

City of Lynchburg
Procurement Division
900 Church Street
Lynchburg, Virginia 24504
Telephone No.: (434) 455-3970
Fax No.: (434) 845-0711

**Addendum No. 1- Invitation for Bid #2017-026
Laurel Regional Program Facility and
Sheffield Elementary School BMP Retrofit Projects**

Date: 10/25/2016

From: Melissa Tillman, Buyer

RE: Addendum No. 1

This Addendum supplements and amends the original Invitation for Bid and shall be taken into account in preparing bids and shall become a part of the Contract Documents. The Bidder shall indicate receipt of this Addendum on the Proposal Form.

1. Is there an overall budget for this project?
Below is the link to the SLAF grant awarded to the City. This award amount constitutes 50% of the total estimated cost. Total project is listed below link.
http://www.deq.virginia.gov/Portals/0/DEQ/Water/ConstructionAssistanceProgram/FY15_SLAF_Memo.pdf

Laurel	\$115,700
Sheffield	\$100,300
2. What is the timeframe for both projects to be done? Is it 90 days total or 90 days for each site? Do you have a start date or job order preference?
Start date will not be before January 1, 2017 and there is no order preference. Both projects would be done in 90 days total.
3. Where is the disposal area? Does the city have a dump site for the spoils that the vendor can use?
Disposal of material shall occur at a permitted dump site, whether the land fill or other permitted off-site area to be determined by the contractor. The City is not providing an off-site dump location.

LAUREL:

4. Since this project is located on a school site, how do we coordinate for access? Does the construction interfere with bus loops or parking lots? Are there time restrictions due to in-session school hours? What are the school operating hours?
Construction will not interfere with the bus loop but may impact parking lot. The first entrance off Monticello into the parking lot must remain open at all times. Faculty/staff

hours are from 6am-4:30pm and students are in sessions between 9am – 3pm. Restrictions for deliveries to the site may be between 8-9:30am and from 3-4:30pm.

5. Are there any overhead utilities at Laurel where the new drop inlet is going in? Are there any underground utilities involved with this site?
The contractor is responsible for following state law requirements (va811) for locating public or private underground utilities. The only overhead utilities are overhead on the streets and not through the construction area, reference page C-4.
6. Are there any environmental restrictions at the Laurel site? **NO**
7. For traffic control and construction entrances, can this be clarified better?
It will be the contractor's responsibility to create a construction entrance and handle any traffic control issues
8. In regards to the safety fence at Laurel, how do you want us to secure the construction site?
The contractor is responsible for constructing a safety fence along the top of the crestline near the soccer field. The existing chain link fence could be used to secure the site with safety fencing used at north side of site. The replacement fencing along the perimeter will be replaced and handled by another contractor.
9. There are 3 trees in the construction area of Laurel, are we to remove them all?
Only the 2 large trees need to be removed. The double tree on the side hill shall remain. Reference page C-4.
10. There is a stake marked in the Laurel sediment for-bay area, what does this represent?
This marks the end of the pipe that needs carefully excavated around to allow drainage from the street
11. Comments from the Project Engineer at the Laurel location:
The inlet needs to go in first near Rockbridge Avenue, please review the height measurements on C-5. In regards to the bio-mix, arrange to have this delivered in advance and allow 1-2 days for the mixture to settle, generally you need 10% more than your cubic volume to account for settling. Also, the vendor will need to provide documentation to QA for the batch receipt of this mixture to ensure compliance.

SHEFFIELD:

12. Since this project is located on a school site, how do we coordinate for access? Does the construction interfere with bus loops or parking lots? Are there time restrictions due to in-session school hours?
Construction will not interfere with the bus loop but may impact the side parking lot. There is congested traffic and parking between 8-9:30am and from 3-4:30pm. It is advisable to restrict deliveries to between the hours of 9:30-3pm. Regular work may still occur during those restricted times. With notice, large equipment may be delivered on the weekend. SOL testing schedules may require a quiet work site and may restrict loud noisy operations. The schedule will be provided during the pre-con meeting with the contractor.

13. Can vendors get information about any soil tests done?
See the attachment below regarding the Soil Boring and In-Situ Ksat Infiltration Testing done by Hurt & Proffitt, Inc.

14. In regards to planting, what timeline is expected since winter is not the best season to plant?
Project completion should correspond to the spring planting season and shall follow the plans on page L-5 .

15. Is the community aware of this project?
Yes, a community meeting was held and affected neighbors are aware of the project. Be aware of the construction noise ordinance that does not allow work past 9:00 p.m.

16. There is a large tree in the drainage area, does this need removed?
Yes, the large tree does need removed and can be recycled. This area will be used as an outdoor classroom & it would be great to cut some outdoor seating and mulch the rest of the tree to use around the area.

17. Is the shrubbery across from the basketball courts need to be removed, please clarify city property lines.
The shrubbery is not anticipated to be removed. Trimming may occur of the shrubbery along the property line.

Company Name: _____ Address: _____ Date: _____

Authorized Signature: _____ Title: _____

Print Name: _____ Telephone No.: _____ Fax No.: _____



August 20, 2015

Ms. Whitney Blankenship, EIT
Stormwater Engineer
City of Lynchburg
Department of Water Resources
525 Taylor Street
Lynchburg, VA 24501



Re: Laurel and Sheffield Elementary Sites
Soil Borings and In-Situ Ksat Infiltration Testing
Project No. 20150914

Dear Ms. Blankenship:

Hurt & Proffitt, Inc. (H&P) completed the requested subsurface investigation on the above referenced project sites. The investigation was initiated to evaluate the in-situ soil conditions and to determine estimated infiltration rates for the design of future stormwater management facilities at the Laurel and Sheffield sites.

Scope of Field Work:

Laurel Site:

1. Three (3) standard penetration borings (B-1, B-2, and B-3) were completed to depths ranging from 10 feet to 14 feet. Actual sampling extended to depths ranging from 11.5 feet to 15.5 feet.
2. Four (4) hand auger borings with Ksat infiltration tests (Ksat #1, Ksat #2, Ksat #3, and Ksat #4) were performed at depths ranging from 5.5 feet to 7 feet.

