DEPARTMENT OF TRANSPORTATION

Unbound Recycled Materials Database for MnPAVE-Flexible

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This report documents the development of an electronic dataset describing field and laboratory performance of unbound bases from 106 road sections containing recycled materials in Minnesota. This dataset provides a compact view of backcalculated layer properties (from falling-weight deflection data) per road section. This view includes summary statistics on backcalculated layer properties, estimates of possible errant data in raw deflection basins, associated laboratory resilient modulus (MR) values, and other brief but insightful measures that allow MnDOT research engineers to consider which road sections to include and exclude in determining a basis for MnPAVE Flexible material inputs.

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UNBOUND RECYCLED MATERIALS DATABASE FOR MNPAVE-FLEXIBLE

FINAL REPORT

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AC	Asphalt concrete
CIR	Cold In-place recycling
FWD	Falling-weight deflectometer
HMA	Hot-mix asphalt
MDLP	Mid-lane driving lane
MDLP	Mid-lane passing lane
MnDOT	Minnesota Department of Transportation
MnROAD	Minnesota Road Research Facility
MR	Resilient modulus
OMRR	Office of Materials and Road Research
OWPD	Outer wheel driving lane
OWPP	Outer wheel passing lane
RAP	Recycled asphalt pavement
SFDR	Stabilized full-depth reclamation

EXECUTIVE SUMMARY

MnDOT's mechanistic-empirical flexible pavement design procedure, MnPAVE Flexible, recognizes the use of unbound recycled materials (e.g., Cold In-place Recycling, Rubblized Concrete) in its software. Currently, the relevant mechanistic properties assumed for recycled materials within MnPAVE Flexible are estimates developed by MnDOT during the software development stages. That is, they are not values supported by dedicated studies of Minnesota recycled materials, including findings from the various MnDOT research studies on recycled materials.

The developers of MnPAVE Flexible at MnDOT recognized the need to revise and incorporate unbound recycled base material properties into the MnPAVE-Flexible design procedure using available MnDOT resources. After reviewing previously performed research studies, MnDOT determined that MnDOT laboratory and field test data were potential untapped resources for information to improve MnPAVE Flexible's estimate of the structural performance of unbound bases containing recycled materials. MnDOT focused on the potential for existing pavement data — and analysis thereof — to provide information on pavement layer input properties in the MnPAVE Flexible design procedure.

Therefore, this research develops a dataset that describes the field and laboratory performance of unbound bases from 106 road sections containing recycled materials in Minnesota. This dataset provides a compact view of backcalculated layer properties (from falling-weight deflection data) per road section. This view includes summary statistics on backcalculated layer properties, estimates of possible errant data in raw deflection basins, associated laboratory resilient modulus (MR) values, and other brief but insightful measures that allow MnDOT research engineers to consider which road sections to include and exclude in determining a basis for MnPAVE Flexible material inputs.

In addition to the final dataset, the project report concisely documents the effort that resulted in the MnPAVE Flexible unbound recycled base dataset. This effort, while straightforward, is extensive given the volume of data reviewed and analyzed and the condition of that data prior to analysis (i.e., much of the data was not supported with documentation and/or required cleaning/validation).

The final dataset from the project will assist the MnDOT developers of MnPAVE Flexible to better predict pavement performance and improve design. If successfully implemented, improvements to MnPAVE-Flexible will ensure the service life of road infrastructure in Minnesota and lower road maintenance costs. Improvements to the representation of unbound recycled materials in design procedures could also lead to their increased use in pavements, which can potentially lower construction costs.

CHAPTER 1: INTRODUCTION

The Minnesota Department of Transportation (MnDOT) has an established history of using recycled materials in the sublayers of its pavements. This history includes sponsored research to characterize strength or stiffness of base layers that include recycled materials. MnDOT's asphalt pavement design procedure, MnPAVE Flexible, includes a set of recycled materials (e.g., Cold In-Place Recycled, Full Depth Reclamation, Stabilized Full Depth Reclamation) to account for the use of recycled materials in base layers.

However, the default properties for these materials do not properly reflect the varying ratio of recycled material to virgin aggregates typically used in pavement reconstructions and do not fully apply the findings of previous sponsored research studies. Thus, MnDOT has recognized two primary needs relating to this issue:

1. There is a need to (A) characterize typical Minnesota recycled base materials given the results of previous sponsored research and the MnROAD database and (B) verify that values represent field conditions.
2. In addition, the new values must be implemented in MnPAVE, and the underlying MnPAVE design procedure must be calibrated (or modified) to account for performance of Minnesota pavements with recycled material base layers.

This study focused on the first of those two needs, the development of a reliable database for information relating to recycled base materials.

1.1 PROJECT OBJECTIVES

The objectives guiding the project work were as follows:

A. Identify sources of data for the project, which includes the creation of a survey distributed to district engineers to locate additional data
B. Develop a database summarizing lab and field resilient modulus values for recycled material bases from previous MnDOT studies
C. Analyze collected data to possibly uncover relationships between base resilient modulus, FWD basins, and/or base material properties

The primary research product from this project was a dataset describing all road sections featuring recycled bases that were selected for analysis. This research product is referred to as the MnPAVE Flexible recycled base dataset, or, more simply, the "final dataset." A secondary research product is this final report summarizing the project work effort.

1.2 REPORT STRUCTURE

The chapters beyond this introductory charter document the project effort. While the chapters contain summary descriptions of work effort and summary tables of data, the appendices provide full data from project analysis.

- Chapter 2 describes the road section resources that the project team reviewed with the technical liaison (TL) and technical advisory panel (TAP) and selected for analysis with TL and TAP approval. This effort included a survey of district engineers to locate road sections with bases containing recycled materials.
- Chapter 3 discusses the selected road sections, data associated with these sections, and preparations of the data for analysis.
- Chapter 4 describes analysis of field data. Summary results are briefly discussed.
- Chapter 5 describes the final dataset describing analysis of Minnesota road sections with recycled base materials. The project team provided the dataset itself – an electronic Microsoft Excel spreadsheet –to the MnPAVE Flexible developers for possible incorporation into MnPAVE Flexible.
- Chapter 6 provides discussion and conclusions for the project work.

The report is composed and structured on the understanding that its primary audience is MnDOT research engineers who are investigating the final dataset from this project.

CHAPTER 2: MINNESOTA ROADS WITH RELEVANT DATA AND OTHER RESOURCES

The following sections briefly document project efforts to obtain data characterizing Minnesota road bases containing recycled materials, both in terms of material composition and field performance.

2.1 PRELIMINARY RESOURCES CONSULTED

The original work scope for project effort was focused on analysis of readily available data. Therefore, the original work scope did not indicate a literature review. However, because of the initial lack of response from MnDOT research and District engineers to requests for field data, the TAP recommended a brief literature review to ensure that the project team was aware of previous work in this area. The relevance of the literature to this project was determined based on its relevance to the following queries (sorted by priority):

- *Does the resource detail MnDOT research on unbound recycled base materials?*
- *Does the resource detail testing and test results of unbound recycled base materials?*
- *Does the resource detail testing and test results of general base materials?*
- *Does the resource provide insight in the use of base material data in mechanistic-empirical design procedures?*

These criteria were used to select resources that were consulted but not reviewed in detail, as the project objectives were to build a dataset to possibly modify MnPAVE Flexible inputs, not develop research insights into FDR base performance. Compiled literature in response to the above questions are provided in the bibliography. This literature was reviewed by the project team and discussed with the technical advisory panel. The main consequences of these discussions for project activities were as follows:

- The literature review found that literature on the resilient modulus (MR) of recycled materials – when used in a pavement foundation – was highly dependent on: (A) the type recycled material used (RAP, RCA, brick, etc.), (B) the ratio of recycled material to virgin aggregate, and (C) temperature and moisture variation by material type.
- The technical advisory panel indicated that the final dataset should, to the best of its ability, indicate the composition of base material in response to Items A and B above. Due to the difficulty of estimating in-situ moisture at any given time (particularly when poorly documented field test data is involved), moisture effects were to be ignored, although the project team recognizes their significance.

In addition to the literature review, the project team and technical liaison distributed a brief survey to MnDOT engineers to obtain useful field data describing performance of road bases containing recycled materials. The draft of this survey, which was copied into e-mail communications, is provided in Appendix F. The intent of the survey was to obtain FWD, resilient moduli, and historical construction data.

