TURF MASTERS
LANDSCAPING LTD. & GOLF CONSTRUCTION

FIELDturf

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December 18, 2014

Scott Munro
Mgr. Facilities and Parks
Town of Springhill
6 Main St.
Springhill, NS, B0M 1X0

Hi Scott:

On or about October 27, 2014, after a conversation that Turf Masters Landscaping Ltd had with Royce Rushton, you contacted us to attend the site and meet with yourself and members of the Baseball community to discuss issues surrounding drainage to the infields of the two baseball fields immediately behind your community's Arena Centre.

It was noted that the infield mixture that covered the infields of the two baseball fields had significant displacement due to surface run-off after the heavy rains prior to our meeting. It was pointed out during the meeting that this type of material displacement and wet sloppy condition of the infield mix was apparent after every rainfall that landed on the field regardless of the time of year. This condition was very taxing for the Municipal Maintenance Team and to the user groups to keep the field ready for play.

As a result of this meeting, we put together a budget for doing a site review and survey of existing conditions to be followed by a set of recommendations to remediate the infields of the two baseball fields. We indicated that at the low end $3500 be allotted to the task and $4500 to the high end would be the maximum cost for this service.

You subsequently gave assent to having us provide the service, after which, we visited the site and did infield mix sampling, infield profiling, an entire topographic survey, and a qualitative survey of the outlying areas of the facility to gain data to be used for making our recommendations. This data would then be used for preparing a budget to remediate existing conditions. What follows is our report.

Regards,

Paul F Howard BSc (Agr)
Mgr. Project Development and Estimating
Turf Masters Landscaping Ltd

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Methodology

On November 6, 2014, Turf Masters Landscaping Ltd attended the site with survey consultants Azimuth Consulting Ltd. The site had received more rain since the initial site meeting on October 31, 2014 and there was more evidence of infield displacement on both fields. Refer to Appendix "A" for graphics of the types of issues that are evident on the sites. Azimuth was advised of the scope of our work for the day, after which, they immediately brought control to the site so that we could appropriately ascribe elevations to the entire site. The gathering of the data included the entire site so that a determination could be made of the total amount of fall to the discharge that was available. This data would prove to be crucial when setting invert in/out limits for the proposed drainage system.

While Azimuth gathered data, TML did soil profiling and infield mix sampling. Profiles were dug down approximately 300mm in several locations on both fields to determine the nature of the base material under the infield mix, the depth of the infield mix, and the reason why there was poor drainage thru the infields. Infield mix samples were taken to be representative of existing material and all samples for each field were homogenized and subsequently submitted to Maritime Testing to determine the make-up of the infield mix.

TML conducted a qualitative review of the site to determine possible sources of surficial drainage, areas of standing water, assessment of existing in situ drainage, and condition of any in situ drainage and appropriateness of existing drainage. Data collected provided an interesting array of information upon which we made our determinations and conclusions.

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Findings

There are several areas from which rain water enters the site and onto the infields. A major source is coming from Main St., running down on to the site paved parking areas and surface running onto the soccer field that makes up part of Field 1; water was entering the soccer field by way of an underground discharge pipe coming from a sodded area adjacent to the arena and discharge sub surface beyond the edge of the paved surface; the roof of the arena complex was deemed to be discharging water onto the soccer field also. The entire soccer field was sheet draining from south east to northwest and providing a potential source of flood water onto the infield of Field 1
To the east of Field 1 there is higher ground that water could discharge from, onto the field. Effectively, all rain that falls and starts to run over the grassed areas surrounding the infield of Field1 is adding to the total of all water moving onto and over the infield.

Field 2 is sheet drained in a similar way to Field 1. Most of the run is from high ground to the east of the field. We noticed issues with the depth and extent of the drainage swales around this field. For example, the east drainage swale is cut to the depth of the surface of the infield of Field 2, providing little relief for water entering this infield, and the perimeter swale is up and down thus providing a non-continuous flow to the discharge point - this is evidenced by the standing water in the swales.

The infield profiling and sampling has revealed interesting findings. The infield mix should be in the 100mm depth range but it appears on the two infields that it is only 50 – 75mm deep. The mix is loose in texture indicating high sand content and high in silt content which could account in part for the apparent mobility of the medium on the infields. The clay content of the mix is too low – this fraction binds the sand together, reducing mobility but in this case there is too little to do the job.

