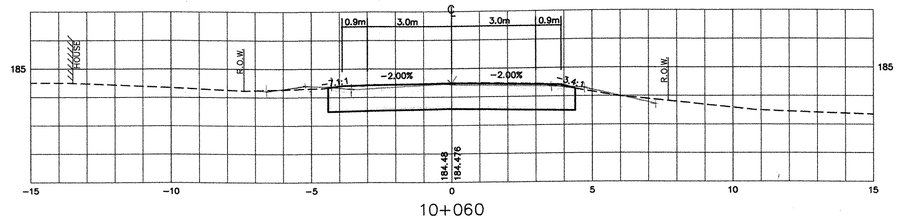


10+080

AREA: 7.35
7.23
7.16
3 / 21.94 = 7.31 sq.m.



10+000



10+060

AREA: 7.35
8.01
7.85
3 / 23.61 = 7.87 sq.m.

ROUTE 121 CROSS SECTIONS

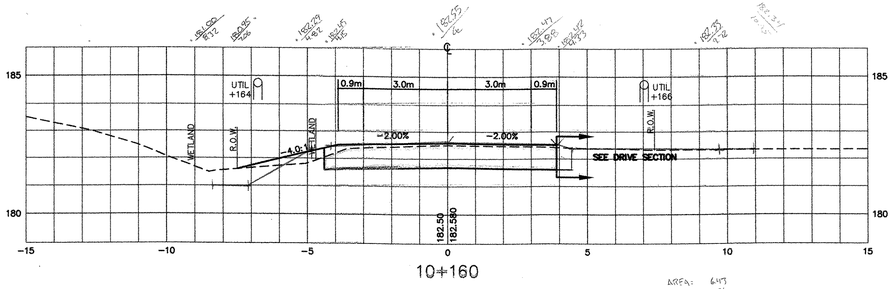
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 58 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

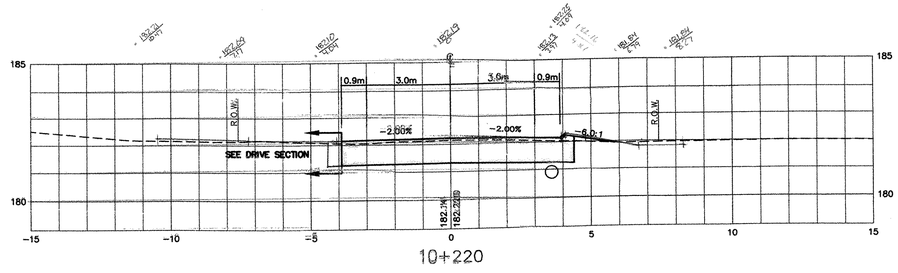
THE LOUIS BERGER GROUP, INC.

Metric



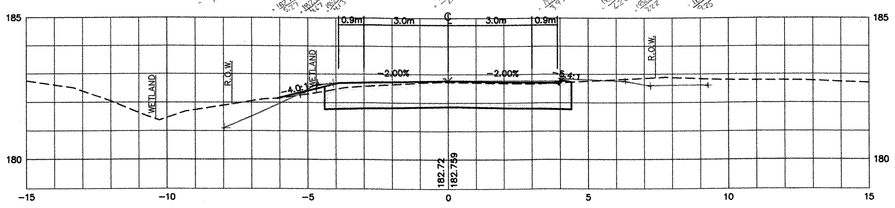
10+160

AREA: 6.47, 6.74, 6.35
$\sqrt[3]{291.14} = 6.38sm + (0.5 \times 0.8)^{0.4} = 6.78sm$



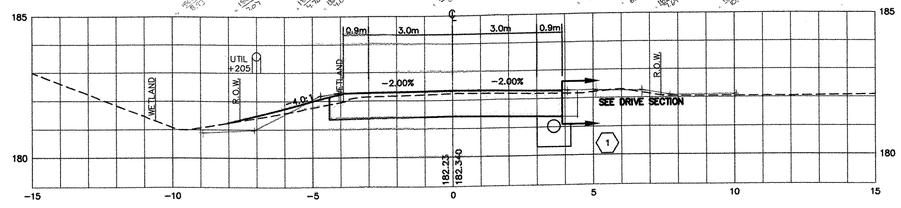
10+220

AREA: 6.56, 6.55, 6.40
$\sqrt[3]{289.71} = 6.57sm + (0.5 \times 0.8)^{0.4} = 6.97sm$



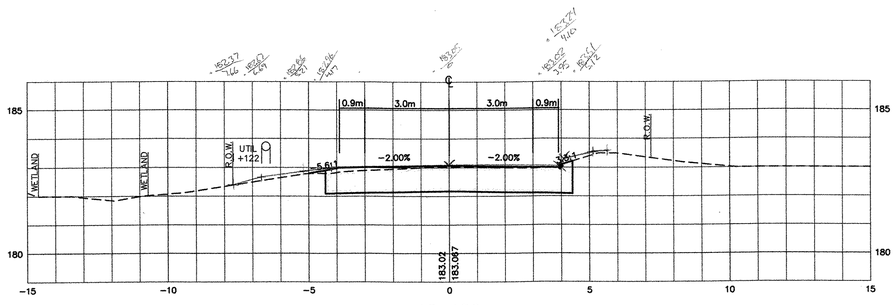
10+140

AREA: 7.42, 7.35, 7.30
$\sqrt[3]{402.07} = 7.36sm$



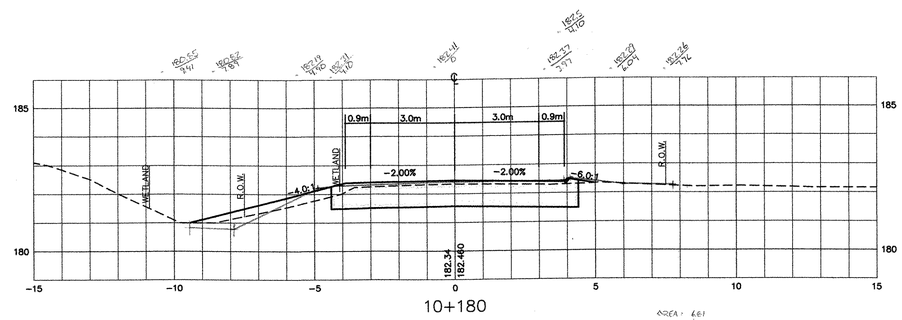
10+200

AREA: 6.27, 6.16, 6.27
$\sqrt[3]{\overset{0.4}{\cancel{0}}\,10.45} = 6.27sm + (0.5 \times 0.8) = 6.62sm$



10+120

AREA: 7.43, 7.41, 7.41
$\sqrt[3]{422.45} = 7.48sm$



10+180

AREA: 6.81, 6.70, 6.76
$\sqrt[3]{\overset{0.4}{\cancel{0}}\,20.29} = 6.76sm$

1 PLOT CBR 2/8/06

CBR 2/22/06

2/27/06

ROUTE 121 CROSS SECTIONS

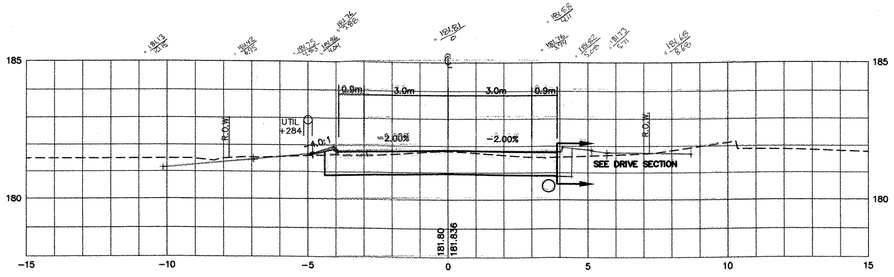
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 59 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

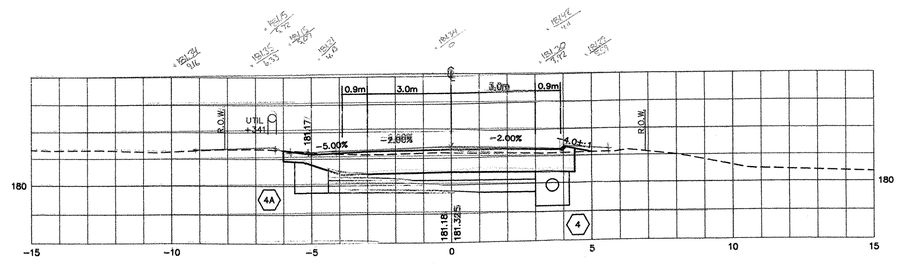
THE LOUIS BERGER GROUP, INC.

Metric



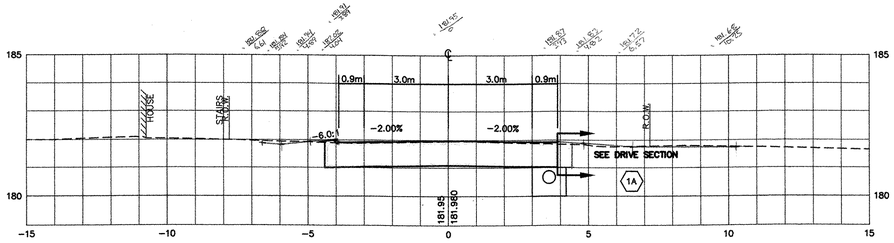
10+280

AREA: 632
628
639
1899/3 = 629sm + (05 x 07) = 664sm



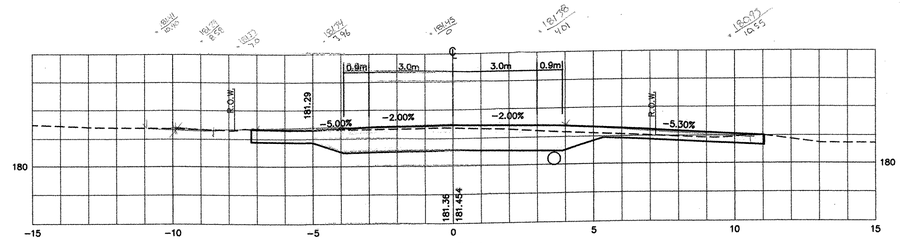
10+340

AREA: 661
643
677
2021/3 = 674



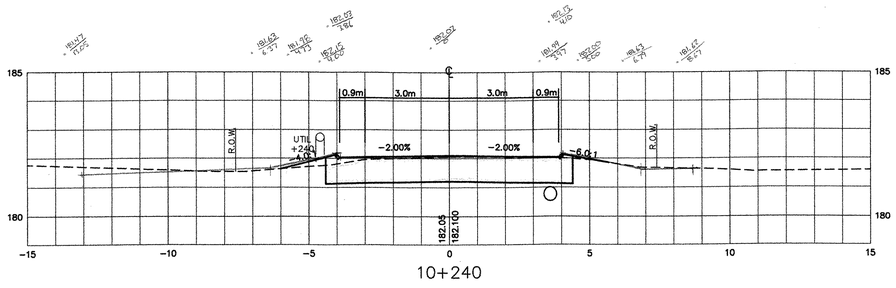
10+260

AREA: 7.17
7.20
7.16
7.25
2153/3 = 7.18 sm + (0.5 x 0.8) = 7.68 sm



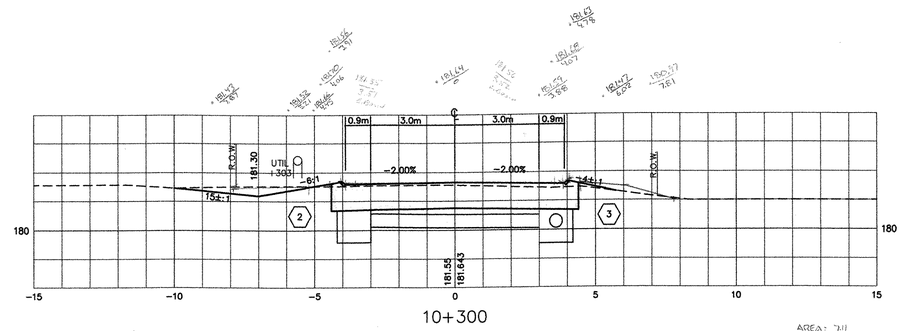
10+320

AREA: 8.48
9.51
9.10
9.64
28.85/3 = 9.52 sm



10+240

AREA: 7.60
7.67
7.66
2293/3 = 7.64 sm



10+300

AREA: 7.11
7.15
7.24
21.50/3 = 7.17 sm

V Plotted: Oct 04

2/07/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**

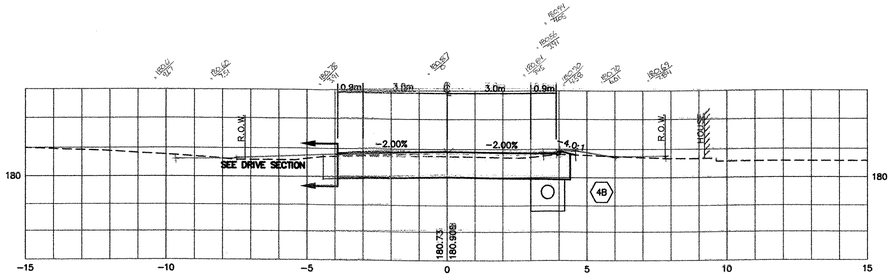
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 60 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

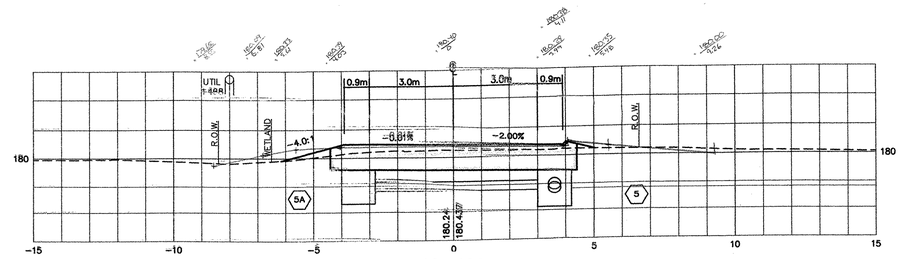
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

THE LOUIS BERGER GROUP, INC.



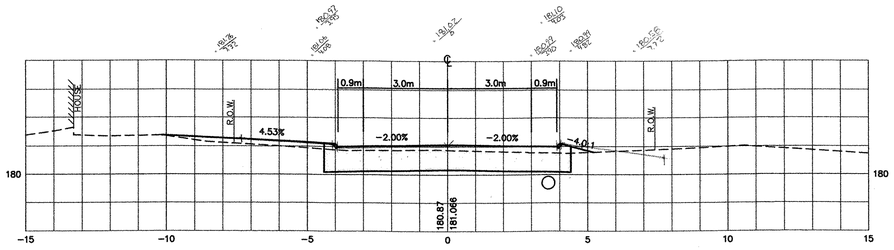
10+400

AREA: 6.33
6.27
6.28
18.88/3 = 6.29sm + (0.75 x 0.5m) (0.375 sm)
= 6.67 sm ✓



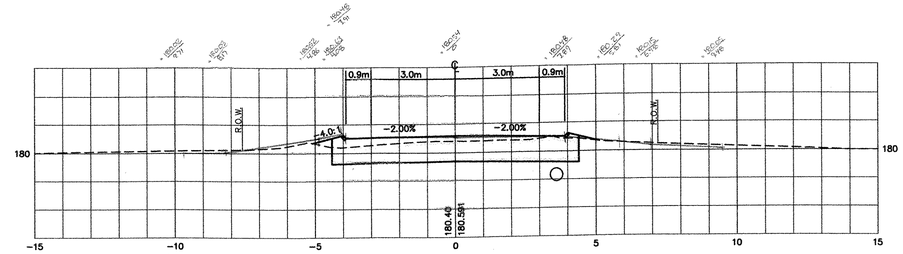
10+460

AREA: 595
5.81
5.92
17.46/3 = 5.89 sm ✓



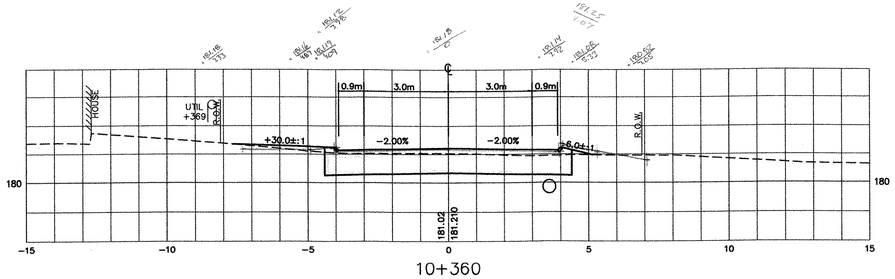
10+380

AREA: 6.42
6.32
6.28
19.02/3 = 6.34sm ✓



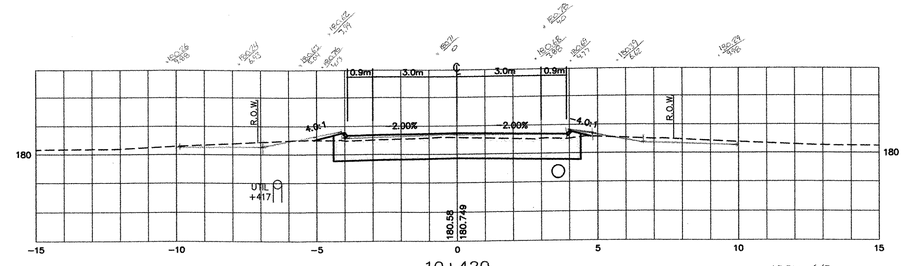
10+440

AREA: 6.41
6.38
6.42
19.22/3 = 6.41sm ✓



10+360

AREA: 6.41
6.32
6.35
19.08/3 = 6.36sm ✓



10+420

AREA: 6.43
6.37
6.36
6.42
19.10/3 = 6.37sm ✓

PLOT CHG. 2/13/06

2/27=1.04

2/27/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 61 OF 116

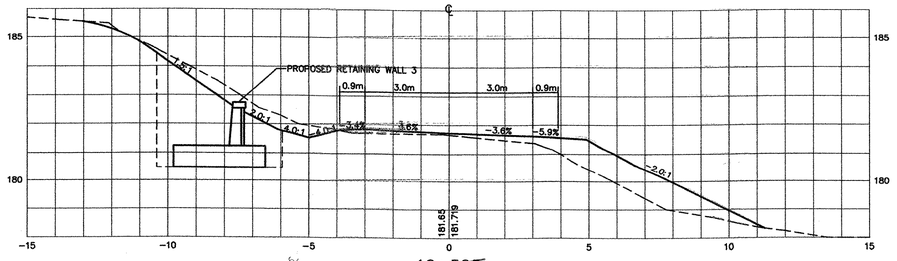
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

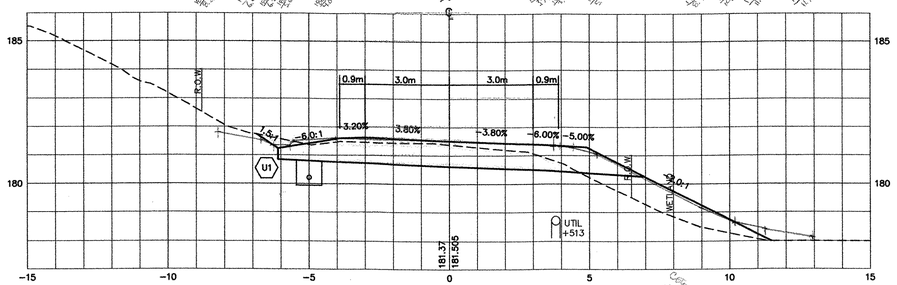
THE LOUIS BERGER GROUP, INC.

Metric

STA. 10+525 5.95 LT BEGIN COFFERDAM EXCAVATION AND GRANULAR BACKFILL.

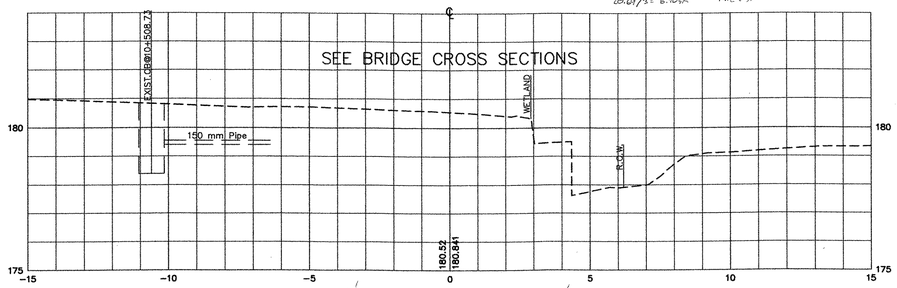


10+525

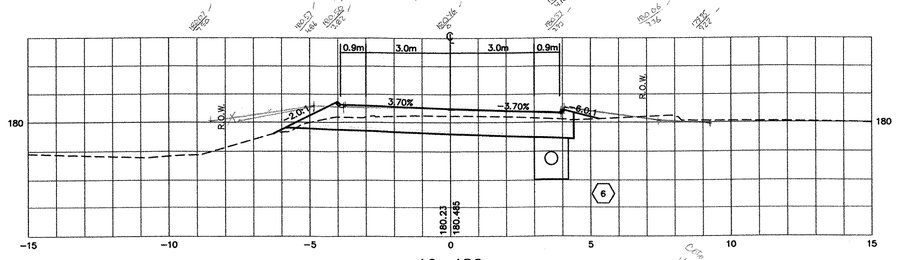


10+520

AREA: 680cm
688cm
701cm
20.69/3 = 6.90cm

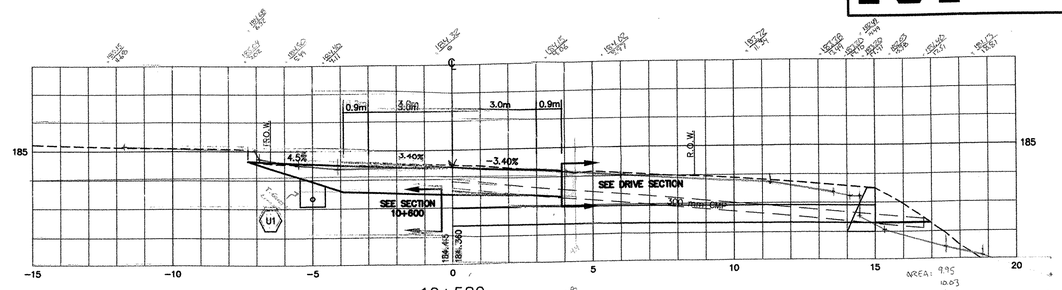


10+500



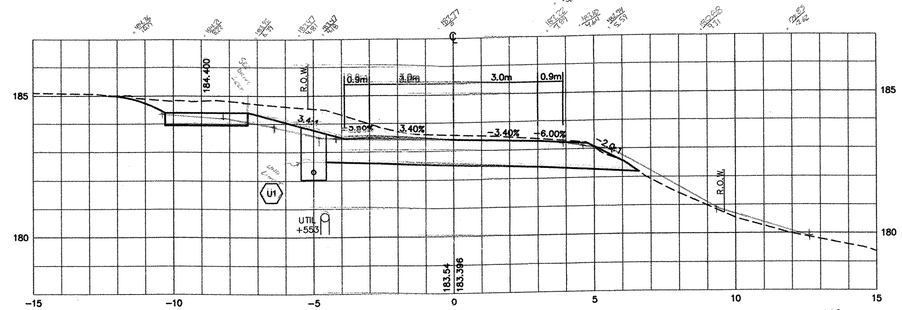
10+480

AREA: 522 cm
518 cm
530 cm
15.7/3 = 5.23 cm



10+580

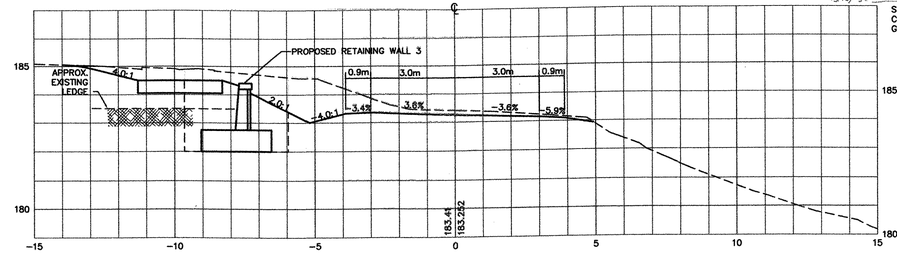
AREA: 9.95
10.03
10.05
30.03/3 = 10.01 sm



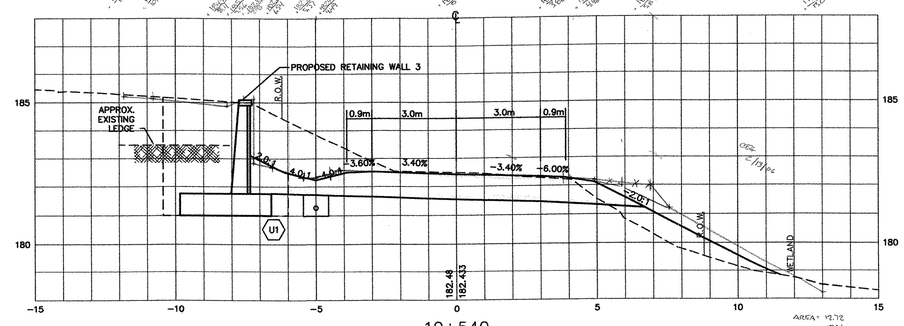
10+560

AREA: 11.45
11.36
11.48
11.52
11.45/3 = 11.48sm

STA. 10+557 5.95 LT END COFFERDAM EXCAVATION AND GRANULAR BACKFILL.



10+557



10+540

AREA: 12.78
12.71
12.77
38.2/3 = 12.73sm

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 62 OF 116

DATUM

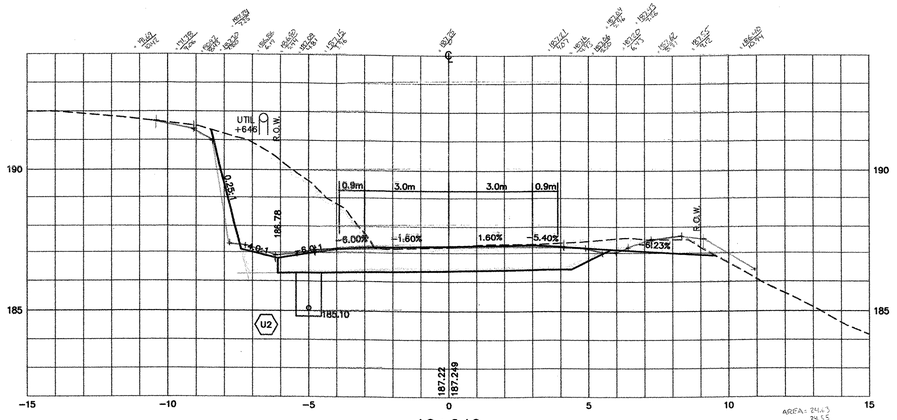
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

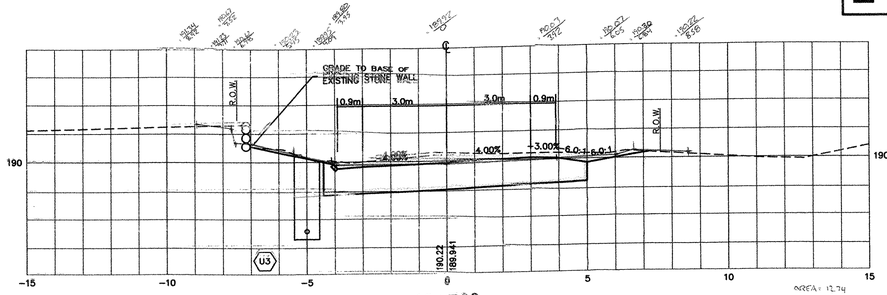
THE LOUIS BERGER GROUP, INC.

Metric



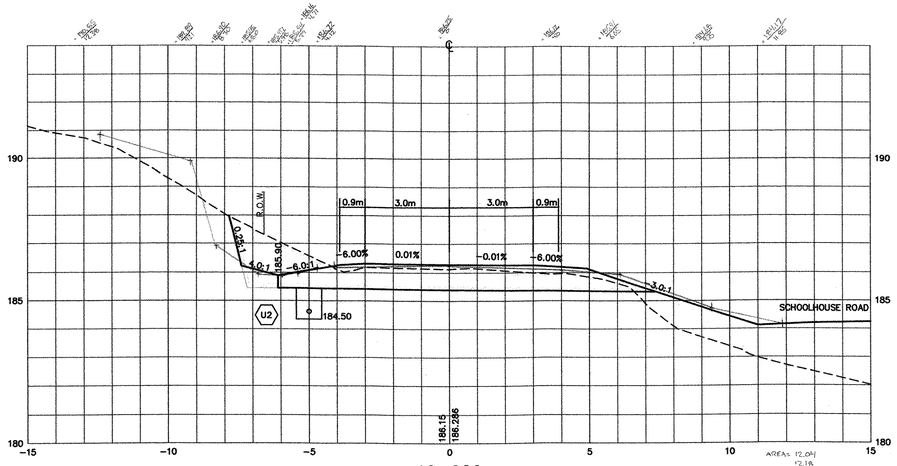
10+640

AREA: 24.43
24.55
24.76
73.70/3 = 24.63sq



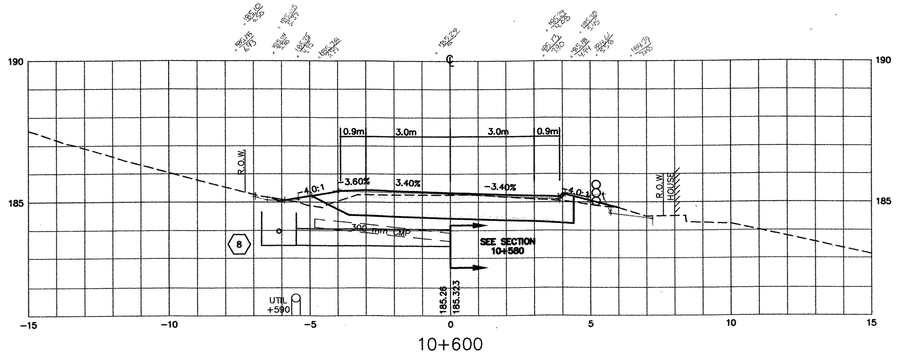
10+700

AREA: 12.74
12.63
12.56
37.93/3 = 12.64sq



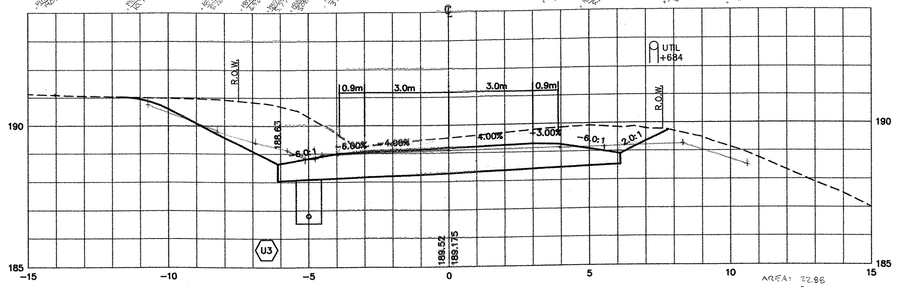
10+620

AREA: 12.04
12.18
12.12
36.34/3 = 12.11sq



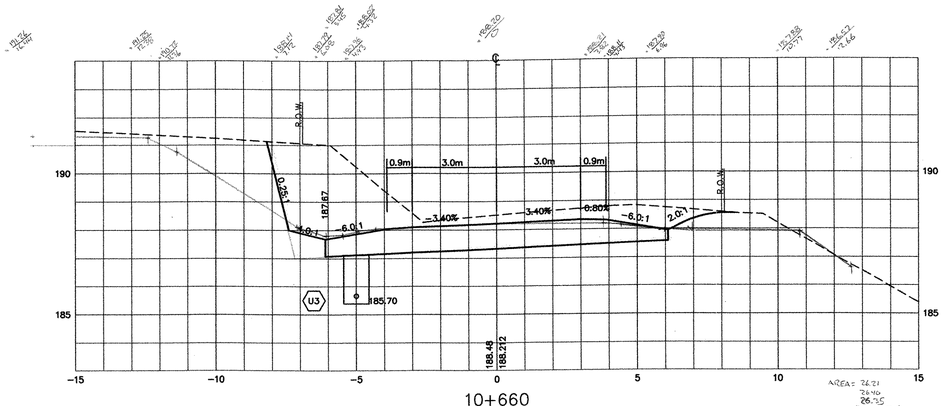
10+600

AREA: 6.56
6.59
6.44
19.61/3 = 6.60sq



10+680

AREA: 22.88
22.81
22.86
68.57/3 = 22.86



10+660

AREA: 24.21
24.40
26.35
78.96/3 = 26.32

ROUTE 121 CROSS SECTIONS

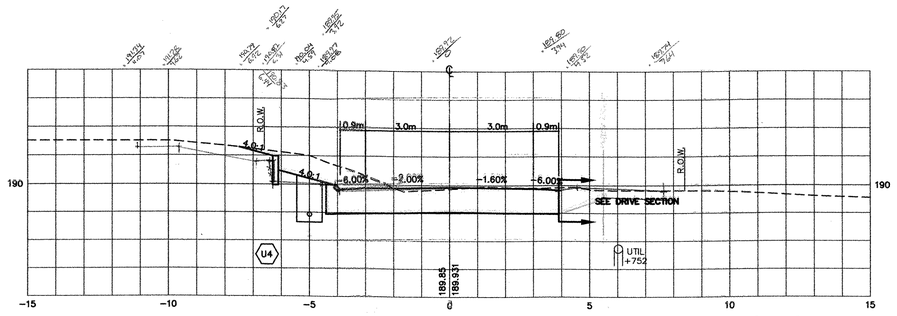
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 63 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

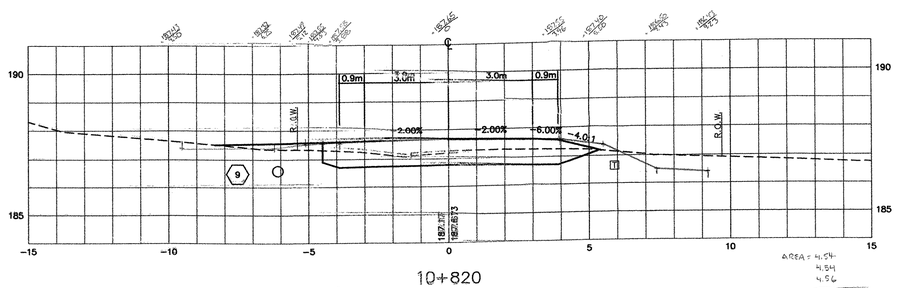
THE LOUIS BERGER GROUP, INC.

Metric



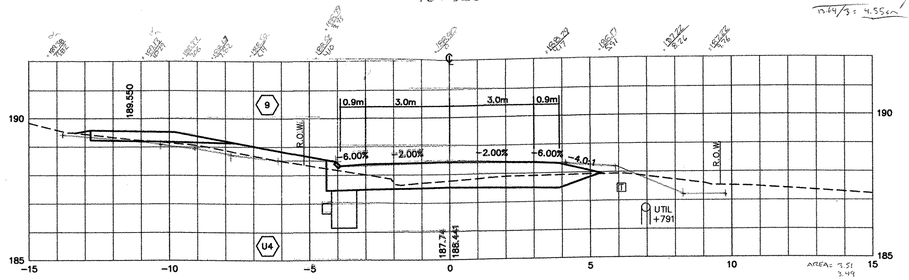
10+760

AREA: 11.27
11.00
10.98
11.05
33.03/3 = 11.01 sq



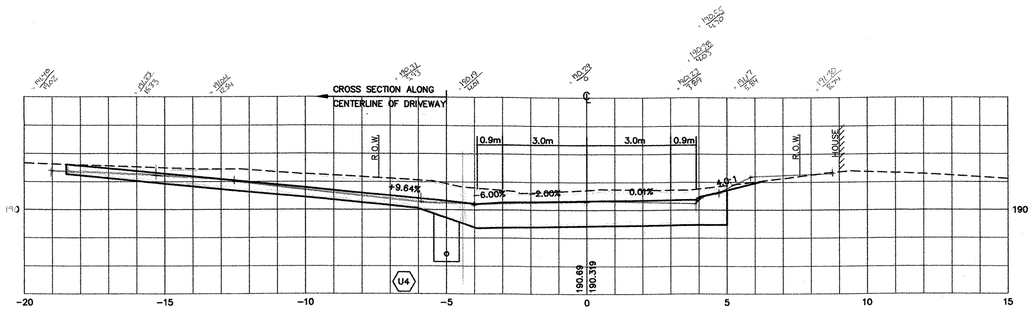
10+820

AREA = 4.54
4.54
4.56
13.64/3 = 4.55 sq



10+800

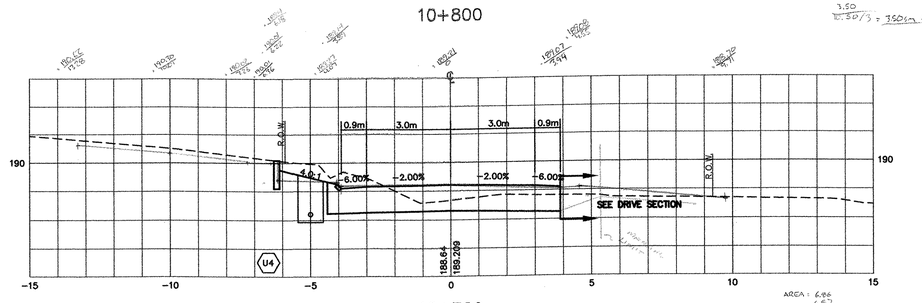
AREA: 3.51
3.49
3.50
10.50/3 = 3.50 sq



10+740

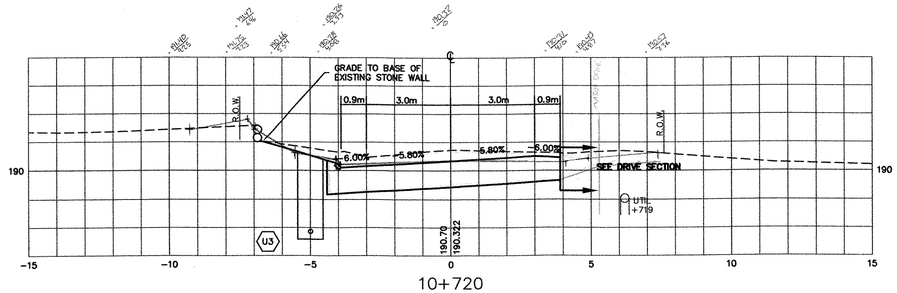
DRIVE AREA: 10.91
10.90
10.93
32.71/3 = 10.90 sq

ROADWAY AREA: 12.22
12.25
12.22
12.20
36.69/3 = 12.23 sq



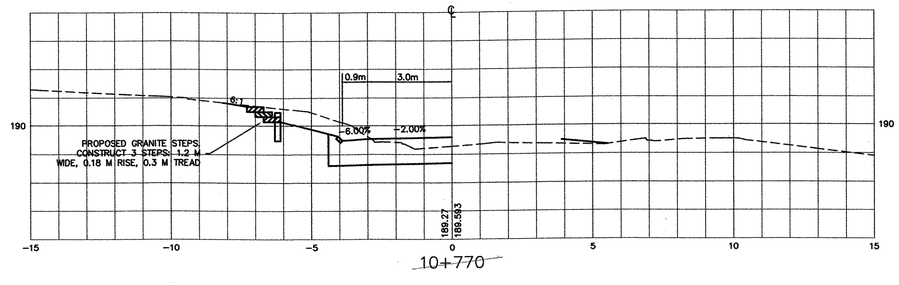
10+780

AREA: 6.86
6.87
6.87
20.6/3 = 6.87 sq



10+720

AREA: 11.80
11.70
11.75
35.25/3 = 11.75 sq



10+770

PLOT Offset 7/MIN

Offset 6'/12'/06

2/07/06

ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 64 OF 116

DATUM

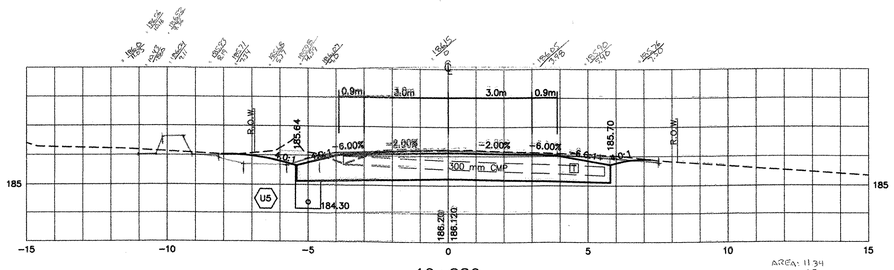
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

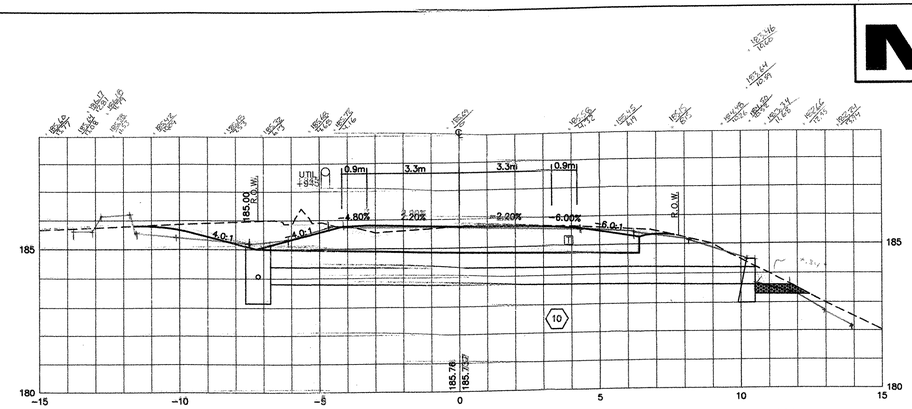
THE LOUIS BERGER GROUP, INC.

Metric



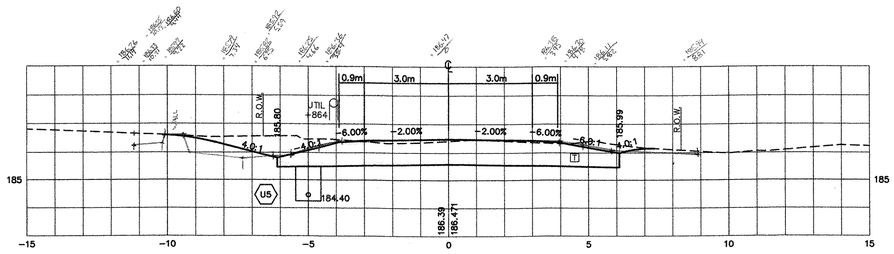
10+880

AREA: 11.34
11.31
11.35
34.0/11.33sm



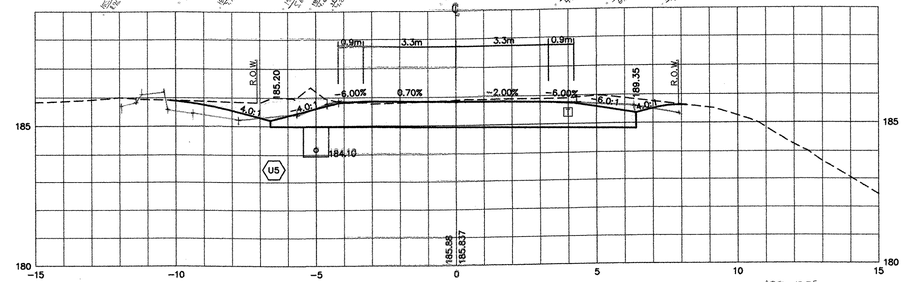
10+940

AREA: 13.42
13.43
13.40
40.25/3 = 13.42sm + 1.34 = 18.76 sm



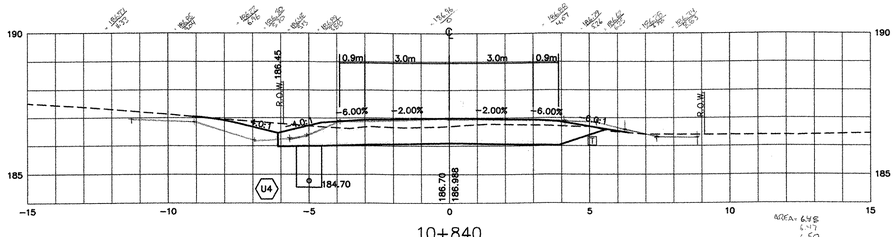
10+860

AREA: 11.63
11.62
11.65
34.90/3 = 11.63sm



10+920

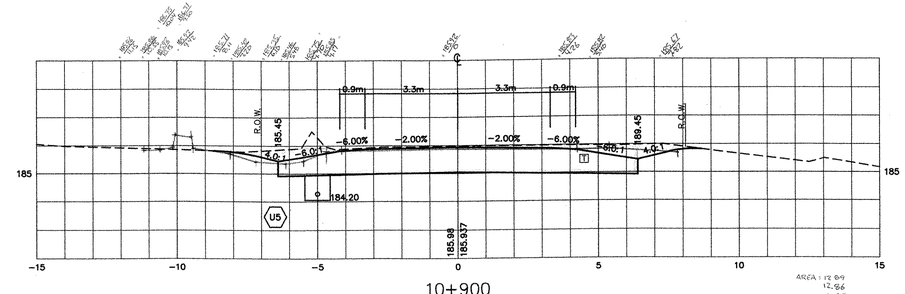
AREA: 13.75
13.69
13.75
41.19/3 = 13.73sm



10+840

AREA= 6.48
6.43
6.50
19.45/3 = 6.48sm

7.47
7.47
7.47
22.41/3 = 7.47 sm



10+900

AREA: 12.89
12.86
12.93
38.68/3 = 12.89sm

1 of 2
CBG
2/6/06

1 Tuer 2/6/06

2/6/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S

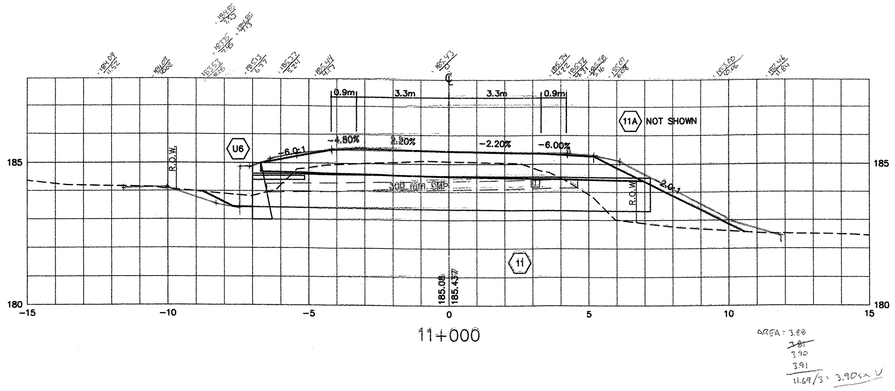
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 65 OF 116

THE LOUIS BERGER GROUP, INC.

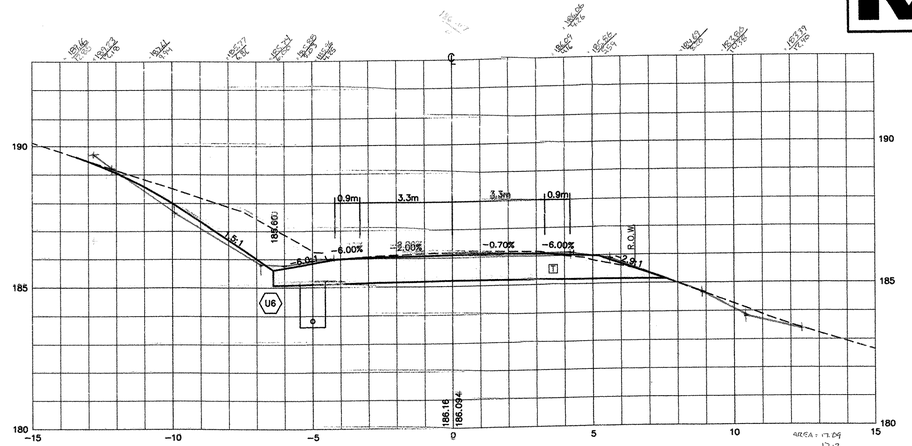
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG



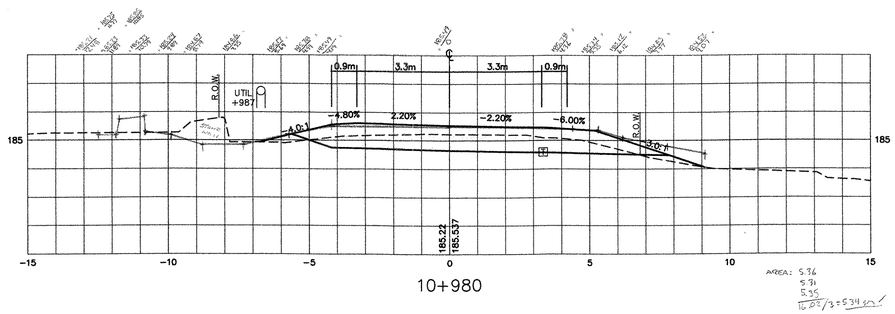
11+000

AREA: 3.88
3.90
3.91
11.69/3 = 3.90sm



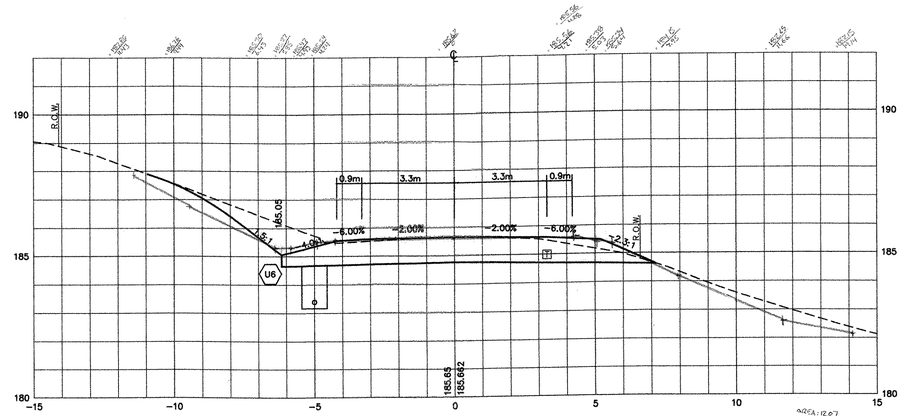
11+060

AREA: 17.09
17.13
17.14
51.36/3 = 17.12sm



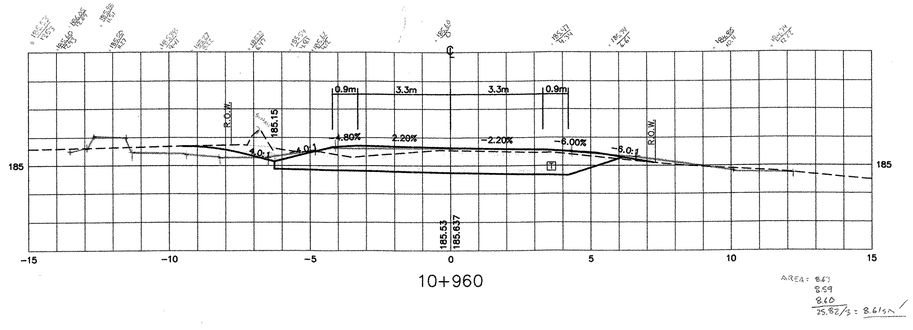
10+980

AREA: 5.36
5.31
5.35
16.05/3 = 5.34sm



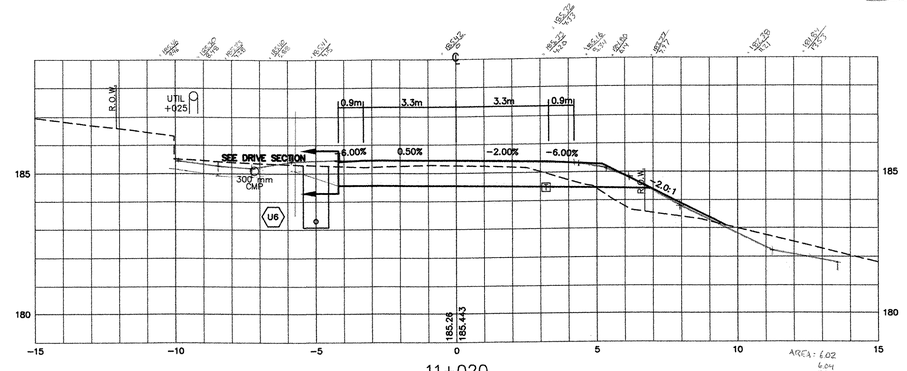
11+040

AREA: 12.07
11.97
12.06
36.1/3 = 12.03sm



10+960

AREA: 8.63
8.59
8.60
25.82/3 = 8.61sm



11+020

AREA: 6.02
6.04
5.93
17.99/3 = 6.0sm

ROUTE 121 CROSS SECTIONS

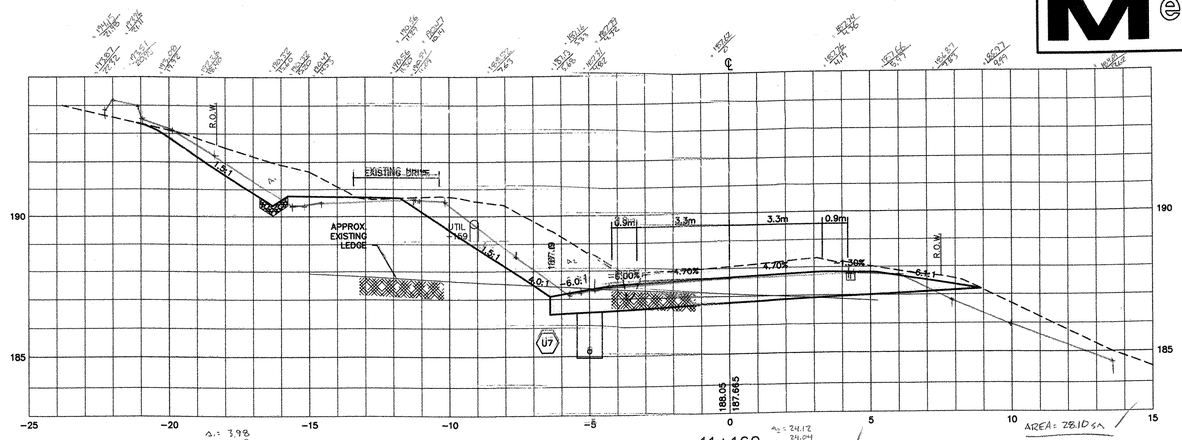
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 66 OF 116

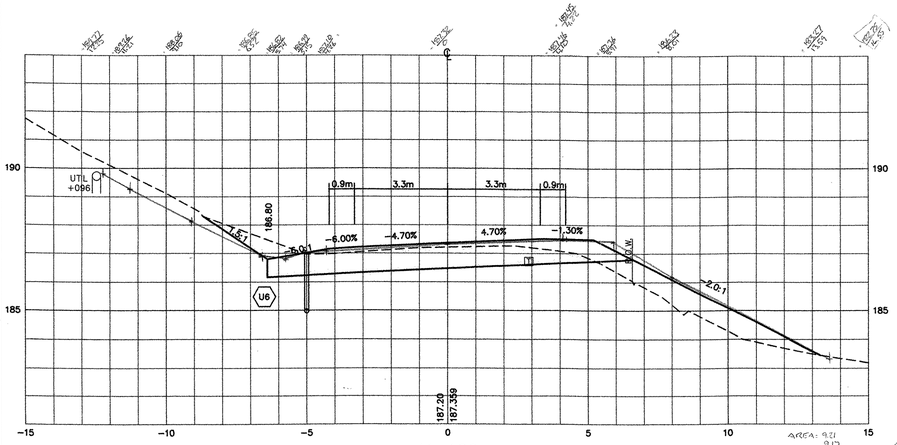
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

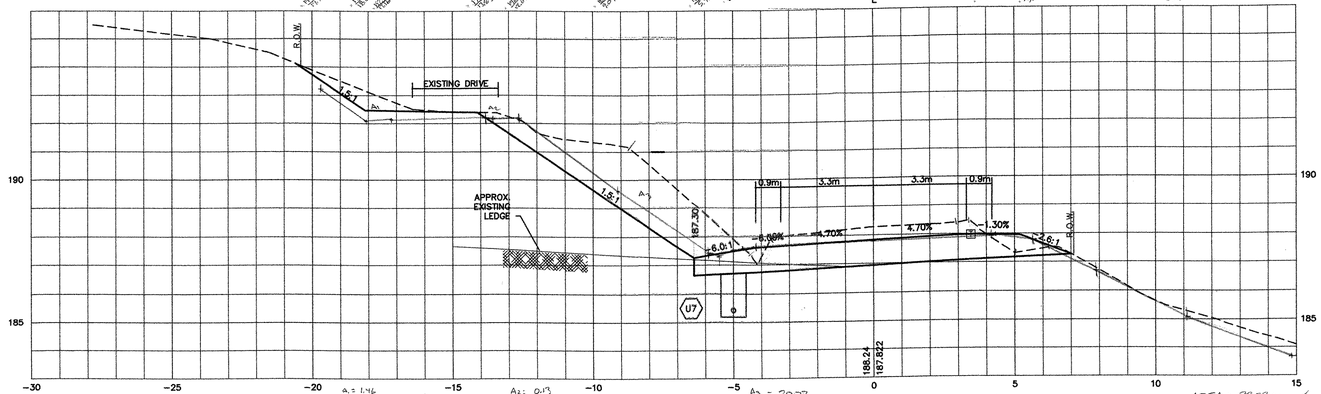
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

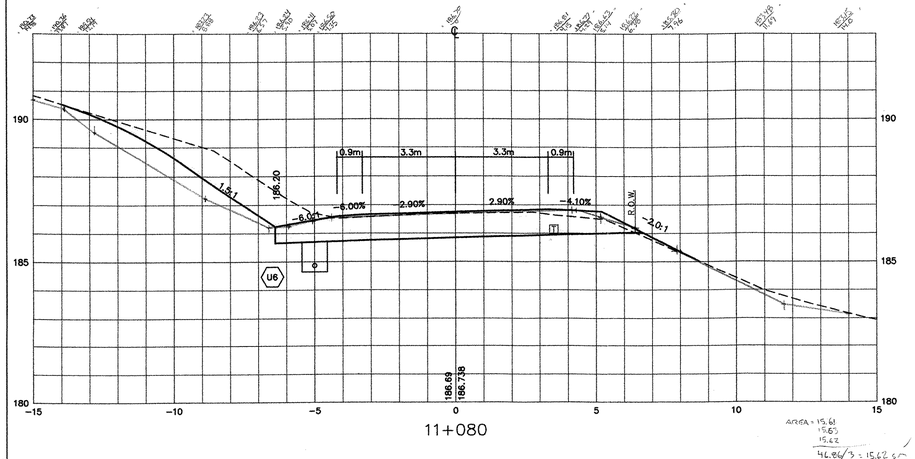
THE LOUIS BERGER GROUP, INC.

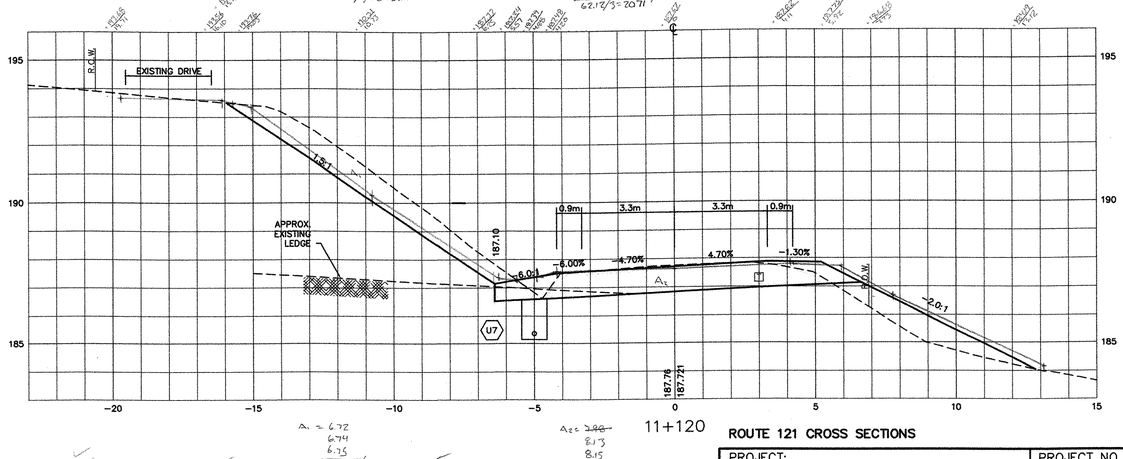
Metric











ROUTE 121 CROSS SECTIONS

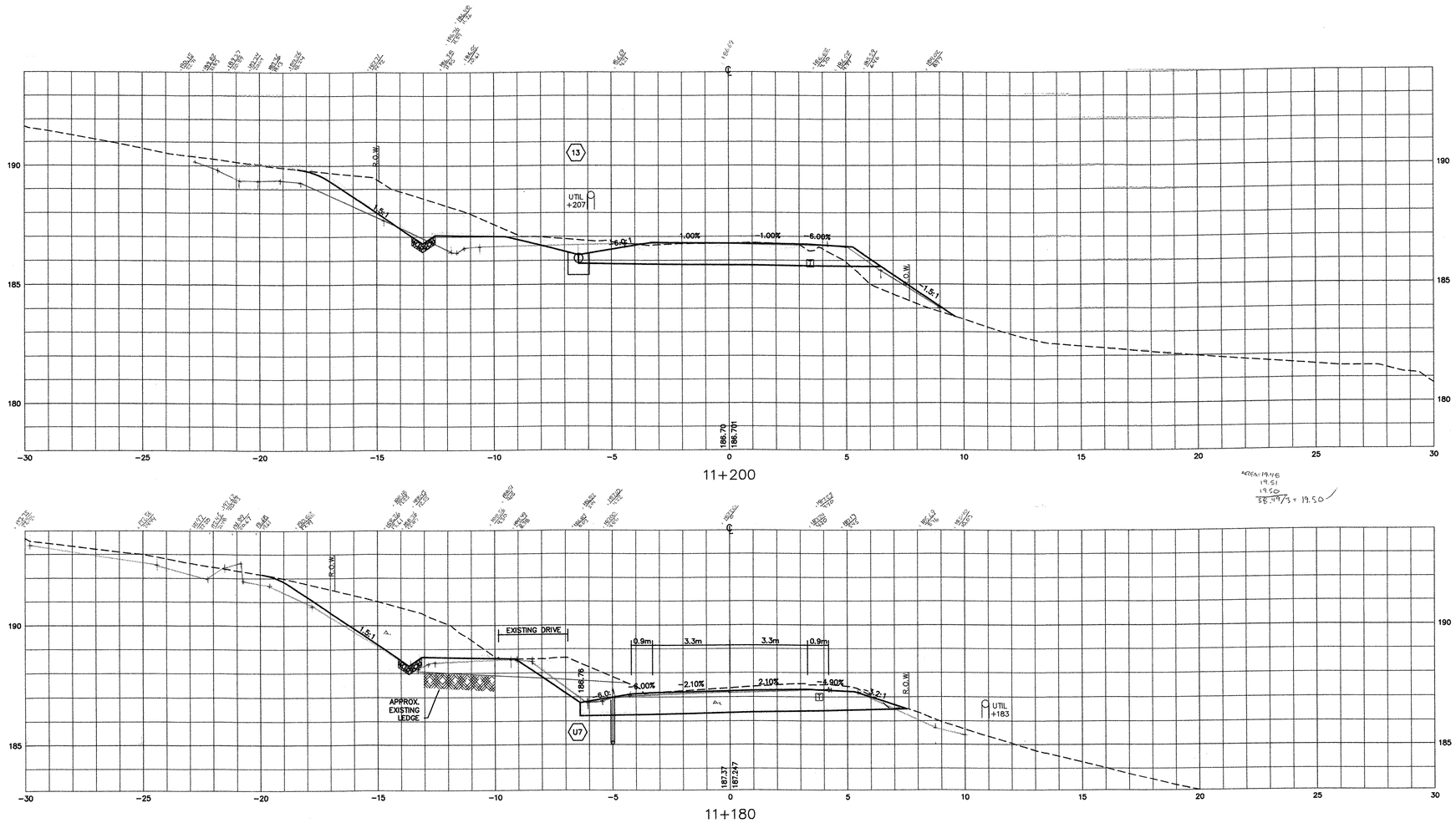
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 67 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

THE LOUIS BERGER GROUP, INC.

Metric



AREA: 19.46
19.51
19.50
58.99/3 = 19.50

A: 11.60
11.60
11.58
34.78/3 = 11.59

A: 14.40
14.38
14.40
43.18/3 = 14.39

AREA: 27.98

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

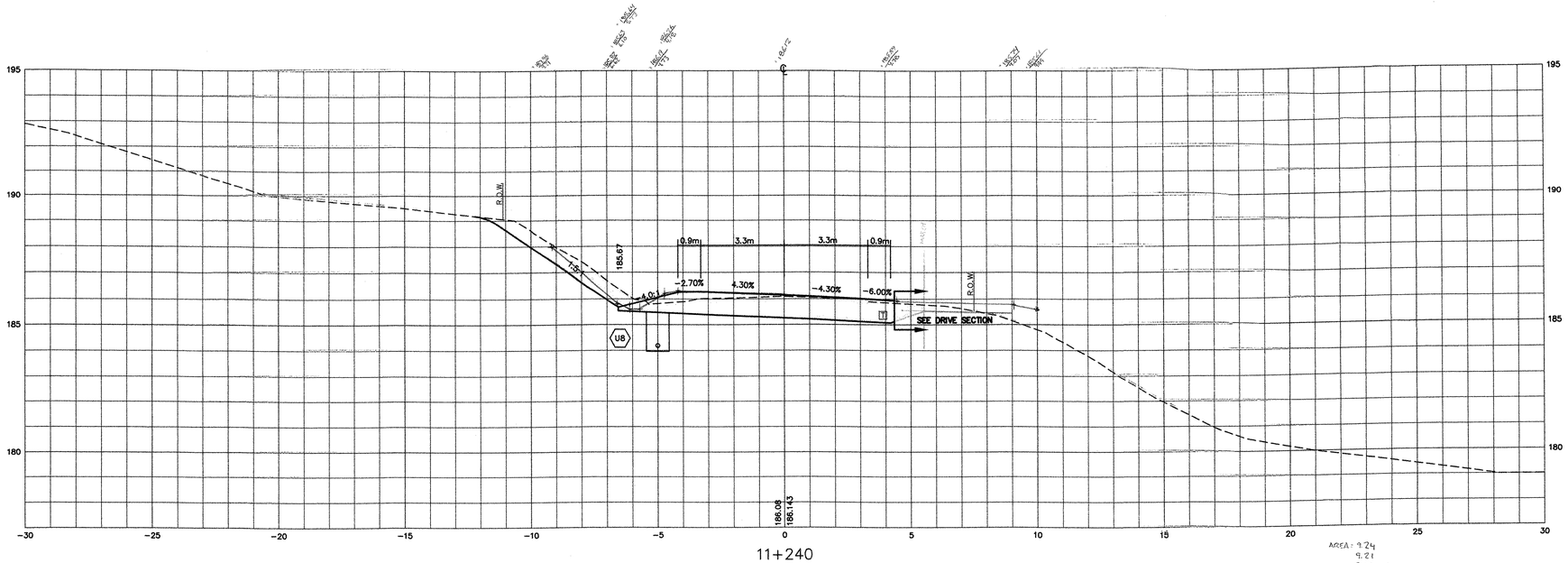
V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2A.DWG

THE LOUIS BERGER GROUP, INC.

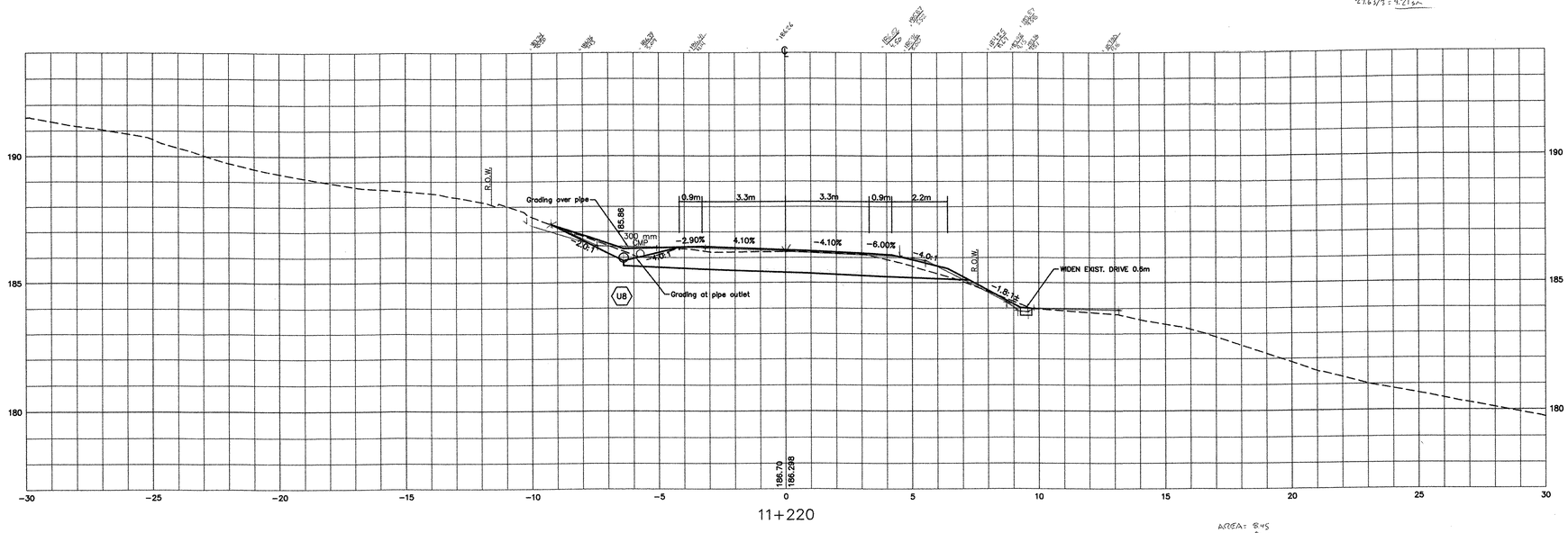
ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 68 OF 116

Metric



AREA: 9.24
9.21
9.18
27.63/3 = 9.21sm



AREA: 8.45
8.44
8.47
25.36/3 = 8.45sm

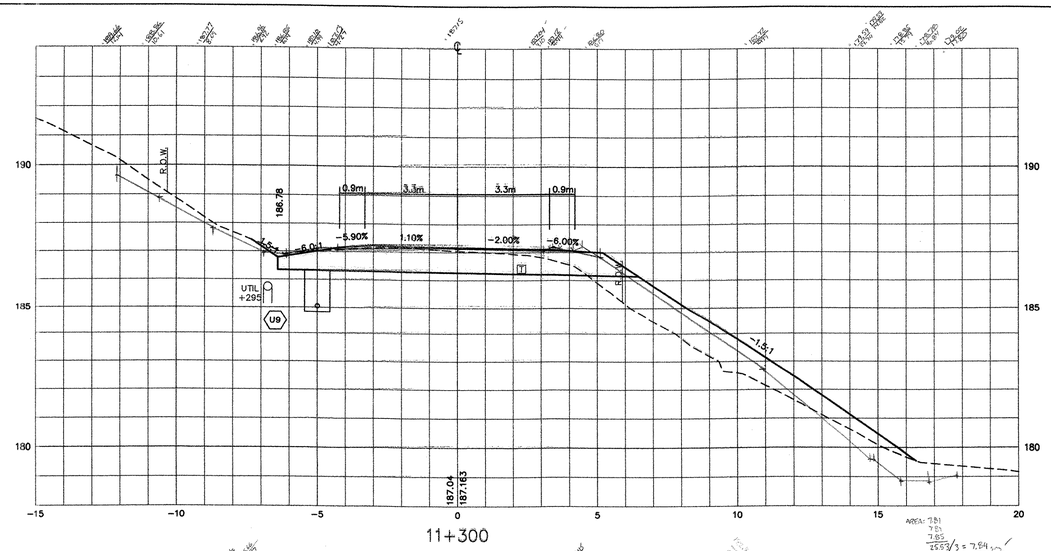
ROUTE 121 CROSS SECTIONS

PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 69 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

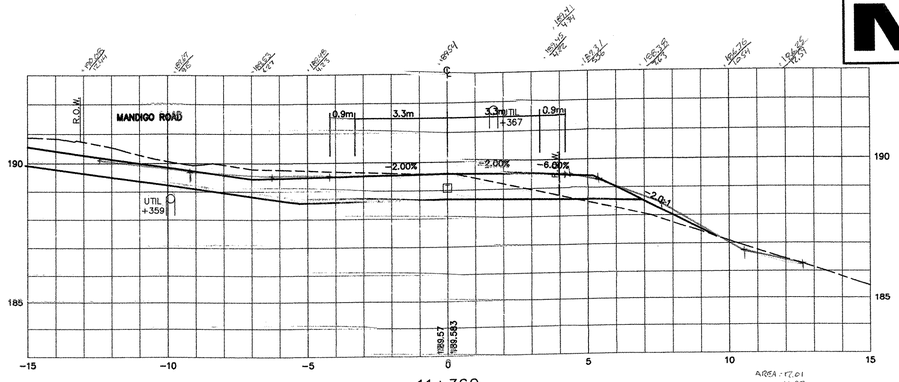
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

THE LOUIS BERGER GROUP, INC.



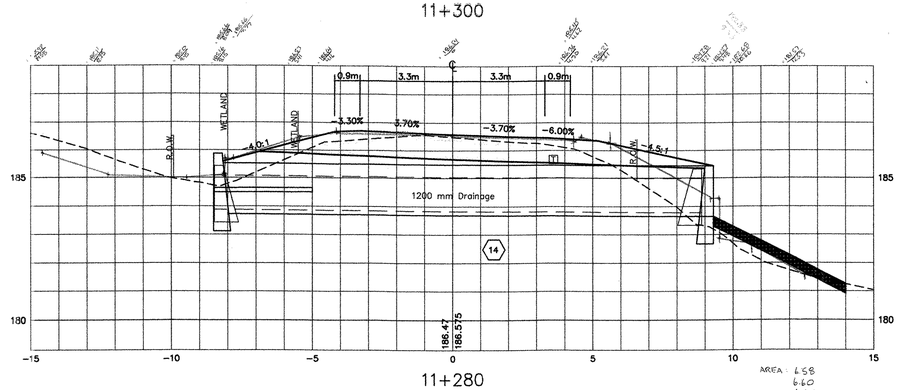
11+300

AREA: 7.81
7.51
7.85
23.57/3 = 7.84sm



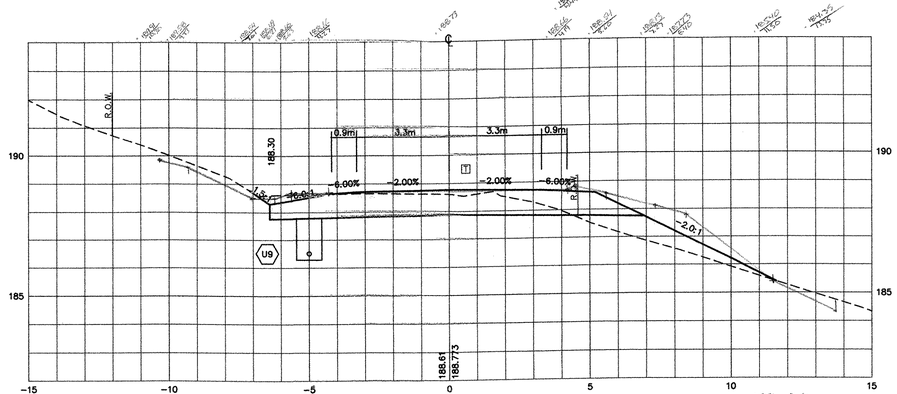
11+360

AREA: 12.01
11.93
12.05
35.99/3 = 12.0sm



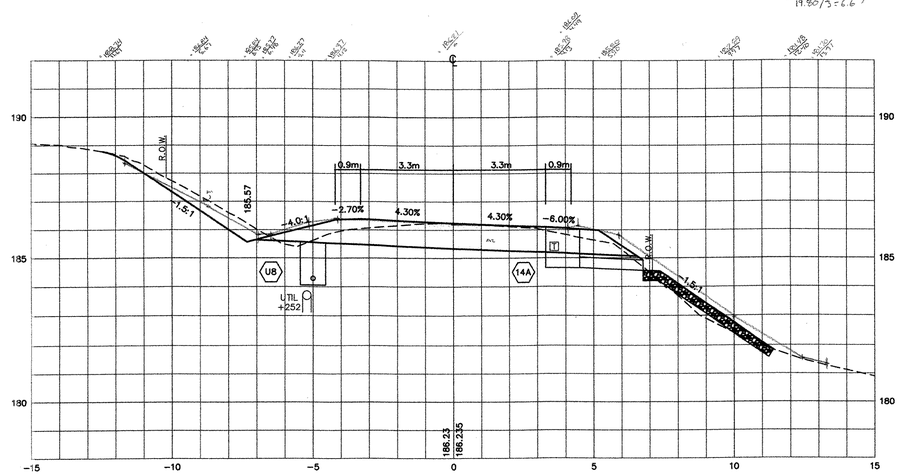
11+280

AREA: 6.58
6.60
6.62
19.80/3 = 6.6



11+340

AREA: 7.69
7.68
7.70
23.07/3 = 7.69sm

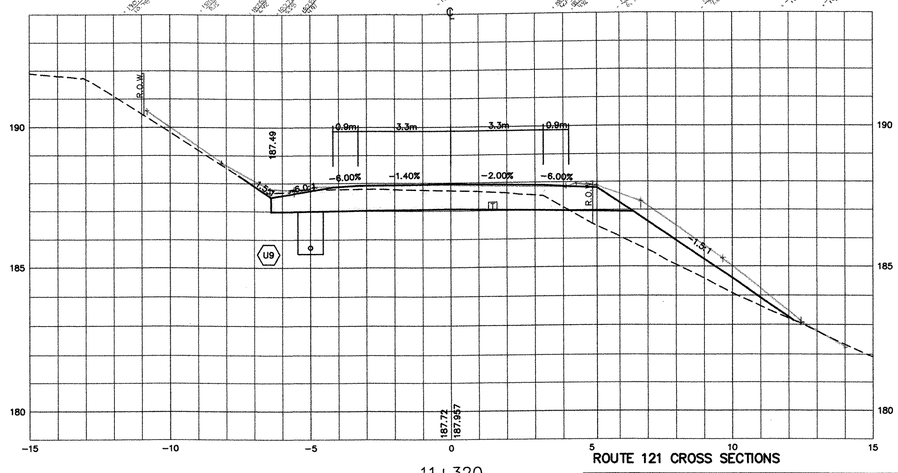


11+260

A1: 1.06
1.08
1.10
3.24/3 = 1.08sm

A1: 7.30
7.24
7.33
21.87/3 = 7.29sm

AREA: 8.37sm



11+320

AREA: 7.08
7.03
6.98
21.09/3 = 7.02sm

ROUTE 121 CROSS SECTIONS

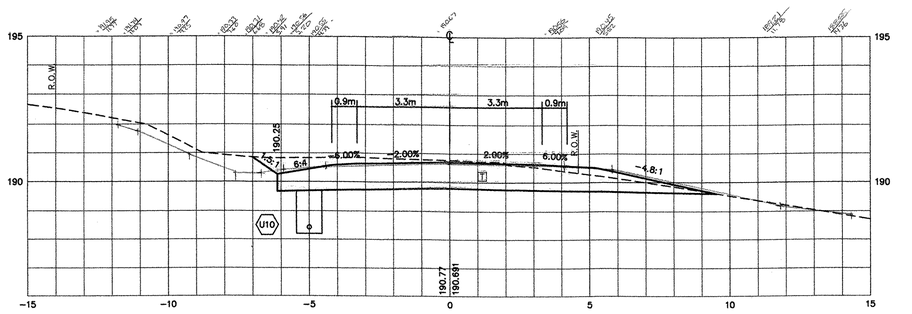
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 70 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

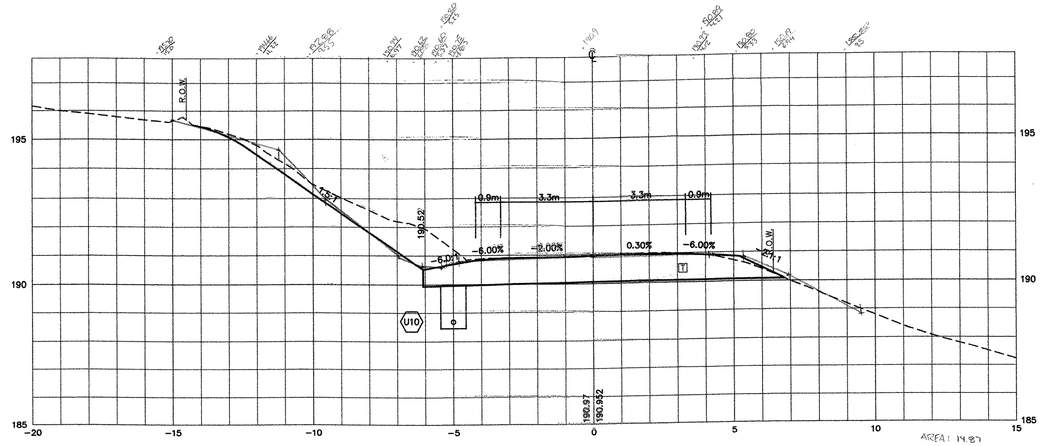
THE LOUIS BERGER GROUP, INC.