2.2 DATA SOURCES AND REVIEW

As noted in Section 2.1, a survey of MnDOT engineers was performed in the initial stages of the project work to acquire field data to analyze and assemble in a dataset for MnPAVE Flexible. The response to this survey did not provide much data, nor did it represent the range of road base applications in Minnesota flexible pavements that were known to the technical advisory panel. Therefore, the project team shifted its activities into actively gathering data for analysis, as a passive mode through the survey was not productive.

Through online meetings, emails, and phone conversations with the technical advisory panel, representatives of MnDOT districts, and other contacts from past MnDOT research projects, the project team and technical liaison located and evaluated electronic data sources relating to field and laboratory performance of recycled base materials. The data collection effort resulted in data sources that included the items described in the remainder of this section.

The 2017 MnDOT study, “MnROAD Cells 16-23 (Phase II),” evaluates the performance of MnROAD test sections utilizing unbound recycled base layers. The study includes falling weight deflectometer (FWD) testing and forensic trenching to facilitate the collection of lightweight deflectometer (LWD), and dynamic cone penetrometer (DCP), gradation, and moisture data for the in-situ base layers. The three test cells in the study relevant to this project were Cells 16 through 18, which had base layers containing 100% RCA; 50% RCA and 50% MnDOT Class 5 aggregate; and 100% RAP respectively. Some results from this study are summarized in Table 1.

The 2012 MnDOT study, “Best value granular material for road foundations,” which characterizes some base materials using proportions of conventional aggregate and recycled materials (RAP/RCA) Based on discussions with the TAP, we understand that this data was provided to that project by OMRR (see note on “MnDOT OMRR worksheets” below). The data is summarized in Table 2. The data provided to the study is extensive and is not reproduced in the appendices – rather the reader is encouraged to seek out these MnDOT resources separately.

The 2021 MnDOT study, “Modulus and Dynamic Cone Penetrometer Data Collection for Full-Depth Reclamation Projects,” is a project whose efforts unintentionally coincided with many aspects of this study to characterize base properties for MnPAVE Flexible. The dynamic cone penetrometer (DCP) testing of field full-depth reclaimed (FDR) bases was supported by falling-weight deflectometer (FWD) testing. Data from that DCP study was made available to this project for possible incorporation and analysis.

Various MnDOT District and other MnDOT documents and resources were consulted.

- District 2 resources indicating field sections that incorporate CIR and FDR base layers (Table 3 and
- Table 4, respectively).
- District 5 (Metro) e-mail indicating possible field sections of interest to the study (details to be determined).

- District 8 e-mail indicating 4 sections along TH-23 using reclaimed (CIR) base layers (Table 5). The e-mail also indicated that while FWD testing had not been performed on these sections, it could be performed upon request.
- Aggregate Source Information System (ASIS) map data describing aggregate sources (Figure 1).

Finally, the MnDOT Office of Materials and Road Research (OMRR) provided worksheets describing laboratory resilient modulus tests performed on a variety of base materials, including Class 7 materials, according to the NCHRP 1-28A procedure. This resource ("MnDOT lab MR database") OMRR involved multiple files and complicated internal material designations, which the project team reviewed closely with OMRR. After review, the project team determined that the MnDOT lab MR database contained lab test records for 921 materials, 191 of which were entries for materials sorted under "Class 7B/C," "RAP," or "FDR" (i.e. designations associated with recycled materials). Because the lab MR database had not been consulted or actively curated in many years, the results were adopted as-is. Its contents are summarized in Table 6 and the MnDOT MR database is reproduced in full in Appendix B.

Table 1. Results of forensic DCP and LWD testing of unbound recycled base layers in MnROAD Cells 16-18 (Ahn et al 2017)

Cell	Grading Number	Moisture Content (%)	Dynamic Penetration Index (mm/blow)		Deflection under LWD (mm)		Notes
			Measured	*Max Allowed*	Measured	*Max Allowed*	
16	3.6	10.3	5.3	*19*	0.21	*0.68*	100% RCA
17	4.2	7.7	5.0	*17*	0.21	*0.61*	50% RCA + 50% CL5
18	4.1	3.6	5.7	*13*	0.20	*0.46*	100% RAP
19	4.6	6.0	7.3	*19*	0.29	*0.68*	100% CL5

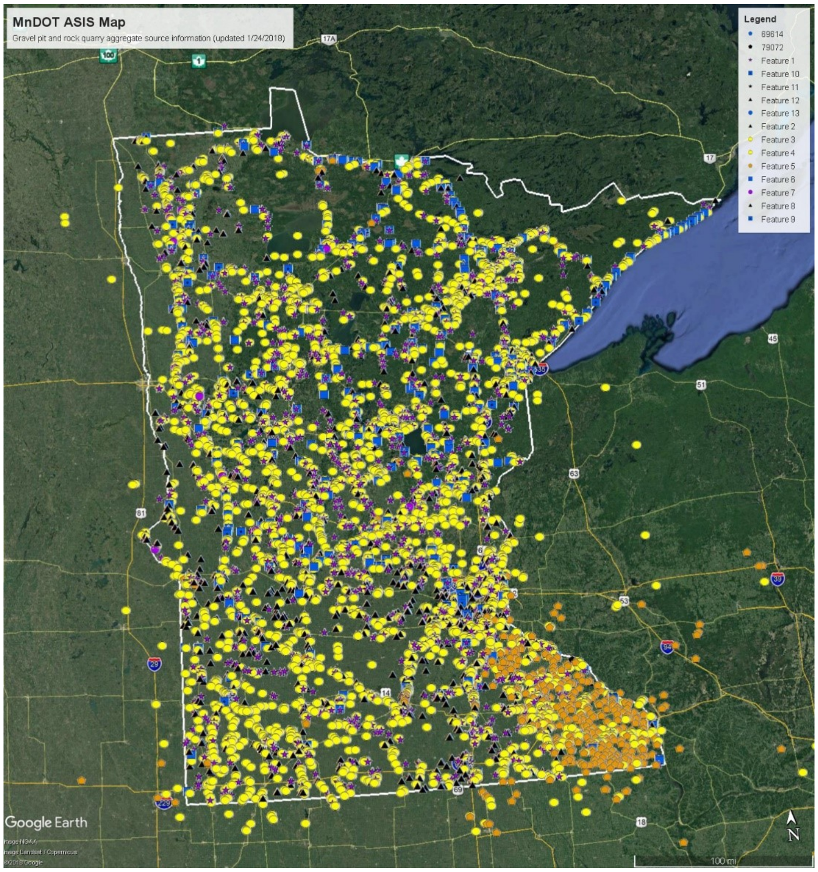

Figure 1. Minnesota aggregate resource (ASIS) locations

Table 2. Summary of Class 7 materials referenced in worksheet from 2012 MnDOT study (Xiao and Tutumluer 2012)