The sub soil under the infields is gummy and aggregated and is apparently getting plugged up with silt. This condition will slow or eliminate any form of percolation thru the infield mix and through the substrate thus exacerbating the elements that are creating the drainage problems that are apparent.

Recommendations

The water moving onto the soccer field from paved areas and the subsurface drain discharging into the field can be addressed by installing a French drain that would run east to west from the eastern edge of the asphalt, running behind the arena and discharging/day lighted into the existing drainage swale at the far side of the access lane located at the distal/west end of the soccer field. This would pick up water from the arena roof also and would benefit the soccer field primarily, and the infield of Field 1.Most of the issues with the infield of Field 1 would then be addressed by installing subsurface drainage as per the drawings of Appendix F.

Because the percolate from Field 1 is routed around Field 2, the greatest amount of activity will be centered on this field. Apart from installing subsurface drainage as per the drawing of Appendix F, attention must be placed on remediating the swale from Field 1, around Field 2, and resetting the culverts under the laneway/trail at the distal/west end of the field to accommodate the new swale depth. Refer to the drawing of Appendix D and appendix F. As you will note we are recommending the use of a standard swale in combination with French drain to facilitate both percolate movement and user movement around the fields. If we were to install the perimeter swales appropriately, then user movement onto the field would be affected by the new depth of swale required to maintain fall. Using the French Drain will provide level entry/egress for people and equipment.

To install the sub surface drainage under the infields, the infield mix will need to be pushed up and wind rowed out of the way. The area will then be trenched to depths noted , pipe and drain rock placed in the trench to the grades noted and then channelled to the perimeter swales at the grades noted. The pipe within the infield will be Big O with a sock fabric around it to prevent silting of the pipe's interior. The pipe will be 100mm in diameter. Once the infield drains are installed, the subgrade will need to be re-established draining appropriately toward the drain lines. The sub grade can then be leveled/evened using the spoil from the trench excavation.

The infield mix can then be reinstalled after it has been augmented with more clay. To do the augmentation, the existing material can be either spread out, add the clay, and rototill in 50mm to 75mm of clay. We recommend the use of Marco Clay for skinned infields to do this. Another technique would be to run the existing infield mix through a soil processor, adding the clay as the mix is processed and then reinstalling the mix to the skinned infield area. The surface should then be

laser graded and rolled to provide an ideal surface for play. An alternative to this approach would be to sod the infields and just have skinned base lines.

The perimeter French drain pipe will be 150mm Big O surrounded by drain rock. In this instance, the entire trench will have a geotextile surround to prevent the trench from silting up and to allow the installation of appropriate surface finishing to the drained areas, be they gravel or sod. The remaining perimeter work will involve cutting the swales deeper so that percolate can move freely and appropriately to the discharge/day light point indicated on the drawings.

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APPENDIX A

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MTL

MARITIME TESTING (1985) LTD.
CONSULTING ENGINEERING AND ENVIRONMENTAL SERVICES

Client	**Turf Masters**
Project	**18900**
Station	
Depth	
Sample No.	**Infield 1**
Date Received	**17-Nov-14**
Soil Description	

