15-1GT Geotechnical Database – Phase 3
RFP Questions and Answers

1. For the subgrade soil survey data, can you provide more details on what this means "An interface, developed by the DOTD Pavement Management Systems (PMS) Section, for the districts to upload boring and core data (thickness, locations, etc.) is ready to deploy." ?

Answer

A software application for the District Lab Engineers to input the boring log information in to the Pavement Management Database is complete. It was written in C#. The installation instructions and presentation are complete, and a meeting with the District Lab Engineers can be set for Training of how to install and input data to foster implementation. During the training, the internal codes for surface, base, subbase, and colors will be reviewed with District Lab Engineers and minor changes will be updated by the Pavement Management Engineer if necessary. After the training takes place, all District Lab Engineers will enter the borings in to the application. Below is a summary of the type of information entered in to the form.

- Location information: control section log mile, project station number, GPS Latitude, GPS Longitude and Distance from Centerline on the left or right.
- Date information: cored data, entered date for boring, and approved date along with who cored, entered, or approved the boring log.
- Layer Information: surface type, base type, subbase type, thickness of each layer, % of thickness bad, Liquid Limit, Plastic Index, Natural Moisture Content, % Original NMC, pH Value, Sample ID, Color of material , whether it's wet or dry material, MR Value and whether the bore is on the pavement or shoulder.
- Project Information: Engineer Title, Project Description, Project Specific Notes, and the Travel Direction (Northbound, Southbound, Eastbound, or Westbound)

Screen shots from the interface are attached as Figure 1 thru Figure 4. Abbreviation codes are shown in Figure 5 thru Figure 7Figure 4 .

2. How does DOTD intend for this interface to be integrated with the current geotechnical database?

Answer:

The soil subgrade survey (SSV) data from the districts will be for new alignments and rehabilitation projects. The samples are collected with auger borings and can often contain manmade materials (previous treated layers, embankments, etc.). Any data pulled into gINT should be tagged to reflect this, in comparison to deep boring data. Links to the data (including GIS) will enhance the Geotechnical Database. The interface will allow districts (and their collection procedures) to have a separate interface without the need for the complex training and license requirements of gINT. Other solutions are also welcome.

3. Does the PMS contain boring, GPR and pavement coring data (this may be answered in question 1)?

Answer:

GPR and calibration borings for the GPR are contained within.
The PMS Coreform is nearing implementation, but does not contain district SSV data at this time.

4. DCP – I seem to recall software that LTRC was working on - - that was used for processing the DCP data. Are we supposed to be integrating with that or are we replacing that and have district personnel use gINT for that?

Answer:

DOTD software for analysis of DCP data exists and can be downloaded at the following address. http://www.ltrc.lsu.edu/downloads.html. We hope to have DCP raw data stored by project. The DOTD analysis software can be integrated. Access to historical DCP data via GIS is desired.

   a. Are the districts using that currently?

   Collection of DCP data is required during subsurface soil investigations, however use of the software is not a mainstream process since there is no centralized place to store the data.

b. If we are integrating with it, does it have the capability of exporting data? If not, would we be provided source code for it so we can create the export?

The DCP Test Method, TR 645 is attached. The DCP Analysis software and input template are available for download via the LTRC website (the address link is in the TR). The TR process states that the data should be placed in an excel file upon completion of the field data. The program and results are Excel based.

c. Can you please send me a copy of a DCP log that is currently generated?

The DCP Test Method, TR 645 is attached. The DCP Analysis software and input template are available for download via the LTRC website (the address link is in the TR). A screen shot of the input table is included as Figure 8. The output is shown as Figure 9. Another method is also employed to search for specific layer behavior. An example is included as Figure 10.

5. Can you please send me a copy of a subgrade soil survey log?

Answer:

The current required soil survey log is attached as Figure 11. An example of a desired output, which includes soil classifications, is included as Figure 12.

6. Are the subgrade soil survey logs transcribed into any system to make them digital? If not, how are they archived today – in paper files?

Answer:

The SSV logs are in paper files and formats, which can vary across districts. The standardization and digitization of these records for the future is desired.

a. If it is digitized, is it plotted as a log, as a cross section with multiple logs, as a table?

They are not currently digitized. The interface (question 1) may meet this need to an extent.

7. There was no mention of integration with Site Manager for the lab tests. This had been discussed quite a bit previously. Is Site Manager being used for inputting those test results currently or would this system be used for inputting it and no consideration for Site Manager is necessary?

Answer:

Site Manager /Materials Manager (SMM) will be tasked to create codes for the districts to identify soil subgrade testing and borrow pit samples. We expect to use SMM as our classification calculator for district SSV soils reporting. See question 2 regarding how this data should be incorporated.

8. Does DOTD envision that subgrade soil survey data should be collected digitally?

Answer:

The data should be stored digitally. Some district laboratories utilize laptops in the field to collect data. Others enter data in the office. Digital field collection is not a mandate at this time, but is under consideration.

9. For the web-based sharing of geotechnical data, does this need to be password protected or open to anyone?

Answer:

The intention is to allow standard format (.PDF or similar type) boring logs to be open to the public after they agree to a Departmental disclaimer.

10. Do consultants do subgrade soil survey logs as well or is this only internal for the districts?

Answer:

At this time, only districts conduct and perform SSV. The information and results are used in construction plans.

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11. How many districts are there?

Answer:

There are nine districts in the state (02, 03, 04, 05, 61, 62, 07, 05, and 58).

12. Do we need to include licenses of software that we cannot sell (e.g. gINT) but DOTD may need to purchase in the budget for this project or is that something DOTD would do on its own through its Bentley contract?

Answer:

Do not budget for licenses in your proposal. An estimate of the number needed and potential cost can be included as a discussion in the proposal, but additional licenses would be requested through our IT section.