ID	XLS_FILE	MATERIAL_TYPE	MNDOT_SPEC	ID	XLS_FILE	MATERIAL_TYPE	MNDOT_SPEC	ID	XLS_FILE	MATERIAL_TYPE	MNDOT_SPEC
54	C1314R2	RECLAIMED CONCRETE	CLASS 7C	201	NDSU_SF2	75 PCT RECLAIMED 25PCT CLASS 5	CLASS 7B	226	TH23_X_3_5_2_APR1	IN-SITU RAP WITH GRAVEL	FDR
58	C3328R2	RECLAIMED CONCRETE	CLASS 7C	202	NDSU_SN1	75 PCT RECLAIMED 25PCT CLASS 5	CLASS 7B	227	TH23_X_5_4_1_MAR30	IN-SITU RAP WITH GRAVEL	FDR
170	CR3_S_5_1_1_FEB7	IN-SITU RAP WITH GRAVEL	FDR	203	NDSU_SN2	75 PCT RECLAIMED 25PCT CLASS 5	CLASS 7B	228	TH23_X_5_4_2_APR2	IN-SITU RAP WITH GRAVEL	FDR
171	CR3_S_5_1_2_FEB11	IN-SITU RAP WITH GRAVEL	FDR	204	NDSU_TF1	50 PCT RECLAIMED 50PCT CLASS 5	CLASS 7B	243	UM_SAT_PCC100_1	100 PCT PCC	OTHER
172	CR3_S_7_8_1_DEC31	IN-SITU RAP WITH GRAVEL	FDR	205	NDSU_TF2	50 PCT RECLAIMED 50PCT CLASS 5	CLASS 7B	244	UM_SAT_PCC100_2	100 PCT PCC	OTHER
173	CR3_S_7_8_2_MAR26	IN-SITU RAP WITH GRAVEL	FDR	206	NDSU_TN1	50 PCT RECLAIMED 50PCT CLASS 5	CLASS 7B	245	UM_SAT_PCC25_1	25 PCT PCC	OTHER
178	CR3_U_5_7_1_FEB14	75 PCT AGGREGATE 25 PCT RAP	OTHER	207	NDSU_TN2	50 PCT RECLAIMED 50PCT CLASS 5	CLASS 7B	246	UM_SAT_PCC50_1	50 PCT PCC	OTHER
179	CR3_U_5_7_2_FEB19	75 PCT AGGREGATE 25 PCT RAP	OTHER	208	NDSU_UF1	RECLAIMED BITUMINOUS	CLASS 7B	247	UM_SAT_PCC50_2	50 PCT PCC	OTHER
180	CR3_U_8_7_1_FEB15	75 PCT AGGREGATE 25 PCT RAP	OTHER	209	NDSU_UF2	RECLAIMED BITUMINOUS	CLASS 7B	248	UM_SAT_PCC75_1	75 PCT PCC	OTHER
181	CR3_U_8_7_2_FEB21	75 PCT AGGREGATE 25 PCT RAP	OTHER	210	NDSU_UN1	RECLAIMED BITUMINOUS	CLASS 7B	249	UM_SAT_PCC75_2	75 PCT PCC	OTHER
182	CR3_V_5_2_1_MAR15	50 PCT AGGREGATE 50 PCT RAP	FDR	211	NDSU_UN2	RECLAIMED BITUMINOUS	CLASS 7B	250	UM_SAT_RAP100_1	100 PCT RAP	OTHER
183	CR3_V_5_2_2_MAR19	50 PCT AGGREGATE 50 PCT RAP	FDR	212	NDSU_VF1	RECLAIMED BITUMINOUS	CLASS 7B	251	UM_SAT_RAP100_2	100 PCT RAP	OTHER
184	CR3_V_8_1_MAR16	50 PCT AGGREGATE 50 PCT RAP	FDR	213	NDSU_VF2	RECLAIMED BITUMINOUS	CLASS 7B	252	UM_SAT_RAP50_1	50 PCT RAP	OTHER
185	CR3_V_8_2_MAR23	50 PCT AGGREGATE 50 PCT RAP	FDR	214	NDSU_VN1	RECLAIMED BITUMINOUS	CLASS 7B	253	UM_SAT_RAP50_2	50 PCT RAP	OTHER
186	CR3_W_4_7_1_MAR2	25 PCT AGGREGATE 75 PCT RAP	OTHER	215	NDSU_VN2	RECLAIMED BITUMINOUS	CLASS 7B	254	UM_SAT_RAP75_1	75 PCT RAP	OTHER
187	CR3_W_4_7_2_MAR8	25 PCT AGGREGATE 75 PCT RAP	OTHER	216	NDSU_WF1	RECLAIMED BITUMINOUS	CLASS 7B	255	UM_SAT_RAP75_2	75 PCT RAP	OTHER
188	CR3_W_7_2_1_MAR7	25 PCT AGGREGATE 75 PCT RAP	OTHER	217	NDSU_WF2	RECLAIMED BITUMINOUS	CLASS 7B	260	UM_UNSAT_PCC25_1	25 PCT PCC	OTHER
189	CR3_W_7_2_2_MAR9	25 PCT AGGREGATE 75 PCT RAP	OTHER	218	NDSU_WN1	RECLAIMED BITUMINOUS	CLASS 7B	261	UM_UNSAT_PCC50_1	50 PCT PCC	OTHER
196	NDSU_RF1	100 PCT RAP	OTHER	219	NDSU_WN2	RECLAIMED BITUMINOUS	CLASS 7B	262	UM_UNSAT_PCC75_1	75 PCT PCC	OTHER
197	NDSU_RF2	100 PCT RAP	OTHER	221	TH200_Y_3_7_1_MAY9	IN-SITU RAP WITH GRAVEL	FDR	263	UM_UNSAT_RAP100_1	100 PCT RAP	OTHER
198	NDSU_RN1	100 PCT RAP	OTHER	222	TH200_Y_3_7_2_JUN3	IN-SITU RAP WITH GRAVEL	FDR	264	UM_UNSAT_RAP25_1	25 PCT RAP	OTHER
199	NDSU_RN2	100 PCT RAP	OTHER	223	TH200_Y_5_7_1_MAY10	IN-SITU RAP WITH GRAVEL	FDR	265	UM_UNSAT_RAP50_1	50 PCT RAP	OTHER
200	NDSU_SF1	75 PCT RECLAIMED 25PCT CLASS 5	CLASS 7B	224	TH200_Y_5_7_2_JUN4	IN-SITU RAP WITH GRAVEL	FDR	266	UM_UNSAT_RAP75_1	75 PCT RAP	OTHER
200	NDSU_SF1	75 PCT RECLAIMED 25PCT CLASS 5	CLASS 7B	225	TH23_X_3_5_1_MAR29	IN-SITU RAP WITH GRAVEL	FDR				

Table 3. District 2 CIR summary

TH	DESCRIPTION	HISTORY
34	BECKER-HUBBARD CTY LINE TO THE W LIMITS OF PARK RAPIDS (WESTERN AVE)	1999 - CIR
59	FROM W JCT TH 1 TO NEWFOLDEN	1999 – CIR; 2005- 1.5" OL; 2014- Microsurfacing
64	FROM THE E JCT TH 64 TO THE JCT TH 200	1999 – CIR; 2006 - 1.5" OL; 2015- Microsurface
71	FROM .8 M N OF JCT TH 34 IN PARK RAPIDS TO .3 M S OF W JCT TH 200	1999 CIR; 2008- Microsurface
71	FROM E JCT TH 200 (KABEKONA) TO THE JCT HUBBARD CSAH 9	2005 CIR; 2013- Microsurface
72	FROM RP 62 TO THE E JCT TH 11	1999 - CIR; 2005 - Chip Seal; 2011 - 1" Mill and 2" OL
89	FROM .5 MI N BELTRAMI CSAH 26 TO THE S RED LAKE RESERVATION LINE	1999 – CIR; 2009- 1.5" OL
172	FROM THE JCT TH 11 AT BAUDETTE TO WHEELERS PT.	2002 – CIR; 2013- Chipseal

Table 4. District 2 FDR summary

TH	DESCRIPTION	Reclaim Depth	Geogrid	COMMENTS
1	7TH ST E IN WARREN TO JCT MARSHALL CSAH 2	10"	No	2009 Reclaim
1	FROM MARSHALL CSAH 2 TO THE JCT TH 59 IN TRF	8"	No	2009 Reclaim
2	.4 Mi E of Fosston to 3.4 Mi E of Fosston	11"	No	2015- Reclaim
6	Big Fork River to N. Jct T.H. 1	12"; 9.5"	Yes	2004 - Reclaim
9	Ada to Norman/Polk CO line	9"	No	2013- Reclaim
9	FROM THE NORMAN POLK- CTY LINE TO CROOKSTON	10"	No	2011 - Reclaim
11	JCT TH 32 to the JCT Roseau CSAH 15	8"	No	2012- Reclaim
11	2.3 Mi. W of Roseau to JCT TH 89in Roseau	12"	Yes	2015- Reclaim
11	Frontier to Indus	12"	Yes	2010 - Reclaim
32	FROM THE N JCT TH 200 TO THE JCT TH 102 JUST N OF FERTILE	8"	No	2009 - Reclaim
32	TH 32 .3 Mi N of 14th St to .1 Mi N of Co Rd 6	12"	No	2015- Reclaim
34	FROM .1 M E JCT HUBBARD CSAH 4 TO E JCT TH 64	6"	No	2011 - Reclaim
71	FROM MENAHGA TO THE WADENA/HUBBARD CTY LINE	8"	No	2009 - Reclaim
71	FROM THE WADENA-HUBBARD CTY LINE TO .8 M N OF JCT TH 34 IN PARK RAPIDS	8"	No	2009 - Reclaim
71	Lake George to Itasca State Park	8"	No	2017- Reclaim
71	FROM JCT HUBBARD CSAH 9 TO JCT TH 2 (BEMIDJI BYPASS	7"	No	2010, 11 - Reclaim
71	Northome to Gemmel	10"	No	2011 - Reclaim
71	Gemmel to Margie	10"	No	2011 - Reclaim
71	Margie to Big Falls	8"	No	2005 - Reclaim
72	FROM TAMARAC RIVER BR AT WASKISH TO 2.9 MI S OF BELTRAMI-LOW CTY LINE	10"	Yes	2011 - Reclaim
72	FROM 2.9 MI S OF BELTRAMI-LOW CTY LINE TO RP 62	9"	Yes	2005 – Reclaim
89	FROM T-321 X-ING TO W GRYGLA LIMITS	6"	No	2001 – Reclaim
113	ON 113 FROM TH 32 TO WAUBUN	9"	No	2006 - Reclaim
200	FROM THE JCT TH 32 TO TH 59 MAHNOMEN	6"	No	2003 - Reclaim