Moisture = 12.7%

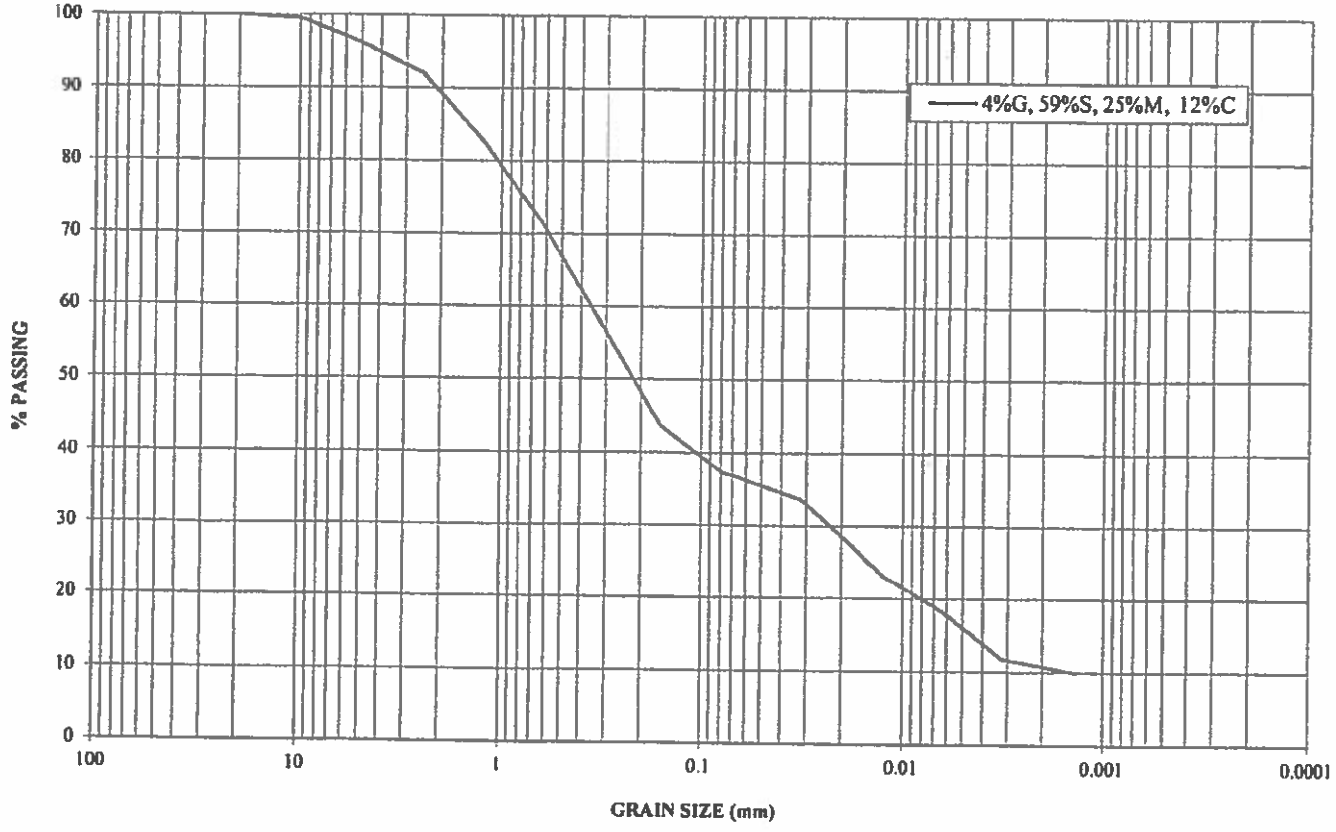
Metric Sieve Analysis

Sieve Size ASTM	Metric (mm)	% Passing
4"	112	100
3"	80	100
2"	56	100
1 1/2"	40	100
1"	28	100
3/4"	20	100
1/2"	14	100
3/8"	10	100
No. 4	5	96
No. 8	2.5	92
No. 16	1.25	83
No. 30	0.63	72
No. 50	0.315	57
No. 100	0.16	44
No. 200	0.08	37.4
Hydrometer Analysis	0.0321	33.7
	0.0209	29.0
	0.0124	23.0
	0.0089	20.6
	0.0064	18.3
	0.0032	11.8
	0.0013	9.9

LVM Maritime Testing

Client:	Turf Masters	Project:	18900
Sample:	Infield 1	Date Sample Rec'd.:	17-Nov-14
Sample Taken By:	Client	Report Date:	21-Nov-14

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND			SILT	CLAY

MTL

MARITIME TESTING (1985) LTD.
CONSULTING ENGINEERING AND ENVIRONMENTAL SERVICES

Client	**Turf Masters**
Project	**18900**
Station	
Depth	
Sample No.	**Infield 2**
Date Received	**17-Nov-14**
Soil Description	