Metric



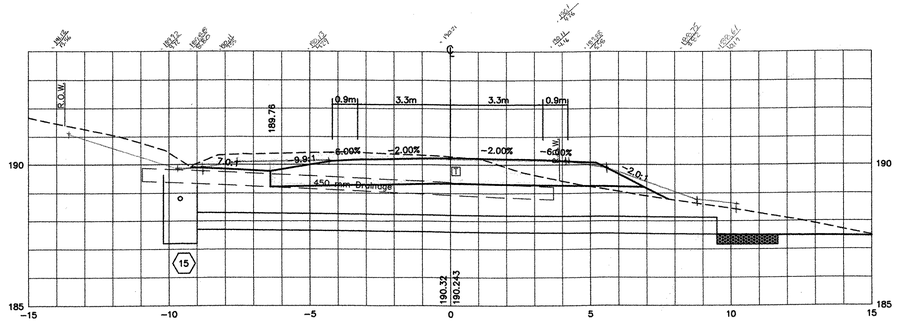
11+400

AREA: 12.74
12.79
12.76
38.29/3: 12.76m²



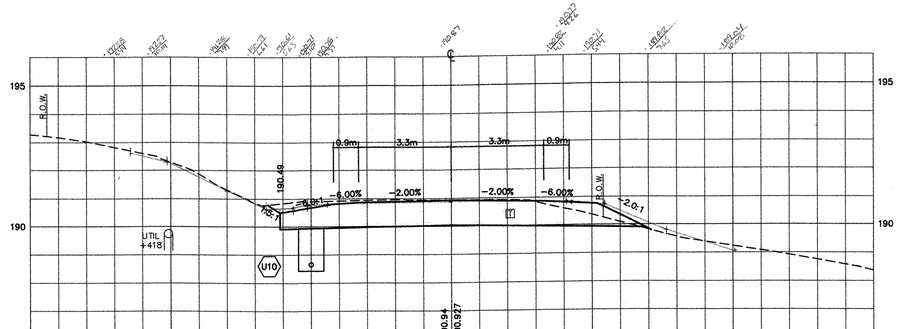
11+440

AREA: 14.87
14.81
14.77
44.45/3: 14.82m²



11+380

AREA: 10.38
10.40
10.36
31.14/3: 10.38m²



11+420

AREA: 10.15
10.20
10.20
30.55/3: 10.18m²

PLOT DEF 3/15/06

DEF 3/29/06

4/1/06

ROUTE 121 CROSS SECTIONS

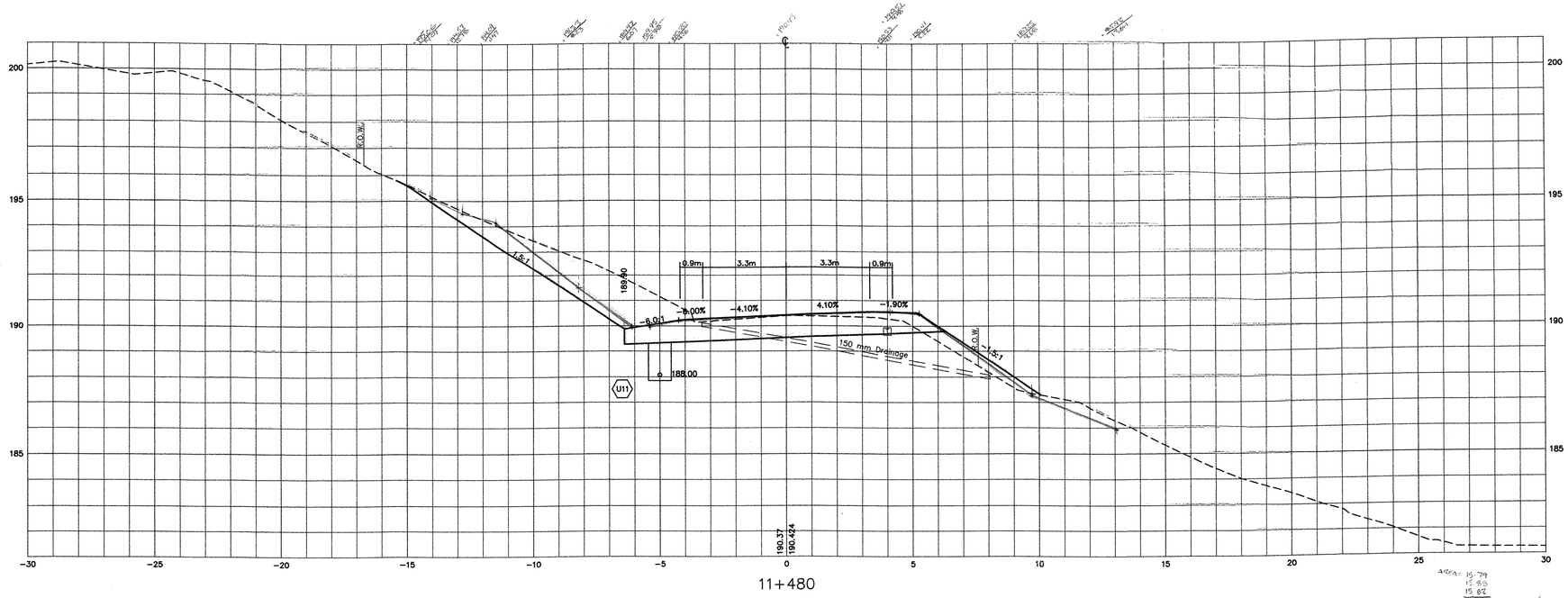
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 71 OF 116

THE LOUIS BERGER GROUP, INC.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

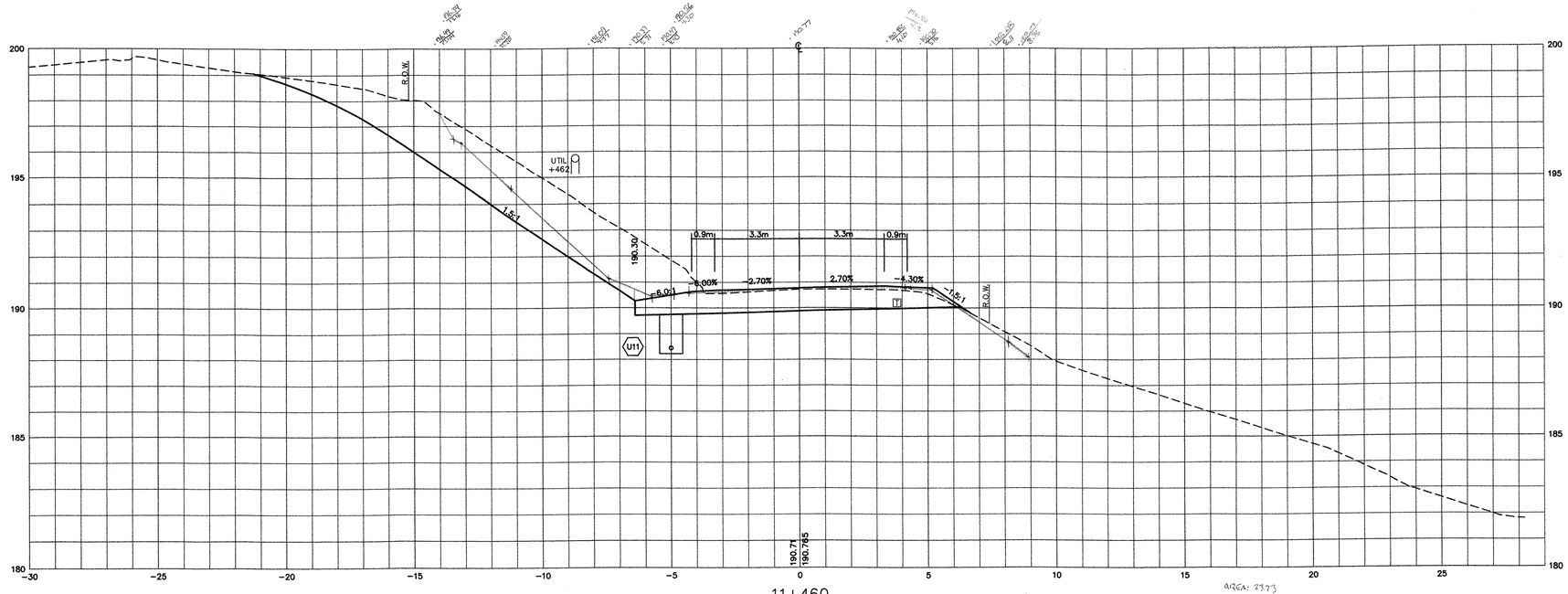
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

Metric



11+480

AREA: 15.79
15.80
15.82
47.49/3 = 15.83



11+460

AREA: 23.73
23.67
23.72
71.12/3 = 23.71 sq

ROUTE 121 CROSS SECTIONS

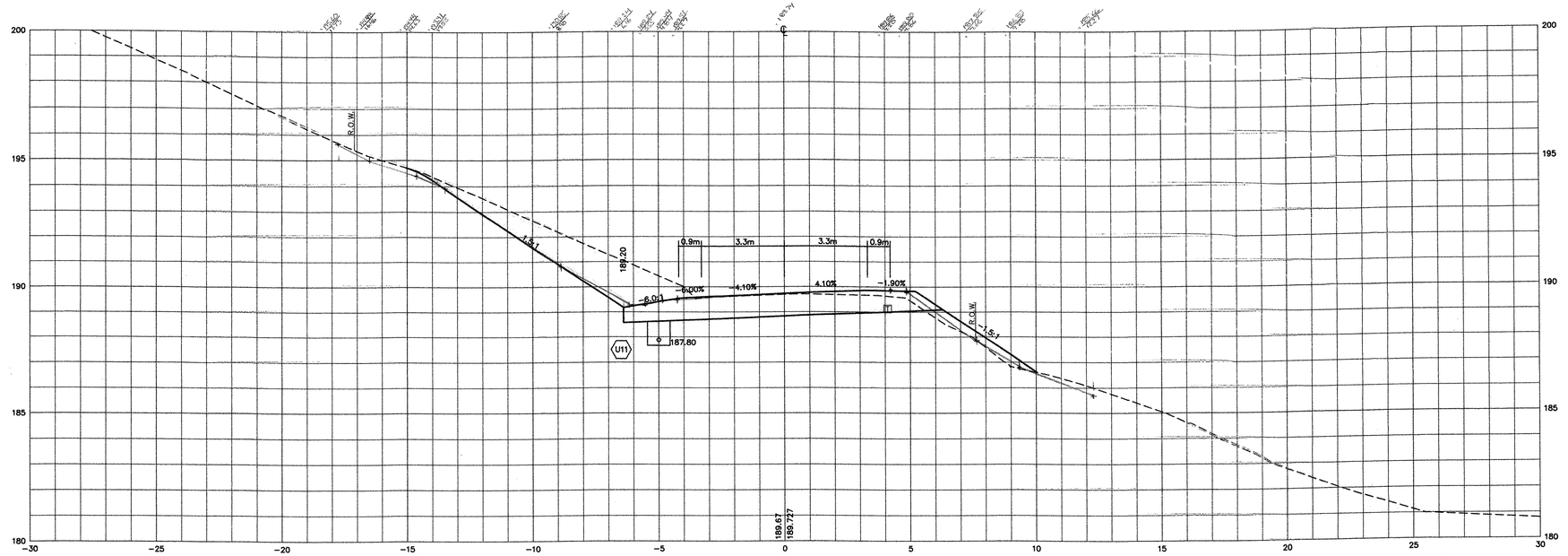
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 72 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

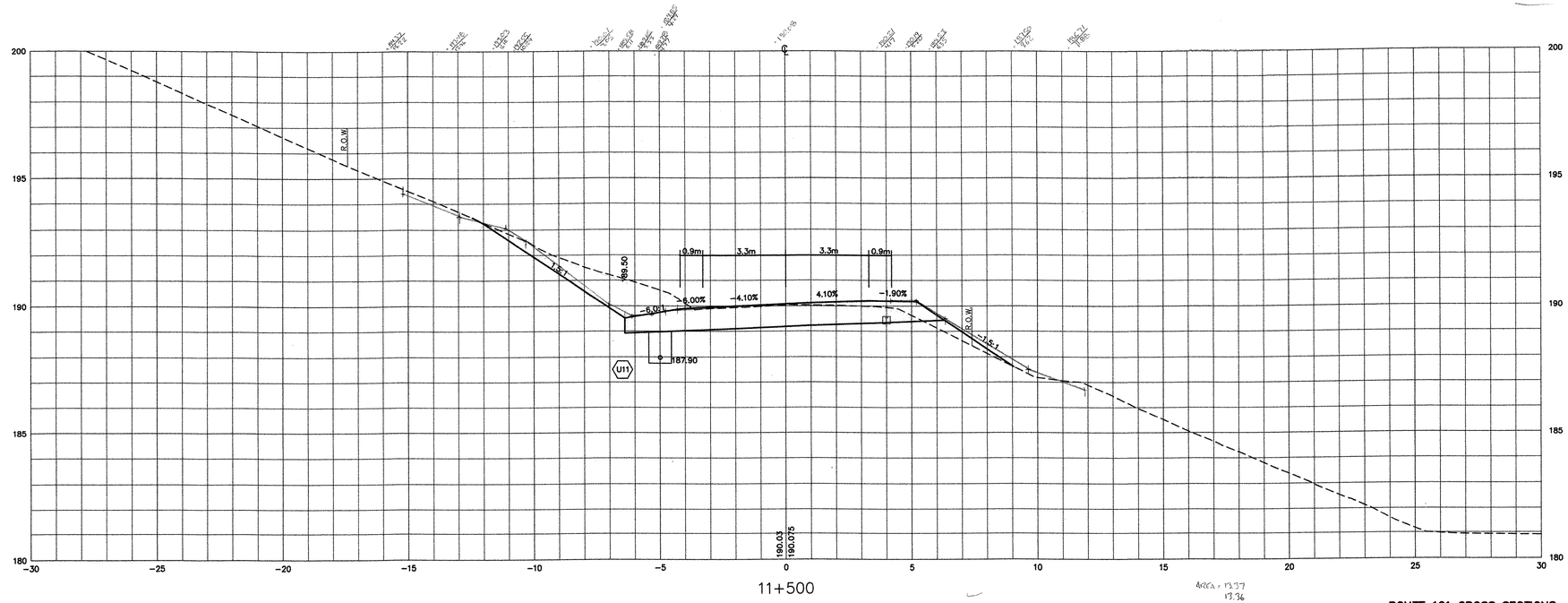
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

THE LOUIS BERGER GROUP, INC.

Metric



AREA = 18.57
18.56
18.60
55.73/3 = 18.58 sm



AREA = 13.37
13.36
13.42
40.15/3 = 13.38 sm

ROUTE 121 CROSS SECTIONS

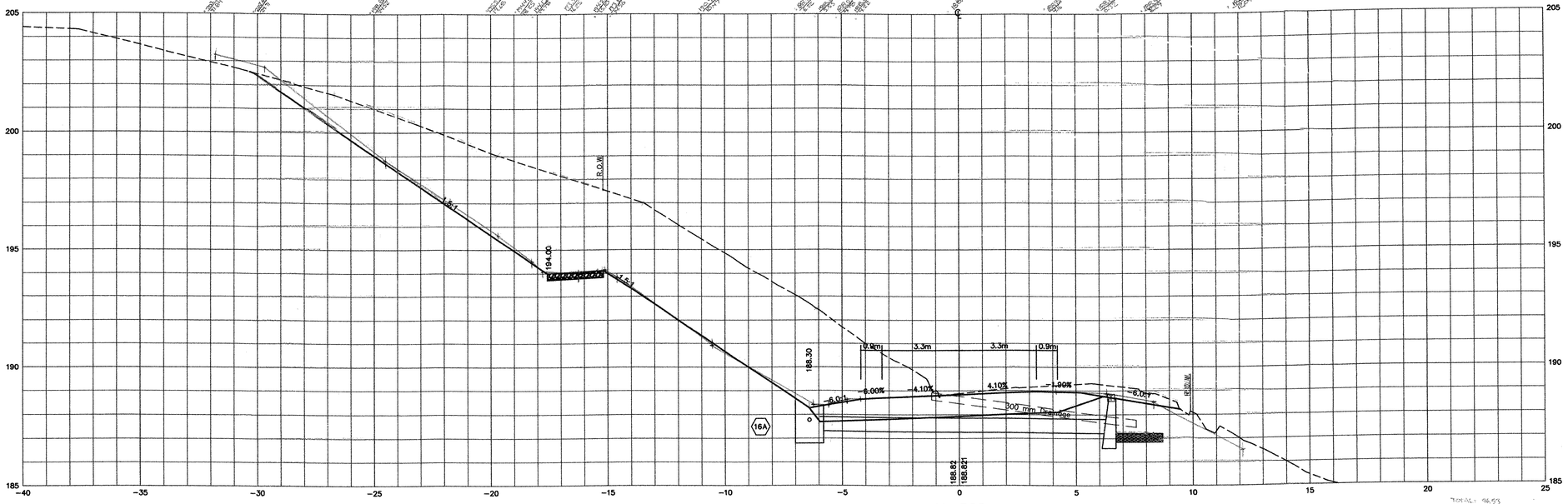
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 73 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

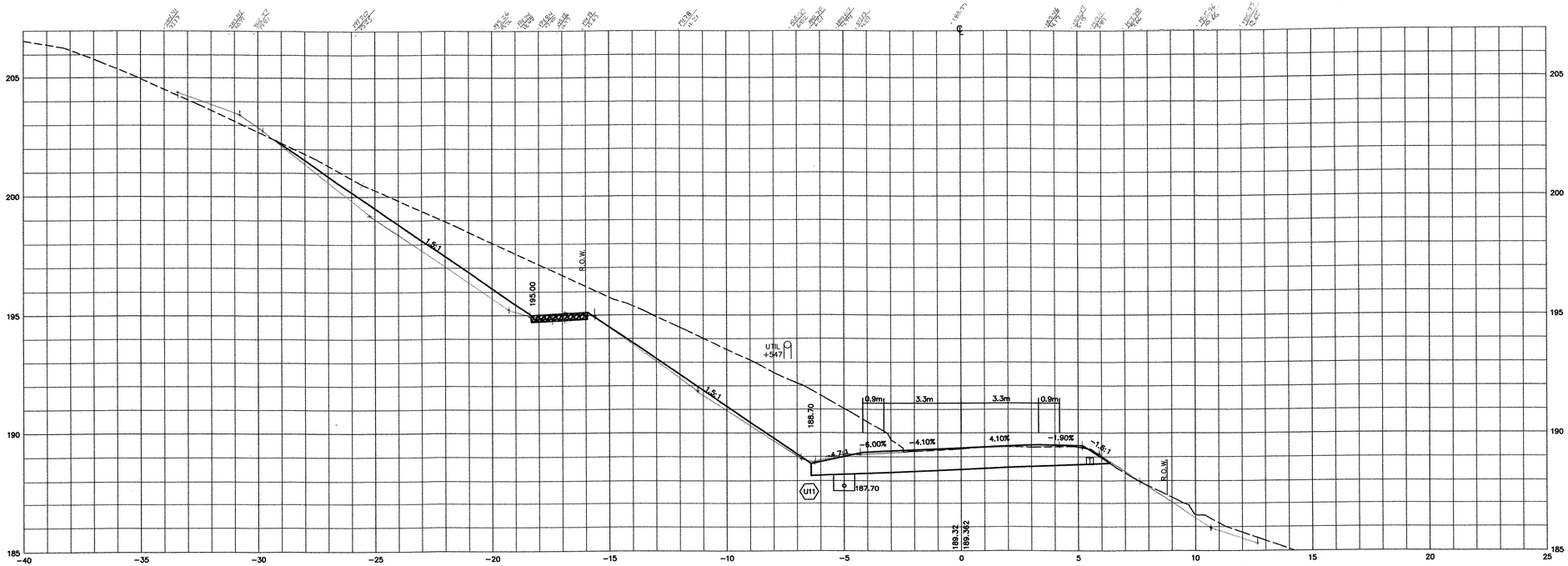
THE LOUIS BERGER GROUP, INC.

Metric



11+560

TOTAL: 96.53
96.60
96.66
289.79/3 = 96.60



11+540

AREA: 52.14
52.16
52.19
156.48/3 = 52.160

ROUTE 121 CROSS SECTIONS

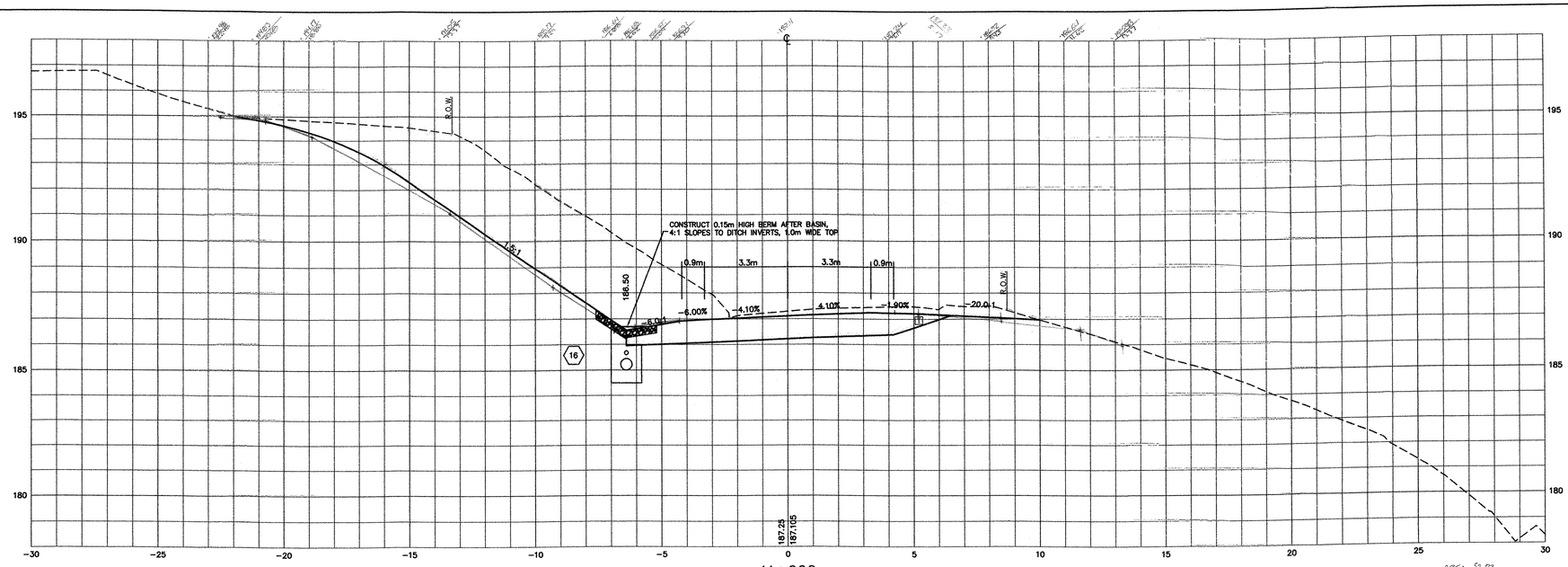
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 74 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

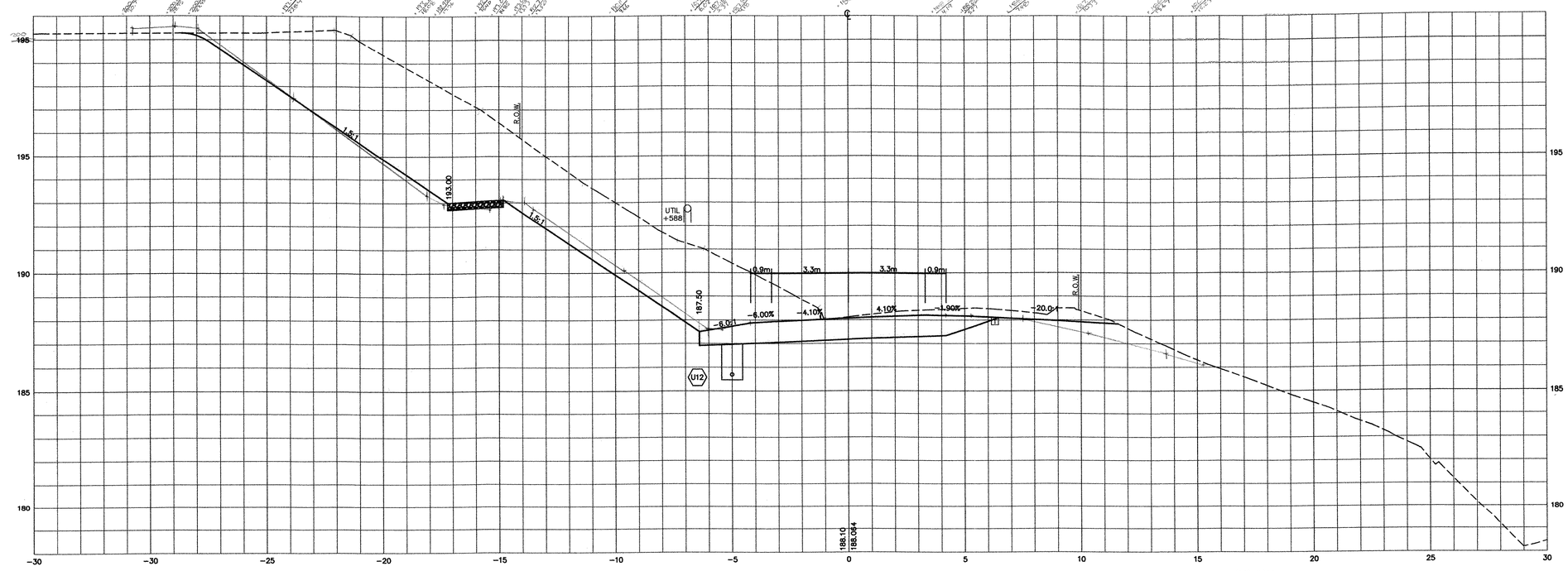
THE LOUIS BERGER GROUP, INC.

Metric



11+600

AREA: 53.83
53.86
53.87
161.56/3 = 53.85



11+580

AREA: 90.42
90.47
90.45
271.34/3 = 90.43m

ROUTE 121 CROSS SECTIONS

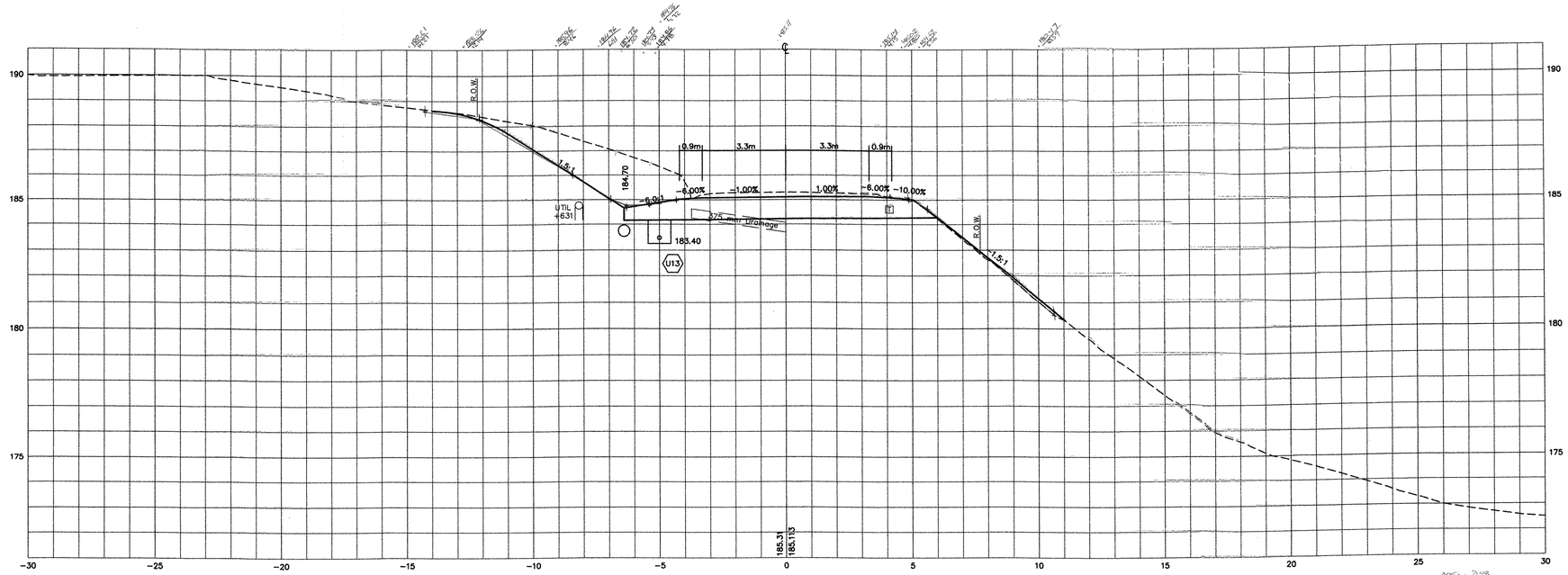
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 75 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

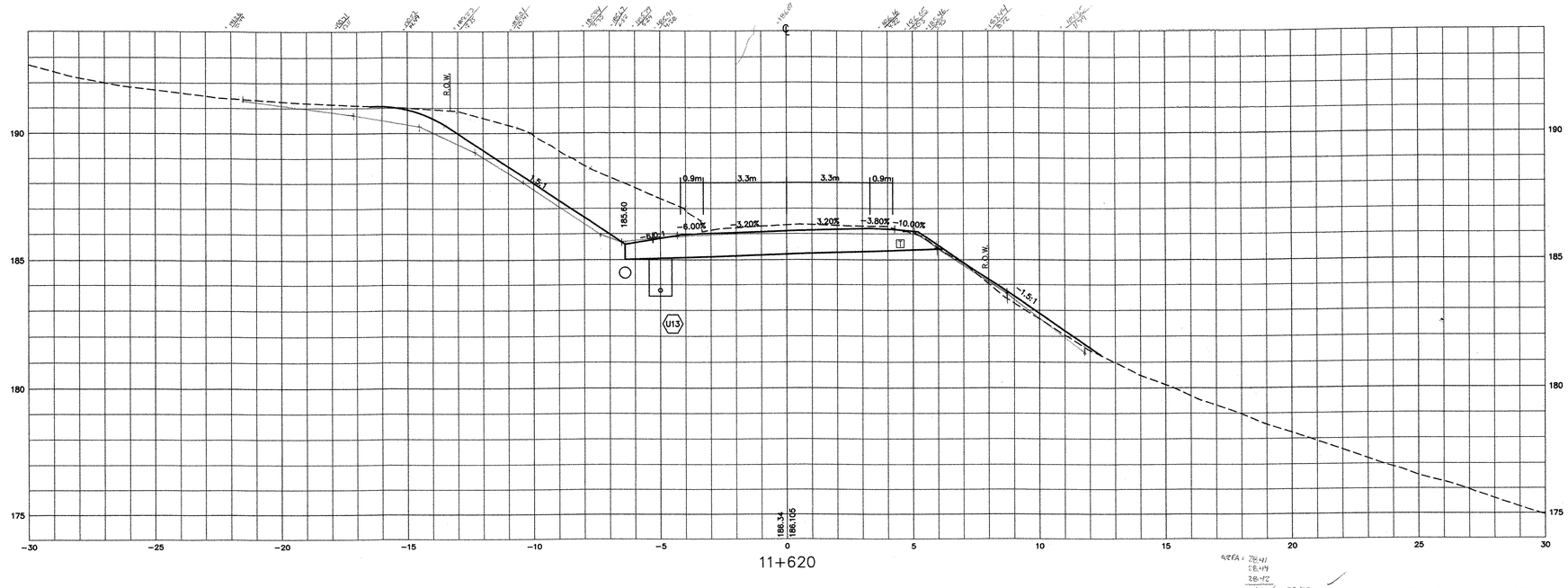
THE LOUIS BERGER GROUP, INC.

Metric



11+640

AREA = 21.48
21.52
21.56
64.56/3 = 21.52 sq m



11+620

AREA = 28.41
28.44
28.42
85.27/3 = 28.42 sq m

ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 76 OF 116

DATUM

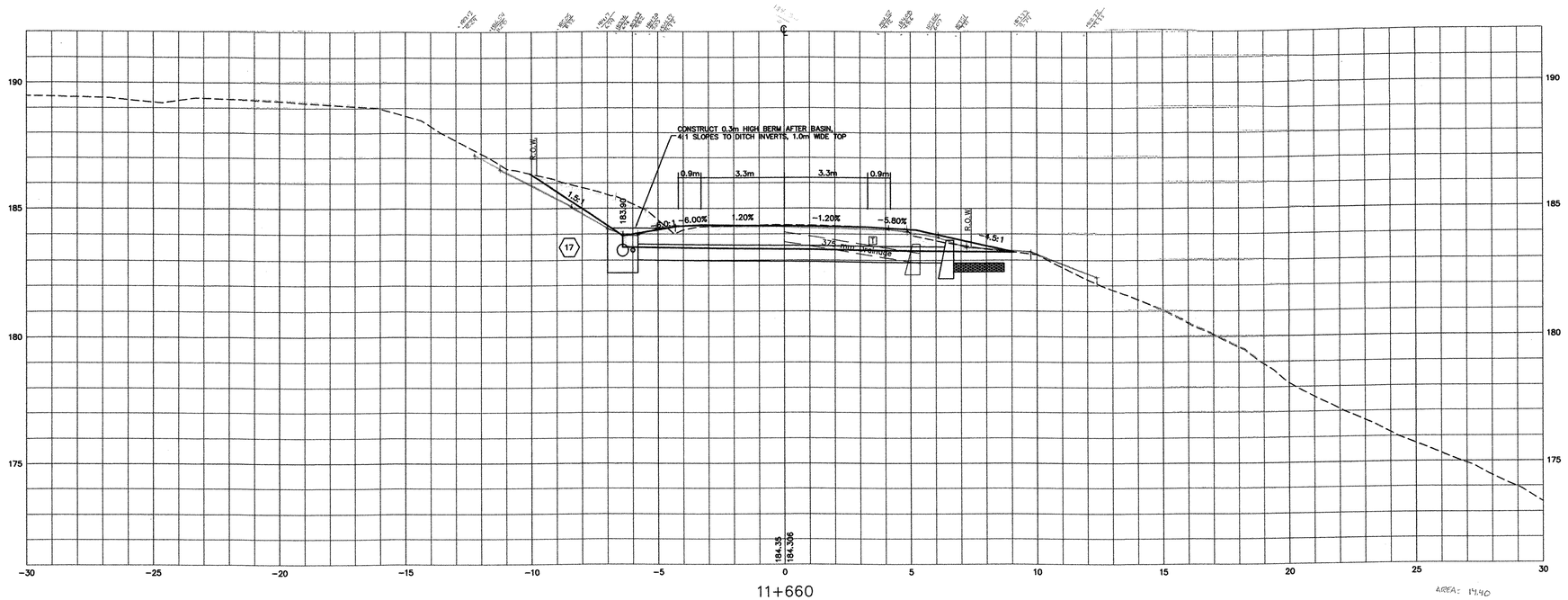
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

THE LOUIS BERGER GROUP, INC.

Metric



AREA: 14.40
14.36
14.38
43.14/3 = 14.38 sq m

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2B.DWG

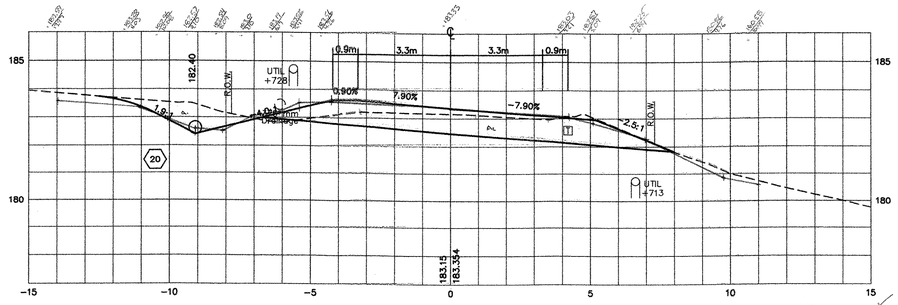
THE LOUIS BERGER GROUP, INC.

ROUTE 121 CROSS SECTIONS

2/15/06

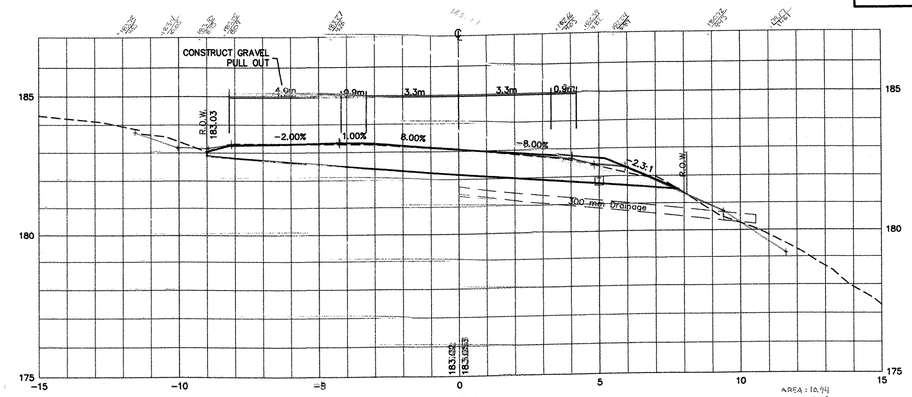
PROJECT: **GRAFTON-ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 77 OF 116

Metric



11+720

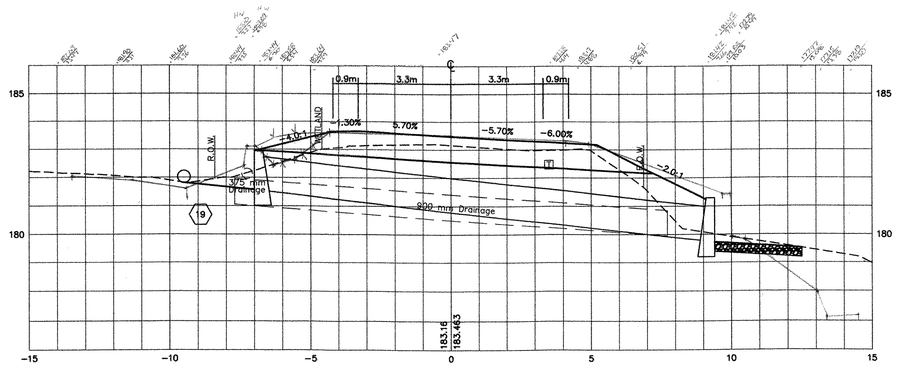
AREA: 10.03 sq m



11+780

AREA: 10.94, 11.05, 11.07

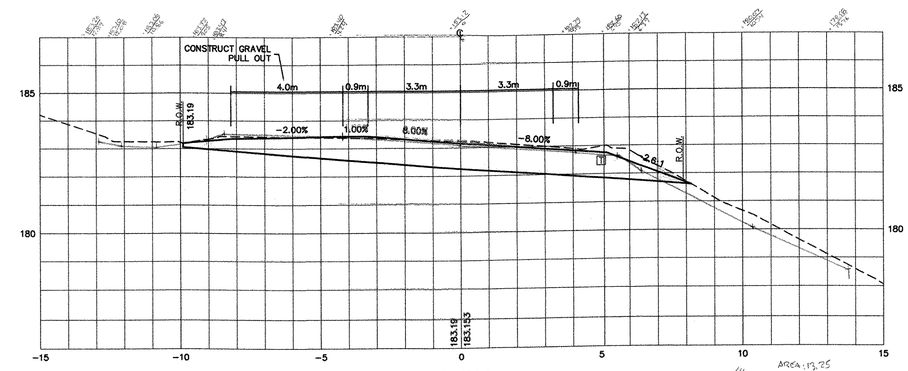
33.06/3 = 11.02 sq m



11+700

AREA: 5.60, 5.63, 5.55

16.78/3 = 5.59 sq m

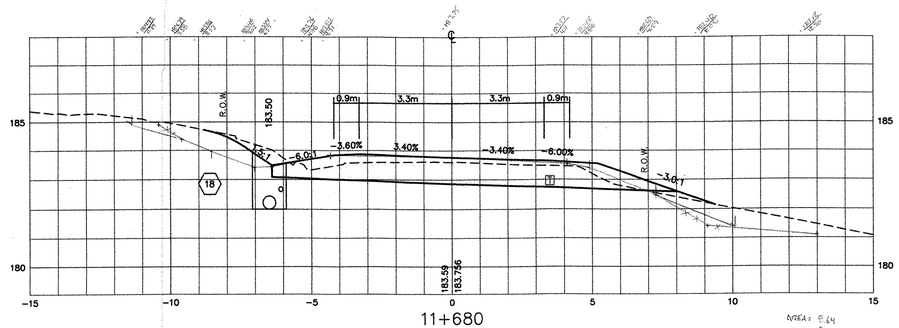


11+760

AREA: 13.25, 13.26, 13.16

39.67/3 = 13.22 sq m

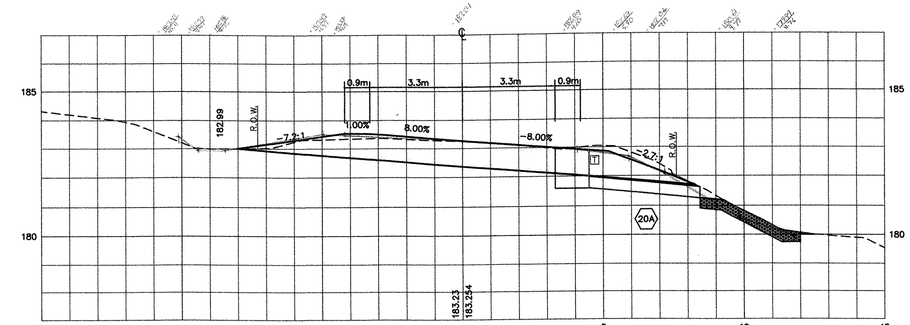
14.26, 13.25, 13.96, 14.04 sq m



11+680

AREA: 8.64, 8.69, 8.68

26.01/3 = 8.67 sq m



11+740

AREA: 11.62, 11.58, 11.62

34.83/3 = 11.61 sq m

ROUTE 121 CROSS SECTIONS

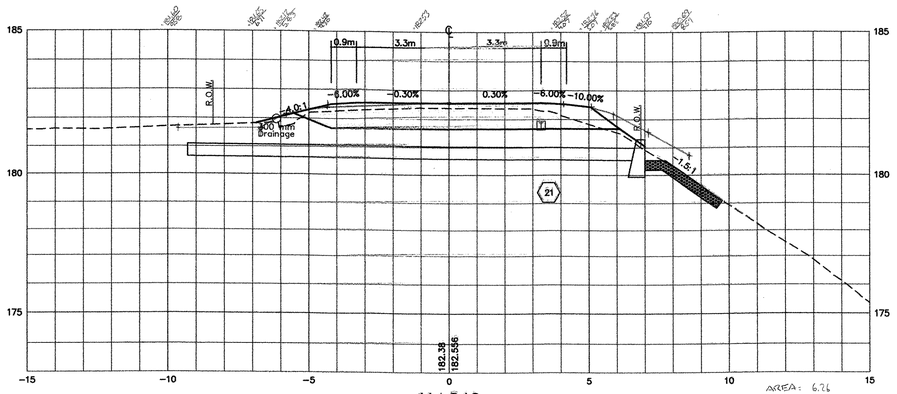
DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2B.DWG

THE LOUIS BERGER GROUP, INC.

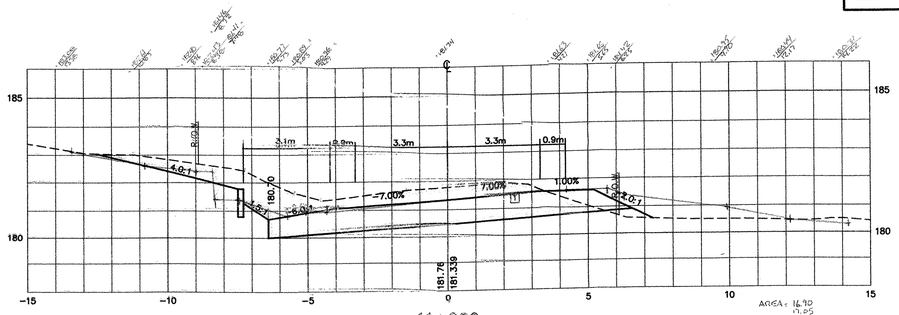
PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 78 OF 116

Metric



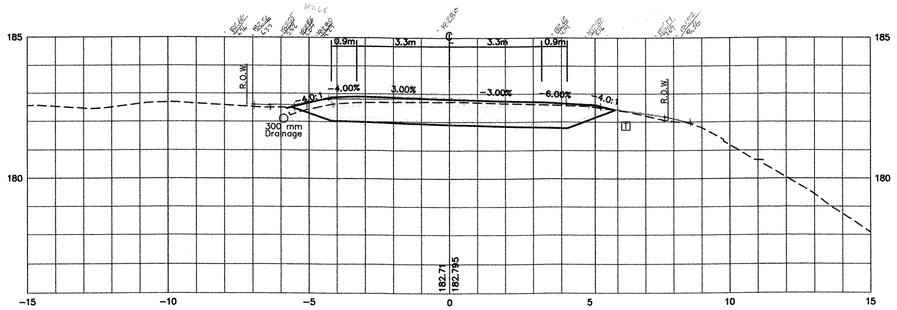
11+840

AREA: 6.76, 6.75, 6.75
19.76/3 = 6.75 sq m



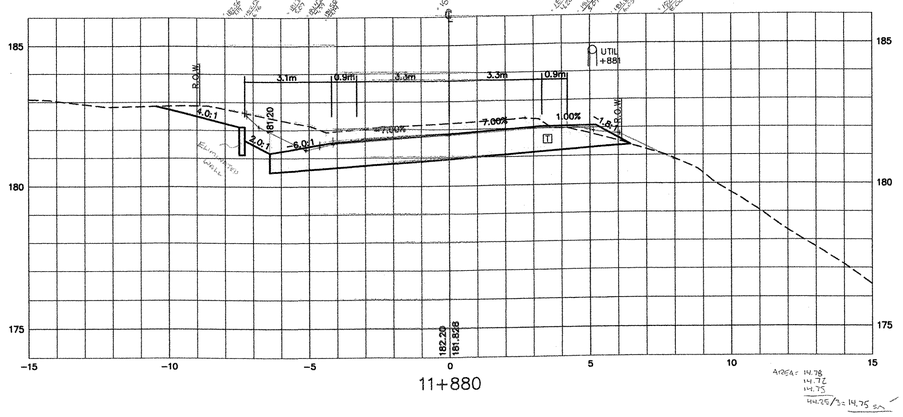
11+900

AREA = 16.70, 17.05, 16.71
50.86/3 = 16.95 sq m



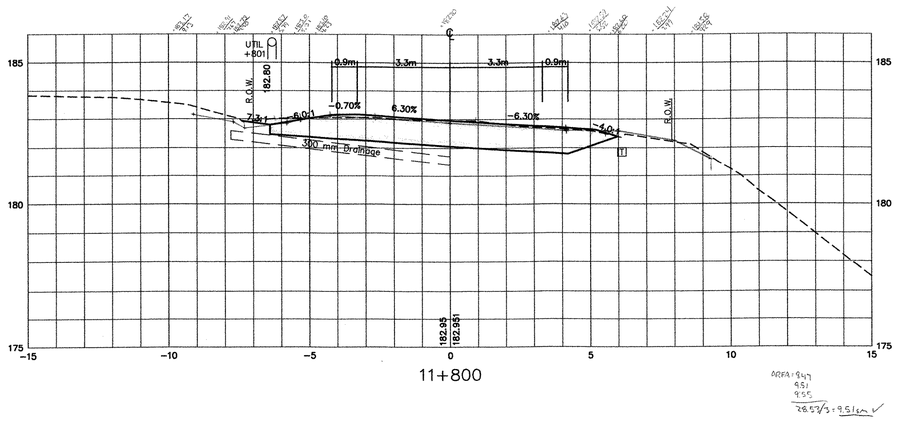
11+820

AREA: 7.26, 7.21, 7.28
21.75/3 = 7.25 sq m



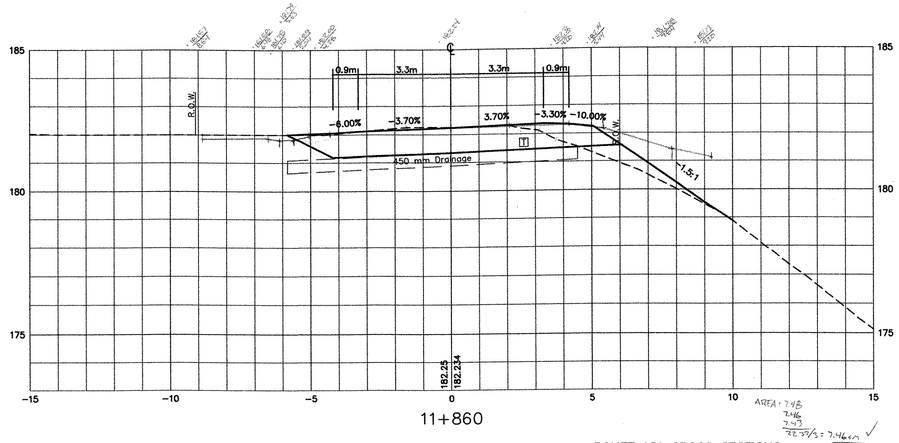
11+880

AREA = 14.78, 14.72, 14.75
44.25/3 = 14.75 sq m



11+800

AREA: 9.47, 9.51, 9.55
28.53/3 = 9.51 sq m



11+860

AREA: 7.48, 7.46, 7.47
22.39/3 = 7.46 sq m

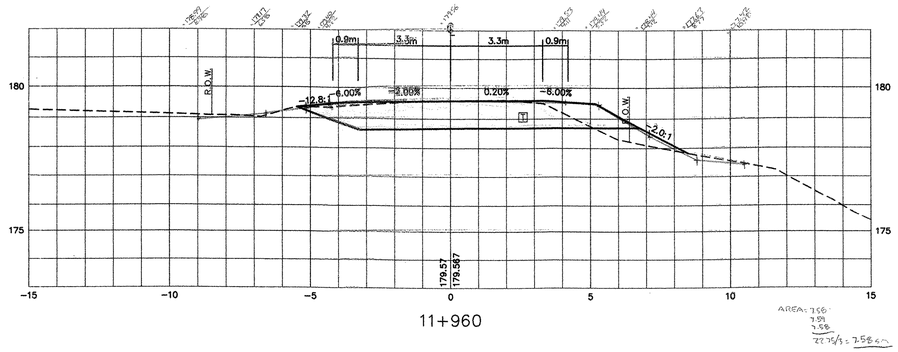
ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 79 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

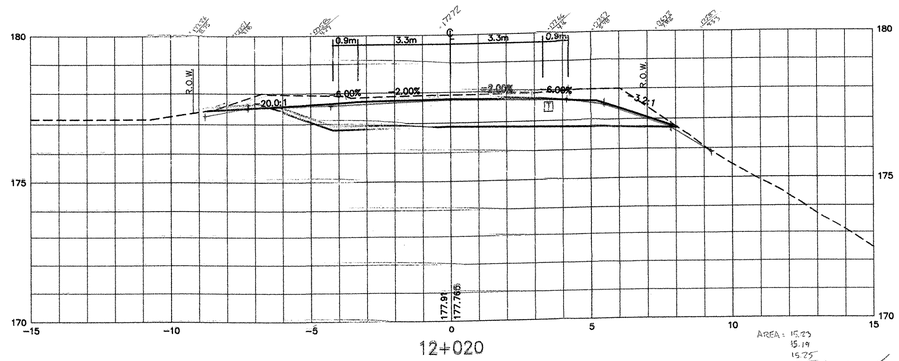
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

THE LOUIS BERGER GROUP, INC.



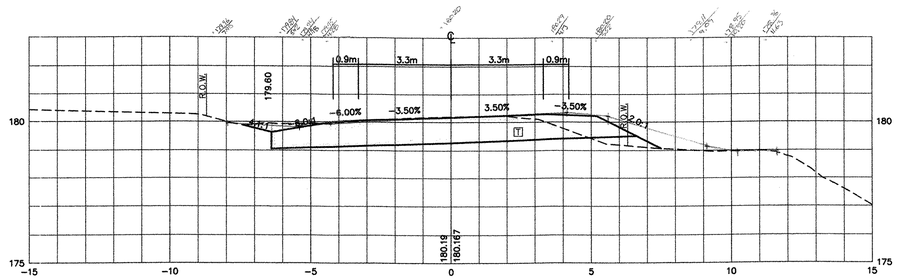
11+960

AREA: 7.56
7.91
7.58
22.75/3 = 7.58 sq m



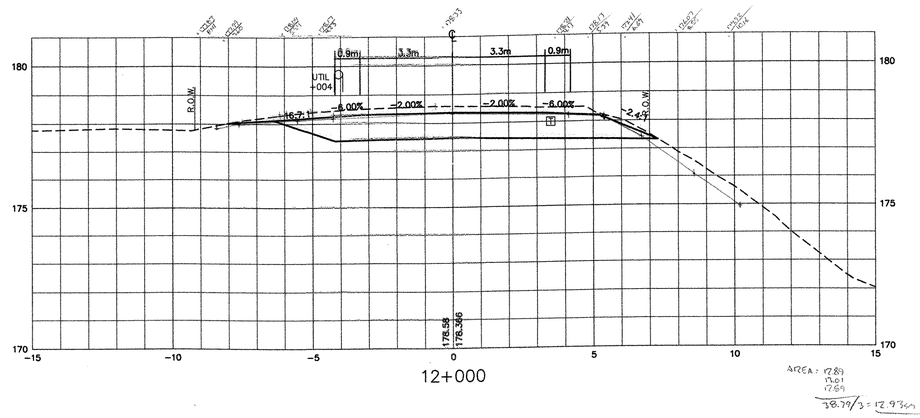
12+020

AREA: 15.23
15.19
15.25
45.67/3 = 15.22 sq m



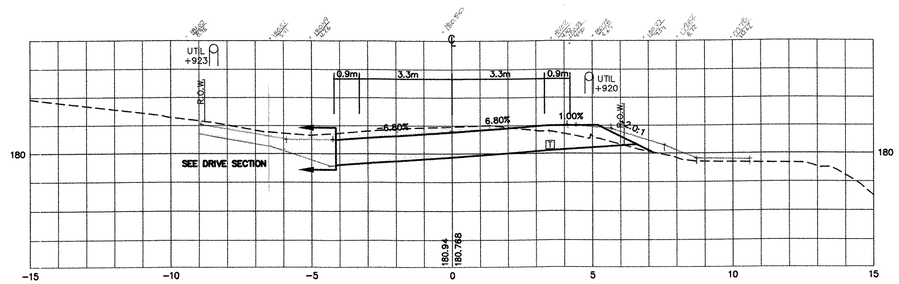
11+940

AREA: 8.79
8.81
8.15
26.75/3 = 8.76 sq m



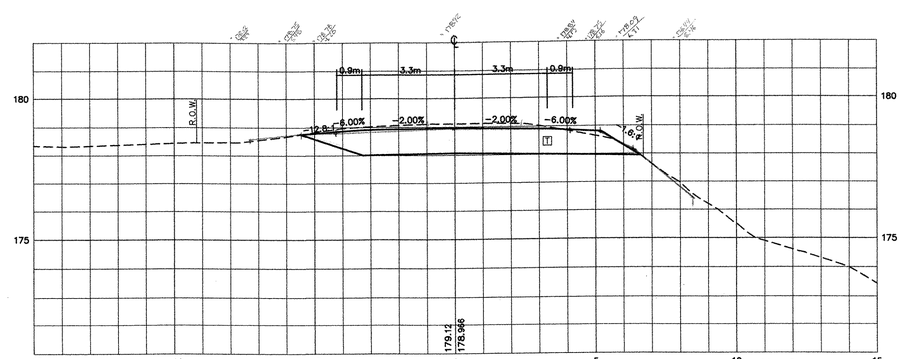
12+000

AREA: 17.89
17.01
17.69
38.79/3 = 12.93 sq m



11+920

AREA: 10.35
10.70
10.76
32.21/3 = 10.74 sq m



11+980

AREA: 9.74
9.78
9.75
29.29/3 = 9.76 sq m

ROUTE 121 CROSS SECTIONS

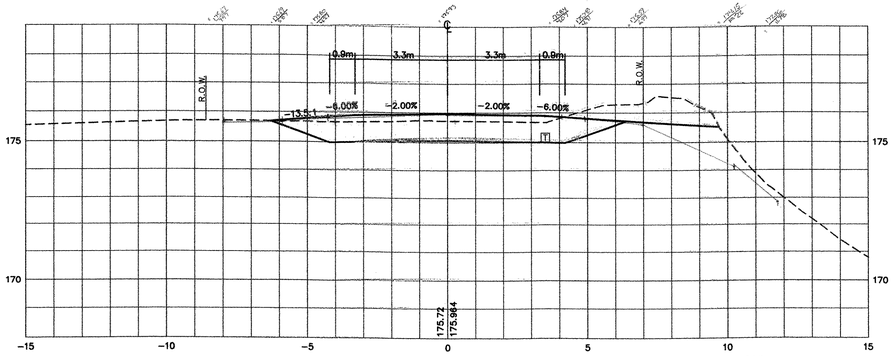
PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 80 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2B.DWG

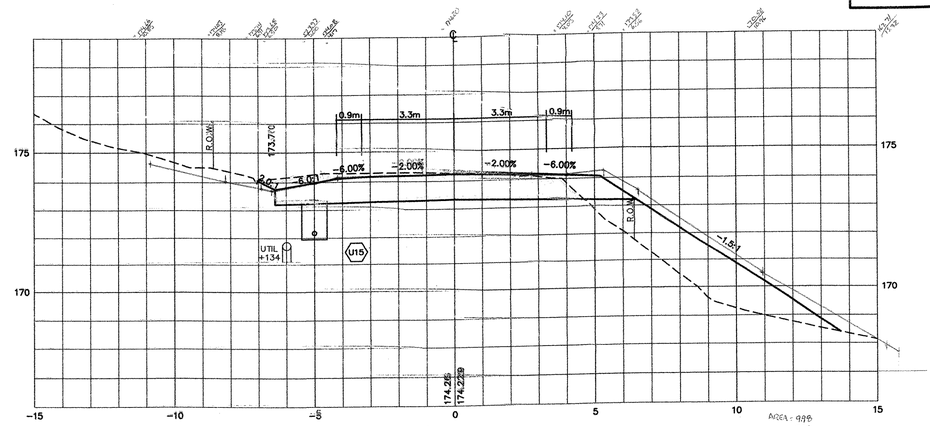
THE LOUIS BERGER GROUP, INC.

Metric



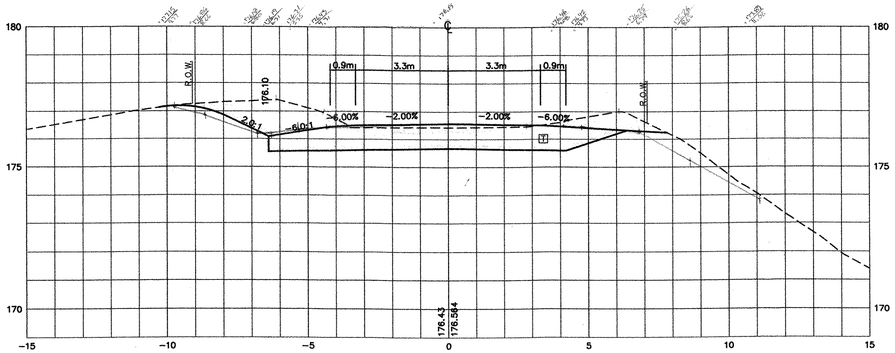
12+080

AREA=10.76
10.15
10.32
32.25/3 = 10.75m²



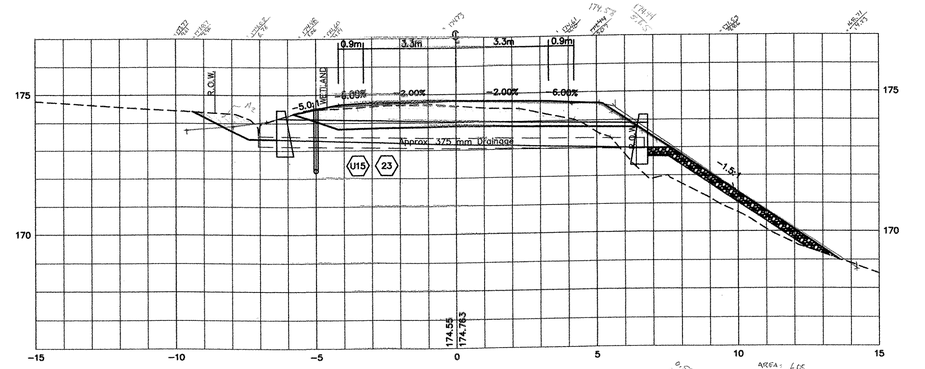
12+140

AREA = 9.98
9.96
9.98
29.92/3 = 9.97m²



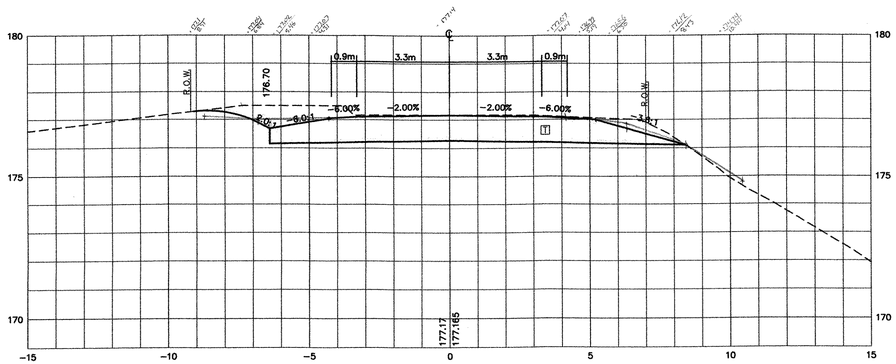
12+060

AREA= 14.95
14.36
14.45
43.24/3 = 14.41m²



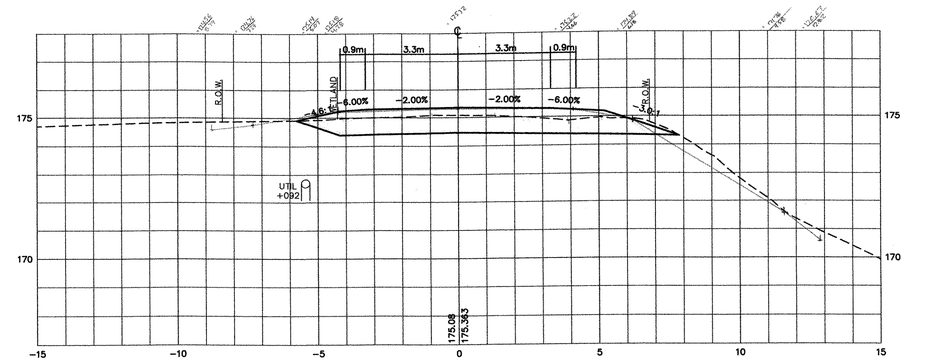
12+120

AREA: 6.05
6.01
6.05
18.11/3 = 6.04m + 0.58m
= 6.62m²



12+040

AREA: 14.53
14.53
14.52
43.58/3 = 14.53m²



12+100

AREA: 6.71
6.65
6.67
20.03/3 = 6.68m²

ROUTE 121 CROSS SECTIONS

PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 81 OF 116

DATUM

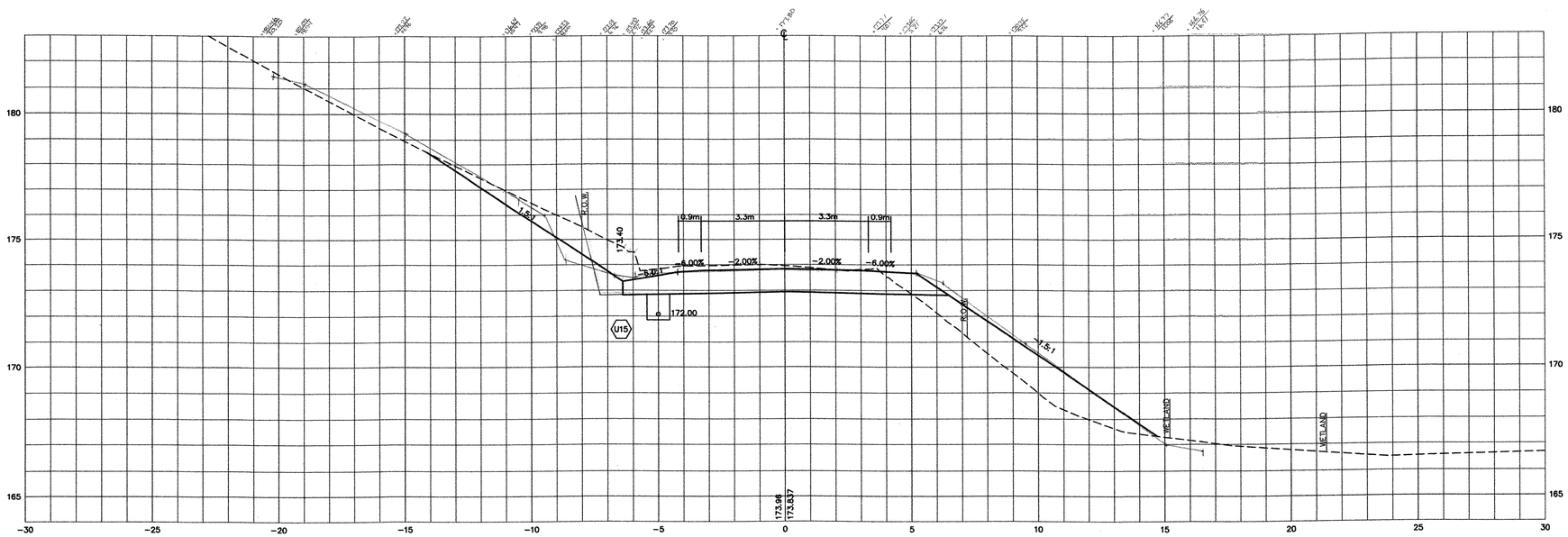
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+160

AREA: 13.87
13.76
13.85
41.48/3 = 13.83 sq m ✓ AUTHORIZED EXTRA CUT

1 PLOT Dgn 2/16/06

Val Dgn 2/15/06

2/16/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 82 OF 116

DATUM

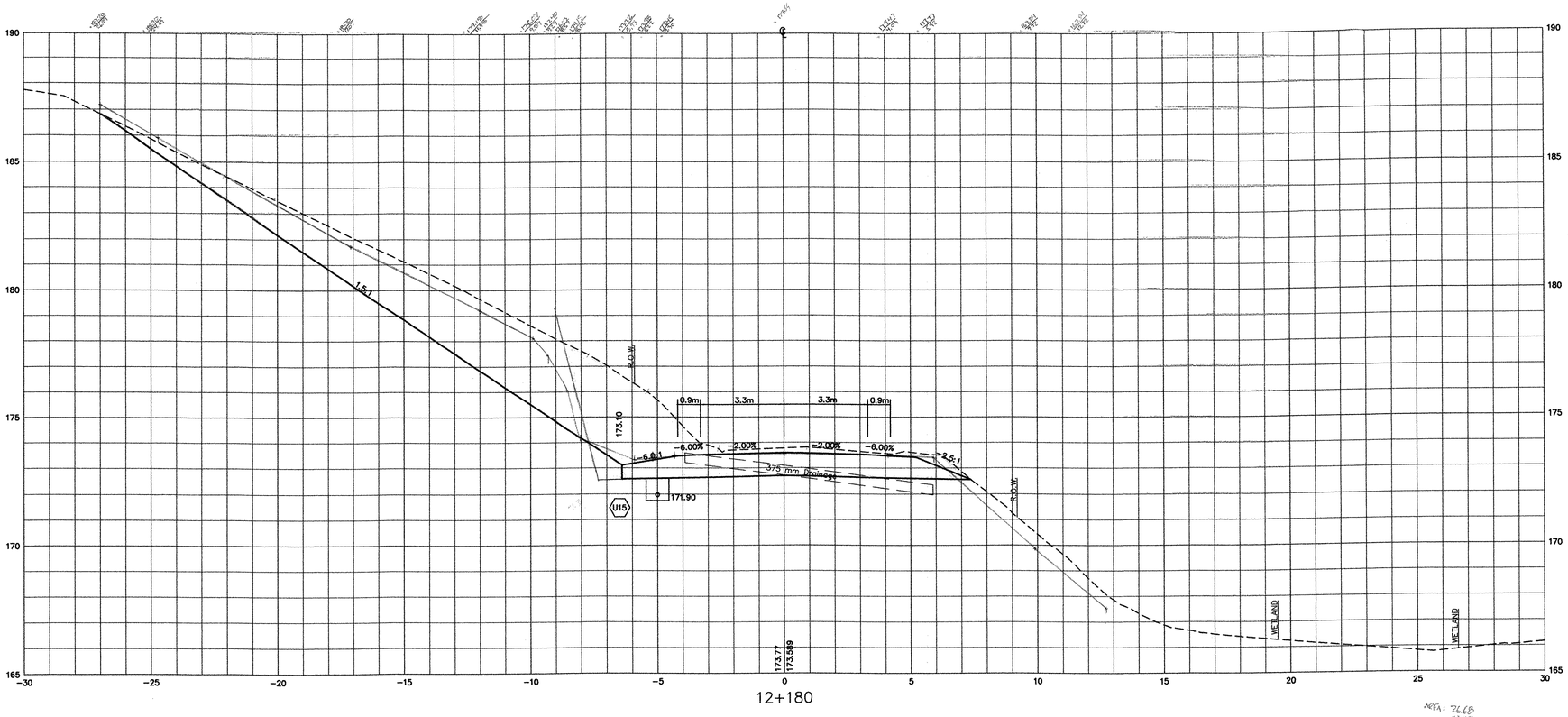
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+180

AREA: 26.68
26.82
26.71
80.27/3 = 26.76 m²

ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 83 OF 116

DATUM

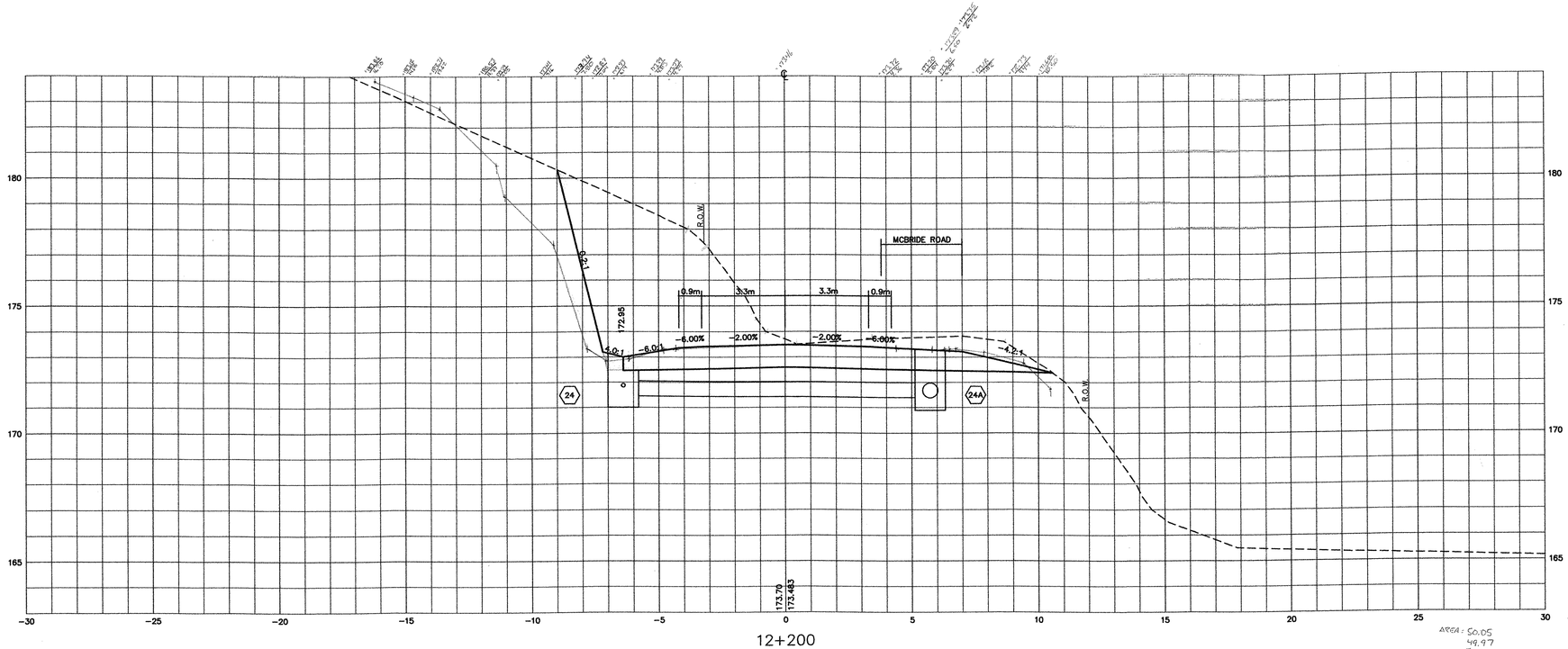
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+200

AREA: 50.05
49.97
50.07
150.09/3 = 50.03 sq.m

DATUM

VERTICAL NGVD 1929

HORIZONTAL NAD 1927

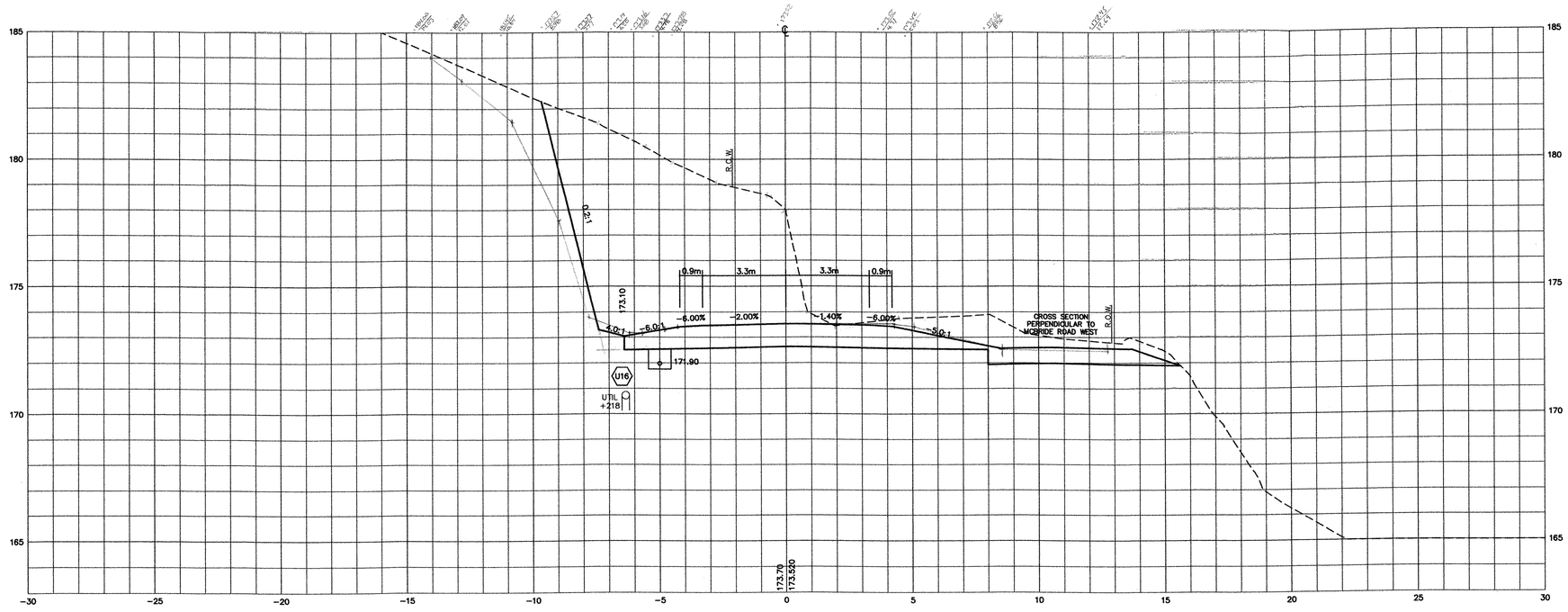
V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2C.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 84 OF 116

Metric



12+220

AREA: 72.51
72.54
72.54
217.64/3 = 72.55sq

✓ Plotted C&C 2/16/06

✓ Red C&C 2/17/06

2/16/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

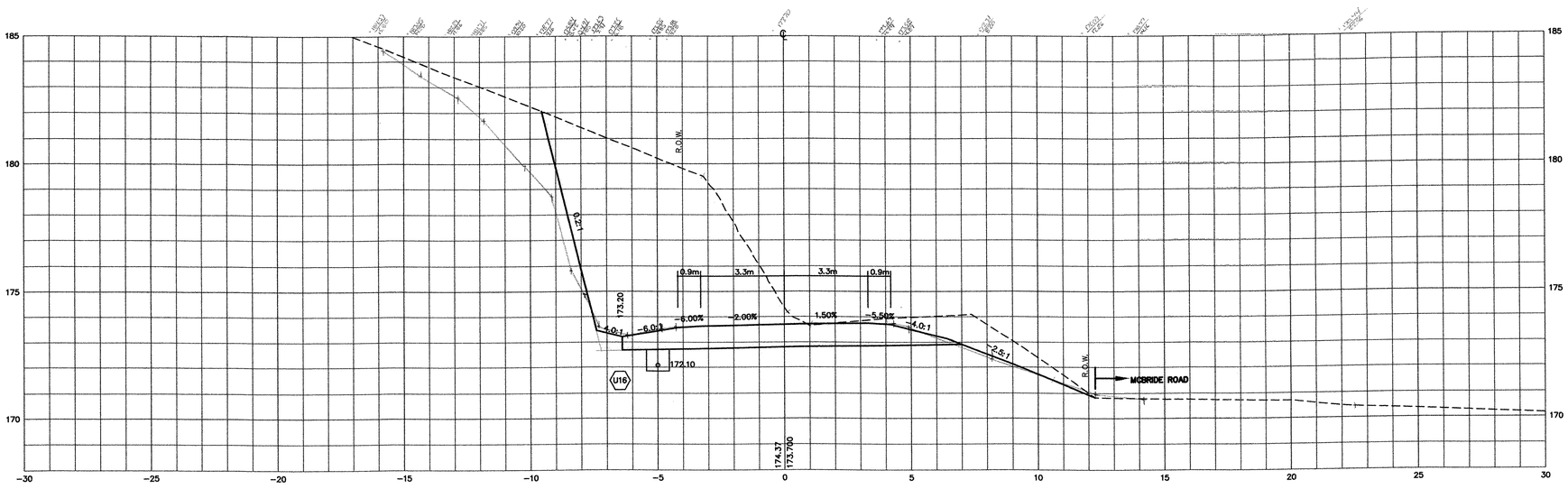
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 85 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+240

AREA : 64.36
64.40
64.30
193.06/3 = 64.35cm
64.75 sq.m

Void Cost 21/3/06

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

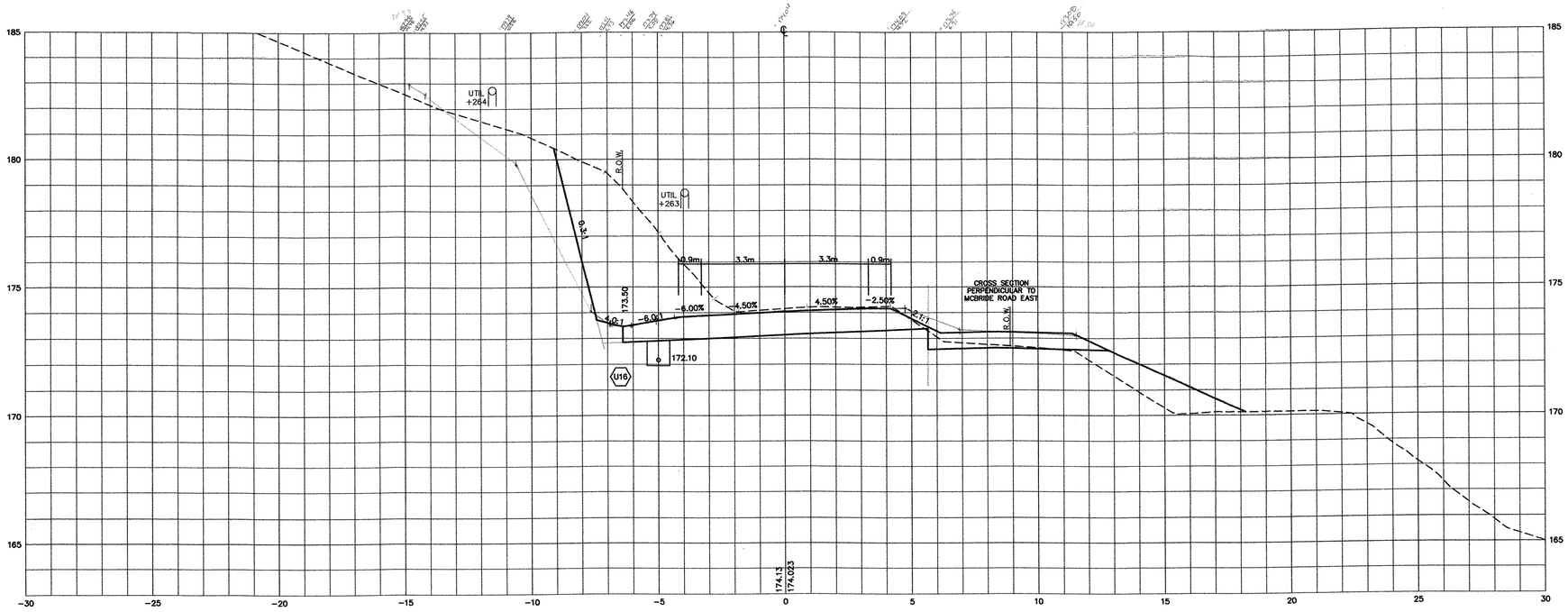
V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2C.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 86 OF 116

Metric



12+260

AREA= 32.86
32.87
32.81
98.54/3 = 32.86sq

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

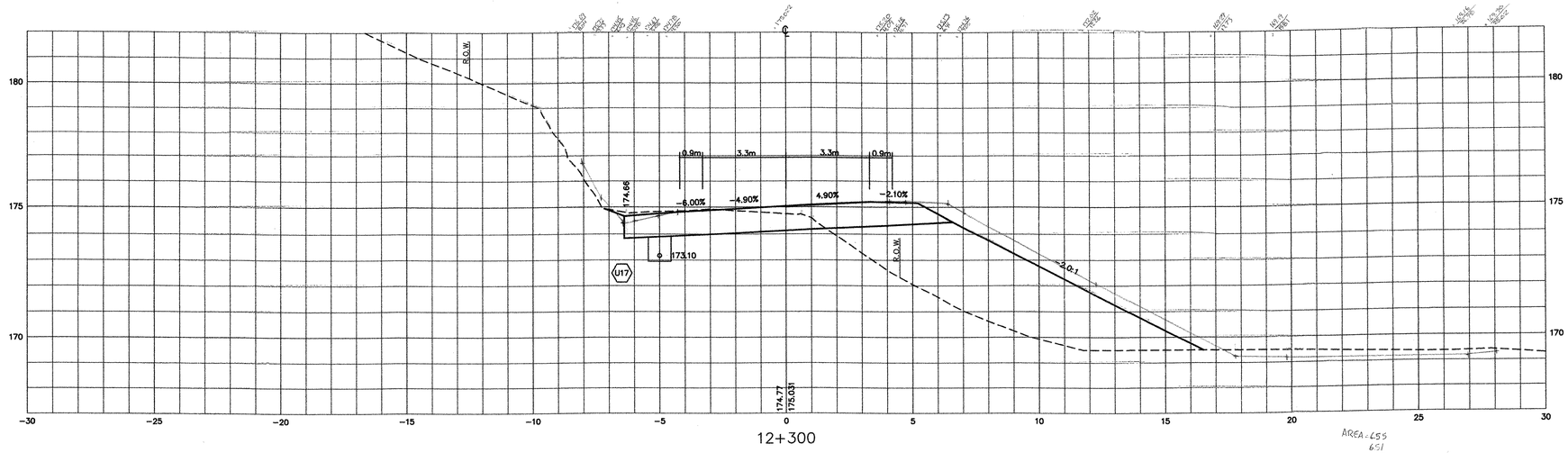
V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2C.DWG

THE LOUIS BERGER GROUP, INC.