Sheffield Site:

1. Two (2) standard penetration borings (B-4 and B-5) were completed to depths ranging from 10 feet to 12 feet. Actual sampling extended to depths ranging from 11.5 feet to 13.5 feet.
2. Three (3) hand auger borings with Ksat infiltration tests (Ksat #5, Ksat #6, and Ksat #7) were performed at depths ranging from 5 feet to 6.5 feet.

Summary of Subsurface Conditions and Ksat Results:

Laurel Site:

The upper subsurface profile below the surficial organic bearing topsoil zone as described by the Unified Soils Classification System, consist of fill and residual type soil conditions. The following is a general visual description of the subsurface materials that were encountered during the investigation. A detailed description of the soil conditions is provided in the Test Boring Logs located in Appendix B of this report.

Probable fill type soils were encountered in each of the borings to a depth of 2 feet. The fill material is a fine grain Elastic SILT (ML) having a stiff consistency with SPT "N" values ranging from 10 to 12.

The on-site fill material is underlain by residual soils that have formed in place due to the decomposition of the parent rock underlying the site. The residual soil profile generally consists of Elastic SILT (MH) in the upper 2 feet to 8 feet that transitions to Sandy SILT (ML). The fine grain silts have a variable consistency of soft to stiff with SPT "N" values ranging from 4 to 13.



No evidence of bedrock conditions was identified in the upper 14 feet during the investigation. Ground water was not observed above the boring cave-in depths.

The results of the Ksat infiltration tests at the Laurel site are as follows:

Ksat #1 – 7.7E-05 cm/s or 0.11 in/hr (Depth 6'-6")
Ksat #2 – 6.4E-05 cm/s or 0.09 in/hr (Depth 6'-0")
Ksat #3 – 2.6E-04 cm/s or 0.36 in/hr (Depth 7'-0")
Ksat #4 – 1.3E-05 cm/s or 0.02 in/hr (Depth 5'-6")

Sheffield Site:

The upper subsurface profile below the surficial organic bearing topsoil zone as described by the Unified Soils Classification System, consist of fill and residual type soil conditions. The following is a general visual description of the subsurface materials that were encountered during the investigation. A detailed description of the soil conditions is provided in the Test Boring Logs located in Appendix B of this report.

Residual soil conditions were encountered in the area of boring B-4. The residual soil profile at B-4 consists of Elastic SILT (MH) in the upper 4 feet that transitions to Silty SAND (SM). The fine grain silt at B-4 has a stiff consistency with SPT "N" values ranging from 14 to 15. The coarse grain sand varies from medium dense to very dense with SPT "N" values ranging from of 14 to 61.

Probable fill type soils were encountered in boring B-5 to a depth of 2 feet. The fill material is a fine grain Elastic SILT (ML) having a soft consistency with an SPT "N" value of 4. The fill material at the B-5 location is underlain by residual soils. The residual soil profile at B-5 consists of Elastic SILT (MH) that transitions to Sandy SILT (ML) at a depth of 6 feet and then to Silty SAND (SM) at a depth of 10 feet. The fine grain silt at B-5 has a stiff consistency with SPT "N" values ranging from 7 to 12. The density conditions of the coarse grain sand at a depth of 10 feet is described as loose with an SPT "N" value of 8.

No evidence of bedrock conditions was identified in the upper 12 feet during the investigation. Ground water was not observed above the boring cave-in depths.

The results of the Ksat infiltration tests at the Sheffield site are as follows:

Ksat #5 – 6.4E-05 cm/s or 0.09 in/hr (Depth 5'-0")
Ksat #6 – 3.0E-05 cm/s or 0.42 in/hr (Depth 6'-6")
Ksat #7 – 2.1E-06 cm/s or 0.003 in/hr (Depth 5'-0")

H&P appreciates the opportunity to complete this study for you. Should you have any questions in reference to this work or the site, please do not hesitate to contact us.

Sincerely,
Hurt & Proffitt, Inc.

J. Kenneth Meritt, P.G., P.E.
Director, Geotechnical and Materials Testing

attachments



Appendix A
Boring Location Plan

The City of Lynchburg, VA

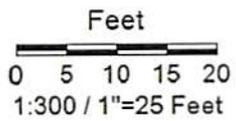
Legend

- Addresses
- Street Labels
- Legal Lot Lines
- ☐ Vacated Right of Way
- ▭ Parcels
- ▭ Owner Unknown
- ▭ Survey Gap
- 10ft Contours
- 2ft Contours

Laurel Site Boring Location Plan



8/19/2015



DISCLAIMER: This drawing is neither a legally recorded map nor a survey and is not intended to be used as such. The information displayed is a compilation of records, information, and data obtained from various sources, and the City of Lynchburg is not responsible for its accuracy or how current it may be.



The City of Lynchburg, VA

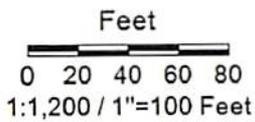
Legend

- Street Labels
- 10ft Contours
- 2ft Contours

Sheffield Site Boring Location Plan



8/19/2015



DISCLAIMER: This drawing is neither a legally recorded map nor a survey and is not intended to be used as such. The information displayed is a compilation of records, information, and data obtained from various sources, and the City of Lynchburg is not responsible for its accuracy or how current it may be.





Appendix B
Test Boring Logs

LOG OF BORING B-1



Hurt & Proffitt, Inc.
 2524 Langhorne Road
 Lynchburg, VA 24501
 Telephone: (434) 847-7796
 Fax: (434) 847-0047
 http://www.HandP.com

CLIENT: City of Lynchburg
PROJECT: Stormwater Management Facilities
LOCATION: Laurel School and Sheffield Elementary
 Lynchburg, Virginia
PROJECT NO. 20150914

		FIELD DATA			LAB DATA				DRILLING DETAILS:
ELEVATION (feet)	SOIL SYMBOL	DEPTH (feet)	SAMPLES BLOW COUNT	PERCENT RECOVERY / R.Q.D. N-value	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS NO. 200 SIEVE (%)
						LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	
									Drilled by N. Hurdis using CME-45C and Continuous Flight Hollow Stem Augers. Boring completed 8/11/2015. SURFACE ELEVATION: 725.0 BORING DEPTH (ft): 11.50 PROPOSED SUBGRADE ELEVATION: GROUNDWATER DEPTH AT COMPLETION (ft): GROUNDWATER DEPTH AFTER 24 HRS (ft):
									DESCRIPTION OF STRATUM
									3 inches of Topsoil
		1	4	10					PROBABLE FILL: Stiff, Reddish Brown Sandy ELASTIC SILT (MH), moist
		2	3						RESIDUUM: Medium Stiff, Reddish Brown Sandy SILT (ML), micaceous, moist
		3	3	8					decreasing plasticity
720		4	3						Orangish Yellow Brown, contains manganese staining
		5	4	8					Soft
		6	2						
		7	3	7					
		8	4						
		9	3	7					
715		10	2						
		11	2	4					
			2						Boring Terminated at 11.5 feet.