Table 5. District 8 summary

TH	SP	START	END	HISTORY
23	5901-24	19.2	29.7	1999 - CIR
23	5902-21	30.5	45.6	2002 – Reclaim
23	5902-20	45.6	52.8	2002 – CIR
23	4206-20	52.8	61.2	2000 – CIR

Table 6. Materials references in OMRR resilient modulus spreadsheets

UM_SAT_PCC100_1	UM_UNSAT_FS15_1	C7C042HPRC090	C7T061INRC236
UM_SAT_PCC100_2	UM_UNSAT_FS5_1	C7C042HPRC093	C7T200ENRC219
UM_SAT_PCC25_1	UM_UNSAT_PCC100_1	C7M072GORC326	C7T200FNRC223
UM_SAT_PCC25_2	UM_UNSAT_PCC25_1	C7M072GORC330	C7T200FNRC224
UM_SAT_PCC50_1	UM_UNSAT_PCC50_1	C7M072GPRC331	C7T200FORC076
UM_SAT_PCC50_2	UM_UNSAT_PCC75_1	C7M072GPRC335	C7T200FPRC077
UM_SAT_PCC75_1	UM_UNSAT_RAP100_1	C7M072HORC327	C7T200GNRC057
UM_SAT_PCC75_2	UM_UNSAT_RAP25_1	C7M072HORC328	C7T200GNRC058
UM_SAT_RAP100_1	UM_UNSAT_RAP50_1	C7M072HORC329	C7T200GNRC068
UM_SAT_RAP100_2	UM_UNSAT_RAP75_1	C7M072HPRC334	C7T200GNRC079
UM_SAT_RAP25_F_1	C7C042EORC203	C7M072HPRC357	C7T200GORC059
UM_SAT_RAP25_F_2	C7C042EPRC199	C7T061ENRC228	C7T200GORC061
UM_SAT_RAP50_1	C7C042FORC081	C7T061ENRC229	C7T200GORC071
UM_SAT_RAP50_2	C7C042FORC082	C7T061EORC231	C7T200GPRC065
UM_SAT_RAP75_1	C7C042FORC083	C7T061FORC234	C7T200GPRC066
UM_SAT_RAP75_2	C7C042FPRC091	C7T061GORC233	C7T200GPRC074
UM_UNSAT_AGG100_1	C7C042FPRC092	C7T061GORC235	C7T200GPRC211
UM_UNSAT_FA15_AG10_RAP75_1	C7C042FPRC198	C7T061HNRC189	C7T200HNRC062
UM_UNSAT_FA15_AG35_RAP50_1	C7C042GORC084	C7T061HNRC190	C7T200HNRC063
UM_UNSAT_FA15_AG60_RAP25_1	C7C042GORC089	C7T061HNRC192	C7T200HORC064
UM_UNSAT_FA5_AG20_RAP75_1	C7C042GPRC085	C7T061HNRC193	C7T200HORC070
UM_UNSAT_FA5_AG45_RAP50_1	C7C042GPRC086	C7T061HORC188	C7T200HORC078
UM_UNSAT_FA5_AG70_RAP25_1	C7C042GPRC088	C7T061HORC232	C7T200HORC080
UM_UNSAT_FS10_1	C7C042HPRC087	C7T061INRC191	

CHAPTER 3: SELECTED ROADS AND ASSOCIATED TEST DATA

After discussing the assembled laboratory and field data, the technical advisory panel elected to focus the study on using falling-weight deflectometer (FWD) data from Minnesota roads using full-depth reclaimed (FDR) or recycled material bases, performing backcalculation analysis of these data, and associating backcalculated layer stiffnesses with observed laboratory MR values from the MnDOT OMRR database of MR performance, if and when the field base was known to resemble properties.

Due to this decision, the project team focused its efforts on closely evaluating datasets and locations associated with FWD data. In some respects, this aided the project efforts, as it filtered out road sections without FWD data. However, there remained many sets of data (often undocumented Microsoft Excel worksheets or raw FWD files) for locations throughout Minnesota that required review prior to analysis.

This chapter identifies the selected testing locations – including the road name, its termini, cross-section information, and material composition of the pavement structure – and preliminary treatment of selected location data, including obtaining supporting data to improve analysis.

3.1 SELECTED ROAD AND TEST CELL LOCATIONS

The project team, in collaboration with the technical liaison, selected field data from a total of 22 trunk highways located in Districts 1, 2, 3, 4, 7, and 8, and four test cells from the Minnesota Road Research facility (MnROAD).

- A table listing all the road sections, geometry, and material description is reported in Appendix A.
- The complete list of data files associated with all selected location is provided in Appendix C. These data files were provided to the project team through the Minnesota File Transfer resource online.

In discussing these sections with MnDOT engineers, the project team understood these to be flexible pavements whose base materials could be described as one of the following.

- <u>Full-depth Reclaimed (FDR)</u>. A base material produced through technique where the entire existing pavement layer is pulverized together with a portion of base course material.
- <u>Cold In-place Recycled (CIR)</u>. is a recycling technique that removes, mills, treats (with a recycling agent), and replaces an existing asphalt immediately without the application of heat.
- <u>FDR with Geogrid</u>. A combination of FDR plus the application of the geogrid to stabilize the recycled base material to improve layer stability and stiffness.
- <u>Class 5 Modified</u>: A recycled concrete aggregate (RCA) base material meeting Class 5 gradation requirements, but with the additional capability of draining water more quickly, making the base material more resistant to the freeze and thaw cycles. The bases in this study were composed 100% of RCA.

- Class 6: A base material meeting the MnDOT Class 6 gradation requirements. In this study, Class 6 bases contained exclusively RAP at a fraction of 60-75% and were otherwise composed of natural aggregates.

The primary base type for the selected road sections is FDR.

3.2 ASSESSING ROAD DESIGNS AND MATERIALS

The major challenge in the pre-analysis phase of this study was to estimate the composition of the pavement structure (including layer thicknesses) of the selected roads. Investigation of design plans or as-built records started using the online database eDigs, a service provided by MnDOT that collects construction design plans of all state projects in Minnesota. The use of historical records consumed project resources – while finding records associated with projects is relatively straightforward, the review of those records is involved as they consist of large plans that can be hundred of pages in length. While eDigs provided useful information including construction details and design plans, for many road sections, these data were not up to date.

To obtain updated design plans, the team contacted engineers at MnDOT OMRR and, most importantly, the MnDOT District engineers to obtain improved estimates of the thickness and the material composition of each road section's structural cross-section, as well as an approximate year of construction. This search for improved cross-section data was a constant need throughout the analysis stages of the project work, to an extent that the final project effort (described in Section 5.4) involved iterating and refining analysis based on input from MnDOT engineers. This iterative process was time consuming, as it involved re-creating section files for renewed backcalculation analysis. However, for many sections with uncertain layer thicknesses and composition, this iterative process steered uncertain and nonsensical results into reasonable layer properties that resembled those of an engineered pavement structure.

In addition to a continual search for improved project records, the project team assessment of the data also included review of TONN2010 calculations that had been performed by MnDOT District personnel in storing FWD data in TONN2010 worksheets. In those cases, the TONN2010 worksheets represented the only record of the deflection basins (i.e. the original deflection files were not provided or unavailable). In these cases, the project team needed to separate the deflection basins for the road section from the calculated results. The calculations were saved and reserved for later verification. MnROAD data for the low-volume test Cells 16, 17, 18, and, 19 were provided in their original FWD files, however the data was extensive and required categorization according to test date and lane before initiating backcalculation analysis. More information on deflection basin file pre-processing is provided in Section 3.3.

3.3 FALLING-WEIGHT DEFLECTOMETER DATA PREPARATION

During the review process of the design plans, the project team built the final version of the input files for each of the test sections that were to be coupled with the raw deflection basin files prior to backcalculation analysis. Existing input data were extracted from the TONN2010 analysis sheet tables provided in MnDOT District files for corresponding road sections. These data were organized in a new database that was validated during TAP meetings.