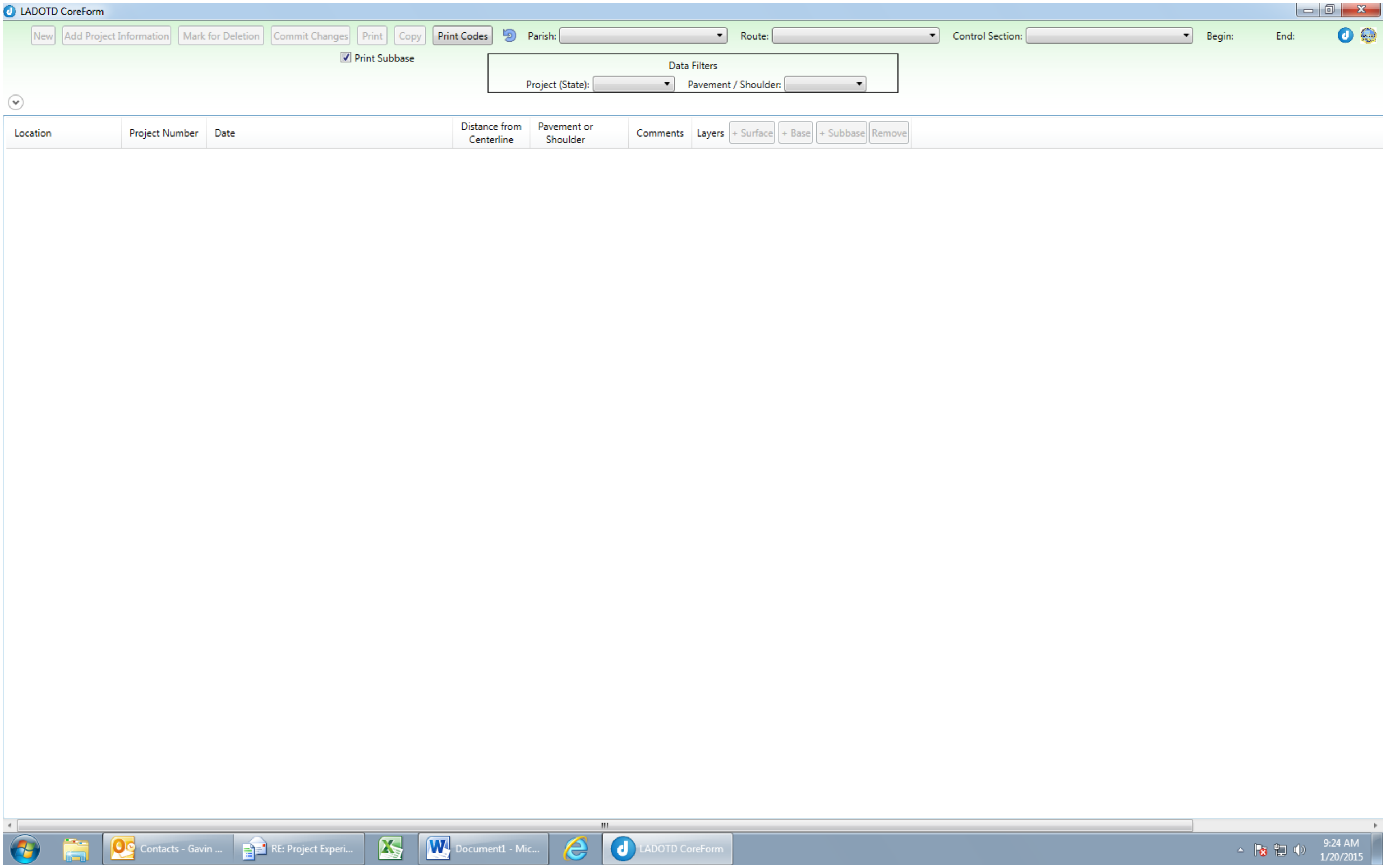


Figure 1: PMS DOTD Coreform Screen Shot – Home Page/Project Search

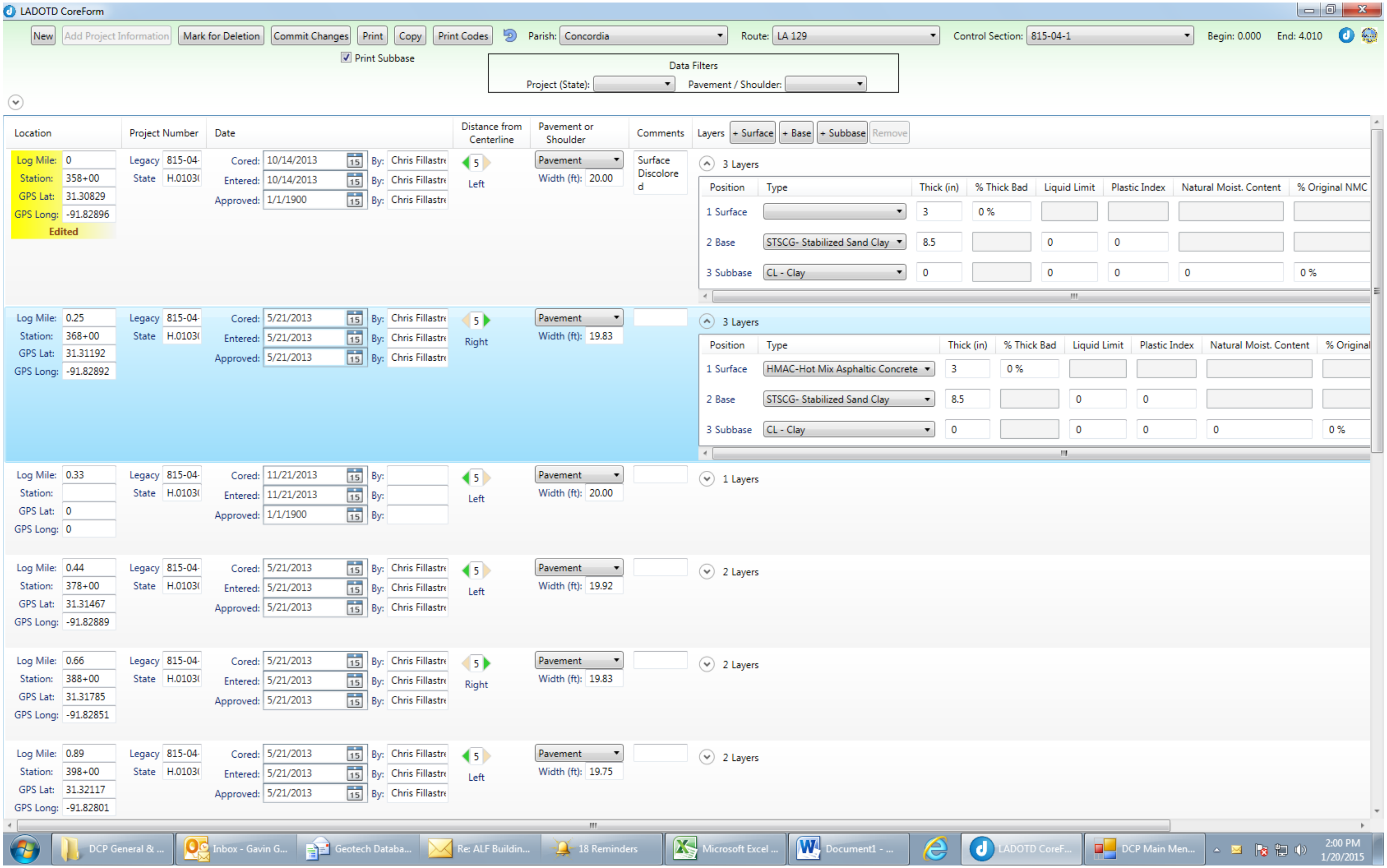


Figure 2: PMS DOTD Coreform Screen Shot – Data Entry Fields

Report date: Tuesday, January 20, 2015 2:17 PM

Control	Location From	To	Route	Legacy Project #	State Project #	Parish	Sheet #
815-04-1	0.000	4.010	LA 129	815-04-0001	H.010305.6	Concordia	1 of 2

Legacy	DC	P/S	Suface			Base				Sub Base									
State		Width	Type	Thick	% Bad	Type	Thick	LL	PI	Type	Color	Thick	LL	PI	NMC	% Orig	pH	W/D	MR
815-04-0001 H.010305.6	Left 5.00	Pavement 20.00		3.00	0.0 %	STSCG	8.50	0.00	0.00	CL	Brown/Black	0.00	0.00	0.00	0.00	0.0 %	0.00	Dry	0
	Surface Discolored																		
815-04-0001 H.010305.6	Right 5.00	Pavement 19.83	HMAC	3.00	0.0 %	STSCG	8.50	0.00	0.00	CL	Brown/Black	0.00	0.00	0.00	0.00	0.0 %	0.00	Dry	0
815-04-0001 H.010305.6	Left 5.00	Pavement 20.00		3.00	0.0 %														
815-04-0001 H.010305.6	Left 5.00	Pavement 19.92	HMAC	3.00	0.0 %	STSCG	9.50	0.00	0.00										
815-04-0001 H.010305.6	Right 5.00	Pavement 19.83	HMAC	3.00	0.0 %	STSCG	9.50	0.00	0.00										
815-04-0001 H.010305.6	Left 5.00	Pavement 19.75	HMAC	3.50	0.0 %	STSCG	9.00	0.00	0.00										
815-04-0001 H.010305.6	Right 5.00	Pavement 19.25	HMAC	2.00	0.0 %	STSCG	8.50	0.00	0.00										
815-04-0001 H.010305.6	Left 5.00	Pavement 18.50	HMAC	2.00	0.0 %	STSCG	8.50	0.00	0.00										
815-04-0001 H.010305.6	Right 5.00	Pavement 19.58	HMAC	2.00	0.0 %	STSCG	9.50	0.00	0.00										
815-04-0001 H.010305.6	Left 5.00	Pavement 19.17	HMAC	2.50	0.0 %	STSCG	10.00	0.00	0.00										
815-04-0001 H.010305.6	Left 5.00	Pavement 19.50	HMAC	2.50	0.0 %	STSCG	8.00	0.00	0.00										
815-04-0001 H.010305.6	Right 5.00	Pavement 19.83	HMAC	2.50	0.0 %	STSCG	8.50	0.00	0.00										

NMC Natural Moisture Content

LL Liquid Limit

PI Plastic Index

NP Non Plastic

DC Distance from Centerline

P/S Pavement or Shoulder

Travel Direction: Northbound

Notes: Had high longitudinal and tranverse cracking

Signature:

Engineer Title: District 58 Lab Engineer

Figure 3: PMS DOTD Coreform Screen Shot - Output Page 1

Report date: Tuesday, January 20, 2015 2:17 PM

Control	Location From	To	Route	Legacy Project #	State Project #	Parish	Sheet #
815-04-1	**0.000**	**4.010**	**LA 129**	**815-04-0001**	**H.010305.6**	**Concordia**	2 of 2