Moisture = 14.1%

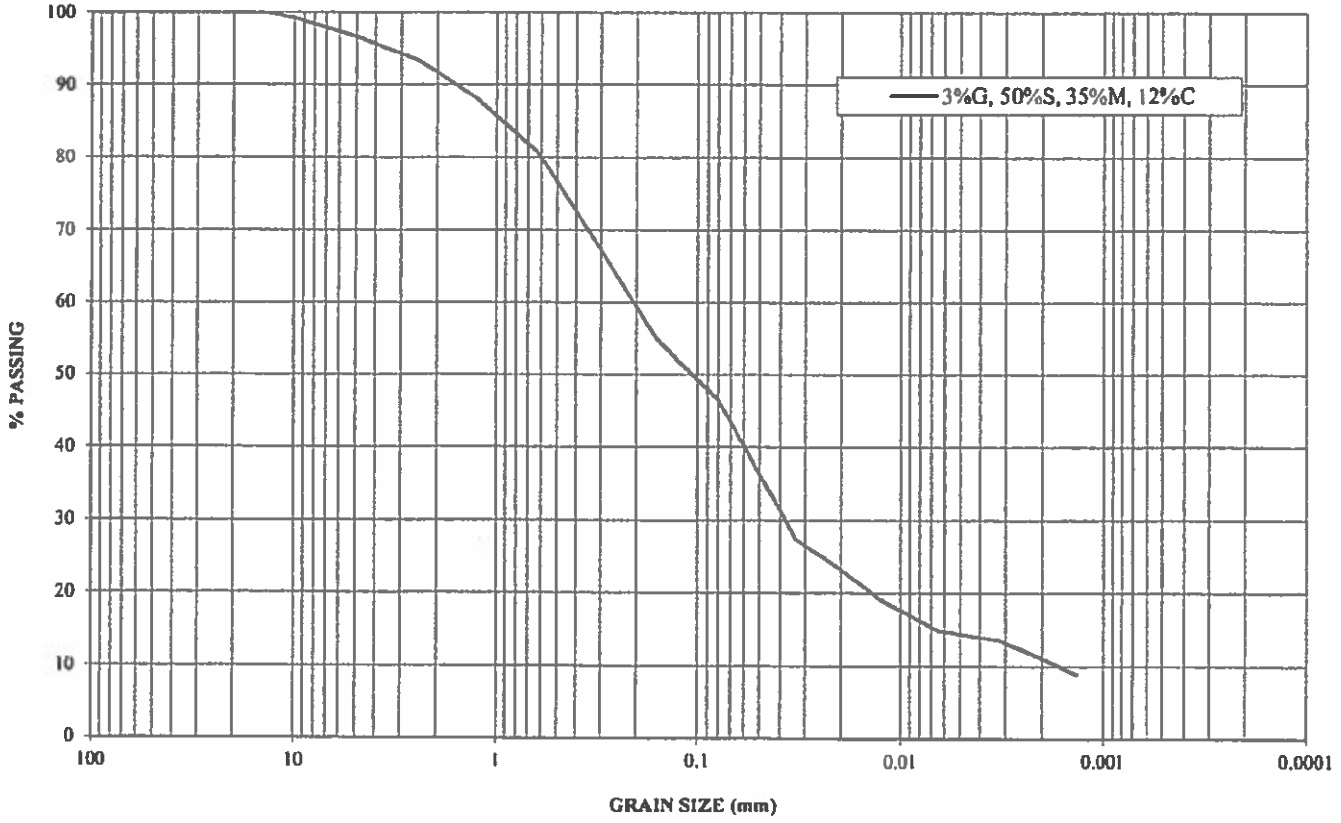
Metric Sieve Analysis

Sieve Size ASTM	Metric (mm)	% Passing
4"	112	100
3"	80	100
2"	56	100
1 1/2"	40	100
1"	28	100
3/4"	20	100
1/2"	14	100
3/8"	10	99
No. 4	5	97
No. 8	2.5	93
No. 16	1.25	88
No. 30	0.63	81
No. 50	0.315	68
No. 100	0.16	55
No. 200	0.08	46.5
Hydrometer Analysis	0.0334	27.4
	0.0215	23.8
	0.0127	19.1
	0.0091	17.1
	0.0065	14.9
	0.0032	13.6
	0.0014	8.9

LVM Maritime Testing

Client:	Turf Masters	Project:	18900
Sample:	Infield 2	Date Sample Rec'd.:	17-Nov-14
Sample Taken By:	Client	Report Date:	21-Nov-14