Other information related to testing (including the mean temperature from the day prior to the test date) were collected as inputs for backcalculation. The team obtained these temperatures from online weather station databases. The temperature used in the analyses are reported in Appendix A.

In addition, all FWD deflection basins (including basins provided only in TONN2010 worksheets) were screened prior to this project's backcalculation analysis to identify presence of outlier basins, inconsistencies in stationing, and otherwise unusual drops (e.g. disordered loading, null readings under deflectometers). Any file containing irregular entries was flagged for review so that outliers and possibly errant drops could be removed. No deflection data was "corrected" in this process – the project team elected to remove questionable data rather than develop and defend a technique to adjust data.

Finally, the project team understood that the deflection basins to be used for backcalculation analysis were collected by MnDOT staff according to the procedure described in ASTM D4694, "Standard Test Method for Deflections with a Falling-Weight-Type Impulse Load Device" using a calibrated FWD test device.

3.4 INTERPRETATION OF LABORATORY RESILIENT MODULUS DATA

The project objectives indicate that one objective of the study was to, where possible, propose a relationship between a backcalculated elastic moduli (in-situ modulus) and a similar material previously tested in the laboratory by MnDOT OMRR. As noted in Chapter 2, the OMRR MR database provided to the study was voluminous: it describes the tests of 921 materials in disorganized sheets that were not well documented. Verifying and accounting for these results in a satisfactory manner was beyond the scope of this project.

- The project team did not create the OMRR MR database and could not easily verify its contents nor its classifications of materials.
- Furthermore, as noted above, in many cases the project team did not have accurate details on field base material composition. For instance, FDR bases were estimated to contain either 50% or between 60 and 75% RAP in nearly all cases.
- Estimates of the composition of either laboratory or field material taken individually might be useful for a rough understanding of base performance. However, taken together they may lead to unreliable results.

As a result, the project team relied on assistance from the technical advisory panel in characterizing base layers in selected field sections so that they could be correlated with items from the OMRR MR database. Correlations between field elastic modulus (from backcalculation) and laboratory resilient modulus (from NCHRP 1-28A testing) are provided to MnDOT research engineers in the final dataset for information only. These correlations cannot be substantiated rigorously.

CHAPTER 4: BACKCALCULATION ANALYSIS

Backcalculation is the mathematical algorithm used to obtain the resilient modulus of a specific layer given a set of deflection basins. There are multiple methods of backcalculation proposed in literature and several software programs that implement these methods. This chapter focuses on the discussion of two different methods of backcalculation adopted by the team for this study, and the steps taken to perform the analyses successfully.

While the final dataset summarizes the backcalculation results of over 12,000 unique deflection basins distributed over 106 road sections, the project team performed backcalculation analysis of many more additional deflection basins to refine the analysis and improve the quality of the final dataset. Where applicable, this summary included results independently calculated by MnDOT in the provided files and verified by the project team.

4.1 METHODS (ELMOD AND TONN2010)

For this study, the project team selected ELMOD6 and TONN2010 for backcalculation analysis of all deflection basin files for the selected road sections.

- ELMOD: ELMOD version 6.1.89 (or "ELMOD6") is a well-known backcalculation procedure for FWD data analyses developed and maintained by Dynatest in support of their other FWD test services. The history of this procedure is left to the reader to investigate. ELMOD6 allows a user to define a pavement structure with up to five layers, including a subgrade, where each layer can be seeded with target modulus values. ELMOD6 uses the Bells model for asphalt modulus temperature correction. ELMOD6 accounts for load traffic effects and structural capacity ratings by providing a tool that allows to convert traffic data into ESALs.

  The project team proposed ELMOD6 for the study given indications on the MnDOT OMRR website that ELMOD was a MnDOT-preferred analysis tool. However, after discussing the initial round of backcalculation results with the technical advisory panel, the project team learned that the MnDOT engineers knew of no such preference. None of the engineers on the technical advisory panel reported being familiar with ELMOD6.

- TONN2010: The project also utilized TONN2010, MnDOT's procedure to estimate the elastic modulus and structural capacity of a three-layer (pavement, base, subgrade) system. This procedure was developed at the University of Minnesota and later adapted into a Microsoft Excel implementation by Mankato State University (Bly et al 2010; Wilde 2014).

  While the Excel worksheet implementation was used for some cases, the majority of the project use of TONN2010 utilized the original TONN2010 program, which allowed for road section files to be processed more quickly, which in turn allowed the team to investigate road sections with uncertain layer compositions using a factorial of possible scenarios.

Regardless of the backcalculation procedure used, the work flow for a deflection basin file from a road section followed the process described in Figure 2. Note that this work flow represents an early stage of the project work – in later stages, deflection basins previously analyzed in MnDOT-provided worksheets were re-run using ELMOD6 and TONN2010 by the project team for verification.

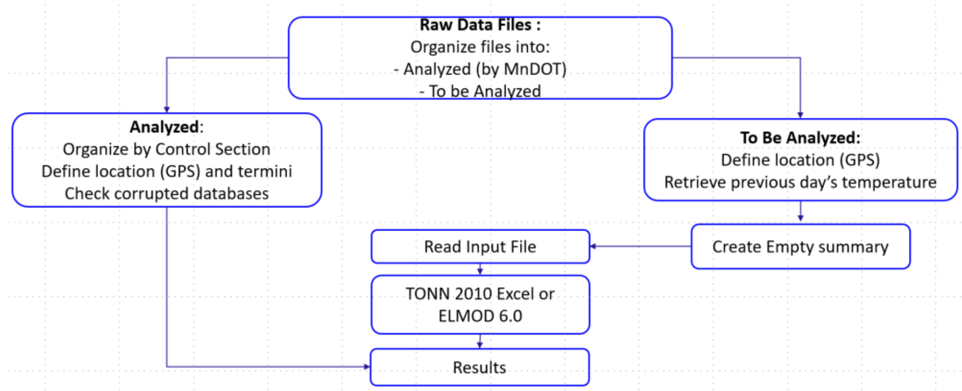

Figure 2. Pre-processing and analysis process for provided data files

4.2 ORIGINAL ANALYSIS AND DISCUSSION

The original set of data delivered to the project team by MnDOT consisted of a set of raw deflection basins to be analyzed and a set of sheets of TONN2010 reporting backcalculated results. The project team followed these steps prior to the analysis process:

1. Identify raw data and backcalculated results from the sheets of TONN2010
2. Identify the testing locations of the raw data files and the backcalculated results
3. Research design plans associated with each of the sections of this study
4. Create inputs for backcalculation
5. Backcalculate
6. Summarize results

The following subsections briefly summarize some (but not all) of the challenges encountered over the course of the project effort. This section, like the remainder of the report, is not comprehensive to avoid unnecessary length. Both the final dataset and this report were developed on the understanding that MnDOT research engineers – not the general public – represent the only audience. The project team expects that research engineers are aware of the iterative nature of data collection, pre-processing (cleaning), analysis, post-processing, etc.

4.2.1 Investigating road cross-sections

As explained previously, it was difficult for the project team to define the geometry and material composition of most of the sections because of the lack of relevant (i.e. current) information. Even after several meetings with the technical advisory panel, there remained many road sections whose critical details for backcalculation analysis were still unknown. Figure 3 illustrates the results of filtering processes applied to preliminary analysis in ELMOD6 and/or TONN2010 – the process illustrated identifies possibly inaccurate layer thickness inputs in provided MnDOT records.