Legacy	DC	P/S	Suface			Base				Sub Base									
State		Width	Type	Thick	% Bad	Type	Thick	LL	PI	Type	Color	Thick	LL	PI	NMC	% Orig	pH	W/D	MR
815-04-0001	Left	Pavement	HMAC	3.00	0.0 %	STSCG	9.00	0.00	0.00										
H.010305.6	5.00	19.25																	
815-04-0001	Right	Pavement	HMAC	2.50	0.0 %	STSCG	9.50	0.00	0.00										
H.010305.6	5.00	19.50																	

NMC Natural Moisture Content

LL Liquid Limit

PI Plastic Index

NP Non Plastic

DC Distance from Centerline

P/S Pavement or Shoulder

Travel Direction: Northbound

Notes: Had high longitudinal and tranverse cracking

Signature:

Engineer Title: District 58 Lab Engineer

Figure 4: PMS DOTD Coreform Screen Shot - Output Page 2

Surface and Base Codes and Description

Surface & Base Type Code	Surface & Base Name
ACFC	Asphaltic Concrete Friction Course
ACGM	Asphaltic Concrete Gravel Mix
ACWFC	Asphalt Concrete with Friction Course
ASC	Aggregate Surface Course
AST	Asphaltic Surface Treatment
BRK	Brick
CRCP	Continuously Reinforced Concrete Pavement
CT	Cement Treated
CTS	Cement Treated Soil
HM	HM or AC or ACP-Asphaltic Concrete
PCC	Portland Concrete Cement
G	Crushed Gravel
HMAC	Hot Mix Asphaltic Concrete
JCP20	Jointed PCC (20' Joint Spacing)
SAHM	Sand with Asphalt
RAP	Reclaimed Asphaltic Pavement
RAP & SS	Mixture Rap and Sand Shell
ROCK	Winn Rock
RF	Reinforcing Fabric
RSS	Raw Sand Shell
SA	Sand
SC	Soil Cement
SCG	Sand Clay Gravel
SOIL	Soil
SS	Sand Shell
SSS	Stabilized Sand Shell
STSCG	Stabilized Sand Clay
STSS	Stabilized Sand Shell

Figure 5: DOTD Coreform – Surface and Base Codes and Descriptions

Subgrade Type and Description

Subgrade Type Code	Subgrade Name
SHLY	Shelly
CL	Clay
GRAV	Gravel
SA	Sand
CMT	Cement
SSLM	Shelly Sand
LT	Light
LM	Loam
PCC	Portland Cement Concrete
STY	Silty
SDYLM	Sandy Loam
MED	Medium
SDY	Sandy
SC	Soil Cement
SCG	Sand Clay Gravel
ST	Surface Treatment
SSC	Stabilized Soil Cement
SS	Sand Shell
ACGM	Asphaltic Concrete Gravel Mix
SCL	Sand Clay Loam
SGL	Sand Gravely Loam
GML	Gravely Mix Loam

Figure 6: DOTD Coreform – Surface and Base Codes and Descriptions

Soil Classification Code and Description

DOTD TR 423 Symbol	DOTD TR 423 Name
Hvy Cl	Heavy Clay
Med Sdy Cly	Medium Sandy Clay
Med Sty Cly	Medium Silty Clay
Sdy Cl	Sandy Clay
Lt Sdy Cl	Lt. Sandy Clay
Lt Sty Cl	Lt. Silty Clay
Sty Cl	Silty Clay
Sdy Cl Lm	Sandy Clay Loam
Cl Lm	Clay Loam
Sty Cl Lm	Silty Clay Loam
Sa	Sand
Sdy Lm	Sandy Loam
Lm	Loam
Sty Lm	Silty Loam
Si	Silt
Org	Organic

Figure 7: DOTD Coreform – Surface and Base Codes and Descriptions

Project Number		(Ex. 089-02-0019 or H.001923)
WBS Element		(Ex. H.980001.1)
Work Description		(Ex. 36334)
SIO number		(Ex. 30000306)
Date		(Ex. 1/21/2010)

Location Information

Location (Control Section Log Mile)		(Ex. 5.965)
Location (Station Number)		(Ex. 100+00.00)
Location (GPS Latitude (Dec. Deg.)		(Ex. 30.2111563)
Location (GPS Longitude (Dec. Deg)		(Ex. 91.1046523)
Location (Lane direction)		(Ex. North Bound)
Location (Outside / Inside Lane)		(Ex. Inside)
Location (Distance from centerline)		(Ex. 8' Rt. CL)

REQUIRED Measurements

Reading on Pavement (cm)		(Ex. 2.1)
Reading beneath Pavement (cm)		(Ex. 9.3)
Pilot hole depth (cm)		Automatically Calculated
Comments		

Number (A) Of Blows blow #	Rod (B) Reading (cm)
0	
1	
2	
3	
4	
5	

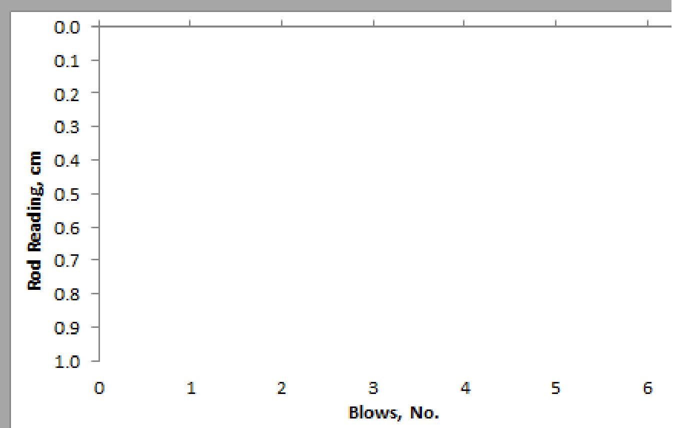


Figure 8: DCP Software Input Template – Screen Shot

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1																							
2		Location	164+25					180+44					196+26					223+93					227+17
3			RT Lane					LT Lane					RT Lane					LT Lane					RT SHDR
4			5 RTofCL					5 LtofCL					6 RTofCL					6 LTofCL					13 RTofCL
5																							
6		Readings																					
7		in	cm	DCPI	Mr		in	cm	DCPI	Mr		in	cm	DCPI	Mr		in	cm	DCPI	Mr		in	cm
8		17.3228	44	2.00			17.7165	45	1.50			26.1811	66.5	4.50			24.8031	63	3.00			21.6535	55
9		18.1102	46	0.50			18.3071	46.5	1.00			27.9528	71	3.00			25.9843	66	1.00			23.622	60
10		18.3071	46.5	0.50			18.7008	47.5	0.50			29.1339	74	3.50	3.67	3.43691	26.378	67	1.30			24.0157	61
11		18.5039	47	0.75			18.8976	48	1.50			30.5118	77.5	1.00			26.8898	68.3	1.10			24.4882	62.2
12		18.7992	47.75	0.25			19.4882	49.5	1.50			30.9055	78.5	2.00			27.3228	69.4	0.20			24.9606	63.4
13		18.8976	48	0.00			20.0787	51	2.80			31.6929	80.5	2.50			27.4016	69.6	1.40			25.4331	64.6
14		18.8976	48	0.00			21.1811	53.8	1.60			32.6772	83	3.00			27.9528	71	0.10			25.9843	66
15		18.8976	48	0.50			21.811	55.4	2.10	1.56	8.06528	33.8583	86	2.00			27.9921	71.1	1.40			26.7323	67.9
16		19.0945	48.5	0.50			22.6378	57.5	4.00			34.6457	88	2.50			28.5433	72.5	0.50			27.3622	69.5
17		19.2913	49	0.50			24.2126	61.5	2.50			35.6299	90.5	3.00			28.7402	73	1.00			27.7559	70.5
18		19.4882	49.5	0.25			25.1969	64	4.00			36.811	93.5	3.00			29.1339	74	0.50			28.3465	72
19		19.5866	49.75	0.25			26.7717	68	5.00			37.9921	96.5	2.50			29.3307	74.5	1.10	0.87	14.4398	28.7402	73
20		19.685	50	0.00			28.7402	73	3.00			38.9764	99	1.00	2.25	5.60089	29.7638	75.6	1.60			29.5276	75
21		19.685	50	1.00			29.9213	76	1.00			39.3701	100				30.3937	77.2	1.80			30.1181	76.5
22		20.0787	51	0.00			30.315	77	1.20								31.1024	79	1.50			31.063	78.9
23		20.0787	51	0.50			30.7874	78.2	3.80								31.6929	80.5	1.70			32.4803	82.5
24		20.2756	51.5	0.50			32.2835	82	4.00								32.3622	82.2	1.80	1.68	7.50119	34.252	87
25		20.4724	52	0.20			33.8583	86	4.50								33.0709	84	2.00			35.9055	91.2
26		20.5512	52.2	0.80			35.6299	90.5	3.00								33.8583	86	2.20			37.5984	95.5
27		20.8661	53	0.20			36.811	93.5	2.50								34.7244	88.2	3.00			38.6614	98.2
28		20.9449	53.2	0.80			37.7953	96	3.80								35.9055	91.2	2.40				100
29		21.2598	54	0.50			39.2913	99.8	0.20	3.04	4.15125						36.8504	93.6	4.40				
30		21.4567	54.5	0.20				100									38.5827	98	2.00	2.67	4.72575		
31		21.5354	54.7	0.30														100					
32		21.6535	55	1.00																			
33		22.0472	56	1.00																			
34		22.4409	57	0.20																			
35		22.5197	57.2	0.00																			
36		22.5197	57.2	0.60																			
37		22.7559	57.8	0.70																			
38		23.0315	58.5	0.50																			
39		23.2283	59	0.30																			
40		23.3465	59.3	0.70																			
41		23.622	60	1.00																			
42		24.0157	61	0.50																			
43		24.2126	61.5	0.50	0.46	27.5669																	
44		24.4094	62	1.40																			
45		24.9606	63.4	0.60																			
46		25.1969	64	1.20																			
47		25.6693	65.2	0.80																			
48		25.9843	66	1.30																			