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND			SILT	CLAY

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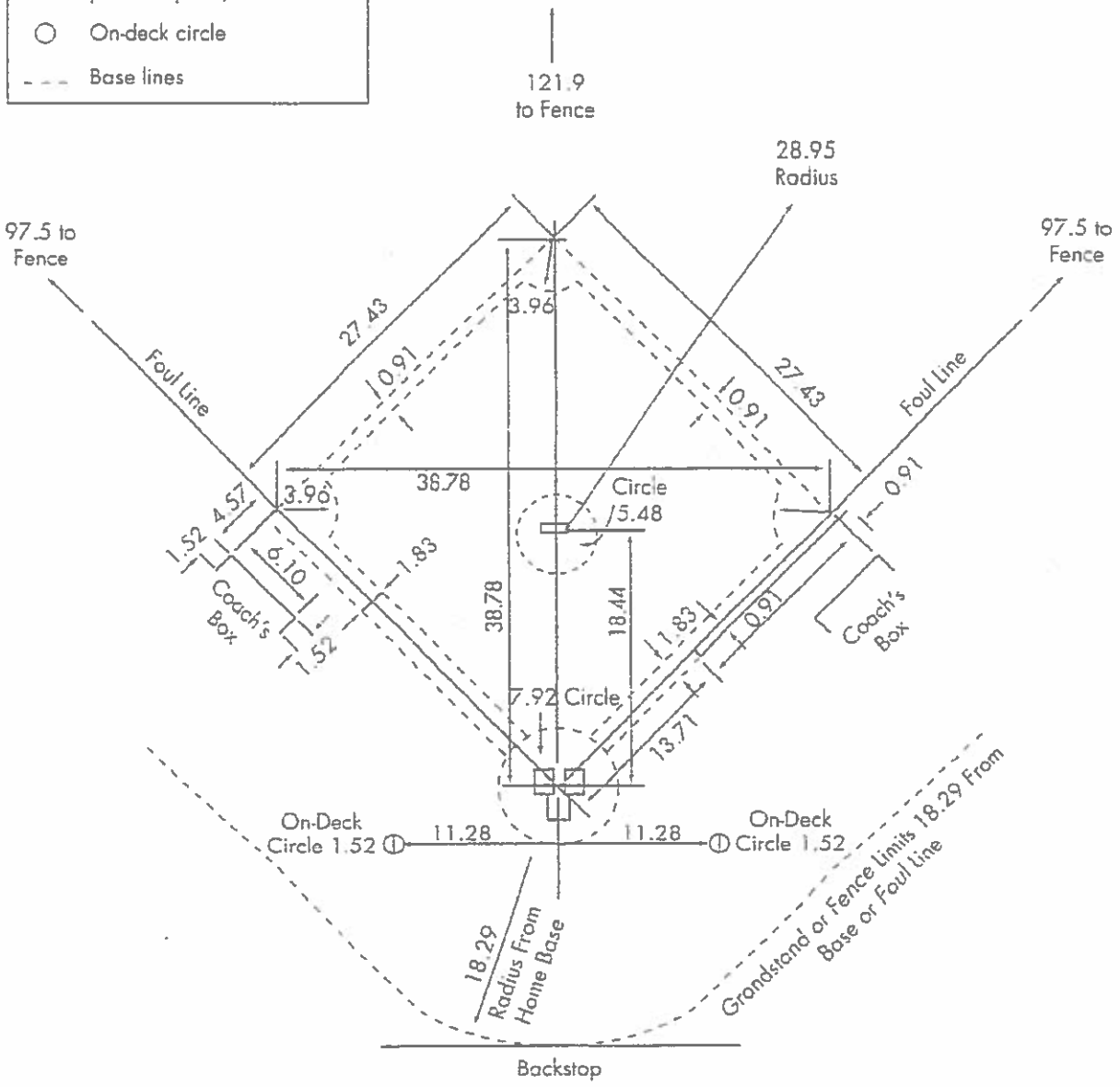
10.2 Baseball

All dimensions are in metres. Diagrams not to scale.

Legend

- Base lines, batter's box, catcher's box, foul line, pitcher's plate, coach's box
- On-deck circle
- Base lines

Warning Track
Where the outfield or side boundaries are enclosed by a fence or other permanent structure, a warning track (minimum 3.66, maximum 4.57) shall be installed.