As noted in Chapter 3, due to this uncertainty on the composition of the pavement structures, in many cases the team implemented subcases representing a small factorial of assumed layer thicknesses and/or stiffness bounds. These factorials and results were later refined through additional meetings with MnDOT engineers.

					elmod						TONN2010-SPREADSHEET MZ						TONN2010-SPREADSHEET MNDOT					
					HMA [Mpa]		Base [Mpa]		Subgrade [Mpa]		HMA		Base		Subgrade		HMA		Base		Subgrade	
District	Roadnam	Control	HMA	Base	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev	Avg	St.Dev
D1	USTH 53	6917	7	7	5546.4	1955.6	5466.9	4716.1	124.12	43.872												
D1	USTH 53	6917	7	7	4757.4	2394.1	20263	19102	227.73	107.6												
D2	TH1	4502	5	12	3211.2	590.86	600.81	122.69	123.71	29.357							709612	112940	65915	16346	19501	4096.5
D2	TH1	5701	5	8	3252.8	585.27	1085.2	468.78	128.05	30.552							543116	82017	91636	27357	20943	3994
D2	TH1	5701B	5	8	3154.2	664.84	1026.5	200.75	139.23	28.302												
D2	TH2	6005	6	11	2368.8	186.03	433.38	104.32	85.71	30.172							568037	75443	43056	11276	15139	3748.3
D2	TH6	3107A	4.5	12							2E+06	1E+06	64022	39514	11338	2760.4						
D2	TH6	3107B	4.5	12							448429	153062	32718	8696.3	7708.2	1533.2	448429	153062	32718	8696.3	7708.2	1533.2
D2	TH6	3107B-1	4.5	12							408886	77226	33034	8205	7949.4	1371.1						
D2	TH9	5408	5	9	1406.4	339.53	997.74	462.69	93.692	22.541							305946	91463	83157	27693	14059	2696.8
D2	TH9	6010A	4.5	10	4091.6	805.77	802.75	259.26	119.97	36.608							725589	126763	99203	27451	16248	2633
D2	TH9	6010B	4.5	10	7192.7	3750	624.84	267.63	115.18	21.441							1E+06	741285	98092	34466	14368	1540.9
D2	TH9	6010C	4.5	10	3320.6	502.07	460.31	154.75	70.348	13.538							700833	82903	53724	13418	10983	1175.8
D2	TH9	6010D	4.5	10	2840.8	2207.7	551.35	405.79	57.006	17.503							569539	162528	53657	14575	9199.4	1294.2
D2	TH11	3604A	6	12	1518.5	344.78	338.28	86.698	63.016	22.946							406690	85296	29106	7697.6	11256	2642.3
D2	TH11	3604B	6	12	1991.3	576.42	322.73	144.35	56.55	23.406							491323	99168	28093	10865	9866	2287.8
D2	TH11	6802	4.5	12	2354.2	595.5	555.71	152.35	128.58	37.096							518441	110610	66405	14429	17717	4026
D2	TH11	6802A	4.5	8	2226.9	340.43	775.13	132.54	206.22	37.436							517865	162931	81813	24887	29710	4896.6
D2	TH11	6802	4.5	8													487760	100590	72663	18098	28822	5854.4
D2	TH32	4503	4.5	12	1981.4	423.82	531.45	132.84	110.74	32.87												
D2	TH32	4503A	4.5	12	2171.4	504.83	644.21	100.37	131.53	30.235							423708	112731	76183	13694	18925	3984.1
D2	TH32	4504	4.5	12	2183.3	440.46	749.87	173.32	31.838	121.8												
D2	TH32	5704	4.5	12	2739.4	769.57	583.76	180.73	93.588	16.902							526273	78572	77118	14629	12934	1683.5
D2	TH32	5405	4.5	8	2370.9	604.17	870.9	343	117.68	29.718							488402	84675	47988	10778	20573	3814.4
D2	TH32	6006A	4.5	8	2673.7	702.25	912.17	582.23	130.21	28.79												
D2	TH32	6006B	4.5	8	2714.9	772.68	803.48	123.41	160.71	23.511												
D2	TH34	2902A	5.5	8	1917.8	268.82	721.66	119.53	190.03	23.078							353707	57099	67783	23152	27986	4608.7
D2	TH34	2902B	5.5	8	2071.9	524.76	758.43	300.5	184.69	37.406							508295	84276	42878	10873	29703	5241.3
D2	TH59	4505	7.88	12													426162	114934	50353	18174	15272	5955.3
D2	TH71	0409N	6.5	7	2040.8	446.09	700.06	174.82	164.6	38.05							412197	65232	43759	15872	27476	6133.9
D2	TH71	0409S	6.5	7	2189.1	212.24	868.19	265.17	168.1	37.41							429902	71279	63506	18990	25441	9454.9
D2	TH71	2907N	6	8	2393.4	409.25	990.29	236.1	128.04	28.962												
D2	TH71	2907S	6	8	2026.7	305.72	949.02	210.11	177.11	56.104												
D2	TH71	2904A	6	8	1689.6	287.77	1135.5	307.7	151.85	30.799							382823	109258	90451	33278	25918	4999.2
D2	TH71	2904B	6	8	2984.6	976.79	1241.5	68.333	126	9.7196												
D2	TH71	2904C	6	8	1548.1	268.31	1135.6	270.68	171.04	24.087							282249	28145	123621	31979	24639	3740.9
D2	TH71	2904D	6	8	2180.2	698.82	1036.3	180.6	144.12	12.105												
D2	TH71	2905	6	8	2450.9	427.1	654.65	611.28	105.25	39.494												

Figure 3. Red cell highlighting in post-processing of backcalculation results

4.2.2 ELMOD6 limitations

As noted previously, the ELMOD6 procedure was selected by the project team to satisfy what was understood to be a MnDOT preference for the method/software. Early in the application of ELMOD6 to road section deflection basins, the project team understood from its experiences that ELMOD6 is not intended to be a research-grade analysis tool:

- ELMOD6 does not allow batch analyses, therefore input files have to be manually created using the ELMOD6 user interface and then processed manually.
- ELMOD6 is poorly documented. Searches for documentation of ELMOD's underlying mechanistic assumptions or iterative solution method resulted in no current literature. Instead, other pavement resources emerged from these searches, and the project team understood that these other studies utilized ELMOD software in a single-use, "black box" manner.
- Numerous requests for elaboration on ELMOD6 numerical assumptions were posted by the project team to Dynatest. No responses were provided other than to confirm that ELMOD6 could not be run in a "research" (i.e. batch) mode.

The project team made its best effort to use ELMOD6 as efficiently as possible. An Excel Visual Basic (VBA) macro was developed to process ELMOD6 backcalculated results and create a final report of section analyses. However, despite the added efficiencies put into place by the project team, a larger problem with ELMOD6 persisted: backcalculated layer parameters from ELMOD6 consistently did not agree with engineering expectations of layer stiffness nor with TONN2010 backcalculation results on the same files. Because the project team was unable to validate the underlying solution of the layered elastic elastic problem for ELMOD6, after consultation with the technical advisory team, ELMOD6 results were not reported in the final dataset. (However, ELMOD6 was used to backcalculate layer properties of all deflection basins in the study.)

4.2.3 Expanding TONN2010 for section investigations

As noted in Section 4.2.1, the project team used iterative backcalculation analysis to explore different structures for sections whose as-built properties were in question. In order to perform many backcalculations and process backcalculated results efficiently – and, more importantly, within available project resources – the team developed an analysis method that relied on its pre-existing knowledge of the original TONN2010. A Fortran-compiled Windows executable of TONN2010 – which was provided with the original final report to MnDOT – allows the user to develop and run thousands of backcalculations in minutes given prepared input files. The input files were built by the project team through a Visual Basic macro that extracted the input data from the road section information database, which was verified and refined with the help of the technical advisory panel. Additional iterations of this process using TONN2010 and the supplementary tools developed by the project team allowed for the development of final road section backcalculation information that appears in the final dataset.

4.3 ADDITIONAL SEASONAL ANALYSIS AND DISCUSSION

As noted in Chapter 2, while moisture and seasonal effects had been set aside by the technical advisory panel in identifying key parameters for the dataset, the project team is aware that these factors play an important role in layer stiffness. The behavior of materials and structures can be influenced by seasonal variations (combinations of temperature and moisture). These effects are particularly worth investigating in wet-freeze climates such as that of Minnesota, where low-temperatures ("cold snaps") and freeze-thaw cycling are the primary source of flexible pavement damage.

As project resources had been adequately conserved throughout the study, in the later analysis stages, the project team suggested that the study venture slightly into an investigative research to include seasonal analysis of the backcalculated data. The technical advisory panel agreed to this suggestion on the understanding that the investigation would be performed within the existing contract – i.e., there would be no additional cost associated with the investigation.

For seasonal effects to be visible as trends in the base and/or subgrade resilient modulus, the analysis requires that (1) each section is tested many times in the same location and (2) those many tests include testing throughout the late spring, summer, and fall. Deflection data across seasons allows the analysis to possibly reflect changing base and subgrade conditions that accord with the seasons. In short, the more deflection basins that are recorded, the easier it is to identify the seasonal pattern.

Unfortunately, while the final dataset accounts for over 12,000 deflection basins, a very small number of those tests were informative for a study of seasonal effects. The team hypothesizes that this is a function, in part, of engineering habits. Data collected once in location was considered sufficient – i.e.