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
	Location	164+25			180+44			196+26			223+93			227+17			242+48			270+08			296+25			320+13	
		RT Lane			LT Lane			RT Lane			LT Lane			RT SHDR			RT Lane			LT Lane			RT Lane			LT Lane	
		5 RTofCL			5 LtofCL			6 RTofCL			6 LTofCL			13 RTofCL			6 RTofCL			6 LTofCL			5 RTofCL			5 LTofCL	
	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr	Depth (in)		Mr
		17-24	27.56		17.5-21	8.06		26-29	3.43		24-29	14.43		21-29.5	9.16		25-35	6.30		30-35	4.44		23-25.5	12.60		22.5-34	6.69
		25-28	10.31		22-40	4.15		30-40	5.60		30-32	7.50		30-40	3.75		36-40	3.85		36-40	21.00		26-40	3.64		35-40	11.55
		29-31.5	13.44								33-40	4.72															
		31.5-40	7.75																								
	Expected values			Mr																							
	Stone Base			42.007																							
	Embankment			10.082																							

Figure 9: DCP Software Output – Screen Shot Example

Example DCP Calculations...
SEE Comments at RED Corners

Row	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	Project Name	ALF Test Lane																								
2	Project Number		00-1P																							
3	Material type:	see plan tab below																								
4	Site Info	see plan tab below																								
5	Station Number		Sta 99								Sta 106								Sta 114							
6			Field Reading	Recycled Asphalt Pavement (RAP) Material			Subgrade Material (could not penetrate soil cement, calculated depth, drilled additional depth and conducted dcp on subgrade.)				Recycled Asphalt Pavement (RAP) Material				Subgrade Material				Recycled Asphalt Pavement (RAP) Material				Subgrade Material			
7	Hole Depth		8.3	cm		calculated depth below pavement surface	28.6				10				29				6.5				31			
8	top of testing surface	Blow #	13.0	calculated dirt/blow	calculated total dirt		2.4				2.5	0.0			2.5	0.0			13	0.0			2.5	0.0		
9	Initial Reading	0	21.3	0.0	0.0	8.3	31	0.0	0.0	28.6	12			9.5	31.5			29.0	20.5			6.5	33.5			31.0
10		1	21.8	0.5	0.5	8.8	32.1	1.1	1.1	29.7	12.6	0.6	0.6	10.1	33.3	1.8	1.8	30.8	21.1	0.6	0.6	7.1	34.5	1.0	1.0	32.0
11		2	22.1	0.3	0.8	9.1	32.4	0.3	1.4	30.0	12.7	0.1	0.7	10.2	34	0.7	2.5	31.5	21.5	0.4	1.0	7.5	35.2	0.7	1.7	32.7
12		3	22.3	0.2	1.0	9.3	32.7	0.3	1.7	30.3	12.9	0.2	0.9	10.4	34.7	0.7	3.2	32.2	21.6	0.1	1.1	7.6	35.5	0.3	2.0	33.0
13		4	22.4	0.1	1.1	9.4	33.1	0.4	2.1	30.7	13.2	0.3	1.2	10.7	35.1	0.4	3.6	32.6	22	0.4	1.5	8.0	36.3	0.8	2.8	33.8
14		5	22.6	0.2	1.3	9.6	33.5	0.4	2.5	31.1	13.3	0.1	1.3	10.8	35.7	0.6	4.2	33.2	22	0.0	1.5	8.0	36.5	0.2	3.0	34.0
15		6	22.7	0.1	1.4	9.7	33.9	0.4	2.9	31.5	13.4	0.1	1.4	10.9	36	0.3	4.5	33.5	22.2	0.2	1.7	8.2	36.6	0.1	3.1	34.1
16		7	22.8	0.1	1.5	9.8	34.3	0.4	3.3	31.9	13.6	0.2	1.6	11.1	36.2	0.2	4.7	33.7	22.2	0.0	1.7	8.2	37	0.4	3.5	34.5
17		8	23.0	0.2	1.7	10.0	34.5	0.2	3.5	32.1	13.8	0.2	1.8	11.3	36.5	0.3	5.0	34.0	22.3	0.1	1.8	8.3	37.1	0.1	3.6	34.6
18		9	23.1	0.1	1.8	10.1	35	0.5	4.0	32.6	14	0.2	2.0	11.5	36.5	0.0	5.0	34.0	22.5	0.2	2.0	8.5	37.2	0.1	3.7	34.7
19		10	23.3	0.2	2.0	10.3	35.2	0.2	4.2	32.8	14.3	0.3	2.3	11.8	36.5	0.0	5.0	34.0	22.6	0.1	2.1	8.6	37.5	0.3	4.0	35.0
20		11	23.4	0.1	2.1	10.4	35.8	0.6	4.8	33.4	14.5	0.2	2.5	12.0	36.7	0.2	5.2	34.2	22.7	0.1	2.2	8.7	37.5	0.0	4.0	35.0
21		12	23.5	0.1	2.2	10.5	36.3	0.5	5.3	33.9	14.6	0.1	2.6	12.1	36.8	0.1	5.3	34.3	23	0.3	2.5	9.0	37.5	0.0	4.0	35.0
22		13	23.9	0.4	2.6	10.9	36.7	0.4	5.7	34.3	14.8	0.2	2.8	12.3	37	0.2	5.5	34.5	23.1	0.1	2.6	9.1	37.7	0.2	4.2	35.2
23		14	24.0	0.1	2.7	11.0	37.3	0.6	6.3	34.9	14.9	0.1	2.9	12.4	37.3	0.3	5.8	34.8	23.2	0.1	2.7	9.2	37.7	0.0	4.2	35.2
24		15	24.1	0.1	2.8	11.1	38	0.7	7.0	35.6	15.1	0.2	3.1	12.6	37.5	0.2	6.0	35.0	23.2	0.0	2.7	9.2	37.9	0.2	4.4	35.4
25		16	24.2	0.1	2.9	11.2	38.9	0.9	7.9	36.5	15.3	0.2	3.3	12.8	37.5	0.0	6.0	35.0	23.3	0.1	2.8	9.3	38	0.1	4.5	35.5
26		17	24.3	0.1	3.0	11.3	40	1.1	9.0	37.6	15.4	0.1	3.4	12.9	37.5	0.0	6.0	35.0	23.5	0.2	3.0	9.5	38.1	0.1	4.6	35.6
27		18	24.5	0.2	3.2	11.5	41.1	1.1	10.1	38.7	15.6	0.2	3.6	13.1	37.8	0.3	6.3	35.3	23.6	0.1	3.1	9.6	38.2	0.1	4.7	35.7
28		19	24.8	0.3	3.5	11.8	42.4	1.3	11.4	40.0	15.8	0.2	3.8	13.3	37.9	0.1	6.4	35.4	24	0.4	3.5	10.0	38.2	0.0	4.7	35.7
29		20	25.0	0.2	3.7	12.0	44	1.6	13.0	41.6	15.9	0.1	3.9	13.4	38.1	0.2	6.6	35.6	24	0.0	3.5	10.0	38.4	0.2	4.9	35.9
30		21	25.1	0.1	3.8	12.1	45.5	1.5	14.5	43.1	16.1	0.2	4.1	13.6	38.5	0.4	7.0	36.0	24.1	0.1	3.6	10.1	38.4	0.0	4.9	35.9