ROUTE 121 CROSS SECTIONS

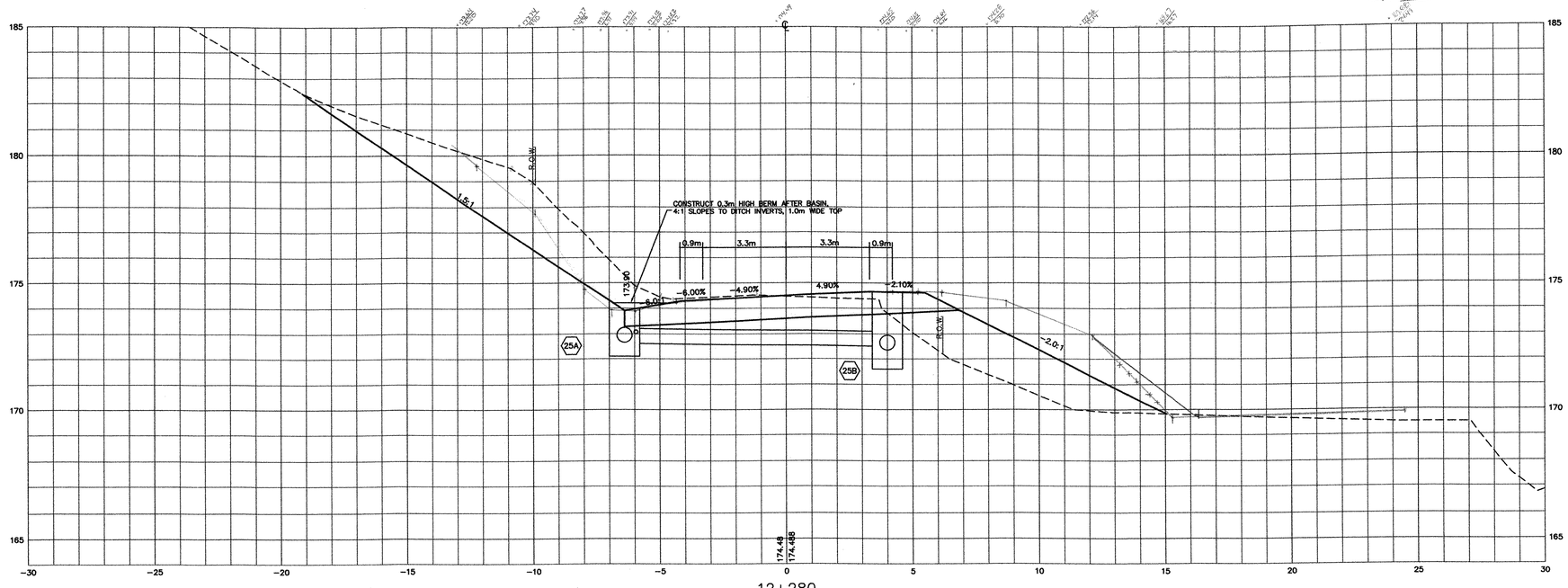
PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 87 OF 116

Metric



12+300

AREA: 6.55
6.51
6.57
19.63/3: 6.54 sq m



12+280

AREA: 17.53
17.71
17.59
52.83/3: 17.61 sq m

Rec'd Oct 4/2006

PLOT CEG 2/10/06

2/16/06

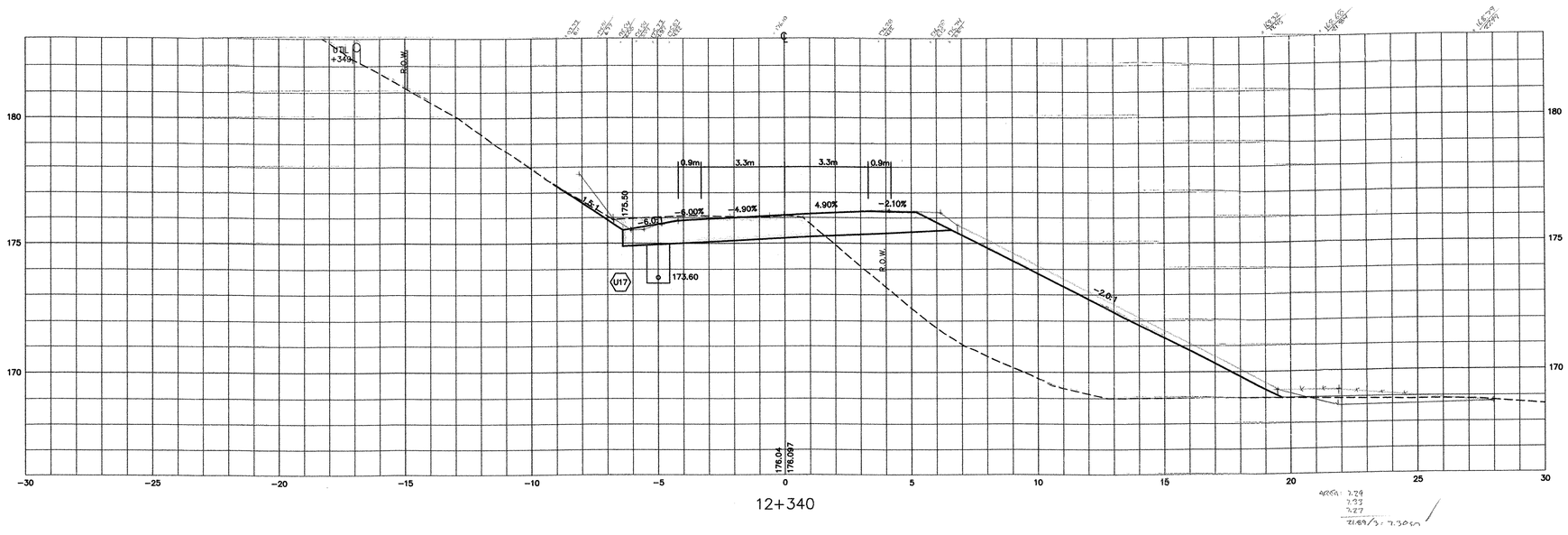
ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 88 OF 116

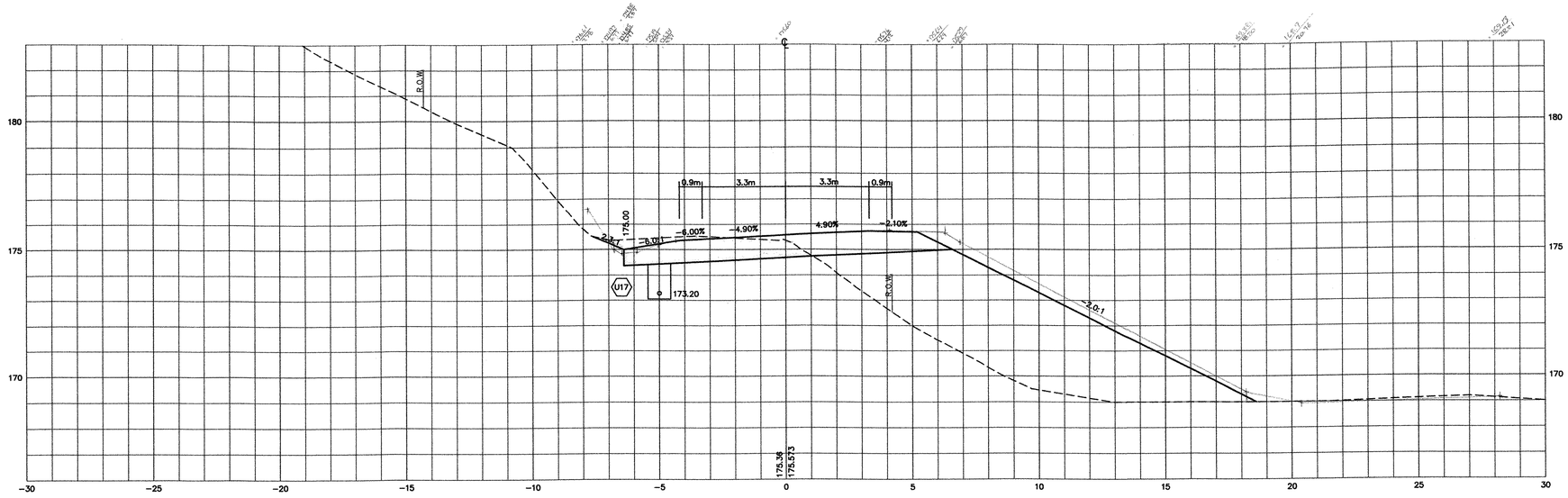
THE LOUIS BERGER GROUP, INC.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG



12+340



12+320

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS-FINAL-ROUTE121-C2C.DWG

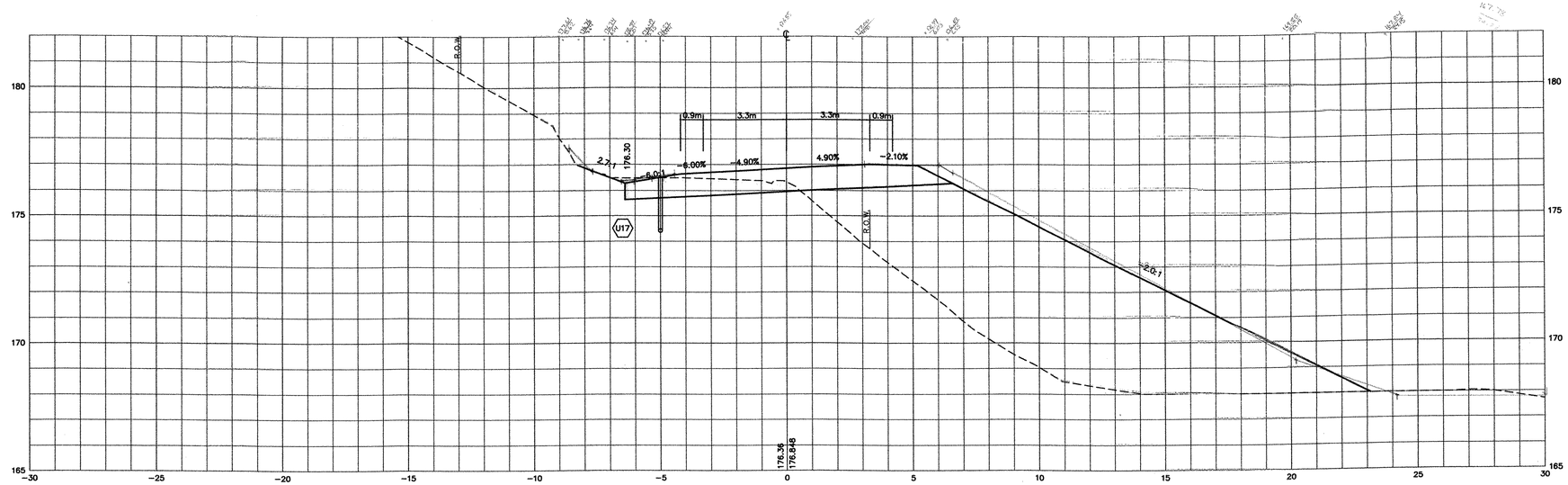
THE LOUIS BERGER GROUP, INC.

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S

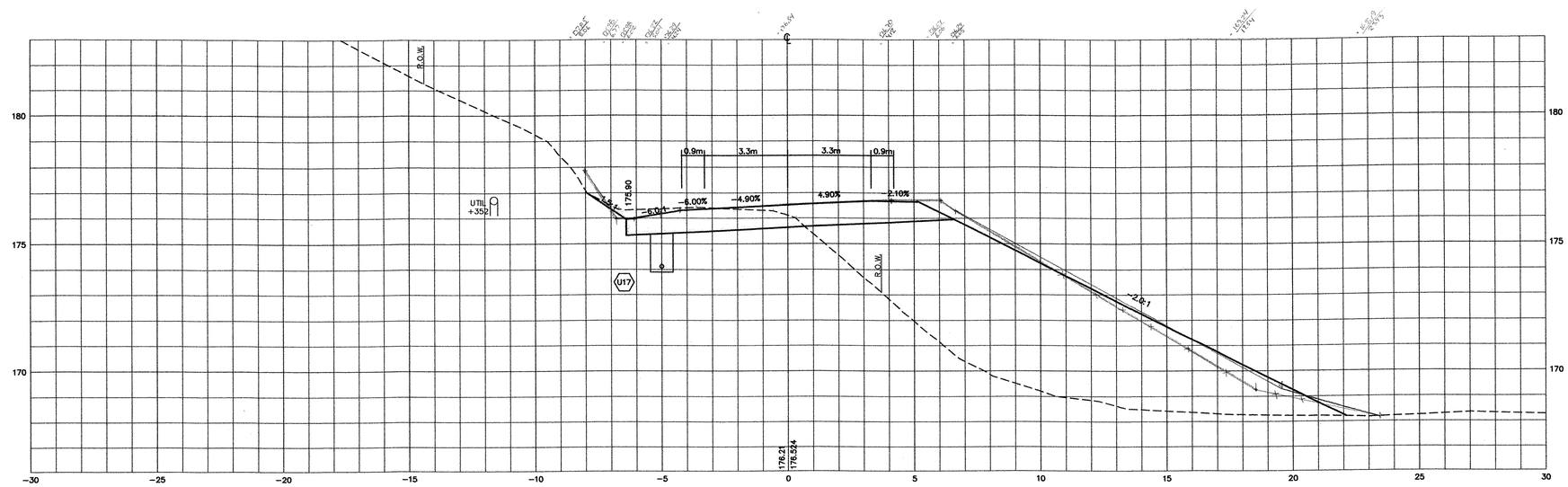
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 89 OF 116

Metric



12+380

AREA = 4.10
4.13
4.15
12.38/3 = 4.13 sq m



12+360

AREA = 5.96
6.00
5.94
17.90/3 = 5.97m²

ROUTE 121 CROSS SECTIONS

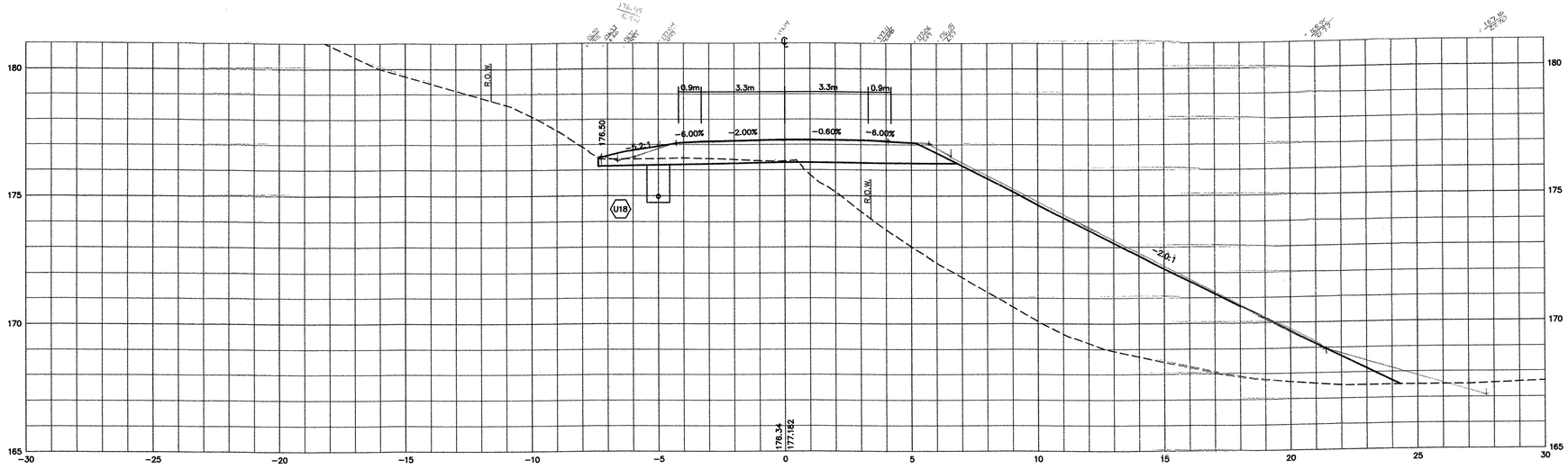
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 90 OF 116

THE LOUIS BERGER GROUP, INC.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

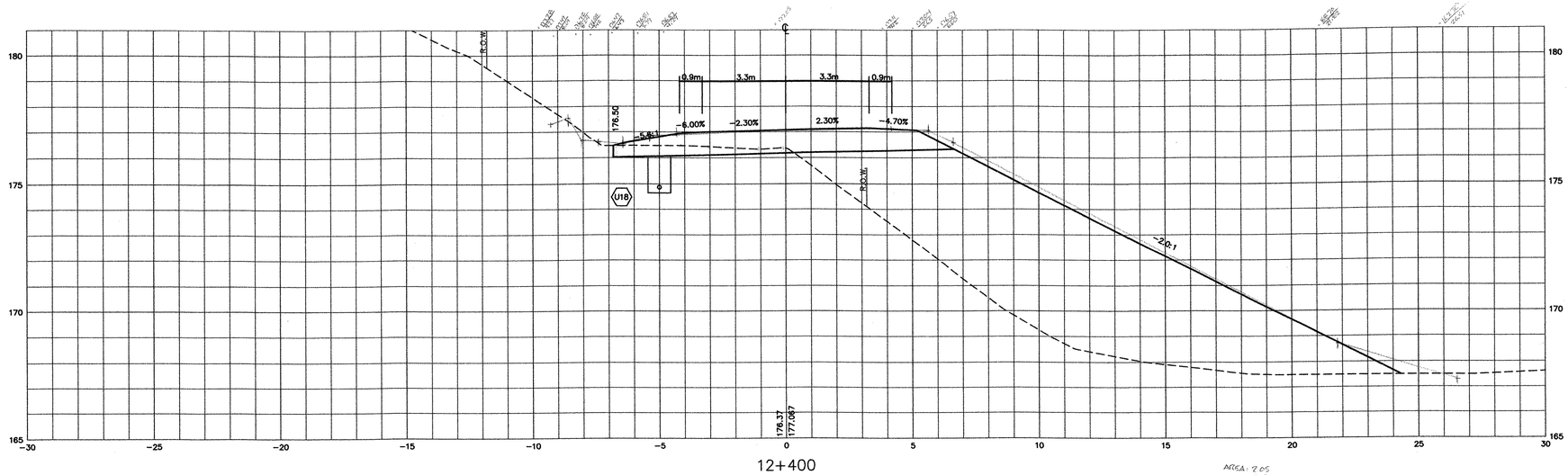
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

Metric



12+420

AREA = 1.49
1.49
1.51
4.49/3 = 1.50 sq.m



12+400

AREA: 2.05
2.16
2.07
6.28/3 = 2.09 sq.m

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

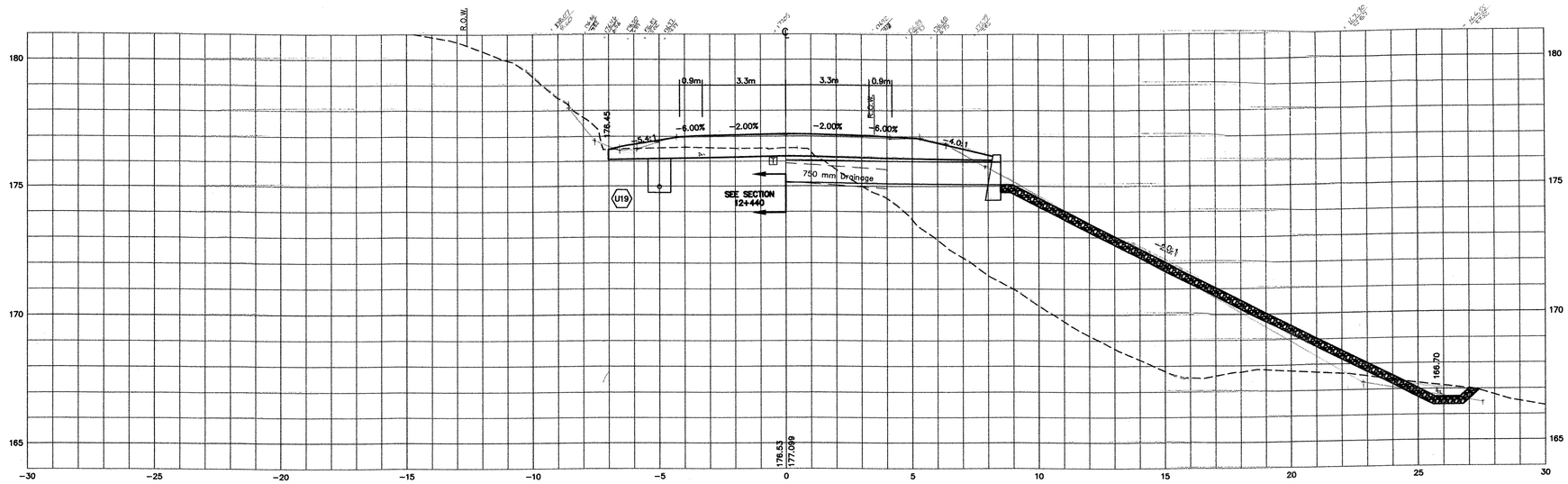
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 91 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric

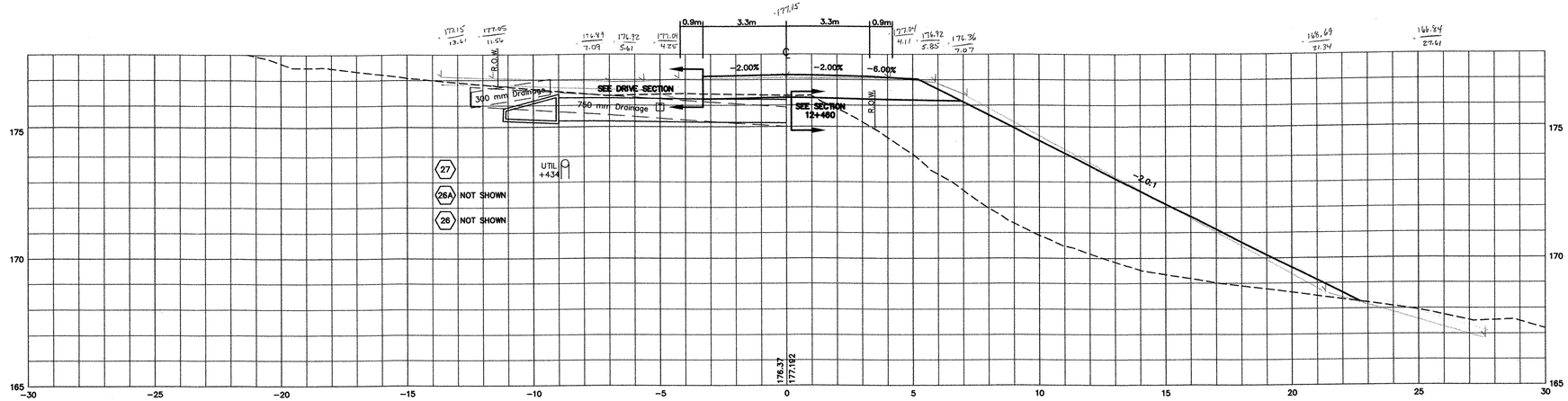


12+460

$A_1 = 3.01 + 2.04 + 2.95 = 8.9/3 = 2.97\,sq.m$

$A_2 = 1.86 + 1.86 + 1.84 = 5.56/3 = 1.85\,sq.m$

AREA: 4.82 sq.m



12+440

AREA 0.86 + 0.72 + 0.79 = 2.38/3 = 0.79 sq.m

1 Year Bond 2/21/06

2/21/06

ROUTE 121 CROSS SECTIONS

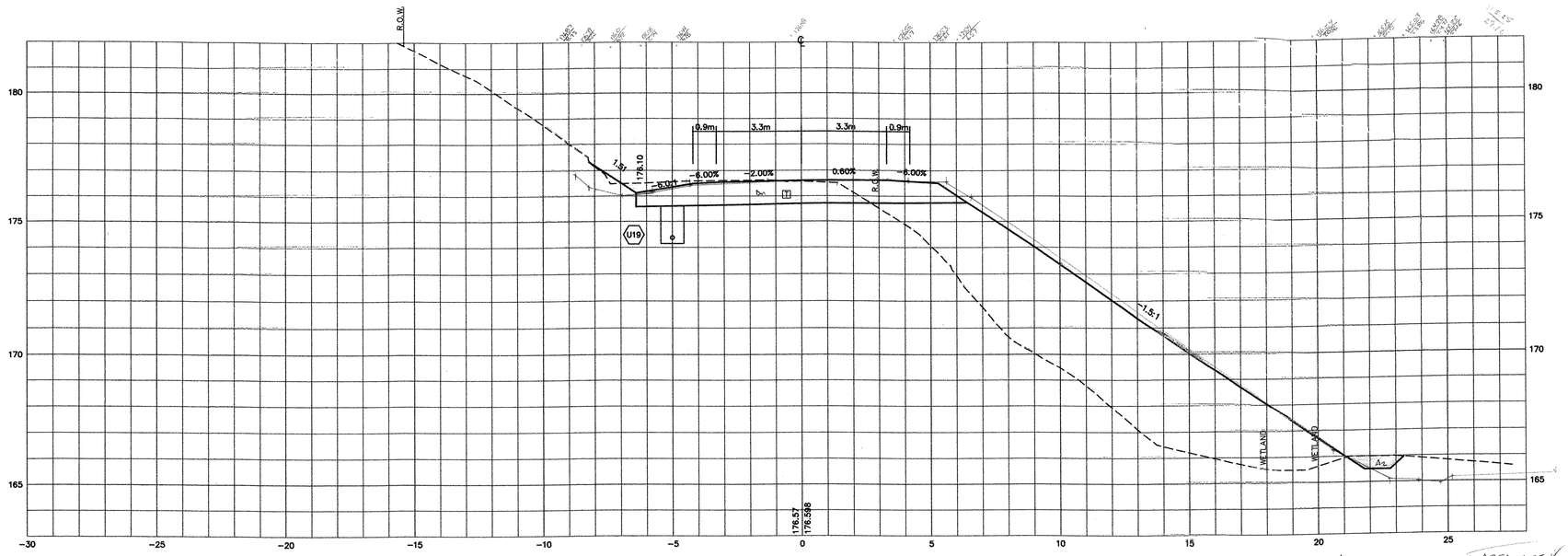
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 92 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

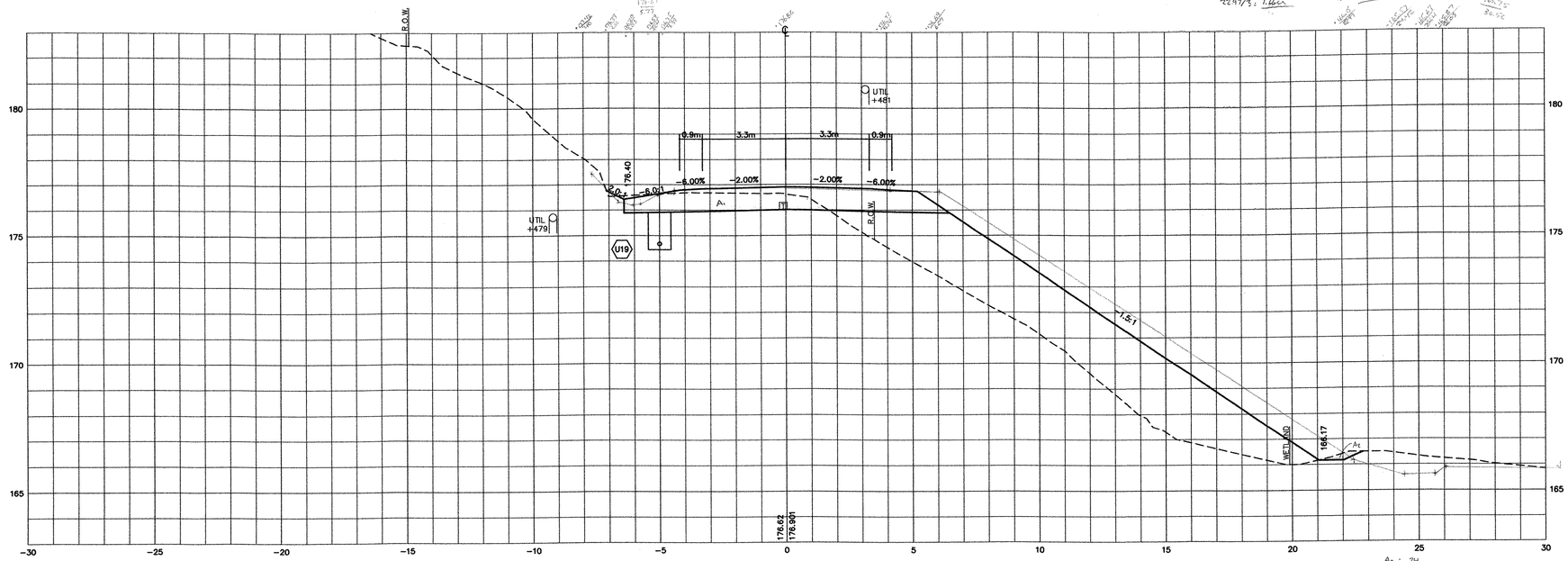
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+500



12+480

A_1 = 7.71, 7.61, 7.65 → 22.97/3 = 7.66m²

A_2 = .70, .68, .70 → 2.08/3 = 0.69m²

AREA = 8.35

A_1 = 5.10, 5.19, 5.13 → 15.44/3 = 5.15m²

A_2 = .24, .26, .27 → 0.77/3 = 0.26m²

AREA = 5.41

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

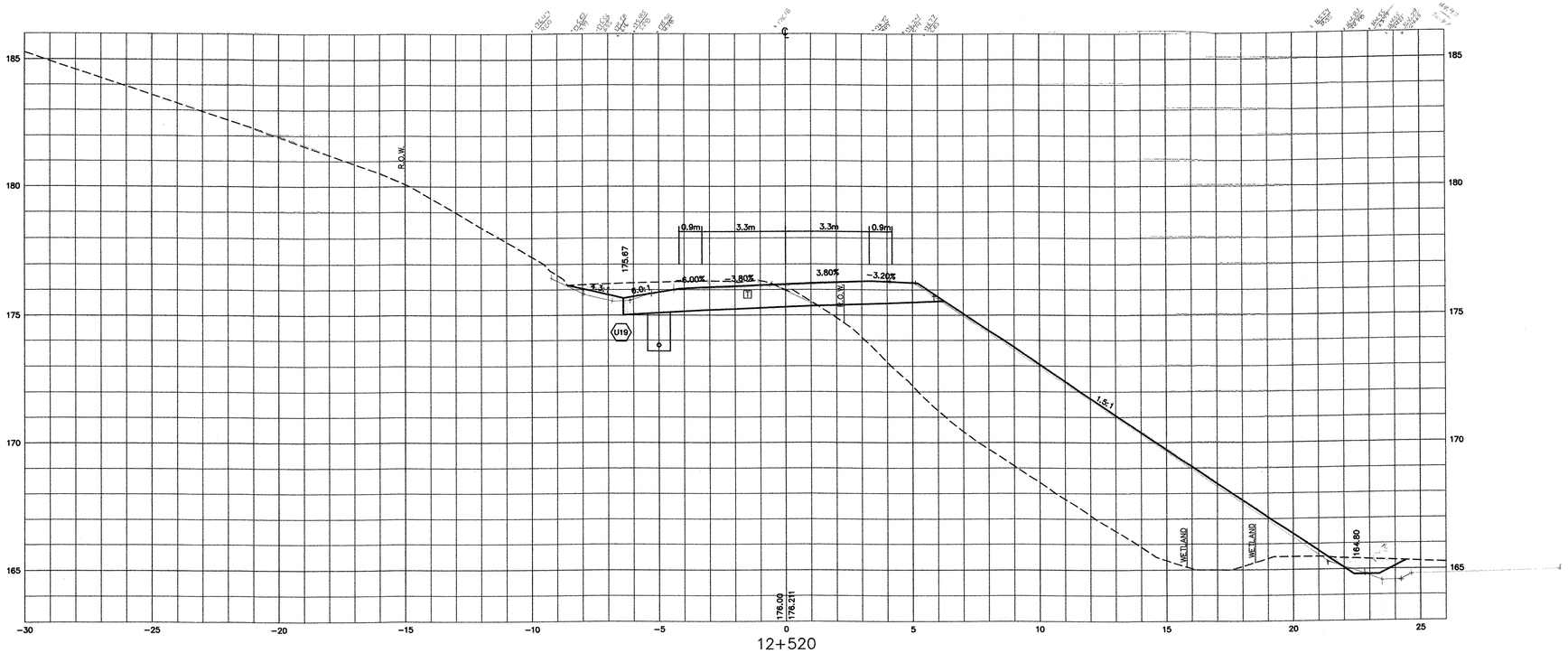
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 93 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+520

A_e = 1.17
1.13
1.10
1.13 sm

AREA: 8.32
8.27
8.26
24.85/3 = 8.28 sm
+ 1.13
9.41 sm

2/21/06

PLOT
Date
2/21/06

1 of
Date
2/21/06

2/21/06

ROUTE 121 CROSS SECTIONS

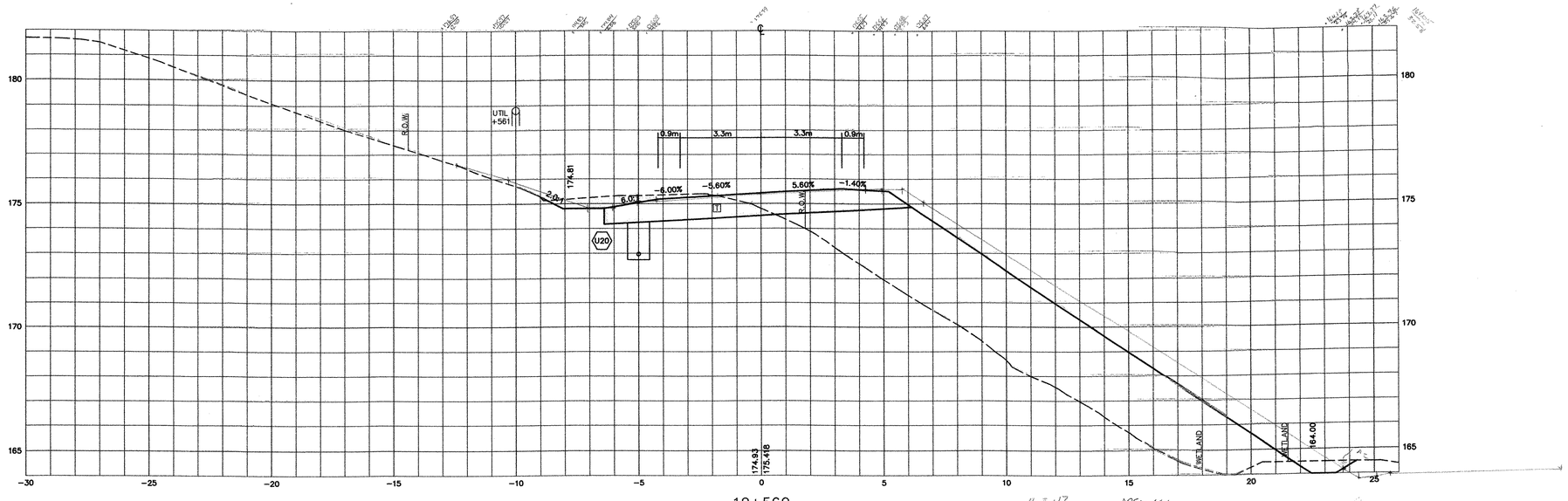
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 94 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

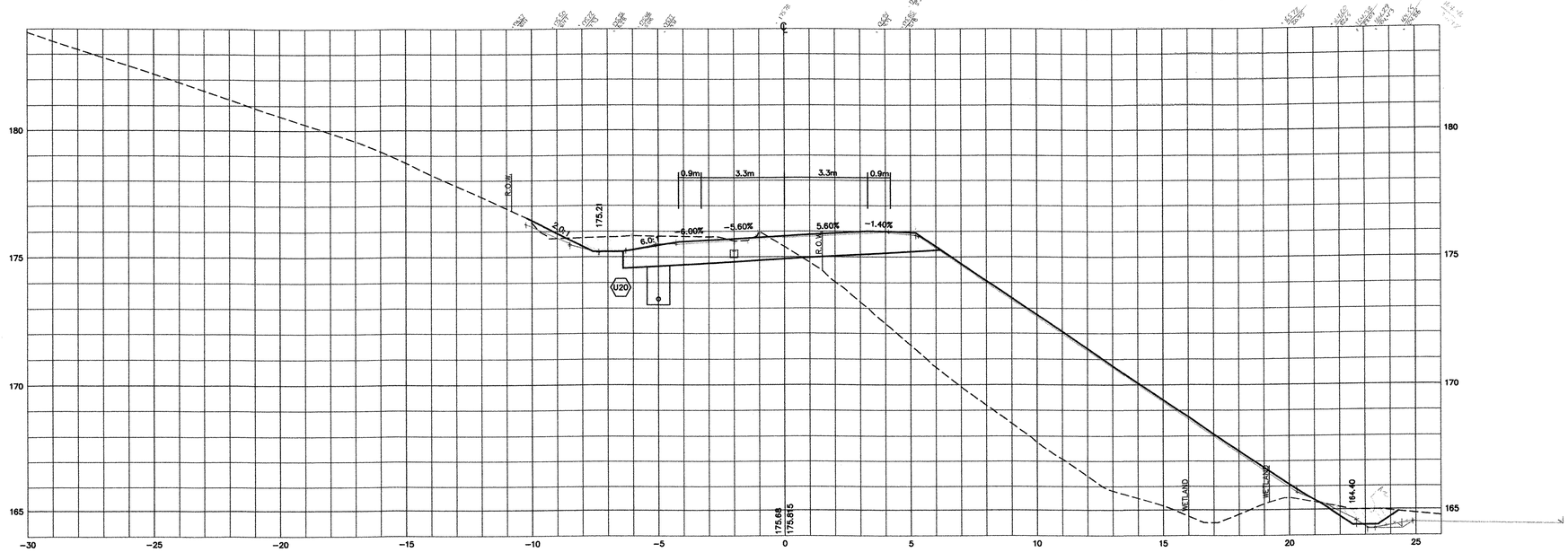
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric



12+560



12+540

ROUTE 121 CROSS SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 95 OF 116

DATUM

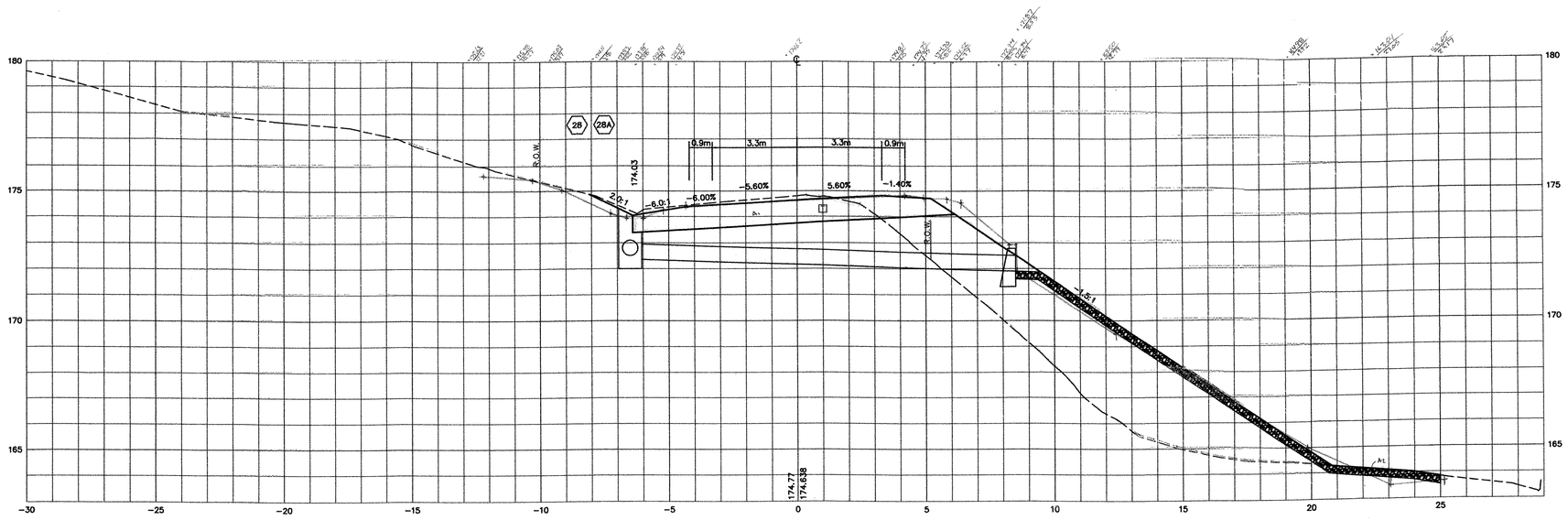
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

Metric

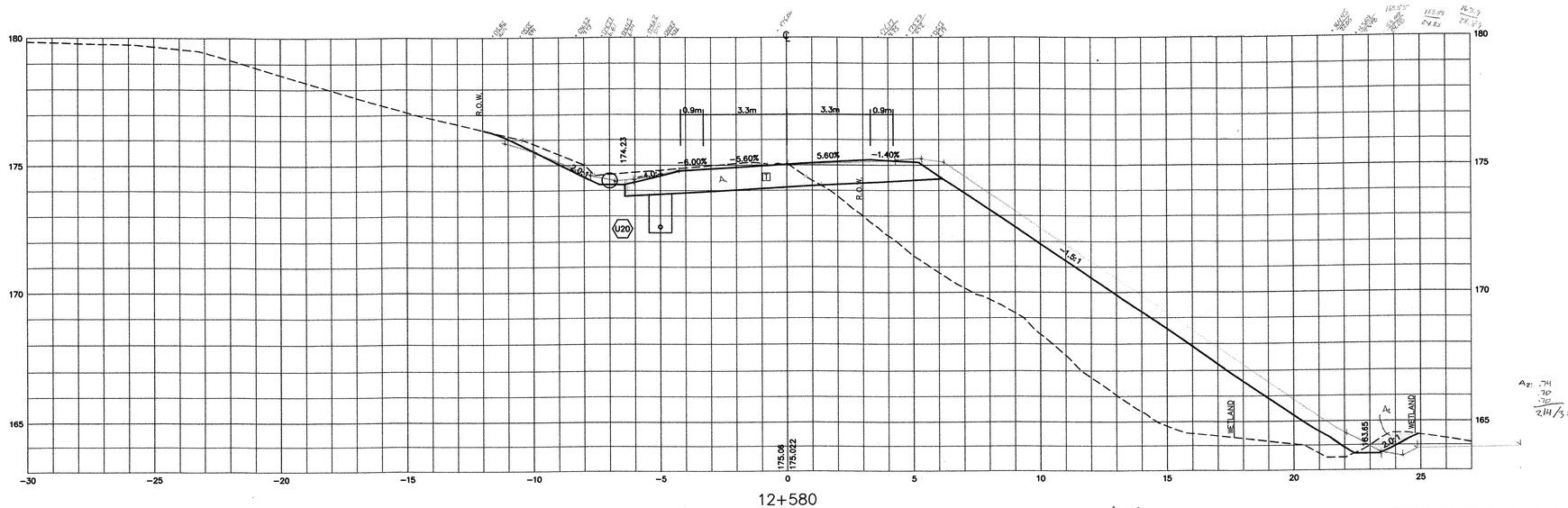


12+600

A_1 = 8.42, 8.46, 8.45 → 25.31/3 = 8.44 sq m

A_2 = 1.49, 1.45, 1.52 → 4.46/3 = 1.49 sq m

AREA = 9.93 sq m



12+580

A_1 = 8.04, 7.96, 7.89 → 23.88/3 = 7.96 sq m

AREA = 8.67 sq m

A_2 = .714, .710, .712 → 2.14/3 = 0.71 sq m

J. Hall Chg 2/17/06

T. Prior Chg 2/14/06

2/14/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S

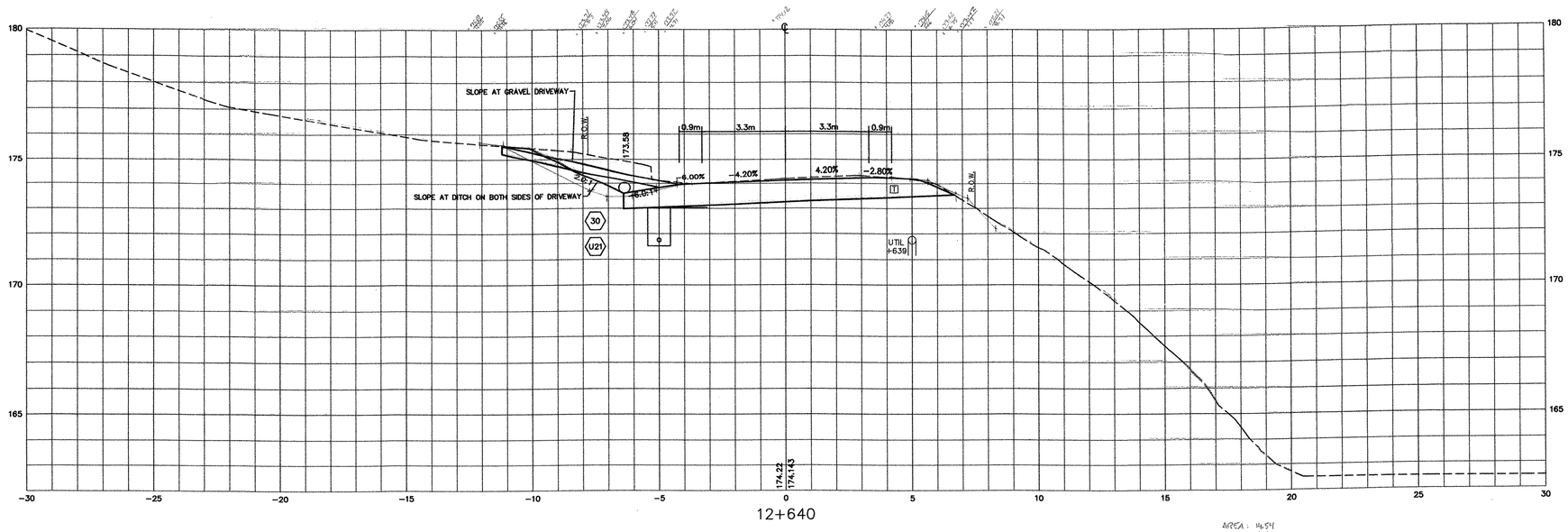
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 96 OF 116

THE LOUIS BERGER GROUP, INC.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

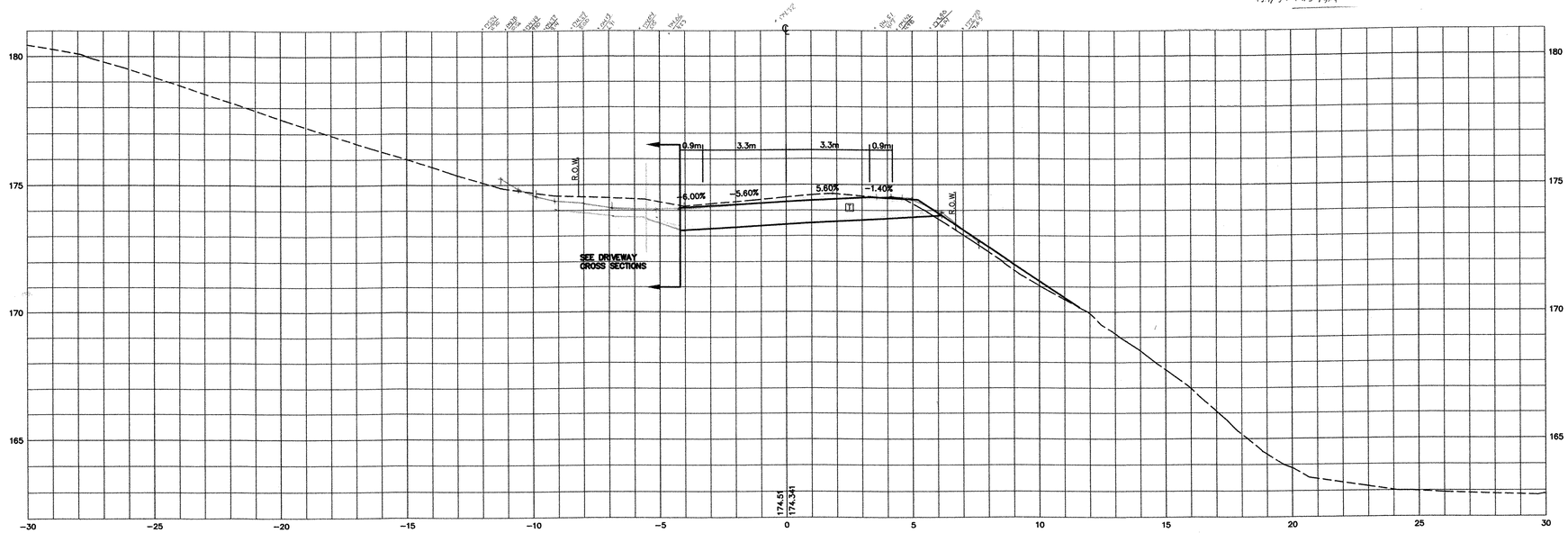
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

Metric



12+640

AREA: 14.54
14.56
14.60
43.7/3 = 14.57 s.m



12+620

AREA: 10.48
10.35
10.51
31.34/3 = 10.45 s.m

J. Pilot Date 12/21/06

J. Pilot Date 12/21/06

12/21/06

ROUTE 121 CROSS SECTIONS

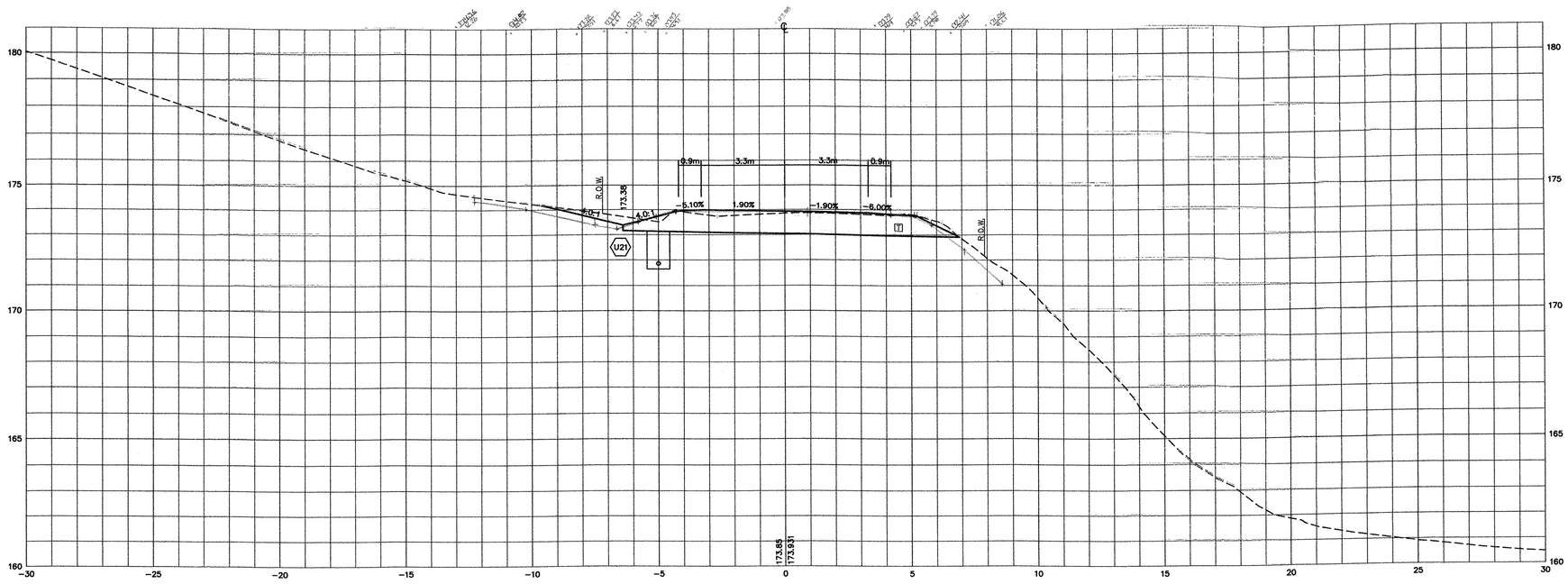
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 97 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

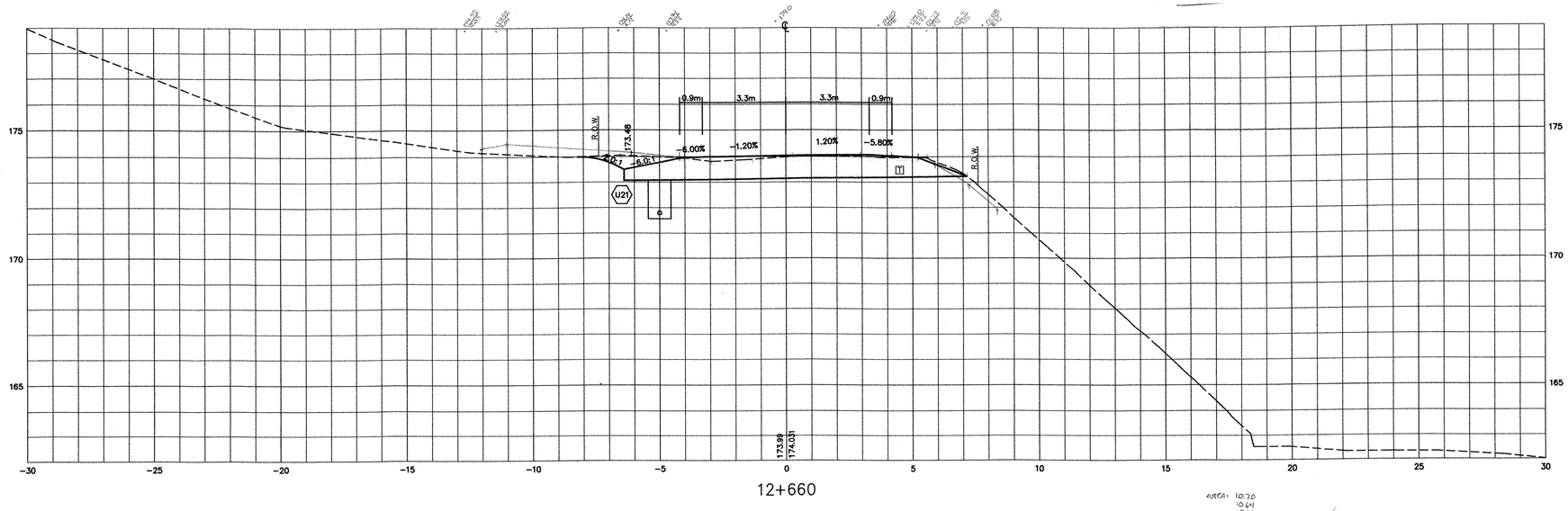
THE LOUIS BERGER GROUP, INC.

Metric



12+680

AREA: 9.48
9.44
9.43
28.35/3 = 9.450m



12+660

AREA: 10.70
10.41
10.71
32.05/3 = 10.684m

J Pilot Chg 2/21/06

J ed Chg 2/21/06

2/21/06

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**

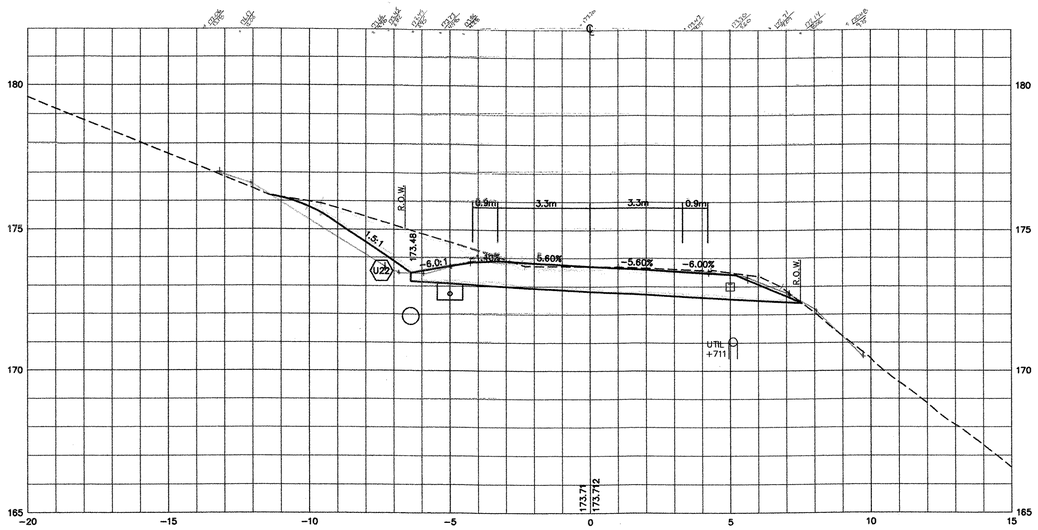
DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 98 OF 116

THE LOUIS BERGER GROUP, INC.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

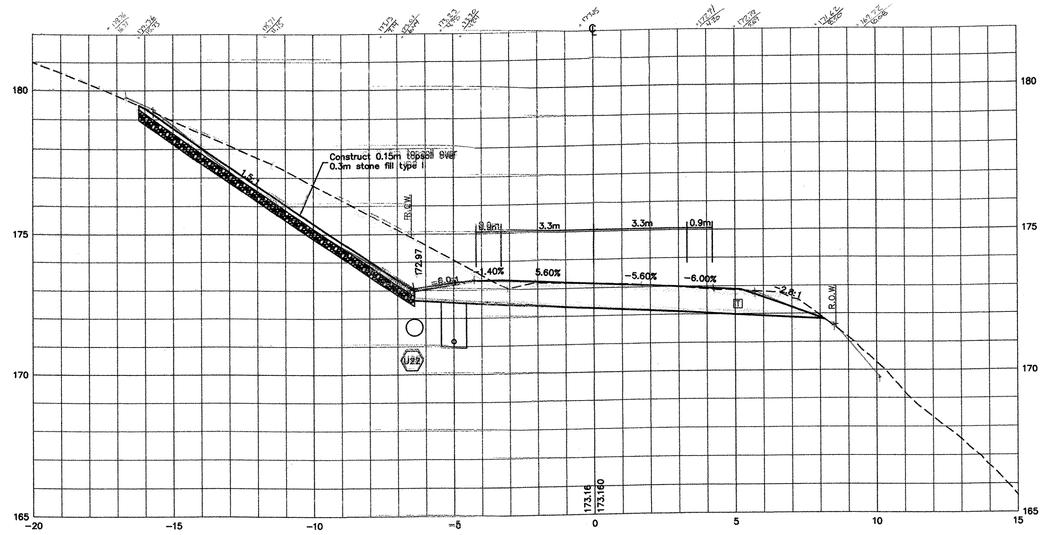
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

Metric



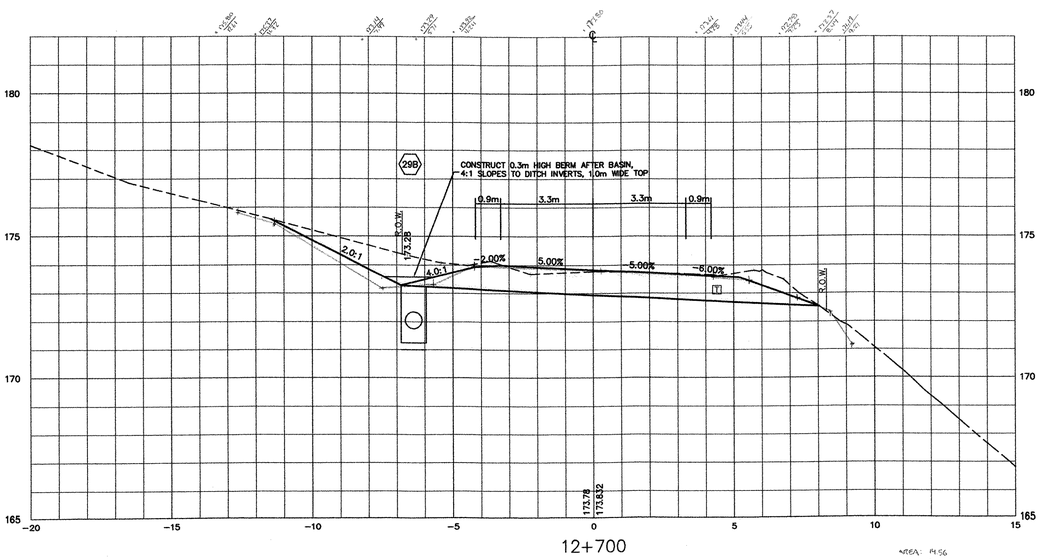
12+720

AREA: 15.81
15.78
15.84
47.43/3 = 15.81 sq.m



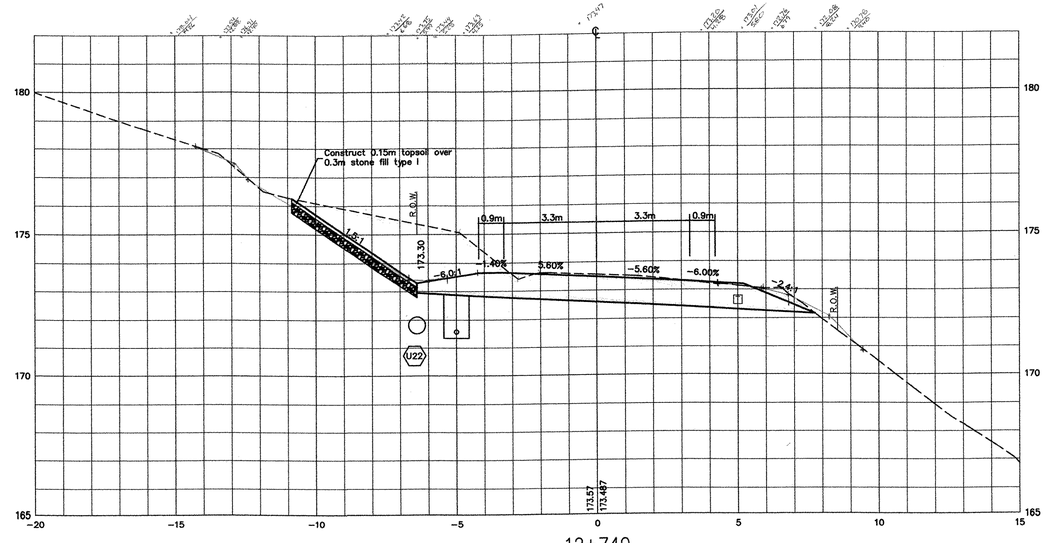
12+760

AREA: 28.74
28.42
28.68
86.04/3 = 28.68 sq.m



12+700

AREA: 14.56
14.66
14.24
43.36/3 = 14.45 sq.m



12+740

AREA: 22.48
22.42
22.51
67.41/3 = 22.47 sq.m

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

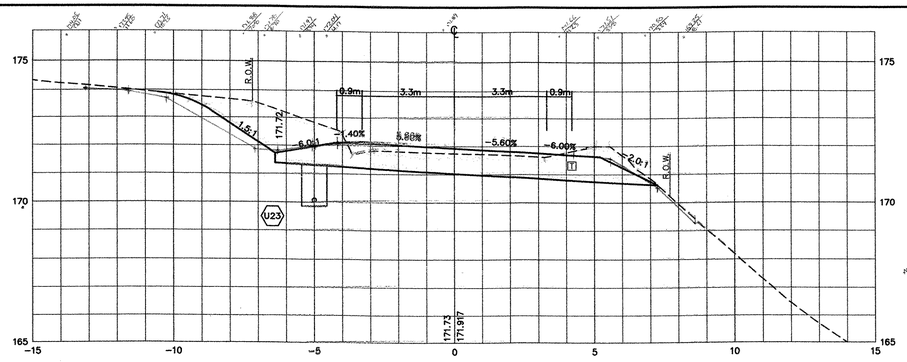
PLOT DATE: 12/08/03
SURVEY DATE:
DRAWN BY:
SHEET: 99 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

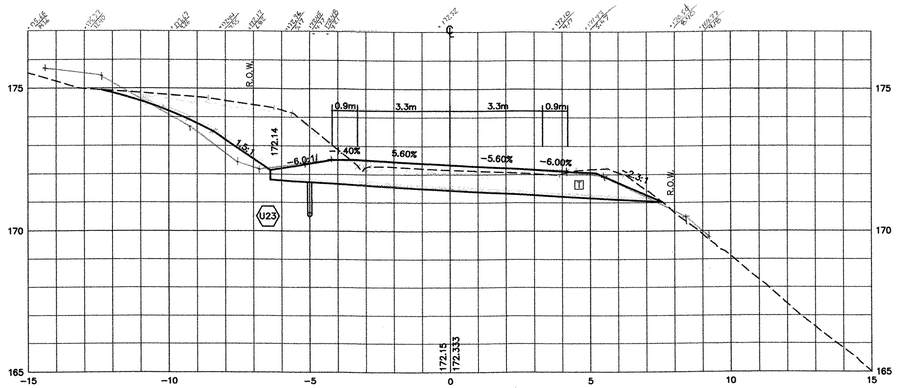
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

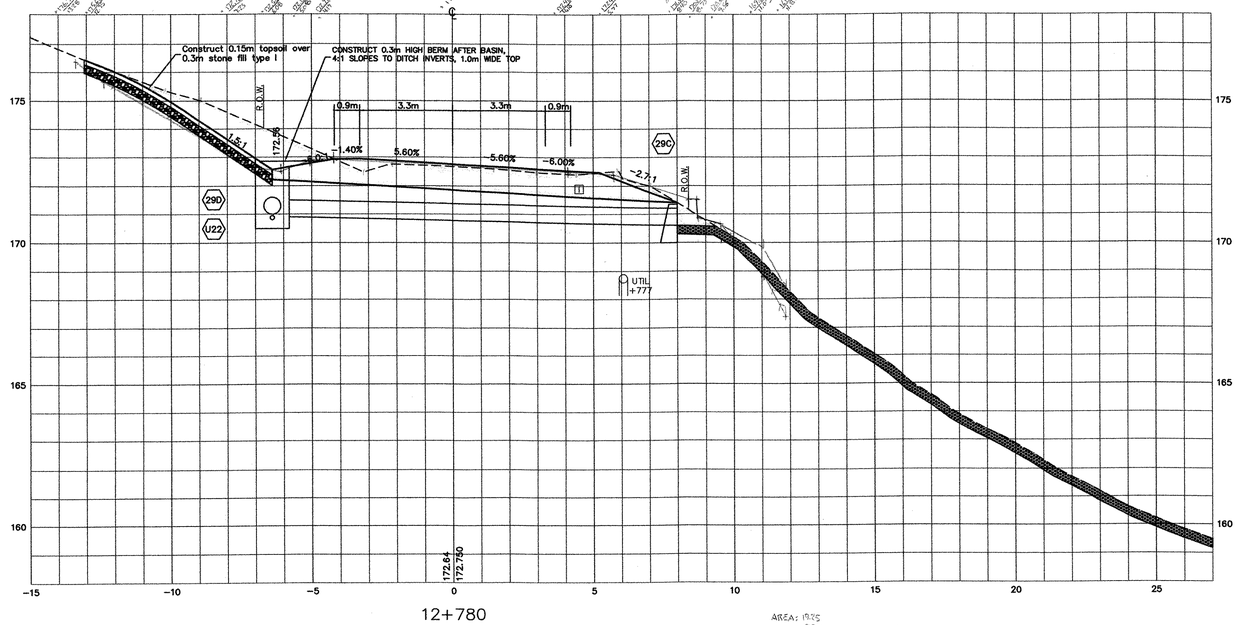
Metric



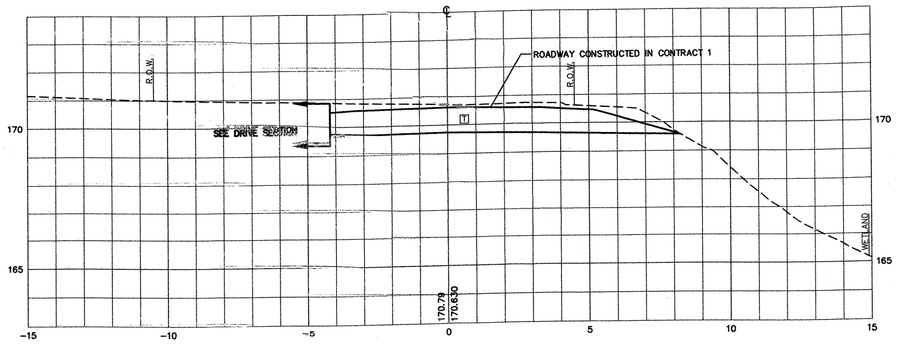
12+820



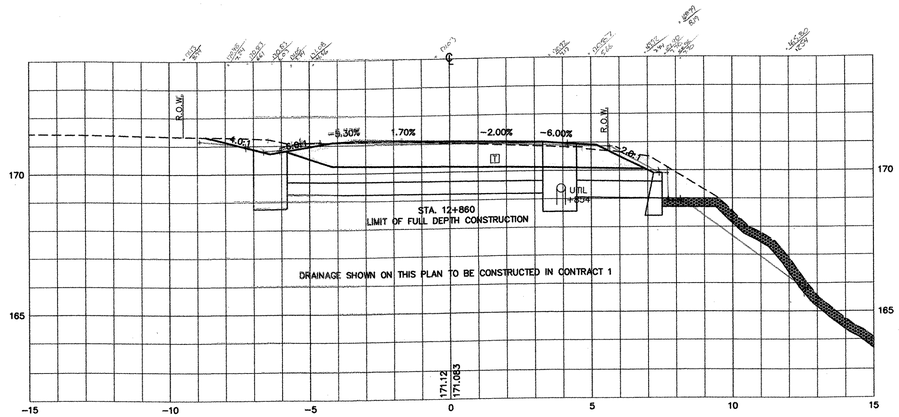
12+800



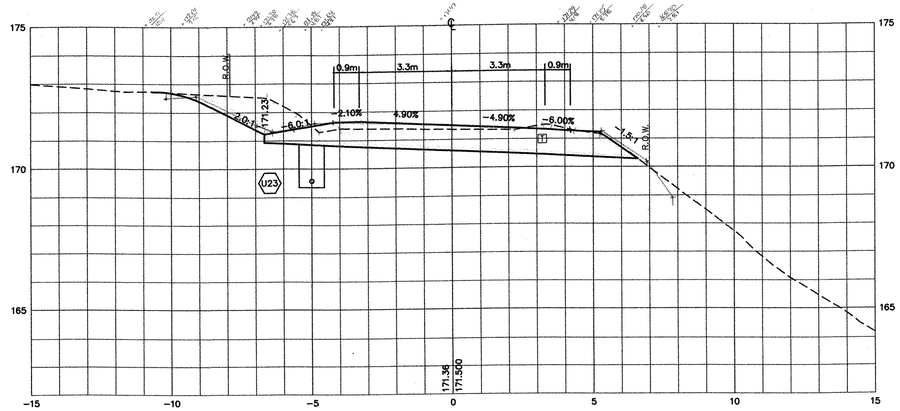
12+780



12+880



12+860



12+840

ROUTE 121 CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 100 OF 116

DATUM

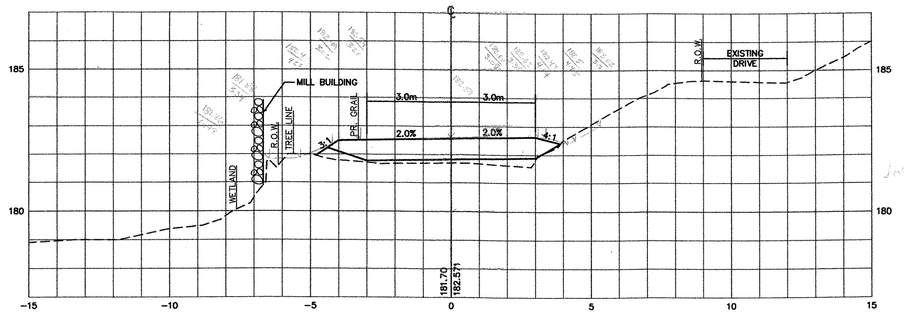
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

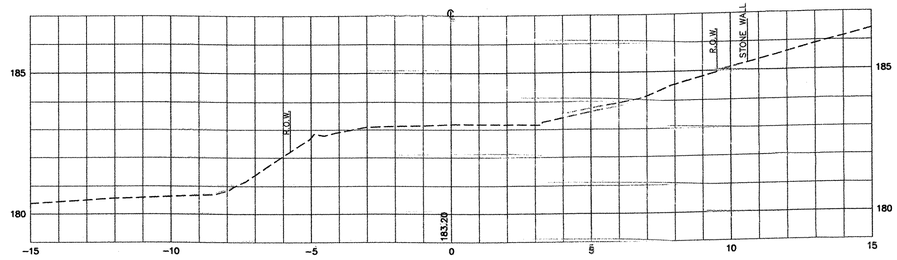
THE LOUIS BERGER GROUP, INC.