N - Standard Penetration Test Resistance (ASTM D 1586)
 R.Q.D. - Rock Quality Designation

NOTES:
 Elevations based on approximate Lynchburg City GIS
 Cave-in at 8.6 feet

LOG OF BORING B-2



Hurt & Proffitt, Inc.
 2524 Langhorne Road
 Lynchburg, VA 24501
 Telephone: (434) 847-7796
 Fax: (434) 847-0047
 http://www.HandP.com

CLIENT: City of Lynchburg
PROJECT: Stormwater Management Facilities
LOCATION: Laurel School and Sheffield Elementary
 Lynchburg, Virginia

PROJECT NO. 20150914

		FIELD DATA			LAB DATA			DRILLING DETAILS:	
ELEVATION (feet)	SOIL SYMBOL	DEPTH (feet)	SAMPLES BLOW COUNT	PERCENT RECOVERY / R.Q.D. N-value	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS NO. 200 SIEVE (%)
						LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	
Drilled by N. Hurdis using CME-45C and Continuous Flight Hollow Stem Augers. Boring completed 8/11/2015.									
		SURFACE ELEVATION:		729.0					
		BORING DEPTH (ft):		15.50					
		PROPOSED SUBGRADE ELEVATION:							
		GROUNDWATER DEPTH AT COMPLETION (ft):							
		GROUNDWATER DEPTH AFTER 24 HRS (ft):							
DESCRIPTION OF STRATUM									
3 inches of Topsoil									
PROBABLE FILL: Stiff, Reddish Brown ELASTIC SILT (MH), moist									
RESIDUUM: Stiff, Reddish Brown ELASTIC SILT (MH), moist									
Sandy									
trace Sand									
Medium Stiff, Reddish Brown Sandy SILT (ML), moist									
Yellowish Orangish Brown, contains manganese staining, micaceous									
Boring Terminated at 15.5 feet.									

LOB 20150914.GPJ 8/19/15

N - Standard Penetration Test Resistance (ASTM D 1586)
 R.Q.D. - Rock Quality Designation

NOTES:
 Cave-in at 11.5 feet

LOG OF BORING B-3



Hurt & Proffitt, Inc.
 2524 Langhome Road
 Lynchburg, VA 24501
 Telephone: (434) 847-7796
 Fax: (434) 847-0047
 http://www.HandP.com

CLIENT: City of Lynchburg
PROJECT: Stormwater Management Facilities
LOCATION: Laurel School and Sheffield Elementary
 Lynchburg, Virginia
PROJECT NO. 20150914

		FIELD DATA			LAB DATA			DRILLING DETAILS:	
ELEVATION (feet)	SOIL SYMBOL	DEPTH (feet)	SAMPLES BLOW COUNT	PERCENT RECOVERY / R.Q.D. N-value	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS NO. 200 SIEVE (%)
						LL	PL	PI	
									Drilled by N. Hurdis using CME-45C and Continuous Flight Hollow Stem Augers. Boring completed 8/11/2015. SURFACE ELEVATION: 729.0 BORING DEPTH (ft): 13.50 PROPOSED SUBGRADE ELEVATION: GROUNDWATER DEPTH AT COMPLETION (ft): GROUNDWATER DEPTH AFTER 24 HRS (ft):
									DESCRIPTION OF STRATUM
			2						2 inches of Topsoil
		1	4 8	12					PROBABLE FILL: Stiff, Reddish Brown ELASTIC SILT (MH), moist
		2	4						RESIDUUM: Stiff, Reddish Brown ELASTIC SILT (MH), moist
		3	6 7	13					
725		4	3						
		5	5 6	11					
		6	3						Stiff, Yellowish Brown Sandy SILT (ML), contains manganese staining
		7	4 7	11					
		8	1						Medium Stiff, Reddish Brown Sandy ELASTIC SILT (MH), moist
720		9	2 3	5					
		10	2						Medium Stiff, Reddish Brown Sandy SILT (ML), micaceous, contains manganese staining, moist
		11	2 3	5					
		12	1						
		13	2 4	6					
									Boring Terminated at 13.5 feet.

N - Standard Penetration Test Resistance (ASTM D 1586)
 R.Q.D. - Rock Quality Designation

NOTES:
 Cave-in at 9.8 feet

LOG OF BORING B-4



Hurt & Proffitt, Inc.
 2524 Langhorne Road
 Lynchburg, VA 24501
 Telephone: (434) 847-7796
 Fax: (434) 847-0047
 http://www.HandP.com

CLIENT: City of Lynchburg
PROJECT: Stormwater Management Facilities
LOCATION: Laurel School and Sheffield Elementary
 Lynchburg, Virginia
PROJECT NO. 20150914

		FIELD DATA			LAB DATA				DRILLING DETAILS:
ELEVATION (feet)	SOIL SYMBOL	DEPTH (feet)	SAMPLES BLOW COUNT	PERCENT RECOVERY / R.Q.D. N-value	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS NO. 200 SIEVE (%)
						LL	PL	PI	
DRILLED by N. Hurdis using CME-45C and Continuous Flight Hollow Stem Augers. Boring completed 8/11/2015. SURFACE ELEVATION: 790.0 BORING DEPTH (ft): 13.50 PROPOSED SUBGRADE ELEVATION: GROUNDWATER DEPTH AT COMPLETION (ft): GROUNDWATER DEPTH AFTER 24 HRS (ft):									
DESCRIPTION OF STRATUM									
									2 inches of Topsoil
		1	6	14					RESIDUUM: Stiff, Reddish Brown Sandy ELASTIC SILT (MH), moist
		2	3						contains mica
		3	6	15					
		4	3						Medium Dense, Olive Grayish Brown Silty SAND (SM), micaceous, moist
785		5	7	14					
		6	5						Dense
		7	9	20					
		8	9						
		9	15	31					
780		10	14						Very Dense
		11	28	61					
		12	12						Dense, contains manganese staining
		13	11	30					
			19						Boring Terminated at 13.5 feet.