31		22	25.2	0.1	3.9	12.2	47.4	1.9	16.4	45.0	16.3	0.2	4.3	13.8	38.7	0.2	7.2	36.2	24.2	0.1	3.7	10.2	38.6	0.2	5.1	36.1
32		23	25.4	0.2	4.1	12.4	49.4	2.0	18.4	47.0	16.5	0.2	4.5	14.0	38.9	0.2	7.4	36.4	24.2	0.0	3.7	10.2	38.6	0.0	5.1	36.1
33		24	25.6	0.2	4.3	12.6	51.3	1.9	20.3	48.9	16.7	0.2	4.7	14.2	39.2	0.3	7.7	36.7	24.3	0.1	3.8	10.3	38.9	0.3	5.4	36.4
34		25	25.7	0.1	4.4	12.7	53	1.7	22.0	50.6	16.8	0.1	4.8	14.3	39.3	0.1	7.8	36.8	24.5	0.2	4.0	10.5	38.9	0.0	5.4	36.4
35		26	26.0	0.3	4.7	13.0	55.1	2.1	24.1	52.7	17.1	0.3	5.1	14.6	39.5	0.2	8.0	37.0	24.5	0.0	4.0	10.5	39.1	0.2	5.6	36.6
36		27	26.1	0.1	4.8	13.1	57	1.9	26.0	54.6	17.2	0.1	5.2	14.7	39.7	0.2	8.2	37.2	24.5	0.0	4.0	10.5	39.2	0.1	5.7	36.7
37		28	26.3	0.2	5.0	13.3	59.3	2.3	28.3	56.9	17.3	0.1	5.3	14.8	39.7	0.0	8.2	37.2	24.8	0.3	4.3	10.8	39.3	0.1	5.8	36.8
38		29	26.5	0.2	5.2	13.5	62	2.7	31.0	59.6	17.5	0.2	5.5	15.0	40.2	0.5	8.7	37.7	24.9	0.1	4.4	10.9	39.6	0.3	6.1	37.1
39		30	26.7	0.2	5.4	13.7	64.6	2.6	33.6	62.2	17.7	0.2	5.7	15.2	40.3	0.1	8.8	37.8	25.2	0.3	4.7	11.2	39.6	0.0	6.1	37.1
40		31	26.8	0.1	5.5	13.8	67.3	2.7	36.3	64.9	17.8	0.1	5.8	15.3	40.8	0.5	9.3	38.3	25.5	0.3	5.0	11.5	39.9	0.3	6.4	37.4
41		32	27.0	0.2	5.7	14.0	70.3	3.0	39.3	67.9	18	0.2	6.0	15.5	41	0.2	9.5	38.5	25.6	0.1	5.1	11.6	40	0.1	6.5	37.5
42		33	27.0	0.0	5.7	14.0	72.9	2.6	41.9	70.5	18.2	0.2	6.2	15.7	41.7	0.7	10.2	39.2	25.7	0.1	5.2	11.7	40.2	0.2	6.7	37.7
43		34	27.2	0.2	5.9	14.2	75.5	2.6	44.5	73.1	18.3	0.1	6.3	15.8	42	0.3	10.5	39.5	25.9	0.2	5.4	11.9	40.5	0.3	7.0	38.0
44		35	27.4	0.2	6.1	14.4	78.5	3.0	47.5	76.1	18.4	0.1	6.4	15.9	42.2	0.2	10.7	39.7	26.2	0.3	5.7	12.2	40.6	0.1	7.1	38.1
45		36	27.7	0.3	6.4	14.7	81.3	2.8	50.3	78.9	18.5	0.1	6.5	16.0	42.9	0.7	11.4	40.4	26.4	0.2	5.9	12.4	41.1	0.5	7.6	38.6
46		37	27.8	0.1	6.5	14.8	84.3	3.0	53.3	81.9	18.6	0.1	6.6	16.1	43.3	0.4	11.8	40.8	26.7	0.3	6.2	12.7	41.4	0.3	7.9	38.9
47		38	28.0	0.2	6.7	15.0	87.7	3.4	56.7	85.3	18.8	0.2	6.8	16.3	43.8	0.5	12.3	41.3	26.9	0.2	6.4	12.9	41.7	0.3	8.2	39.2
48		39	28.1	0.1	6.8	15.1	91	3.3	60.0	88.6	19	0.2	7.0	16.5	44.8	1.0	13.3	42.3	27.1	0.2	6.6	13.1	42.2	0.5	8.7	39.7
49		40	28.4	0.3	7.1	15.4					19.2	0.2	7.2	16.7	45.5	0.7	14.0	43.0	27.3	0.2	6.8	13.3	42.6	0.4	9.1	40.1
50		41	28.5	0.1	7.2	15.5					19.5	0.3	7.5	17.0	46.9	1.4	15.4	44.4	27.3	0.0	6.8	13.3	43.1	0.5	9.6	40.6
51		42	28.6	0.1	7.3	15.6					19.7	0.2	7.7	17.2	48.2	1.3	16.7	45.7	27.4	0.1	6.9	13.4	44	0.9	10.5	41.5
52		43	28.7	0.1	7.4	15.7					19.9	0.2	7.9	17.4	50	1.8	18.5	47.5	27.7	0.3	7.2	13.7	44.8	0.8	11.3	42.3
53		44	28.9	0.2	7.6	15.9					20.1	0.2	8.1	17.6	52.2	2.2	20.7	49.7	27.9	0.2	7.4	13.9	45.9	1.1	12.4	43.4
54		45	29.0	0.1	7.7	16.0					20.4	0.3	8.4	17.9	53.5	1.3	22.0	51.0	28	0.1	7.5	14.0	49.2	3.3	15.7	46.7
55		46	29.0	0.0	7.7	16.0					20.6	0.2	8.6	18.1	55	1.5	23.5	52.5	28.3	0.3	7.8	14.3	51.9	2.7	18.4	49.4
56		47	29.2	0.2	7.9	16.2					20.8	0.2	8.8	18.3	56.3	1.3	24.8	53.8	28.5	0.2	8.0	14.5	54.5	2.6	21.0	52.0
57		48	29.4	0.2	8.1	16.4					21	0.2	9.0	18.5	58.3	2.0	26.8	55.8	28.9	0.4	8.4	14.9	57.9	3.4	24.4	55.4
58		49	29.5	0.1	8.2	16.5					21.2	0.2	9.2	18.7	60.7	2.4	29.2	58.2	29	0.1	8.5	15.0	62	4.1	28.5	59.5
59		50	29.6	0.1	8.3	16.6					21.4	0.2	9.4	18.9	63.2	2.5	31.7	60.7	29.1	0.1	8.6	15.1	68.4	6.4	34.9	65.9
60		51	29.8	0.2	8.5	16.8					21.6	0.2	9.6	19.1	66.8	3.6	35.3	64.3	29.2	0.1	8.7	15.2	72.8	4.4	39.3	70.3
61		52	30.0	0.2	8.7	17.0					22.2	0.6	10.2	19.7	69.5	2.7	38.0	67.0	29.3	0.1	8.8	15.3	75.1	2.3	41.6	72.6
62		53	30.1	0.1	8.8	17.1					22.2	0.0	10.2	19.7	73.1	3.6	41.6	70.6	29.5	0.2	9.0	15.5	78.3	3.2	44.8	75.8
63		54	30.2	0.1	8.9	17.2					22.4	0.2	10.4	19.9	77.7	4.6	46.2	75.2	29.6	0.1	9.1	15.6	83.3	5.0	49.8	80.8
64		55	30.5	0.3	9.2	17.5					22.6	0.2	10.6	20.1	81.8	4.1	50.3	79.3	29.8	0.2	9.3	15.8	85.4	2.1	51.9	82.9
65		56	30.6	0.1	9.3	17.6					23	0.4	11.0	20.5	85.1	3.3	53.6	82.6	30	0.2	9.5	16.0	87.2	1.8	53.7	84.7
66		57	30.8	0.2	9.5	17.8					23.6	0.6	11.6	21.1	88.1	3.0	56.6	85.6	30.1	0.1	9.6	16.1	88.6	1.4	55.1	86.1
67		58	30.9	0.1	9.6	17.9					23.8	0.2	11.8	21.3	91.5	3.4	60.0	89.0	30.2	0.1	9.7	16.2	89.8	1.2	56.3	87.3
68		59	31.0	0.1	9.7	18.0					24	0.2	12.0	21.5	94.6	3.1	63.1	92.1	30.5	0.3	10.0	16.5	91	1.2	57.5	88.5
69		60	31.2	0.2	9.9	18.2					24.2	0.2	12.2	21.7					30.6	0.1	10.1	16.6	92.4	1.4	58.9	89.9
70		61	31.3	0.1	10.0	18.3					24.5	0.3	12.5	22.0					30.8	0.2	10.3	16.8	93	0.6	59.5	90.5
71		62	31.4	0.1	10.1	18.4					24.8	0.3	12.8	22.3					31	0.2	10.5	17.0				