Metric

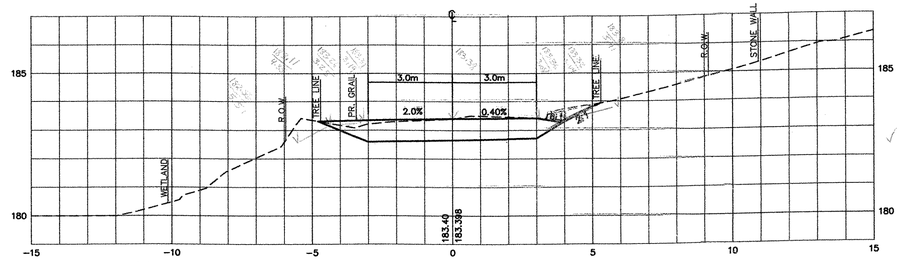


* No Common Exc.

3+030

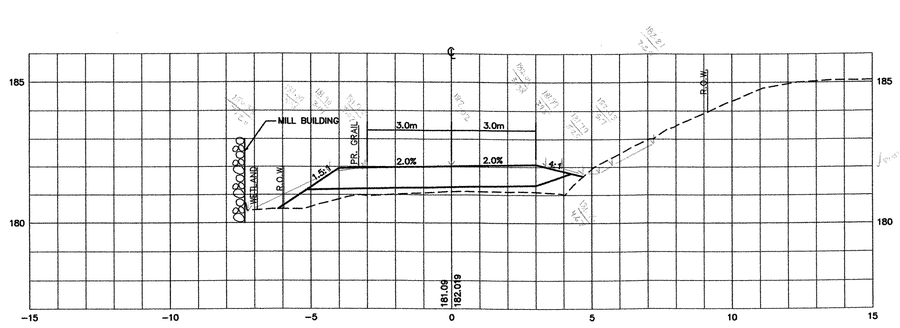


3+070



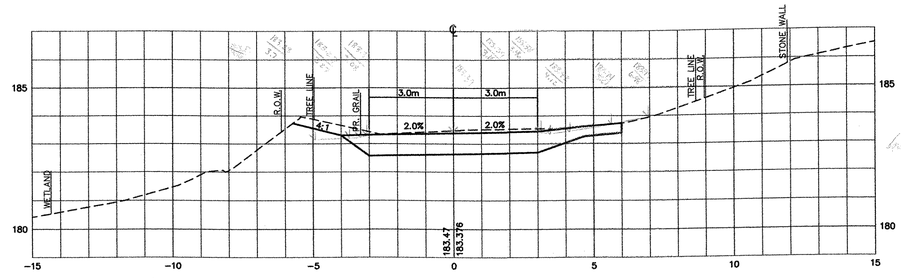
5.81
5.87
5.81
5.83 Sm

3+060



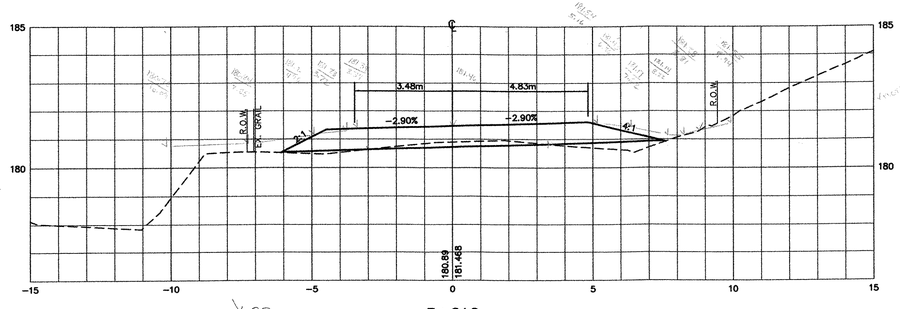
* No Common Exc.

3+020



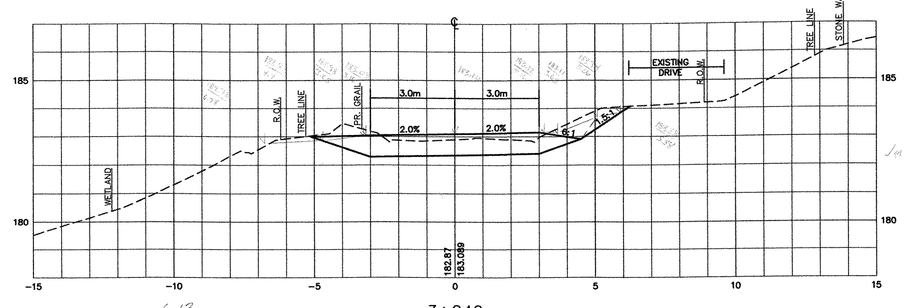
7.93
8.00
7.74
7.89 Sm

3+050



1.23
1.16
1.29
1.23 Sm

3+010



6.13
6.32
6.45
6.30 Sm

3+040

CAMBRIDGEPORT ROAD SECTIONS

PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 101 OF 116

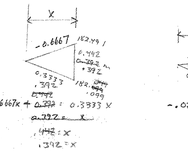
DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

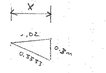
V: /1261/CADD/PLANS/XSECTIONS–CAMBRIDGE.DWG

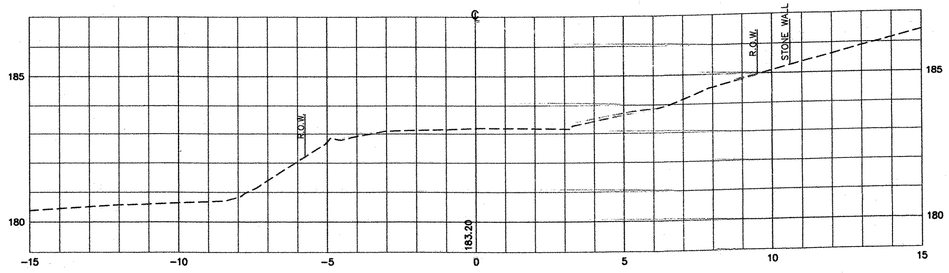
* ZERO @ 3+009

THE LOUIS BERGER GROUP, INC.

Metric







ZERO @ 3+070

SAND

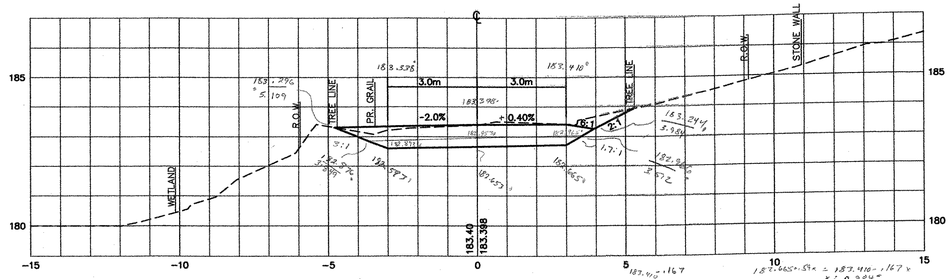
0	182.953
-3.849	182.876
-3.6	182.59
0	182.653
3.0	182.665
3.512	182.966
0	182.953

A_1 = 2.003 sm

DENSE GRADED

0	183.398
-3.0	183.338
-5.109	183.296
-3.849	182.876
0	182.953
3.512	182.966
3.924	183.244
3.0	183.410
0	183.398

A_2 = 3.620 sm - 0.87 sm = 2.750 sm



182.393 + 0.3333x = 182.893 - .02x
0.3533x = 0.3
x = 0.849'

3+060

PAVEMENT = 0.87 sm
FINE-GRADE = 7.361 m

182.691 + 0.3333x = 182.991 + .02x
0.3333x = 0.3
x = 0.958'

182,665 + 0.59x = 182.965 + .004x
0.586x = 0.3
x = 0.512'

SAND

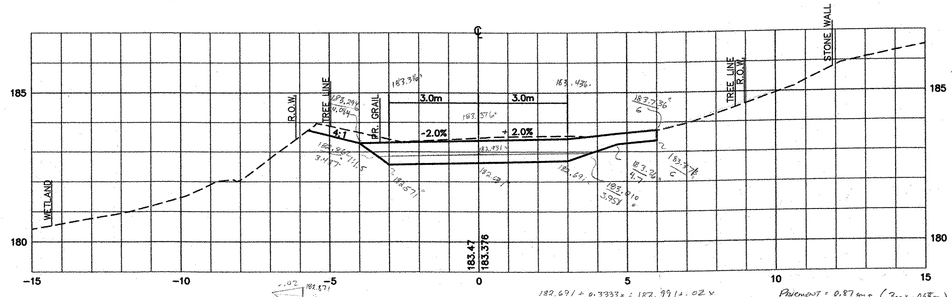
0	182.931
-3.437	182.862
-3.0	182.57
0	182.631
3.0	182.691
3.958	183.010
0	182.931

A_1 = 2.009 sm

DENSE GRADED

0	182.931
3.958	183.010
4.7	183.26
6.1	183.373
6.0	183.736
3.0	183.436
0	183.376
-3.0	183.316
-4.084	183.294
-3.437	182.862
0	182.931

A_2 = 4.255 sm - 1.059 sm = 3.196 sm = 3.20 sm



182.571 + 0.667x = 182.871 + .02x
0.647x = 0.3
x = 0.437

3+050

PAVEMENT = 1.065 sm - 1.059 sm
FINE-GRADE = 7.395 m

0.3333x - 0.745 = -0.167x
0.5003x = 0.745
x = 1.489'

SAND

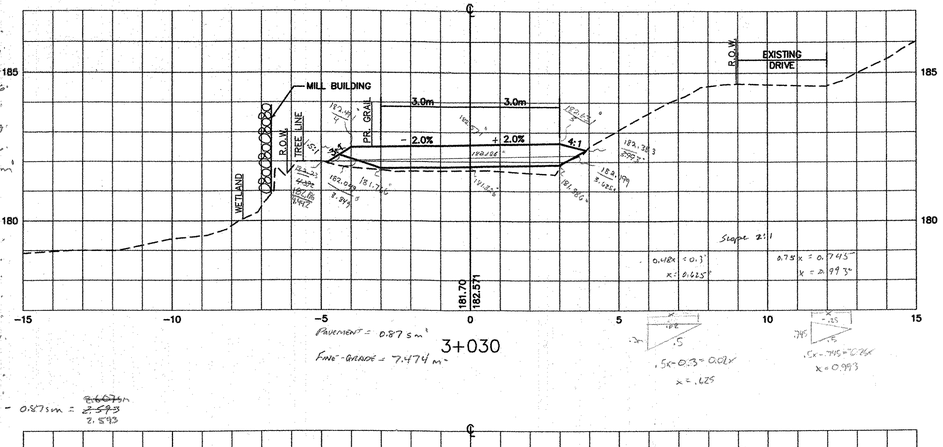
-3.849	182.567
-3.0	182.284
0	182.344
3	182.404
3.958	182.723
0	182.644
-3.849	182.567

A_1 = 2.071 sm

DENSE GRADED

0	183.084
-3.0	183.029
-5.11	182.987
-3.849	182.567
0	182.644
3.958	182.723
4.489	182.900
3.0	183.149
0	183.089

A_2 = 3.740 sm - 0.87 sm = 2.870 sm



PAVEMENT = 0.87 sm
FINE-GRADE = 7.474 m

0.745x = 0.7933x
x = 0.625'

0.5x - 0.3 = 0.03x
x = 0.625

0.745x = 0.7933x
x = 0.993'

SAND

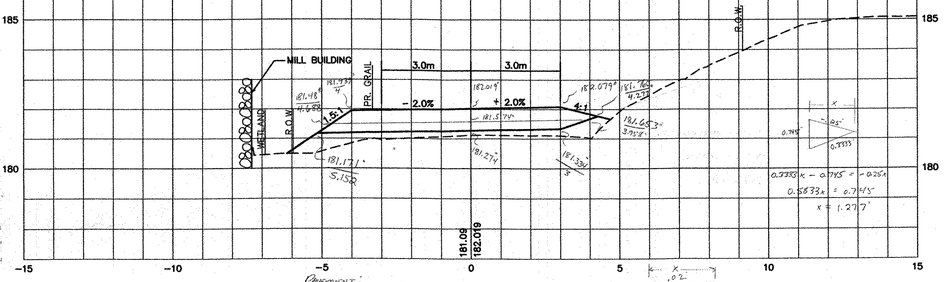
0	182.126
-3.849	182.049
-3.0	181.766
0	181.826
3.0	181.886
3.625	182.199
0	182.126

A = 2.022 sm

DENSE GRADED

0	182.126
3.625	182.199
3.993	182.383
3.0	182.631
0	182.571
-4.0	182.49
-4.849	182.049
0	182.126

A_1 = 2.022 sm - 0.87 sm = 1.152 sm



PAVEMENT = 0.145m x 6.0m = 0.87 sm
F. GRADE = 8.65 m

3+020

0.3333x - 0.3 = 0.02x
0.3 = 0.3133x
0.958 = x'

SAND

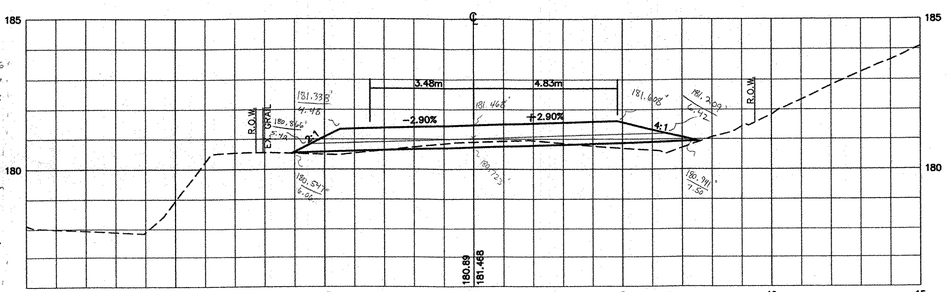
0	181.574
-4.688	181.48
-5.152	181.171
0	181.274
3	181.734
3.958	181.653
0	181.574

A = 2.519 sm

DENSE GRADED

0	181.574
3.958	181.653
4.277	181.76
3.0	182.079
0	182.019
-4.0	181.939
-4.688	181.48
0	181.574

A_1 = 3.601 sm - 0.87 sm = 2.731 sm



PAVEMENT
0.145m x 8.31m = 1.205 sm

3+010

FINE-GRADING = 11.84 m

SAND

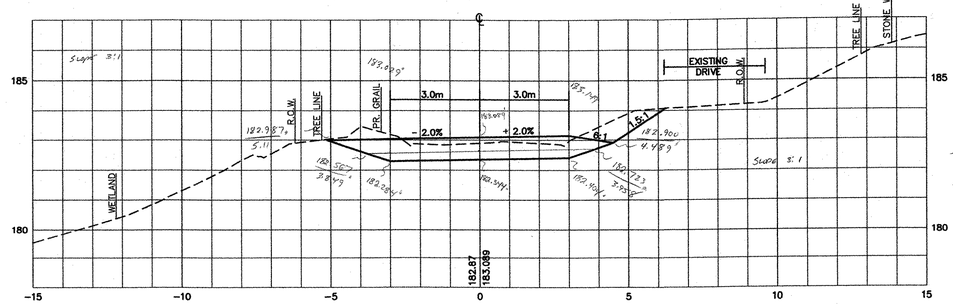
0	181.023
-5.42	180.846
-6.04	180.547
0	180.723
3.5	180.941
6.42	181.209
0	181.023

A_1 = 3.809 sm

DENSE GRADED

0	181.468
-4.48	181.338
-5.42	180.846
0	181.023
4.42	181.209
4.93	181.601
0	181.468

A_2 = 4.705 sm - 1.205 sm = 3.5 sm



-.02x + 0.745 = 0.3333x
2.11 = Xo

-0.02x + 0.3 = 0.3333x
0.3 = 0.3533x
X = 0.849'

0.3333x - 0.745 = -0.167x
0.5003x = 0.745
X = 1.489'

SAND

-3.849	182.567
-3.0	182.284
0	182.344
3	182.404
3.958	182.723
0	182.644
-3.849	182.567

A_1 = 2.071 sm

DENSE GRADED

0	183.084
-3.0	183.029
-5.11	182.987
-3.849	182.567
0	182.644
3.958	182.723
4.489	182.900
3.0	183.149
0	183.089

A_2 = 3.740 sm - 0.87 sm = 2.870 sm

MATCH MAINLINE @ 3+006.1 = 3+010

DATUM

VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/XSECTIONS-CAMBRIDGE.DWG

THE LOUIS BERGER GROUP, INC.

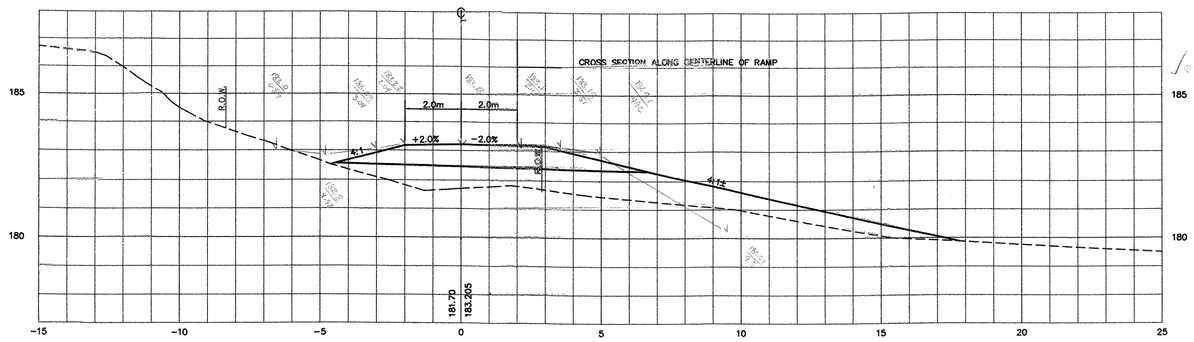
CAMBRIDGEPORT ROAD SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 101A OF 116

101A

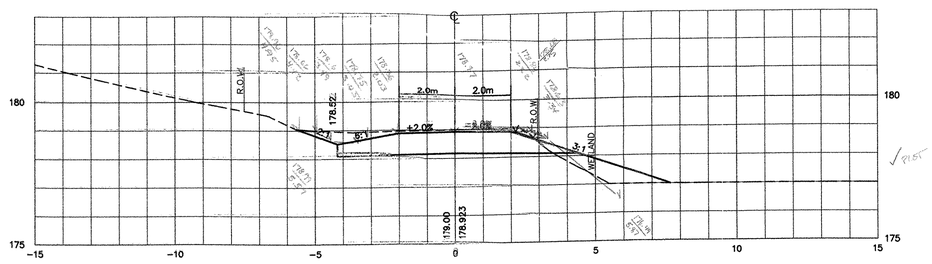
Metric

6+052 SAME COMMON AS 6+050



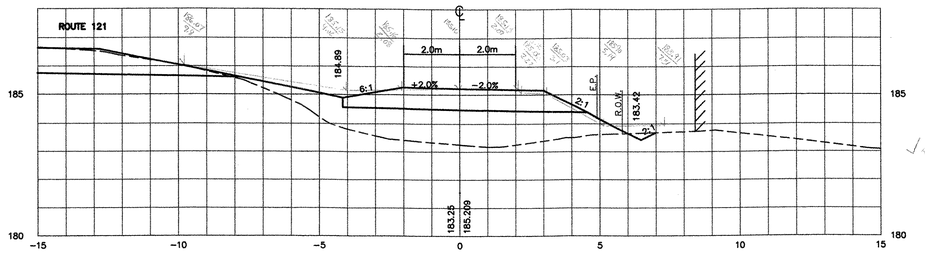
* NO COMMON EXCAVATION

6+020



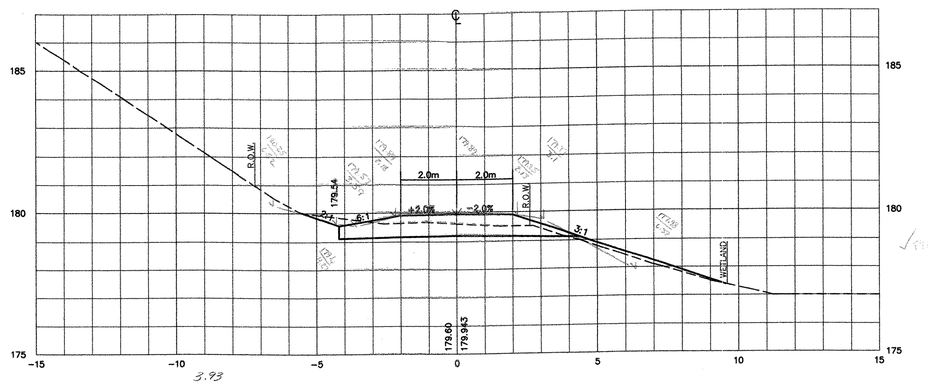
6.32
6.45
6.51
6.43

6+050



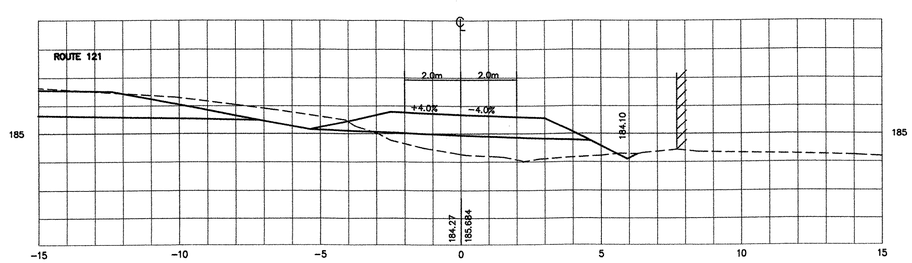
* NO EXCAVATION

6+010

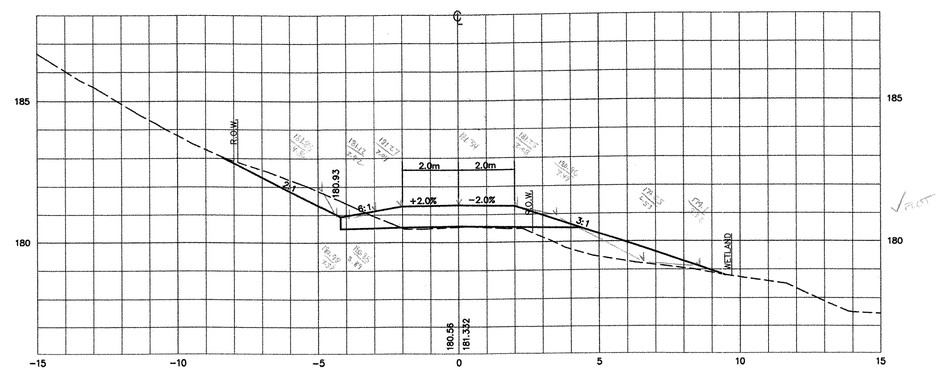


3.93
3.87
3.87
3.89 SM

6+040



6+007



1.10
1.29
1.16
1.18 SM

6+030

2/9/06

SCHOOLHOUSE ROAD SECTIONS

PROJECT: GRAFTON–ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/02
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 102 OF 116

DATUM

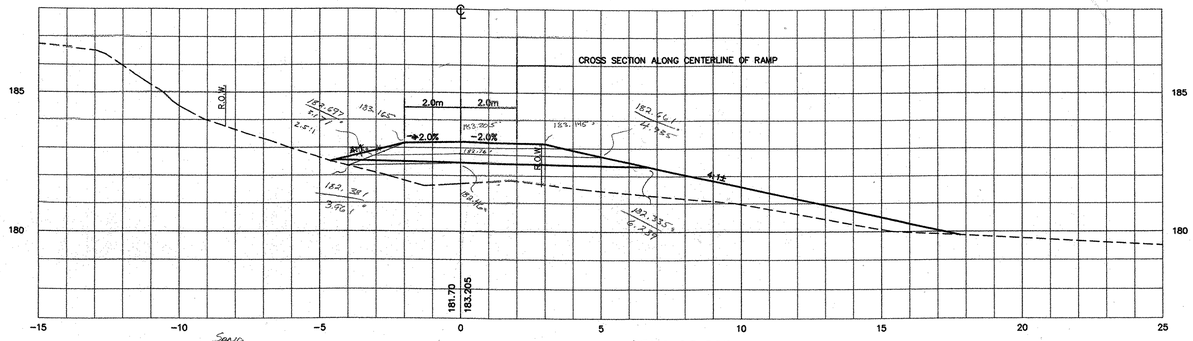
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–SKOOL.DWG

THE LOUIS BERGER GROUP, INC.

Metric



SAND	
0	182.76
-3.171	182.697
-3.961	182.381
0	182.460
6.237	182.335
4.935	182.661
0	182.760

A_1 = 2.716 sm

6+020

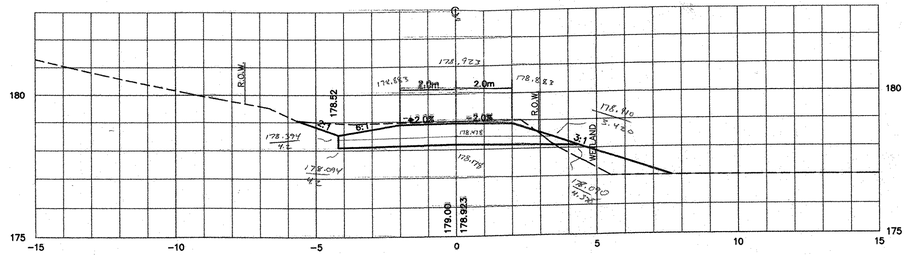
PAVEMENT = 0.58 sm

FINE-GRADING = 8.106 m

DENSE GRADED	
0	183.205
-2.0	183.165
-3.171	182.697
0	182.760
4.935	182.661
3.0	183.145
0	183.205

A_2 = 2.916 sm − 0.58 sm

= 2.336 sm



SAND = 2.431 sm

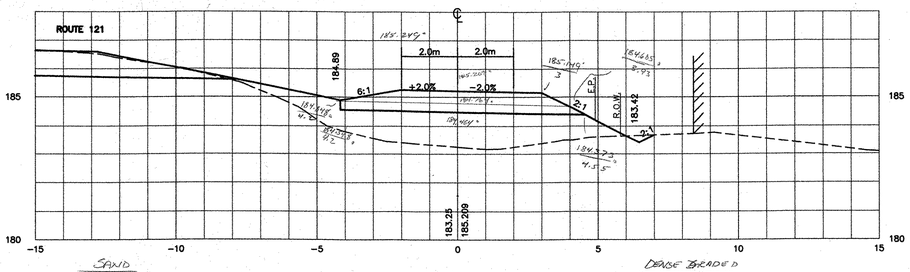
DENSE GRADE = 2.144 sm

6+050

PAVEMENT = 0.58 sm

FINE-GRADE = 7.62 m

ZERO @ 6+054



SAND	
0	184.764
-4.2	184.848
-4.2	184.548
0	184.464
4.55	184.373
3.93	184.685
0	184.764

A_1 = 2.531 sm

6+010

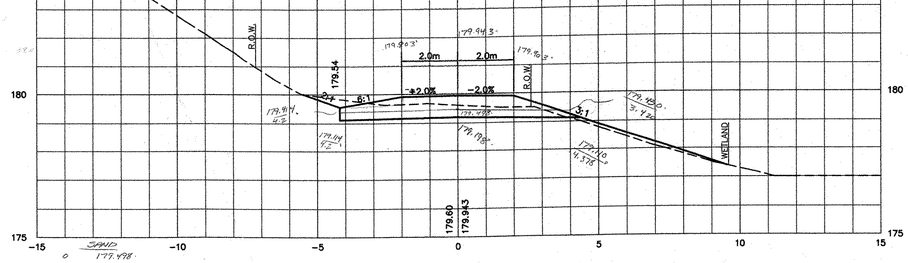
PAVEMENT = 0.58 sm

FINE-GRADING = 8.13 m

DENSE GRADED	
0	185.209
-2.0	185.249
-4.2	184.390
-4.2	184.848
0	184.764
3.93	184.685
3.0	185.149
0	185.209

A_2 = 2.968 sm − 0.58 sm

= 2.388 sm



SAND	
0	179.498
-4.2	179.414
-4.2	179.114
0	179.198
4.378	179.110
3.42	179.430
0	179.498

A_1 = 2.431 sm

6+040

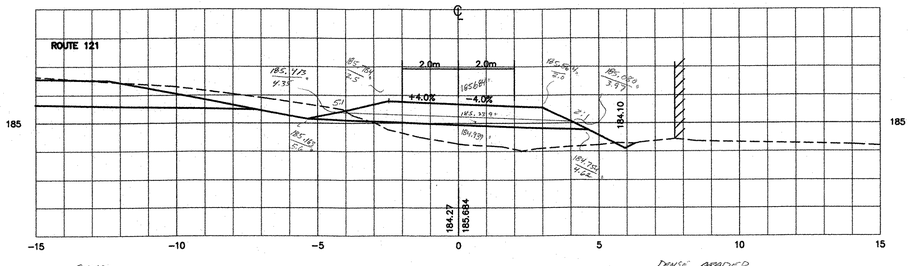
PAVEMENT = 0.58 sm

FINE-GRADING = 7.62 m

DENSE GRADE	
0	179.943
-2.0	179.903
-4.2	179.540
-4.2	179.414
0	179.498
3.42	179.430
2.0	179.903
0	179.943

A_2 = 2.724 sm − 0.58 sm

= 2.144 sm



SAND	
0	185.239
-4.35	184.413
-5.6	185.163
0	184.939
4.62	184.754
3.57	185.080
0	185.239

A_1 = 2.781 sm

6+007

PAVEMENT = 4m x 0.145m = 0.58sm

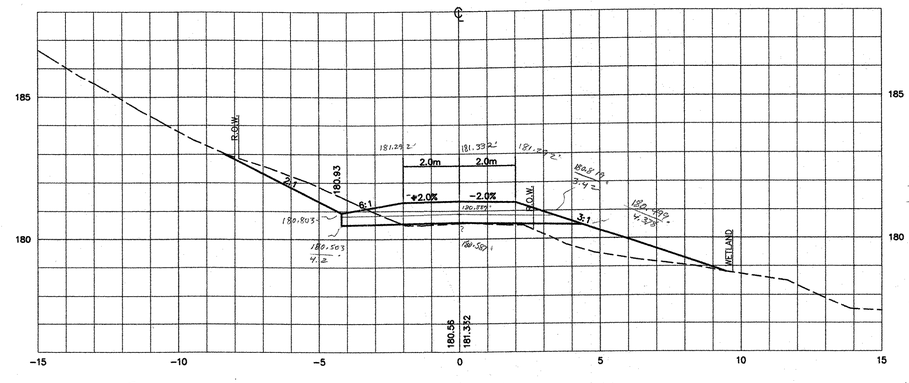
FINE-GRADING = 8.32 m

BATT MAINLINE @ 6+004.5 = 6+007 AREAS

DENSE GRADED	
0	185.684
-2.5	185.784
-4.35	185.413
0	185.239
3.97	185.080
3.4	185.564
0	185.684

A_2 = 3.075 sm − 0.58 sm

= 2.495 sm



SAND	
0	180.887
-4.2	180.803
-4.2	180.503
0	180.587
4.378	180.499
3.42	180.819
0	180.887

A_1 = 2.431 sm

6+030

PAVEMENT = 0.58 sm

FINE-GRADING = 7.62 m

DENSE GRADE	
0	181.332
-2.0	181.292
-4.2	180.930
-4.2	180.803
0	180.887
3.42	180.819
2.0	181.292
0	181.332

A_2 = 2.725 sm − 0.58 sm

= 2.145 sm

CBC 10/28/05

SCHOOLHOUSE ROAD SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S

DESIGN FILE NAME:
IPARM FILE NAME:
SURVEYED BY:
SQUAD LEADER:

PLOT DATE: 12/08/02
SURVEY DATE:
DRAWN BY:
SHEET: 102 OF 116

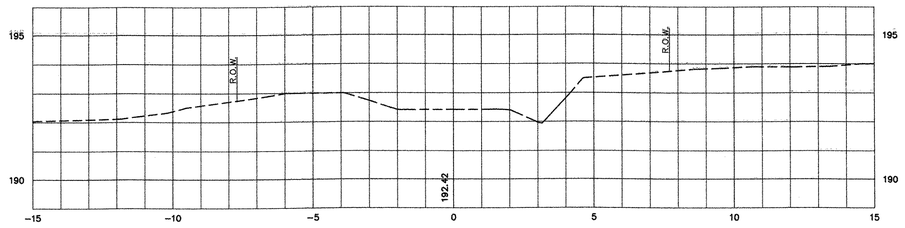
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–SKOOL.DWG

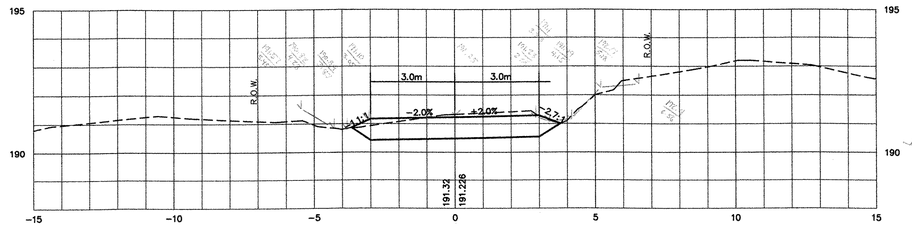
THE LOUIS BERGER GROUP, INC.

10 Z A

Metric

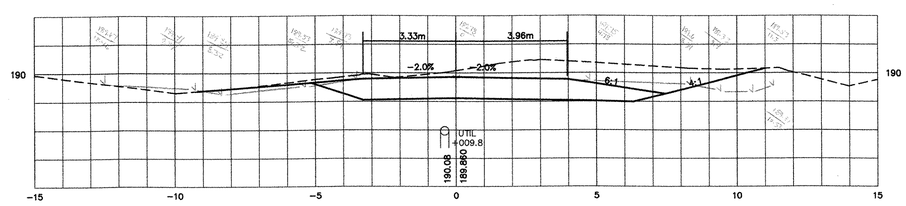


8+030



5.48
5.42
5.53
5.48 sm.

8+020



15.80
15.48
15.80
15.69 sm

8+010

Cbz 2/8/06

MANDIGO ROAD SECTION

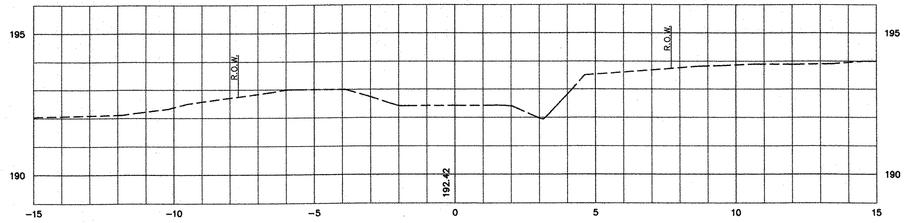
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 103 OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MANDIGO.DWG

THE LOUIS BERGER GROUP, INC.

Metric



ZERO @ 8+030

ZERO SAND @ 8+025

PAVEMENT = 6.0 m x 0.145 m = 0.87 sm

FINE-GRADE = 6.90 m

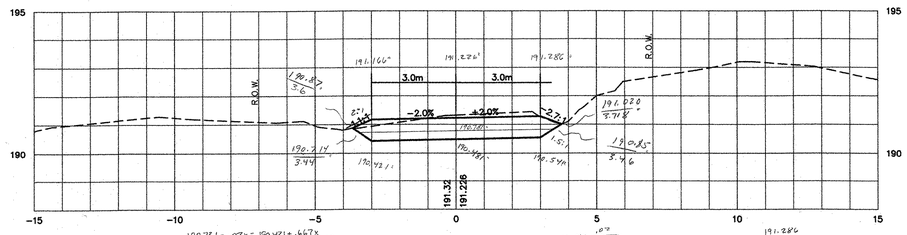
SAND	
0	190.781
-3.44	190.714
-3.0	190.421
0	190.481
3.0	190.541
3.46	190.85
0	190.781

A_1 = 1.937 sm

DENSE GRADE	
0	191.226
-3.0	191.166
-3.6	190.87
-3.44	190.714
0	190.781
3.46	190.85
3.718	191.02
3.0	191.286
0	191.226

A_2 = 3.034 sm − 0.87 sm

= 2.164 sm



8+020

ZERO LEDGE 8+018

190.781 − .07x = 190.421 + .667x

0.3 = 0.667x

0.45 = x

190.841 + .02x = 190.541 + .667y

0.3 = 0.647x

0.46 = x

191.286 − 0.37x = 190.541 + .667y

0.745 = 1.037x

x = 0.719

ITEM 203.16 SOLID ROCK EXCAV.

STA	DIST	AREA	VOL
8+005		0	5.397
	5	2.12883	5.324
8+010		2.1588	
	8	0	8.519
8+018			8.635

73.864 sm

14.032 cm

2.6	
3.46	189.043
0	189.115
-6.4	188.99
-7.0	189.195
-2.7	189.483
-2.5	189.33
0	189.32
1.93	189.057
3.46	189.043
2.6	

2.12883 sm

2.1588 sm

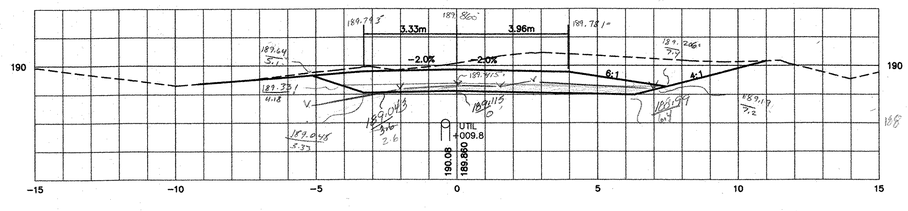
SAND	
0	189.415
-4.18	189.331
-3.33	189.048
0	189.115
6.4	188.99
7.2	189.19
0	189.415

A_1 = 2.897 sm

DENSE GRADE	
0	189.860
-3.33	189.793
-5.1	189.640
-4.18	189.331
0	189.415
7.2	189.19
7.4	189.206
3.96	189.781
0	189.860

A_2 = 4.744 sm − 1.057 sm

= 3.687 sm



8+010

PAVEMENT = 7.79 m x 0.145 m = 1.057 sm

FINE-GRADING = 11.38 m

.102 189.748

.3333 189.046

189.348 − .102x = 189.048 + .3333y

0.3 = 0.3533x

0.85 = x

8+005

ZERO LEDGE

BUTT M.L. @ 8+06.7 = 8+010.

AREAS

11/10/05

11/10/05

11/7/05

11/10/05

MANDIGO ROAD SECTION

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 103 OF 116

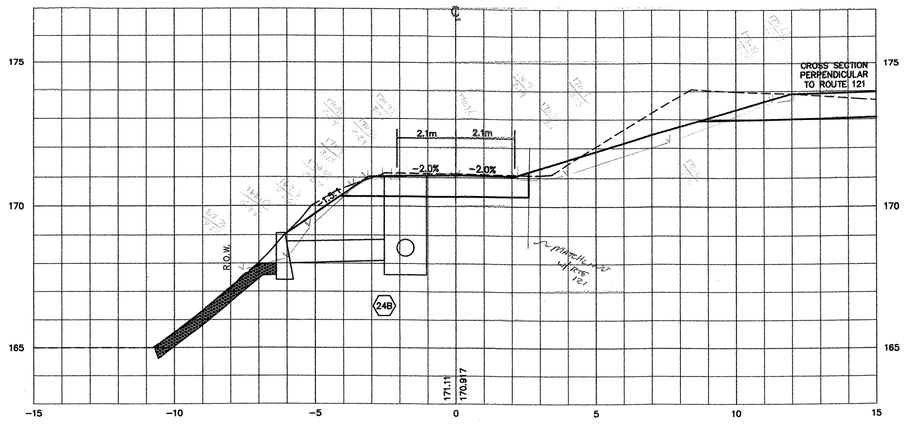
DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MANDIGO.DWG

THE LOUIS BERGER GROUP, INC.

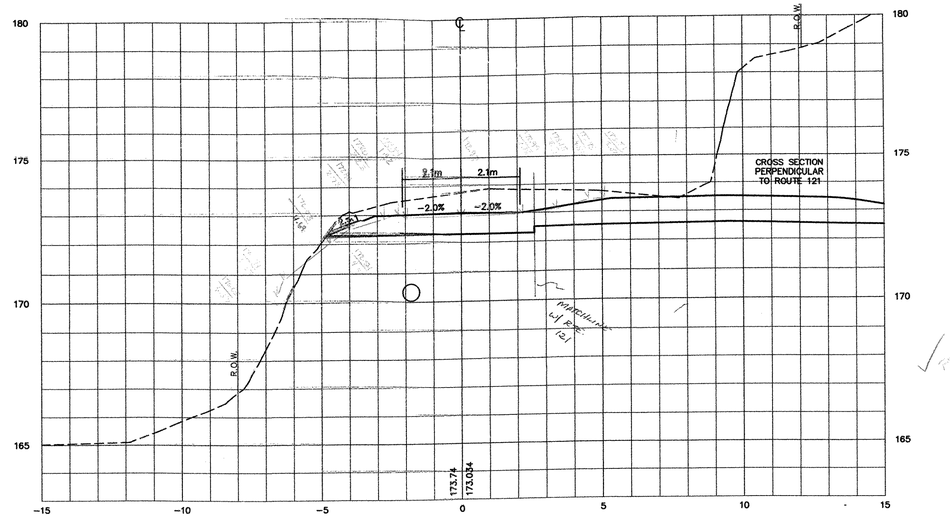
Metric

MATCH 1+077 SAME AS 1+060



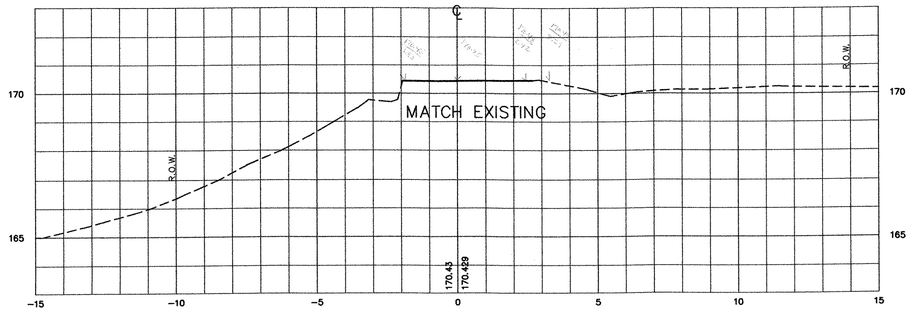
1+040

5.61
5.61
5.68
5.63 sm

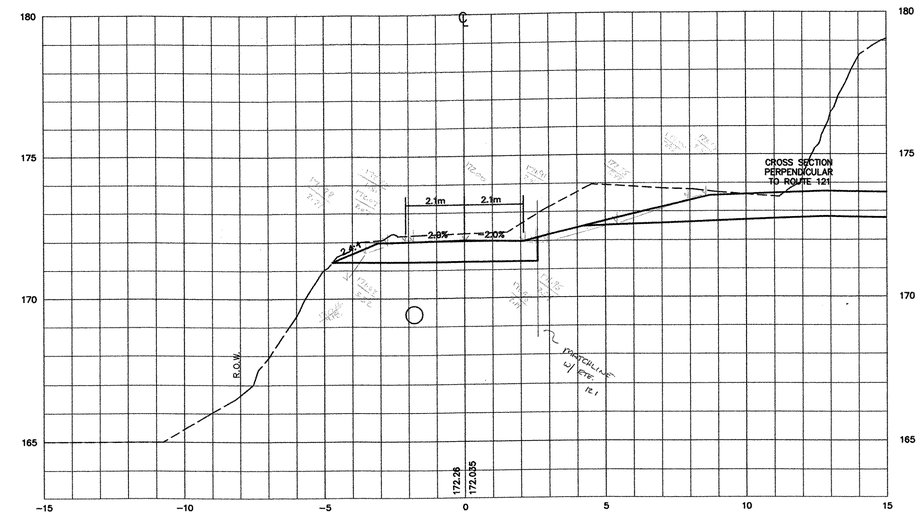


1+060

9.55
9.55
9.61
9.57 sm



1+030



1+050

7.03
7.10
7.03
7.05 sm

CBK 2/5/06

MCBRIDE ROAD WEST SECTION

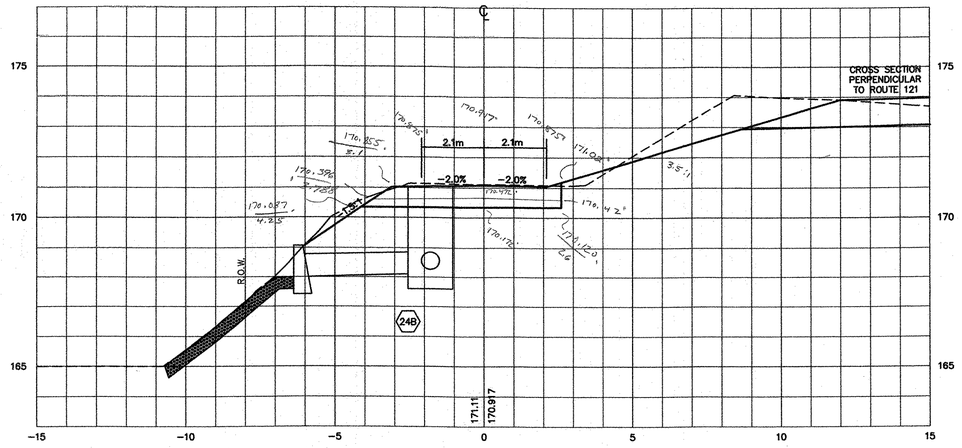
PROJECT: GRAFTON – ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 104 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MCBRIDE WEST.DWG

THE LOUIS BERGER GROUP, INC.

Metric



SAND	
0	170.472
-3.788	170.396
-4.25	170.087
0	170.172
2.6	170.120
2.6	170.420
0	170.472

A_1 = 1.985 sm.

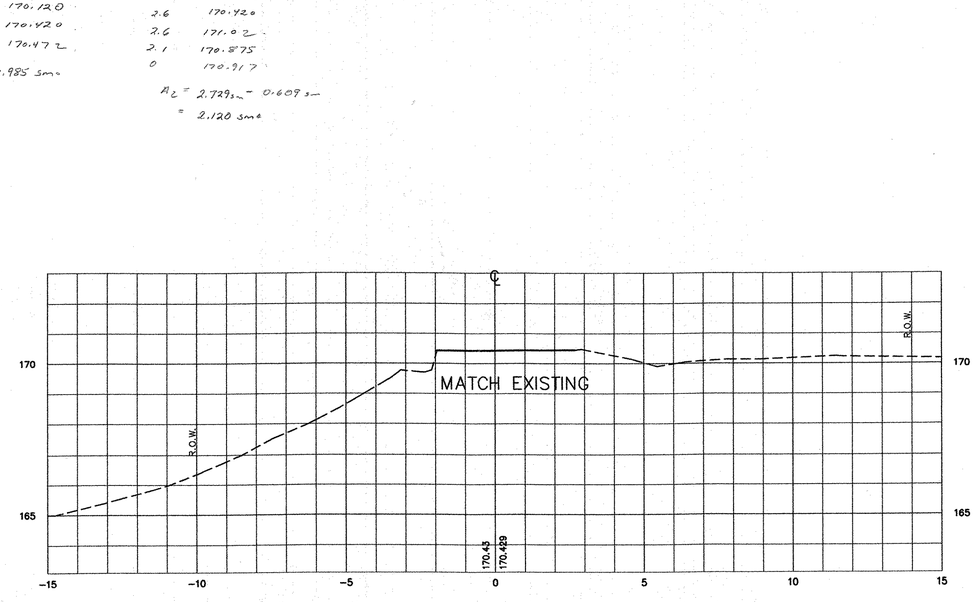
DENSE GRADED	
0	170.917
-3.1	170.855
-3.728	170.396
0	170.472
2.6	170.420
2.6	171.02
2.1	170.875
0	170.917

A_2 = 2.729 sm - 0.609 sm
= 2.120 sm.

1+040

PAVEMENT = 0.145m × 4.2m = 0.609 sm

FINE-GRADING = 6.39 m

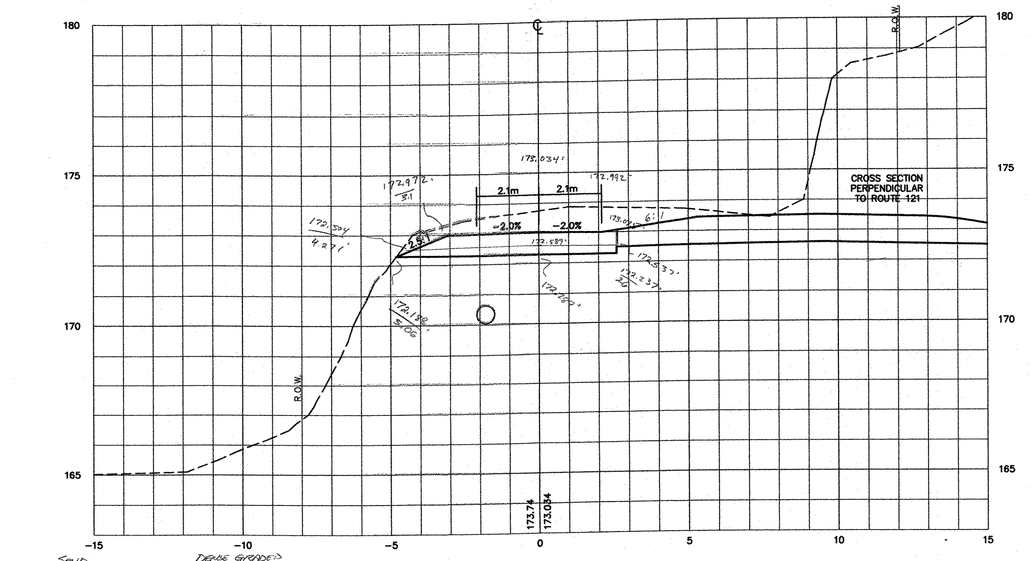


1+030

SAND AREA = 0.3 m × 4.2 m = 1.26 sm.

DENSE GRADED AREA = 0.3 m × 4.2m = 1.26 sm.

FINE-GRADING = 4.2 m.



SAND	
0	172.589
-4.271	172.504
-5.06	172.184
0	172.288
2.6	172.237
2.6	172.537
0	172.589

A_1 = 2.180 sm.

DENSE GRADED	
0	173.034
-3.1	172.972
-4.271	172.504
0	172.589
2.6	172.537
2.6	173.075
2.1	172.992
0	173.034

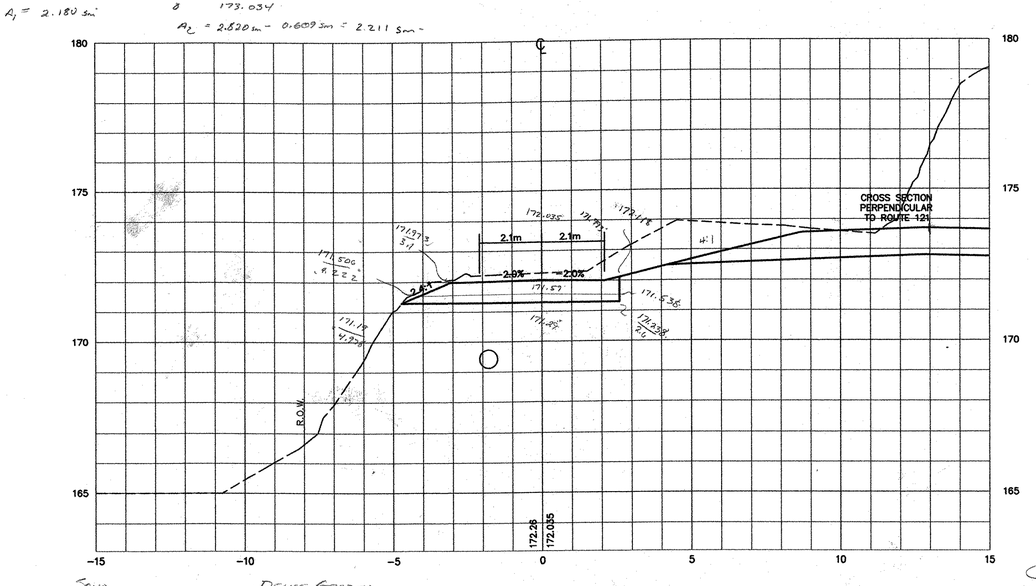
A_2 = 2.820 sm - 0.609 sm = 2.211 sm.

1+060

PAVEMENT = 0.609 sm

FINE-GRADING = 6.871 m.

BUTT MAINLINE @ 1+072 = 1+060



SAND	
0	171.59
-4.282	171.506
-4.978	171.190
0	171.290
2.6	171.238
2.6	171.538
0	171.59

A_1 = 2.162 sm.

DENSE GRADED	
0	172.035
-3.1	171.973
-4.282	171.506
0	171.59
2.6	171.538
2.6	172.118
2.1	171.993
0	172.035

A_2 = 2.819 sm - 0.609 sm = 2.21 sm.

1+050

PAVEMENT = 0.609 sm.

FINE-GRADING = 6.82 m.

11/7/05

11/10/05

MCBRIDE ROAD WEST SECTION

PROJECT: GRAFTON – ROCKINGHAM, ROUTE 121	PROJECT NO. : STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 104 OF 116

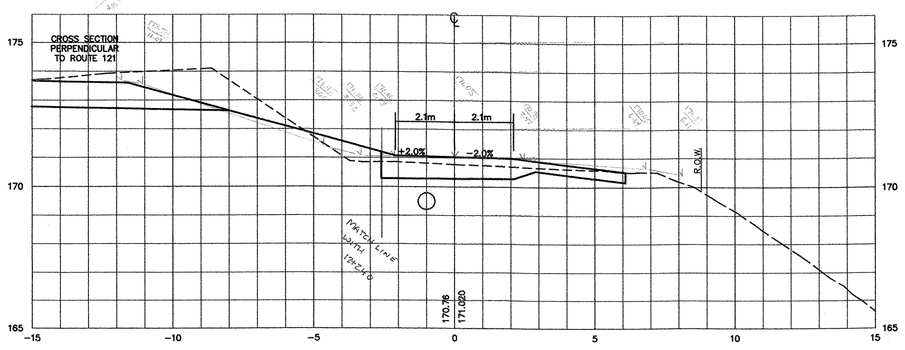
THE LOUIS BERGER GROUP, INC.

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MCBRIDE WEST.DWG

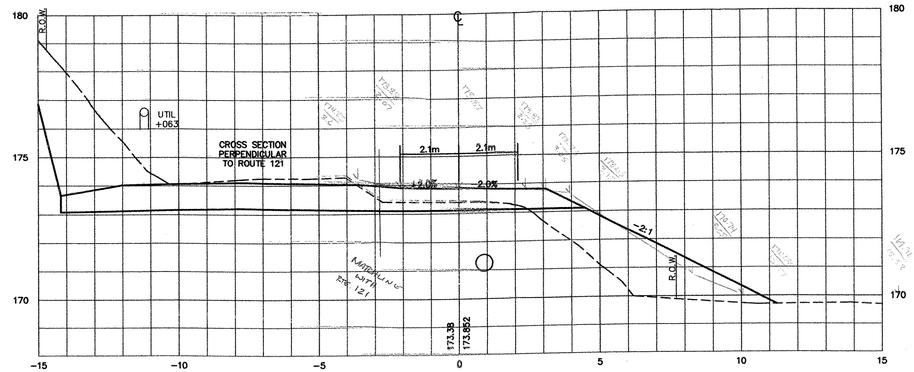
104A

Metric



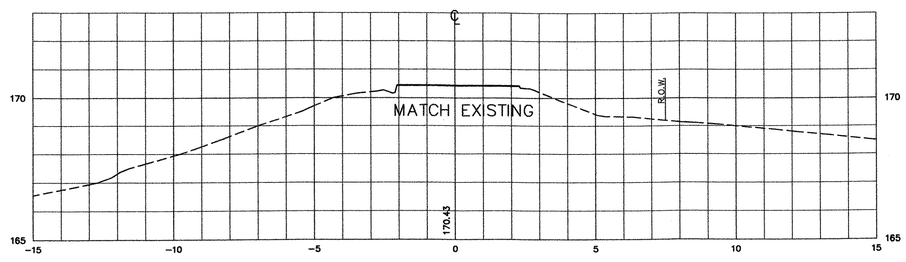
0+040

AREA = 3.48
3.55
3.55
3.53 sm

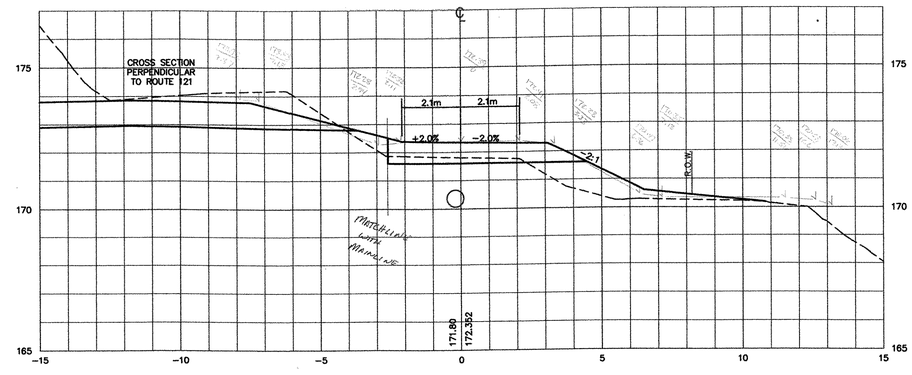


0+060

WB
1.35
1.95
1.39 sm



0+030



0+050

0.97
1.03
0.97
0.99 sm

OBE
2/8/06

MCBRIDE ROAD EAST SECTION

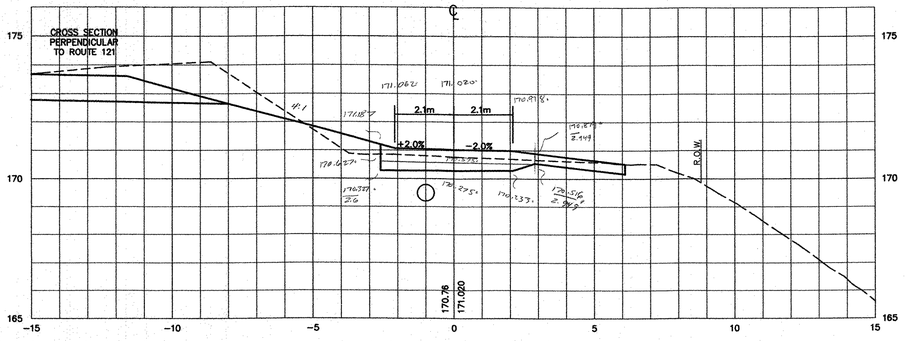
PROJECT:	PROJECT NO. :
GRAFTON – ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 105 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MCBRIDE EAST.DWG

THE LOUIS BERGER GROUP, INC.

Metric



SAND		DENSE GRADED	
0	170.575	0	171.020
-2.6	170.627	-2.1	171.062
-2.6	170.327	-2.6	171.187
0	170.275	-2.6	170.627
2.1	170.233	0	170.575
2.949	170.516	2.949	170.516
0	170.575	2.143	170.878
		2.1	170.878
		0	171.020

A_1 = 1.557 sm

A_2 = 2.463 - 0.609 sm
= 1.954 sm

0+040

PAVEMENT = 0.145m x 4.2m = 0.609 sm

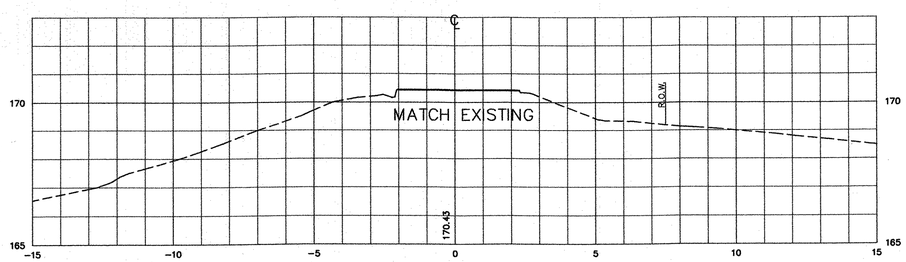
FINE-GRADING = 3.549 m

170.533 - .102 = 170.233 + .3333x

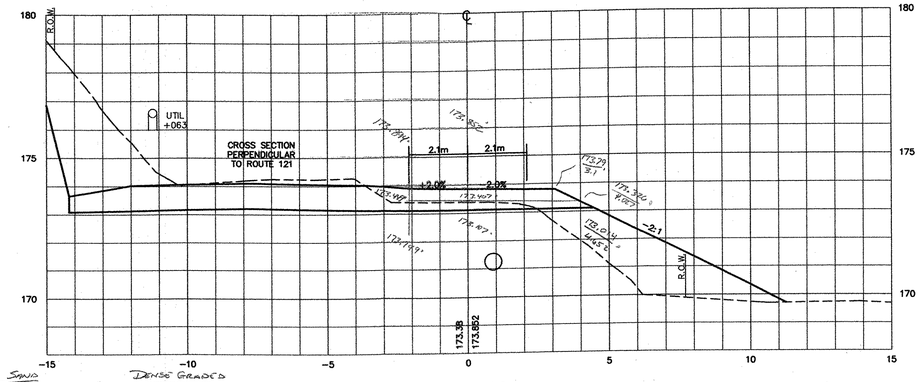
0.3 = 0.3333 x

0.949 = x

BUTT @ 0+035 = 0+040 AREA



0+030



SAND		DENSE GRADED	
0	173.407	0	173.852
-2.1	173.449	-2.1	173.894
-2.1	173.149	-2.1	173.449
0	173.107	0	173.407
4.652	173.014	4.027	173.326
4.027	173.326	3.1	173.798
0	173.407	0	173.852

A_1 = 1.931 sm

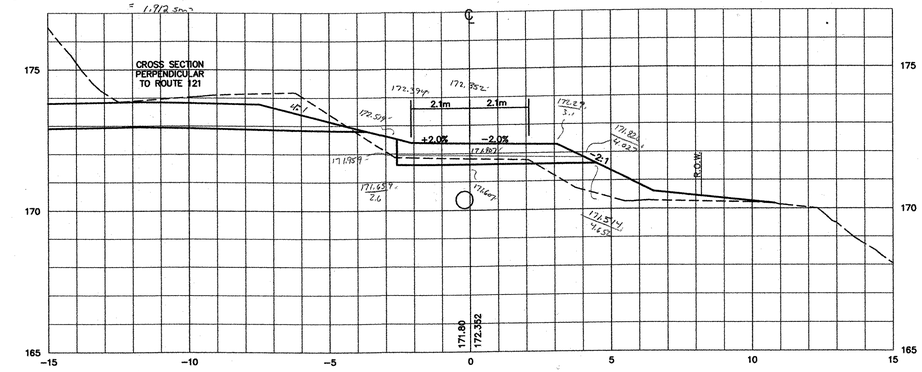
A_2 = 2.521 sm - 0.609 sm
= 1.912 sm

0+060

PAVEMENT = 0.609 sm

FINE-GRADING = 6.127 m

BUTT @ 0+065 = 0+060 A



SAND		DENSE GRADED	
0	171.907	0	172.352
-2.6	171.959	-2.1	172.394
-2.6	171.659	-2.6	172.359
0	171.607	-2.6	171.959
4.652	171.514	0	171.907
4.027	171.826	4.027	171.826
0	171.907	3.1	172.29
		0	172.352

A_1 = 2.081 sm

A_2 = 2.772 sm - 0.609 sm
= 2.163 sm

0+050

PAVEMENT = 0.145m x 4.2m = 0.609 sm

FINE-GRADING = 6.627 m

CBE 11/7/05

11/10/05

MCBRIDE ROAD EAST SECTION

PROJECT:	PROJECT NO. :
GRAFTON – ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 105 OF 116

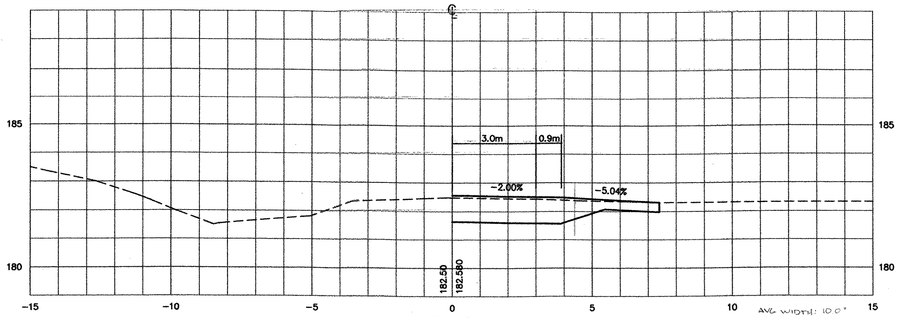
105A

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/XSECTIONS–MCBRIDE EAST.DWG

THE LOUIS BERGER GROUP, INC.

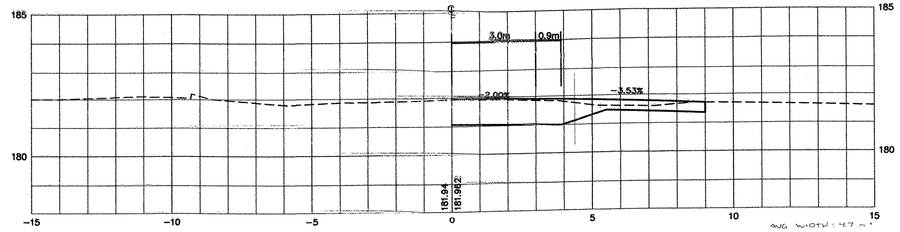
Metric



10+160

AVG WIDTH: 10.0 m

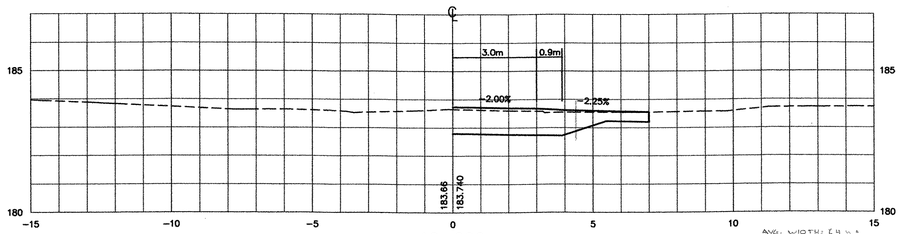
AREA: 1.08
1.10
1.14
3.32/3 = 1.11sm x 10m = 11.10cm ✓



10+263

AVG WIDTH: 4.7 m

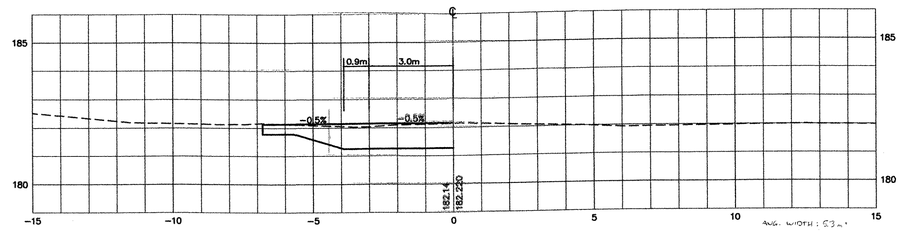
AREA: 1.28
1.22
1.33
3.83/3 = 1.28sm x 4.7m = 6.0cm ✓



10+090

AVG WIDTH: 6.4 m

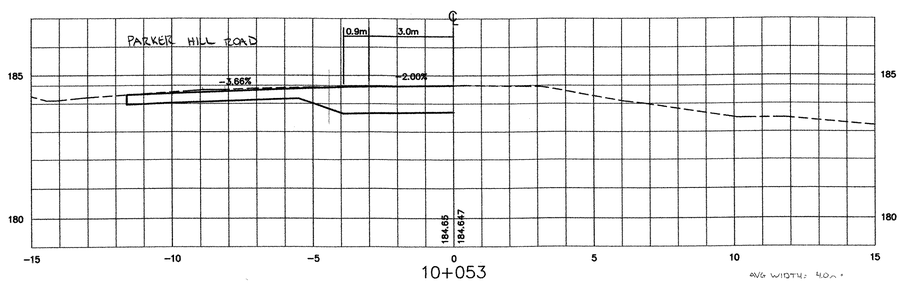
AREA: 1.01
0.99
1.05
3.05/3 = 1.02sm x 6.4m = 6.53cm ✓



10+220

AVG WIDTH: 5.3m

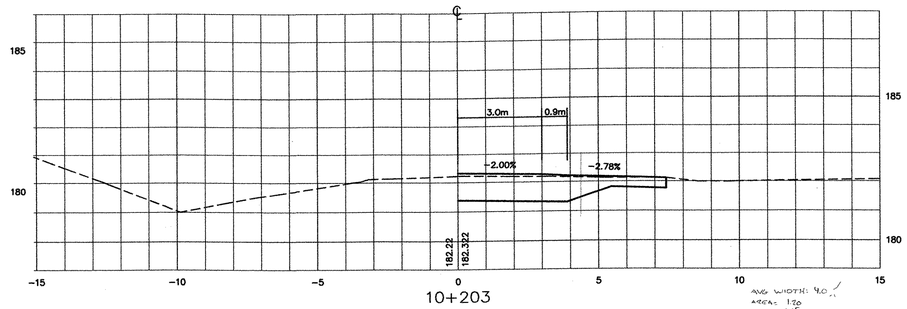
AREA: 1.02
1.02
1.01
3.05/3 = 1.02sm x 5.3m = 5.38cm
5.41cm ✓



10+053

AVG WIDTH: 4.0m

AREA: 1.21
1.20
1.24
3.65/3 = 1.15sm x 4.0m = 12.6cm ✓



10+203

AVG WIDTH: 4.0 m

AREA: 1.20
1.15
1.13
3.48/3 = 1.16sm x 4.0m = 4.64cm ✓

DRIVEWAY CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 106 OF 116

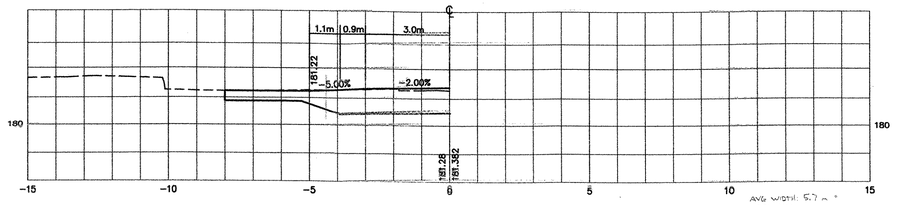
THE LOUIS BERGER GROUP, INC.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLAN/XSECTION–DRIVES.DWG

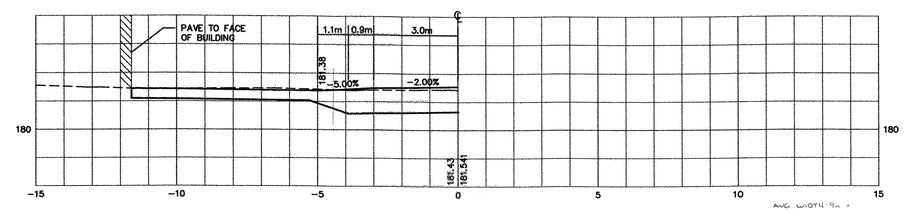
Metric

10+330



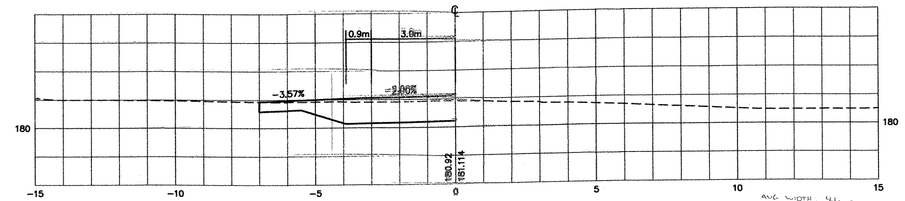
AVG WIDTH: 5.7m
AREA: 1.47
1.48
1.45
4.4/3 = 1.473m² x 5.7m = 8.36m³

10+310

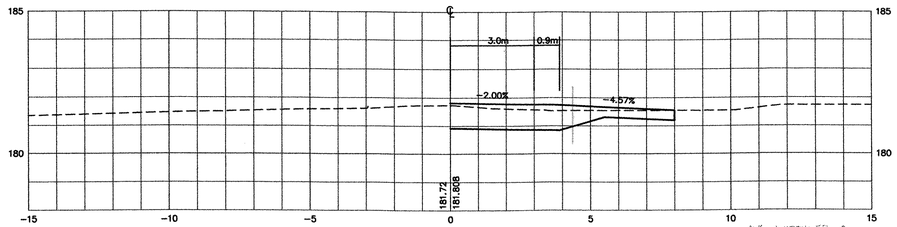


AVG WIDTH: 4.9m
AREA: 2.99
2.96
2.92
8.85/3 = 2.95m² x 9m = 26.55m³

10+374

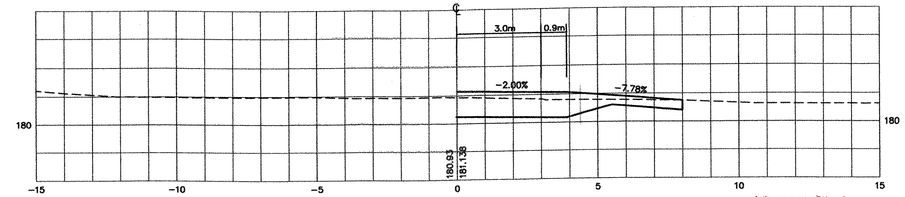


AVG WIDTH: 4.1m
AREA: 0.97
0.97
0.98
2.92/3 = 0.97m² x 4.1m = 3.98m³



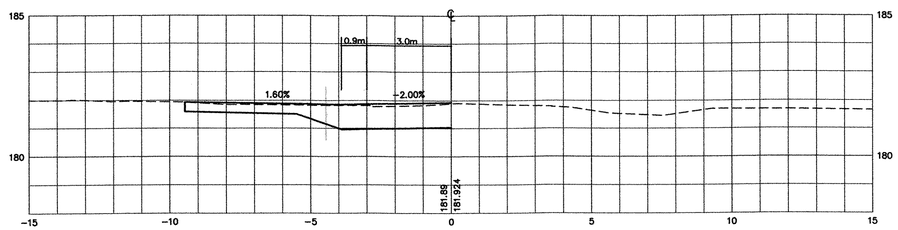
10+286

AVG WIDTH: 5.2m
AREA: 1.18
1.17
1.17
3.54/3 = 1.18m² x 5.2m = 6.14m³



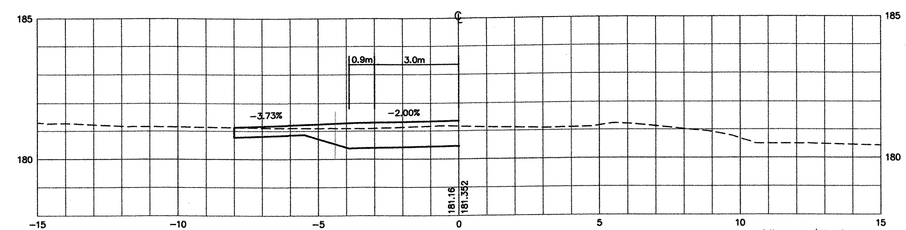
10+371

AVG WIDTH: 7.4m
AREA: 0.96
0.95
0.98
2.89/3 = 0.96m² x 7.4m = 7.10m³



10+269

AVG WIDTH: 4.6m
AREA: 1.81
1.75
1.50
5.36/3 = 1.79m² x 4.6m = 8.22m³



10+344

AVG WIDTH: 4.7m
AREA: 1.18
1.15
1.15
3.48/3 = 1.16m² x 4.7m = 5.45m³

Ved Oke 3/11/04

2/12/04

DRIVEWAY CROSS SECTIONS

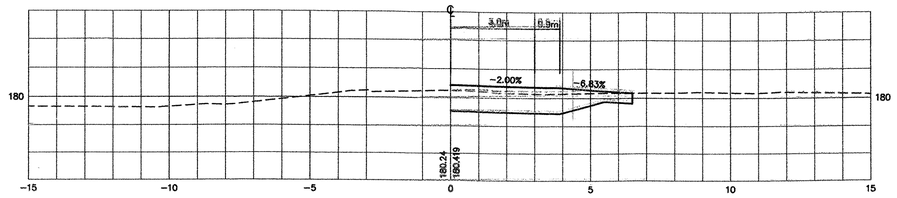
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 107 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLAN/XSECTION–DRIVES.DWG

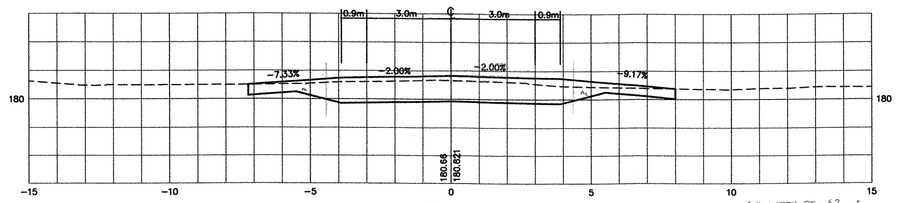
THE LOUIS BERGER GROUP, INC.