“No need to test there again, we already got it last summer/fall!” Naturally, this tendency limits the ability of the final dataset to comment on seasonal effect.

Where FWD testing had been performed in more than one season, such as in the MnROAD test cells, the backcalculation results did not indicate statistically significant correlation with seasonal (i.e. test date). However, the project team acknowledges that with more resources, the analysis may have considered other factors and been expanded to better understand performance by test date. This aspect of the project work is one that could be expanded by MnDOT in future studies.

4.4 RESULTS

Results were summarized in a final datasheet table that was delivered to the technical advisory panel for full review on three separate occasions. The final dataset is described in Chapter 5. A compact version of the final dataset – which focuses on backcalculated base stiffness – is available in Appendix C. The table, which represents the results for unbound recycled base stiffness, reports the following details for each tested section.

- Statistical values: average and standard deviation of the backcalculated elastic moduli of the top, base, and subgrade layer.
- Layer thicknesses and material composition.
- Base construction types (FDR, CIR, FDR + Geogrid, MnDOT Class 5 Modified (RCA), MnDOT Class 6 (RAP). The definitions of base composition and the assigned base type by road section were provided to the project team by MnDOT engineers.

Figure 4 illustrates a histogram for the average backcalculated base stiffness for the road sections using unbound FDR bases (62 sections). Similar statistical analysis can be produced using the final dataset.

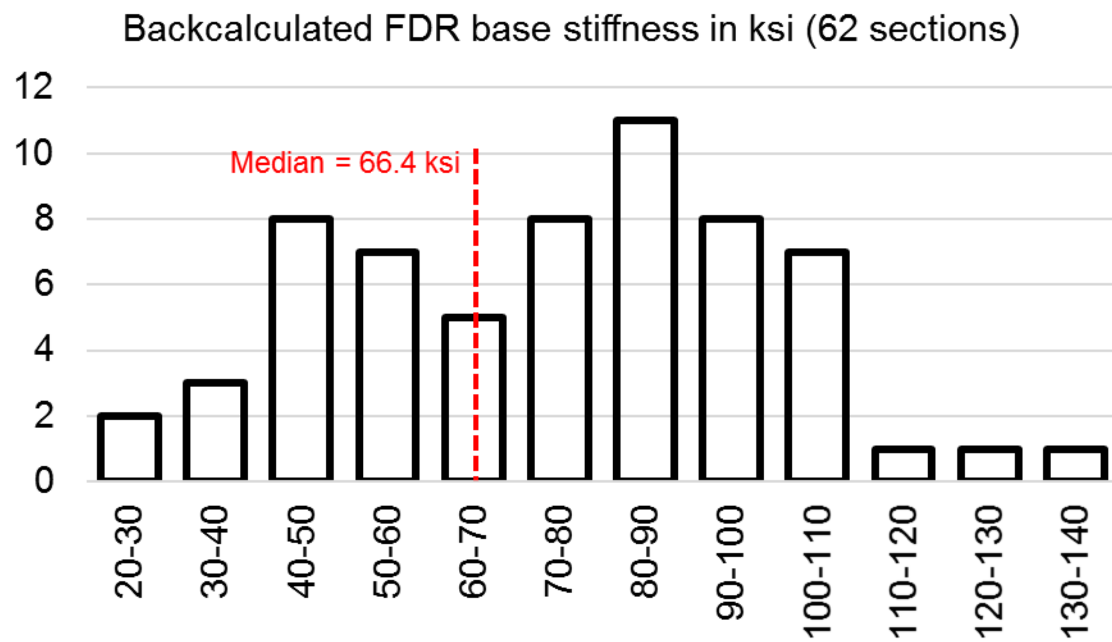

Figure 4. Histogram of average base stiffness for 62 road sections using FDR bases

CHAPTER 5: FINAL DATASET FOR MNPAVE FLEXIBLE DEVELOPER REVIEW

As noted previously, the MnPAVE Flexible software performs mechanistic-empirical modeling of asphalt pavements to predict performance (in fatigue cracking and rutting) and optimize pavement thickness design. To adequately capture in-situ behavior, MnPAVE Flexible relies on an up-to-date library of pavement construction materials. While each material can be described through characteristics such as gradation, moisture, composition, etc., MnPAVE Flexible – like many other mechanistic-empirical methods – prioritizes the elastic (resilient) modulus.

Chapters 2 through 4 above summarize the process by which the project team (with the assistance of MnDOT district and research engineers) selected road sections, verified and corrected supplemental road section data, validated procedures, performed analysis using two backcalculation procedures, and performed post-processing to confirm or re-run backcalculation analysis as required. These efforts led to the compilation of the final dataset, which is described in this chapter using basic summary tables.

Note: While the report uses summary tables to describe the organization of the dataset, this report assumes the reader has full access to the final dataset.

Finally, as noted in Section 3.4, an additional project objective was to correlate field base materials (and their associated elastic moduli) with one of 921 pavement construction materials described in the MnDOT OMRR MR laboratory database. The team explored possible relationships between field and lab materials with the technical advisory panel – where possible correlations were identified and reported in the final dataset for information purposes only.

5.1 ROAD SECTIONS IN THE DATASET

Table 7 summarizes the road sections that are described in the final dataset. The table provides a quick reference of each road, location (district and county) and termini.

- The pavement structure is reported listing the thickness of the bituminous layer, base and subgrade (if available) and the base material type.
- The base material types were estimated with the help of the district engineers and were summarized into 5 categories: CIR, FDR, FDR+Geogrid, Class 5 Mod, Class 6. These categories were discussed in Chapter 3.
- Blank cell entries for road base materials exist for instances where the project team and technical advisory panel were unable to obtain a base material description.
- Falling-weight deflectometer (FWD) tests were performed along each of the road sections at 0.1-mile intervals. The average number of the FWD drops per test for all tests conducted on a road section are reported in this table.

5.2 DATASET COLUMN DESCRIPTIONS

The team delivered to MnDOT the final dataset reporting the backcalculated results. Because of the size of the database, the team introduced simplified and abbreviated column headers. Table 8 provides a detailed description of each of the column headers of the database.

5.3 SUMMARY OF BASE PERFORMANCE BY TYPE

The team provided a summary of the tested sections classifying them by base type. Table 9 lists the tested road sections and the statistical values of the backcalculated resilient moduli of the base layer. Base type and composition were estimated with the help of the MnDOT districts engineers. Cells of the dataset were left blank in the case of incomplete information. District engineers provided important details regarding the base material composition which was expressed as a probabilistic range. Overall, the dataset lists base materials composed by recycled asphalt pavement (RAP), Portland cement concrete (PCC), recycled concrete aggregate (RCA), and Class 5 aggregate. As noted above, the performance summary includes information-only attempts to associated backcalculated elastic modulus ("in situ") and resilient modulus obtained through triaxial testing ("laboratory").

5.4 SPECIAL NOTES ON ROAD STRUCTURE ESTIMATES

As discussed in Section 3.2, a project challenge was characterizing the pavement structure for a given road location and its FWD data. One of the main issues was identifying and verifying the base type composition and as-built thickness, particularly when design plans were not updated or unavailable.

All assumed cross-sections and materials sections and results in the final dataset were reviewed with MnDOT engineers, either MnDOT district engineers or MnDOT research engineers from OMRR. This included termini of each of the roads.

MnDOT engineers were able to identify some of roads and were able to confirm or redefine the base construction type for most of them. The estimate of the material composition of the base was more challenging, but the project team was able to collect for most of the roads an estimate of the material in terms of percentage. Additionally, MnDOT engineers assisted the project team in distinguishing roads whose layers included cold-in place recycled (CIR) layers from roads using full depth reclamation (FDR).

In some cases, where backcalculation results were clearly questionable yet design or as-built information was not available, the project team performed multiple sets of analyses. In these cases, a factorial of layer thicknesses for surface asphalt or base material were assumed and investigated using many backcalculation analyses. These varied results were discussed with MnDOT engineers, and when the structure remained uncertain, a cross-section corresponding with behavior judged to be reasonable by MnDOT engineers was selected for inclusion in the final dataset.

Finally, for road sections lacking important details, such as state project number, base construction year, base type, and material composition, the team left the corresponding values blank in the final dataset. The project team still performed and reported backcalculation analysis to provide an estimate of performance for the final dataset on the understanding that these sections could be excluded by MnDOT when characterizing inputs for MnPAVE Flexible.

Table 7. Road Sections: Locations, geometry and base material description.