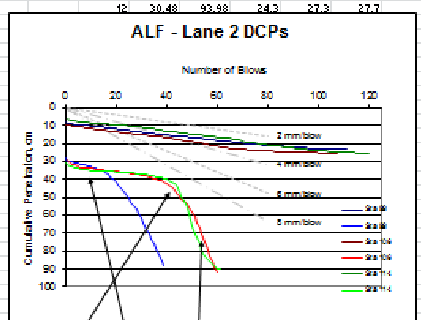
ALF - Lane 2

Average Millimeters per Blow

	in	cm	Depth	Sta 99	Sta 106	Sta 114
				Location		
Asphalt	3.5	8.89	8.89	Drilled	Drilled	Drilled
RAP	3.5	8.89	17.78	1.7	1.8	1.7
Soil Cem	6	15.24	33.02	1.0	0.9	1.5
Subgrade	12	30.48	48.26	8.0	4.3	3.5
	12	30.48	93.98	26.0	27.7	27.4

Based on Curves Below

	in	cm	Depth	Sta 99	Sta 106	Sta 114
Asphalt	3.5	8.89	8.89	Drilled	Drilled	Drilled
RAP	3.5	8.89	17.78	1.7	1.8	1.7
Soil Cem	6	15.24	33.02	1.0	0.9	1.5
Subgrade	12	30.48	48.26	6.0	4.0	2.8
	12	30.48	93.98	24.3	27.3	27.7



Change in Slope indicates Layer change

Slope indicates strength   Stronger   Weaker

Stone Base should be about 3 to 4 mm/blow

Reference Curves		
2 mm/blow	0.2	1
	16	80
4 mm/blow	0.4	1
	32	80
6 mm/blow	0.6	1
	48	80
8 mm/blow	0.8	1
	64	80

Figure 10: DCP Example – Layer Determination

Attachment 1A

ROADWAY
DESIGN INFORMATION

Project or Control Section No. LA 4: LA 578 - LA 128 Total Length 2.320 MI Route LA 4

Control Section Log Mile	Offset PE or CL	Pavement			Overlay			Base			Sub-Base			Shoulder Surface			Shoulder Base		
		Type	Depth	Width	Type	Depth	Width	Type	Depth	Width	Type	Depth	Width	Type	Depth	Width	Type	Depth	Width
0.054	6' RT CL	HMAC	7"	22'00"				SCG	6"	--	SOIL	--	--						
0.228	7' LT CL	HMAC	7"	22'00"				SCG	10"	--	SOIL	--	--						
0.237*	350' LT	HMAC	3"					SCM	12"	--	SOIL	--	--						
0.237*	35' LT	HMAC	5"					SCM	12"	--	SOIL	--	--						
0.242*	100' LT	HMAC	4"					SCM	12"	--	SOIL	--	--						
0.251*	25' LT	HMAC	4.5"					SCM	12"	--	SOIL	--	--						
0.424	6' RT CL	HMAC	7.5"	22'00"				SCG	7"	--	SOIL	--	--						
0.652	6'RT CL	HMAC	8"	22'00"				SCG	8"	--	SOIL	--	--						
0.883	5' LT CL	HMAC	8"	22'00"				SCG	6"	--	SOIL	--	--						
1.125	6' RT CL	HMAC	8.5"	22'00"				SCG	7"	--	SOIL	--	--						
1.359	6' LT CL	HMAC	8"	22'00"				SCG	6"	--	SOIL	--	--						
1.538	6' RT CL	HMAC	8"	22'00"				SCG	7"	--	SOIL	--	--						
1.760	6' LT CL	HMAC	8"	22'00"				SCG	7"	--	SOIL	--	--						
1.983	6' RT CL	HMAC	8"	22'00"				SCG	7"	--	SOIL	--	--						
2.205	6' RT CL	HMAC	8.5"	22'00"				SCG	7.5"	--	SOIL	--	--						

Remarks: FB # 58-351; SCM = Soil Cement, HMAC = Hot Mixed Asphaltic Concrete * - denotes LA 578 intersection borings

Figure 11: Roadway Design Information – Example of Currently Required

Roadway Classifications

ROADWAY
DESIGN INFORMATION

Project or Control Section No. LA 4: LA 578 - LA 128 Total Length 2.320 MI

	Offset	Base					Subbase			
CSLM	PE or CL	Depth	Group/Class	Slt/Snd/Cl	LL/PL/PI	Org.	Group/Class	Slt/Snd/Cl	LL/PL/PI	Org.
0.054	6' RT CL	6"	A-6 (03) Grav Lm & org	41/40/19	27/11/16	3%	A-4 (07) Sty Cl Lm	54/17/29	28/18/10	1%
0.228	7' LT CL	10"	A-6 (03) Grav Cl Lm & org	42/35/23	30/18/12	3%	A-6 (10) Sty Cl Lm	59/14/27	31/18/13	1%
0.237*	350' LT	12"	Soil Cement	--	--	--	--	--	--	--
0.237*	35' LT	12"	Soil Cement	--	--	--	--	--	--	--
0.242*	100' LT	12"	Soil Cement	--	--	--	--	--	--	--
0.251*	25' LT	12"	Soil Cement	--	--	--	--	--	--	--
0.424	6' RT CL	7"	A-4 (04) Grav Sty Cl Lm & org	54/19/27	27/19/8	3%	A-6 (10) Sty Cl Lm	59/14/27	31/18/13	1%
0.652	6'RT CL	8"	A-6 (01) Grav Cl Lm & org	29/49/21	30/17/13	3%	A-4 (04) Cl Lm	39/34/27	26/16/10	2%
0.883	5' LT CL	6"	A-6 (06) Grav Cl Lm	42/32/25	35/19/16	2%	A-4 (04) Cl Lm	39/34/27	26/16/10	2%
1.125	6' RT CL	7"	A-2-6 (00) Grav Sdy Lm	26/56/17	26/15/11	2%	A-4 (05) Cl Lm	46/27/27	27/18/9	1%
1.359	6' LT CL	6"	A-4 (03) Grav Cl Lm & org	47/30/23	28/18/10	3%	A-4 (05) Cl Lm	46/27/27	27/18/9	1%
1.538	6' RT CL	7"	A-4 (00) Grav Cl Lm	28/50/21	25/17/8	2%	A-4 (02) Cl Lm	48/27/25	24/18/6	1%
1.760	6' LT CL	7"	A-6 (04) Grav Cl Lm & org	40/39/21	32/18/14	3%	A-4 (02) Cl Lm	48/27/25	24/18/6	1%
1.983	6' RT CL	7"	A-6 (01) Grav Cl Lm & org	29/49/21	26/15/11	3%	A-4 (04) Cl Lm	48/27/25	25/17/8	2%
2.205	6' RT CL	7.5"	A-6 (05) Grav Lm & org	46/38/16	30/15/15	3%	A-4 (04) Cl Lm	48/27/25	25/17/8	2%

Remarks: FB # 58-351; * - denotes LA 578 intersection borings

Figure 12: Roadway Design Information – Example Idea including Soil Classifications

Method of Test for

THE DETERMINATION OF IN-PLACE STIFFNESS BY THE DYNAMIC CONE PENETROMETER (DCP)

DOTD Designation TR 645-10

Introduction

The locations of DCP testing shall be selected by the Engineer. In locations where the subgrade is being assessed, DCP testing should be conducted to at least 36 in. (914.4 mm) into the subgrade unless otherwise directed by the Engineer.