Metric



10+467

AVG WIDTH: 9.2m *
AREA: 0.83
0.81
0.83
2.48/3: 0.83sm X 9.2m = 7.61sm



10+411

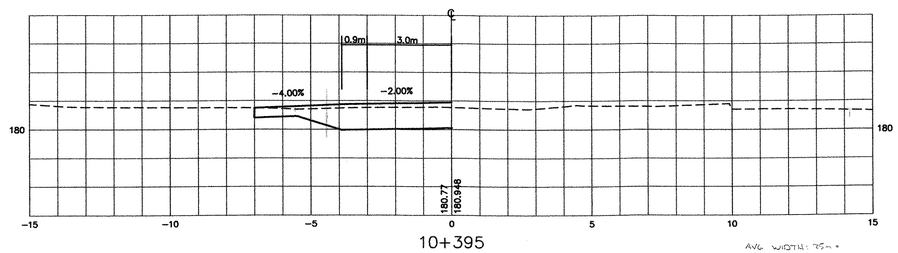
AVG WIDTH RT: 6.2m *

Az: 1.02
1.05
1.03
3.14/3: 1.05sm ✓

AREA: 1.05sm x 6.2m = 13.96sm
6.51sm

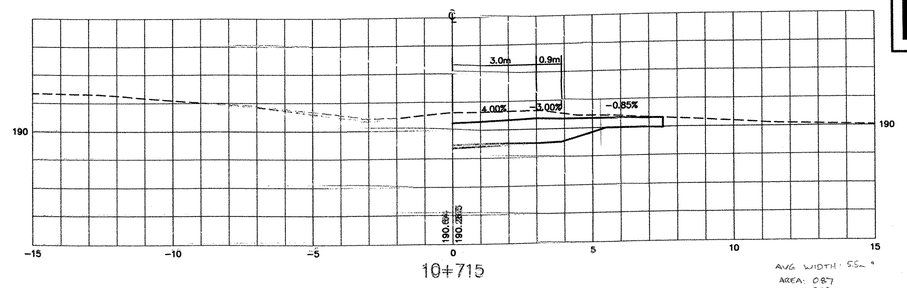
1.0
1.0
1.03
3.03/3: 1.01sm
See Below @ 10+395

4/3/06



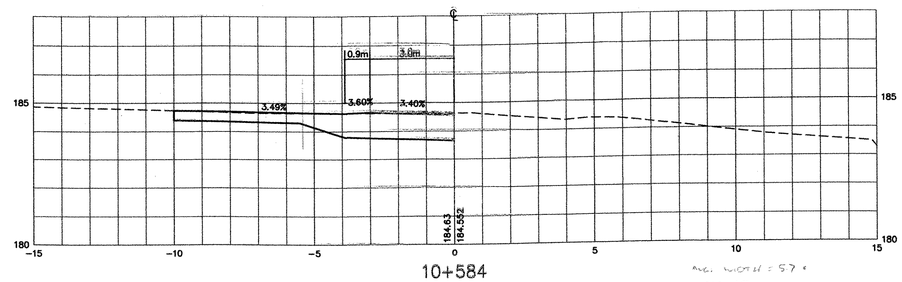
10+395

AVG WIDTH: 7.5m *
AREA: 0.85
0.81
0.84
7.5/3: 0.83sm X 25m = 20.75sm



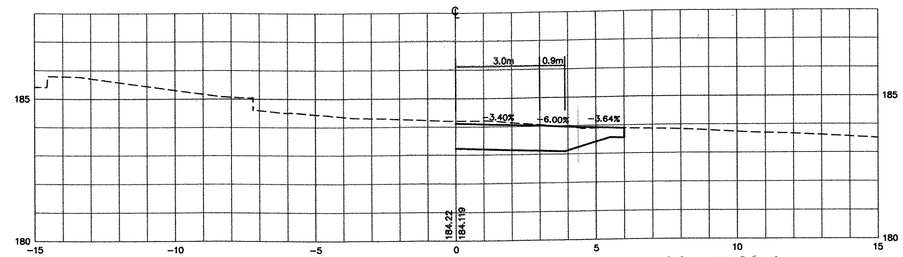
10+715

AVG WIDTH: 5.5m *
AREA: 0.87
0.87
0.86
2.62/3 = 0.87sm X 5.5m = 4.80sm



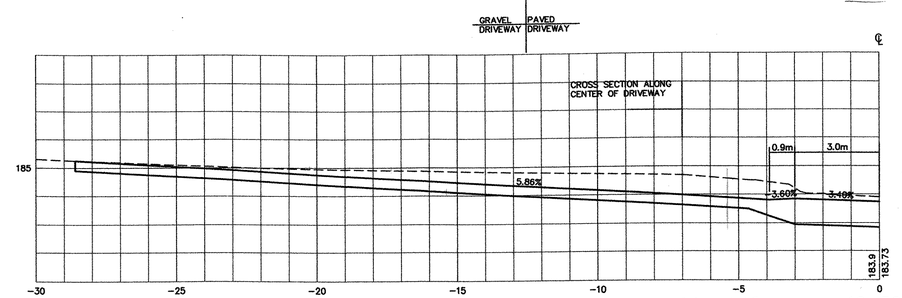
10+584

AVG WIDTH: 5.7m *
AREA: 1.59
1.62
1.61
4.82/3 = 1.61sm X 5.7m = 9.18sm



10+575

AVG WIDTH: 8.5m *
AREA: 0.79
0.82
0.77
2.38/3 = 0.79sm X 8.5m = 6.72sm



10+567

AVG WIDTH: 4.7m *

AREA: 15.65
15.57
15.66
46.88/3 = 15.63sm X 4.7m = 73.45sm

4/27/06

Ved Cert 3/1/06

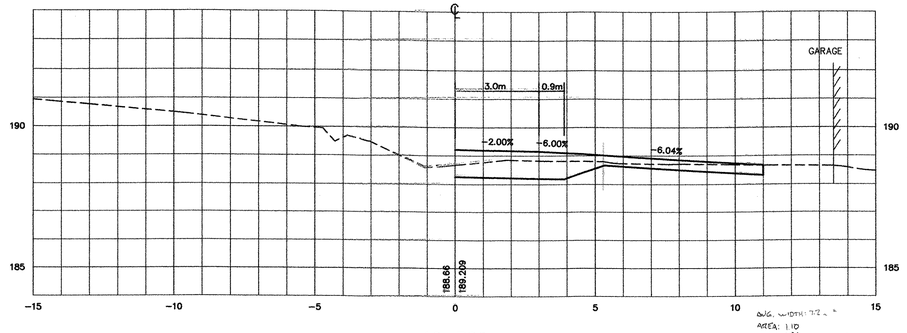
DRIVEWAY CROSS SECTIONS

PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 108 OF 116

THE LOUIS BERGER GROUP, INC.

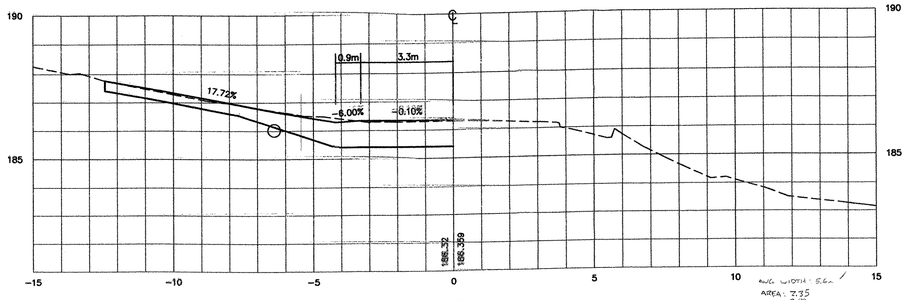
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLAN/XSECTION–DRIVES.DWG



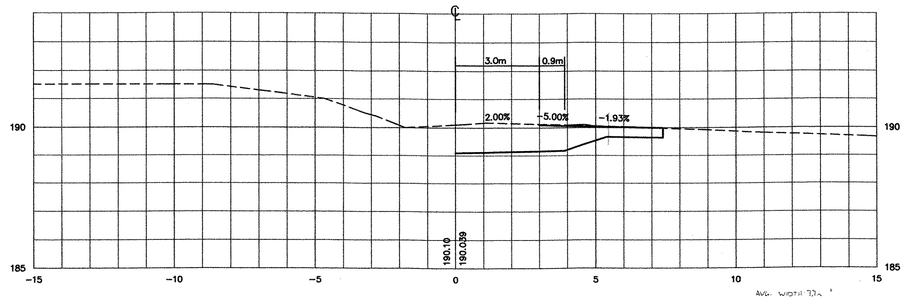
10+780

AVG. WIDTH: 7.2m
AREA: 1.10
1.06
1.07
3.23/3: 1.08m x 7.2m = 7.78m



11+216

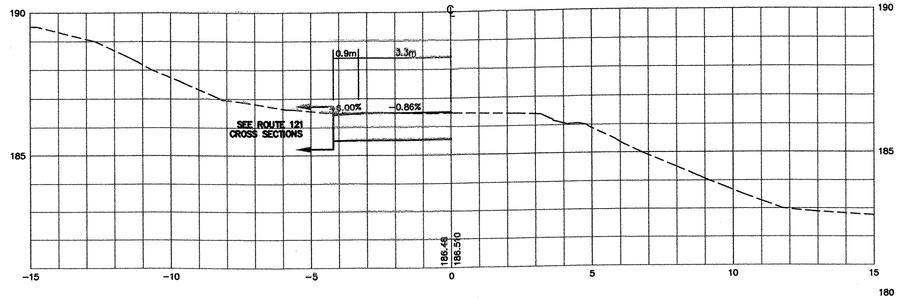
AVG. WIDTH: 5.6m
AREA: 7.35
7.29
7.28
6.92/3: 2.31m x 5.6m = 12.94m



10+756

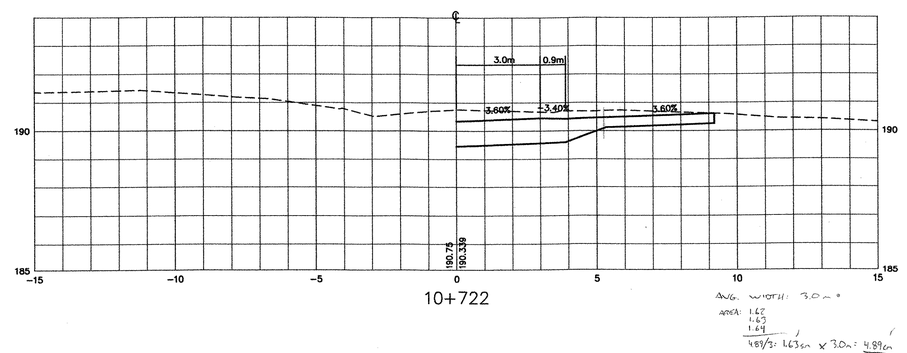
AVG. WIDTH: 7.7m
AREA: 0.99
0.96
0.98
1.93/3: 0.98m X 7.7m = 1.78m

10+340 = 109m
10.9m x 7.5m = 38.5m



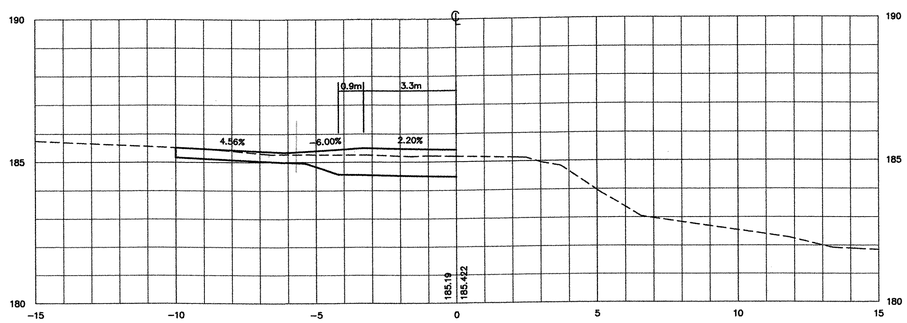
11+208

AVG. WIDTH:



10+722

AVG. WIDTH: 3.0m
AREA: 1.62
1.63
1.64
4.89/3: 1.63m x 3.0m: 4.89m



11+015

AVG. WIDTH: 10m
AREA: 0.99
1.03
0.99
3.01/3: 1.00 sq m x 10m = 10.0cm

10+972 BARN (7x7x.03: 1.47m)

Pd 1
CADD 5/11/06

4/08/06

DRIVEWAY CROSS SECTIONS

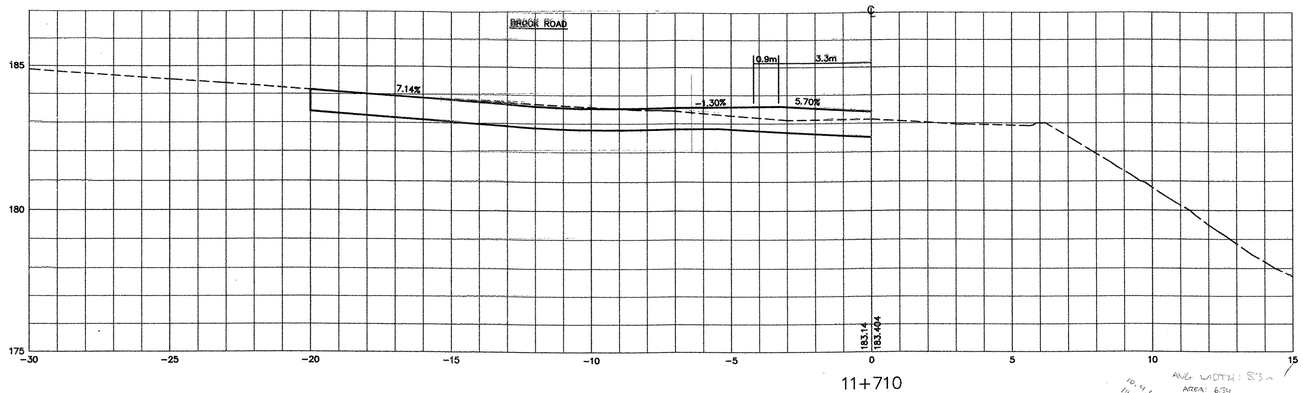
PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	**STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 109 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLAN/XSECTION–DRIVES.DWG

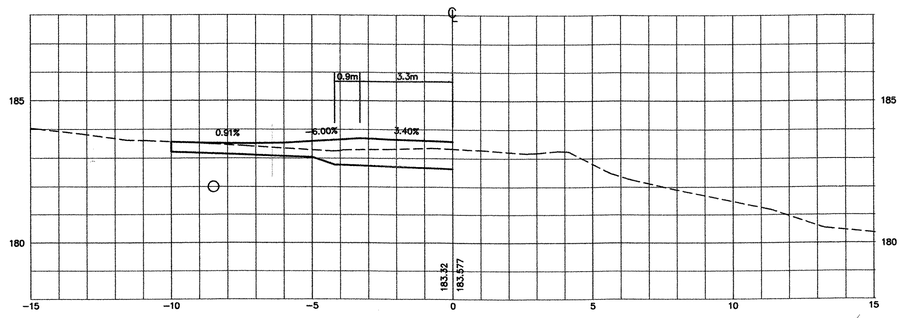
THE LOUIS BERGER GROUP, INC.

Metric



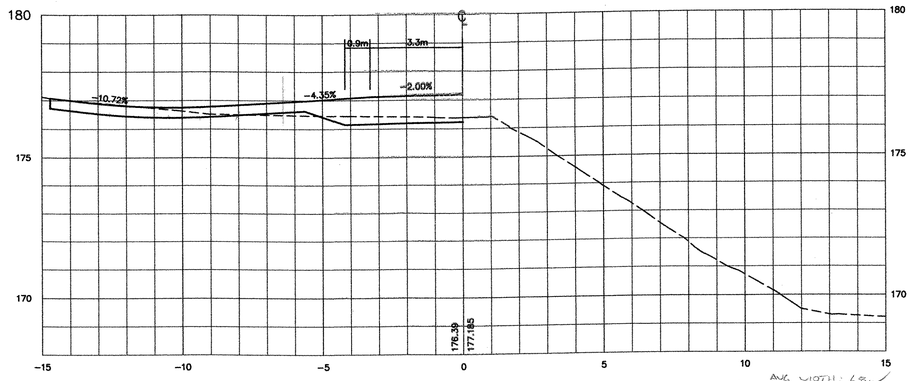
11+710

AVG WIDTH: 8.3m
AREA: 6.34
4.30
6.24
19/3: 6.82m X 8.3m = 52.54m
10.42
86.49 cm



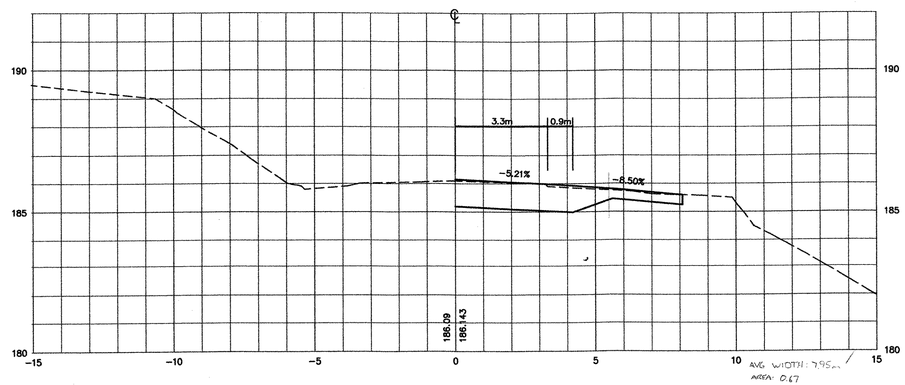
11+690

AVG WIDTH: 6.1m
AREA: 0.68
0.64
0.68
0.68
1.13
1.13
1.05
1.10 cm
6.1
6.7m X 0.68cm = 4.75cm
6.71 cm



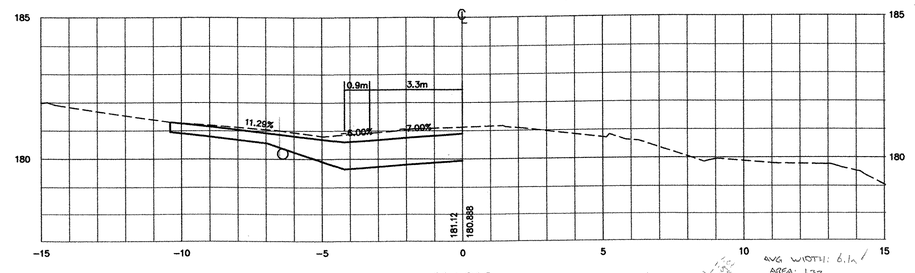
12+443

AVG WIDTH: 6.8m
AREA: 1.21
1.17
1.23
3.6/3: 1.2cm X 6.8m = 8.16cm
1.18
1.80cm
1.80
1.74
1.74
12.24 cm



11+240

AVG WIDTH: 7.95m
AREA: 0.67
0.68
0.69
2.04/3 = 0.68cm X 7.95m = 5.41cm



11+916

AVG WIDTH: 6.1m
AREA: 1.33
1.35
1.36
4.04/3 = 1.35cm X 6.1m = 8.24cm
1.61
1.61
1.61
1.61m
9.82 cm

Vol 6.68 3/1/06

3/1/06

3/1/06

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

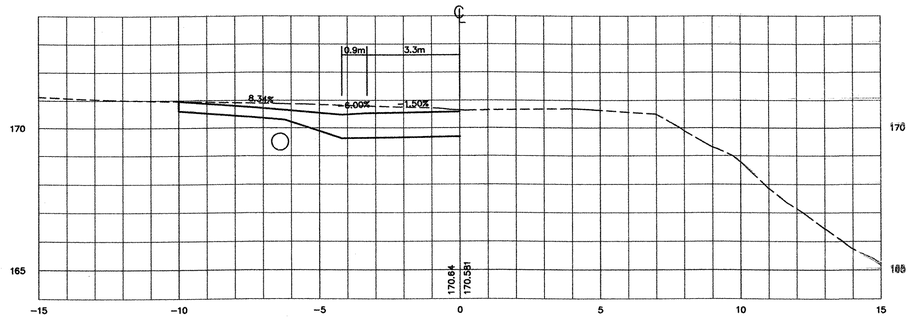
V: /1261/CADD/PLAN/XSECTION-DRIVES.DWG

THE LOUIS BERGER GROUP, INC.

DRIVEWAY CROSS SECTIONS

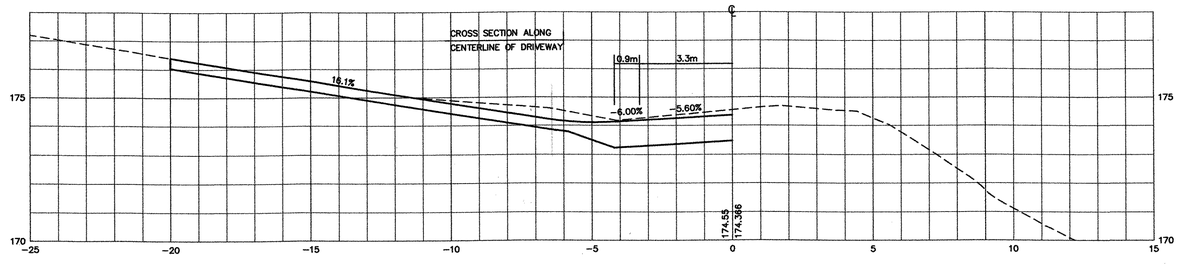
PROJECT:	PROJECT NO. :
GRAFTON-ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 110 OF 116

Metric



12+882

AVG WIDTH: 5.0m



12+618

AVG WIDTH: 6.3m

AREA: 90
909
995
2704/3: 901.5m² x 6.3m = 5676cm
5.68m
35.78cm²

DRIVEWAY CROSS SECTIONS

PROJECT:	PROJECT NO. :
GRAFTON–ROCKINGHAM, ROUTE 121	STP 0126(4)S
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: 111 OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLAN/XSECTION–DRIVES.DWG

THE LOUIS BERGER GROUP, INC.

Metric

WALL CONSTRUCTION NOTES:

GENERAL:

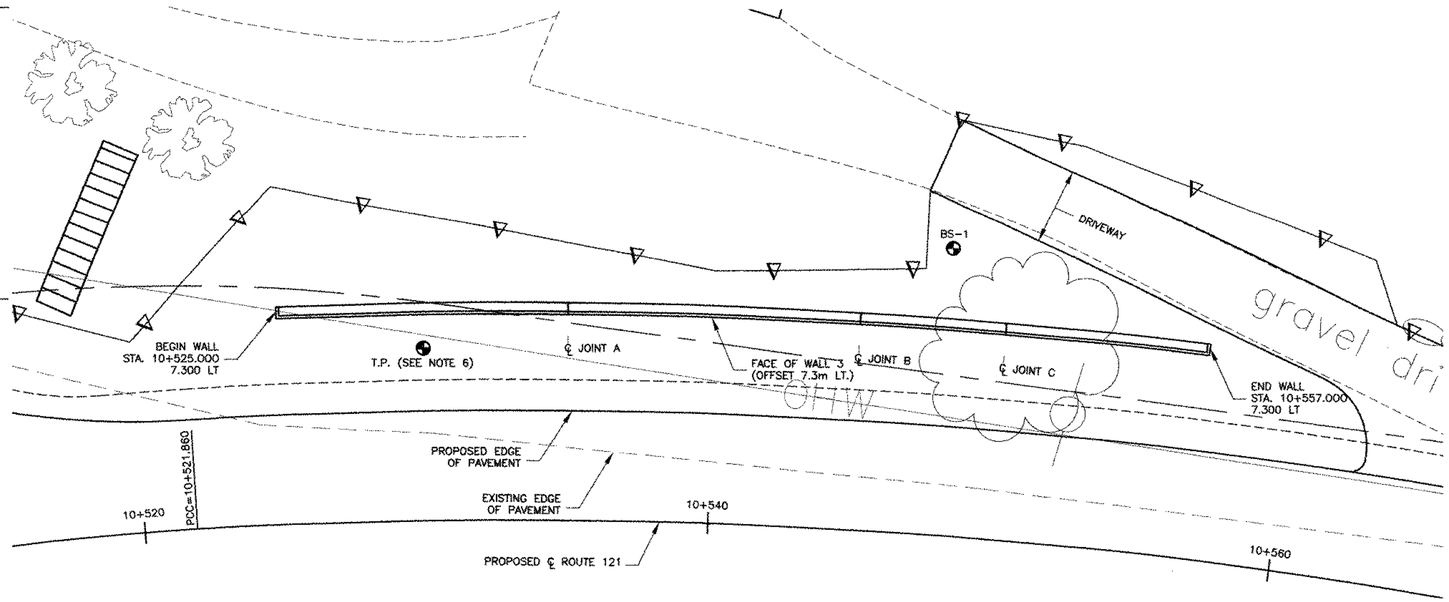
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO STATE OF VERMONT, AGENCY OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION, DATED 2001, AND ITS LATEST REVISIONS, AND THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, DATED 1996, AND ITS LATEST REVISIONS.
2. ALL DIMENSIONS ARE HORIZONTAL OR VERTICAL AND ARE GIVEN AT 68 DEGREES F UNLESS NOTED OTHERWISE.
3. FOR EXISTING SOIL INFORMATION, SEE BORING LOGS PREPARED BY NOBIS ENGINEERING IN THE CONTRACT DOCUMENTS. SEE ROADWAY PLANS FOR BORING LOCATIONS.
4. THE CONTRACTOR SHALL PROVIDE SUFFICIENT SURVEY CONTROL LINES SO THAT THE RETAINING WALLS CAN BE LAYED OUT ACCURATELY.

WALLS ON LEDGE:

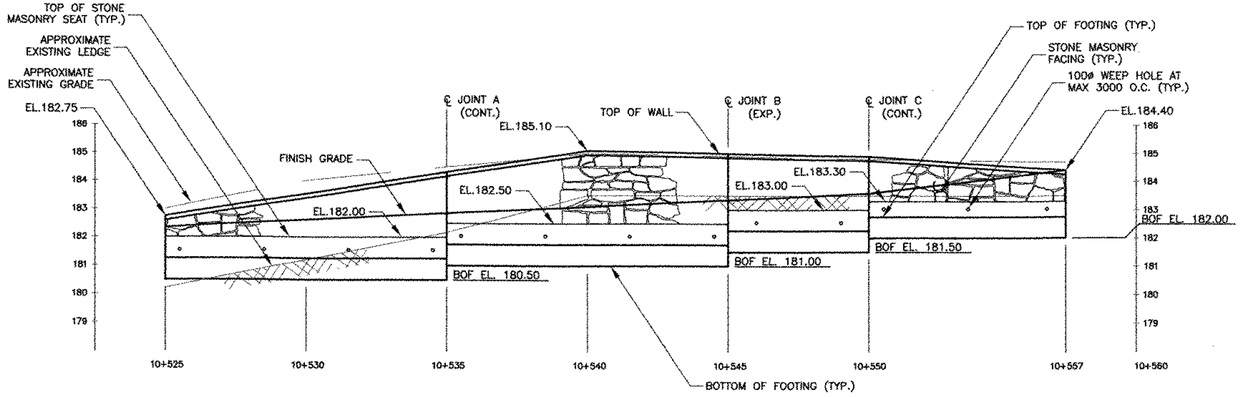
1. WHERE FOOTINGS ARE FOUNDED ON LEDGE, THE LEDGE SHALL BE CLEANED OF ALL LOOSE ROCK AND OTHER DEBRIS. THE LEDGE SHALL BE REMOVED AS REQUIRED TO ENSURE THE FOOTINGS ARE PLACED ON COMPETENT ROCK.
2. WHERE LEDGE IS 300mm OR LESS BELOW THE DESIGN BOTTOM OF FOOTING ELEVATION, THE FOOTING SHALL BE POURED FROM THE TOP OF THE LEDGE USING "CONCRETE CLASS B".
3. THE SUBSTRUCTURE UNITS HAVE BEEN DESIGNED FOR THE BOTTOM OF FOOTING ELEVATIONS AS SHOWN ON THE PLANS. WHEN THE LEDGE ELEVATION IS GREATER THAN 300mm BELOW THE DESIGN BOTTOM OF FOOTING, THE FOOTING SHALL BE FOUNDED ON SOIL.
4. WHERE THE LEDGE ELEVATION IS 300 mm ABOVE THE DESIGN BOTTOM OF FOOTING, THE LEDGE SHALL BE EXCAVATED DOWN TO THE BOTTOM OF FOOTING ELEVATION. ALL OVERBREAKAGE BELOW THIS ELEVATION SHALL BE REPLACED WITH "CONCRETE CLASS B". A MAXIMUM OF 150mm AVERAGE DEPTH OF OVERBREAKAGE REPLACEMENT SHALL BE PAID FOR AS "CONCRETE CLASS B". ANY ADDITIONAL CONCRETE SHALL BE PAID FOR AT THE CONTRACTORS EXPENSE. ALL LEDGE REMOVAL IS PAID FOR UNDER THE ITEM 208.35 – COFFERDAM EXCAVATION (ROCK).
5. IF LEDGE IS GREATER THAN 300 mm ABOVE THE DESIGN BOTTOM OF FOOTING, THE BOTTOM OF FOOTING ELEVATION MAY BE RAISED, BUT THE BOTTOM OF FOOTING MUST REMAIN A MINIMUM OF 1.0M BELOW FINISH GRADE. BEFORE ANY ADJUSTMENT IS MADE TO FOOTING ELEVATIONS THE ENGINEER SHALL BE CONTACTED FOR APPROVAL OF THE CONFIGURATION.
6. MINIMUM BOTTOM OF FOOTING DEPTH BELOW FINISH GRADE WHERE FOUNDED ON SOIL IS 1.5M AND 1.0M WHERE FOUNDED ON LEDGE.
7. BLASTING FOR WALL CONSTRUCTION IS NOT ALLOWED EXCEPT BY APPROVAL OF THE ENGINEER. IF BLASTING IS REQUIRED AND/OR PERMISSIBLE IN THIS LOCATION THEN THE CONTRACTOR SHALL ACT IN ACCORDANCE WITH VERMONT STANDARD SPECIFICATION 501.10 (f).

CONCRETE:

1. THE MINIMUM COVER FOR REINFORCING STEEL IN THE SUBSTRUCTURES SHALL BE 50mm ALONG WALL FACES AGAINST EARTH, AND 75mm ELSEWHERE UNLESS DETAILED OTHERWISE.
2. REINFORCING STEEL PLACEMENT TOLERANCES SHALL BE AS FOLLOWS:
   SPACING +/– 50 mm
   CLEARANCE +/– 6 mm
3. THE KEY IN CONCRETE CONSTRUCTION JOINTS SHALL BE MONOLITHIC AND CONTINUOUS FOR THE FULL LENGTH OF THE JOINT. UPWARD KEYS SHALL BE PLACED INTEGRALLY WITH THE CONCRETE BELOW THE JOINT. JOINTS AND SCORE MARKS IN THE CONCRETE SHALL BE CONSTRUCTED AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
4. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 25 mm X 25 mm.



PLAN
SCALE 1:100



WALL 3 ELEVATION
SCALE 1:100

NOTES:

1. SEE ROADWAY PLAN SHEETS FOR PROJECT LIMITS OF CONSTRUCTION, ROADWAY GEOMETRY, ROADWAY CROSS SECTIONS AND BORING LOCATIONS. SEE THIS SHEET FOR WALL CONSTRUCTION NOTES.
2. WALL OFFSETS TO FACE OF WALL.
3. WALL LENGTHS AND DISTANCE BETWEEN JOINTS ARE BASED ON ROADWAY STATIONING, ACTUAL WALL LENGTHS AT FACE OF WALL ARE SHORTER THAN STATIONING SHOWN.
4. STONE MASONRY FACING ON WALL SHALL NOT COVER THE JOINTS IN THE WALL.
5. REFER TO WALL SHEET 2 FOR WEEP HOLE AND JOINT DETAILS.
   (CONT) = CONTRACTION JOINT.
   (EXP) = EXPANSION JOINT.
6. A TEST PIT (T.P.) TAKEN AT THE LOCATION SHOWN ON 9/26/02 INDICATES THE MATERIAL TO BE A CLEAN BANK RUN GRAVEL. THE TEST PIT WAS DUG TO 1.8 m BELOW EXISTING GRADE AND NO LEDGE WAS ENCOUNTERED.

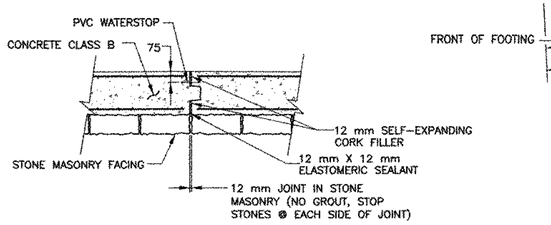
Town Of *GRAFTON – ROCKINGHAM*	Bridge No.
Highway No. *ROUTE 121*	Log Sta. / Surv. Sta.
ROUTE 121	
GENERAL PLAN AND ELEVATION – WALL 3	
Designed By JPB	Drawn By JBB
Checked By JPC Date 12/03	Bridge Design Supervisor / Date
PROJECT *GRAFTON – ROCKINGHAM*	PROJECT NO. *STP 0126(4)–S*
I.G.C. Info. *V:\1261\Cadd\STRUCTURAL\PLANS\WallPlanC2.dwg*	
Wall Sheet No. 1	Sheet 112 of 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

0 1 2 3 4 5
SCALE = 1:200

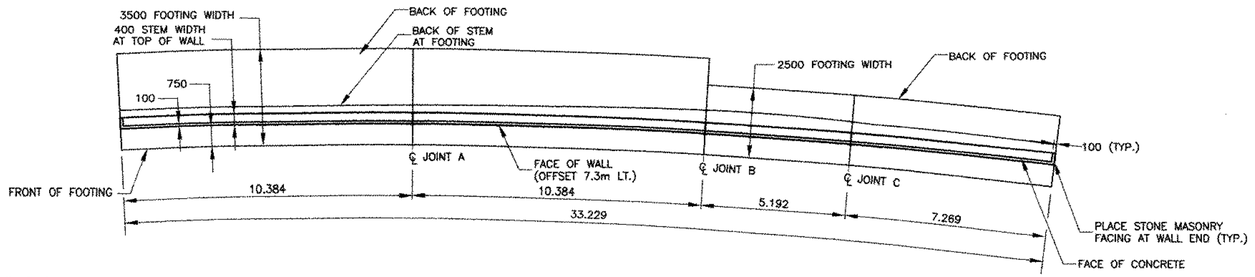
THE LOUIS BERGER GROUP, INC.

Metric



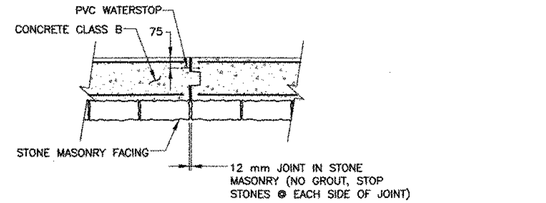
NOTE:
JOINT COMPONENTS (PVC WATERSTOP, CORK FILLER AND SEALANT INCIDENTAL TO ITEM 501.25)

TYPICAL EXPANSION JOINT
SCALE 1:20



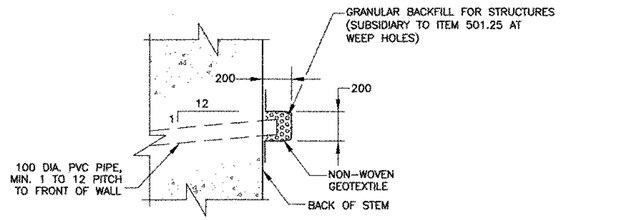
NOTE:
WALL LENGTH DIMENSIONS SHOWN ARE AT FACE OF WALL.

WALL 3 MASONRY PLAN
SCALE 1:10



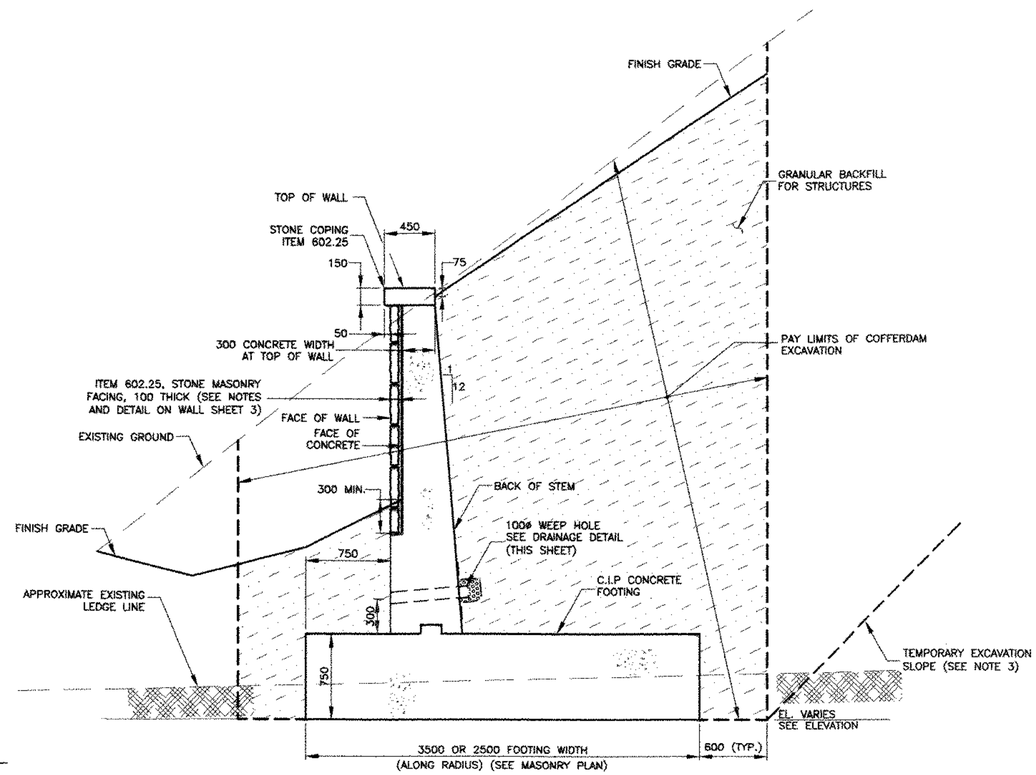
NOTES:
1. REINFORCING STEEL SHALL EXTEND THROUGH THE CONTRACTION JOINT.
2. JOINT COMPONENTS (PVC WATERSTOP, CORK FILLER AND SEALANT INCIDENTAL TO ITEM 501.25)

TYPICAL CONTRACTION JOINT
SCALE 1:20



NOTES:
1. WEEP HOLE COMPONENTS, (PVC PIPE, NON-WOVEN GEOTEXTILE, CONNECTOR, AND GRANULAR BACKFILL) SUBSIDIARY TO ITEM 501.25.
2. PVC PIPE TO EXTEND 25mm MAX OUTSIDE BACK OF WALL. PVC PIPE TO BE FLUSH WITH FACE OF WALL.

DRAINAGE DETAIL
SCALE 1:20



TYPICAL EARTHWORK SECTION
SCALE 1:25

NOTES:
1. PLACE CONTRACTION AND EXPANSION JOINTS THROUGH WALL STEM ONLY.
2. DUE TO PROXIMITY OF ACTIVE DRIVEWAY, A TEMPORARY COFFERDAM SHALL BE ALLOWED. IF USED, THE COFFERDAM WILL BE PAID FOR UNDER 208.40 - COFFERDAM.
3. ANY TEMPORARY EXCAVATION SHALL NOT EXTEND PAST THE PROPOSED RIGHT-OF-WAY OR AFFECT ACTIVE DRIVEWAY.

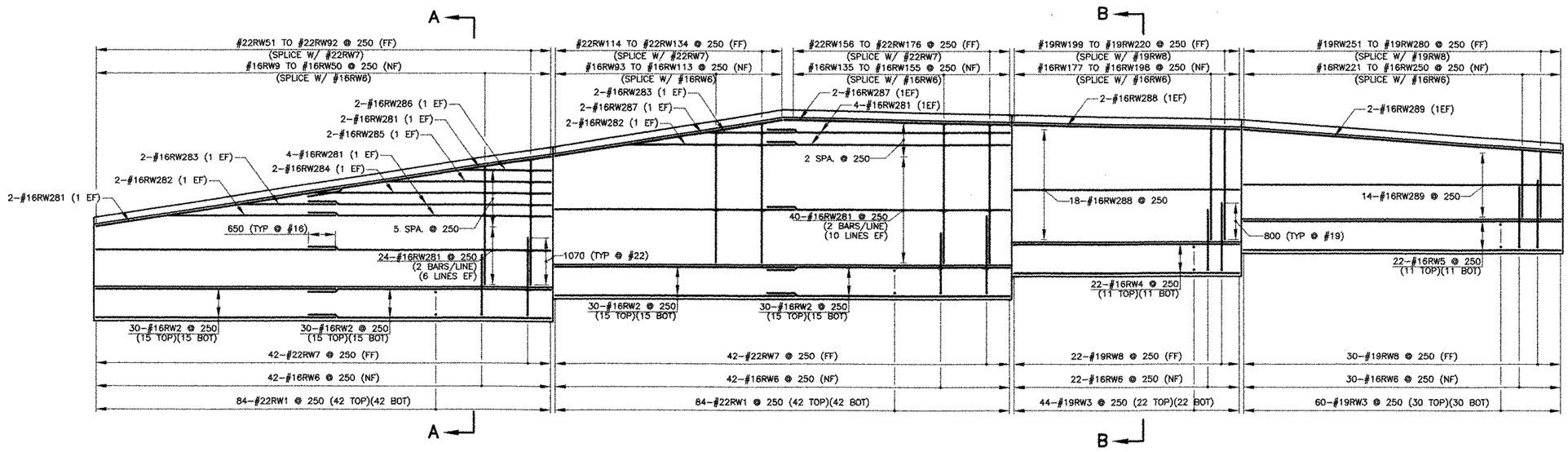
DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

0 1 2 3 4
SCALE = 1:100

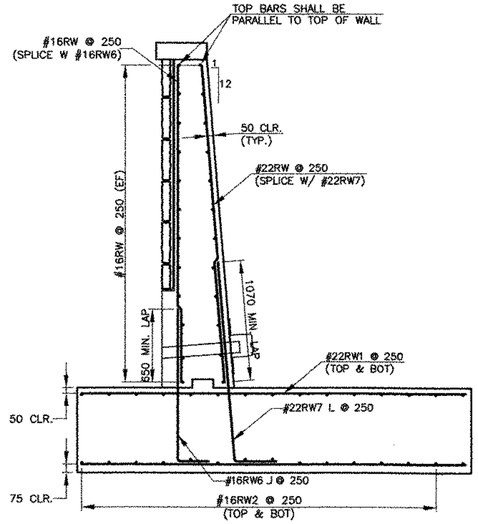
THE LOUIS BERGER GROUP, INC.

Town Of *GRAFTON - ROCKINGHAM*	Bridge No.
Highway No. *ROUTE 121*	Log Sta. / Surv. Sta.
ROUTE 121	
MASONRY PLAN AND DETAILS - WALL 3	
Designed By JPB	Drawn By JBB
Checked By JPC Date 12/03	Bridge Design Supervisor Date
PROJECT *GRAFTON - ROCKINGHAM*	PROJECT NO. *STP 0126(4)-S*
I.G.C. Info. *V:\1261\Cadd\STRUCTURAL\PLANS\WallPlanC2.dwg*	
Wall Sheet No. 2	Sheet 113 of 116

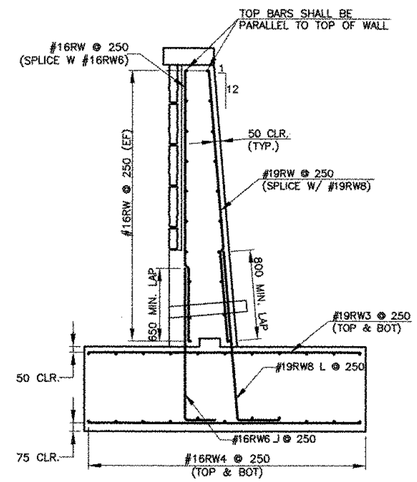
Metric



WALL 3 ELEVATION
SCALE 1:50



SECTION A–A
SCALE 1:25



SECTION B–B
SCALE 1:25

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

0 1 2 3 4 5
SCALE = 1:200

THE LOUIS BERGER GROUP, INC.

Town Of *GRAFTON – ROCKINGHAM*	Bridge No.
Highway No. *ROUTE 121*	Log Sta. / Surv. Sta.
ROUTE 121	
WALL 3 REINFORCING	
Designed By JPB	Drawn By JBB
Checked By JPC Date 12/03	Bridge Design Supervisor / Date
PROJECT *GRAFTON – ROCKINGHAM*	PROJECT NO. *STP 0126(4)–S*
I.G.C. Info. *V:\1261\Cadd\STRUCTURAL\PLANS\WallPlanC2.dwg*	
Wall Sheet No. 3	Sheet 114 of 116

STONE MASONRY NOTES:

1. STONE FACING AND STONE COPING SHALL BE PAID UNDER ITEM 602.25 "STONE MASONRY FACING." THE UNIT BID PRICE SHALL BE FULL COMPENSATION FOR ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY.

2. ALL EXPOSED FACES OF WALLS SHALL BE FACED WITH STONE UNLESS NOTED OTHERWISE. THE STONE FACING SHALL EXTEND BELOW GROUND TO THE SHELF ELEVATION SHOWN ON THE PLANS.

3. LAYOUT DIMENSIONS SHOWN ON THE PLANS ARE TO THE OUTSIDE FACE OF THE STONE FACING OR TO THE FACE OF CONCRETE IF NO STONE FACING IS PRESENT. ADDITIONAL DIMENSIONS NEEDED BY THE CONTRACTOR WILL BE SUPPLIED UPON REQUEST.

4. ALL STONE SHALL BE DARK WARM GRAY COLOR STONE AND BE IN ACCORDANCE WITH SUBSECTION 706.02 "STONE FOR MASONRY FACING." ALL STONE SHALL BE CONSISTENT IN COLOR AND TAKEN FROM THE SAME QUARRY. BLUE-GRAY BLASTED SLATE LEDGE WILL NOT BE ACCEPTED. THE NAME OF THE QUARRY SHALL BE SUBMITTED TO THE RESIDENT ENGINEER. THE STONE SHALL BE SIMILAR IN LOOK AND APPEARANCE TO THE WALL CONSTRUCTED AT THE INTERSECTION OF PLEASANT VALLEY ROAD AND ROUTE 121.

5. THE STONE SHALL BE CLASSIFIED AS IRREGULAR WITH A "ROUGH FINISH" (SURFACES IN WHICH THE VARIATIONS FROM THE PITCH LINE DO NOT EXCEED 13mm). THE NOMINAL DIMENSIONS OF THE STONES WILL BE 150mm TO 450mm VERTICAL, 300mm TO 1000mm HORIZONTAL AND 50 TO 75mm THICK. VERTICAL DIMENSION MAY VARY WITHIN EACH STONE. A VARIETY OF STONE SIZES WITHIN THE GIVEN LIMITS SHALL BE PROVIDED. THE PATTERN SHALL BE RANDOM AS SHOWN ON THE DETAIL ON THIS SHEET. THE STAGGERED STONE PATTERN MUST BE MAINTAINED OVER ANY HORIZONTAL CONSTRUCTION JOINTS IN THE CONCRETE.

6. STONE COPING SHALL BE SQUARED WITH A ROUGH FINISH. STONE COPINGS SHALL BE A UNIFORM THICKNESS OF 200mm, 450mm WIDE AND LENGTHS OF 1.0-2.0M. COPING JOINTS SHALL BE 13mm MAX THICKNESS.

7. THE JOINT MATERIAL SHALL CONFORM TO SPECIFICATIONS IN ITEM 707.02 "MORTAR, TYPE II". THE MAXIMUM JOINT THICKNESS SHALL BE 25mm. JOINT RECESSES SHALL BE 50mm MIN. FROM FACE OF WALL AND 75mm MAX. THE SPACE BETWEEN THE BACK FACE OF STONE AND THE FRONT FACE OF THE CONCRETE SHALL BE COMPLETELY FILLED WITH MORTAR, TYPE II. PROVIDE ACRYLIC ADMIXTURE TO MORTAR MIX BY "SIL-PRO" OR APPROVED EQUAL. PROVIDE SAMPLE FOR COLOR & APPLICATION, SEE NOTE 18.

8. ANCHORS CONNECTING THE STONE TO THE CONCRETE SHALL BE PLACED ACCORDING TO SHOP DRAWINGS SUPPLIED FROM THE GENERAL CONTRACTOR OR THE SUBCONTRACTOR PERFORMING MASONRY WORK. TYPICAL STONE PLACEMENT AROUND SHARP CORNERS SHALL ALSO BE SHOWN ON SHOP DRAWINGS. THE MASONRY CONTRACTOR SHALL BE ABLE TO DEMONSTRATE 3 YEARS OF PRIOR EXPERIENCE WITH SIMILAR MASONRY INSTALLATION. THE SHOP DRAWINGS DETAILING THE ANCHOR SYSTEM SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACING ANY CONCRETE THAT WILL BE FACED.

9. ALL ANCHORS, CRAMPS, DOWELS, AND OTHER ANCHORING DEVICES SHALL BE AUSTENITIC STAINLESS STEEL (ALLOY TYPE 304) OR OTHER APPROVED NONFERROUS METAL OF THE TYPES AND SIZES SHOWN ON APPROVED SHOP DRAWINGS. RELYING ON ADHESIVES ALONE FOR ANCHORING WILL NOT BE ALLOWED.

10. DUPLICATE SAMPLES OF STONE SHALL BE SUBMITTED TO THE RESIDENT ENGINEER THROUGH THE GENERAL CONTRACTOR TO SHOW TEXTURE, FINISH, AND ANTICIPATED RANGE OF COLOR TO BE SUPPLIED. ONE SET OF APPROVED SAMPLES SHALL BE RETAINED BY THE RESIDENT ENGINEER, THE OTHER BEING RETURNED TO THE STONE SUPPLIER FOR GUIDANCE.

11. ANY PIECE OF STONE SHOWING FLAWS, IMPERFECTIONS, OR UNUSUAL COLOR UPON RECEIPT ON THE PROJECT SHALL BE REFERRED TO THE ENGINEER FOR A DECISION AS TO WHETHER IT SHALL BE REJECTED, PATCHED, OR REDRESSED FOR USE. ANY STONE REJECTED BY THE ENGINEER SHALL BE REMOVED FROM THE PROJECT IMMEDIATELY OR MARKED WITH PAINT. THE RESIDENT WILL MAKE THE FINAL DETERMINATION ABOUT WHETHER A PARTICULAR STONE SHALL BE USED.

12. WHERE THICKNESS PERMITS, ALL PIECES WEIGHING OVER 45kg MAY HAVE LEWIS HOLES FOR LIFTING IF DESIRED. LEWIS HOLES MAY EXTEND NO CLOSER THAN 50mm FROM THE FINISHED FACE, AND WILL NOT BE PERMITTED ON EXPOSED SURFACES.

13. STONE SHALL BE CAREFULLY SET WITHOUT JARRING STONE ALREADY LAID AND SHALL BE HANDLED WITH A LEWIS OR OTHER SUITABLE DEVICE WHICH WILL NOT MAR THE STONE. ROLLING OR TURNING OF STONE ON MASONRY ALREADY IN PLACE WILL NOT BE PERMITTED.

14. STONE TO BE LAID IN CEMENT MORTAR SHALL BE THOROUGHLY CLEANED BEFORE BEING SET, AND THE BED TO RECEIVE IT SHALL BE WELL CLEANED. THE THICKNESS OF ALL JOINTS AND BEDS SHALL BE UNIFORM THROUGHOUT. SPALLS SHALL NOT BE USED AS PINNERS IN MORTAR BEDS OR JOINTS. WHEN ANY STONE IS DISTURBED OR MORTAR JOINT BROKEN, THE STONE SHALL BE TAKEN UP, AND AFTER ALL MORTAR HAS BEEN CLEANED FROM THE STONE, BED, AND JOINTS, IT SHALL BE RESET IN FRESH MORTAR.

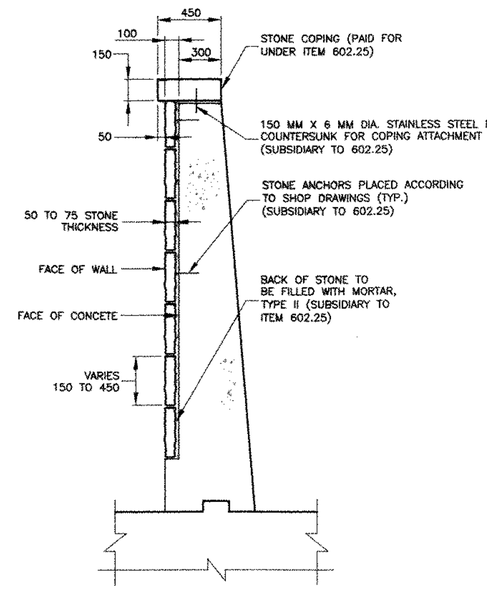
15. ALL STONES SHALL BE WELL BEDDED WITH THE FACE JOINTS PROPERLY POINTED BEFORE THE MORTAR HAS SET, UNLESS OTHERWISE PERMITTED. WHEN PERMITTED, JOINTS TO BE POINTED AFTER MORTAR HAS SET, SHALL BE RAKED OUT TO A DEPTH OF 80mm. JOINTS SHALL BE MOISTENED AND FILLED WITH MORTAR WELL DRIVEN IN. ALL POINTING SHALL BE FINISHED WITH AN APPROVED POINTING TOOL TO FORM THE TYPE OF JOINT INDICATED ON THE PLANS OR ORDERED.

16. THE MASONRY SHALL BE KEPT WET DURING POINTING, AND IN HOT OR DRY WEATHER SHALL BE PROTECTED FROM THE SUN AND KEPT WET FOR A PERIOD OF 3 DAYS AFTER COMPLETION UNLESS OTHERWISE PERMITTED OR ORDERED. THE EXPOSED SURFACES OF THE STONES SHALL NOT BE SMEARED WITH MORTAR. THE JOINTS SHALL BE WIPED FREE OF LOOSE MORTAR. STONE SHALL NOT BE SET WHEN CONTAINING FROST OR DURING FREEZING WEATHER.

17. STONE SHALL BE SHOP CLEANED AT THE TIME OF FINAL FABRICATION. AFTER INSTALLATION AND POINTING IS COMPLETED, THE CONTRACTOR SHALL CAREFULLY CLEAN THE STONE, REMOVING ALL DIRT, EXCESS MORTAR WELD SPLATTER, STAINS, AND/OR OTHER SITE INCIDENT DEFACEMENTS.

18. THE CONTRACTOR SHALL CONSTRUCT ONE 1.2 METER BY 1.2 METER FACADE MOCK-UP CONSISTING OF STONES TO BE USED AS THE WALL FACADE. THE MOCK-UP MUST BE APPROVED BY THE ENGINEER BEFORE FACADE PLACEMENT MAY BEGIN.

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927



TYPICAL STONE MASONRY FACING DETAIL
SCALE 1:20

0 1 2 3 4
SCALE = 1:100

THE LOUIS BERGER GROUP, INC.

Town Of *GRAFTON - ROCKINGHAM*	Bridge No.
Highway No. *ROUTE 121*	Log Sta. / Surv. Sta.
ROUTE 121	
STONE FACING DETAIL AND NOTES	
Designed By JPB	Drawn By JBB
Checked By JPC Date 12/03	Bridge Design Supervisor / Date
PROJECT *GRAFTON - ROCKINGHAM*	PROJECT NO. *STP 0126(4)-S*
I.G.C. Info. *V:\1261\Cadd\STRUCTURAL\PLANS\WallPlanC2.dwg*	
Wall Sheet No. 4	Sheet 115 of 116

EACH	SIZE	LENGTH	MARK	TYPE	A	B	C	D	E	F	G	H	J	K	R	O
WALL 3																
168	22	3400	RW 1	STR												
120	16	5535	RW 2	STR												
104	19	2400	RW 3	STR												
22	16	5090	RW 4	STR												
22	16	7170	RW 5	STR												
136	16	1625	RW 6	17		250	1375									
84	22	2175	RW 7	19		375	1800					375		30		
52	19	1850	RW 8	19		300	1550					300		25		
1	16	1250	RW 9	STR												
		TO	TO		41	INCREMENTS										
1	16	2815	RW 50	STR												
1	22	1250	RW 51	STR												
		TO	TO		41	INCREMENTS										
1	22	2815	RW 92	STR												
1	16	2315	RW 93	STR												
		TO	TO		20	INCREMENTS										
1	16	3080	RW 113	STR												
1	22	2315	RW 114	STR												
		TO	TO		20	INCREMENTS										
1	22	3080	RW 134	STR												
1	16	3095	RW 135	STR												
		TO	TO		20	INCREMENTS										
1	16	2895	RW 155	STR												
1	22	3095	RW 156	STR												
		TO	TO		20	INCREMENTS										
1	22	2895	RW 176	STR												
1	16	2395	RW 177	STR												
		TO	TO		21	INCREMENTS										
1	16	2185	RW 198	STR												
1	19	2395	RW 199	STR												
		TO	TO		21	INCREMENTS										
1	19	2185	RW 220	STR												
1	16	1685	RW 221	STR												
		TO	TO		29	INCREMENTS										
1	16	1400	RW 250	STR												
1	19	1685	RW 251	STR												
		TO	TO		29	INCREMENTS										
1	19	1400	RW 280	STR												
76	16	5470	RW 281	STR												
4	16	4140	RW 282	STR												
4	16	2480	RW 283	STR												
2	16	5640	RW 284	STR												
2	16	3980	RW 285	STR												
2	16	2320	RW 286	STR												
4	16	5100	RW 287	STR												
20	16	5090	RW 288	STR												
16	16	7170	RW 289	STR												

DATUM

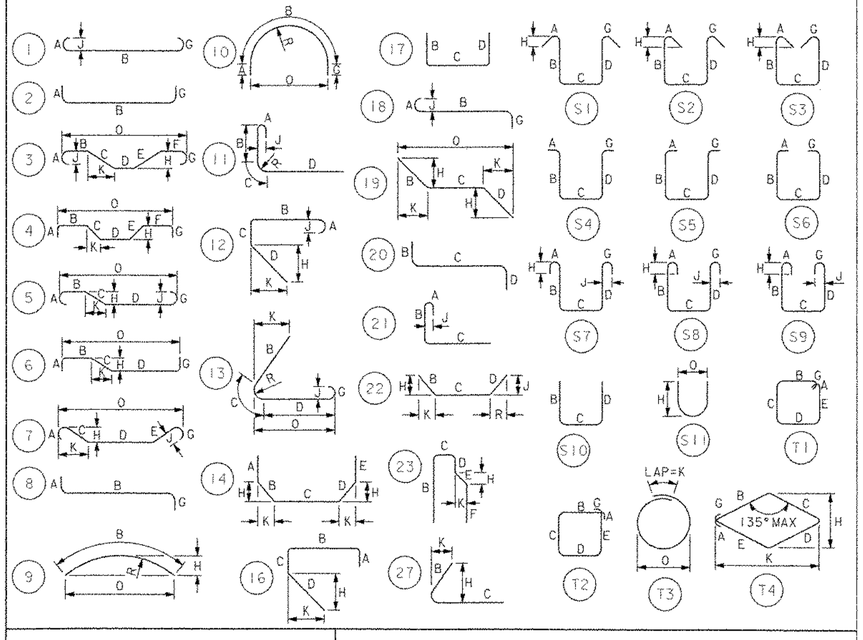
VERTICAL NGVD 1929

HORIZONTAL NAD 1927

NOTES

Metric

1. UNLESS OTHERWISE DESIGNATED, ALL BAR REINFORCEMENT FOR CONCRETE IN SIZES UP TO AND INCLUDING 55MSHALL CONFROM TO THE REQUIREMENT OF THE "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", AASHTO M 31M (ASTM A 615M-SI). ALL BARS SHALL BE GRADE 400, UNLESS OTHERWISE DESIGNATED.
2. FOR TYPICAL BENDING DETAILS, RECOMMENDED PIN DIAMETER "D" OF BENDS AND HOOKS, AND OTHER STANDARD PRACTICE, SEE CURRENT CONCRETE REINFORCING STEEL INSTITUTE "MANUAL OF STANDARD PRACTICE".
3. BARS WHICH REQUIRE MORE ACCURATE BENDING THAN STANDARD PRACTICES SHOULD HAVE LIMITS INDICATED.
4. ALL DIMENSIONS ARE OUT TO OUT OF BAR EXCEPT "A" AND "G" ON STANDARD 180 DEGREE AND 135 DEGREE HOOKS.
5. "J" DIMENSION ON 180 DEGREE HOOKS ARE TO BE SHOWN ONLY WHEN NECESSARY TO RESTRICT HOOK SIZE. OTHERWISE, STANDARD HOOKS ARE TO BE USED.
6. "H" DIMENSION ON STIRRUPS ARE TO BE SHOWN ONLY WHEN NECCESSARY TO MAINTAIN CLEARANCES.
7. WHERE SLOPE DIFFERS FROM 45 DEGREES, DIMENSIONS "H" AND "K" MUST BE SHOWN.
8. ▲ DENOTES BARS TO BE CUT IN FIELD.
9. ✳ DENOTES ONE EXTRA BAR ADDED FOR TESTING PURPOSES.
10. △ DENOTES TWO EXTRA BARS ADDED FOR TESTING PURPOSES.
11. "E" IN PREFIX DENOTES EPOXY COATED REINFORCING STEEL.



ASTM STANDARD REINFORCING BARS

BAR SIZE DESIGNATION	NOMINAL MASS kg/m	NOMINAL DIMENSIONS ROUND SECTION DIAMETER mm	CROSS SECTIONAL AREA mm²	PERIMETER mm
10	0.560	9.5	71	29.84
13	0.994	12.7	129	39.90
16	1.552	15.9	199	49.95
19	2.235	19.1	284	60.00
22	3.042	22.2	387	69.74
25	3.973	25.4	510	79.80
29	5.060	28.7	645	90.16
32	6.404	32.3	819	101.47
36	7.907	35.8	1006	112.47
43	11.380	43.0	1452	135.09
57	20.240	57.3	2581	180.01

STATE OF VERMONT
AGENCY OF TRANSPORTATION

Town Of GRAFTON - ROCKINGHAM	Bridge No.
Highway No. ROUTE 121	Log Sta.
	Surv. Sta.

WALL 3

REINFORCING SCHEDULE

Designed By JPB	Drawn By
Checked By JPC Date 12/03	Bridge Design Supervisor Date
PROJECT GRAFTON - ROCKINGHAM	PROJECT NO. STP 0126(4)-S
I.G.C. Info.	rebarsched_C2.dgn
Wall Sheet No. 5	Sheet 116 of 116

ITEM DETAIL AND DRAINAGE SHEET

STATE OF VERMONT
AGENCY OF TRANSPORTATION

DRAINAGE STRUCTURES

STA.	STA.	POSITION	ASKEW	TYPE IN/OUT	DITCH IN	DITCH OUT	PIPE ARCH S IN	PIPE ARCH R IN	PIPE ARCH L M	PIPE D mm	PIPE L M	ALLOWABLE OPTIONS PCCSP TH	CAAP TH	RCP CL	CSP TH	CPEP SL	PCCSP PI TH	PIPE ELBOW NO-DEG	ES EA	PRECAST CB	PRECAST DI	DEPTH DI	CONC CL B cm	REIN STEEL kg	DI GRATE TYPE	CHAN ELEV	CRM cm	TR EXCAV EARTH cm	TR EXCAV ROCK cm	COMM EXC cm	UNC CHAN EXC cm	STRUC EXCAV cm	GRAN BKF STRUC cm	GRAN BORR cm	EROS MATT sm	STONE FILL cm	STONE FILL TYPE	MRKR POSTS LT	MRKR POSTS RT	GEO. UNDER STONE FILL SM	SYSTEM #	REMARKS
10+197	10+257	RT		CB/CB						450	58.52			III					1						E			61.37													1	
10+257	10+300	RT		CB/CB						450	42.1			III					1						E			46.089													1A	
10+300	10+300	LT/RT		CB/CB						450	7.0			III					1						E			12.016													2	
10+300	10+350	RT		CB/CB						450	49.0			III					1						E			59.16						17.89							3	
10+350	10+400	RT		CB/CB						450	48.77			III					1						E			68.143						37.673							4	
10+340	10+350	LT/RT		CB/CB						450	12.19			III					1						E			20.039						7.123							4A	
10+400	10+459	RT		CB/CB						450	58.0			III					1						E			74.318						20.63							4B	
10+459	10+476	RT		CB/CB						450	16.0			III					1						E			29.253													5	
10+450	10+459	LT/RT		CB/CB						450	11.0			III					1						E			20.945						2.28							5A	
10+476	10+498.4	RT		CB/ARM						450	21.94			III					1						E			44.86	1.275												6	
																																									7	ROCKINGHAM TH2-9103 PROJECT
10+581	10+591	RT/LT		HW/CB						600	23.0					✓			1				2.0	560	B			59.695								2.30	I			8.64	8	
10+810	10+825	LT		CB						375	15.0					✓			1						E			11.926													9	
10+940	10+940	LT/RT		CB/HW						600	19.22					✓			1				2.0	5.6	A			19.766								2.16	I			7.2	10	
11+000	11+004	LT/RT		HW/HW						1200	14.63			III									11.99	56.0				57.808								39.62	II			49.36	11	
11+009	11+004	RT		DI						375	4.88			III						1					E			3.192													11A	
11+025	11+006	LT								375	23.55					✓												17.529	8.60												12	
11+195	11+209	LT								375	14.6			III														4.503													13	
11+211	11+220	LT								375	9.75			III														8.020													13A	
11+255	11+255	RT		DI						375	5.9					✓				1					E			4.164								2.48	I			9.25	14A	
11+277	11+288.5	LT/RT		HW/HW						1800	19.5			III									31.18	108.0				220.492								49.2	II			40.0	14	
11+370	11+370	LT/RT		CB						600	18.6					✓			1						A			33.524	11.85												15	
11+552	11+552	LT/RT		CB/HW						600	14.5					✓			1				2.0	18.06	B			40.285													16A	
11+600	11+650	LT		CB/CB						600	48.2					✓			1						B			121.133													16	
11+650	11+655	LT/RT		CB/HW						600	13.69					✓			1				2.0	5.6	B			33.237	1.08							12.96	I			14.03	17	
11+680	11+697	LT		CB						375	17.0			III					1						B			48.449	1.782												18	
11+698	11+698	LT/RT		HW/HW						1200	17.07			III									11.932	56.8				81.759	7.246							7.09	I			42.89	19	
																																			17.84	II					
11+750	11+750	RT		DI						375	4.88					✓			1						B			4.99								5.39	I			17.4	20A	
11+720	11+700	LT								375	19.51			III														20.121								9.66	I				20	
11+849	11+849	LT/RT		-/HW						450	17.07			III									1.3	9.5				25.77								1.31	I			49.4	21	
																																				44.06	II					
11+907	11+927	LT								375	19.51			III														14.34													22	
12+110	12+113	LT/RT								750	14.63			III									5.245	33.52				48.217								1.80	I				23	
																																				20.95	II					
12+200	12+200	LT/RT		CB/CB						600	12.19			III					1						B			0.826	30.04												24	
12+200	1+040	RT/LT		CB/CB						600	35.84			III					1						E			117.525	16.713												24A	
1+040	1+040	LT		OB						750	4.57					✓			1						E			32.319								12.0	II				24B	
TOTALS										375 450 600 750 1200 1800	35.25 341.59 46.034 14.63 31.70 19.50			III		46.33 135.16 4.57			1	21	3		69.64	89.68				1511.582	78.586		77.586				45.15 183.67	I II			237.17		

GUARD RAIL

STA.	STA.	LT.	RT.	END TREATMENT	
TOTALS					

UNDERDRAIN

STA.	STA.	TYPE	POS.	D	L	TRENCH E	TRENCH R	GRAN BKF	FB	MKR PST
TOTALS										

4/1/06 1/31/06

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 4(6.5) C/2

FILE NAME: _____ PLOT DATE: 24-SEP-2001
PROJECT LEADER: _____ DRAWN BY: CGREENWOOD
DESIGNED BY: _____ CHECKED BY: _____
_____ SHEET 1 OF 2

120 DRAIN

ITEM DETAIL AND DRAINAGE SHEET

STATE OF VERMONT
AGENCY OF TRANSPORTATION

DRAINAGE STRUCTURES

STA.	STA.	POSITION	ASKEW	TYPE IN/OUT	DITCH IN	DITCH OUT	PIPE ARCH S mm	PIPE ARCH R mm	PIPE ARCH L m	PIPE D mm	PIPE L M	ALLOWABLE OPTIONS PCCSP TH	CAAP TH	RCP CL	CSP TH	CPEP SL	PCCSP FI TH	PIPE ELBOW NO-DEG	ES EA	SPEC CB	PROJ	DEPTH DI	CONC CL B cm	REIN STEEL KG	DI GRATE TYPE	CHAN ELEV	CRM cm	TR EXCAV EARTH cm	TR EXCAV ROCK cm	COMM EXC cm	UNC CHAN EXC cm	STRUC EXCAV cm	GRAN BKF STRUC cm	GRAN BORR cm	EROS MATT SM	STONE FILL cm	STONE FILL TYPE	MRKR POSTS LT	MRKR POSTS RT	GEO UNDER STONE SM	DRAINAGE SYSTEM #	REMARKS
12+280	10+040	RT/LT		CB/CB						600	48.77			III						1					E			153.66	6.14												25B	
12+280	12+280	LT/RT		CB/CB						600	9.75			III						1					B			17.927	6.314												25A	
12+449	12+463	LT/RT								900	21.95			III														41.115							70.5	II			117.5	27	
12+600	12+600	LT/RT		CB/HW						750	14.33					✓				1			2.6	16.76	B			41.338	1.496	✓						38.76	II			64.6	28A	
12+700	12+781	LT		CB/CB						600	81.08					✓				1					B			256.24	6.956												29B	
12+781	12+781	LT/RT		CB/HW						600	15.24					✓				1			2.0	18.04	B			46.379								4.13	I				29D	
12+436	12+644	LT								450	9.75			III														0													30	
			TOTALS							450				9.75						5			4.6	29.80				56.637	20.906							4.13	I			182.1		
			PAGE 2							600				58.52		96.32																			109.26	II					
										750						14.33																									
										900				21.95																											

STA.	STA.	TYPE	POS.	D (mm)	L (m)	TRENCH E (cm)	TRENCH R (cm)	GRAN BKF (cm)	FB	SYSTEM #	MKR PST
10+509.5	10+532		LT	150	81.11	34.896	5.63			1	
10+532	10+652		LT	150	62.9	12.06	53.68		1	2	
10+652	10+726		LT	150	74.34	64.66	109.70		1	3	
10+726	10+810		LT	150	84.5	127.86				4	
10+845	10+940		LT	150	95.35	98.79			1	5	
11+000	11+100		LT	150	99.34	99.42			1	6	
11+100	11+180		LT	150	80.29	41.37	60.52		1	7	
11+230	11+277		LT	150	46.97	77.43			1	8	
11+277	11+350		LT	150	75.13	81.05	37.32		1	9	
11+370	11+450		LT	150	81.05	66.45	22.35		1	10	
11+450	11+552		LT	150	102.29	110.50				11	
11+552	11+600		LT	150	49.23	42.88				12	
11+600	11+650		LT	150	50.4	26.97				13	
11+650	11+680		LT	150	28.96	13.35				14	
12+120	12+200		LT	150	80.92	41.84	115.11		1	15	
12+200	12+280		LT	150	80.6		58.38			16	
12+280	12+380		LT	150	101.78	76.97	50.14		1	17	
12+380	12+438		LT	150	59.67	81.62			1	18	
12+455	12+530		LT	150	76.93	107.35			1	19	
12+530	12+600		LT	150	70.57	94.08	13.35		1	20	
12+600	12+700		LT	150	99.53	82.306	28.41			21	
12+700	12+781		LT	150	81.68	120.65	1.12			22	
12+781	12+860		LT	150	77.42	93.177	8.18			23	
84005	84005		LT-RT	150	16.79	8.81				24	
TOTALS					1754.97	1613.33	474.56		13		

STA.	STA.	LT.	RT.	END TREATMENT	

STA.	STA.	LT.	RT.	END TREATMENT	
TOTALS					

TOTALS PAGES 1 & 2																						
							375		85.25		46.93											
							450		351.34													
							600		104.554		231.48											
							750		14.63		18.90											
							900		21.95													
							1200		31.70													
							1800		19.50													
												26	3	74.247	383.48	1068.214 / 99.492		77.596	49.28 I / 292.93 II	419.27		

UNDERDRAIN

GUARD RAIL

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126(46)S C/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
PLOT DATE:	24-SEP-2001
DRAWN BY:	C. GREENWOOD
CHECKED BY:	
SHEET	2 OF 2

C.G. 1/11/06

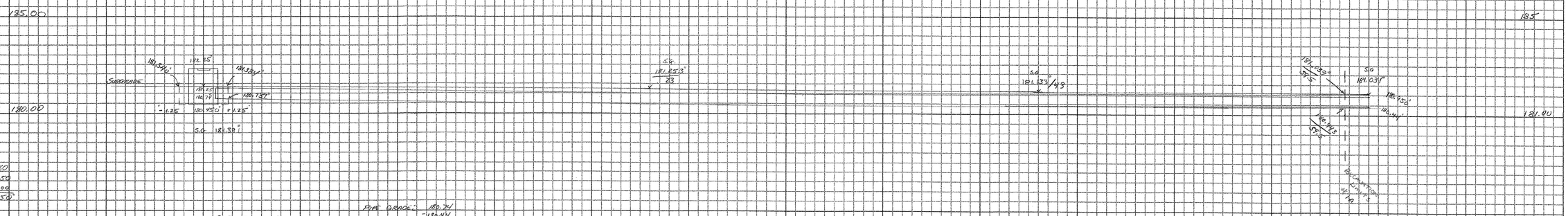
A.F. 1/31/06

2/1/06

121 DRAIN

DRAINAGE SYSTEM #1

10+197.36m RT ~ 10+257.36m RT



10+197 = 0

@ 5.6m RT

℄ F.G. 182.358

Pipe Thickness = 0.665 m

Pipe Grade: 180.74 − 180.41 = 0.3 ÷ 58.52m = 0.005

10+220 @ 36m RT

10+240 @ 36m RT

10+257 @ 36m RT

℄ F.G. 181.798

Env 180.80
Sump -0.150
Base -0.200
Rev 180.450

58.52m
New 59.0m x 450 mm RCP w/ precast catch basin

204.20 Trench Excavation of Earth

Catch Basin:		Pipe:	
0	180.450	1.25	180.737
1.25	180.450	59.5	180.448
1.25	184.384	59.5	181.039
0	184.391	93.0	181.133
-1.25	181.340	93.0	181.253
-1.25	180.450	1.25	181.384
0	180.450	1.25	180.737

A_1 = 2.316 m²

Volume = 2.316 m² x 2.5 m = 5.79 m³

A_2 = 36.089 m²

Vol. = 36.089 m² x 1.54 m = 55.58 m³

Total = 61.37 m³

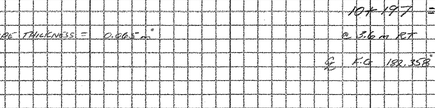
604.20 Precast Reinf. Concrete Catch Basin

1 Ea.

601.0615 450 mm RCP Class III

58.52 m

Date 1/20/05 DT 4736



CROSS SECTION SHEET

MTO Metric

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(5) 92

FILE NAME:

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

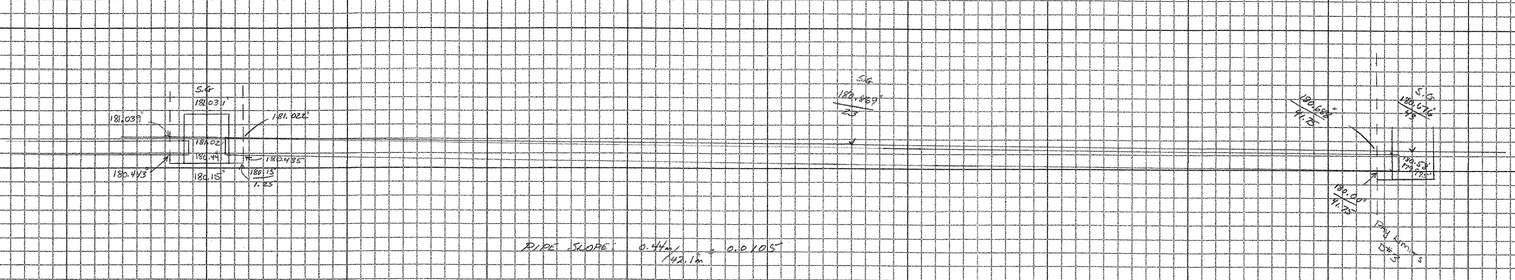
CHECKED BY:

SHEET 1 OF 23

122 Drain

DRAINAGE SYSTEM #1A

10+257, 8.6m RT ~ 10+300, 3.6m RT



PIPE SLOPE 0.44m / 42.1m = 0.01045

Sta (Eq)	180.500
Ditch	- 0.150
Base	= 0.300
Elev.	180.150

10+257 = 0
31.6m RT
℄ Elev 181.398

10+280
31.6m RT

10+300
31.6m RT

42.1 m
NEW 450 mm x 450 mm RCP w/ PRECAST CONCRETE CATCH BASIN

20M.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN		PIPE	
0	180.150	1.25	180.435
1.25	180.150	4.25	180.010
1.25	181.022	4.25	180.638
0	181.031	129	180.869
-1.25	181.039	4.25	181.022
-1.25	180.450	1.25	180.435
0	180.450		

A_1 = 2.202 sm

Vol_1 = 2.202 sm x 2.5 m = 5.505 cm

A_2 = 26.353 sm

Vol_2 = 26.353 sm x 1.54 m = 40.584 cm

TOTAL = 46.089 cm

60M.20 PRECAST REINFORCED CONCRETE CATCH BASIN

1 EA.

601.0815 450 MM RCP CLASS III

42.1 M

ORS 1/20/05

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(5) C/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C.GREENWOOD
CHECKED BY:	
SHEET	2 OF 23

123 DRAIN

VAOT Metric CROSS SECTION SHEET

DRAINAGE SYSTEM # 3

104300, 3.6m RT ~ 104350, 3.6m RT

20.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN		PIPE	
0	179.71	1.25	179.991
1.25	179.71	48.25	179.644
1.25	180.664	48.25	180.311
0	180.676	40	180.388
-1.25	180.688	20	180.487
-1.25	179.71	1.25	180.664
0	179.71	1.25	179.991

185.00

A_1 = 2.415 sm

Vol_1 = 2.415 sm x 2.5m = 6.038 cm

A_2 = 30.336 sm

Vol_2 = 30.336 sm x 1.54 m = 47.487 cm

0.15m UNDERCUT - C.A. BY C.GREENWOOD 180.00

0.15m x 4.45m x 20.91m = 3.035 cm

TOTAL = 58.16 cm

20.30 GRANULAR BACKFILL FOR STRUCTURES

EST. BY C.GREENWOOD

$[(1.06m \times 1.45m \times 9.315m)] - [(\frac{\pi(0.45^2)}{4} \times 9.315m)]$ = 5.201 cm

$[(0.25m \times 1.45m \times 14.630m)] - [\frac{1}{2}(\frac{\pi(0.45^2)}{4} \times 14.63)]$ = 4.140 cm

$[(0.4m \times 1.45m \times 12.07m)] - [\frac{1}{2}(\frac{\pi(0.45^2)}{4} \times 17.07m)]$ = 8.544 cm

17.885 cm

PAY 17.89 cm

ENV	180.960
SUMP	0.150
BASE	0.200
ELEV	179.71

10 x 300 = 0

3.6m RT

104320

Pipe Slope: 6.3m ÷ 49.0m = 0.0073 = 0.73 %

104340

NEW 49.0m x 450 mm RCP c/w PRECAST CONC. CATCH BASIN

104350

3.6m RT

E.G @ C 181.271

601.0215 450mm RCP CLASS III

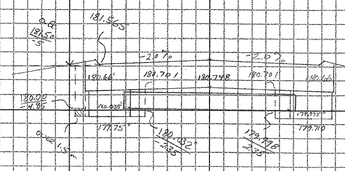
49.0m

604.20 PRECAST CONCRETE CATCH BASIN

1 EA

DRAINAGE SYSTEM # 2

104300, 3.6m LT ~ 104300, 3.6m RT



ENV (CATCH)	180.210
SUMP	0.15
BASE	0.20
ELEV	179.75

STEEP PIPE = 0.044m ÷ 6.2m = 0.0065 = 0.645 %

185.00

180.00

-10 -5 0 5 10

NEW 6.6m x 450 mm RCP c/w PRECAST CATCH BASIN

7.2m

20.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN	
-3.6	179.75
-3.35	180.032
-2.35	180.701
-4.4	180.66
-4.4	181.50
-4.85	181.50
-4.85	180.00
-4.4	180.00
-4.4	179.75
-3.6	179.75