LOB 20150914.GPJ B2015

N - Standard Penetration Test Resistance (ASTM D 1586)
 R.Q.D. - Rock Quality Designation

NOTES:
 Cave-in at 10.3 feet

LOG OF BORING B-5



Hurt & Proffitt, Inc.
 2524 Langhome Road
 Lynchburg, VA 24501
 Telephone: (434) 847-7796
 Fax: (434) 847-0047
 http://www.HandP.com

CLIENT: City of Lynchburg
PROJECT: Stormwater Management Facilities
LOCATION: Laurel School and Sheffield Elementary
 Lynchburg, Virginia

PROJECT NO. 20150914

ELEVATION (feet)	SOIL SYMBOL	FIELD DATA			LAB DATA				MINUS NO. 200 SIEVE (%)	DRILLING DETAILS:
		DEPTH (feet)	SAMPLES	PERCENT RECOVERY / R.Q.D. N-value	MOISTURE CONTENT (%)	ATTERBERG LIMITS				DESCRIPTION OF STRATUM
						LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI		
									Drilled by N. Hurdis using CME-45C and Continuous Flight Hollow Stem Augers. Boring completed 8/11/2015. SURFACE ELEVATION: 787.0 BORING DEPTH (ft): 11.50 PROPOSED SUBGRADE ELEVATION: GROUNDWATER DEPTH AT COMPLETION (ft): GROUNDWATER DEPTH AFTER 24 HRS (ft):	
									2 inches of Topsoil PROBABLE FILL: Very Soft, Reddish Brown ELASTIC SILT (MH), moist	
785		1	4	4					RESIDUUM: Medium Stiff, Reddish Brown ELASTIC SILT (MH), moist	
		2	2						Stiff, contains mica	
		3	3	8						
		4	5							
		5	4							
		7	5	12						
		6	3						Stiff, Reddish Brown Sandy SILT (ML), moist	
780		7	4	9					Medium Stiff, Grayish Brown, micaceous, decreasing plasticity	
		8	5							
		9	2							
		10	3	7					Loose, Yellowish Brown Silty SAND (SM), micaceous, moist	
		11	4						Boring Terminated at 11.5 feet.	
			4	8						
			4							

N - Standard Penetration Test Resistance (ASTM D 1586)
 R.Q.D. - Rock Quality Designation

NOTES:
 Cave-in at 8.5 feet



Appendix C

Ksat Field Results

Hurt & Proffitt, Inc.		SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET					Sheet No.: 1 of 2				
Project Name.: Laurel School		Parcel.....:			Terminology and Solution (Modified Glover)						
Boring No.....: Ksat# 1		Date.....: 8/12/15			Ksat : Saturated hydraulic conductivity						
Investigators.: Sears/Jones		File Name.....:			Q: Steady-state rate of water flow into the soil						
Boring Depth.: 6 ft 6 in		WCU Base. Ht. h: 15.0 cm			H: Constant height of water in borehole						
Boring Dia.....: 9.5 cm		WCU Susp. Ht. S: cm			r: Radius of cylindrical borehole						
Boring Rad. (r): 4.75 cm		Const. Wtr. Ht. H: 15.0 cm			Ksat = $Q[\sinh^{-1}(H/r) - (r^2/H^2+1)^{-0.5} + r/H] / (2\pi H^2)$ [Glover R. E.]						
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").					3.75" Dia. (AMS 3.25" auger) adjustment factor...: 0.48						
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	----- Ksat Equivalent Values-----					
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)	
2000		3:05:00 PM									
1250	750	3:05:10 PM	0:00:10	0.17	4500.00	1.736	2.89E-02	2499.7	41.005	82.01	
1050	200	3:05:20 PM	0:00:10	0.17	1200.00	0.463	7.72E-03	666.6	10.935	21.87	
1030	20	3:05:30 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
1020	10	3:05:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
1020	0	3:05:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
1010	10	3:06:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
1000	10	3:06:10 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
990	10	3:06:20 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
990	0	3:06:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
980	10	3:06:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
980	0	3:06:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
970	10	3:07:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
970	0	3:07:10 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
960	10	3:07:20 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
960	0	3:07:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
950	10	3:07:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
950	0	3:07:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
940	10	3:08:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
810	130	3:13:00 PM	0:05:00	5.00	26.00	0.010	1.67E-04	14.4	0.237	0.47	
690	120	3:18:00 PM	0:05:00	5.00	24.00	0.009	1.54E-04	13.3	0.219	0.44	
600	90	3:23:00 PM	0:05:00	5.00	18.00	0.007	1.16E-04	10.0	0.164	0.33	
510	90	3:28:00 PM	0:05:00	5.00	18.00	0.007	1.16E-04	10.0	0.164	0.33	
430	80	3:33:00 PM	0:05:00	5.00	16.00	0.006	1.03E-04	8.9	0.146	0.29	
360	70	3:38:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
280	80	3:43:00 PM	0:05:00	5.00	16.00	0.006	1.03E-04	8.9	0.146	0.29	
2000		3:44:00 PM									
1970	30	3:48:00 PM	0:04:00	4.00	7.50	0.003	4.82E-05	4.2	0.068	0.14	
1900	70	3:53:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1840	60	3:58:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	

1770	70	4:03:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1710	60	4:08:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1640	70	4:13:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1580	60	4:18:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1520	60	4:23:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1460	60	4:28:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1400	60	4:33:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1340	60	4:38:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1270	70	4:43:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1200	70	4:48:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1130	70	4:53:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1060	70	4:58:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1000	60	5:03:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
940	60	5:08:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
880	60	5:13:00 PM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
Natural Moisture: Pry in slightly		Init. Satur.Time:		ESTIMATED FIELD Ksat.....:		0.109 in/hr					
Texture/Classif: Sandy silt		Consistency:		Water Temp. BH:		Notes:					
Structure/Fabric: Sandy silt		Water Tbl. Dpth:		Soil Temp:							
File: KsatWKS-375a.xls (Modified Glover Solution)				Johnson Permeameter™				Rev. 1/06/09			