The DCP can be used to measure the stiffness of cohesive and non-cohesive soils, base course aggregates, recycled asphalt pavement, recycled concrete pavement, blended calcium sulfate and in some instances chemically (cement or lime) stabilized or treated soils. Under no circumstance should the DCP be used to measure the stiffness of Concrete or Asphalt pavements as well as large size (> 1 in. diameter) aggregate.

There are generally 5 types of typical sections that will be assessed with the DCP as shown in Table 1. The Engineer shall provide specific instructions on the testing regime for each type.

Table 1

Case 1	Case 2	Case 3	Case 4	Case 5
Pavement	Pavement	Base course	Base course	Subgrade
Base course	Base course	Subgrade layer	Subgrade	
Subgrade layer	Subgrade	Subgrade		
Subgrade				

Only an Authorized DCP operator is to conduct the DCP tests. Completion of DCP training conducted by DOTD is required for authorization.

Method of Test for
THE DETERMINATION OF IN-PLACE STIFFNESS BY THE DYNAMIC CONE PENETROMETER (DCP)
DOTD Designation TR 645-10

I. Scope

A. The DCP can be used to measure the stiffness of cohesive and non-cohesive soils, base course aggregates, recycled asphalt pavement, recycled concrete pavement, blended calcium sulfate and in some instances chemically (cement or lime) stabilized or treated soils. Under no circumstance should the DCP be used to measure the stiffness of Concrete or Asphalt pavements as well as large size (> 1 in. diameter) aggregate.

B. Reference Documents
   1. ASTM D6951-03, Standard Test Method for Use of Dynamic Cone Penetrometer in Shallow Pavement Applications
   2. DOTD TR 602M/602-96, Measuring Thicknesses and Widths of Base and Subbase Courses and Aggregate Type Surface Courses

II. Apparatus

A. The Schematic for the DCP is shown in Figure 1 (Source: ASTM D6951-03). The components of the DCP are typically constructed of stainless steel with the exception of the replacement tip, which is typically made of hardened tool steel or wear resistance material.
   1. 17.6 lb (8 kg) hammer with a tolerance of 0.022 lb (0.010 kg).
   2. Fixed Drop hammer height of 22.6 in. (575 mm) with a tolerance of 0.039 in. (1 mm).
   3. 5/8 in. (16 mm) diameter upper steel drive rod and handle.
   4. 5/8 in. (16 mm) diameter lower steel drive rod.
   5. Coupler assembly
   6. Anvil 2 in. (50 mm) diameter x 2.5 in. (62.5 mm) long (min).
      a) Measuring rod or tape measure: The scale should have increments of 0.04 in. (1 mm) and a minimum length of 36 in. (914.4 mm).
      b) Optional sliding attachment: An optional sliding attachment may be used to hold the scale vertical while conducting tests
   7. Extension rod. Length varies from 12 in. (304.8 mm) to 36 in. (914.4 mm).
   8. Extraction jack as shown in Figure 4. (Source: ASTM D6951-03)
   9. Rotary hammer drill capable of drilling at least a 1 in. (25 mm) diameter hole through the pavement. Alternatively, augering with a coring rig is allowed (refer to TR 602M/602-98).
   10. Cone tips. There are two types of cone tips as shown in Figures 2 and 3: Type I (reusable) and Type II (disposable). The Type I tip may be used repeatedly (up to 250 times) and has inclined angle of 60 degrees and base diameter of 0.787 in. (20 mm). Type II cone tips are used only once and its dimensions are similar to Type I cone tips. The tolerances for both types of cone tips are ± 1 degree for the tip angle and ± 0.010 in. (0.25 mm) for their diameter.

Note A-1: Wet coring is not allowed.

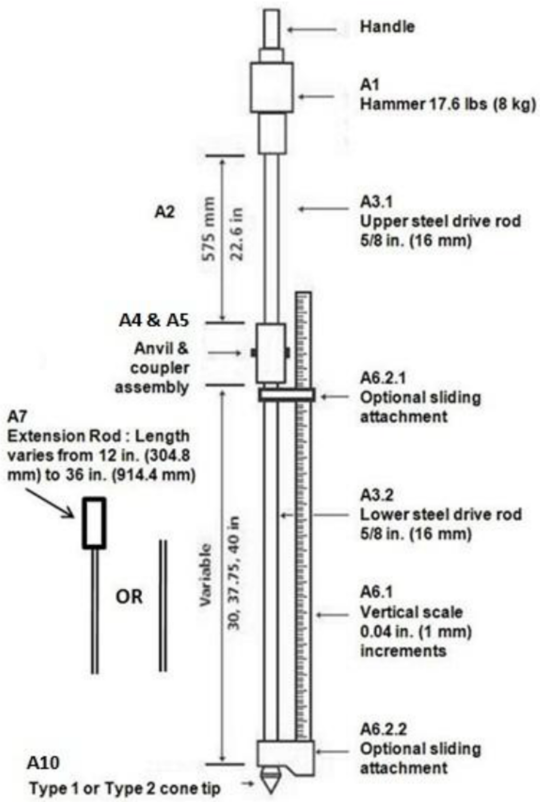


FIG 1: Schematic of DCP device

11. In addition to the DCP, DCP assembly tools as recommended by the manufacturer, lubricating oil, and a data recording sheet shown later may be required. Data may also be typed into an excel spreadsheet template which is available to all DOTD personnel at http://www.ltrc.lsu.edu/downloads.html.

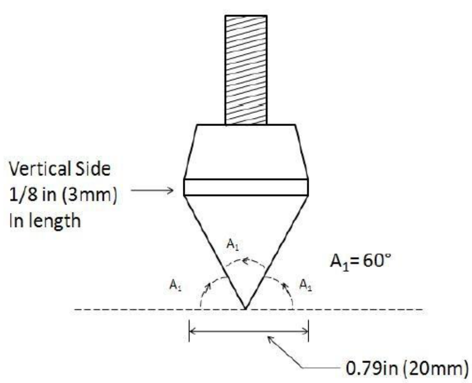


FIG 2: Type 1 Reusable Tip

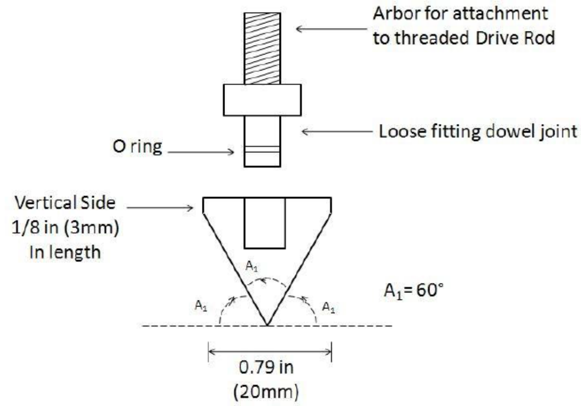


FIG 3: Type 2 Disposable Tip

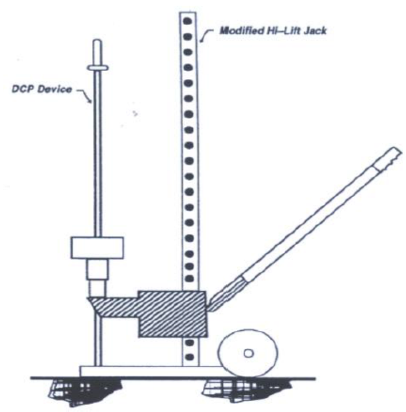


FIG 4: Extraction Jack

III. Health Precautions

Care must be taken with hand placement on the measuring scale, handle, or hammer during testing so as not to injure the hands or fingers.