2.582

A_1 = 2.406 sm

(CURB 1.5m)

-4.85	180.00
-4.4	180.00
-4.4	179.75
-4.85	179.75
-4.85	180.00

A_2 = 0.1125 sm x 1.5 = 0.169 sm

2.732

Vol_1 = ~~2.575~~ sm x 25m = 6.4989 cm = 6.699 cm

PIPE	
-2.35	180.032
2.35	179.998
2.35	180.701
0	180.748
-2.35	180.701
-2.35	180.032

A_3 = 3.335 sm

Vol_2 = 3.335 sm x 1.54 m = 5.136 cm

TOTAL = 11.835 cm

601.0215 450 MM RCP, CLASS III

7.0m

604.20 PRECAST REINF. CONC. CATCH BASIN

1 EA

1/24/05

1/19/05

6/20/05

CROSS SECTION SHEET

MADOT Metric

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(3) 4/2

FILE NAME:

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C.GREENWOOD

CHECKED BY:

SHEET 3 OF 23

124 DRAIN

DRAINAGE SYSTEM #4

10+350, 36m RT ~ 10+400, 36m RT

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

C	179.355
1.25	178.355
1.25	180.206
C	180.506
-1.25	180.311
-1.25	179.35
C	179.35

$A_1 = 2.3841\ cm$

$Vol_1 = 2.3841\ cm \times 2.5m = 5.961\ cm^3$

PIPE: (ENLARGES 0.2m UNDER CB)

1.25	179.486
48.75	179.064
48.75	179.957
30	180.099
10	180.243
1.25	180.086
1.25	179.486

$A_2 = 10.684\ cm$

$Vol_2 = 10.684\ cm \times 1.54m = 62.459\ cm^3$

TOTAL = 68.613 cm²

204.30 GRANULAR BACKFILL FOR STRUCTURES

From my C. GREENWOOD

$[(0.15m \times 1.45m \times 48.77m)] - [[(\frac{\pi(0.45)^2}{4}) \times 48.77m]] = 34.6737m^3$

601.0813 450 mm RCP, CLASS III

48.77 m

604.20 PRECAST CONC. CATCH BASIN

1 EA.

INV.	179.20
SUMP	- 0.150
BASE	- 0.300
ELEV	179.350

10+350 = 0
@
36m RT

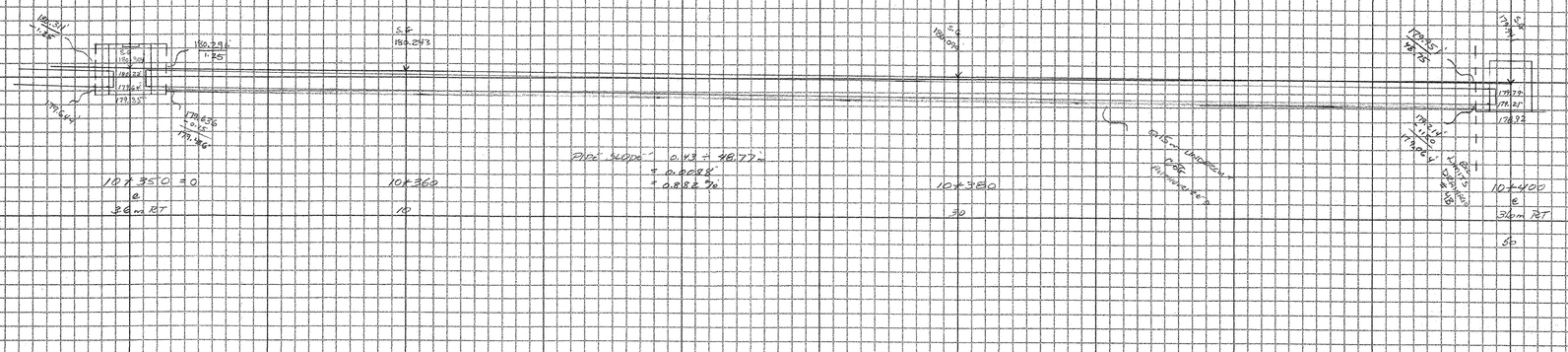
10+360
10

PIPE SLOPE: 0.43 ÷ 48.77m
= 0.0088'
= 0.882%

10+380
30

10+400
@
36m RT
30

INV.	179.27
SUMP	- 0.150
BASE	- 0.300
ELEV	178.920



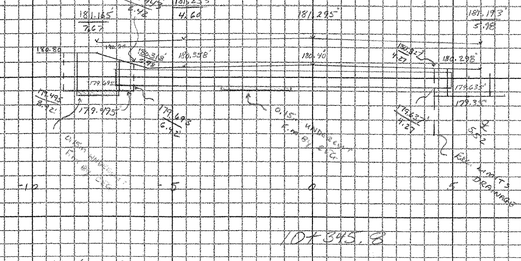
DRAINAGE SYSTEM #4A

10+340, 50 LT ~ 10+350, 36m RT

(No Sump)

INV.	179.760
PIPE THICK.	- 0.065
BASE	- 0.200
ELEV	179.495

℄
F.G = 181.295



PIPE SLOPE: 0.060 ÷ 12.19m
= 0.00492
= 0.492 %

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

-8.92	179.495
-6.42	179.495
-6.42	180.493
-7.67	180.800
-8.92	180.800
-8.92	179.495

$A_1 = 3.039\ cm$

$Vol_1 = 3.039m \times 2.5m = 7.598\ cm^3$

PIPE:

-6.42	179.633
-6.42	179.637
-4.27	179.327
0	180.400
-4.6	180.358
-5.98	180.318
-6.42	180.443
-6.42	179.693

$A_2 = 7.511\ cm$

$Vol_2 = 7.511m \times 1.54m = 11.567\ cm$

F.M. UNDERCUT: $(0.15m \times 2.44m \times 1.45m) = 0.531$
$(0.15m \times 1.3m \times 1.3m) = 0.338$
$0.869\ cm^3$

TOTAL = 20.034 cm³

204.30 GRANULAR BACKFILL FOR STRUCTURES

From my C. GREENWOOD

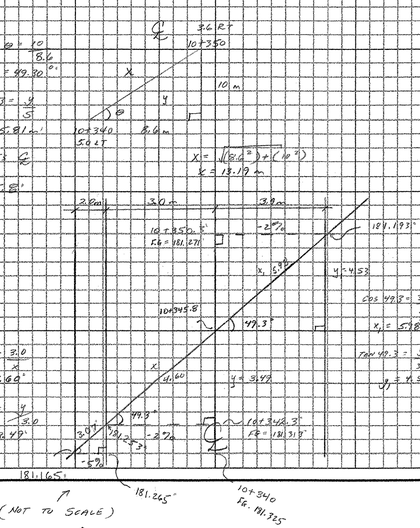
$(0.375m \times 2.44m \times 1.45m) = 1.327\ cm$
$(0.225m \times 2.44m \times 1.45m) = 0.796\ cm$
$2.123\ cm$

601.0815 450 mm RCP, CLASS III

12.19 m

604.20 PRECAST CONCRETE CATCH BASIN

1 EA.



1/26/05

4-26-05

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 4(3) C/2

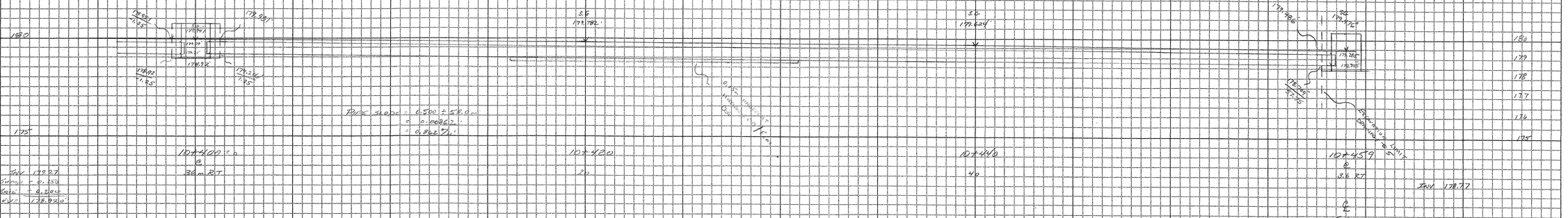
FILE NAME:
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:
DRAWN BY: C. GREENWOOD
CHECKED BY:
SHEET 4 OF 23

125 DRAIN

DRAINAGE SYSTEM # 4B

10+400, 3.6m RT ~ 10+459, 3.6m RT



P.I.=
Sta = 179.27
Summ = 0.150
Rate = 0.200
Elev = 178.9210

NEW 58.0m x 450 mm RCP w/ PRECAST CATCH BASIN

20/20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:		PIPE:		
0	178.92	1.25	179.266	
1.25	178.92	57.75	178.709	
1.25	179.931	57.75	179.482	
0	179.941	58	179.624	
-1.25	179.351	58	179.782	
-1.25	178.92	1.25	179.931	
0	178.92	1.25	179.206	

A_1 = 2.553 sm
Vol_1 = 2.553sm x 25m = 6.383 cm
A_2 = 42.372 sm
Vol_2 = 42.372 sm x 1.54 m = 65.253 cm

Em. By C.GREENWOOD
(0.15m)(14.63m)(1.45m) = 3.182 cm

TOTAL = 74.818 cm

20/30 GRANULAR BACKFILL FOR STRUCTURES

Em. By C.GREENWOOD

(0.15m)(14.63m)(1.45m) = 3.182 cm

$\left[\left(\frac{0.15m+1.45m}{2}\right)(35.36m)\right] - \left[\left(\frac{\pi(1.45)^2}{4}\right)(35.36m)\right] = 17.449$ cm

23.87 L 5.68 V

TOTAL = 20.63 cm

604/0815 450 mm RCP CLASS III

58.0 m

604/20 PRECAST CONC CATCH BASIN

1 EA

12-7-10

4-26-05

METRIC CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(5) C/2

FILE NAME:

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C.GREENWOOD

CHECKED BY:

SHEET 5 OF 23

126 DRAWN

604.20 PRECAST CONC. CATCH BASIN

1 EA°

204.20 TRENCH EXCAVATION OF EARTH.

CATCH BASIN:		PIPE:	
-1.4	178.623	1.4	178.618
1.4	179.123	15.75	178.562
14.4	179.475	15.75	179.467
0	179.480	1.4	178.475
-1.4	179.486	1.4	178.818
-1.4	178.230		

A_1 = 3.495 sm°

Vol_1 = 3.495 sm x 2.8 m = 9.786 cm°

A_2 = 12.642 sm x 1.54 m

Vol_2 = 19.469 cm°

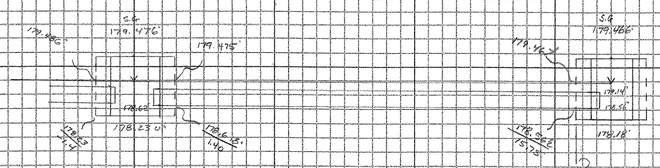
TOTAL = 29.255 cm°

601.0815 450 mm RCP, CLASS III

16.0 m°

DRAINAGE SYSTEM # 5

10+459, 3.6m RT ~ 10+476, 3.6m RT



Cul.(Cart) 178.69'
Sump - 0.150'
Base - 0.300'
EGEV. - 178.230'

10+459 = 0
@ 3.6m RT

S.F.G 180.443

Pipe slope: 0.06m ÷ 16.0m = 0.00375 = 0.375%

10+476
@ 3.6m RT

S.F.G 180.451

10+476 = 17

Cul.(Cart) = 178.53'
Sump - 0.150'
Base - 0.300'
EGEV. = 178.18'

WELD 1740 mm x 430 mm RCP w/ PRECAST CATCH BASIN 16.0 m

TAN 57.3 = $\frac{Y_1}{5.6}$

Y_1 = 4.49°

TAN $\theta = \frac{9}{7.2}$

θ = 51.34°

10+454.5 ℄ 36 LT

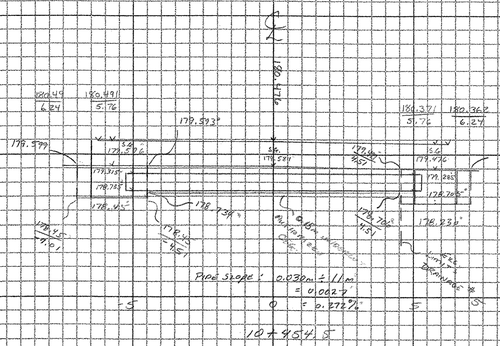
10+450 36 LT

9

7.2m

DRAINAGE SYSTEM # 5A

10+450, 3.6m LT ~ 10+457, 3.6m RT



Cul.(Cart) = 178.80
Sump - 0.15
Base - 0.20
EGEV = 178.45

10+454.5

NEW 11.0m x 450 mm RCP

11.0 m

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:		PIPE:	
-7.61	178.45'	-4.51	178.734
-4.51	178.45	4.51	178.706
-4.51	179.593	4.51	179.199
-5.76	179.591	0	179.581
-7.61	179.599	-4.51	179.593
-7.01	178.45'	-4.51	178.734

A_1 = 2.865 sm

Vol_1 = 2.865 sm x 2.5 m = 7.163 cm

A_2 = 7.608 sm°

Vol_2 = 7.608 sm x 1.54 m = 11.716 cm

Arm By C.GREENWOOD (UNOFFICIAL)
(0.15m X 9.5m X 1.45m) = 2.066° cm

TOTAL = 20.945 cm°

204.30 GRANULAR BACKFILL FOR STRUCTURES
ARM BY C.GREENWOOD

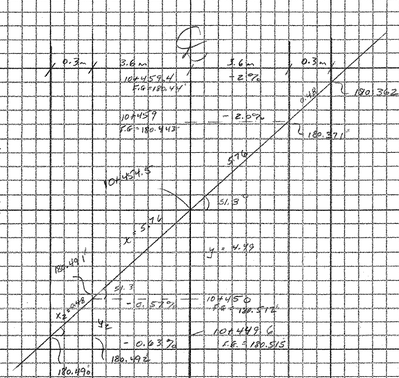
(0.15m X 10.5m X 1.45m) = 2.28 cm

601.0815 450 mm RCP, CLASS III

11.0 m°

604.20 PRECAST CONCRETE CATCH BASIN

1 EA°



TAN 51.3 = $\frac{Y}{3.6}$

Y = 4.49°

COS 51.3 = $\frac{3.6}{X}$

X = 5.76°

TAN 51.3 = $\frac{Y_2}{0.3}$

Y_2 = 0.37°

COS 51.3 = $\frac{0.3}{X_2}$

X_2 = 0.48°

Cost 1/28/00

4-26-00

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(9) 9/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C.GREENWOOD
CHECKED BY:	
SHEET	6 OF 23

127 DRAIN

204.2U TRENCH EXCAVATION OF EARTH

CATCH BASIN:		PIPE:	
-1.25	178.03	1.25	178.460
0	178.03	21	178.255
1.25	178.03	21	178.678
1.25	178.479	1.25	178.479
0	178.466	1.25	178.460
-1.25	178.462		
-1.25	178.093		

A_1 = 3.599 sm

A_2 = 24.115 sm

Vol_1 = (3.599 sm)(2.5m) = 8.998 cm

Vol_2 = (24.115 sm)(1.54 m) = 37.137 cm (+ Rock)

TOTAL = 46.135 cm − 1.275 cm = 44.86 cm

204.21 TRENCH EXCAVATION OF ROCK
Am By C. GREENWOOD

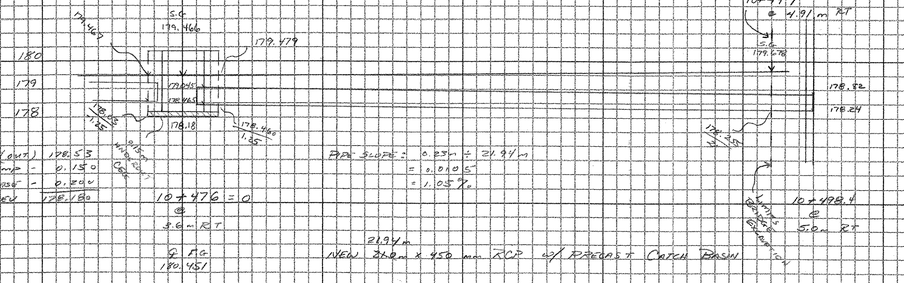
2.75m x 1.0m x 1.7m = 1.275 cm BOULDER

604.20 PRECAST REINFORCED CONCRETE CATCH BASIN
1 EA

601.0815 450 mm RCP CLASS III
21.94 m

DRAINAGE SYSTEM #6

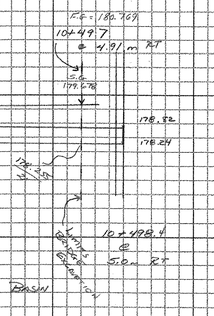
10+476, 3.6m RT ~ 10+477.8, 5.0m RT
178.14

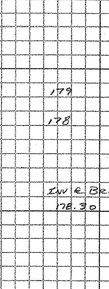


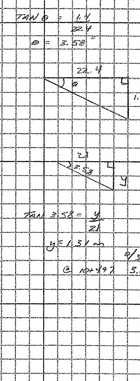
END(OUT) 178.53
SUMP - 0.150
BASE - 0.300
ELEV 178.180

PIPE SLOPE: 0.23m ÷ 21.94m
= 0.0105
= 1.05%

21.94m
NEW 2400 x 450 mm RCP c/ PRECAST CATCH BASIN







CBMH 241165
1 DWB
EP 100

DRAINAGE SYSTEM #7

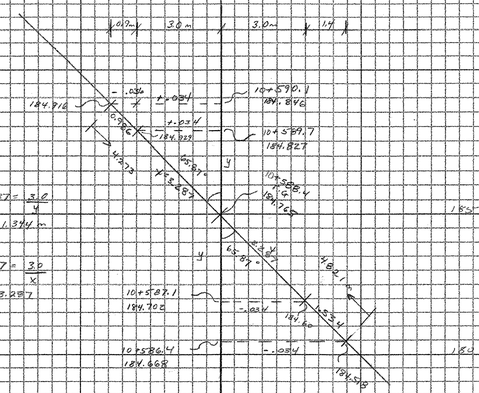
SEE ROCKINGHAM IM2-9103 PROJECT

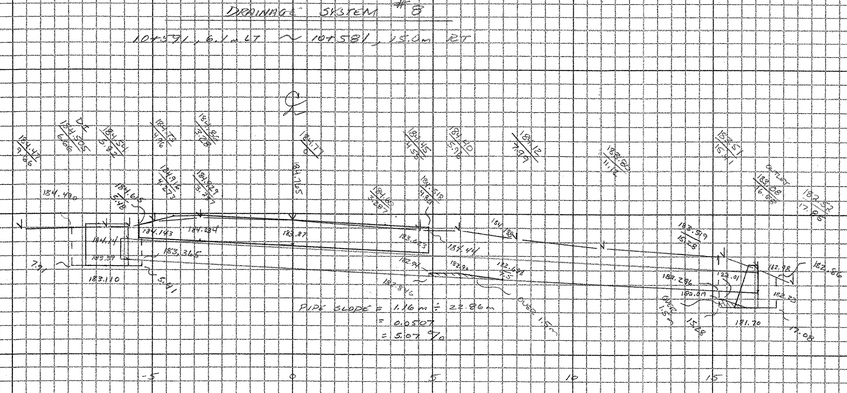
PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(5) C/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:3
DRAWN BY:	C. GREENWOOD
CHECKED BY:	D. BRIER
SHEET	7 OF 23

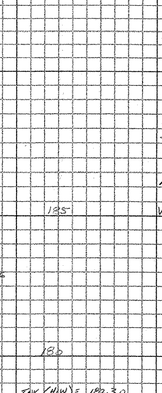
VAOT Metric

CROSS SECTION SHEET

128 DRAIN







601.2620 600 mm CPEP (S&L)

Cut in Field 22.86m

Pay 23.0 m

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:		PIPE:			HEADWALL:		
-5.41	184.140	-5.41	183.365	(over 1.5m)			
-5.41	184.140	4.821	182.940	4.821	182.846	15.28 182.319	(over 1.5m)
-5.48	184.143	3.96	182.90	4.821	182.940	15.28 182.019	
-5.42	184.615	7.31	182.688	5.96	182.90	15.41 182.01	15.28 182.019
-5.82	184.547	15.28	182.296	7.3	182.688	16.2 181.70	15.28 181.70
-6.66	184.505	15.28	181.517	4.821	182.846	12.08 181.70	16.2 181.70
-2.91	184.496	11.12	182.810			12.08 182.846	15.41 182.01
-7.91	183.111	7.99	184.12	A_3 = 0.216 sm		16.58 182.08	15.28 182.019
-5.41	183.111	5.96	184.440			15.41 182.51	
		4.821	184.446	Vol_3 = 0.216 sm x 1.75m		15.28 183.519	A_6 = 0.163 sm
A_1 = 3.492 sm		4.821	182.063	= 0.378 cm x 1.5			
Vol_1 = 3.492 sm x 2.5m		D	182.87	= 0.567 cm		A_4 = 2.574 sm	Vol_6 = 0.163 x 3.4m
= 8.73 cm		-5.41	184.140				= 0.554 cm x 15
		-5.41	183.365			Vol_4 = 2.574 sm x 3.4 m	= 0.831 6m
		A_2 = 21.760 sm				$\frac{1}{3}$ = 8.752 cm	
		Vol_2 = 21.760 sm x 1.75m		Incl. for stone: 730 = 0.3m x 1.76m x 3.4m = 1.795 cm		TOTAL = 59.755 cm	
		= 38.08 cm					
		38.08					

507.15 REINFORCING STEEL

4 - #5 dowel @ 0.90m = 3.6m x 1.555 kg/l = 5.60 kg

501.25 CONCRETE, CLASS B (STRUCTURAL D-2)

2.0 cm

613.10 STONE FILL, TYPE I (OUTLET) 649.31 C&G, UNDER STONE FILL

Km. by J. SMITH

3.4m x 2.26m x 0.3m = 2.30 cm 2.54m x 3.4m = 8.64 sm

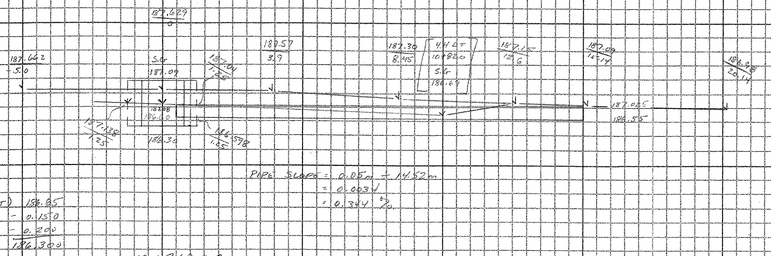
604.20 PRECAST REIN. CONCRETE CATCH BASIN

1 Ea.

1 Ea 6/13/05

604.20 PRECAST REIN. CONCRETE CATCH BASIN

1 Ea. 6/13/05



204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:		PIPE:	
-1.25	187.138	1.25	186.578
-1.25	186.30	15	186.55
0	186.30	15	187.09
1.25	186.30	12.6	187.15
1.25	187.04	10	186.69
0	187.09	1.25	187.04
-1.25	187.138	1.25	186.578
A_1 = 1.794 sm		A_2 = 4.756 sm	
Vol_1 = 4.794 sm x 2.5m		Vol_2 = 4.756 sm x 1.47m	
= 4.785 cm		= 6.891 cm	

TOTAL = 11.726 cm

604.20 PRECAST REIN. CONCRETE CATCH BASIN

1 Ea.

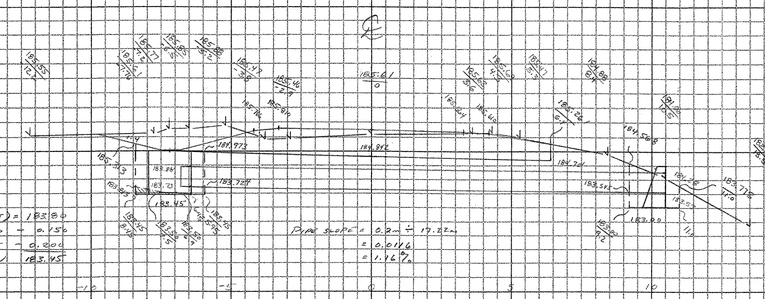
604.2610 375 mm CPEP (S&L)

Installed 14.52m Cut in Field

Paid 15.0m

DRAINAGE SYSTEM # 10

10+940, 7.2m LT ~ 10+940, 10.5m LT


185.00
180.00
-10
-5
0
5
10
184.974
184.724
183.724
183.723
183.845
183.00
183.775
183.575
183.525
183.38
184.508
185.00
185.61
185.73
185.46
185.30
185.13
185.00
185.00
185.00

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

-1.05	184.456
-1.05	183.60
1.05	183.610
1.05	183.974
0	184.438
-1.05	184.456

TOTAL = 8.192 cm

A_1 = 1.5200 sm

Vol_1 = 1.5200 sm × 2.1 m
= 3.192 cm

604.25 PRC 1200 DROP INLET

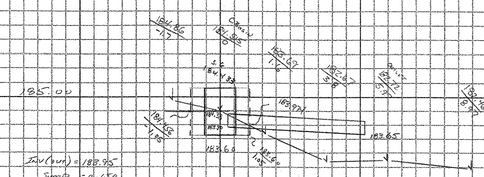
1 EA.

601.0810 375 mm RCP CLASS III

4.88 m

DRAINAGE # 11A

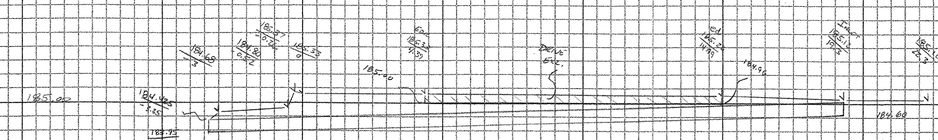
11+009, 3.9 m RT ~ 11+000, 7.2 m RT



4.88 m
NEW 375 mm x RCP w/ DROP INLET

DRAINAGE SYSTEM #12

11+025, 6.5 m LT ~ 11+006, 9.5 m LT



204.20 TRENCH EXCAVATION OF EARTH

PIPE:

-3.25	183.95
19.8	184.50
19.3	185.12
19.39	185.16
19.39	184.16
4.39	185.20
4.39	184.23
0	184.13
-0.26	184.37
-0.52	184.50
-3.0	184.68
-3.25	184.25
-3.65	183.95

A_1 = 17.761 sm

$(20)_1$ = 17.761 sm × 1.47 m
= 26.109 cm

TOTAL EARTH = 26.109 - 8.60 cm
= 17.509 cm

601.2610 375 mm CPEP (SL)

22.55 m

204.21 TRENCH EXC. OF ROCK
F.M. BY C. GREENWOOD
(BOULDERS)

0.5 m × 1.5 m × 1.8 m = 1.35 cm
1.25 m × 2.6 m × 1.8 m = 5.85 m
1.3 m × 1.8 m × 1.6 m = 1.404 cm

8.60 cm

NEW 17m x 375 mm CPEP (SL)
22.55 m

CBS 2/14/00

12" PRAIN

CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(5) C/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C. GREENWOOD
CHECKED BY:	D. BRAGG
SHEET	10 OF 23

134 PRAIN

204.20 TRENCH EXCAVATION OF EARTH

PIPE:

-0.3	185.85
14.3	185.83
14.3	186.275
14	186.23
12.8	186.33
10.4	186.68
10.4	186.68
6.4	186.402
6.4	186.282
3.1	186.172
-0.3	186.325
-0.3	185.85

A_1 = 9.866 sm

Vol_1 = 9.866 sm x 1.47m

= 14.503 cm

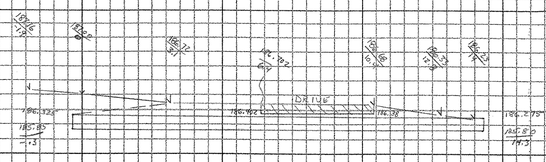
TOTAL = 14.503 cm

601.08/10 375 mm RCP, CLASS III

14.6m

DRAINAGE SYSTEM #13

114185, 6.4m LT ~ 114209, 6.4m LT



204.20 TRENCH EXCAVATION OF EARTH

PIPE:

0	185.74
9.75	185.619
9.75	185.887
9	185.978
8.7	186.05
8.4	186.127
7.4	186.60
2.4	186.237
1.1	186.287
1.1	186.65
0.1	186.52
0	186.08
0	185.74

A_1 = 5.456 sm

Vol_1 = 5.456 sm x 1.47m

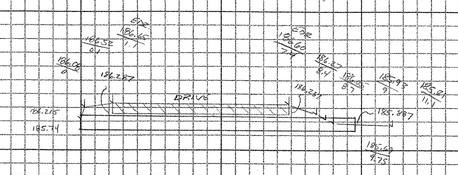
TOTAL = 8.020 cm

601.08/10 375 mm RCP, CLASS III

9.75 m

DRAINAGE SYSTEM #13A

114211, 6.4m LT ~ 114220, 6.4m LT



132 DRAIN

Metric

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(0) C/2

FILE NAME:

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY: D. BREER

SHEET 11 OF 23

DRAINAGE SYSTEM # 14A

11+255, 3.9 RT ~ 11+255, 6.7m RT

204.02 TRENCH EXCAVATION OF EARTH

DE:

2.85	184.30
4.95	184.30
4.95	185.081
2.85	185.171
2.85	184.30

PIPE:

4.95	184.587
6.05	184.536
5.7	184.77
5.3	185.066
4.95	185.081
4.95	184.587

A_1 = 1.1735 sm

Vol_1 = 1.1735 sm x 2.1m = 3.6414 cm

A_2 = 0.3574 sm

Vol_2 = 0.3574 sm x 1.47m = 0.5801 cm

TOTAL = 4.164 cm

613.10 STONE FILL, TYPE I
Em BY G.GREENWOOD

0.3m x 5.5m x 1.5m = 2.48 cm

649.31 GRD. UNDER STONE

1.5m x 5.5m = 8.25 sm

601.2610 375 mm CPEP (CSC)

3.9m

604.75 PRC PIPE DROP INLET

1 EA.

185.00

INV(EX) = 184.65
Sand = 0.150
Base = 0.240
GEO = 184.34

INV(OUT) = 184.55

11+255 PIPE SLOPE = 6.1m ÷ 3.9m = 0.0256

EG: 186.189

NEW 3.9 m x 375 mm CPEP

601.0870 1800 mm RCP, CLASS III

19.5 m

DRAINAGE SYSTEM # 14

11+227, 8.5m LT ~ 11+235.5, 9.3m RT

204.02 TRENCH EXCAVATION OF EARTH

HW1

(Below 1.5m)	(Above 1.5m)
-9.2	182.90
-7.58	182.90
-7.58	182.605
-8.1	183.35
-9	183.11
-9.2	183.05
-9.2	183.90

A_1 = 0.634 sm

Vol_1 = 0.634 sm x 8.3m = 5.262 cm x 1.5 = 7.893 cm

PIPE

(Below 1.5m)	(Above 1.5m)
-7.58	183.256
8.48	182.982
8.48	182.218
8.2	182.40
5.6	184.001
0	184.181
-6	184.379
-7.58	183.605
-7.58	183.256

A_2 = 2.430 sm

Vol_2 = 2.430 sm x 8.7m = 20.169 cm

HW2

(Below 1.5m)	(Above 1.5m)
8.48	181.442
9.1	181.442
9.1	181.442
9	181.881
8.48	182.218
8.48	181.442

A_3 = 0.362 sm

Vol_3 = 0.362 (8.3m) = 3.005 cm x 1.5 = 4.5075 cm

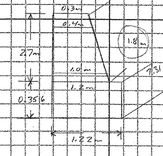
A_4 = 1.140 sm

Vol_4 = 1.140 (8.3m) = 11.062 cm

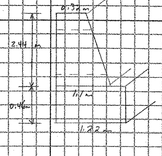
TOTAL EXC = 220.442 cm

501.25 CONCRETE, CLASS 35
Em. BY C.GREENWOOD

HW1 (LT)



HW1 (RT)



$\left(\frac{0.3m + 1.20m}{2}\right)$ x 2.7m x 7.31m = 14.803 cm

0.356m x 1.22m x 7.31m = 3.175 cm

DEDUCT PIPE:

$\left(\frac{0.4m + 1.0m}{2}\right)$ x $\frac{\pi(1.8)^2}{4}$ = 1.178 cm

TOTAL = 16.201 cm

$\left(\frac{0.32m + 1.11m}{2}\right)$ x 2.44m x 7.31m = 12.66 cm

0.46m x 1.22m x 7.31m = 4.102 cm

DEDUCT PIPE = 1.178 cm

TOTAL = 14.98 cm

507.15 REINF. STEEL
Em BY C.GREENWOOD

(HW) 42.7m x 1.555 kg/m = 66.4 kg = 66 kg

(PI) 27.0m x 1.555 kg/m = 41.985 kg = 42 kg

TOTAL = 108 kg

613.11 STONE FILL, TYPE II
Em. BY C.GREENWOOD
Em BY DTrew

(HW) $\left(\frac{2.6m + 2.6m}{2}\right)$ x 8.0m x 0.6m = 24 cm

TOTAL = 49.2 cm

(PI) $\left(\frac{0.6m + 0.6m}{2}\right)$ x 6m x 0.6m = 25.2 cm

649.31 GRD. UNDER STONE FILL

(PI) 6.0m x 8.0m = 48 sm

PLANS CALLED FOR TYPE IV CONTRACTOR UNABLE TO GET TYPE IV USED TYPE II

DWB 6/11/05

INV(HW) = 183.50

INV(OUT) = 182.00

PIPE SLOPE = 1.5m ÷ 19.5 m = 0.0769 = 7.69% m

11+280.04

19.5m NEW 18.0m x 1800 mm RCP w/ CONCRETE HEADWALL @ INLET & OUTLET

CSC 2/16/05

CROSS SECTION SHEET

Metric

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(6) C/2

FILE NAME: const: g:/common/cadd/m-xsection.dgn

PROJECT LEADER:

DESIGNED BY:

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C.GREENWOOD

CHECKED BY: D BREER

SHEET 12 OF 23

133 DRAIN

601.2620 600 mm CPEP (SL)

18.6 m

204.12 TRENCH EXCAVATION OF EARTH

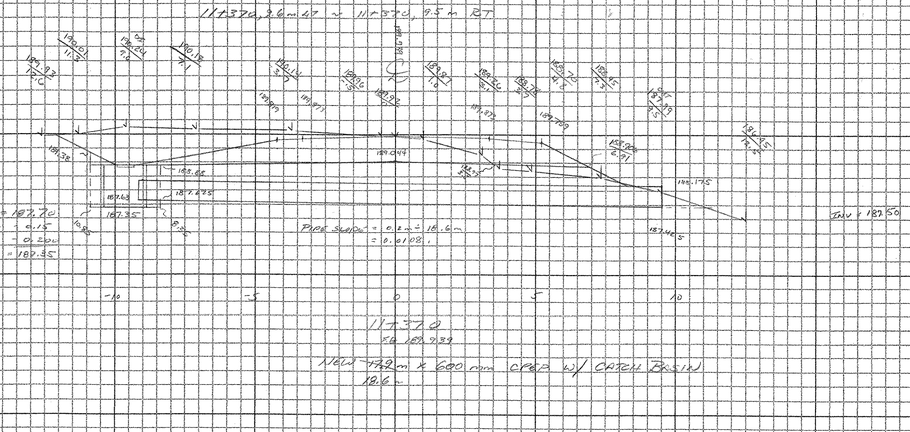
CATCH BASIN:		PIPE:	
-10.85	187.35	-2.35	187.685
-8.35	187.35	2.5	187.485
-8.35	186.88	9.5	187.99
-9.9	188.90	7.3	188.45
-10.85	189.38	4.8	188.70
-10.85	187.85	3.7	188.98
		1.5	188.97
A_1 = 4.088 sm		0	189.048
		-2.35	188.88
Vol = 4.088 m x 9.5 m		-2.85	187.685
= 10.22 cm			
		R_2 = 22.946 sm	
TOTAL = 50.376 cm		Vol_2 = 22.946 x 1.75 m	
- 11.850 cm T. ROCK		= 40.158 cm	
38.526 cm			

204.21 TRENCH EXCAVATION OF ROCK
S.M. BY G. GREENWOOD

$\left(\frac{0.3m + 1.5m}{2}\right) \times 8.73m \times (18m) = 11.85$ cm

604.20 PRECAST REIN. CONC. CATCH BASIN

1 EA.



204.12 TRENCH EXCAVATION OF EARTH

CATCH BASIN: (ABOVE 1.5m)		(BELOW 1.5m)		PIPE:		U.W.:	
-7.65	187.593	-7.65	187.593	-5.15	187.23	7.3	186.60
-6.7	186.95	-7.65	186.95	2.3	188.3	9.1	187.34
-5.15	186.95	-6.7	186.95	2.1	188.46	8.2	187.58
-5.15	187.96	-7.65	187.593	0	186.165	7.8	188.20
-5.65	187.94			-5.15	187.76	7.3	188.2
-5.65	188.52	W_2 = 0.305 sm		-5.15	187.23	7.3	186.6
-6.1	188.46	Vol_2 = 0.305 x 9.5m x 15					
-6.7	188.46	= 1.144 cm		A_1 = 12.844 sm		A_1 = 2.31 sm	
-7.65	189.693						
-7.65	189.593			Vol_2 = 12.844 x 1.75 m		Vol_2 = 2.31 x 3.4m	
				= 22.477 cm		= 7.854 cm	
A_1 = 3.524 sm							
Vol_1 = 3.524 sm x 9.5 m		TOTAL = 40.285 cm					
= 8.81 cm							

INV (out) = 187.30
SUMP = 0.15
BASE = 0.30m
ELEV = 186.95

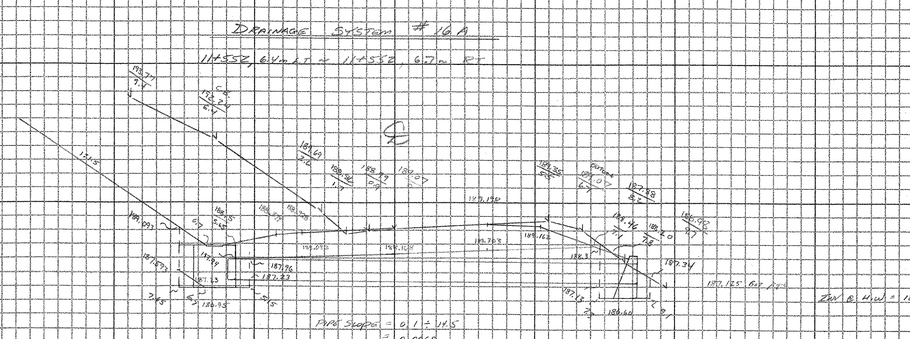
INV @ HWL = 187.20

601.2620 600 mm CPEP (SL)

14.5m

604.20 PRECAST REIN. CONC. CATCH BASIN

1 EA.



501.05 CONCRETE, CLASS 'B' (STANDARD D-2)	507.15 REIN. STEEL S.M. BY G. GREENWOOD
2.0 cm	#@ 21 cm = 8.4m x 11.535 kg/m = 13.06 kg

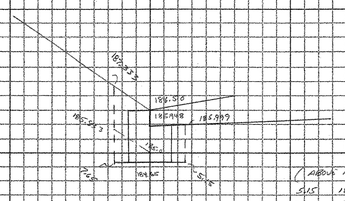
CADD 24/JUL/06

M 147 Metric

CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(3) C/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
	PLOT DATE: 07-JUN-2000 13:
	DRAWN BY: G. GREENWOOD
	CHECKED BY: D BREEZE
const: g:/common/cadd/m-xsection.dgn	SHEET 13 OF 23

134 DRAIN

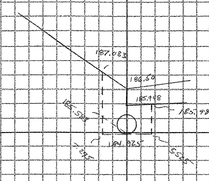


INV (OUT) = 185.00
Sump = -0.150
Base = -0.200
184.650

11+600
@
6.4m LT

CATCH BASIN:

(ABOVE 1.5m)		(BELOW 1.5m)	
5.15	184.65	6.4	184.65
5.15	185.099	6.4	185.00
6.4	185.948	7.65	185.833
6.4	186.150	7.65	184.65
7.65	185.733	6.4	184.65
7.65	185.83		
6.4	185.00	A_2 = 0.958 sm x 1.5	
6.4	184.65	= 1.437 sm	
5.15	184.63		
A_1 = 2.529 sm		TOTAL = 4.966 sm	



11+600
@
6.4m LT

DRAINAGE SYSTEM # 16

11+600, 6.4m LT ~ 11+650, 6.4m LT

PIPE:

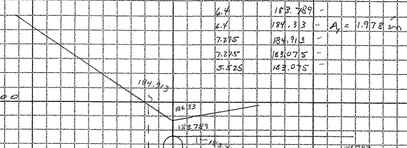
(ABOVE 1.5m)		(BELOW 1.5m)	
5.525	184.925	6.4	184.925
5.525	185.184	7.275	184.525
6.4	185.948	7.275	184.925
6.4	186.50	6.4	184.925
7.275	187.083		
7.275	186.383	A_2 = 0.785 sm x 1.5	
6.4	184.823	= 0.932 sm	
5.525	184.925		
		TOTAL = 2.688 sm	

A_1 = 2.756 sm

48.2m
NEW 47.4m x 600 mm CPEP w/ PRECAST CATCH BASIN

PIPE:

5.525	183.075
5.525	183.788
6.4	183.989
6.4	184.313 - A_1 = 1.978 sm
7.275	184.913
7.275	183.075
5.525	183.075



SW (6%) = 184.15

11+650
@
6.4m LT

CL EQ = 184.677
+ 11.7% LT

PIPE AREA = 48.1cm - 4.6cm - 1.60cm = 41.90 cm² for 6 barrels (Exc. Lining O.D.)

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN: 4.98m x 2.5m = 12.45 cm²

PIPE: $\left(\frac{2.688\,sm + 1.978\,sm}{2}\right)$ x 46.6m = 108.718 cm²

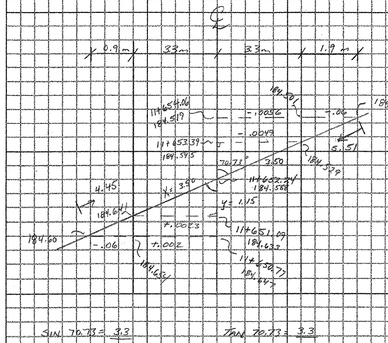
TOTAL = 121.137 cm²

601.3620 600 mm CPEP (SL)

48.2m

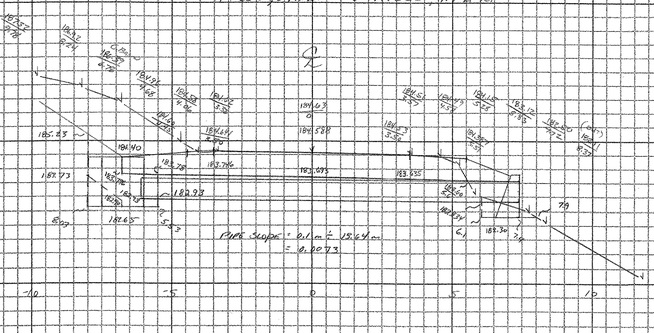
604.20 PRECAST REIN. CONC. CATCH BASIN

1 EA.



SIN 70.73 = 3.3 / x
x = 3.50

TAN 70.73 = 3.3 / y
y = 1.15



DRAINAGE SYSTEM #18

11+680.65m LT ~ 11+697.9.5m LT

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

(ABOVE 1.5m)		(BELOW 1.5m)	
1.25	182.00	-1.25	1820
0	182.00	-1.25	180.0
1.25	182.25	1.25	180.0
1.25	182.25	1.25	182.25
0	1825	0	182.0
-1.25	182.50	-1.25	182.00
-1.25	182.0		

A_1 = 3.75 sm

A_2 = 1.071 sm x 1.5 = 1.547 sm

Vol = 5.297 sm x 25m = 182.243 cm

TOTAL = 50.231 cm
- 1 TRE sm ROCK 48.449 cm

PIPE

(ABOVE 1.5m)		(BELOW 1.5m)	
1.25	182.25	1.25	182.25
2.5	182.5	1.25	181.94
5	182.38	6.2	181.38
6.2	181.38	5	182.38
12.2	181.75	2.5	182.50
12.7	181.719	1.25	182.25
12.2	181.99		
16.6	182.6		
15	183.44		
12.1	183.34		
12.1	182.98		
8.7	182.67		
8.7	183.48		
7.5	183.4		
6.5	183.20		
5	184.08		
2.5	184.60		
1.25	182.75		
1.25	182.25		

A_2 = 2.540 sm x 1.5 = 3.810 sm

Vol_2 = 25.142 sm x 1.43m = 36.986 cm

A_3 = 21.352 sm

INV 182.00
Slope = -0.120
Grade = -0.200
GRADE = 182.85

INV (OUT) = 181.80

PIPE Slope = 0.12m ÷ 16.61m = 0.0120

600.08 10 375 mm RCP CLASS III

16.61m (CENTRE TO CENTRE)

PAY 17.0 m

600.20 PRECAST REINF CONC CATCH BASIN

1 EA. 1

NEW 18.7m x 375mm RCP c/w PRECAST CATCH BASIN 17.0

11+680.0 @ 6.5m LT

204.21 TRENCH EXCAVATION OF ROCK

(BOULDERS) Fm. BY C. GREENWOOD

0.6m x 0.9m x 1.8m = 0.648 cm
0.9m x 0.9m x 1.4m = 1.134 cm
1.782 cm

DRAINAGE SYSTEM #19

11+688.70m LT ~ 11+692.24m RT

204.20 TRENCH EXCAVATION OF EARTH

HEADWALL 1 (ABOVE 1.5m)		PIPE (ABOVE 1.5m)		HEADWALL 2 (ABOVE 1.5m)	
-7.8	180.90	-5.8	181.21	8.2	179.5
-6.5	180.90	-5.8	181.3	8.2	179.25
-5.5	181.12	-5.7	181.19	8.7	179.25
-5.8	181.3	0	181.185	8.2	179.5
-5.8	182.8	6.6	180.13		
-6.0	182.62	7.6	180.07		
-7.0	182.26	7.9	179.9		
-7.4	182.16	7.6	181.12		
-7.8	181.5	6.6	182.23		
-7.8	180.90	0	182.585		
		-5.7	181.89		
		-5.8	181.30		
		-5.8	181.11		

A_1 = 2.789 sm

A_2 = 0.063 sm x 5.8m = 0.365 cm

TOTAL EARTH = 59.005 cm
- T.Rock - 7.246 cm

81.759 cm

A_3 = 20.315 sm

(BELOW 1.5m)	
-6.5	180.90
-6.0	181.12
-5.8	181.3
-5.8	180.9
-6.5	180.9

A_2 = 0.117 sm x 1.5 = 0.176 sm

Vol_1 = 7.965 sm x 5.8m = 17.197 cm

(ABOVE 1.5m)	
-5.8	181.21
-5.8	181.3
-5.7	181.19
0	181.185
6.6	180.13
7.6	180.07
7.9	179.10
-6.8	181.21

A_3 = 5.971 sm x 1.5 = 8.95 sm

Vol_2 = 29.28 sm x 2.44m = 71.443 cm

204.21 TRENCH EXC. OF ROCK

(BOULDERS) Fm. BY C. GREENWOOD

0.5m	x 1.0m	x 1.5m	= 0.75 cm
0.5	x 0.6	x 1.7	= 0.51 cm
0.6	x 1.4	x 1.8	= 1.512 cm
0.5	x 1.2	x 1.4	= 0.84 cm
0.5	x 1.0	x 1.4	= 0.70 cm
0.45	x 1.2	x 1.2	= 0.648 cm
0.6	x 0.8	x 1.3	= 0.624 cm
0.55	x 1.0	x 1.0	= 0.55 cm
0.6	x 0.6	x 1.4	= 0.504 cm
0.45	x 0.9	x 1.5	= 0.608 cm

TOTAL = 7.246 cm

INV 183.48

NEW 15.6m x 1200 mm RCP c/w HEADWALL @ INLET & OUTLET

17.07

600.0855 1200 mm RCP CLASS III

17.07 m

501.25 CONCRETE CLASS B

(LT) STANDARD D-2 = 5.9 cm

(LT) Fm. BY C. GREENWOOD (ADDED HEIGHT TO H.W)
STANDARD D-2 = 5.9 cm
0.69m x 4.87 x 0.3 = 0.132 cm
6.032 cm

TOTAL = 11.932 cm

507.15 REINFORCING STEEL

LT & RT [4 @ 4.57m x 1.555 KG/m] x 2 H.W

= 56.8 KG

649.31 GRD. UNDER STONE FILL Fm. BY C. GREENWOOD

(RT) 3.5m x 5.5m = 19.25 sm

(LT) (3.6m x 3.1) + (3.9m x 3.2m) = 23.64 sm

42.89 sm

613.10 STONE FILL, TYPE I

Fm. BY J. SMITH

(LT) 0.9m x 3.2m = 3.79 / 3.37 cm
0.7m x 3.1m = 3.5cm = 8.85 cm
6.72 cm
7.09 cm

613.11 STONE FILL, TYPE II

Fm. BY C. GREENWOOD

(RT) 0.914m x 3.05m x 6.4m = 17.84 cm

CROSS SECTION SHEET

Metric

Copy 2/14/05

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 4(5) 0/2

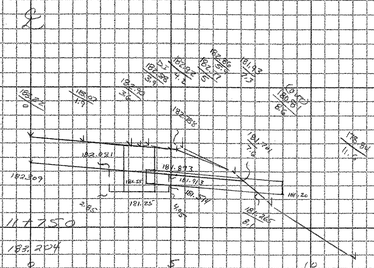
FILE NAME: DRAINAGE
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:
DRAWN BY: C. GREENWOOD
CHECKED BY: D. RUCKER
SHEET 15 OF 23

136 DRAIN

DRAINAGE SYSTEM # 20 A

11+750, 3.9m RT ~ 11+750, 9.6m RT



209.20 TRENCH EXCAVATION OF EARTH

CATCH BASINS		PIPE	
2.85	181.25	4.95	181.514
4.95	181.25	6.1	181.265
4.95	181.713	7.6	181.791
2.85	181.081	4.95	181.918
2.85	181.25	4.95	181.514

A_1 = 1.569 sm

A_2 = 1.153 sm

Vol_1 = 1.569 sm x 2.1m = 3.295 cm

Vol_2 = 1.153 sm x 1.47m = 1.695 cm

TOTAL EXC = 4.99 cm

601.20(10) 375mm CPSP (CSL)

4.88 m

604.25 PRE FAB DROP INLET

1.50

613.10 STONE FILL, TYPE I

6.0m BY 6 GREENWOOD

0.3m x 2.9m x 6.2m = 5.37 cm

649.31 GEO. LINEN STONE FILL

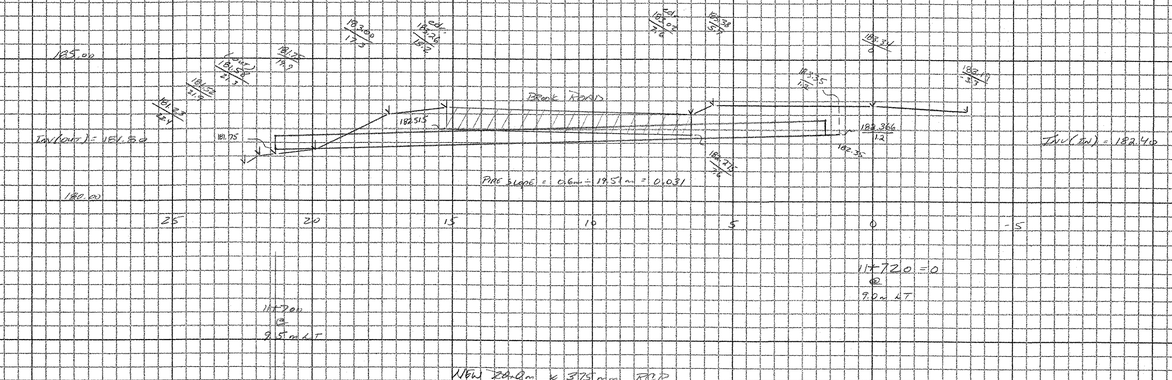
2.9m x 6.0m = 17.4 sm

Inv (IN) = 181.955

Pipe slope = 0.25m ÷ 4.88m = 0.072

DRAINAGE SYSTEM # 20

11+720, 9.0m LT ~ 11+700, 2.5m LT



209.20 TRENCH EXCAVATION OF EARTH

PIPE	
19.9	181.75
1.2	182.866
1.2	183.35
5.7	182.38
7.6	182.02
2.6	181.275
15.2	182.515
15.2	182.26
17.7	183.00
19.9	181.75

A_1 = 13.688 sm

Vol_1 = 13.688 x 1.47m

TOTAL = 20.121 cm

601.08(10) 375mm RCP CLASS III

19.51m

613.10 STONE FILL, TYPE I:

5m BY 6 GREENWOOD

0.3m x 3.7m x 8.7m = 9.66 cm

M MADOT Metric

CROSS SECTION SHEET

Okay 2/21/05 – DWB 4/26/05

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(53) C/2

FILE NAME: DRAINAGE

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY: D. BRAYE

SHEET 16 OF 23

137 DRAIN

DRAINAGE SYSTEM # 21

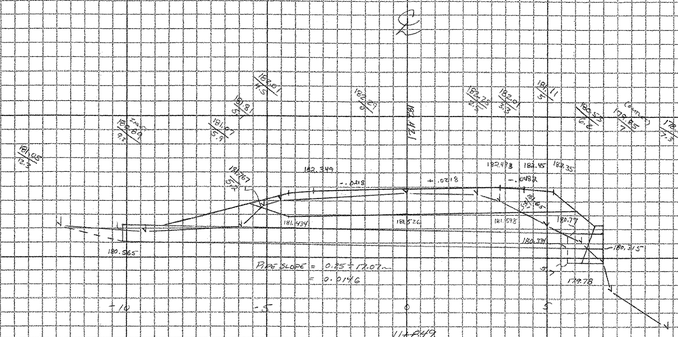
11+849.83m LT ~ 11+869.70m RT

204.20 TRENCH EXCAVATION OF EARTH

FIRST:		HEADWALL:	
-12.3	181.05	5.7	180.77
-10.1	180.565	5.7	179.78
5.7	180.334	7.0	179.72
5.7	180.77	7.0	179.85
5	181.11	6.2	180.58
4.1	181.615	5.7	180.77
0	181.526		
-4.2	181.434	A_1 = 0.763m x 2.8m	
-5.2	181.767		
-5.9	181.07	Vol_1 = 2.138 cm	
-9.2	180.89		
-12.3	181.05	EXC for STONE FILL: (LT)	
		Em. By C.GREENWOOD	
A_1 = 14.496m x 1.54m		0.5m x 1.5m x 21/1 = 1.181 cm	
Vol_1 = 28.324 cm		TOTAL EXC = 25.774 cm	

601.0815 450 mm RCP CLASS III

17.07m



NEW 16.0m x 450 mm RCP c/w HEADWALL @ OUTLET

17.07m

DRAINAGE SYSTEM # 22

11+907.64m LT ~ 11+927.64m LT

204.20 TRENCH EXCAVATION OF EARTH

Em. By C.GREENWOOD

0.52m x 1.47m x 19.54m = 14.34 cm ✓

601.0810 375 mm RCP CLASS III

19.51m ✓

613.10 STONE FILL TYPE I

Em. By C.GREENWOOD

(LT)

0.3m x 1.5m x 2.9m = 1.31 cm ✓

613.11 STONE FILL TYPE II

(RT)

0.6m x 9.0m x (50+9.0 / 2) = 37.8 cm ✓

0.3m x 1.0m x 9.0m ÷ 2 = 2.7 cm ✓

CURVED ADJUST 3.3m x 1.8m x 1/6 = 3.56 cm

44.06 cm

649.31 GEO. UNDER STONE FILL

(LT) 1.5m x 2.9m = 4.4 sm ✓

(RT) 5.0m x 9.0m = 45 sm ✓

49.4 sm ✓

501.25 CONCRETE, CLASS B

(1) STANDARD D-2m)

1.3 cm ✓

507.15 REIN. STEEL

1.52m ø4 = 6.08m x 1.535 kg/m

= 9.5 kg ✓

Chkd 2/28/05 ✓ Dwb 6/6/05

CROSS SECTION SHEET

MDOT Metric

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 4(5) C/2

FILE NAME: DRAINAGE

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

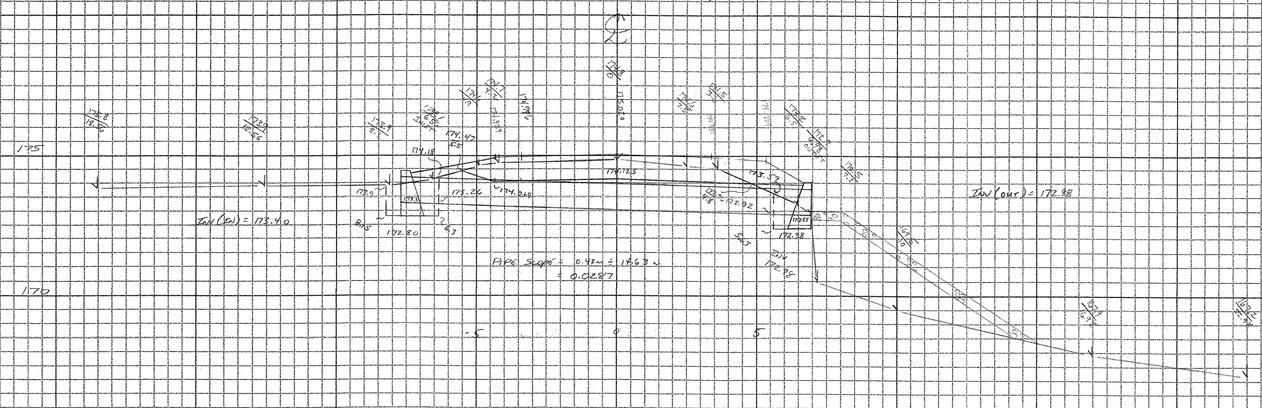
DRAWN BY: C.GREENWOOD

CHECKED BY: D BARGER

SHEET 17 OF 23

DRAINAGE SYSTEM # 23

124+110, 6.4m LT ~ 124+113, 6.8m RT



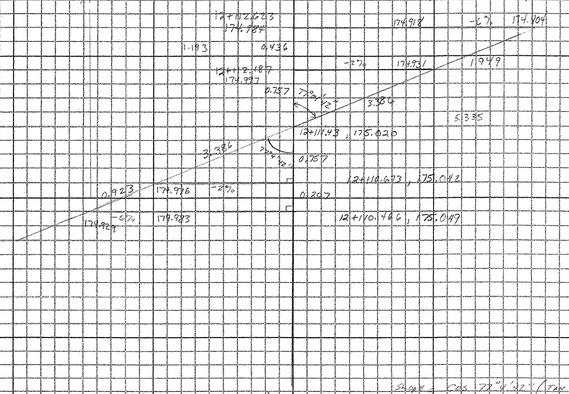
124+111.43 77°04'42" skew

14.63m

Culvert to Headwalls @ Inlet & Outlet

1.65m x 1.350 mm RCP w/ Headwalls @ Inlet & Outlet

14.63 m



Slope = cos 77°4'42" (tan 77°4'42" / 5 − .03)

= 0.188 or 1:5.31

Slope = cos 77°4'42" (tan 77°4'42" / 1.5 + .08)

= 0.6565 or 1:1.15

204.20 Trench Excavation of Earth

(HW1):		Pipe:		HW2:	
-8.15	172.80	-6.3	178.76	5.63	178.38
-6.3	172.80	5.63	172.92	6.98	178.38
-6.3	174.18	5.63	178.58	6.98	172.96
-6.56	174.1	4.8	178.96	6.5	173.2
-8.1	173.9	0	174.125	5.63	172.57
-8.15	173.9	-4.309	174.069	5.63	172.58
-8.15	172.80	-5.5	174.47		
		-6.3	174.18		
		-6.3	172.26		

A_1 = 9.251 sm x 4.0 m

Vol_1 = 9.004 cm

A_2 = 11.877 sm x 1.93 m

Vol_2 = 22.913 cm

TOTAL = 48.217 cm

A_3 = 1.205 cm x 4.0 m

Vol_3 = 4.82 m

Exc for Stone @ Inlet
Km by C. Greenwood

0.45m x 8.5m x 3.0m = 11.48 cm

613.10 Stone Fill, Type I
Km by C. Greenwood

(RT) 0.3m x 1.5m x 4.0m = 1.8 cm

613.11 Stone Fill, Type II
Km by C. Greenwood

(LT): 0.45m x 8.5m x 3.5m = 13.39 cm

(RT) 0.3m x 8.5m x 3m = 7.56 cm

20.95 cm

601.0835 750 mm RCP Class III

14.63m

601.25 Concrete Class B

Outlet: 2.645 cm

50 mm extra height on headwall

Inlet: 2.60 cm
Rounded 0-2

567.15 Rein Steel

4 @ 2.7m = 10.8 x 1.552 = 16.76 kg

4 @ 2.7m = 10.8 x 1.552 = 16.76 kg

33.52 kg

Cec
7/28/00 / DWR
8/10/00

CROSS SECTION SHEET

PROJECT NAME: Grafton - Rockingham

PROJECT NUMBER: STP 0126(4)S

FILE NAME: Drainage

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. Greenwood

CHECKED BY: D Breer

SHEET 18 OF 23

139 DRAIN

204.20 TRENCH EXCAVATION OF EARTH

PIPE:

#3	172.52
4.0	171.95
4.57	171.97
4.57	172.498
3.8	172.52

A_1 = 0.472 sm x 1.75 m

Vol_1 = 0.826 cm

TOTAL EARTH = 0.826 cm

204.21 TRENCH EXCAVATION OF ROCK

CATCH BASIN:

(ABOVE 1.5m)		(BELOW 1.5m)	
-7.65	173.88	-7.65	172.33
-7.65	173.37	-7.65	171.10
-7.5	171.73	-6.8	171.10
-6.4	171.45	-6.1	171.45
-6.4	171.10	-7.5	171.73
-5.15	171.10	-7.65	172.33
-5.15	172.485	-5.15	171.38
-6.8	172.66		
-7.5	171.83		
-7.65	172.37		

A_1 = 3.321 sm x 2.5m

Vol_1 = 8.303 cm

A_2 = 0.699 sm x 2.5m

Vol_2 = 1.698 cm x 1.5 = 2.546 cm

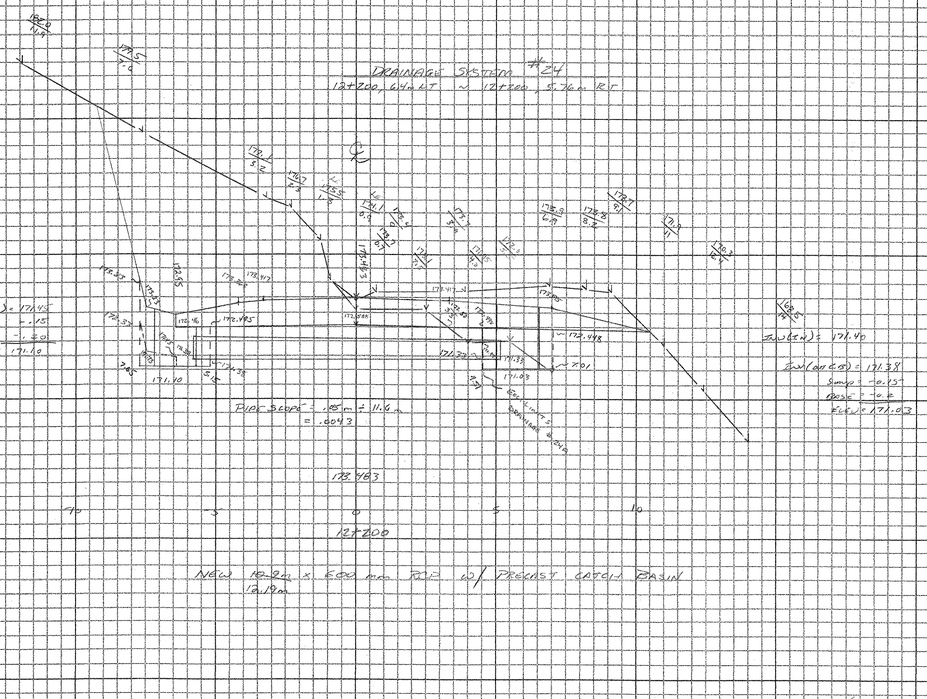
PIPE:

-5.15	171.38
4.51	171.33
4.51	171.97
4.0	171.95
3.3	172.52
4.0	171.95
4.51	171.97
4.51	172.498
-5.15	171.38

A_3 = 10.966 sm x 1.75m

Vol_3 = 19.191 cm

TOTAL ROCK = 30.04 cm



204.20 TRENCH EXCAVATION OF EARTH

HEADWALL:

7.0	167.32		
5.5	167.32		
5.5	168.80		
6.7	168.055		
2.0	167.35		

PIPE:

(ABOVE 1.5m)		(BELOW 1.5m)	
5.5	167.32	5	167.86
5	167.86	3.15	167.89
4.1	168.89	3.15	168.609
2.15	168.609	4.1	168.89
3.15	170.109	5	167.86
4.1	170.09		
5.5	168.80		
6.55	169.85		
6.7	170.055		

CATCH BASIN:

(ABOVE 1.5m)		(BELOW 1.5m)	
3.15	168.609	3.15	167.65
0.45	168.669	0.45	167.65
0.45	170.169	0.45	168.669
3.15	170.109	2.15	168.609
3.15	168.609	3.15	167.65

A_1 = 1.493 sm x 49m

Vol_1 = 5.756 cm

A_2 = 1.003 sm x 1.93m

Vol_2 = 1.936 x .45 = .871

A_2 = 8.378 sm x 1.93m = 2.904 cm

Vol_2 = 6.909 cm

A_3 = 4.85 sm x 2.7m

Vol_3 = 13.095 cm

A_3 = 2.602 sm x 2.7m

Vol_3 = 7.187 sm x .45 = 1.781 cm

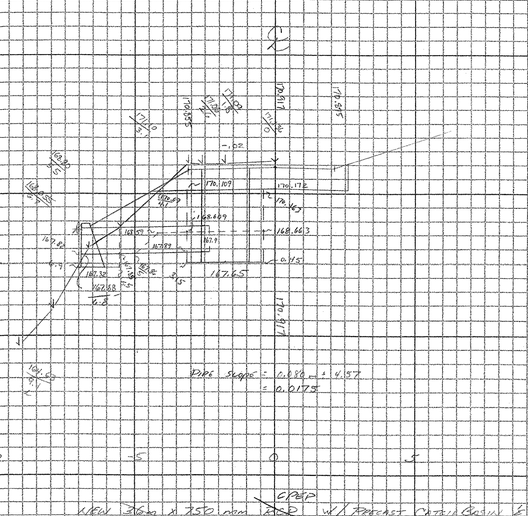
TOTAL EXC = 36.719 cm

32.319 cm

Ent(CB) = 168.00
Sump = -.15
Base = -.300
Elev = 167.85
Ent(HW) = 167.92

175.00
170.00
165.00

DRAINAGE SYSTEM # 24 B



NEW 756m x 750 mm RCP w/ PRECAST CATCH BASIN & CONCRETE HEADWALL

VT 040 (McBride Road)

204.21 TRENCH EXCAVATION OF ROCK

(SEE DRAINAGE #24)

CATCH BASIN:

4.51	171.97
4.51	171.03
7.01	171.03
5.15	172.0
4.51	171.97

A_1 = 1.678 sm x 2.5m

Vol_1 = 4.195 cm

PIPE: Ent. at C. Barrel

(BALLAST)

0.9m	x	1.8m	x 0.6m	= 0.972 cm
1.8	x	0.75	x 0.4	= 0.54 cm
2.2	x	0.55	x 1.0	= 1.21 cm
1.0	x	2.3	x 0.7	= 1.61 cm
1.0	x	2.7	x 1.8	= 4.86 cm
				9.192 cm

(CRUSH)

1.52m	x	0.102 m	x 1.2m	= 0.196 cm
2.47m	x	0.269	x 1.2	= 0.667 cm
1.827	x	0.381	x 1.2	= 0.836 cm
3.46	x	0.305	x 1.2	= 1.340 cm
1.22	x	0.203	x 1.2	= 0.297 cm
				3.326 cm

TOTAL ROCK = 16.713 cm

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

4.51	172.498
4.51	171.97
5.5	172.0
7.01	171.03
7.01	172.498
4.51	172.498

PIPE:

79.95 sm x 1.75m = 139.913 cm

Total = 134.238 cm

- 16.713 cm (T. Rock)

A_2 = 1.930 sm x 2.5m

Vol_2 = 4.825 cm

T. EARTH 117.525 cm

DRAINAGE SYSTEM # 24 A

12+200, 5.76m RT ~ 14+040, 1.8 m LT

12+200 "1" = ~ 14076

STATION	Bottom of Pipe	Subgrade	Depth	Dist.	Pipe Area Above 1.5m	Pipe Area Below 1.5m
(use 14074.75) Exc. Limits 0+24	14076	171.305	172.473	1.168'		
For Dist.	14060	170.0	172.253	2.253'	14.75	19.677' / 6.553'
	14050	169.08	171.254	2.174'	10.	15.0' / 7.135'
					8.65	12.975' / 4.844'
(use 14041.35) Exc. Limits 0+24	14040	168.19	170.136	1.946		
						47.652 sm / 17.532 sm x 1.5 = 26.298 sm

601.0825 600mm RCP CLASS III

33.844 m

604.20 PRECAST REIN. CONC. CATCH BASIN

1 Ea

604.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN:

4.51	172.498
4.51	171.97
5.5	172.0
7.01	171.03
7.01	172.498
4.51	172.498

PIPE:

79.95 sm x 1.75m = 139.913 cm

Total = 134.238 cm

- 16.713 cm (T. Rock)

T. EARTH 117.525 cm

604.20 PRECAST REIN. CONCRETE CATCH BASIN

1 Ea

601.0825 600mm RCP CLASS III

12.19 m

604.20 PRECAST REIN. CONC. CATCH BASIN

1 Ea

501.25 CONCRETE CLASS B *

603.11 STONE FILL TYPE II

5m @ C. BARREL

((1/2m x 4m) + (2m x 1)) x 2) / x 0.6m

= 12.0 cm

4.57 m

507.15 REIN. STEEL *

* HEADWALL ELIMINATED DWB

CROSS SECTION SHEET

DWB 3/3/05 - DWB 6/07/23

PROJECT NAME:	GRAFTON – ROCKINGHAM
PROJECT NUMBER:	STP 0126 (4)S CONTRACT #2
FILE NAME:	DRAINAGE
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C. GREENWOOD
CHECKED BY:	D. BEETLE
SHEET	19 OF 23

140 DRAWN

DRAINAGE SYSTEM # 25 B

* USE 48.8 m = 160 FT of 600 mm RCP

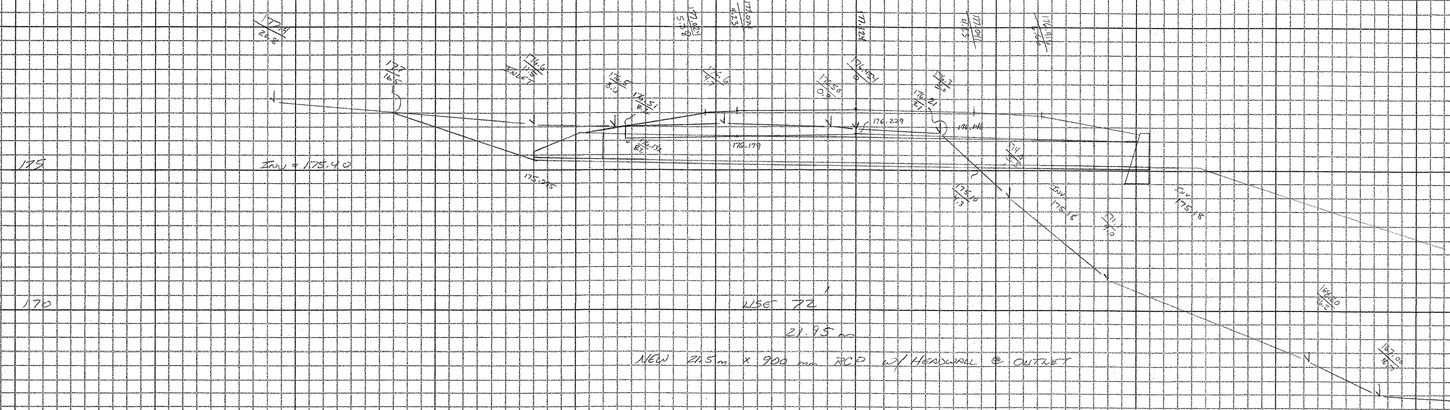
12+280, 4 m RT W. 14+40, 1.8 m LT

12+280 = N 0+080

| 204.20 TRENCH EXCAVATION OF EARTH | | |

DRAINAGE SYSTEM # 27

STA 12+419, 9.0m LT – 12+463, 8.5m RT



tan 51.34° = 2.3/y

y = 2.640

sin 51.34° = 3.3/x

x = 4.222

tan 51.34° = 5.2/y1

y1 = 4.162

sin 51.34° = 5.2/x1

x1 = 6.659

3.360

Slope Lt:
= tan 51.340 (tan 51.340/4 + .018)
= 0.3789
OR 1:3.1

613.11 STONE FILL, TYPE II

from BY C. GREENWOOD

0.6m x 5.0m x 23.5m = 70.5 cm

649.31 GEO. CONCRETE STONE FILL

5.0m x 23.5m = 117.5 sm

204.20 TRENCH EXCAVATION OF EARTH

Pipe:

-16.5	177.0
-11.5	175.296
4.3	175.10
3.1	176.24
0	176.889
-8.2	176.132
-8.2	176.151
-8.6	176.154
-14.5	176.16
-16.5	177.0

A_1 = 19.486 sm

Vol_1 = 19.486 sm x 2.11 m

Total = 41.115 cm

601.0845 900mm RCP, CLASS III

21.95m

601 6016 900mm DIAPH'S

* NO END SECTION USED

501.25 CONCRETE CLASS B

* NO HEADWALL USED

507.15 REBAR STEEL

* NO HEADWALL USED

CROSS SECTION SHEET

Metric

Okayed 3/7/05 - DMM 6/09/05

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 (4)S CONTRACT #2

FILE NAME: DRAINAGE

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY: J. BRAZIL

SHEET 21 OF 23

142 DRAIN

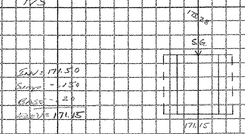
DRAINAGE SYSTEM #29B

12+700, 6.4m LT ~ 12+781, 6.4m LT

PIPE

STATION	INV of PIPE	SEABROOK	DEPTH	DISTANCE	AREA (ABOVE 1.5m)	AREA (BELOW 1.5m)
12+701.25	171.425	173.257	1.832	18.75	28.125	6.626
12+720	171.30	173.175	1.875	20	30	6.5
12+740	171.175	172.950	1.775	20	30	3.48
12+760	171.05	172.623	1.573	19.75	27.532	0.721
12+779.75	170.925	172.213	1.288		115.657 sm	17.329 sm x 1.5 = 25.994 cm

175



Pipe Slope = 0.5m ÷ 80m
= 0.00625

12+700
to
6.4m LT

204.20 TRENCH EXCAVATION OF EARTH

CATCH BASIN = (1.5m x 2.5m x 2.5m) + (0.68m x 2.5m x 2.5m x 1.5) = 15.281 cm

PIPE = 141.651 sm x 1.75m = 247.889 cm

TOTAL EXC = 263.17 cm + 7. Rock 6.956 cm = 256.214 cm

204.21 TRENCH EXCAVATION OF ROCK

(BOULDERS) Fm. by D. BREAU & G. GREENWOOD

0.9m x 1.3m x 0.7m = 0.819 cm
0.65m x 1.8m x 1.8m = 1.17 cm
1.5m x 0.6m x 0.9m = 0.819 cm
1.4m x 1.1m x 0.16m = 0.924 cm
0.6m x 1.6m x 0.9m = 0.864 cm
1.6m x 0.7m x 0.7m = 0.780 cm
0.7m x 0.7m x 1.2m = 0.588 cm
1.5m x 1.1m x 0.6m = 0.990 cm
6.956 cm

601.16220 600mm CREF (CSA)

81.08m

604.20 PRECAST REIN. CONC. CATCH BASIN

1 EA

DRAINAGE SYSTEM #29A

12+600, 6.4m LT ~ 12+600, 8.3m RT

204.21 TRENCH EXCAVATION OF ROCK

(BOULDERS) Fm. By G. GREENWOOD

0.8m x 1.1m x 1.7m = 1.496 cm

204.20 TRENCH EXC. OF EARTH

CATCH BASIN (ABOVE 1.5m)		CATCH BASIN (BELOW 1.5m)		PIPE (ABOVE 1.5m)		PIPE (BELOW 1.5m)	
-7.65	174.505	-7.65	174.005	-5.15	172.234	+2.2	172.12
-7.65	173.005	-7.65	172.90	-2.2	172.12	2.9	172.41
-6.7	173.53	-6.4	172.90	2.5	172.41	3.13	172.93
-6.4	173.53	-6.4	173.33	3.3	171.93	4.2	172.12
-6.4	172.00	-6.7	173.33	5.3	171.88		
-5.15	172.00	-7.65	174.005	2.9	173.905	A_1 = 1.231 sm x 1.5 = 1.8467 sm	
-5.15	173.453			2	173.243		
-6.4	173.453			-5.15	173.453		
-6.4	174.03	A_2 = 0.858 sm x 1.5 = 1.339 sm		-5.15	172.234	Vol_1 = 1.847 sm x 1.93 m = 3.565 cm	
-6.7	174.03						
-7.65	174.505						
A_1 = 3.65 sm		A_2 = 1.332 sm x 2.5 m = 3.33 cm		A_2 = 13.89 sm			
Vol = 3.65 sm x 25 m = 9.125 cm				Vol_2 = 13.89 sm x 1.93 m = 26.810 cm			
		TOTAL = 42.830 cm					
		- 1.498 cm					
		ADD = 41.334 cm					

INV (IN) = 172.35
Invert = 171.15
Cover = 0.20
Pipe = 172.00

INV (OUT) = 171.90

601.26225 750mm CMP (CSA)

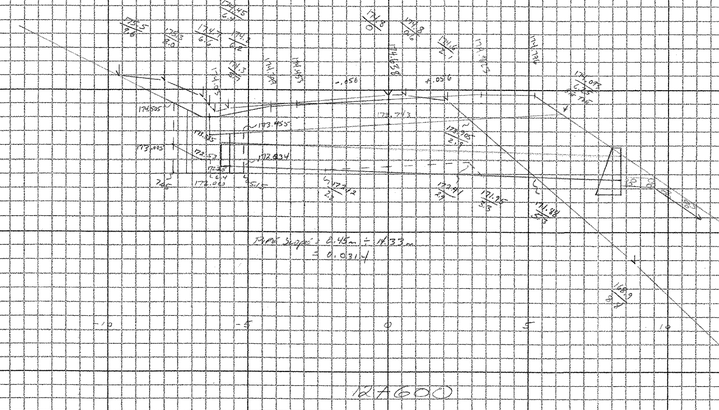
14.33m

604.20 PRECAST REIN. CONC. CATCH BASIN

1 EA

180.00N

175.00



Pipe Slope = 0.45m ÷ 14.33m
= 0.0314

14.33m NEW 750mm CMP (CSA) W/ PRECAST CATCH BASIN & CONCRETE HEADWALL

613.11 STONE FILL, TYPE II

Fm. By G. GREENWOOD

0.6m x 3.8m x 17m = 38.76 cm

649.31 CLR. UNDER STONE FILL

38.8m x 17.0m = 659.6 sm

501.25 CONCRETE CLASS B

STANDARD 0-2 2.6cm

07.15 REIN. STEEL

40 x 7m = 10.8 x 1.552 = 16.76 Kg

DRAWN 24/05/2000

MTO Metric

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 (4) S CONTRACT #2

FILE NAME: DRAINAGE
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:
DRAWN BY: G. GREENWOOD
CHECKED BY: D. BREER
SHEET 22 OF 23

DRAINAGE SYSTEM # 30

12+636, 6.4m LT ~ 12+654, 6.4m LT

601.0815 450mm RCP, CLASS III 9.75 M

CATCH BASIN (BELOW 1.5m)	
7.75	171.74
7.75	170.45
5.05	170.45
5.05	170.62
6.4	170.692
6.4	171.039
7.75	171.74

AREA = 1.696 sm x 1.5 = 2.319 sm

Vol = 2.319 sm x 2.7 m = 6.261 cm

CATCH BASIN (ABOVE 1.5m)	
6.4	172.192
6.4	172.539
6.7	172.539
7.75	173.24
7.75	171.74
6.70	171.039
6.4	172.039
6.4	170.692
5.05	170.62
5.05	172.12
6.4	172.192

AREA = 4.05 sm

Vol = 4.05 sm x 2.7 m = 10.935 cm

HEADWALL	
7.5	170.00
9.3	170.00
9.3	170.50
8.9	170.90
8.3	171.35
7.5	171.41
7.5	170.00

AREA 2.059 X 3.4

Vol 9.00 cm

PIPE	
- 5.05	170.88
7.5	170.43
7.5	171.41
- 5.05	172.12
- 5.05	170.88

AREA 12.676 X 1.75

Vol 22.183

TOTAL F.E. 416.379 cm

203.20 TRENCH EXCAVATION OF EARTH

501.25 CONC CLASS B
STANDARD D-2M
2.0 cm

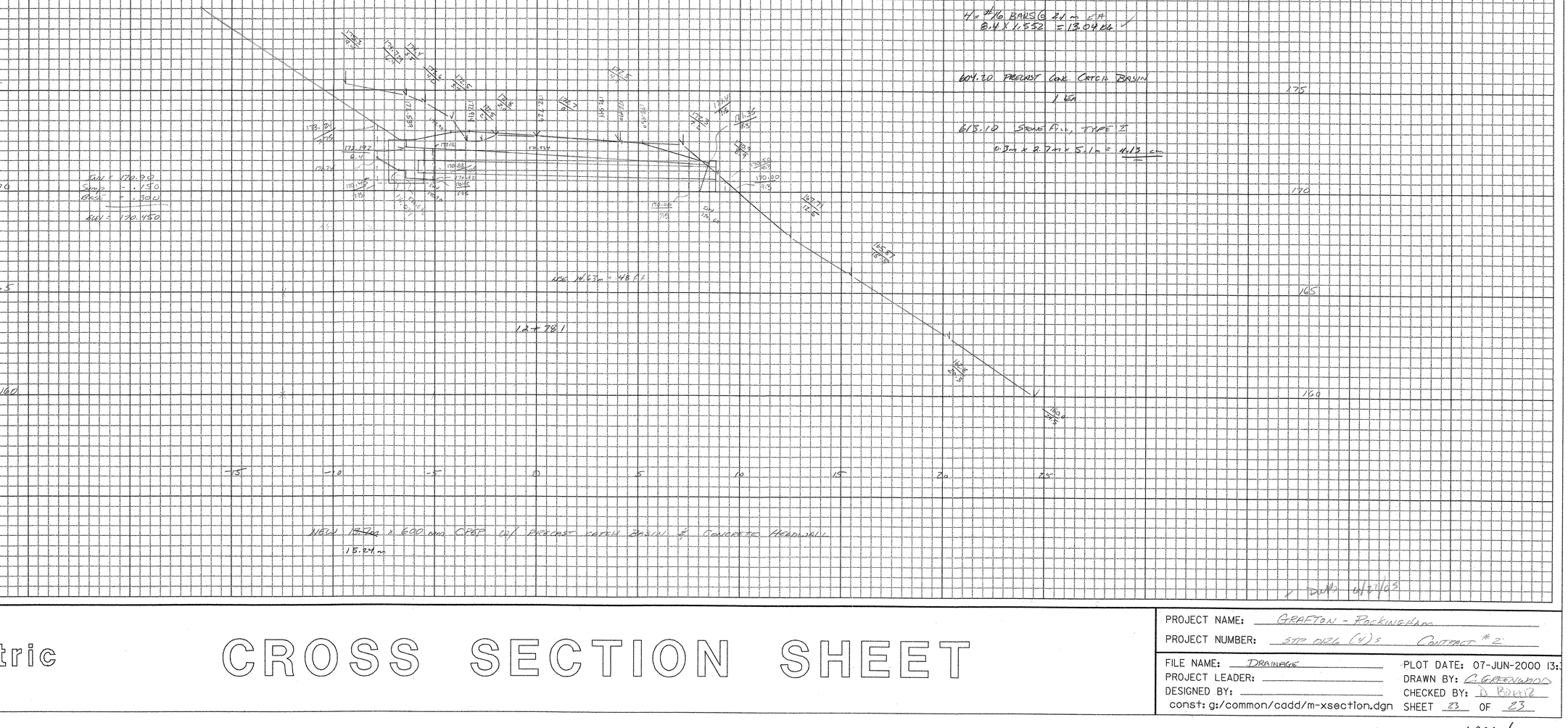
507.15 REINFORCING STEEL
H = #16 BARS @ 2M = 8.4 X 1.552 = 13.04 KG

604.20 PRECAST CONC CATCH BASIN
1 EA

613.10 STONE A.L., TYPE I
0.3m x 2.7m x 5.1m = 4.13 cm

DRAINAGE SYSTEM # 29 D

12+781, 6.4m LT ~ 12+781, 8.8m RT



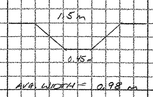
PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 (4)S CONTRACT # 2

FILE NAME: DRAINAGE
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:3
DRAWN BY: C.GREENWOOD
CHECKED BY: D.BUSSIÈR
SHEET 23 OF 23

CROSS SECTION SHEET

144 DRAIN



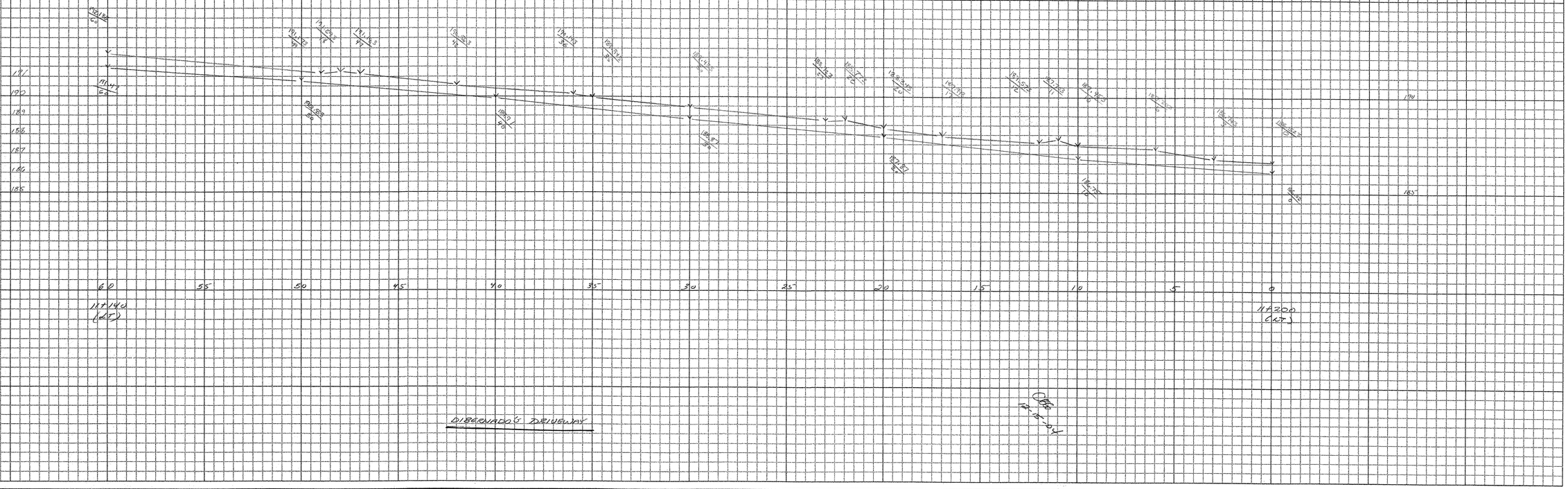
AVG. WIDTH = 0.98 m

2003/6 SOUTH ROCK EXC.