Hurt & Proffitt, Inc.		SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET					Sheet No.: 1 of 2				
Project Name.: Laurel School		Parcel.....:			Terminology and Solution (Modified Glover)						
Boring No.....: Ksat# 2		Date.....: 8/11/15			Ksat : Saturated hydraulic conductivity						
Investigators.: Sears/Jones		File Name.....:			Q: Steady-state rate of water flow into the soil						
Boring Depth.: 6' ft		WCU Base. Ht. h: 15.0 cm			H: Constant height of water in borehole						
Boring Dia.....: 9.5 cm		WCU Susp. Ht. S: 0.0 cm			r: Radius of cylindrical borehole						
Boring Rad. (r): 4.75 cm		Const. Wtr. Ht. H: 15.0 cm			Ksat = $Q[\sinh-1(H/r) - (r^2/H^2+1)^{-0.5} + r/H] / (2\pi H^2)$ [Glover R. E.]						
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").					3.75" Dia. (AMS 3.25" auger) adjustment factor....: 0.48						
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	----- Ksat Equivalent Values -----					
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)	
2000		1:20:00 PM									
1250	750	1:20:10 PM	0:00:10	0.17	4500.00	1.736	2.89E-02	2499.7	41.005	82.01	
1000	250	1:20:20 PM	0:00:10	0.17	1500.00	0.579	9.64E-03	833.2	13.668	27.34	
980	20	1:20:30 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
970	10	1:20:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
960	10	1:20:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
950	10	1:21:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
950	0	1:21:10 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
940	10	1:21:20 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
930	10	1:21:30 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
930	0	1:21:40 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
920	10	1:21:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
910	10	1:22:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
910	0	1:22:10 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
900	10	1:22:20 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
900	0	1:22:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
890	10	1:22:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
880	10	1:22:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
880	0	1:23:00 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
870	10	1:23:10 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
870	0	1:23:20 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
860	10	1:23:30 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
860	0	1:23:40 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
860	0	1:23:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
850	10	1:24:00 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
750	100	1:28:00 PM	0:04:00	4.00	25.00	0.010	1.61E-04	13.9	0.228	0.46	

660	90	1:33:00 PM	0:05:00	5.00	18.00	0.007	1.16E-04	10.0	0.164	0.33	
590	70	1:38:00 PM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
470	120	1:48:00 PM	0:10:00	10.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
450	20	1:58:00 PM	0:10:00	10.00	2.00	0.001	1.29E-05	1.1	0.018	0.04	
220	230	2:08:00 PM	0:10:00	10.00	23.00	0.009	1.48E-04	12.8	0.210	0.42	
2000		2:09:00 PM									
1910	90	2:18:00 PM	0:09:00	9.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1810	100	2:28:00 PM	0:10:00	10.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1710	100	2:38:00 PM	0:10:00	10.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
Natural Moisture: Pry in slightly		Init. Satur. Time:		ESTIMATED FIELD Ksat.....:			0.091 in/hr				
Texture/Classif: Sandy silt		Consistency:		Water Temp. BH:			Notes: Terminated test due to storm.				
Structure/Fabric: Sandy silt		Water Tbl. Dpth:		Soil Temp:							
File: KsatWKS-375a.xls (Modified Glover Solution)				Johnson Permeameter				Rev. 1/06/09			

Hurt & Proffitt, Inc.		SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET				Sheet No.: 1 of 2					
Project Name.: Laurel School		Parcel.....:		Terminology and Solution (Modified Glover)							
Boring No.....: Ksat# 3		Date.....: 8/12/15		Ksat : Saturated hydraulic conductivity							
Investigators.: Sears/Jones		File Name.....:		Q: Steady-state rate of water flow into the soil							
Boring Depth.: 7 ft		WCU Base. Ht. h: 15.0 cm		H: Constant height of water in borehole							
Boring Dia.....: 9.5 cm		WCU Susp. Ht. S: cm		r: Radius of cylindrical borehole							
Boring Rad. (r): 4.75 cm		Const. Wtr. Ht. H: 15.0 cm		Ksat = $Q[\sinh^{-1}(H/r) - (r^2/H^2+1)^{-0.5} + r/H] / (2\pi H^2)$ [Glover R. E.]							
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").				3.75" Dia. (AMS 3.25" auger) adjustment factor....:		0.48					
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	----- Ksat Equivalent Values-----					
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)	
2000		9:00:00 AM									
1300	700	9:00:10 AM	0:00:10	0.17	4200.00	1.620	2.70E-02	2333.0	38.271	76.54	
980	320	9:00:20 AM	0:00:10	0.17	1920.00	0.741	1.23E-02	1066.5	17.496	34.99	
900	80	9:00:30 AM	0:00:10	0.17	480.00	0.185	3.09E-03	266.6	4.374	8.75	
850	50	9:00:40 AM	0:00:10	0.17	300.00	0.116	1.93E-03	166.6	2.734	5.47	
820	30	9:00:50 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
770	50	9:01:00 AM	0:00:10	0.17	300.00	0.116	1.93E-03	166.6	2.734	5.47	
740	30	9:01:10 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
710	30	9:01:20 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
680	30	9:01:30 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
650	30	9:01:40 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
620	30	9:01:50 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
590	30	9:02:00 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
560	30	9:02:10 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
530	30	9:02:20 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
510	20	9:02:30 AM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
480	30	9:02:40 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
460	20	9:02:50 AM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
430	30	9:03:00 AM	0:00:10	0.17	180.00	0.069	1.16E-03	100.0	1.640	3.28	
2000		9:05:00 AM									
1640	360	9:08:00 AM	0:03:00	3.00	120.00	0.046	7.72E-04	66.7	1.093	2.19	
1150	490	9:13:00 AM	0:05:00	5.00	98.00	0.038	6.30E-04	54.4	0.893	1.79	
730	420	9:18:00 AM	0:05:00	5.00	84.00	0.032	5.40E-04	46.7	0.765	1.53	
340	390	9:23:00 AM	0:05:00	5.00	78.00	0.030	5.01E-04	43.3	0.711	1.42	
2000		9:25:00 AM									
1810	190	9:28:00 AM	0:03:00	3.00	63.33	0.024	4.07E-04	35.2	0.577	1.15	
1480	330	9:33:00 AM	0:05:00	5.00	66.00	0.025	4.24E-04	36.7	0.601	1.20	
1180	300	9:38:00 AM	0:05:00	5.00	60.00	0.023	3.86E-04	33.3	0.547	1.09	
880	300	9:43:00 AM	0:05:00	5.00	60.00	0.023	3.86E-04	33.3	0.547	1.09	
590	290	9:48:00 AM	0:05:00	5.00	58.00	0.022	3.73E-04	32.2	0.529	1.06	
320	270	9:53:00 AM	0:05:00	5.00	54.00	0.021	3.47E-04	30.0	0.492	0.98	
2000		9:55:00 AM									
1830	170	9:58:00 AM	0:03:00	3.00	56.67	0.022	3.64E-04	31.5	0.516	1.03	
1580	250	10:03:00 AM	0:05:00	5.00	50.00	0.019	3.21E-04	27.8	0.456	0.91	
1340	240	10:08:00 AM	0:05:00	5.00	48.00	0.019	3.09E-04	26.7	0.437	0.87	
1080	260	10:13:00 AM	0:05:00	5.00	52.00	0.020	3.34E-04	28.9	0.474	0.95	