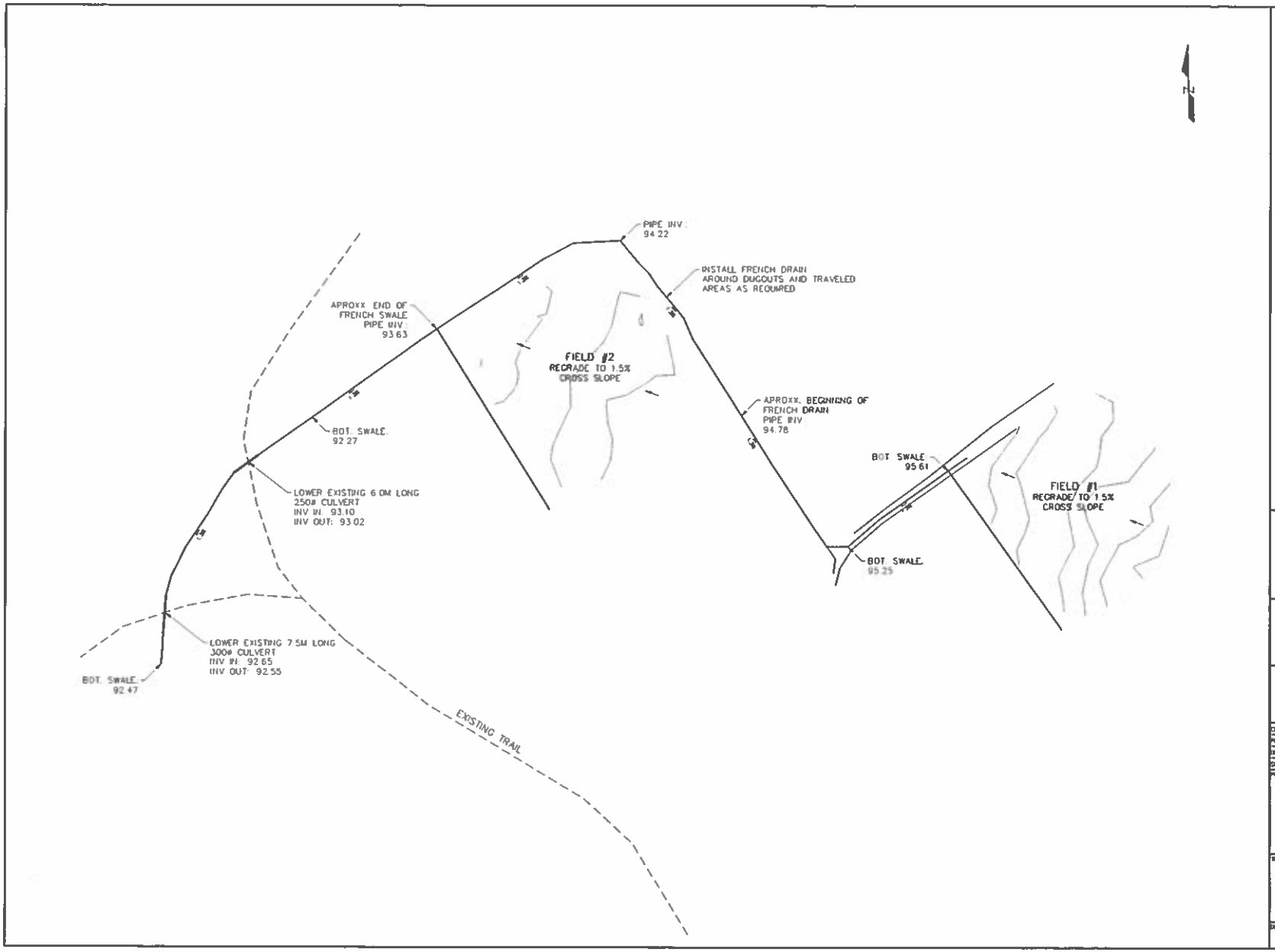
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NOTES

1. ALL MEASUREMENTS RECORDED WITH TRIMBLE S6 TOTAL STATION
2. ALL MEASUREMENTS ARE IN METERS OR DECIMALS THEREOF
3. ALL COORDINATES ARE REFERENCED TO AN ASSUMED LOCAL COORDINATE SYSTEM, WITH A DATUM ELEVATION OF 100.00m

TURF MASTERS

AZIMUTH CONSULTING LTD.

CLIENT NO.:		Drawn BY: RH	DATE: 12/08/14
PROJECT NO.:	14-041	DSNS BY:	DATE:
DRAWING SIZE:	11x17	CHKD BY:	DATE:
SCALE:	1:750	APPD BY:	DATE:

PROJECT:

SPRINGHILL
BALL FIELD DRAINAGE

TITLE:

DRAINAGE
DESIGN

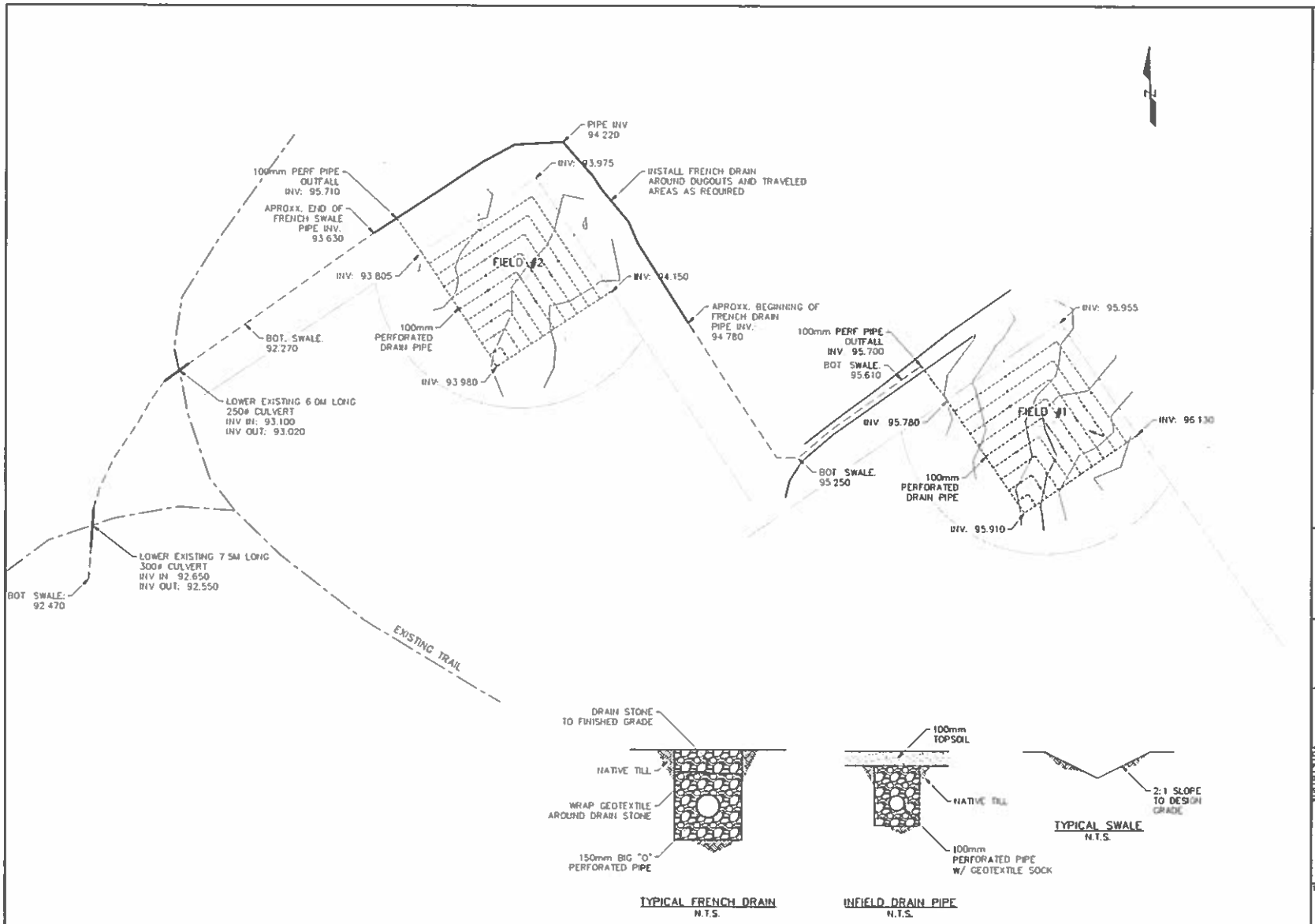
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NOTES

1. ALL MEASUREMENTS RECORDED WITH TRIMBLE S8 TOTAL STATION
2. ALL MEASUREMENTS ARE IN METERS OR DECIMALS THEREOF
3. ALL COORDINATES ARE REFERENCED TO AN ASSUMED LOCAL COORDINATE SYSTEM, WITH A DATUM ELEVATION OF 100.00m

TURF MASTERS

AZIMUTH CONSULTING LTD.

CLIENT NO.:		DRWN BY: RH	DATE: 12/08/14
PROJECT NO.:	14-041	DSN'D BY:	DATE:
DRAWING SIZE:	11x17	CHK'D BY:	DATE:
SCALE:	1:750	APP'D BY:	DATE:

PROJECT:

SPRINGHILL
BALL FIELD DRAINAGE

TITLE:

DRAINAGE
DESIGN

DWG NO.: 14-041-001 REV: 0