60	192.185
55	191.497
50	190.828
45	189.904
40	188.887
35	187.857
30	186.775
25	186.062
20	186.528
15	186.774
10	187.204
5	187.453
0	187.703
0	187.517
5	187.993
10	188.343
15	188.723
20	188.774
25	189.433
30	189.933
35	189.948
40	190.148
45	190.583
47	191.183
48	191.293
49	191.178
50	192.183

AREA = 3432 sm x 0.98m = 33,634 cm²

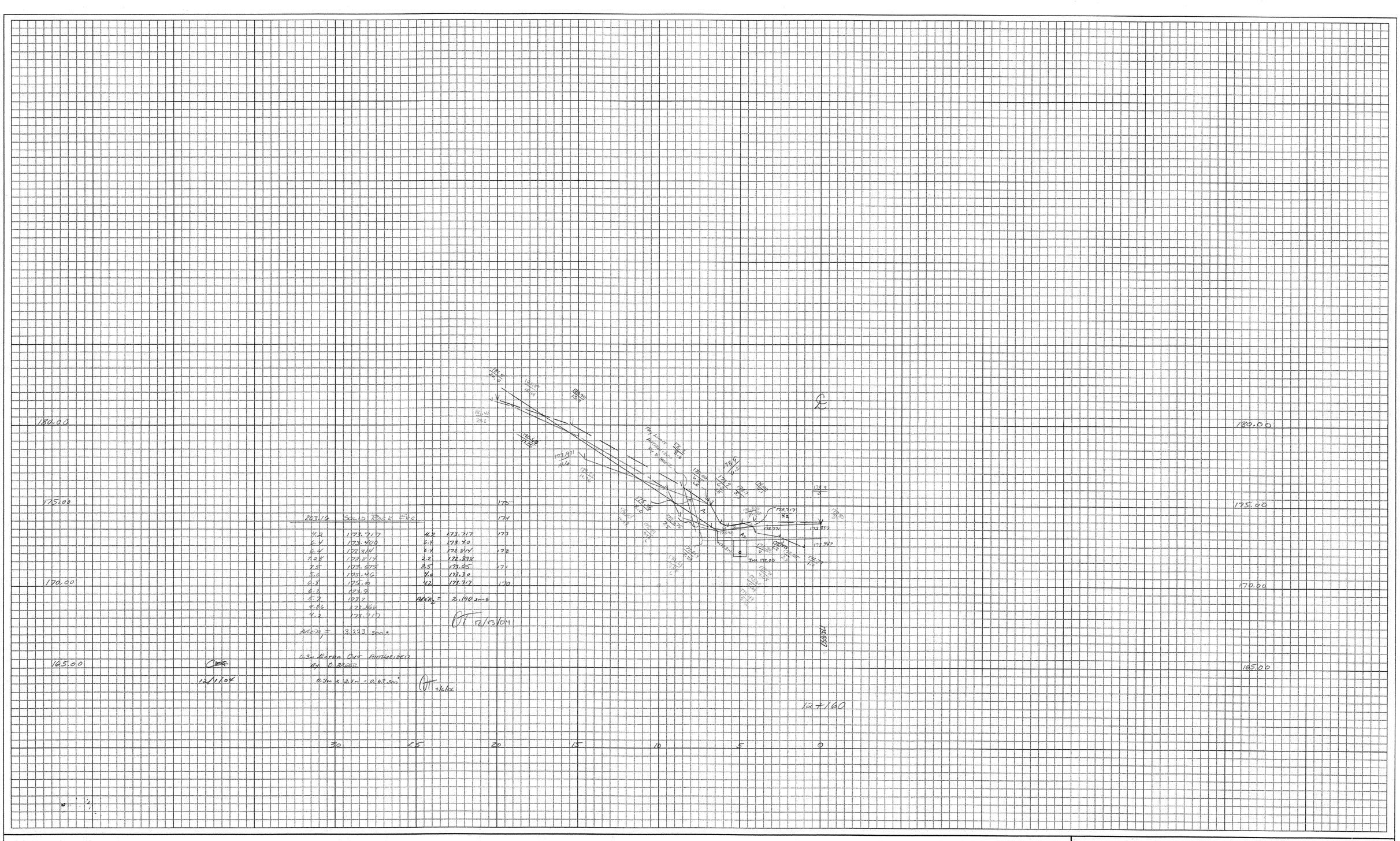
12/15/04



CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126(4)S 9/2
FILE NAME:	
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C.GREENWOOD
CHECKED BY:	DTYLER
SHEET	1 OF 1

~~Scale~~ Back 150 LEDGE XS



CROSS SECTION SHEET

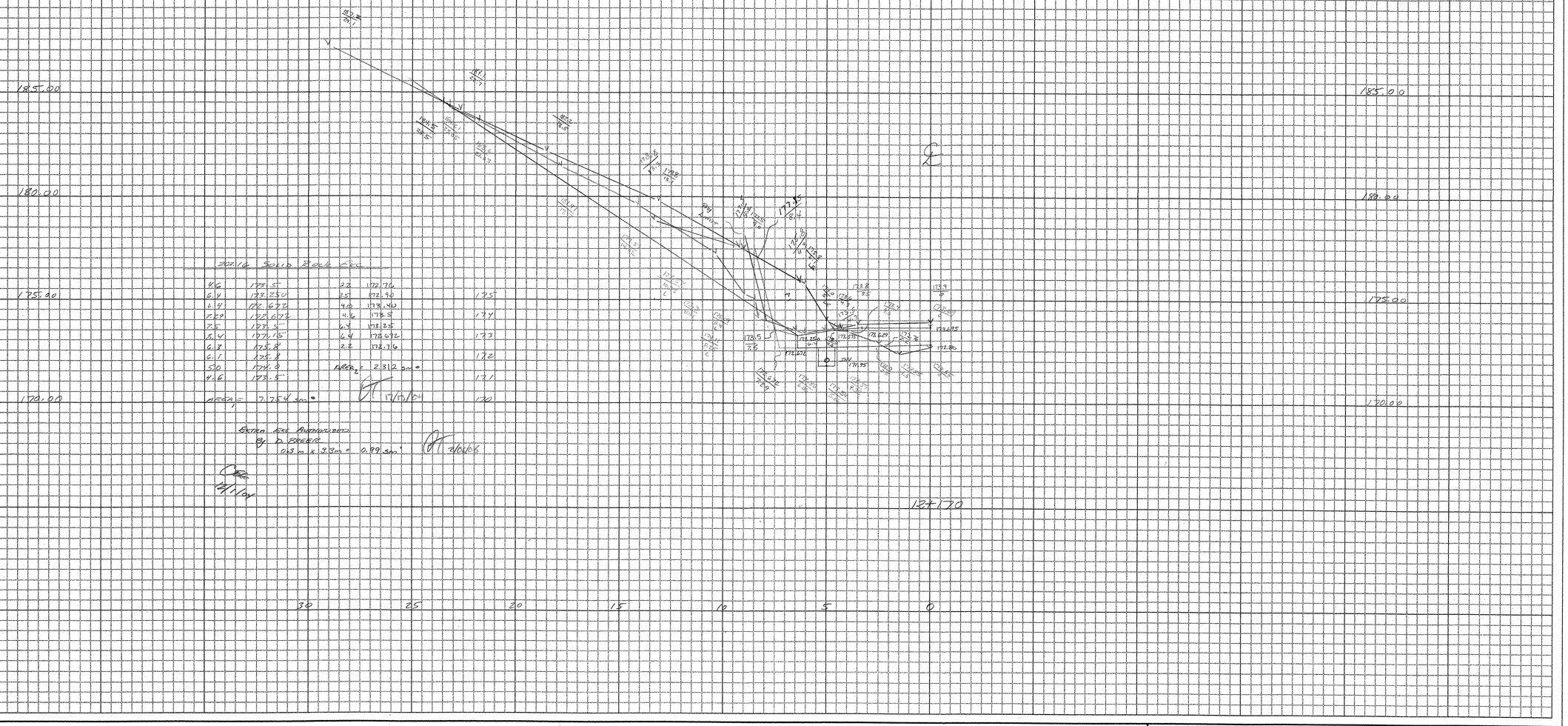
MaDOT Metric

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126(4)S CONTRACT #2

FILE NAME: LEDGE
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:
DRAWN BY: C. GREENWOOD
CHECKED BY: D. TYLER
SHEET 1 OF 7

151 LEDGE+S



2001a Solid Rock Exc.

4.6	178.5	2.2	172.76	
6.4	173.250	2.5	172.90	175
6.4	172.672	4.6	173.40	
4.6	172.672	4.6	173.5	174
2.5	173.5	6.4	173.25	
6.4	177.15	6.4	178.672	173
6.3	175.8	2.2	178.76	
6.1	175.8			172
5.0	174.0	Area$_2$ =	2.312 sq.m	
4.6	173.5			171
Area$_1$ =	7.754 sq.m			170

17/11/04

Extra Exc. Authorised
By D. Exeter
0.3 m x 3.3m = 0.99 sq.m

2/12/04

14/1/04

Metric

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126(4)S CONTRACT #2

FILE NAME: LEDGE

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

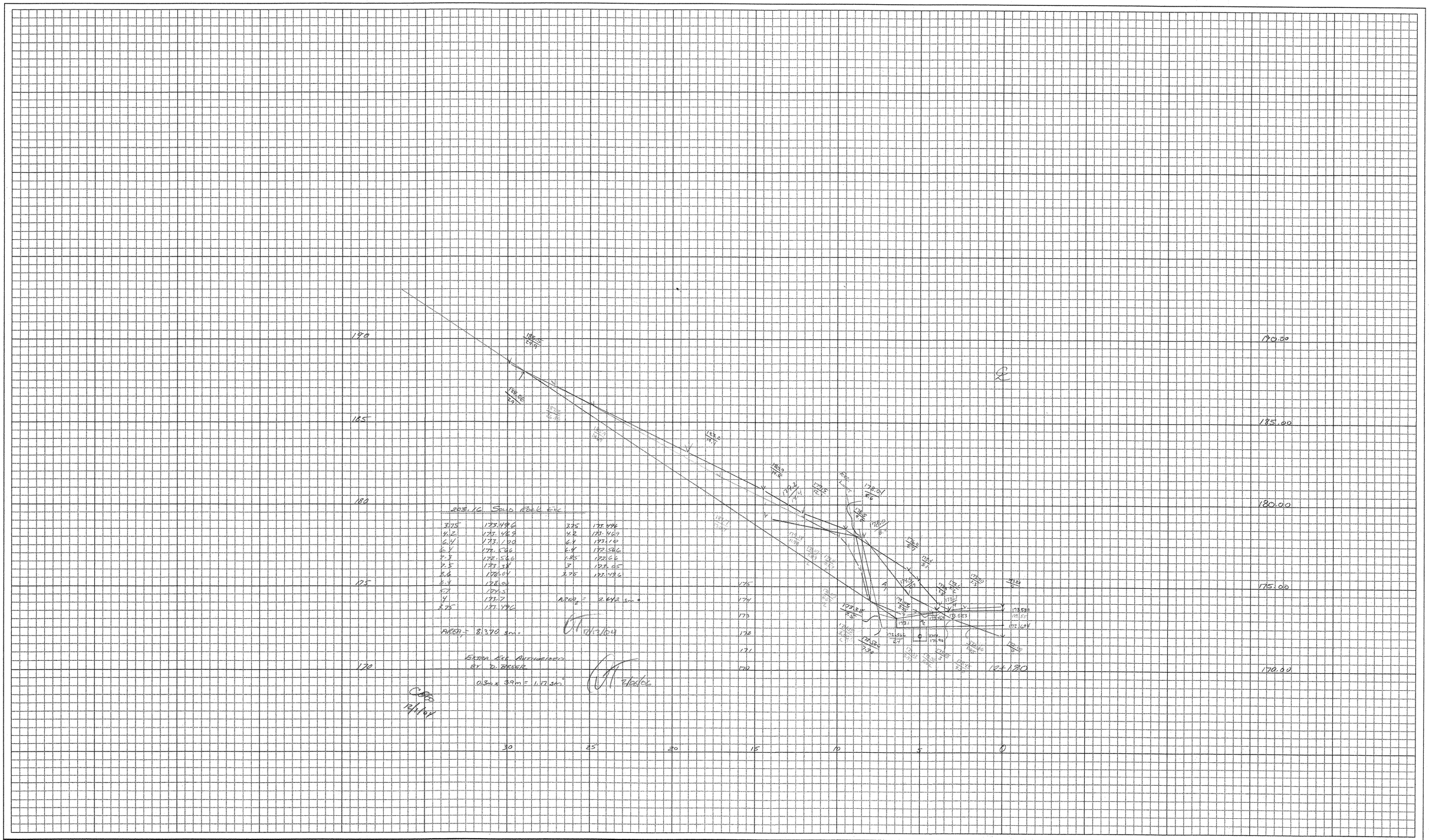
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY: D.TYLER

SHEET 2 OF 9

152 LEDGE #3



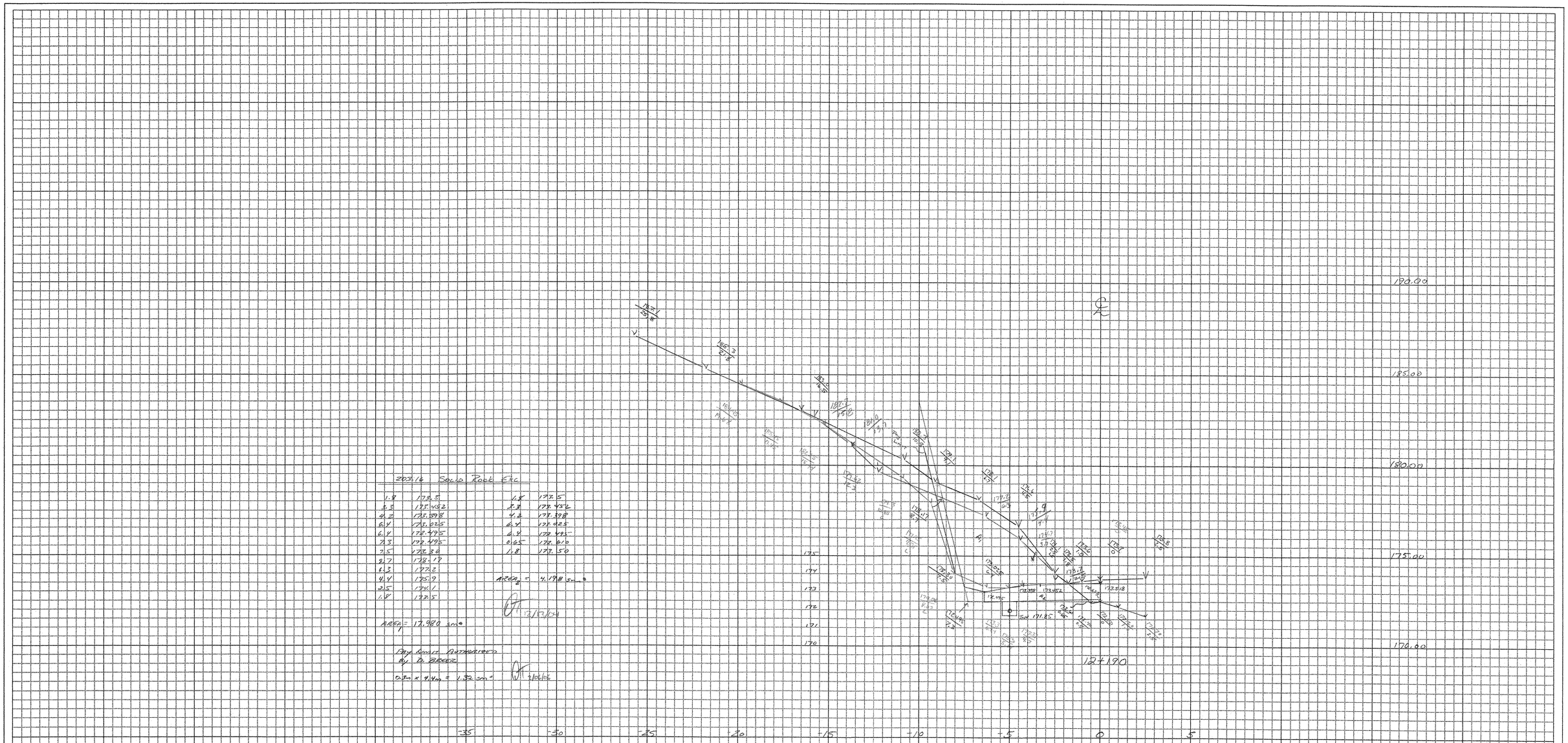
CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM
PROJECT NUMBER: STP 0126 (4) S CONTRACT #2

FILE NAME: LEDGE
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:3
DRAWN BY: C. GREENWOOD
CHECKED BY: D.TYLER
SHEET 3 OF 9

153 LEDGE XS



203.16 Equiv Rock Exc.			
1.8	173.5	1.8	173.5
2.3	173.482	2.3	173.482
4.2	173.398	4.2	173.398
6.4	173.025	6.4	173.025
6.4	172.495	6.4	172.495
7.3	172.495	0.65	172.610
7.5	172.38	1.8	173.50
8.7	172.17		
6.3	172.2		
4.4	172.9	AREA =	4.198 sq ft
2.5	173.1		
1.8	173.5		

AREA = 17.980 sq ft

12/12/04

Pay Limit Automated By D. Barger

0.3m x 4.4m = 1.32 sq m

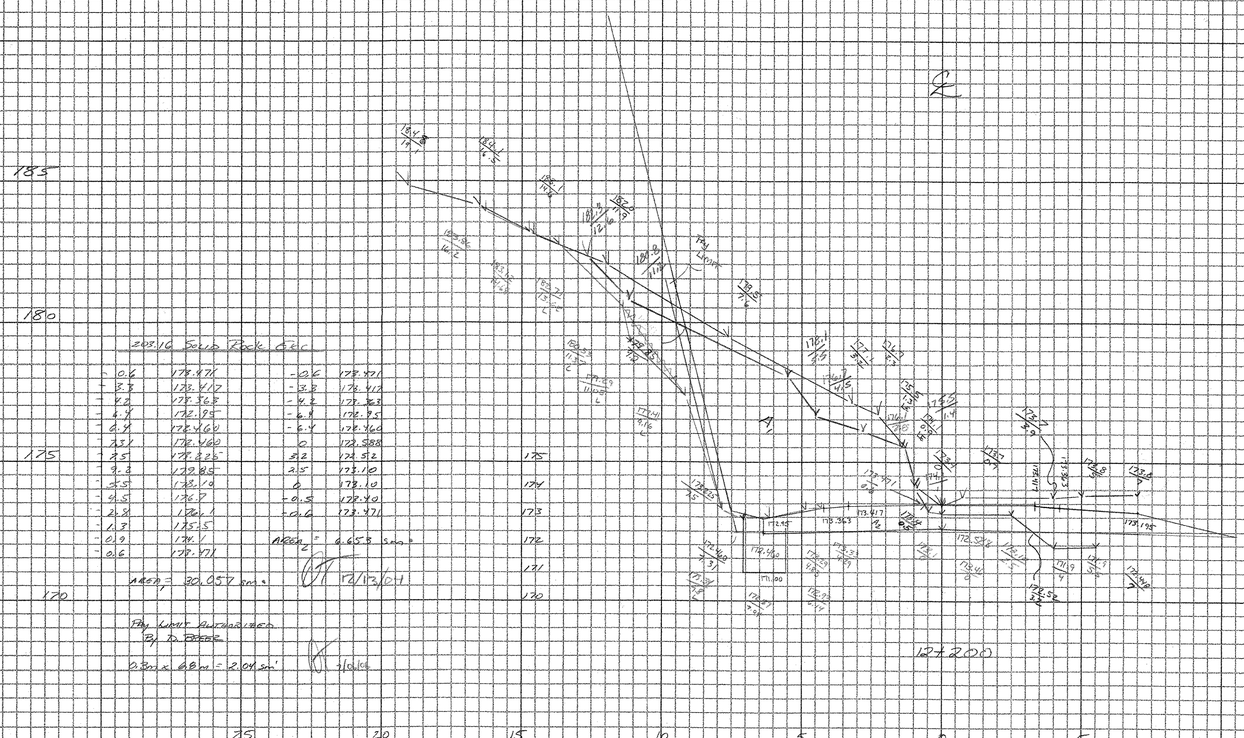
1/26/05

6/6/05

CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 (4) S CONTRACT #2
FILE NAME:	LEDGE
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:3
DRAWN BY:	C GREENWOOD
CHECKED BY:	DTYLER
SHEET	4 OF 9

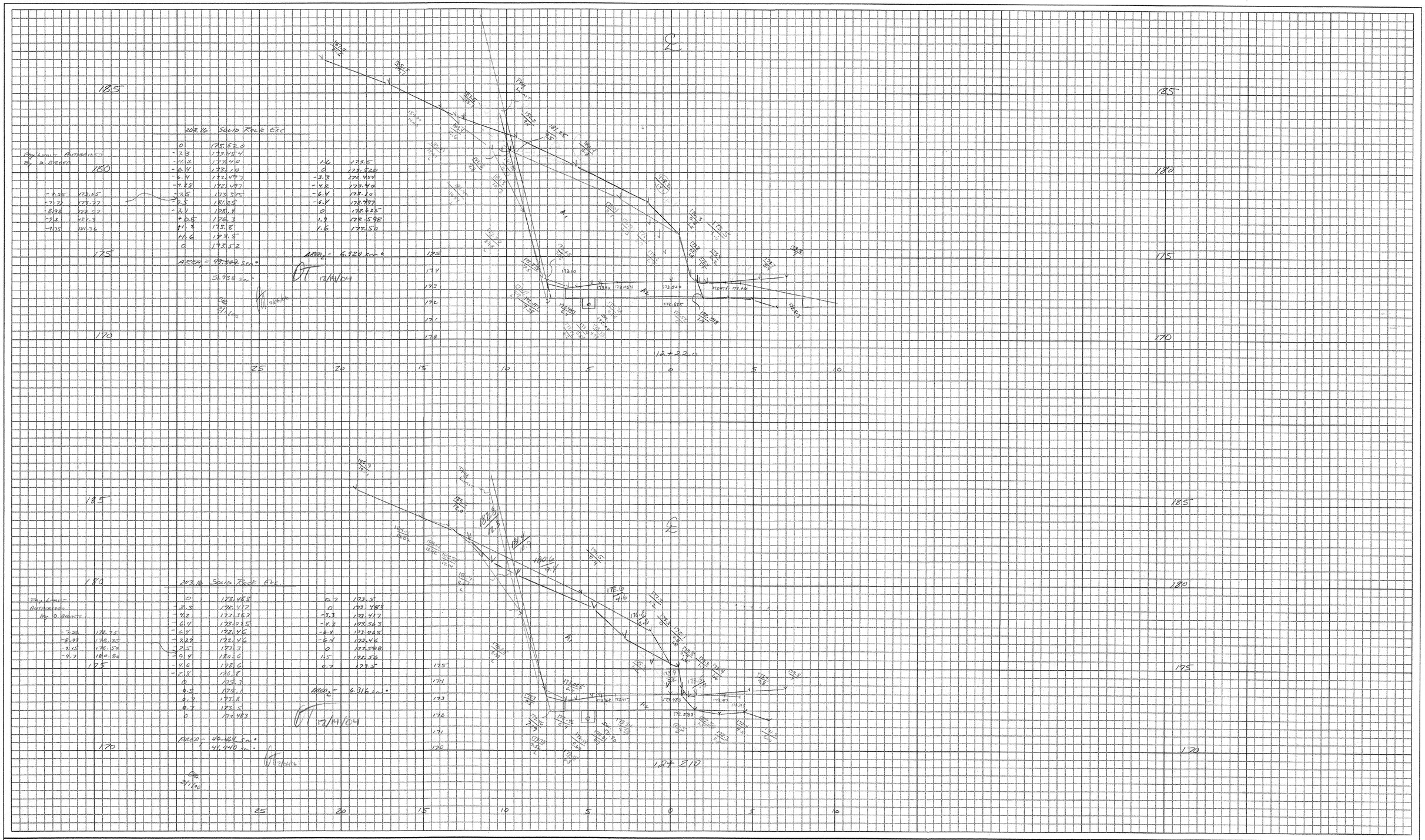
154 LEDGE 75



CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126(4)S
FILE NAME:	LEDGE
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:3
DRAWN BY:	L.GREENWOOD
CHECKED BY:	D.TYLER
SHEET	5 OF 7

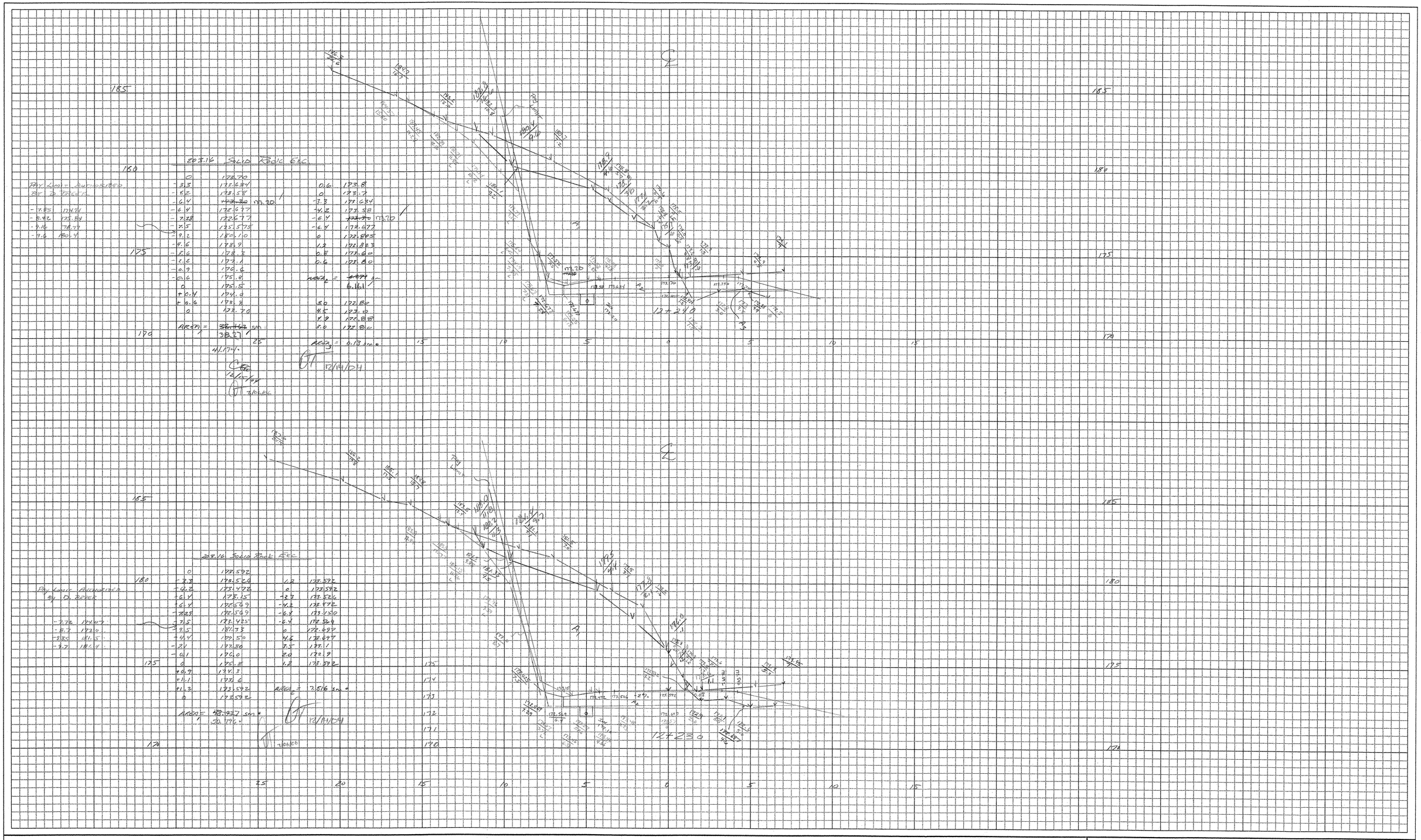
155 LEDGE XS

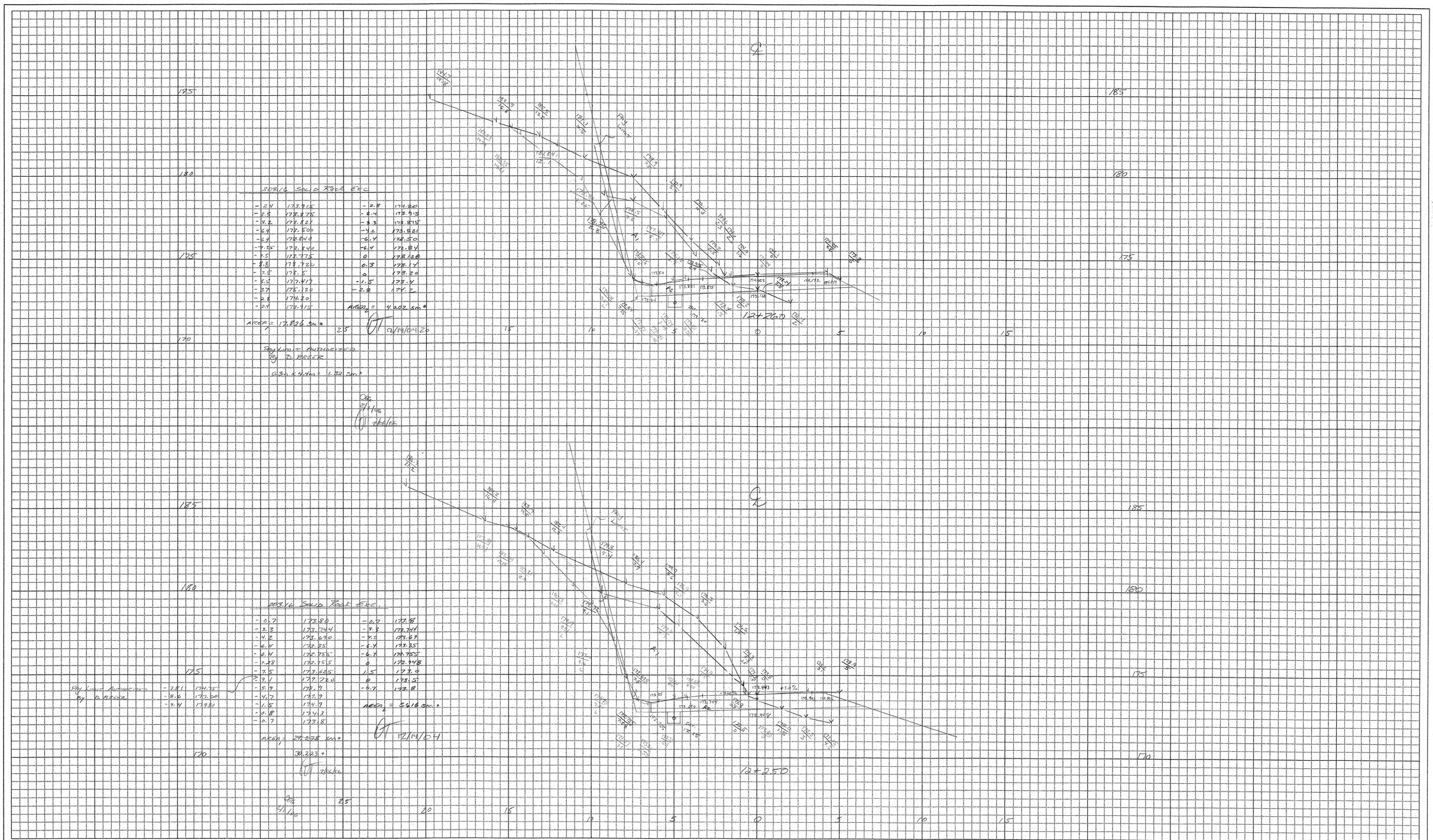


CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 (4) S CONTRACT #2
FILE NAME:	LEDGE
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C. GREENWOOD
CHECKED BY:	D.TYLER
SHEET	6 OF 9

156 LEDGE XS

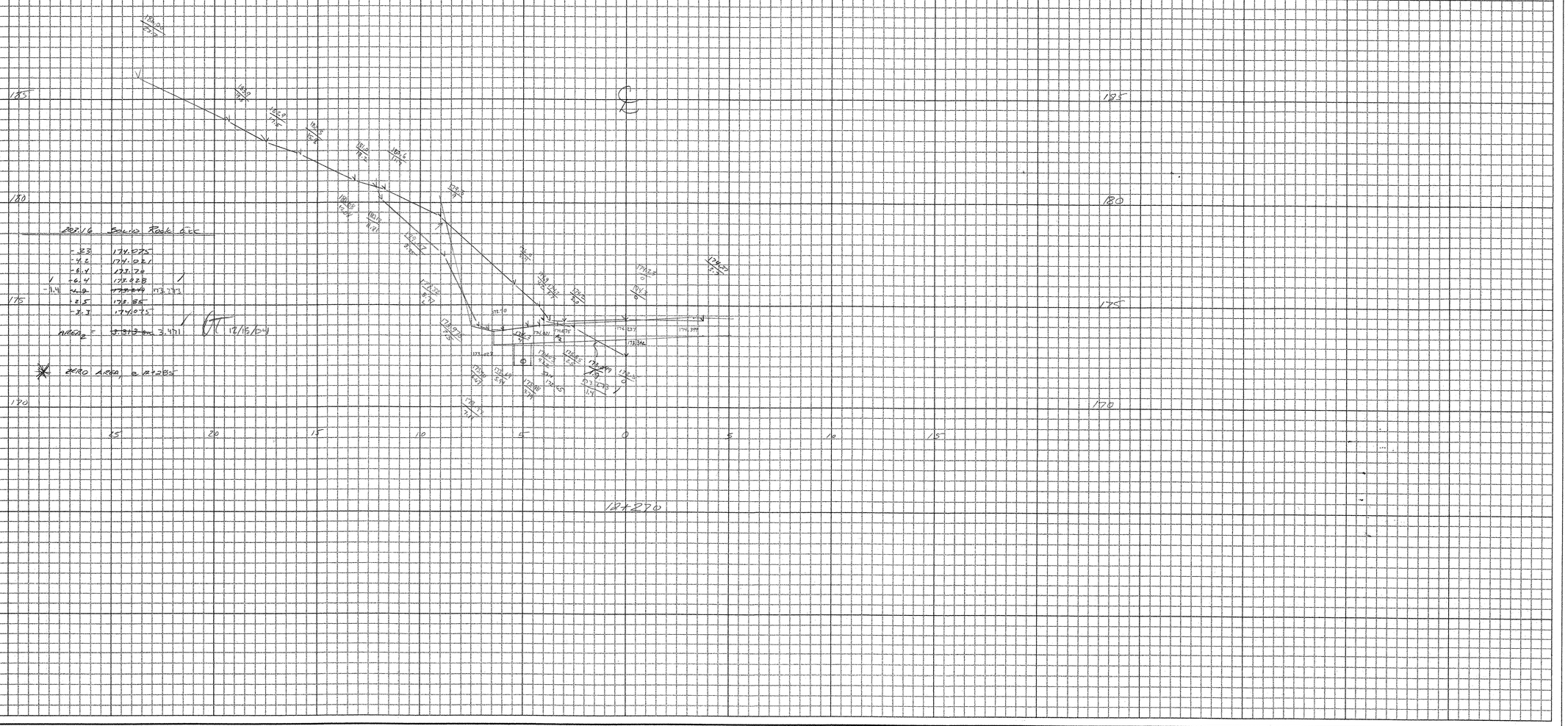

203.16 SOLID ROCK EXC
Pay Limit = Surface Area
Per 25 Stations
-12.8 174.21
-5.42 175.84
-5.16 178.77
-7.6 180.14
0 178.70
-3.3 178.634
-6.2 178.577
-7.28 175.573
-9.2 180.10
-9.6 178.9
-5.6 178.3
-2.2 177.1
-0.9 176.6
-0.6 175.8
0 175.5
+0.4 174.0
+0.6 173.8
0 173.70
AREA = 38.27 sm
41.174
12/14/24
7/06/06
0.16 173.8
0 173.7
-3.3 178.634
-4.2 178.58
-6.4 173.70
-6.4 172.677
0 172.805
1.2 172.823
0.8 173.60
0.6 173.80
AREA = 6.161
80 172.80
45 173.0
49 172.88
50 172.80
AREA = 0.18 sm
203.16 SOLID ROCK EXC
Pay Limit Accepted By D. Beer
-7.78 174.07
-8.7 172.0
-8.85 171.5
-8.7 171.64
0 178.592
-3.3 178.526
-6.4 178.472
-6.4 178.549
-7.5 178.425
-9.5 181.33
-4.4 179.50
-2.1 177.80
-0.1 176.0
0 175.8
+0.9 174.3
+1.1 173.6
+1.3 173.592
0 178.592
AREA = 38.937 sm
50.196
7/06/06
0.2 178.592
0 178.592
-3.3 178.526
-4.2 178.472
-6.4 178.549
-6.4 178.549
0 178.592
1.2 178.592
AREA = 7.516 sm
12/14/24
12+230
CL
Pay Limit
Pay Limit
Pay Limit



MAOT Metric

CROSS SECTION SHEET

158 LEDGE +S



CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126(4)S CONTRACT #2

FILE NAME: LEDGE

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

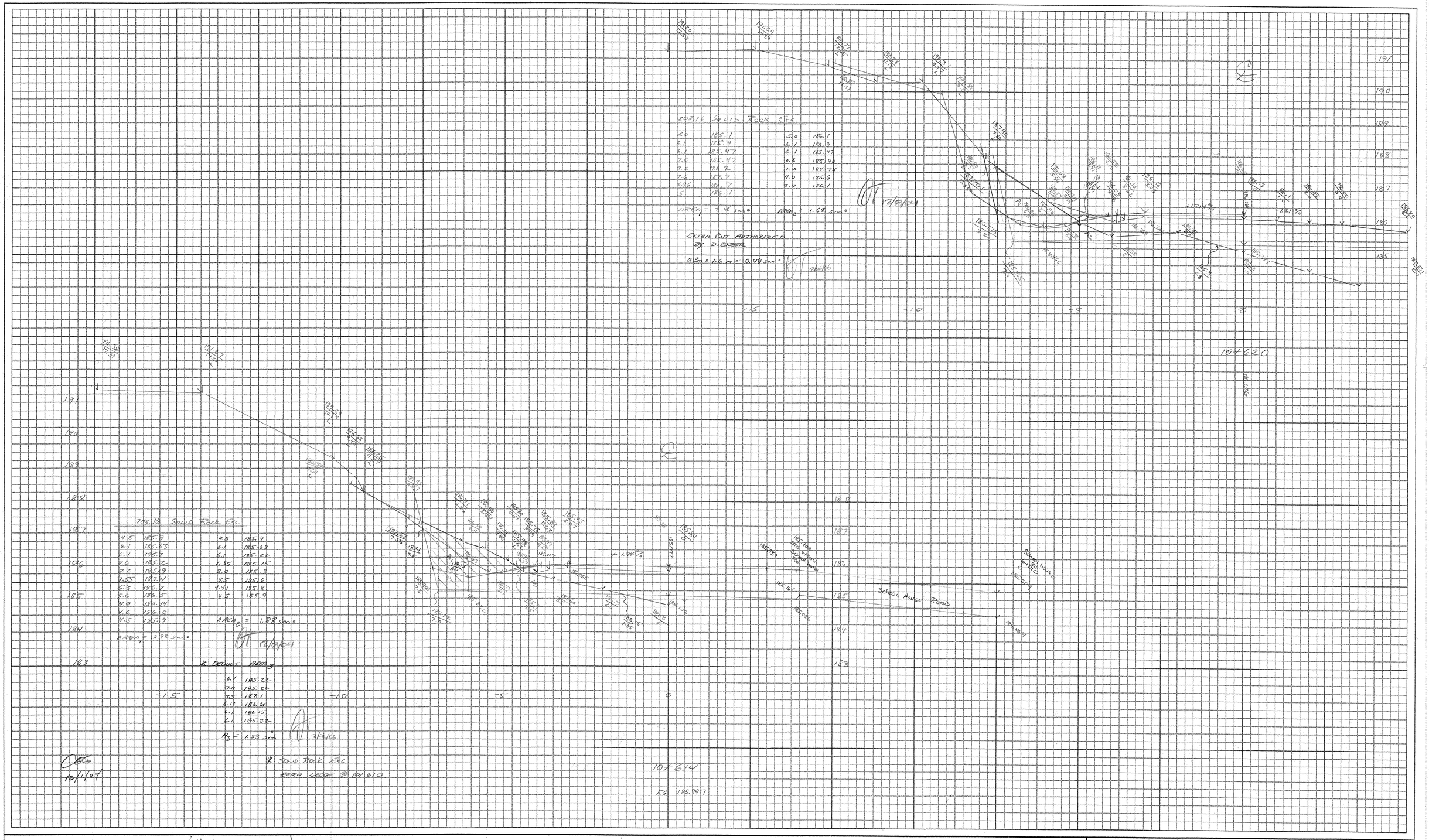
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C.GREENWOOD

CHECKED BY: DTYLER

SHEET 9 OF 9

159 LEDGE 45

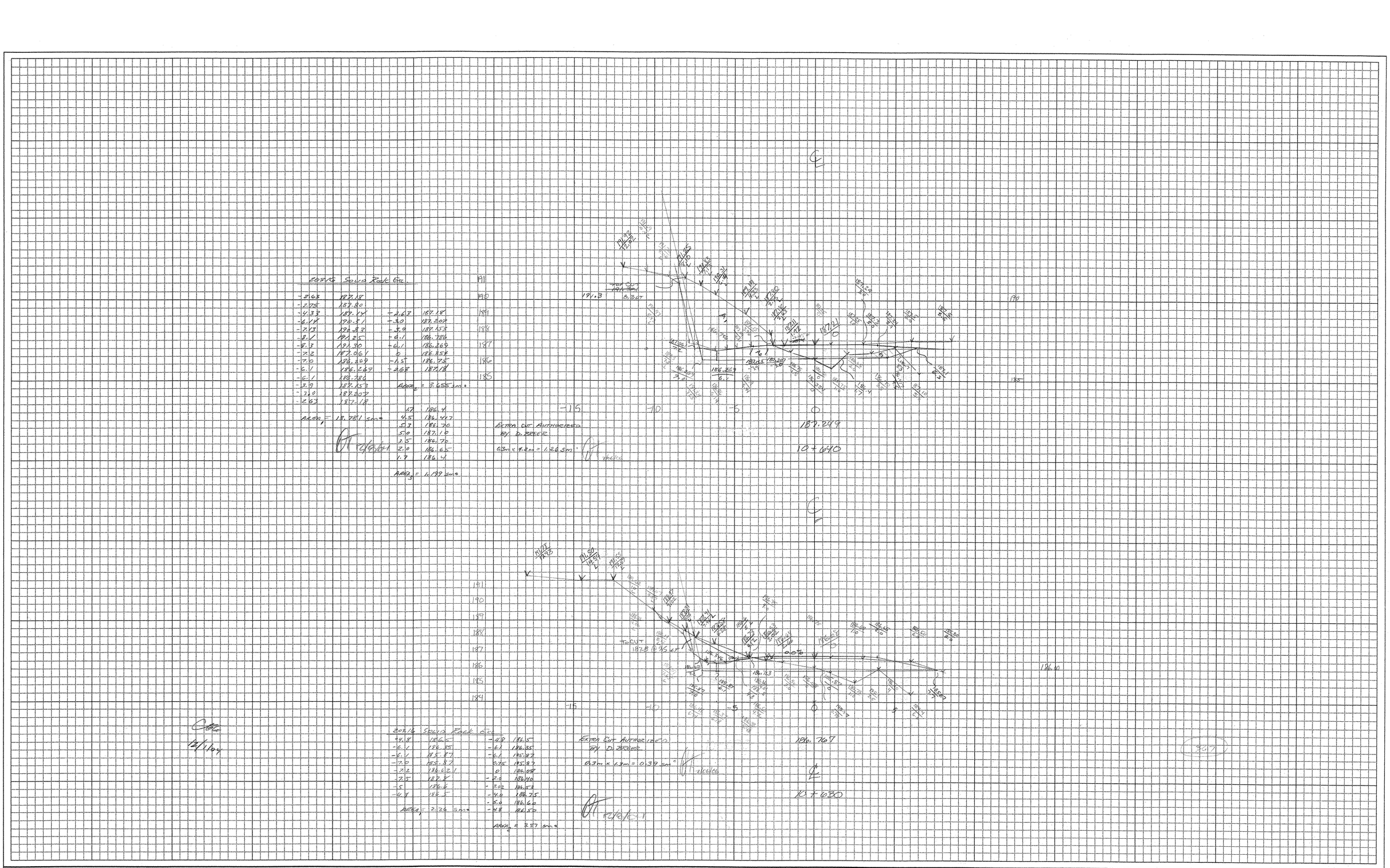


* SCALE: 1:500

CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM
PROJECT NUMBER:	STP 0126 4(3) 4/2
FILE NAME:	LEDGE (SMALL CUT)
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	C.GREENWOOD
CHECKED BY:	DTYLER
SHEET	1 OF 4

160 LEDGE 4.3



CROSS SECTION SHEET

PROJECT NAME: Groton - Rockingham
PROJECT NUMBER: STP 0126(4) C/2
FILE NAME: Ledge (small cut)
PROJECT LEADER:
DESIGNED BY:
const: g:/common/cadd/m-xsection.dgn
PLOT DATE: 07-JUN-2000 13:
DRAWN BY: J. Smith
CHECKED BY: DTYLER
SHEET 2 OF 4

16/LEDGE+S

2008/16 SOLID ROCK EXC.

-2.17	188.1	-2.7	188.1
-2.87	188.89	-2.8	188.092
-4.26	190.19	-3.9	188.0378
-5.91	191.10	-4.1	187.671
-6.44	191.08	-6.1	187.078
-7.85	190.8	0	187.317
-7.8	187.846	2.10	187.397
+6.98	187.073	1.10	187.65
+6.1	187.073	0	187.90
+6.1	187.671	-1.5	188.10
-3.9	188.1038	-2.92	188.39
-3.0	188.092	-2.7	188.10
-2.17	188.1		

$AREA_1$ = 17.2775 sm*

$AREA_2$ = 5.608 sm*

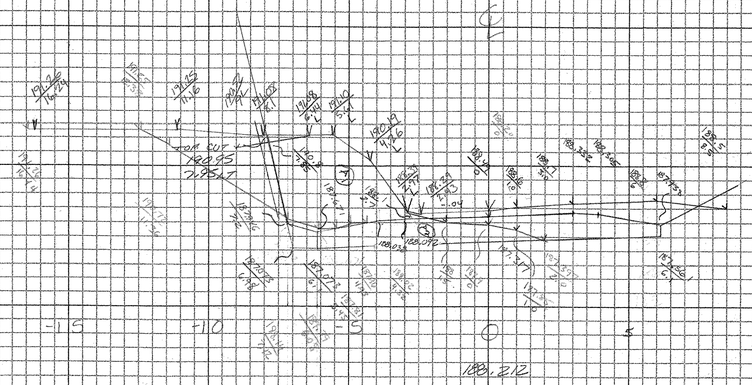
12/16/04

* ZERO LEDGE FOR AREA, @ 10+667

EXTRA CUT AUTHORIZED BY D. BREEZE

0.3m x 2.9m = 0.87 sm*

2/16/06



2008/16 SOLID ROCK EXC.

-2.29	187.617	0	187.27
-2.0	187.645	-1.5	187.1
-1.9	187.591	-2.29	187.27
-6.1	187.224	-3	187.645
-6.1	188.662	-3.9	187.591
6.99	188.662	+6.1	187.224
-7.2	189.479	+6.1	186.662
8	191.04	0	186.896
6.9	190.461	4.5	187.0
5.55	191.32	2.5	187.1
3.95	191.27	2.0	187.2
2.28	188.85	1.0	187.53
1.08	187.86	0	187.27
-2.29	187.27		

$AREA_1$ = 17.513 sm*

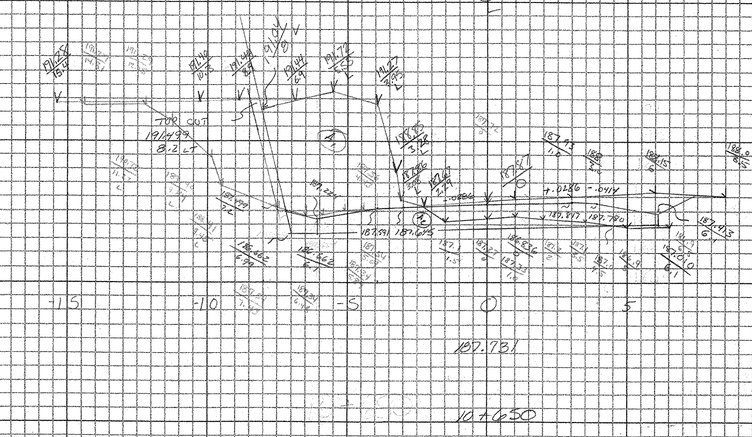
$AREA_2$ = 5.241 sm*

12/16/04

EXTRA CUT AUTHORIZED BY D. BREEZE

0.3m x 4.0m = 1.2 sm*

2/16/06



Scale 1:100

NDOT Metric

CROSS SECTION SHEET

PROJECT NAME: Grafton - Rockingham

PROJECT NUMBER: STP 0126(4) c/2

FILE NAME: Ledge (small cut)

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

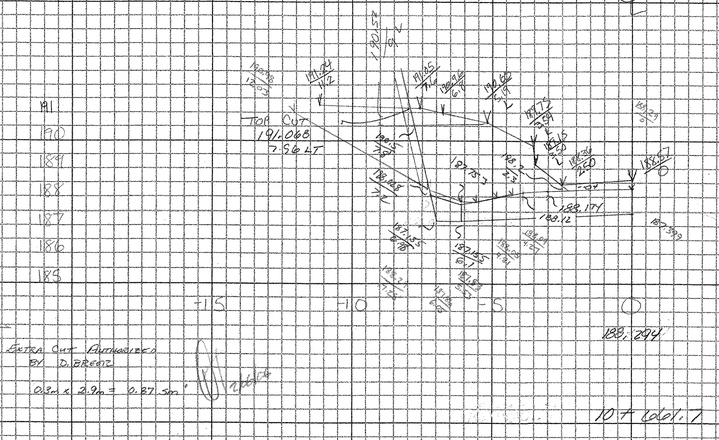
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: J.Smith

CHECKED BY: DTYLER

SHEET 3 OF 4

162 LEDGE+S



203.16	Solid	Rock Etc.
2.7	188.2	
3.0	188.174	
2.9	188.12	
6.1	187.753	
6.1	187.155	
6.98	187.155	
7.2	188.028	
7.8	190.5	
5.19	190.60	
3.54	189.75	
2.5	189.15	
2.5	188.36	
2.3	188.2	

AREA = 11.065 sm

EXTRA CUT CALCULATED BY D. BRENT

0.3m & 2.9m = 0.87 sm

12/1/98

Scale 1:100

7.96

CROSS SECTION SHEET

MaDOT Metric

PROJECT NAME: Grafton - Rockingham

PROJECT NUMBER: STP 0126 (4) C/2

FILE NAME: ledge (small cut)

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

PLOT DATE: 07-JUN-2000 13:3

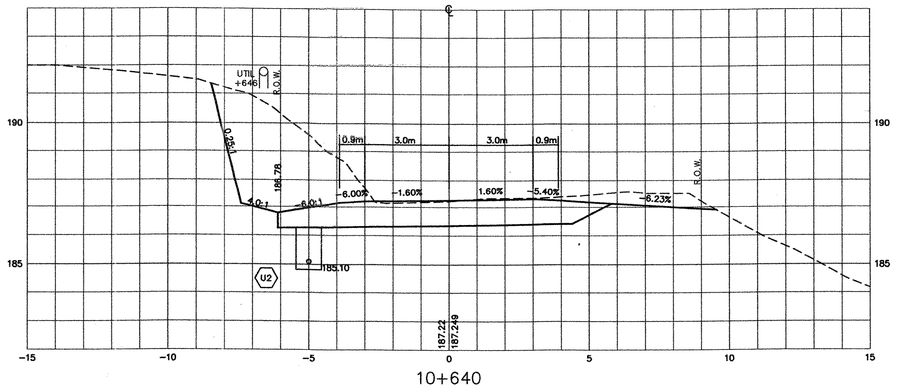
DRAWN BY: J.Smith

CHECKED BY: DTYLER

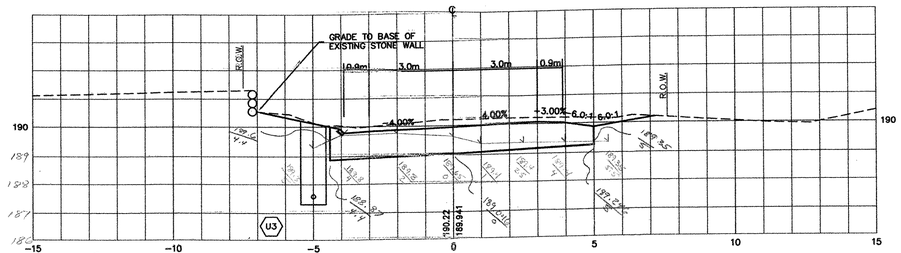
SHEET 4 OF 4

163 LEDGE +S

Metric



10+640



10+700

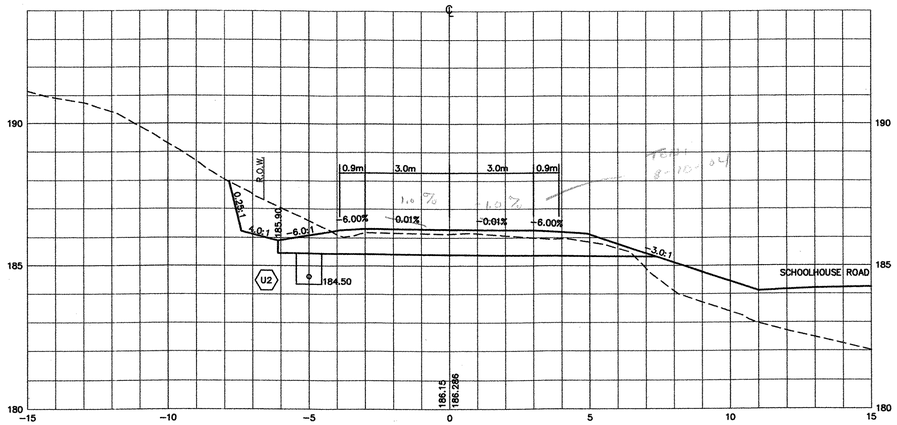
Solid Rock Exc

5	189.35
4	189.4
2.5	189.4
1	189.4
0	189.65
-2	189.9
-4	189.8
-4.4	189.6
-4.4	188.87
0	189.046
5	189.246
5	189.35

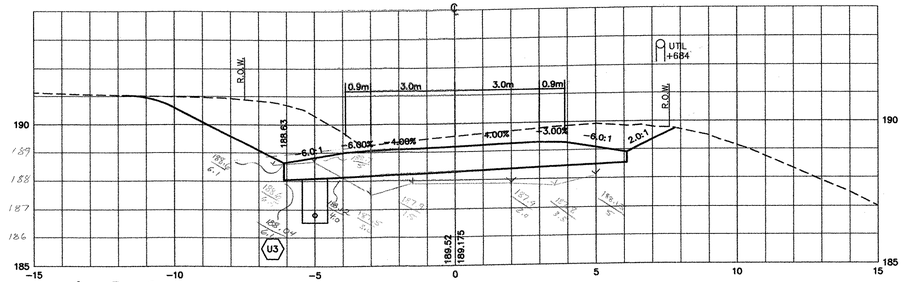
AREA = 4.885 sm

ZERO Solid Rock Exc. @ 10+710

12/9/03



10+620



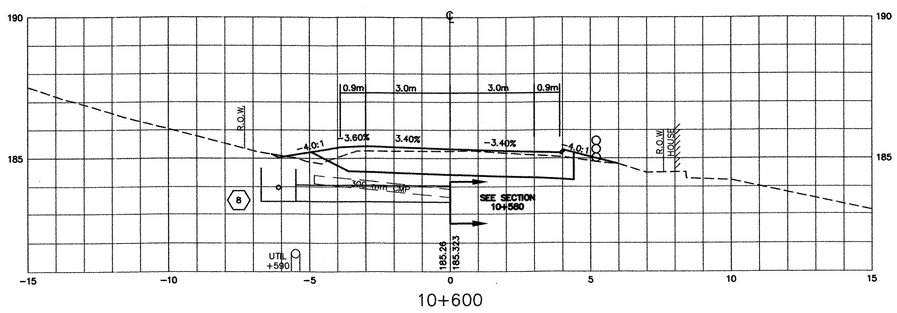
10+680

Solid Rock Exc

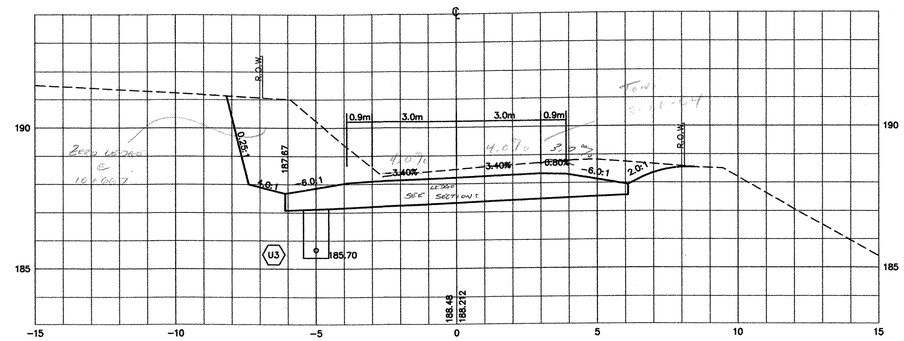
-4.0	188.12
-5	188.70
-6.1	188.60
-6.1	188.04
-4.0	188.12

AREA = 0.957 sm

12/9/03



10+600



10+660

ROUTE 121 CROSS SECTIONS

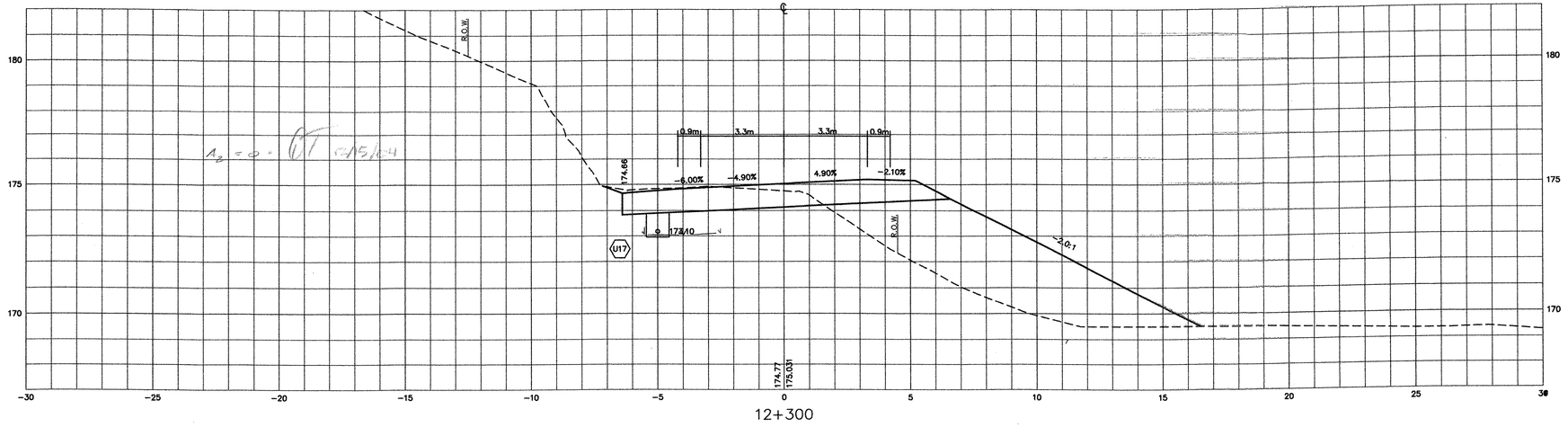
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: ~~85~~ OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

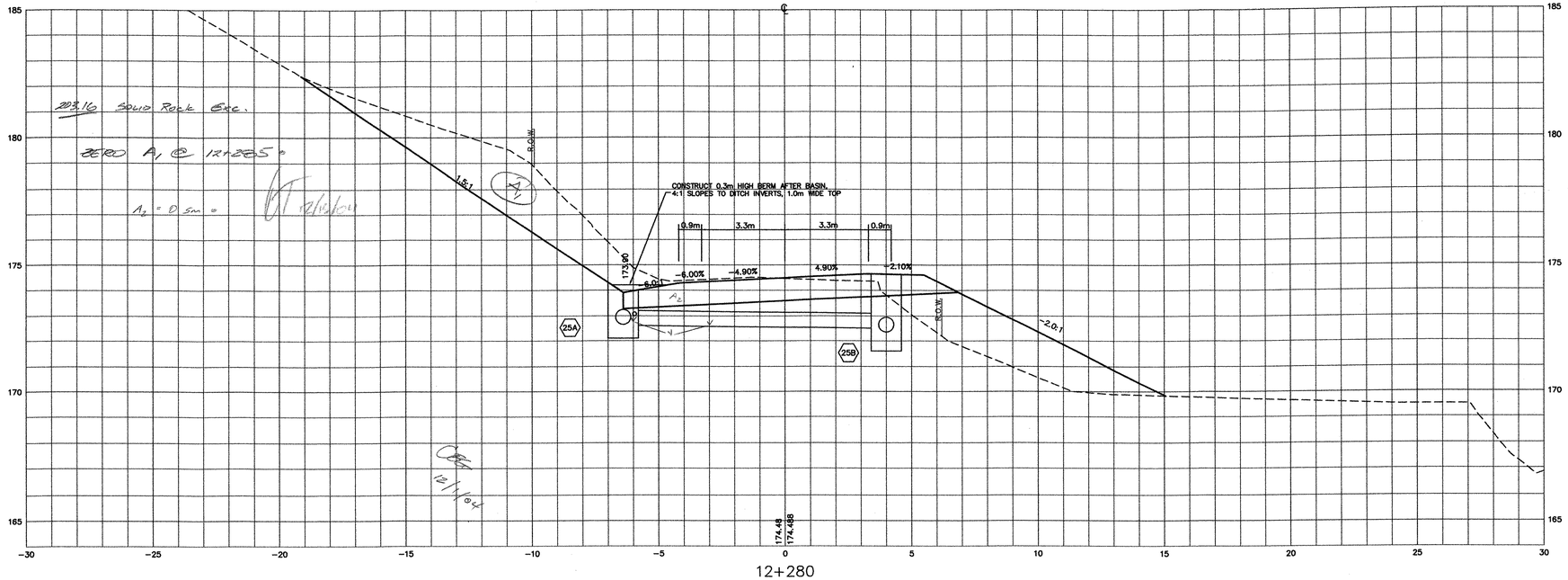
V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2A.DWG

THE LOUIS BERGER GROUP, INC.

164 LEDGE + S



12+300



12+280

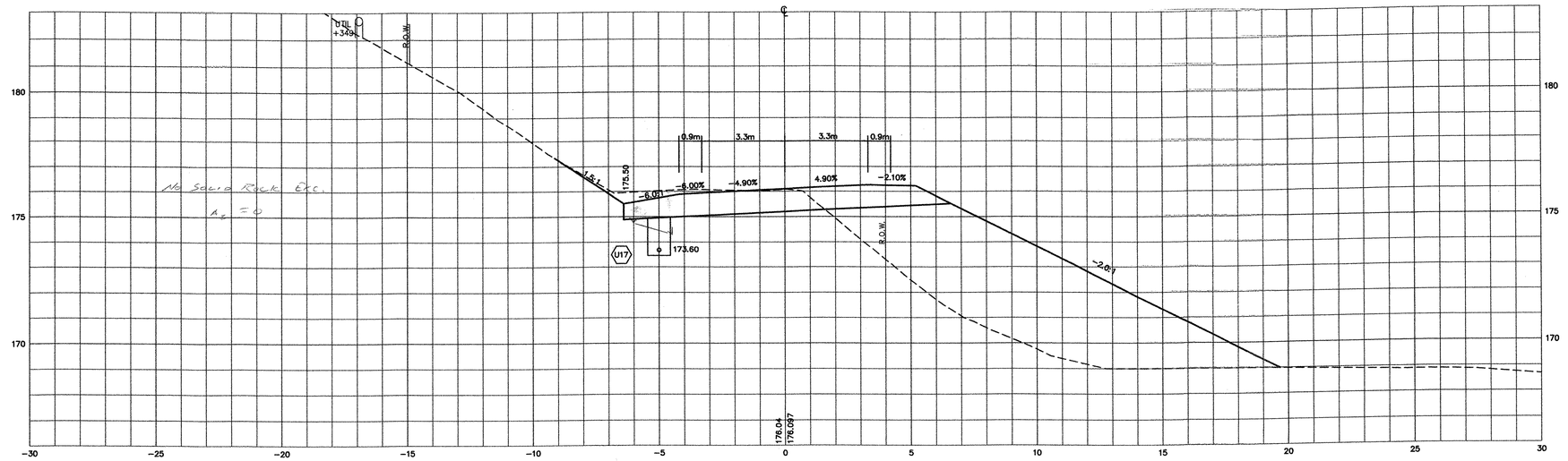
ROUTE 121 CROSS SECTIONS

PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: ~~35~~ OF 116

DATUM
VERTICAL NGVD 1929
HORIZONTAL NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

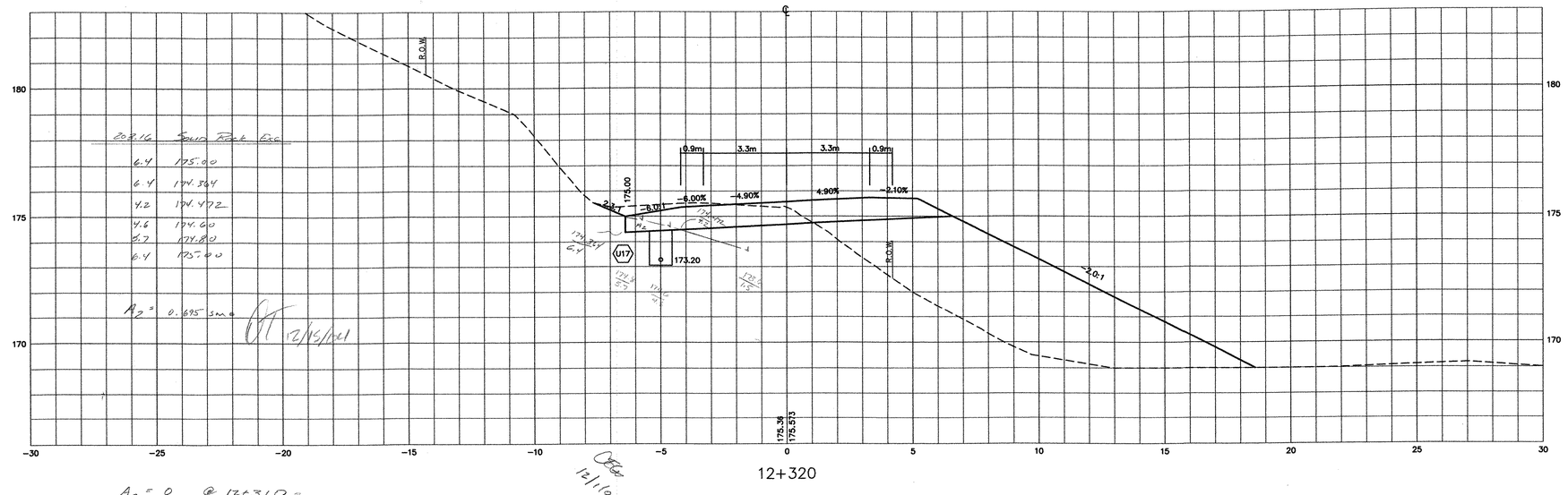


No Solid Rock Exc.

$A_z = 0$

$A_z = 0$ @ 12+330

12+340



208.16	Solid Rock Exc.
6.4	175.00
6.4	174.364
4.2	174.472
4.6	174.60
5.7	174.80
6.4	175.00

$A_z = 0.695$ sm ✓ 12/15/2004

12+320

$A_z = 0$ @ 12+310 ±

CEE 12/11/04

CEE 12-14-04

ROUTE 121 CROSS SECTIONS

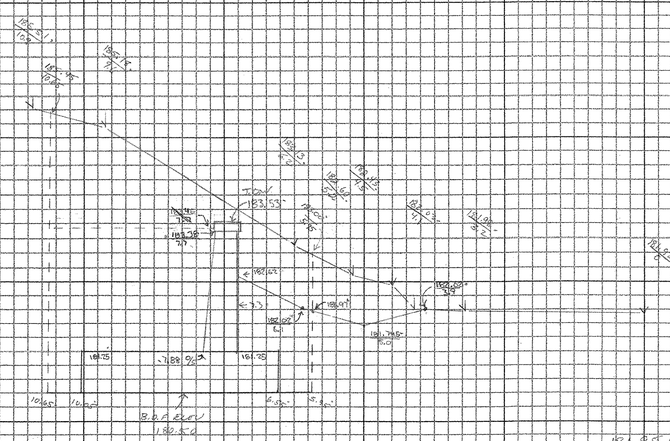
PROJECT: **GRAFTON–ROCKINGHAM, ROUTE 121**	PROJECT NO. : **STP 0126(4)S**
DESIGN FILE NAME:	
IPARM FILE NAME:	PLOT DATE: 12/08/03
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER:	DRAWN BY:
	SHEET: ~~65~~ OF 116

DATUM	
VERTICAL	NGVD 1929
HORIZONTAL	NAD 1927

V: /1261/CADD/PLANS/SECTIONS–FINAL–ROUTE121–C2C.DWG

THE LOUIS BERGER GROUP, INC.