840	240	10:18:00 AM	0:05:00	5.00	48.00	0.019	3.09E-04	26.7	0.437	0.87	
600	240	10:23:00 AM	0:05:00	5.00	48.00	0.019	3.09E-04	26.7	0.437	0.87	
350	250	10:28:00 AM	0:05:00	5.00	50.00	0.019	3.21E-04	27.8	0.456	0.91	
2000		10:30:00 AM									
1880	120	10:33:00 AM	0:03:00	3.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
1640	240	10:38:00 AM	0:05:00	5.00	48.00	0.019	3.09E-04	26.7	0.437	0.87	
1410	230	10:43:00 AM	0:05:00	5.00	46.00	0.018	2.96E-04	25.6	0.419	0.84	
1200	210	10:48:00 AM	0:05:00	5.00	42.00	0.016	2.70E-04	23.3	0.383	0.77	
980	220	10:53:00 AM	0:05:00	5.00	44.00	0.017	2.83E-04	24.4	0.401	0.80	
760	220	10:58:00 AM	0:05:00	5.00	44.00	0.017	2.83E-04	24.4	0.401	0.80	
520	240	11:03:00 AM	0:05:00	5.00	48.00	0.019	3.09E-04	26.7	0.437	0.87	
300	220	11:08:00 AM	0:05:00	5.00	44.00	0.017	2.83E-04	24.4	0.401	0.80	
2000		11:09:00 AM									
1860	140	11:13:00 AM	0:04:00	4.00	35.00	0.014	2.25E-04	19.4	0.319	0.64	
1630	230	11:18:00 AM	0:05:00	5.00	46.00	0.018	2.96E-04	25.6	0.419	0.84	
1430	200	11:23:00 AM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
1230	200	11:28:00 AM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
1020	210	11:33:00 AM	0:05:00	5.00	42.00	0.016	2.70E-04	23.3	0.383	0.77	
820	200	11:38:00 AM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
620	200	11:43:00 AM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
420	200	11:48:00 AM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
Natural Moisture: Pry in slightly			Init. Satur. Time:	ESTIMATED FIELD Ksat.....:			0.364 in/hr				
Texture/Classif: Sandy silt/clay		Consistency:		Water Temp. BH:		Notes:					
Structure/Fabric: Sandy silt/clay		Water Tbl. Dpth:		Soil Temp:							
File: KsatWKS-375a.xls (Modified Glover Solution)				Johnson Permeameter™				Rev. 1/06/09			

Hurt & Proffitt, Inc.		SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET				Sheet No.: 1 of 1						
Project Name.: Laurel School		Parcel.....:		Terminology and Solution (Modified Glover)								
Boring No.....: Ksat# 4		Date.....: 8/12/15		Ksat : Saturated hydraulic conductivity								
Investigators.: Sears/Jones		File Name.....:		Q: Steady-state rate of water flow into the soil								
Boring Depth.: 5 ft 6 in		WCU Base. Ht. h: 15.0 cm		H: Constant height of water in borehole								
Boring Dia.....: 9.5 cm		WCU Susp. Ht. S:		r: Radius of cylindrical borehole								
Boring Rad. (r): 4.75 cm		Const. Wtr. Ht. H: 15.0 cm		Ksat = Q[sinh-1(H/r) - (r ² /H ² +1) ^{-0.5} + r/H] / (2piH ²) [Glover R. E.]								
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").				3.75" Dia. (AMS 3.25" auger) adjustment factor....:		0.48						
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	Ksat Equivalent Values-----						
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)		
2000		1:00:00 PM										
1320	680	1:00:10 PM	0:00:10	0.17	4080.00	1.574	2.62E-02	2266.4	37.178	74.36		
990	330	1:00:20 PM	0:00:10	0.17	1980.00	0.764	1.27E-02	1099.9	18.042	36.08		
980	10	1:00:30 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09		
980	0	1:00:40 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
970	10	1:00:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09		
970	0	1:01:00 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
970	0	1:01:10 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
970	0	1:01:20 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
970	0	1:01:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
970	0	1:01:40 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
960	10	1:01:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09		
960	0	1:02:00 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
960	0	1:02:10 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
960	0	1:02:20 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
960	0	1:02:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
950	10	1:02:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09		
950	0	1:02:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
950	0	1:03:00 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00		
910	40	1:08:00 PM	0:05:00	5.00	8.00	0.003	5.14E-05	4.4	0.073	0.15		
880	30	1:13:00 PM	0:05:00	5.00	6.00	0.002	3.86E-05	3.3	0.055	0.11		
840	40	1:18:00 PM	0:05:00	5.00	8.00	0.003	5.14E-05	4.4	0.073	0.15		
820	20	1:23:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
800	20	1:28:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
770	30	1:33:00 PM	0:05:00	5.00	6.00	0.002	3.86E-05	3.3	0.055	0.11		
750	20	1:38:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
730	20	1:43:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
720	10	1:48:00 PM	0:05:00	5.00	2.00	0.001	1.29E-05	1.1	0.018	0.04		
700	20	1:53:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
680	20	1:58:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
660	20	2:03:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
640	20	2:08:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
620	20	2:13:00 PM	0:05:00	5.00	4.00	0.002	2.57E-05	2.2	0.036	0.07		
610	10	2:18:00 PM	0:05:00	5.00	2.00	0.001	1.29E-05	1.1	0.018	0.04		
600	10	2:23:00 PM	0:05:00	5.00	2.00	0.001	1.29E-05	1.1	0.018	0.04		
590	10	2:28:00 PM	0:05:00	5.00	2.00	0.001	1.29E-05	1.1	0.018	0.04		
Natural Moisture: Pry in slightly		Init. Satur.Time:		ESTIMATED FIELD Ksat.....:		0.018 in/hr						
Texture/Classif: Sandy silt		Consistency:		Water Temp. BH:		Notes:						
Structure/Fabric: Sandy silt		Water Tbl. Dpth:		Soil Temp:								
File: KsatWKS-375a.xls (Modified Glover Solution)				Johnson Permeameter™				Rev. 1/06/09				