IV. Sampling

The locations of DCP testing shall be selected by the Engineer. In locations where the subgrade is being assessed, DCP testing should be conducted to at least 36 in. (914.4 mm) into the subgrade unless otherwise directed by the Engineer.

V. Procedure

A. **Equipment check:** Inspect the DCP for damaged or fatigued parts and excessive wear of the drive rod or reusable cone tip if it is being used. Securely tighten or fasten all joints as well as the Type 1 or Type 2 tips on the drive rod. (See Figures 2 and 3)

B. **Basic operation:**

1. Operator
   a. Hold the DCP in a vertical\plumb position.
      i. On the pavement surface, take an initial reading.
      ii. In a drilled hole (if applicable), take an additional reference reading.
   b. Raise and release the hammer from the standard drop height.
2. Recorder
   a. Read the scale at reference points and after each blow.
   b. Record the measurements corresponding to the blow on the DCP data recording sheet included in this document (Appendix 1).

Note B-1: A measurement is recorded for each blow.

C. Testing and recording procedure for Case 1 and 2 sections as shown in Table 1

1. Determine thickness needed to ensure that penetration will be at least 36 inches into the subgrade. Add extensions. The appropriate extensions should be added to the DCP assembly prior to beginning testing to account for the thickness of the Pavement, base course, and subgrade layer.
2. **Initial reading:** Begin by placing the DCP and measuring scale vertically plumb on the surface and record the measurement (R1) (cm) on the data recording sheet as shown in Figures 5 and 6, respectively.
3. **Pilot hole:** Drill a vertically plumb 1 in. (25.4 mm) diameter hole (minimum) through the pavement layer as shown in Figure 7. Alternatively, the pilot hole may be created by auguring with a core rig. The pilot hole under no circumstance should be created by wet coring.
4. Record the reading prior to the first DCP blow: Place the DCP through the pilot hole and let the cone tip rest on top of the layer to be tested as shown in Figure 8. Record the reading (R2) (cm) in the location shown in Figure 6. This reading corresponds to blow count 0 as shown in Figure 6.

D. **Testing sequence**

1. **Dropping the hammer:** Hold the DCP assembly vertically plumb. Lift and drop the hammer and from the standard height as shown in Figure 1. The person recording the data records the blow count and reading from the vertical scale corresponding to each blow as the DCP penetrates through the layer as shown in Figure 6. Alternatively, the data may be recorded directly into the excel template as mentioned in Section II.A.10.

Note D-1: A reading must be recorded for each blow.

2. **Depth of penetration:** The depth of penetration should be to at least 36 inches into the subgrade as shown in Figure 9 unless otherwise directed by the Engineer. For example, if the total thickness of the pavement, base course, and subgrade layer is 24 in. (609.6 mm) then a 24 in. (609.6 mm) extension should be added to the assembly.
3. **Refusal:** In some instances, the DCP may not penetrate the material and this is referred to as refusal. If after 10 blows, the device has not advanced more than 1 mm, testing shall cease on that layer. When refusal occurs, the DCP is removed from the hole and the rotary drill is used to drill through that layer as shown in Figure 10. The DCP is then carefully placed vertically plumb through the hole and allowed to rest on top of the layer to be tested. Record that reading (R2) (cm) and re-label that blow as 0 as shown in Figures 11 and 12. Testing is resumed as before as outlined in V.D.1.
4. **Extraction:** Once testing is complete, use the extraction jack to remove the DCP from the testing hole.

Note D-2: Do not reverse impact the handle to extract the DCP. Damage/breakage will occur.

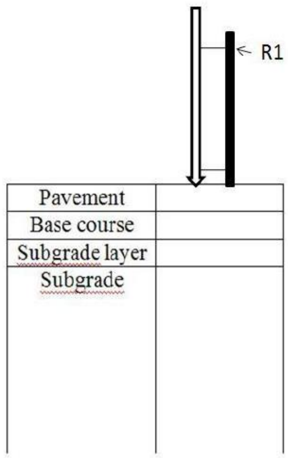


Figure 5

Project	
Date	
Location (CSLM / STA.)	
Location (Lane direction)	
Location (Outside / Inside Lane)	
Location (Distance from centerline)	
Initial reading on Surface	R1 = 42.1
Pilot hole depth	R2-R1 = 56.8-42.1=14.7
Reading after pilot hole	R2 = 56.8
Comments	

Number (A) Of Blows	Rod (B) Reading (cm)	Comments
0	56.8	
1	61.7	
2	62.6	
3	63.1	
4	63.5	
5	64.0	
"	"	

(A) Number of Hammer blows between test reading
(B) Scale reading corresponding to blow in cm

Figure 6

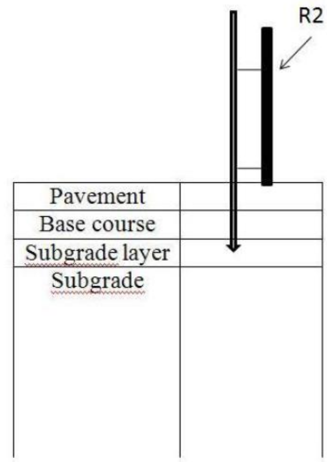


Figure 11

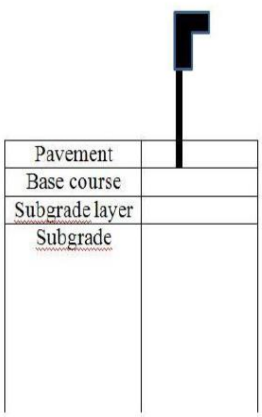


Figure 7

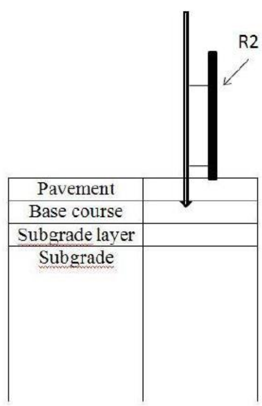


Figure 8

Project	
Date	
Location (CSLM / STA.)	
Location (Lane direction)	
Location (Outside / Inside Lane)	
Location (Distance from centerline)	
Initial reading on Surface	R1=30.2
Pilot hole depth	R2-R1=26.6
Reading after pilot hole	R2=56.8
Comments	

Prior to refusal

Number (A) Of Blows	Rod (B) Reading (cm)	Comments
0	46.3	
1	46.8	
2	49.9	
3	47.0	
4	47.0	
5	47.0	
6	47.0	
7	47.0	
8	47.0	
9	47.0	
10	47.0	
11	47.0	
12	47.0	
13	47.0	
0	56.8	
1	61.7	
2	62.6	
3	63.1	
4	63.5	
5	64.0	
"		

(RF) Refusal occurred from Blows 3 to 13 & drilled through layer
(A) Number of Hammer blows between test reading
(B) Scale reading corresponding to blow in cm

Figure 12

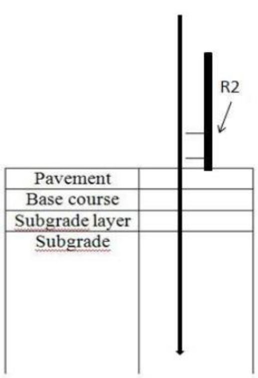


Figure 9

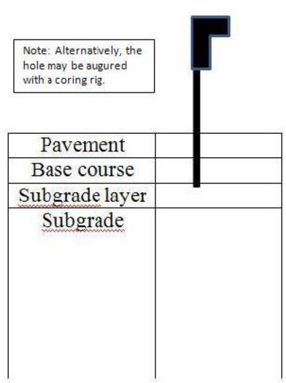


Figure 10

5. **Data recording:** Use the form shown in Appendix 1 to record field data from DCP testing or the Excel template mentioned in A10 to record the data in a lab top computer. Form can be downloaded from http://www.ltrc.lsu.edu/downloads.html.

VI. Report

If the field data was recorded on the form in Appendix 1, then it will be transcribed into the Excel template mentioned in Section II.A10 and given to the Engineer. If the field data was recorded into the excel template in the field, that shall be delivered to the Engineer as the report.

VII. Normal Test Reporting Time

DCP testing time varies from 5 to 30 minutes depending upon site conditions.