166 CEDGE +S



208.30 Excavation, Earth

5.95	183.00
6.20	183.13
7.16	185.18
10.65	185.45
10.65	180.50
5.95	180.50
5.95	183.00

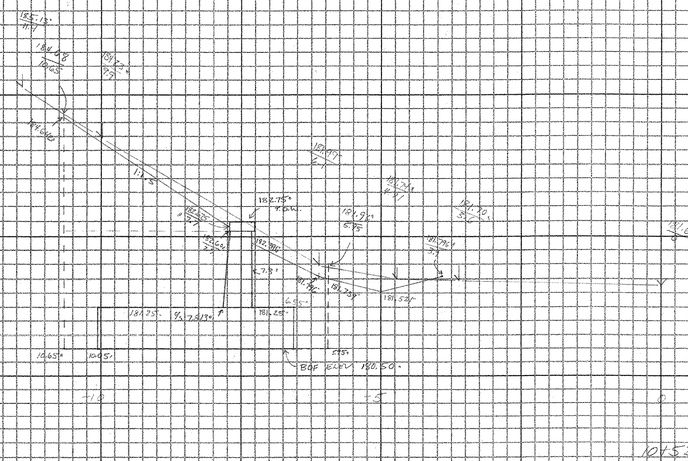
AREA = 18.124 sq.m.

206.20 Granular Fill for Structures

5.95	180.50	7.7	185.38
6.55	180.58	11.45	183.38
6.55	181.75	11.45	182.50
7.90	181.75	10.65	180.50
7.36	181.52	10.65	181.25
6.10	182.62	7.88	181.25
5.95	180.97	7.7	183.38
5.95	181.50		

A_1 = 1.845 sq.m. A_2 = 1.545 sq.m.

AREA = 8.31 sq.m.



206.30 Granular Backfill for Structures

5.95	180.50	7.7	182.60
5.95	181.75	10.65	182.60
6.1	184.70	10.65	180.50
7.3	183.30	10.65	180.50
7.3	182.25	10.65	181.25
6.55	181.25	7.87	181.25
6.55	180.50	7.7	182.60
5.95	180.50		

A_1 = 1.541 sq.m. A_2 = 4.386 sq.m.

AREA = 5.90 sq.m.

208.30 Excavation, Earth

5.95	181.96
6.10	182.99
7.90	184.23
10.65	184.68
10.65	180.50
5.95	180.50
5.95	181.96

AREA = 13.106 sq.m.

SCALE 1:500

MDOT Metric

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM

PROJECT NUMBER: STP 0126 (4) S Contract #2

FILE NAME: Retaining Wall #3

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

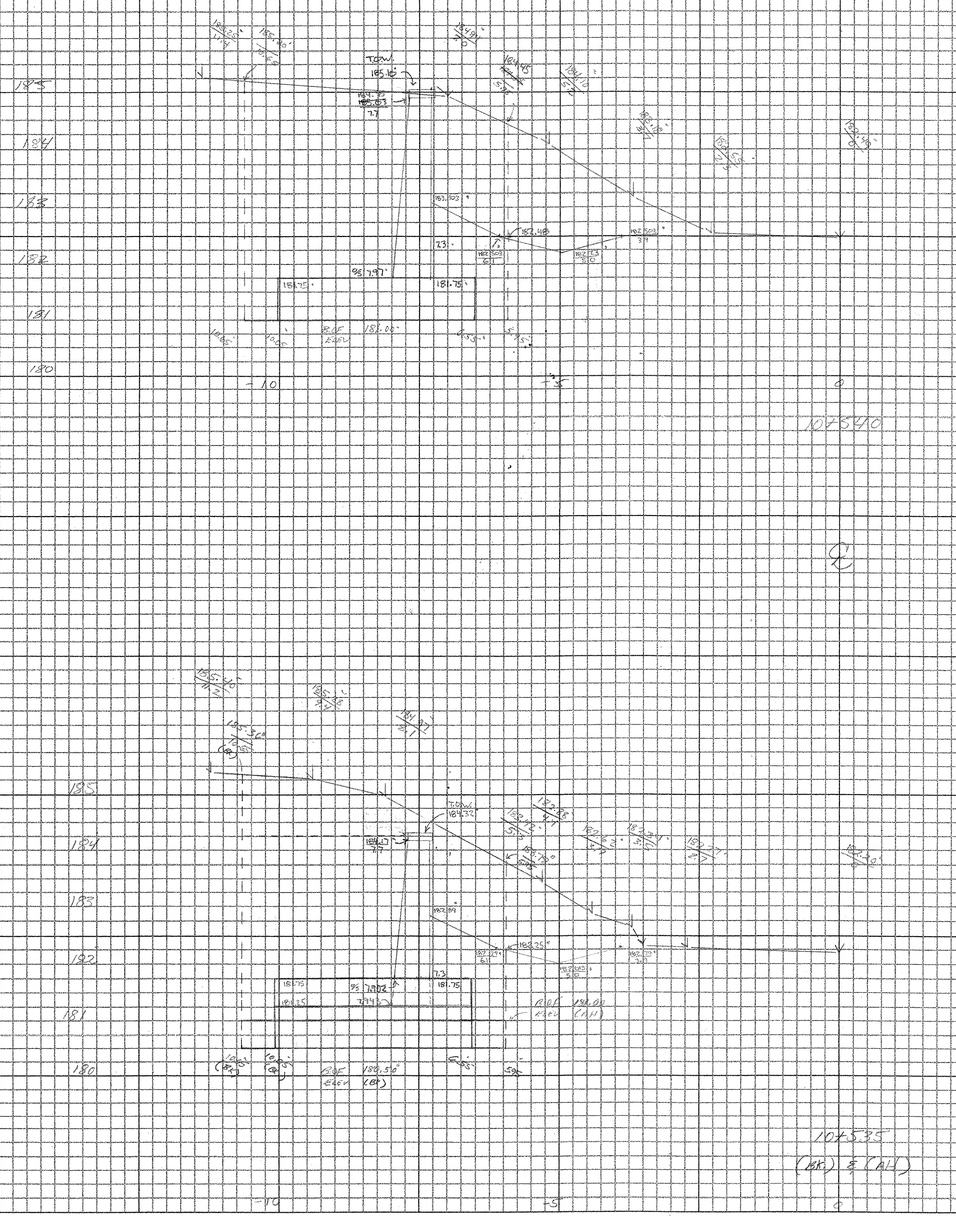
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C.GREENWOOD

CHECKED BY:

SHEET 1 OF 4

167 WALL3



204.30 CofferDam Excavation, Earth

5.95	~~[illegible]~~	184.45	
7.0	184.04		
10.65	185.24		
10.65	181.66		
5.95	181.81		
5.95	~~[illegible]~~	184.45	

AREA = ~~[illegible]~~ SM 18.705

204.30 GRAN BACKFILL FOR STRUCTURES

5.95	181.00		7.71	~~[illegible]~~	184.95
5.55	187.48		10.65	~~[illegible]~~	186.70
6.10	187.30		10.65	181.66	
7.15	185.105		10.05	181.00	
5.95	181.75		10.05	181.75	
5.95	181.75		7.71	~~[illegible]~~	184.95
5.95	181.00				

A_1 = 1.82 A_2: ~~[illegible]~~ 9827

AREA: ~~[illegible]~~ SM 11.65

204.30 Coffer Dam Excavation, Earth

(Back)

5.95	183.78
8.10	184.97
9.4	185.28
10.65	185.36
10.65	184.50
5.95	180.58
5.95	183.78

AREA = 20.369 SM

(Ahead)

5.95	183.78
8.1	184.97
9.4	185.28
10.65	185.36
10.65	184.00
5.95	181.00
5.95	183.78

AREA = 18.019 SM

204.30 GRAN BACKFILL FOR STRUCTURES

(Ahead)

5.95	184.00	7.962	181.75	
6.55	184.00	7.70	184.17	
6.55	181.75	10.65	184.17	
7.30	181.75	10.65	184.00	
7.30	182.89	10.65	181.00	
6.10	182.89	10.65	181.75	
5.95	182.75	7.962	181.75	
5.95	184.00			

A_1 = 1.5361 A_2 = 7.345

AREA = 8.881 SM

(Back)

5.95	180.50	7.962	181.75	
6.55	180.50	7.70	184.17	
6.55	181.75	10.65	184.17	
7.30	181.75	10.65	180.50	
7.30	182.89	10.65	180.50	
6.10	182.89	10.65	181.75	
5.95	182.75	7.962	181.75	
5.95	180.50			

A_1 = 7.711 A_2 = 8.709

AREA = 10.92

SCALE: 1:500

VDOT Metric

CROSS SECTION SHEET

PROJECT NAME: GRAFTON - ROCKINGHAM CONTRACT #2

PROJECT NUMBER: STP 0126 4(5)

FILE NAME: RETAINING WALL #3

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

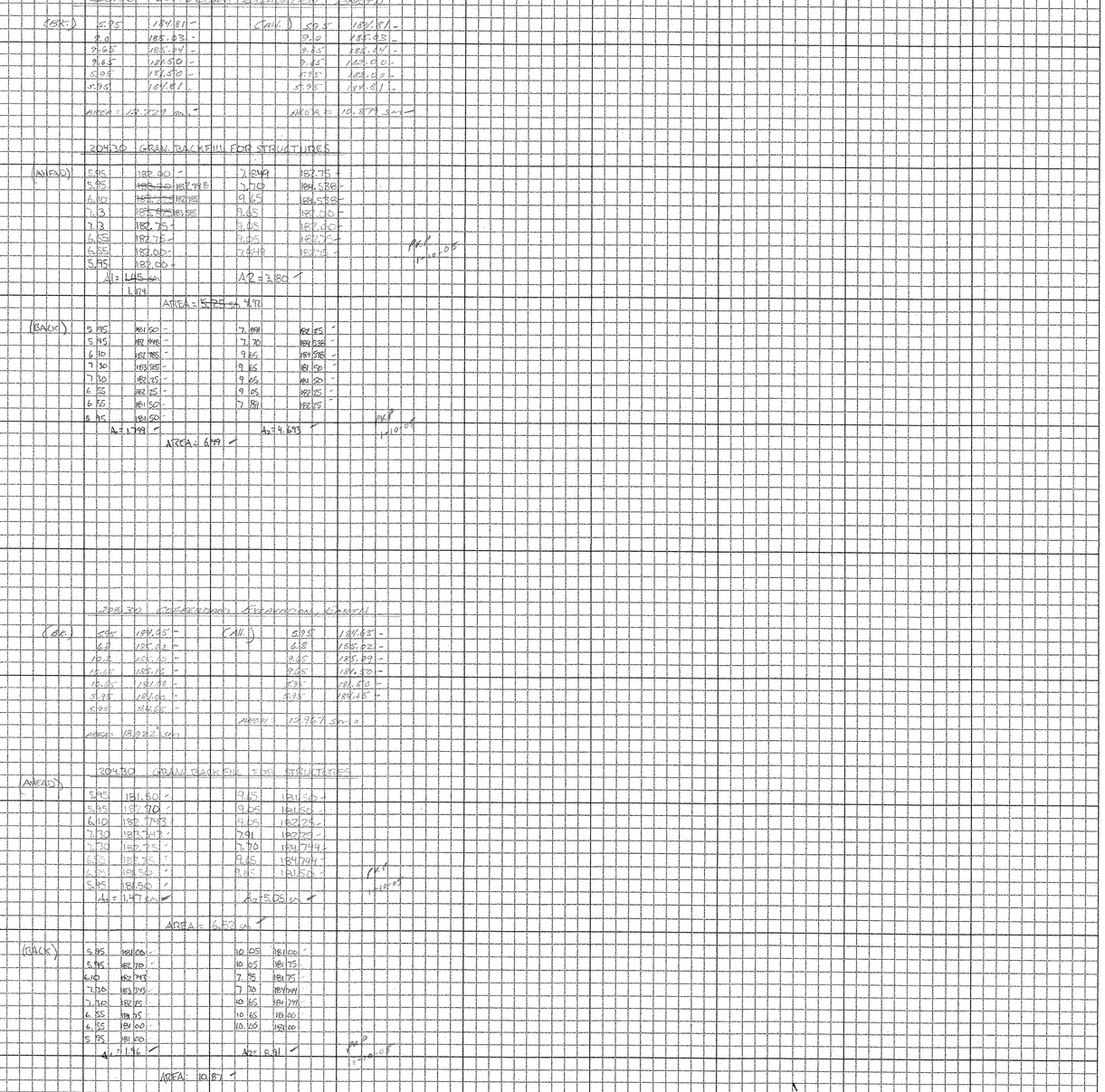
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY:

SHEET 2 OF 4

168 WALL 3



Metric

CROSS SECTION SHEET

PROJECT NAME: CRAFTON - ROCKINGHAM #2

PROJECT NUMBER: STP 0126 4(6)

FILE NAME: RETAINING WALL #3

PROJECT LEADER:

DESIGNED BY:

const: g:/common/cadd/m-xsection.dgn

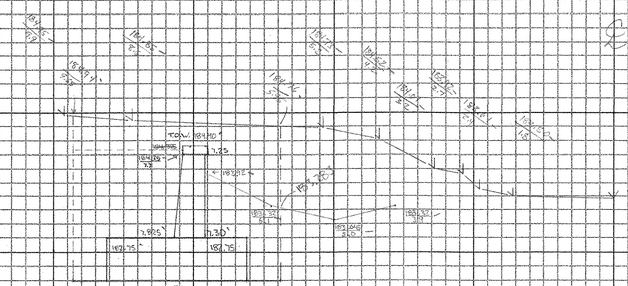
PLOT DATE: 07-JUN-2000 13:

DRAWN BY: C. GREENWOOD

CHECKED BY:

SHEET 3 OF 4

169 WALL 3



204.30 GRAN. BACKFILL FOR STRUCTURES					
5.45	182.80	-	9.65	182.00	-
5.05	183.30	-	9.85	182.00	-
6.10	183.32	-	9.95	182.15	-
7.20	183.97	-	7.625	182.75	-
7.20	184.78	-	7.70	184.75	-
6.55	184.78	-	9.65	184.75	-
6.15	182.30	-	9.65	182.00	-
5.95	182.45	-			
A1 = 1.58 sq.			A2 = 3.28 sq.		

AREA = 4.86 sq. -

203.30 EXCAVATION, EARTH		
5.95	184.76	-
5.76	184.65	-
9.65	184.20	-
9.65	182.20	-
5.95	182.45	-
6.95	184.76	-

MCOM 10.473 sq. -

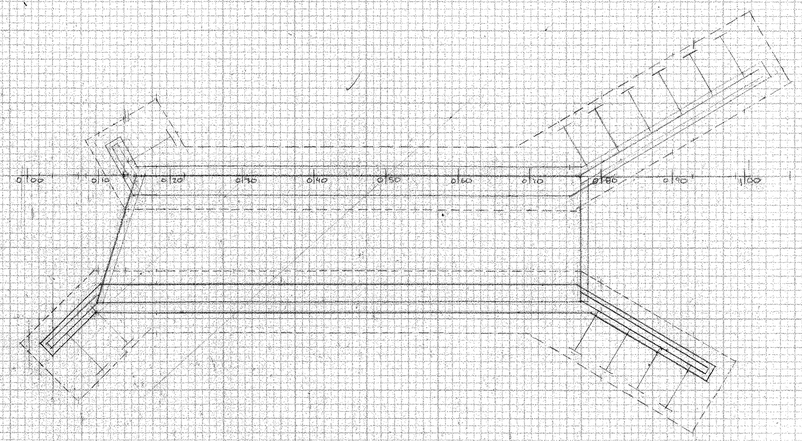
CROSS SECTION SHEET

PROJECT NAME:	GRAFTON - ROCKINGHAM CONTRACT #2
PROJECT NUMBER:	STP 0126 4(6)
FILE NAME:	RETAINING WALL #3
PROJECT LEADER:	
DESIGNED BY:	
const: g:/common/cadd/m-xsection.dgn	
PLOT DATE:	07-JUN-2000 13:
DRAWN BY:	CGREENWOOD
CHECKED BY:	
SHEET	4 OF 4

170 WALL 3

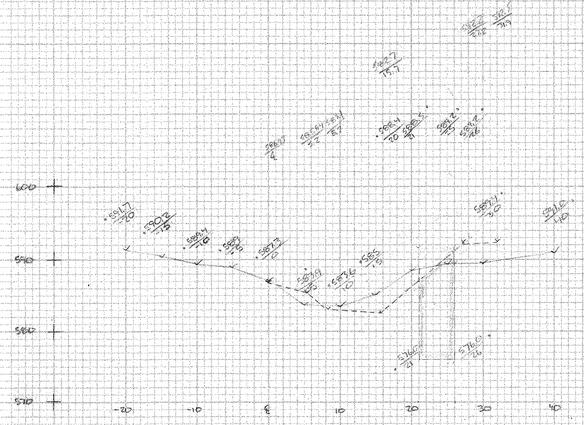
FINAL SURVEY
SURVEYED
PLOTTED
NOTE BOOK
TEMPLATE
NO.
AREAS
AREAS CHECKED
BY
DATE

ORIGINAL SURVEY
SURVEYED
PLOTTED
NOTE BOOK
TEMPLATE
NO.
AREAS
AREAS CHECKED
BY
DATE



SCALE 1"=10'

20835 COFFERDAM EXCAVATION, ROCK



* 0+00 FINAL SECTION USED TO ESTIMATE ITEM 209.30 GRAN. BKFL FOR STRUCT.
0+81.7

209.30: COFFERDAM EXC., EARTH

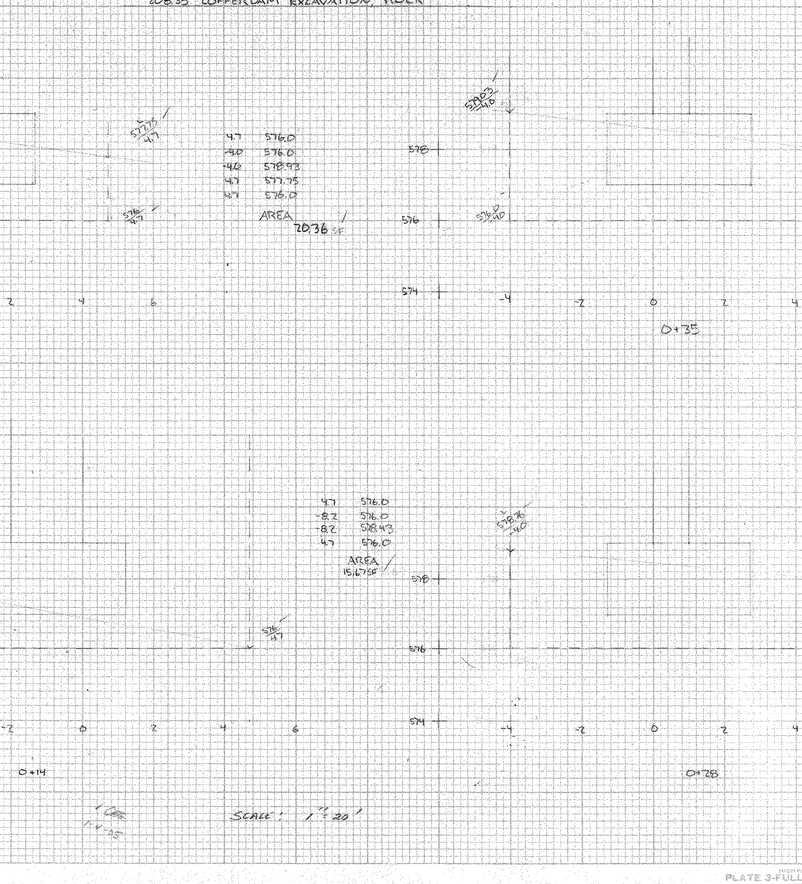
X	Y
21.0	576.0
26.0	576.0
26.0	589.7
22.5	588.6
21.0	576.0

AREA: 64.3 ft²
64.6 ft² ✓ 12/16/05

204.30: GRAN. BKFL FOR STRUCT.

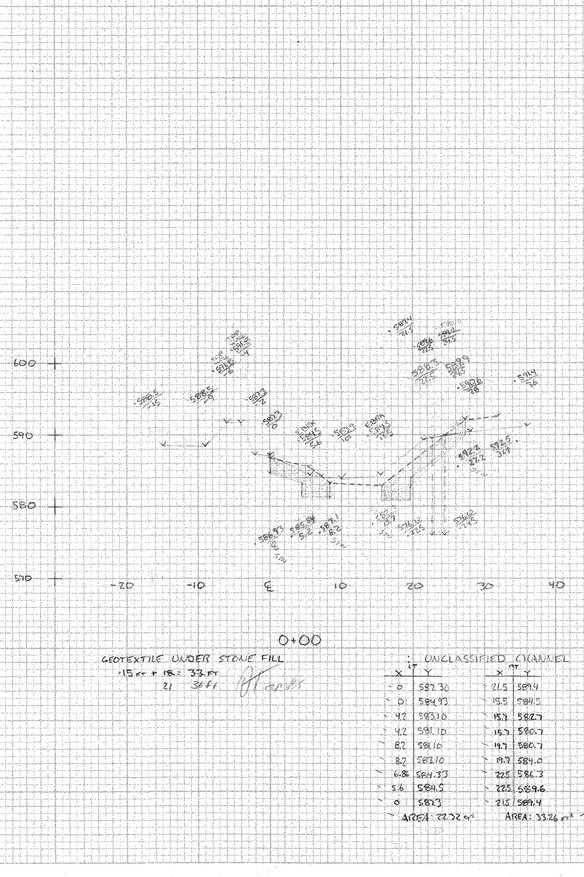
X	Y
21.0	576.0
21.0	~~585.68~~ 587.08
~~24.0~~	~~589.71~~
26.0	~~576.0~~ 591.4
24.0	576.0
21.0	576.0

AREAS: ~~55.7~~ ft²
65.2 ft² ✓ 12/16/05



ZERO LEDGE
0+08

SCALE: 1"=20'



0+00

GEOTEXTILE UNDER STONE FILL
.15 cy ÷ 18.2 = 33 ft
21 ✓ ft

UNCLASSIFIED EXCAVATION

LT X	LT Y	RT X	RT Y
-0	587.30	21.5	589.4
-0	584.92	15.5	589.5
-4.2	583.10	15.7	588.7
-4.2	581.10	15.7	580.7
-8.2	581.10	14.7	580.7
-8.2	583.10	19.7	584.0
-6.8	584.33	22.5	586.3
-5.6	584.5	22.5	589.6
-0	587.3	21.5	589.4

AREA: 22.32 ft² ✓ AREA: 33.26 ft² ✓

209.30: COFFERDAM EXC., EARTH

X	Y
22.5	576.0
24.5	576.0
22.5	589.6
24.5	588.9
22.5	576.0

AREA: 27.5 ft²

204.30: GRAN. BKFL FOR STRUCT.

X	Y
22.5	576.0
22.5	588.3
24.5	589.9
24.5	576.0
22.5	576.0

AREA: 26.2 ft²

STONE FILL (TYPE I)

LT X	LT Y	RT X	RT Y
0	584.93	15.7	588.7
-0	584.93	15.7	580.7
-4.2	583.10	17.5	580.7
-4.2	581.10	19.7 336	582.7 334.8
-8.2	581.10	21.7 280	588.6 584.2
-8.2	584.45 582.4	21.7 280	590.6 592.6
5.256	584.5 585.3	15.7	588.7
-0	586.93		

AREA: 21.99 ft² AREA: 45.96 ft²
25.35 29.63

171 XS ✓ 12/16/05

MISSOURI FEDERAL AID SHEET
PLATE 3-FULL CROSS SECTION-FULL LINE
NATIONAL FORMS/FAST
PRINTED IN U.S.A.

FINAL SURVEY — PLOTTED / PROFILE / TEMPLATE / NOTE BOOK / AREAS / NO. / CROSS CHECKED — BY / DATE

0+07

208.30 EXC.

X	Y
15.5	576.0
15.5	586.0
7.0	589.15
7.08	589.6
3.4	589.8
-3.4	576.05
15.5	576.0

AREA: 108.9 m²

204.30 CHAN. EXCL

X	Y
15.5	580.5
11.0	583.4
1.90	579
1.80	579
1.80	577
2.18	577
2.18	579
2.05	579
2.03	589.6
7.14	589.8
7.14	576
15.5	576
15.5	580.5

AREA: 163.8 m²

0+035

* 0+00 FINAL SECTION USED TO ESTIMATE GRAN. EXCL. LIMITS

208.30 EXC.

X	Y
-19	576.0
-19	588.0
-2.0	588.75
2.5	589.60
2.8	589.80
2.8	576.0
-19	576.0

AREA: 119.95 m²

204.30 GRAN.

X	Y
-19	576.0
-19	587.4
-2.7	586.65
2.7	579.0
2.6	579.0
2.6	577.0
2.50	577.0
2.50	579.0
2.40	579.0
2.40	590.03
2.80	589.87
2.80	576.0
19.0	576.0

AREA: 86.0 m²

0+13.5

208.30 EXC.

LT

X	Y
-1.8	576.0
-1.8	591.4
-1.5	591.1
-1.5	590.1
0	589.37
4.8	589.6
4.8	576.0
-8.0	576.0

AREA: 167.4 m² / 168.2 sf

RT

X	Y
13.2	576.0
13.2	586.2
15.0	585.9
14.7	585.4
11.6	590.0
7.5	589.78
7.5	576.0
13.2	576.0

AREA: 146.3 m² / 148.3 sf

204.30 GRAN. EXCL. LT

X	Y
-1.8	576
-1.6	579
-1.5	589.4
-1.5	579
-4.4	579
-4.4	577
0.5	577
0.5	579
-1.1	579
-1.1	586.1
0	585.5
1.1	583.2
1.1	581.2
4.8	581.2
4.0	576
-8	576

AREA: 107.7 / 108.3 ft² — 12/16/15

RT

X	Y
13.2	576.0
13.2	580.9
14.83	580.8
14.83	579.0
15.0	579.0
15.0	577.0
19.0	577.0
19.0	579.0
17.67	579.0
17.67	579.07
15.0	585.78
15.0	576.0
13.2	576.0

AREA: 114.2

0+10

208.30 COFFERDAM EXC, EARTH

LT

X	Y
-6	576.0
-6	591.3
-3	590.5
-1.6	589.9
-1.8	576.0
-6	576.0

AREA: 61.9 m²

RT

X	Y
13.2	576.0
13.2	583.8
12.7	583.9
11.0	589.1
7.08	590.03
7.08	584.4
7.06	584.4 / 583.68
7.00	576.0
13.2	576.0

AREA: 208.4 ft² / 19.5 — 12/16/15

UNCLASSIFIED CHAN. EXC.

X	Y
-1.8	589.9
0	589.1
6.3	584.4
9.4	583.0
13.2	582.8
13.2	582.8
5.1	583.2
5.1	581.2
1.1	581.2
1.1	583.2
0	585.5
-1.8	586.6
-1.8	589.9

AREA: 39.24 m²

STONE FILL (TYPE

LT X	LT Y	RT X	RT Y
-5.3	590.8	13.2	582.92
0	587.5	13.2	580.92
5.1	583.2	16.6	580.60
5.1	581.2	16.6	582.50
1.1	581.2	13.2	582.92
1.1	583.2	AREA: 6.8 m²	
0	585.5		
-5.3	588.8		
-5.3	590.8		

AREA: 28.3 m²

GEOTEXTILE UNDER STONE FILL
32m + "BM" = 40m
17 — 27 ft

209.30 GRAN. EXCL. FOR STRUCT.

LT

X	Y
-6.0	576.0
-6.0	587.65
-1.8	587.65
-1.8	576.0
-6.0	576.0

AREA: 48.93 m²

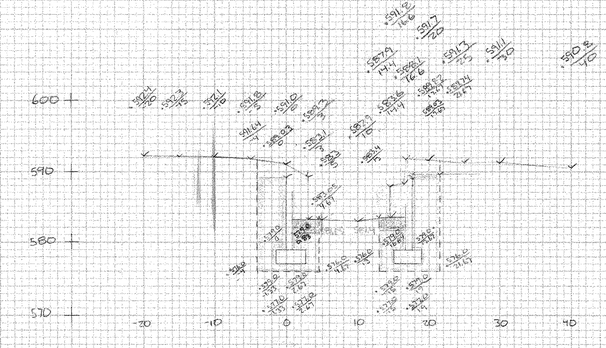
RT

X	Y
13.2	576.0
11.2	580.8 / 580.92
16.60	580.8 / 580.8
16.60	577.0
15.5	579.0
11.5	577.0
13.2	577.0
13.2	579.0
18.8	579.0
18.8	590.12
7.80	587.60
7.80	576.0
13.2	576.0

AREA: 187.72 ft² / 166.224. — 12/16/15 — 10/16/15 — 176 — 23

ORIGINAL SURVEY — PLOTTED / PROFILE / TEMPLATE / NOTE BOOK / AREAS / NO. / CROSS CHECKED — BY / DATE

FINAL SURVEY
NOTE BOOK
NO.
BY
DATE
PROJECTED
SURVEYED
TEMPLATE
AREAS
AREAS CHECKED



0+22

: STONE FILL (TYPE

LT X	LT Y
0.83	583.05
4.67	583.05
4.67	581.05
0.83	581.05
0.83	583.05

AREA: 7.68 ft²

RT X	RT Y
13.0	584.4
17.0	583.4
16.84	582.4
16.84	584.4
13.0	584.4

AREA: 7.68 ft²

208.30: COFFERDAM EXC EARTH

LT X	LT Y
-4.0	576.0
-4.0	591.64
0	591.0
2.0	589.3
3.0	585.1
4.67	585.05
4.67	576.0
-4.0	576.0

AREA: 115.6 ft²

RT X	RT Y
11.0	576.0
13.0	583.4
14.4	583.6
14.4	587.9
16.6	588.1
16.6	591.8
17.67	591.82
21.67	589.34
21.67	576.0
13.0	576.0

AREA: 108.9 ft²

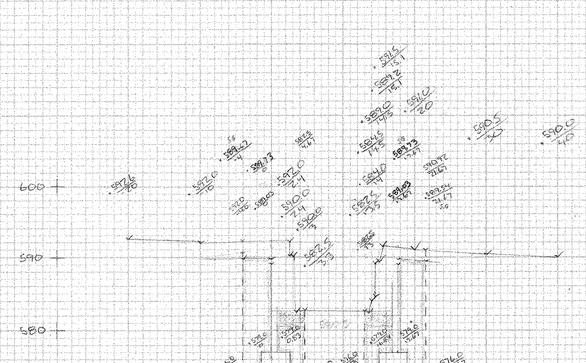
204.30: GRAN BKFL FOR STRUCT.

LT X	LT Y
-4.0	576.0
-4.0	589.03
0	589.03
0	579.03.0
-1.33	579.0
-1.33	577.0
2.67	577.0
2.67	579.0
0.83	579.0
0.83	581.05
4.67	581.05
4.67	576.0
-4.0	576.0

AREA: 66.0 ft²

RT X	RT Y
11.0	576.0
13.0	581.4
16.84	581.4
16.84	579.0
15.0	579.0
15.0	577.0
19.0	577.0
19.0	579.0
17.67	581.82
21.67	581.34
21.67	576.0
13.0	576.0

AREA: 70.3



0+36

: STONE FILL (TYPE

LT 3.84 ft x 2 ft = 7.68 ft²

RT 3.84 ft x 2 ft = 7.68 ft²

208.30 KKK

LT X	LT Y
-4.0	576.0
-4.0	589.67
0	589.73
0	577.0
2.4	577.0
3.6	580.0
3.7	582.5
4.67	582.5
4.67	576.0
-4.0	576.0

AREA: 113.6 ft²

RT X	RT Y
13.0	576.0
13.0	582.5
13.5	582.5
14.0	584.0
14.5	584.5
15.1	584.2
15.1	579.5
17.67	579.2
17.67	589.73
21.67	589.54
21.67	576.0
13.0	576.0

AREA: 117.81 ft²

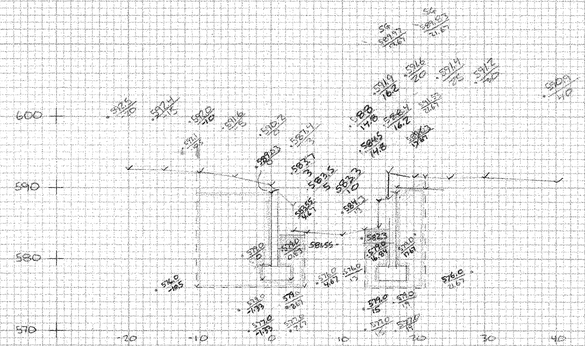
204.30 GRAN BKFL

LT X	LT Y
-4.0	576.0
-4.0	589.67
0	589.73
0	579.0
-1.33	579.0
-1.33	577.0
2.67	577.0
2.67	579.0
0.83	579.0
0.83	580.5
4.67	580.5
4.67	576.0
-4.0	576.0

AREA: 66.57 ft²

RT X	RT Y
11.0	576.0
13.0	580.5
16.84	580.5
16.84	579.0
15.0	579.0
15.0	577.0
19.0	577.0
19.0	579.0
17.67	579.0
17.67	589.73
21.67	589.54
21.67	576.0
13.0	576.0

AREA: 66.31 ft²



0+18

: STONE FILL (TYPE

LT X	LT Y
4.67	585.55
0.83	581.55
0.83	583.05
4.67	583.55
4.67	581.55

AREA: 7.68 ft²

RT X	RT Y
13.0	584.3
16.84	584.3
16.84	582.3
13.0	582.3
13.0	584.3

AREA: 7.68 ft²

GEOTEXTILE UNDER STONE FILL
8 ft + 8 ft = 16 ft

208.30: COFFERDAM EXC EARTH

LT X	LT Y
-10.5	576.0
-10.5	592.1
-1.0	591.6
0	590.2
2.0	587.4
3.0	585.1
4.67	585.55
4.67	576.0
-10.5	576.0

AREA: 212.8 ft²

RT X	RT Y
13.0	576.0
15.0	584.2
14.8	584.5
14.8	588.6
16.6	588.1
16.6	591.8
17.67	591.82
17.67	592.77
21.67	590.53
21.67	576.0
13.0	576.0

AREA: 111.29 ft² + 111.10 ft² = 222.39 ft²

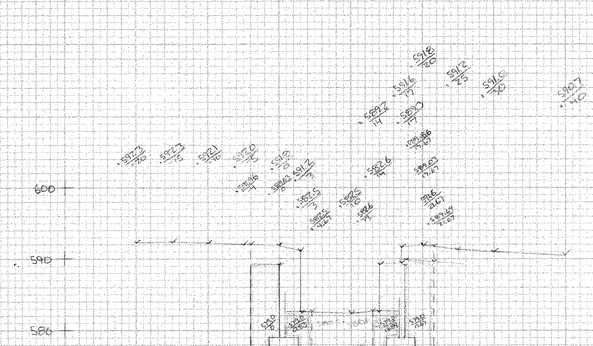
204.30: GRAN BKFL FOR STRUCT.

LT X	LT Y
-10.5	576.0
-10.5	589.03
-1.0	589.03
-1.0	579.03.0
-1.33	579.0
-1.33	577.0
2.67	577.0
2.67	579.0
0.83	579.0
0.83	581.55
4.67	581.55
4.67	576.0
-10.5	576.0

AREA: 152.6 ft²

RT X	RT Y
13.0	576.0
13.0	584.3
16.84	584.3 582.7
16.84	582.7
16.84	579.0
15.0	579.0
15.0	577.0
19.0	577.0
19.0	579.0
17.67	579.0
17.67	589.83
21.67	589.83
21.67	576.0
13.0	576.0

AREA: 93.5 ft² + 75.05 ft² = 168.55 ft²



0+26

: STONE FILL (TYPE

LT 3.84 ft x 2 ft = 7.68 ft²

RT 3.84 ft x 2 ft = 7.68 ft²

208.30 COFFERDAM EXC EARTH

LT X	LT Y
-4.0	576.0
-4.0	591.96
0	591.8
2.0	591.2
3.0	587.5
4.67	582.5
4.67	576.0
-4.0	576.0

AREA: 130.5 ft²

RT X	RT Y
13.0	576.0
13.0	582.6
14.0	582.6
14.0	588.2
16.0	588.3
17.0	588.64
17.67	589.03
21.67	589.69
21.67	576.0
13.0	576.0

AREA: 108.5 ft²

204.30 GRAN BKFL FOR STRUCT.

LT X	LT Y
-4.0	576.0
-4.0	589.63
0	589.03
0	579.0
-1.33	579.0
-1.33	578.0
2.67	578.0
2.67	579.0
0.83	579.0
0.83	580.5
4.67	580.5
4.67	576.0
-4.0	576.0

AREA: 43.89 ft²

RT X	RT Y
13.0	576.0
13.0	580.6
16.84	580.6
16.84	579.0
15.0	579.0
15.0	577.0
19.0	577.0
19.0	579.0
17.67	579.0
17.67	589.86
21.67	589.69
21.67	576.0
13.0	576.0

AREA: 67.25 ft²

11/30/05

10/10/05

173 X5

FINAL SURVEY — SURVEYED BY: — PLOTTED: — NOTE BOOK: — AREAS: — VOLUMES: — DATE: — BY:

0+60

COFFERDAM, EXC.

708.30	LT X	LT Y
	-4.0	576.0
	-4.0	590.57
	0	590.33
	0	591.7
	2.0	581.8
	4.67	581.8
	4.67	576.0
	-4.0	576.0

AREA: 99.7 ft²

GRAN. BKFL FOR STRUCT.	LT X	LT Y
	-4.0	576.0
	-4.0	590.52
	0	590.33
	0	579.0
	-1.33	579.0
	-1.33	577.0
	2.67	577.0
	2.67	579.0
	0.83	579
	0.33	579.8
	4.67	579.8
	4.67	576.0
	-4.0	576.0

AREA: 66.78 ft²

RT X	RT Y
13.0	576.0
13.0	587.36
15.5	587.6
17.0	588.0
20.6	587.5
21.67	587.64
21.67	576.0
13.0	576.0

AREA: 84.7 ft²

RT X	RT Y
15.0	576.0
15.0	588.36 (588.36)
16.84	588.36 (588.36)
16.84	576.0
15.0	577.0
15.0	577.0
17.0	577.0
17.67	579.0
17.67	588.64
21.67	588.36
21.67	576.0
13.0	576.0

AREA: 66.35 ft²
64.81

12/01/05

: STONE FILL (TYPE:
LT 3.84 ft x 2 ft = 7.68 m²
RT 3.84 ft x 2 ft = 7.68 m²

0+46

COFFERDAM, EXC.

708.30	LT X	LT Y
	-4.0	576.0
	-4.0	590.29
	0	590.33
	0	592.0
	2.4	592.0
	2.4	590.0
	3.0	590.0
	3.0	582.0
	4.67	582.0
	4.67	576.0
	-4.0	576.0

AREA: 114.7 ft²

704.30 GRAN. BKFL FOR STRUCTURE	LT X	LT Y
	-4.0	576.0
	-4.0	590.29
	0	590.33
	0	579.0
	-1.33	579.0
	-1.33	577.0
	2.67	577.0
	2.67	579.0
	0.83	579.0
	0.83	580.0
	4.67	580.0
	4.67	576.0
	-4.0	576.0

AREA: 67.69 ft²

RT X	RT Y
13.0	576.0
13.0	588.3
13.8	588.3
14.0	591.0
17.67	590.7
17.67	589.6
21.67	589.42
21.67	576.0
13.0	576.0

AREA: 72.15 ft²

RT X	RT Y
13.0	576.0
13.0	580.35
16.84	580.35
16.84	579.0
15.0	579.0
15.0	577.0
17.67	577.0
17.67	589.42
21.67	589.42
21.67	576.0
13.0	576.0

AREA: 63.39 ft²

12/1/05

: STONE FILL (TYPE:
LT 3.84 ft x 2 ft = 7.68 m²
RT 3.84 ft x 2 ft = 7.68 m²

0+70

COFFERDAM, EXC.

708.30	LT X	LT Y
	-8.0	576.0
	-5.0	590.5
	0	590.26
	1.5	582.3
	4.67	582.0
	4.67	576.0
	-5.0	576.0

AREA: 106.8 ft²

704.30 GRAN. BKFL FOR STRUCT.	LT X	LT Y
	-5.0	576.0
	-5.0	590.5
	0	590.26
	0	579.0
	-1.33	579.0
	-1.33	577.0
	2.67	577.0
	2.67	579.0
	0.83	579.0
	0.83	580.0
	4.67	580.0
	4.67	576.0
	-5.0	576.0

AREA: 81.75 ft²

RT X	RT Y
13.0	576.0
13.0	580.4
16.84	580.4
16.84	579.0
15.0	579.0
15.0	577.0
17.67	577.0
17.67	579.0
17.67	579.0
17.67	589.42
22.0	589.22
22.0	576.0
13.0	576.0

AREA: 69.68 ft²

12/01/05

: STONE FILL (TYPE:
LT 3.84 ft x 2 ft = 7.68 m²
RT 3.84 ft x 2 ft = 7.68 m²

GEOTEXTILE UNDER STONE FILL
8 ft + 8 ft = 16 ft

0+68

COFFERDAM, EXC.

708.30	LT X	LT Y
	-4.0	576.0
	-4.0	590.30
	0	590.32
	2.0	582.0
	4.67	581.86
	4.67	576.0
	-4.0	576.0

AREA: 97.8 ft²

704.30 GRAN. BKFL FOR STRUCTURE	LT X	LT Y
	-4.0	576.0
	-4.0	590.30
	0	590.32
	0	577.0
	-1.33	577.0
	-1.33	577.0
	2.67	577.0
	2.67	579.0
	0.83	579.0
	0.83	579.88
	4.67	579.86
	4.67	576.0
	-4.0	576.0

AREA: 67.03 ft²

RT X	RT Y
13.0	576.0
13.0	582.35
15.0	582.6
18.0	582.4
20.0	581.8
21.67	581.8
21.67	576.0
13.0	576.0

AREA: 83.0 ft²

RT X	RT Y
13.0	576.0
13.0	580.35
16.84	580.35
16.84	579.0
15.0	579.0
15.0	577.0
13.0	577.0
13.0	579.0
17.67	579.0
17.67	589.42
21.67	589.42
21.67	576.0
13.0	576.0

AREA: 64.53 ft²

10/10/05 174 xs

ORIGINAL SURVEY — SURVEYED BY: — PLOTTED: — NOTE BOOK: — AREAS: — VOLUMES: — DATE: — BY:

FINAL SURVEY — SURVEYED / PLOTTED / NOTE BOOK / NO. — BY / DATE / CHECKED

ORIGINAL SURVEY — SURVEYED / PLOTTED / TEMPLATE / NOTE BOOK / NO. — BY / DATE / CHECKED

0+80

GEOTEXTILE UNDER STONE FILL
9 FT + 8 FT = 17 FT

: STONE FILL (TYPE)

LT X	LT Y
-1	580.6
-1	584.5
0	583.5
1.5	582.6
1.5	580.6
-1	580.6

AREA: 7.1 ft²

RT X	RT Y
16.2	579.9
16.2	584.9
18.4	585.1
18.4	579.9
16.2	579.9

AREA: 5.72 ft²

208.30: COFFERDAM EXC EARTH

LT X	LT Y
-11.0	576.0
-11.0	590.09
-11.5	590.5
-12.0	590.13
-1.5	589.76
0	589.44
1.0	589.4
2.5	589.43
2.5	576.0
-11.0	576.0

AREA = 185.6 ft²

RT X	RT Y
14.5	576.0
14.5	584.8
16.5	585.0
20.0	586.41
26.0	587.0
28.0	587.1 587.07
28.0	576.0
14.5	576.0

AREA = 134.35 ft²
137.5 "

12/11/65

204.30: GRAN. BKFL. FOR STRUCT.

LT X	LT Y
-11	576.0
-11	590.7
-2	590.43
-2	579
-3	579
-3	577
0	577
0	579
-1	579
-1	580.6
1.5	580.6
1.5	582.6
2.5	584.93
2.5	576
-11.0	576

AREA: 146.8 ft²

RT X	RT Y
14.5	576
14.5	582
16.2	584.9
16.2	579.9
18.4	579
17.7	579
17.7	577
20.1	577
20.1	579
19.5	579
19.5	591.1
28	590.6
28	576
14.5	576

AREA: 142.8 ft²

* 0+80 FINAL SECTION USED TO ESTIMATE GRAN. BKFL.

0+77

GEOTEXTILE UNDER STONE FILL
8 FT + 8 FT = 16 FT

: STONE FILL (TYPE)

LT X	LT Y
-1	580.5
-1	582.5
-4	582.5
-4	580.5
-1	580.5

AREA: 6.9 ft²

RT X	RT Y
13	580.1
13	582.1
16.84	582.1
16.84	580.1
13	580.1

AREA: 7.7 ft²

7/68

208.30: COFFERDAM EXC, EARTH

LT X	LT Y
-9.2	576.0
-9.2	590.66
-1.7	590.40
0	589.7
1.0	588.1
4.0	586.7
4.0	576.0
-9.2	576.0

AREA 178.1 ft²

RT X	RT Y
13.6	576.0
13.6	582.8
17.0	583.5
22.0	584.9
26.0	587.21
26.3	587.22
26.3	576.0
13.6	576.0

AREA = 159.9

204.30: GRAN. BKFL. FOR STRUCT.

LT X	LT Y
-9.2	576
-9.2	590.8
0	590.71
0	579
-1.5	579
-1.5	577
1.9	577
1.9	579
3	579
3	580.5
4	580.5
4	576
-9.2	576

AREA: 143.6 ft²

RT X	RT Y
13	576
13	580.1
16.84	580.1
16.84	582.1
13	582.1
12.67	584.9 596.34
26.3	584.9 596.34
26.3	576
13.0	576

AREA: 141.0

141.6 ft²

12/13/65

0+90 FINAL SECTION USED TO ESTIMATE GRAN. BKFL.

0+93

208.30: COFFERDAM EXC EARTH

LT X	LT Y
-18.25	576.0
-16.25	590.7 591.37
-5.0	590.41
-5.0	576.0
-16.25	576.0

AREA: 207.4 ft²
197.5 "

RT X	RT Y
22.5	576.0
22.5	585.11
23.0	586.5
36.0	587.2
36.0	576.0
22.5	576.0

AREA: 141.63 ft²

204.30: GRAN. BKFL. FOR STRUCT.

LT X	LT Y
-18.25	576.0
-18.25	591.37
-9.2	590.91
-9.2	579.0
-10.3	579.0
-10.3	577.0
-11.25	577.0
-11.6	579.0
-11.0	585.1
-5.0	591.7
-5.0	576.0
-16.25	576.0

AREA: 160.0 ft²

RT X	RT Y
36.0	576.0
22.5	576.0
22.5	582.6
25.9	584.1
25.4	579
24.6	579
24.6	577
23.5	577
23.5	579
23.3	579
25.8	577
25.8	579
25.5	586.1
36.0	587.2
36.2	576

AREA: 131.7 ft²

0+90

GEOTEXTILE UNDER STONE FILL
15 FT + 12 FT = 27 LF

: UNCLASSIFIED CHANNEL EXC.

LT X	LT Y
-3.4	592.7
0	589.2
1	587.4
2.5	587.3 587.8
2.5	580.8
-1.5	580.8
-1.5	582.5
-3.4	588.1
-3.4	592.7

AREA: 28.9 ft²

RT X	RT Y
20.9	580.3
17.9	580.3
17.9	582.3
16.27	582.55
16	582.6
20.3	585.6
20.9	585.3
20.9	580.3

AREA: 16.4 ft²

: STONE FILL (TYPE)

LT X	LT Y
2.5	582.8
2.5	580.8
-1.5	580.8
-1.5	582.5
-6.6	584.5
-6.6	586.5
2.5	582.8

AREA: 21.3 ft²

RT X	RT Y
17.9	580.3
17.9	582.3
23.8	585.2
23.6	583.2
21.9	582.3
21.9	580.3
17.9	580.3

AREA: 16.7 ft²

208.30: COFFERDAM EXC, EARTH

LT X	LT Y
-16.5	576.0
-16.5	591.26
-7.7	590.8
-7.7	579
-8.5	579
-8.5	577
-5.6	577
-5.6	578
-6.6	579
-6.6	584.5
-7.4	583.9
-7.4	576
-16.5	576

AREA: 159.8 ft²

RT X	RT Y
20.9	576
20.9	580.3
21.9	582.3
23.8	582.2
23.8	579
23.3	579
23.3	577
25.8	577
25.8	579
25.5	586.1
36.0	587.2
36.2	576

AREA: 132.3 ft²

204.30: GRAN. BKFL. FOR STRUCT.

LT X	LT Y
-16.5	576
-16.5	591.26
-7.7	590.8
-7.7	579
-8.5	579
-8.5	577
-5.6	577
-5.6	578
-6.6	579
-6.6	584.5
-7.4	583.9
-7.4	576
-16.5	576

AREA: 159.8 ft²

RT X	RT Y
20.9	576
20.9	580.3
21.9	582.3
23.8	582.2
23.8	579
23.3	579
23.3	577
25.8	577
25.8	579
25.5	586.1
36.0	587.2
36.2	576

AREA: 132.3 ft²

X	Y
34.1	576
20.9	576

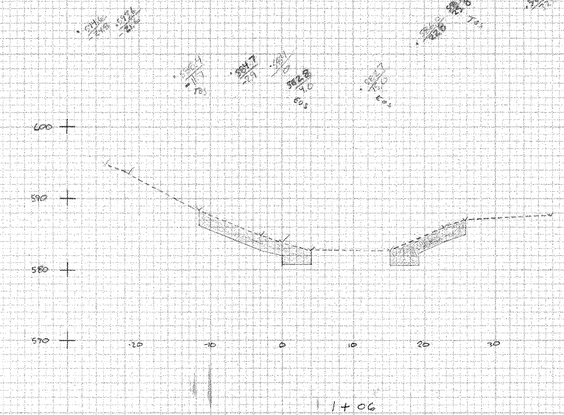
AREA: 132.3 ft²

12/13/65

154.7

175 XS

HIGHWAY FEDERAL AID SHEET
PLATE 3-FULL CROSS SECTION-FULL LINE
NATIONAL PRINTFAST
PRINTED IN U.S.A.



1+06

: STONE FILL (TYPE)

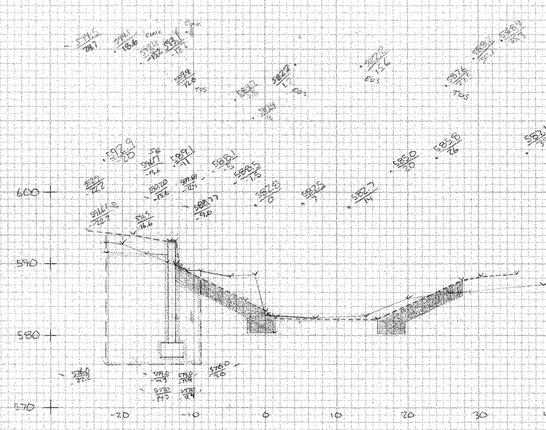
LT X	LT Y	RT X	RT Y
-11.7	588.4	15	582.7
-29	584.7	22.8	586
6	584.6	35.8	587.1
4.0	582.8	25.8	585.1
4.0	580.8	22.8	584.0
6	580.8	19.0	584.1 582.4
6	582	19.0	580.7
-29	582.7	15	580.7
-11.7	586.4	15	582.7
-11.7	588.4		

AREA: 338 ft² — AREA: 274.6 ft² 25.0 ft²

: UNCLASSIFIED CHANNEL EXC

LT AREA: 338 ft² — RT AREA: 224 ft² 25.0

GEOTEXTILE UNDER STONE FILL
21 ft + 18 ft = 39 ft



1+00

GEOTEXTILE UNDER STONE FILL
21 ft + 19 ft + 40 ft

208.30: COFFERDAM EXC, EARTH

LT X	LT Y	RT
-22.2	576.0	0 ft²
-22.2	592.4 591.61	
-16.6	591.5	
-13.6	586.2	
-11.0	589.1	
-9.0	588.37	
-5.0	576.0	
-22.2	576.0	

AREA: 136.43 ft² 193.82

204.30: GRAN. BKFL. FOR STRUCT

LT X	LT Y	RT
-22.2	576.0	0 ft²
-22.2	591.61	
-16.6	591.50	
-13.6	591.17	
-13.6	590.0	
-11.3	590.0	
-11.3	577.0	
-11.4	577.0	
-11.01	579.0	
-12.9	579.0	
-12.4	582.7	
-9.0	584 585.9	
-9.0	576	
-22.2	576	

AREA: 101.0 ft² 167.6

: UNCLASSIFIED CHANNEL EXC

LT X	LT Y	RT X	RT Y
-9.0	585.9	15.6	582.2
-9.0	584.79	7	582.5
-5	588.1	14	582.7
-4.5	586.5	20	585
0	582.0	26	585.8
1.2	582.75	27.5	586.0
1.2	580.3	27.5	585.6
-2.8	580.3	19.6	582.7
-2.8	582.7	17.6	580.2
-9.2	585.9	15.6	580.2

AREA: 46.7 — AREA: 30.7

: STONE FILL (TYPE)

LT X	LT Y	RT X	RT Y
1.2	582.72	15.6	580.2
1.2	580.3	15.6	582.2
-2.8	580.3	27.5	582.6
-2.8	582.7	27.5	585.6
-12.4	582.69	17.6	582.2
-12.4	585.69	19.6	580.2
-2.8	584.7	15.6	580.2
0	583.4		
1.2	582		

AREA: 50.3 — AREA: 26.7

12/17/05

ORIGINAL SURVEY NOTE BOOK — DATE — SURVEYED — DRAWN — TRACED — TEMPLATE — AREAS — CHECKED — PEG —
FINAL SURVEY NOTE BOOK — DATE — SURVEYED — DRAWN — TRACED — TEMPLATE — AREAS — CHECKED — PEG —

GRAFTON - ROCKINGHAM STP 0126(4)S

Station	distance	CL Finish Elev.	Left Typical Section	Left Subbase Uptaper Limit	Left Side Slope	Left Subbase UpTaper	Left Sand Width	Left Subbase Width	Left Subbase Upgrade Depth	Left Subbase Upgrde Width	Left Gravel Shoulder Depth	Left Subbase Slope Width	Left Paved Shoulder Depth	Left Cut Or Fill	Remarks	Left Gravel Shoulder Width	Left Paved Shoulder Width	Left M/L Width	Left Gravel Shoulder Banking	Left Shoulder Banking	Left Mainline Banking	Right Mainline Banking	Right Paved Shoulder Banking	Right Gravel Shoulder Banking	Right M/L Width	Right Paved Shoulder Width	Right Gravel Shoulder Width	Remarks	Right Cut Or Fill	Right Paved Shoulder Depth	Right Subbase Slope Width	Right Gravel Shoulder Depth
				UTL	S	UT	SW	FGW	y5	x5	y4	x4	y2	Fill		x3	x2	x1	b3	b2	b1	b1	b2	b3	x1	x2	x3			y2	x4	y4
10+048.00			4C		-0.141		4.400	4.400			0.535	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000		Butt	0.450	0.500	0.458
	12.00																			-0.060			-0.060								
10+060.00		184.476	4C		-0.141		4.400	4.400			0.535	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000		Butt	0.450	0.500	0.458
	20.00																														
10+080.00		193.986	4C		-0.064		4.400	4.400			0.573	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000		Butt	0.450	0.500	0.559
	20.00																														
10+100.00		183.495	4C		-0.087		4.400	4.400			0.562	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.653
	20.00																														
10+120.00		183.067	4C		-0.179		4.400	4.400			0.516	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.859
	20.00																														
10+140.00		182.762	4C		-0.250		4.400	4.400			0.480	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.614
	20.00																														
10+160.00		182.580	4C		-0.250		4.400	4.400			0.480	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	drive	Butt	0.450	1.500	0.319
	20.00																														
10+180.00		182.460	4C		-0.250		4.400	4.400			0.480	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.624
	20.00																														
10+200.00		182.340	4C		-0.250		4.400	4.400			0.480	0.500	0.450	Butt		0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	drive	Butt	0.545	1.500	0.353
	20.00				-0.050																										
10+220.00		182.220	4B	5.400	-0.050	0.333	3.900	4.749	0.570	0.849	0.320	1.500	0.450	Butt	drive	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.624
	20.00																														
10+240.00		182.100	4		-0.250		4.400	4.400			0.582	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.624
	20.00																														
10+260.00		181.980	4		-0.167		4.400	4.400			0.624	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	drive	Butt	0.450	1.500	0.342
	20.00																														
10+280.00		181.836	4		-0.250		4.400	4.400			0.582	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	drive	Butt	0.450	1.500	0.326
	20.00																														
10+300.00		181.643	4		-0.167		4.400	4.400			0.624	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+320.00		181.454	4B	5.400	-0.050	0.333	3.900	4.749	0.570	0.849	0.320	1.500	0.450	Butt	drive	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	drive	Butt	0.450	1.500	0.316
	20.00																														
10+340.00		181.325	4B	5.400	-0.050	0.333	3.900	4.749	0.570	0.849	0.320	1.500	0.450	Butt	drive	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+360.00		181.210	4		0.033		4.400	4.400			0.724	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.624
	20.00																														
10+380.00		181.066	4		0.045		4.400	4.400			0.730	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+400.00		180.809	4B	5.400	-0.040	0.333	3.900	4.749	0.578	0.849	0.335	1.500	0.450	Butt	drive	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+420.00		180.749	4		-0.250		4.400	4.400			0.582	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+440.00		180.591	4		-0.250		4.400	4.400			0.582	0.500	0.697	Butt	curb	0.00	0.90	3.00	0.00	-0.020	-0.020	-0.020	-0.020	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.582
	20.00																														
10+460.00		180.437	4C		-0.250		4.400	4.400			0.466	0.500	0.450	Butt		0.00	0.90	3.00	0.00	0.009	0.009	-0.026	-0.026	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.583
	20.00																														
10+480.00		180.485	1A		-0.500		5.757	5.198	1.857	0.997		1.298	0.697	Cut	curb	0.00	0.90	3.00	0.00	0.037	0.037	-0.037	-0.037	0.000	3.000	0.900	0.000	curb	Butt	0.697	0.500	0.632
	20.00																														
10+500.00		180.841		calc											Bridge	0.00	0.90	3.00	0.00	-0.030	0.040	-0.040	-0.060	0.000	3.000	0.900	0.000	Bridge				
	20.00																														
10+520.00		181.505	3		-0.167		6.100	6.100			0.082	2.200	0.482	Butt		0.00	0.90	3.00	0.00	-0.032	-0.038	-0.038	-0.060	-0.050	3.000	0.900	1.000	g.rail	Fill	0.525	1.219	0.563
	20.00																														
10+540.00		182.433	3		-0.250		5.000	5.000			0.220	1.100	0.482	Butt	Wall	0.00	0.90	3.00	0.00	-0.036	-0.034	-0.034	-0.060	-0.060	3.000	0.900	1.000	g.rail	Fill	0.522	1.171	0.546
	20.00																														
10+560.00		183.396	3		0.294		4.500	4.500			0.688	0.600	0.482	Butt	U/D	0.00	0.90	3.00	0.00	-0.036	0.034	-0.034	-0.060	-0.060	3.000	0.900	1.000	g. rail	Fill	0.522	1.171	0.546
	20.00																														
10+580.00		184.360	2D		0.045	0.333	3.900	6.002		1.002	0.606	2.102	0.545	Cut	UpTaper	0.00	0.90	3.00	0.00	0.034	0.034	-0.034	-0.060	0.000	3.000	0.900	0.000	drive	Cut	0.522	1.420	0.347
	20.00																														
10+600.00		185.323	2D		-0.250	0.500	3.900	4.544		0.644	0.349	0.466	0.482	Cut	UpTaper	0.00	0.90	3.00	0.00	-0.036	0.034	-0.034	-0.034	0.000	3.000	0.900	0.000	curb	Butt	0.545	0.500	0.614
	20.00																														
10+620.00		186.286	3		-0.167		6.100	6.100			0.143	2.200	0.482	Butt		0.00	0.90	3.00	0.00	-0.060	0.010	-0.010	-0.060	-0.060	3.000	0.900	1.000		Fill	0.500	1.546	0.500
	20.00																														
10+640.00		187.249	3		-0.167		6.100	6.100			0.224	2.200	0.505	Butt		0.00	0.90	3.00	0.00	-0.060	-0.016	0.016	-0.054	0.000	3.000	0.900	0.000	UpTaper	Cut	0.482	0.620	0.483
	20.00																														
10+660.00		188.212	3		-0.167		6.100	6.100			0.280	2.200	0.522	Butt		0.00	0.90	3.00	0.00	-0.060	-0.034	0.034	-0.036	0.000	3.000	0.900	0.000		Butt	0.482	2.200	0.091
	20.00																														
10+680.00		189.175	3		-0.167		6.100	6.100			0.298	2.200	0.527	Butt		0.00	0.90	3.00	0.00	-0.060	-0.040	0.040	-0.030	0.000	3.000	0.900	0.000		Butt	0.482	2.200	0.077
	20.00																														
10+700.00		189.941	4A		0.250		4.400	4.400			0.849	0.500	0.527	Butt	curb	0.00	0.90	3.00	0.00	-0.060	-0.040	0.040	-0.030	0.000	3.000	0.900	0.000		Butt	0.482	1.100	0.305
	20.00																														
10+720.00		190.322	4A		0.250		4.400	4.400			0.801	0.500	0.496	Butt	curb	0.00	0.90	3.00	0.00	-0.060	-0.006	0.006	-0.060	0.000	3.000	0.900	0.000	Drive	Butt	0.486	1.420	0.413
	20.00																														
10+740.00		190.319	2C	6.000	0.096	0.333	3.900	4.749	0.658	0.849	0.361	2.100	0.509	Butt	drive	0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	Curb	Butt	0.509	1.100	0.983
	20.00																														
10+760.00		189.931	4A		0.250		4.400	4.400			0.821	0.500	0.509	Butt	curb	0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	Drive	Butt	0.509	1.420	0.358
	20.00																														
10+780.00		189.209	4A		0.250		4.400	4.400			0.821	0.500	0.509	Butt	curb	0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	Drive	Butt	0.509	1.420	0.300
	20.00																														
10+800.00		188.441	4A		0.250	6.2	4.400	4.400			0.821	0.500	0.509	Butt	curb	0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	UpTaper	Cut	0.509	0.849	0.364
	20.00																														
10+820.00		187.673	3		-0.020		4.500	4.500			0.559	0.600	0.509	Butt		0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	UpTaper	Cut	0.509	0.849	0.364
	20.00																														
10+840.00		186.988	3		-0.250		6.100	6.100			0.053	2.200	0.509	Butt		0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000	UpTaper	Cut	0.509	0.849	0.434
	20.00																														
10+860.00		186.471	3		-0.250		6.100	6.100			0.053	2.200	0.509	Butt		0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000		Butt	0.509	2.200	0.236
	20.00																														
10+880.00		186.120	3		-0.250		5.400	5.400			0.214	1.500	0.509	Butt		0.00	0.90	3.00	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.000	0.900	0.000		Butt	0.509	1.900	0.280
	20.00																														
10+900.00		185.937	3		-0.250	-0.167	6.400	6.400			0.053	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.300	0.900	0.000		Butt	0.509	2.200	0.236
	20.00																														
10+920.00		185.837	3		-0.250		6.600	6.600		-2.081	-0.082	2.400	0.485	Butt		0.00	0.90	3.30	0.00	-0.060	0.007	-0.021	-0.060	0.000	3.300	0.900	0.000		Butt	0.510	2.200	0.239
	20.00																														
10+940.00		185.737	1A		-0.250		7.259	6.156		3.059		1.956	0.482	Cut		0.00	0.90	3.30	0.00	-0.048	0.022	-0.022	-0.060	0.000	3.300	0.900	0.000		Butt	0.511	2.200	0.243
	20.00																														
10+960.00		185.637	3		-0.250		6.300	6.156		1.956	-0.039	2.100	0.482	Butt		0.00	0.90	3.30	0.00	-0.048	0.022	-0.022	-0.060	-0.060	3.300	0.900	1.000	g. rail	UpTaper	0.511	0.935	0.467
	20.00																														
10+980.00		185.537	2D		-0.250	0.333	4.200	5.164		0.964	0.270	0.463	0.482	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.048	0.022	-0.022	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.511	1.679	0.523
	20.00																														
11+000.00		185.437	1A		-0.167		8.610	7.020		4.410	0.060	2.820	0.482	Fill		0.00	0.90	3.30	0.00	-0.048	0.022	-0.022	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.511	1.094	0.523
	20.00																														
11+020.00		185.443	2C	6.000	-0.177	0.333	4.200	5.087	0.707	0.887	0.564	1.800	0.496	Butt	Drive	0.00	0.90	3.30	0.00	-0.060	-0.005	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.509	1.081	0.519
	20.00																														
11+040.00		185.682	3		-0.250		6.200	6.200			0.099	2.000	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.509	1.251	0.519
	20.00																														
11+060.00		186.094	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.007	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.497	1.463	0.494
	20.00																														
11+080.00		186.738	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.055	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.541	1.316	0.586
	20.00																														
11+100.00		187.359	3		-0.167		6.400	6.400			0.264	2.200	0.517	Butt		0.00	0.90	3.30	0.00	-0.060	-0.029	0.029	-0.041	-0.041	3.300	0.900	1.000	g. rail	Fill	0.482	0.873	0.462
	20.00																														
11+120.00		187.721	3		-0.167		6.400	6.400			0.320	2.200	0.533	Butt		0.00	0.90	3.30	0.00	-0.060	-0.047	0.047	-0.023	-0.023	3.300	0.900	1.000	g. rail	Fill	0.482	0.845	0.462
	20.00																														
11+140.00		187.822	3		-0.167		6.400	6.400			0.320	2.200	0.533	Butt		0.00	0.90	3.30	0.00	-0.060	-0.047	0.047	-0.023	-0.023	3.300	0.900	1.000	g. rail	Fill	0.482	1.070	0.462
	20.00																														
11+160.00		187.685	3		-0.167		6.400	6.400			0.320	2.200	0.533	Butt		0.00	0.90	3.30	0.00	-0.060	-0.047	0.047	-0.023	-0.023	3.300	0.900	1.000	g. rail	Fill	0.482	2.190	0.462
	20.00																														
11+180.00		187.247	3		-0.167		6.400	6.400			0.239	2.200	0.510	Butt		0.00	0.90	3.30	0.00	-0.060	-0.021	0.021	-0.049	-0.049	3.300	0.900	1.000	g. rail	Fill	0.482	1.385	0.462
	20.00																														
11+200.00		186.701	3		-0.167		6.400	6.400			0.143	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.060	0.010	-0.010	-0.060	-0.060	3.300	0.900	1.000	g. rail	Fill	0.500	0.761	0.500
	20.00																														
11+220.00		186.298	3A		-0.250		6.400	6.028		1.828	-0.108	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.029	0.041	-0.041	-0.060	-0.250	3.300	0.900	2.200	1 on 4	Cut	0.528	0.230	0.118
	20.00																														
11+240.00		186.143	3A		-0.250		6.400	6.016		1.816	-0.113	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.027	0.043	-0.043	-0.060	0.000	3.300	0.900	0.000	Drive	Butt	0.530	1.200	0.378
	20.00																														
11+260.00		186.235	1A		-0.250		7.040	6.016		2.840		1.816	0.482	Cut		0.00	0.90	3.30	0.00	-0.027	0.043	-0.043	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.530	0.902	0.563
	20.00																														
11+280.00		186.575	1A		-0.250		7.099	6.054		2.899		1.854	0.482	Fill		0.00	0.90	3.30	0.00	-0.033	0.037	-0.037	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.524	2.976	0.551
	20.00																														
11+300.00		187.163	3		-0.167		6.400	6.400			0.141	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.059	0.011	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.509	0.803	0.519
	20.00																														
11+320.00		187.957	3		-0.167		6.400	6.400			0.218	2.200	0.504	Butt		0.00	0.90	3.30	0.00	-0.060	-0.014	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.509	0.803	0.519
	20.00																														
11+340.00		188.773	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.509	1.081	0.519
	20.00																														
11+360.00		189.583	2C	7.000	-0.020	0.154	5.200	6.926	0.559	1.726	0.372	2.800	0.509	Troad		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.509	1.081	0.519
	20.00																														
11+380.00		190.243	3		-0.101		6.400	6.400			0.381	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Fill	0.509	1.081	0.519
	20.00																														
11+400.00		190.691	3		-0.167		6.100	6.100			0.280	1.900	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Cut	0.509	2.257	0.519
	20.00																														
11+420.00		190.927	3		-0.167		6.100	6.100			0.280	1.900	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Cut	0.509	1.081	0.519
	20.00																														
11+440.00		190.952	3		-0.167		6.100	6.100			0.280	1.900	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	0.003	-0.060	-0.060	3.300	0.900	1.000	g. rsil	Cut	0.488	0.992	0.475
	20.00																														
11+460.00		190.765	3		-0.167		6.400	6.400			0.258	2.200	0.515	Butt		0.00	0.90	3.30	0.00	-0.060	-0.027	0.027	-0.043	-0.043	3.300	0.900	1.000	g. rsil	Cut	0.482	0.666	0.462
	20.00																														
11+480.00		190.424	3		-0.167		6.400	6.400			0.301	2.200	0.528	Butt		0.00	0.90	3.30	0.00	-0.060	-0.041	0.041	-0.029	-0.029	3.300	0.900	1.000	g. rsil	Fill	0.482	0.653	0.462
	20.00																														
11+500.00		190.075	3		-0.167		6.400	6.400			0.301	2.200	0.528	Butt		0.00	0.90	3.30	0.00	-0.060	-0.041	0.041	-0.029	-0.029	3.300	0.900	1.000	g. rsil	Fill	0.482	0.653	0.462
	20.00																														
11+520.00		189.727	3		-0.167		6.400	6.400			0.301	2.200	0.528	Butt		0.00	0.90	3.30	0.00	-0.060	-0.041	0.041	-0.029	-0.029	3.300	0.900	1.000	g. rsil	Fill	0.482	0.653	0.462

GRAFTON - ROCKINGHAM STP 0126(4)S

Station	distance	CL Finish Elev.	Left Typical Section	Left Subbase Uptaper Limit	Left Side Slope	Left Subbase UpTaper	Left Sand Width	Left Subbase Width	Left Subbase Upgrade Depth	Left Subbase Upgrde Width	Left Gravel Shoulder Depth	Left Subbase Slope Width	Left Paved Shoulder Depth	Left Cut Or Fill	Remarks	Left Gravel Shoulder Width	Left Paved Shoulder Width	Left M/L Width	Left Gravel Shoulder Banking	Left Shoulder Banking	Left Mainline Banking	Right Mainline Banking	Right Paved Shoulder Banking	Right Gravel Shoulder Banking	Right M/L Width	Right Paved Shoulder Width	Right Gravel Shoulder Width	Remarks	Right Cut Or Fill	Right Paved Shoulder Depth	Right Subbase Slope Width	Right Gravel Shoulder Depth
		180.768		UTL	S	UT	SW	FGW	y5	x5	y4	x4	y2			x3	x2	x1	b3	b2	b1	b1	b2	b3	x1	x2	x3			y2	x4	y4
11+920.00		180.768	2C	7.000	0.113	0.333	4.200	4.948	0.730	0.748	0.278	2.800	0.545	Butt	Drive	0.00	0.90	3.30	0.00	-0.068	-0.068	0.068	-0.002	-0.002	3.300	0.900	1.000	g.rail	Cut	0.482	0.813	0.462
	20.00																															
11+940.00		180.167	3		-0.167		6.400	6.400			0.283	2.200	0.523	Butt		0.00	0.90	3.30	0.00	-0.060	-0.035	0.035	-0.035	-0.035	3.300	0.900	1.000	g.rail	Cut	0.482	0.864	0.462
	20.00																															
11+960.00		179.567	2D		-0.078	0.333	3.300	4.149		0.849	0.510	1.239	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	0.002	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.489	0.951	0.477
	20.00																															
11+980.00		178.966	2D		-0.078	0.333	3.300	4.149		0.849	0.510	1.239	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	0.858	0.519
	20.00																															
12+000.00		178.366	2D		-0.060	0.333	4.200	5.049		0.849	0.525	1.336	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	1.308	0.519
	20.00																															
12+020.00		177.765	2D		-0.050	0.333	4.200	5.049		0.849	0.534	1.393	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	1.774	0.519
	20.00																															
12+040.00		177.165	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	2.013	0.519
	20.00																															
12+060.00		176.564	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.300	0.900	0.000	UpTaper	Cut	0.509	0.849	0.525
	20.00																															
12+080.00		175.964	2D		-0.074	0.333	4.200	5.049		0.849	0.513	1.259	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	0.000	3.300	0.900	0.000	UpTaper	Cut	0.509	0.849	0.525
	20.00																															
12+100.00		175.363	2D		-0.217	0.333	4.200	5.049		0.849	0.391	0.711	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	1.656	0.519
	20.00																															
12+120.00		174.763	2D		-0.200	0.333	4.200	5.049		0.849	0.406	0.762	0.509	Cut	UpTaper	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.509	0.803	0.519
	20.00																															
12+140.00		174.229	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.509	0.803	0.519
	20.00																															
12+160.00		173.837	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.509	0.803	0.519
	20.00																															
12+180.00		173.589	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.509	1.366	0.519
	20.00																															
12+200.00		173.483	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	2.800	T.Road	Cut	0.509	2.050	0.447
	20.00																															
12+220.00		173.520	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.014	-0.060	0.000	3.300	0.900	0.000	T.Road	Butt	0.504	3.800	-0.153
	20.00																															
12+240.00		173.700	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	0.015	-0.055	-0.250	3.300	0.900	1.200	T.Road	Cut	0.482	0.516	0.214
	20.00																															
12+260.00		174.023	3		-0.167		6.400	6.400			0.314	2.200	0.532	Butt		0.00	0.90	3.30	0.00	-0.060	-0.045	0.045	-0.025	0.000	3.300	0.900	0.000	T.Road	Cut	0.482	1.021	0.532
	20.00																															
12+280.00		174.488	3		-0.167		6.400	6.400			0.326	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+300.00		175.031	3		-0.060		6.400	6.400			0.561	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+320.00		175.573	3		-0.167		6.400	6.400			0.326	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+340.00		176.097	3		-0.167		6.400	6.400			0.326	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+360.00		176.524	3		-0.167		6.400	6.400			0.326	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+380.00		176.848	3		-0.167		6.400	6.400			0.326	2.200	0.535	Butt		0.00	0.90	3.30	0.00	-0.060	-0.049	0.049	-0.021	-0.021	3.300	0.900	1.000	g.rail	Fill	0.482	0.842	0.462
	20.00																															
12+400.00		177.067	3		-0.179		6.400	6.400			0.219	2.200	0.512	Butt		0.00	0.90	3.30	0.00	-0.060	-0.023	0.023	-0.047	-0.047	3.300	0.900	1.000	g.rail	Fill	0.482	0.883	0.462
	20.00																															
12+420.00		177.182	3		-0.192		6.400	6.400			0.180	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.006	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.496	0.997	0.492
	20.00																															
12+440.00		177.192	2C	5.600	-0.044	0.333	4.200	5.049	0.539	0.849	0.331	1.400	0.509	Butt	Drive	0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.509	1.081	0.519
	20.00																															
12+460.00		177.099	3		-0.192		6.400	6.400			0.180	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	Hdwl	Fill	0.509	2.257	0.519
	20.00				-0.185																											
12+480.00		176.901	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	-0.020	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.509	0.803	0.519
	20.00																															
12+500.00		176.598	3		-0.167		6.400	6.400			0.236	2.200	0.509	Butt		0.00	0.90	3.30	0.00	-0.060	-0.020	0.006	-0.060	-0.060	3.300	0.900	1.000	g.rail	Fill	0.486	0.698	0.470
	20.00																															
12+520.00		176.211	3		-0.167		6.400	6.400			0.292	2.200	0.525	Butt		0.00	0.90	3.30	0.00	-0.060	-0.038	0.038	-0.032	-0.032	3.300	0.900	1.000	g.rail	Fill	0.482	0.656	0.462
	20.00																															
12+540.00		175.815	3		-0.167		6.400	6.400			0.348	2.200	0.541	Butt		0.00	0.90	3.30	0.00	-0.060	-0.056	0.056	-0.014	-0.014	3.300	0.900	1.000	g.rail	Fill	0.482	0.639	0.462
	20.00																															
12+560.00		175.418	3		-0.167		6.400	6.400			0.348	2.200	0.541	Butt		0.00	0.90	3.30	0.00	-0.060	-0.056	0.056	-0.014	-0.014	3.300	0.900	1.000	g.rail	Fill	0.482	0.639	0.462
	20.00																															
12+580.00		175.022	3		-0.250		6.400	6.400			0.165	2.200	0.541	Butt		0.00	0.90	3.30	0.00	-0.060	-0.056	0.056	-0.014	-0.014	3.300	0.900	1.000	g.rail	Fill	0.482	0.639	0.462
	20.00																															
12+600.00		174.638	3		-0.167		6.400	6.400			0.348	2.200	0.541	Butt		0.00	0.90	3.30	0.00	-0.060	-0.056	0.056	-0.014	-0.014	3.300	0.900	1.000	Hdwl	Fill	0.482	0.639	0.462
	20.00																															
12+620.00		174.341	2C	6.000	-0.060	0.333	4.200	4.971	0.588	0.771	0.183	1.800	0.541	Butt	Drive	0.00	0.90	3.30	0.00	-0.060	-0.056	0.056	-0.014	-0.014	3.300	0.900	1.000	g.rail	Cut	0.482	0.639	0.462
	20.00																															
12+640.00		174.143	3		-0.167		6.400	6.400			0.305	2.200	0.529	Butt		0.00	0.90	3.30	0.00	-0.060	-0.042	0.042	-0.028	-0.028	3.300	0.900	1.000	g.rail	Cut	0.482	0.852	0.462
	20.00																															
12+660.00		174.031	3		-0.167		6.400	6.400			0.212	2.200	0.502	Butt		0.00	0.90	3.30	0.00	-0.060	-0.012	0.012	-0.058	-0.058	3.300	0.900	1.000	g.rail	Cut	0.482	1.121	0.462
	20.00																															
12+680.00		173.931	3A		-0.250		6.400	6.178		1.978	-0.060	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.051	0.019	-0.019	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.508	1.075	0.517
	20.00																															
12+700.00		173.832	1A		-0.250		6.973	5.973		2.773		1.773	0.482	Cut		0.00	0.90	3.30	0.00	-0.020	0.050	-0.050	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.536	1.798	0.576
	20.00																															
12+720.00		173.712	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.541	1.551	0.587
	20.00																															
12+740.00		173.487	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.541	1.629	0.587
	20.00																															
12+760.00		173.160	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.541	1.951	0.587
	20.00																															
12+780.00		172.750	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	Hdwl	Cut	0.541	1.868	0.587
	20.00																															
12+800.00		172.333	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.541	1.551	0.587
	20.00																															
12+820.00		171.917	3		-0.167		6.400	6.400			0.042	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.014	0.056	-0.056	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.541	1.323	0.587
	20.00																															
12+840.00		171.500	3		-0.167		6.400	6.400			0.058	2.200	0.482	Butt		0.00	0.90	3.30	0.00	-0.021	0.049	-0.049	-0.060	-0.060	3.300	0.900	1.000	g.rail	Cut	0.535	0.929	0.574
	20.00																															
12+860.00		171.083	2D		-0.167	0.333	4.200	5.148		0.948	0.358	0.716	0.482	Cut	Uptaper	0.00	0.90	3.30	0.00	-0.053	0.017	-0.020	-0.060	-0.060	3.300	0.900	1.000	Hdwl	Cut	0.509	1.081	0.519