1940	60	9:54:00 AM	0:04:00	4.00	15.00	0.006	9.64E-05	8.3	0.137	0.27	
1890	50	9:59:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1830	60	10:04:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1770	60	10:09:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1720	50	10:14:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1650	70	10:19:00 AM	0:05:00	5.00	14.00	0.005	9.00E-05	7.8	0.128	0.26	
1600	50	10:24:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1550	50	10:29:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1490	60	10:34:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1430	60	10:39:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1370	60	10:44:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1310	60	10:49:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1260	50	10:54:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
1200	60	10:59:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1140	60	11:04:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1080	60	11:09:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
1020	60	11:14:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
960	60	11:19:00 AM	0:05:00	5.00	12.00	0.005	7.72E-05	6.7	0.109	0.22	
910	50	11:24:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
860	50	11:29:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
810	50	11:34:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
760	50	11:39:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
710	50	11:44:00 AM	0:05:00	5.00	10.00	0.004	6.43E-05	5.6	0.091	0.18	
Natural Moisture:		Moist/ply in	Init. Satur.Time:	ESTIMATED FIELD Ksat.....:			0.091 in/hr				
Texture/Classif:		Mica sandy silt	Consistency:	Water Temp. BH:		Notes:					
Structure/Fabric:		Mica sandy silt	Water Tbl. Dpth:	Soil Temp:							
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Hurt & Proffitt, Inc.		SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET				Sheet No.: 1 of 2					
Project Name.: Sheffield School		Parcel.....:		Terminology and Solution (Modified Glover)							
Boring No.....: Ksat# 6		Date.....: 8/13/15		Ksat : Saturated hydraulic conductivity							
Investigators.: Sears/Jones		File Name.....:		Q: Steady-state rate of water flow into the soil							
Boring Depth.: 6 ft 6 in		WCU Base. Ht. h: 15.0 cm		H: Constant height of water in borehole							
Boring Dia.....: 9.5 cm		WCU Susp. Ht. S: cm		r: Radius of cylindrical borehole							
Boring Rad. (r): 4.75 cm		Const. Wtr. Ht. H: 15.0 cm		Ksat = $Q[\sinh^{-1}(H/r) - (r^2/H^2 + 1)^{-0.5} + r/H] / (2\pi H^2)$ [Glover R. E.]							
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").				3.75" Dia. (AMS 3.25" auger) adjustment factor....:		0.48					
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	----- Ksat Equivalent Values-----					
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)	
2000		1:10:00 PM									
1300	700	1:10:10 PM	0:00:10	0.17	4200.00	1.620	2.70E-02	2333.0	38.271	76.54	
900	400	1:10:20 PM	0:00:10	0.17	2400.00	0.926	1.54E-02	1333.2	21.869	43.74	
900	0	1:10:30 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
900	0	1:10:40 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
900	0	1:10:50 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
670	230	1:11:00 PM	0:00:10	0.17	1380.00	0.532	8.87E-03	766.6	12.575	25.15	
660	10	1:11:10 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
660	0	1:11:20 PM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
650	10	1:11:30 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
580	70	1:11:40 PM	0:00:10	0.17	420.00	0.162	2.70E-03	233.3	3.827	7.65	
510	70	1:11:50 PM	0:00:10	0.17	420.00	0.162	2.70E-03	233.3	3.827	7.65	
490	20	1:12:00 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
470	20	1:12:10 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
460	10	1:12:20 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
440	20	1:12:30 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
430	10	1:12:40 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
420	10	1:12:50 PM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
400	20	1:13:00 PM	0:00:10	0.17	120.00	0.046	7.72E-04	66.7	1.093	2.19	
2000		1:14:00 PM									
1680	320	1:18:00 PM	0:04:00	4.00	80.00	0.031	5.14E-04	44.4	0.729	1.46	
1260	420	1:23:00 PM	0:05:00	5.00	84.00	0.032	5.40E-04	46.7	0.765	1.53	
690	570	1:28:00 PM	0:05:00	5.00	114.00	0.044	7.33E-04	63.3	1.039	2.08	
250	440	1:33:00 PM	0:05:00	5.00	88.00	0.034	5.66E-04	48.9	0.802	1.60	
2000		1:34:00 PM									
1640	360	1:38:00 PM	0:04:00	4.00	90.00	0.035	5.79E-04	50.0	0.820	1.64	
1270	370	1:43:00 PM	0:05:00	5.00	74.00	0.029	4.76E-04	41.1	0.674	1.35	
920	350	1:48:00 PM	0:05:00	5.00	70.00	0.027	4.50E-04	38.9	0.638	1.28	
590	330	1:53:00 PM	0:05:00	5.00	66.00	0.025	4.24E-04	36.7	0.601	1.20	
290	300	1:58:00 PM	0:05:00	5.00	60.00	0.023	3.86E-04	33.3	0.547	1.09	
2000		1:59:00 PM									
1570	430	2:03:00 PM	0:04:00	4.00	107.50	0.041	6.91E-04	59.7	0.980	1.96	
1390	180	2:08:00 PM	0:05:00	5.00	36.00	0.014	2.31E-04	20.0	0.328	0.66	
930	460	2:13:00 PM	0:05:00	5.00	92.00	0.035	5.91E-04	51.1	0.838	1.68	
640	290	2:18:00 PM	0:05:00	5.00	58.00	0.022	3.73E-04	32.2	0.529	1.06	
440	200	2:23:00 PM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	

2000		2:25:00 PM									
1720	280	2:28:00 PM	0:03:00	3.00	93.33	0.036	6.00E-04	51.8	0.850	1.70	
1460	260	2:33:00 PM	0:05:00	5.00	52.00	0.020	3.34E-04	28.9	0.474	0.95	
1250	210	2:38:00 PM	0:05:00	5.00	42.00	0.016	2.70E-04	23.3	0.383	0.77	
1050	200	2:43:00 PM	0:05:00	5.00	40.00	0.015	2.57E-04	22.2	0.364	0.73	
560	490	2:48:00 PM	0:05:00	5.00	98.00	0.038	6.30E-04	54.4	0.893	1.79	
300	260	2:53:00 PM	0:05:00	5.00	52.00	0.020	3.34E-04	28.9	0.474	0.95	
2000		2:54:00 PM									
1900	100	2:58:00 PM	0:04:00	4.00	25.00	0.010	1.61E-04	13.9	0.228	0.46	
1410	490	3:03:00 PM	0:05:00	5.00	98.00	0.038	6.30E-04	54.4	0.893	1.79	
1300	110	3:08:00 PM	0:05:00	5.00	22.00	0.008	1.41E-04	12.2	0.200	0.40	
700	600	3:18:00 PM	0:10:00	10.00	60.00	0.023	3.86E-04	33.3	0.547	1.09	
170	530	3:28:00 PM	0:10:00	10.00	53.00	0.020	3.41E-04	29.4	0.483	0.97	
2000		3:28:15 PM									
1530	470	3:38:00 PM	0:09:45	9.75	48.21	0.019	3.10E-04	26.8	0.439	0.88	
1040	490	3:48:00 PM	0:10:00	10.00	49.00	0.019	3.15E-04	27.2	0.447	0.89	
590	450	3:58:00 PM	0:10:00	10.00	45.00	0.017	2.89E-04	25.0	0.410	0.82	
2000		4:07:00 PM									
1510	460	4:18:00 PM	0:10:00	10.00	46.00	0.018	2.96E-04	25.6	0.419	0.84	
1040	470	4:28:00 PM	0:10:00	10.00	47.00	0.018	3.02E-04	26.1	0.428	0.86	
Natural Moisture:		Pry in slightly	Init. Satur. Time:	ESTIMATED FIELD Ksat.....:			0.419 in/hr avg.				
Texture/Classif:		Mica silty sand	Consistency:	Water Temp. BH:		Notes:					
Structure/Fabric:		Mica silty sand	Water Tbl. Dpth:	Soil Temp:							
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Hurt & Proffitt, Inc.			SATURATED HYDRAULIC CONDUCTIVITY WORKSHEET				Sheet No.: 1 of 1				
Project Name.: Sheffield School			Parcel.....:		Terminology and Solution (Modified Glover)						
Boring No.....: Ksat# 7			Date.....: 8/14/15		Ksat : Saturated hydraulic conductivity						
Investigators.: Sears/Jones			File Name.....:		Q: Steady-state rate of water flow into the soil						
Boring Depth.: 5 ft			WCU Base. Ht. h: 15.0 cm		H: Constant height of water in borehole						
Boring Dia.....: 9.5 cm			WCU Susp. Ht. S: cm		r: Radius of cylindrical borehole						
Boring Rad. (r): 4.75 cm			Const. Wtr. Ht. H: 15.0 cm		Ksat = $Q[\sinh^{-1}(H/r) - (r^2/H^2 + 1)^{-0.5} + r/H] / (2\pi H^2)$ [Glover R. E.]						
Worksheet is optimized for borehole diameters of 9 - 11 cm (3.5 - 4.3") and CH depths of 15 - 35 cm (6 - 14").						3.75" Dia. (AMS 3.25" auger) adjustment factor....: 0.48					
VOLUME (ml)	Volume Out (ml) [a]	TIME (hr:min:sec a/p)	Elapsed Time		Flow Rate Q (ml/min) [a/b]	----- Ksat Equivalent Values-----					
			(hr:min:sec)	(min) [b]		(cm/min)	(cm/sec)	(cm/day)	(in/hr)	(ft/day)	
2000		8:30:00 AM									
1250	750	8:30:10 AM	0:00:10	0.17	4500.00	1.736	2.89E-02	2499.7	41.005	82.01	
1000	250	8:30:20 AM	0:00:10	0.17	1500.00	0.579	9.64E-03	833.2	13.668	27.34	
990	10	8:30:30 AM	0:00:10	0.17	60.00	0.023	3.86E-04	33.3	0.547	1.09	
990	0	8:30:40 AM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:30:50 AM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:31:00 AM	0:00:10	0.17	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:36:00 AM	0:05:00	5.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:41:00 AM	0:05:00	5.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:46:00 AM	0:05:00	5.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	8:51:00 AM	0:05:00	5.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	9:01:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	9:11:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	9:21:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	9:31:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
990	0	9:41:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
2000		9:43:00 AM									
2000	0	9:51:00 AM	0:08:00	8.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
2000	0	10:01:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
1990	10	10:11:00 AM	0:10:00	10.00	1.00	0.000	6.43E-06	0.6	0.009	0.02	
1990	0	10:21:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
1990	0	10:31:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
1980	10	10:41:00 AM	0:10:00	10.00	1.00	0.000	6.43E-06	0.6	0.009	0.02	
1980	0	10:51:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
1980	0	11:01:00 AM	0:10:00	10.00	0.00	0.000	0.00E+00	0.0	0.000	0.00	
Natural Moisture: Moist/pry in			Init. Satur.Time:		ESTIMATED FIELD Ksat.....:		0.003 in/hr avg.				
Texture/Classif: Weathered Rock			Consistency:		Water Temp. BH:		Notes:				
Structure/Fabric: Weathered Rock			Water Tbl. Dpth:		Soil Temp:						
File: KsatWKS-375a.xls (Modified Glover Solution)					Johnson Permeameter™			Rev. 1/06/09			