Road	District	County	Begin RP	End RP	HMA [in]	Base [in]	SG [in]	Base Type	Avg_Drops
TH011	D1	Koochiching	0.1	3.1	6.0	12.0	--	FDR	31
TH053	D1	St Louis	34.0	31.0	7.0	7.0	--	Mod. Class 5	31
TH053	D1	St Louis	29.0	27.0	7.0	7.0	--	Mod. Class 5	21
TH071	D1	Koochiching	0.1	3.2	4.5	8.0	--	FDR	28
TH001	D2	Marshall	0.1	3.1	5.0	9.0	--	FDR	30
TH001	D2	Marshall	17.6	31.0	5.0	12.0	--	FDR	135
TH001	D2	Pennington	31.1	37.8	5.0	8.0	--	FDR	68
TH001	D2	Pennington	37.9	44.4	5.0	8.0	--	FDR	66
TH002	D2	Polk	71.6	74.3	6.0	11.0	--	FDR	28
TH006	D2	Itasca	109.3	119.6	4.5	12.0	--	?	104
TH006	D2	Itasca	119.4	130.1	4.5	12.0	--	?	104
TH006	D2	Itasca	119.4	128.3	4.5	12.0	--	?	85
TH009	D2	Polk	210.3	210.6	4.5	10.0	--	FDR	13
TH009	D2	Polk	207.5	210.2	4.5	10.0	--	FDR	28
TH009	D2	Norman	0.1	3.1	4.5	10.0	--	FDR	29
TH009	D2	Polk	210.7	214.5	4.5	10.0	--	FDR	39
TH009	D2	Polk	214.6	225.7	4.5	10.0	--	FDR	114
TH009	D2	Norman	193.6	207.4	5.0	9.0	--	FDR	139
TH011	D2	Koochiching	148.3	158.0	6.0	12.0	--	FDR+Geogrid	98
TH011	D2	Koochiching	158.1	166.7	6.0	12.0	--	FDR+Geogrid	87
TH011	D2	Roseau	67.8	70.7	4.5	12.0	--	FDR	30
TH011	D2	Roseau	48.3	57.9	4.5	8.0	--	FDR	97
TH011	D2	Roseau	58.0	67.7	4.5	8.0	--	FDR	98
TH032	D2	Marshall	108.1	116.3	4.5	12.0	--	FDR	332
TH032	D2	Marshall	121.0	127.0	4.5	12.0	--	FDR	61
TH032	D2	Polk	0.0	3.1	4.5	8.0	--	FDR	31
TH032	D2	Polk	60.8	62.4	4.5	8.0	--	FDR	17
TH032	D2	Polk	59.0	60.7	4.5	8.0	--	FDR	19
TH032	D2	Pennington	105.2	108.0	4.5	12.0	--	FDR	29
TH032	D2	Marshall	116.4	120.9	4.5	12.0	--	FDR	46
TH032	D2	Norman	48.2	58.9	4.5	8.0	--	FDR	118
TH034	D2	Hubbard	77.3	80.1	5.5	8.0	--	FDR	116
TH034	D2	Hubbard	80.2	93.3	5.5	8.0	--	FDR	132

Road	District	County	Begin RP	End RP	HMA [in]	Base [in]	SG [in]	Base Type	Avg_Drops
TH059	D2	Marshall	363.3	377.0	7.9	12.0	--	CIR	138
TH064	D2	Hubbard	260.8	266.6	7.5	10.0	--	CIR	84
TH064	D2	Hubbard	267.2	301.0	7.5	10.0	--	CIR	455
TH064	D2	Hubbard	301.5	324.7	7.5	10.0	--	CIR	315
TH064	D2	Hubbard	325.2	342.1	7.5	10.0	--	CIR	33
TH071	D2	Koochiching	384.5	384.6	5.0	10.0	--	FDR	2
TH071	D2	Koochiching	375.2	384.4	5.0	10.0	--	?	93
TH071	D2	Koochiching	384.7	385.0	5.0	10.0	--	FDR	4
TH071	D2	Hubbard	280.2	287.6	4.5	22.0	--	?	75
TH071	D2	Hubbard	255.7	255.8	6.0	8.0	--	FDR	2
TH071	D2	Hubbard	255.9	258.7	6.0	8.0	--	FDR	29
TH071	D2	Hubbard	258.8	259.2	6.0	8.0	--	FDR	5
TH071	D2	Hubbard	259.3	260.6	6.0	8.0	--	CIR	56
TH071	D2	Beltrami	306.9	308.2	6.5	7.0	--	Class 6	14
TH071	D2	Beltrami	308.2	306.9	6.5	7.0	--	Class 6	14
TH071	D2	Hubbard	303.8	306.8	6.0	8.0	--	FDR	31
TH071	D2	Hubbard	306.8	306.4	6.0	8.0	--	FDR	5
TH071	D2	Hubbard	251.4	255.6	6.0	8.0	--	FDR	172
TH071	D2	Koochiching	354.3	365.0	5.0	10.0	--	FDR	108
TH071	D2	Koochiching	365.1	375.2	5.0	10.0	--	FDR	102
TH071	D2	Koochiching	375.2	384.4	4.5	8.0	--	FDR	93
TH071	D2	Hubbard	294.3	303.8	9.6	12.0	--	CIR	92
TH072	D2	Lake of the Woods	50.9	62.0	4.5	9.0	--	?	672
TH072	D2	Lake of the Woods	71.1	74.6	6.0	10.0	--	?	36
TH072	D2	Beltrami	48.0	50.8	5.0	10.0	--	FDR	174
TH072	D2	Beltrami	36.7	42.4	5.0	10.0	--	FDR	58
TH072	D2	Beltrami	42.5	42.7	5.0	10.0	--	FDR	12
TH072	D2	Beltrami	42.7	42.9	5.0	10.0	--	FDR	13
TH072	D2	Beltrami	43.0	43.2	5.0	10.0	--	FDR	12
TH072	D2	Beltrami	43.2	43.4	5.0	10.0	--	FDR	13
TH072	D2	Beltrami	43.5	46.0	5.0	10.0	--	FDR	51
TH072	D2	Beltrami	46.5	47.0	5.0	10.0	--	FDR	20
TH072	D2	Beltrami	46.0	46.5	5.0	10.0	--	FDR	20
TH072	D2	Beltrami	47.0	48.0	5.0	10.0	--	FDR	39

Road	District	County	Begin RP	End RP	HMA [in]	Base [in]	SG [in]	Base Type	Avg_Drops
TH072	D2	Lake of the Woods	62.0	71.0	6.0	10.0	--	--	91
TH089	D2	Marshall	86.9	103.3	5.0	8.0	--	FDR	165
TH089	D2	Beltrami	74.0	79.6	5.0	8.0	--	FDR	46
TH089	D2	Beltrami	79.7	81.3	5.0	8.0	--	FDR	9
TH089	D2	Beltrami	75.1	79.6	5.0	8.0	--	--	46
TH089	D2	Beltrami	79.7	80.5	5.0	8.0	--	--	9
TH113	D2	Norman	5.1	9.0	5.0	9.0	--	Mill Overlay	40
TH113	D2	Norman	0.0	5.0	5.0	9.0	--	FDR	51
TH113	D2	Mahnomen	9.1	14.8	5.0	9.0	--	FDR	57
TH172	D2	Lake of the Woods	0.1	11.5	8.6	10.0	--	CIR	684
TH200	D2	Norman	32.0	41.4	6.0	8.0	--	FDR	99
TH200	D2	Mahnomen	41.5	46.3	6.0	8.0	--	FDR	48
TH238	D3	Stearns	0.1	4.0	4.0	8.0	--	FDR	39
TH055	D4	Pope	0.0	6.4	5.0	5.0	--	FDR	62
TH059	D4	Nobles	0.1	3.5	7.0	10.0	--	FDR	32
TH062	D7	Cottonwood	0.0	3.3	4.0	10.0	--	FDR	32
TH083	D7	Waseca	0.0	3.2	5.0	15.5	--	FDR	33
TH109	D7	Faribault	0.0	3.6	5.0	18.0	--	FDR	37
TH023	D8	Lincoln	48.0	52.0	12.0	18.0	--	CIR	41
TH023	D8	Lyon	55.0	56.0	12.0	12.0	--	CIR	16
TH023	D8	Lyon	59.0	61.0	12	12.0	--	CIR	64
TH023	D8	Pipestone	34.0	36.0	8	12.0	--	FDR	21
TH023	D8	Pipestone	40.0	43.0	8	12.0	--	FDR	31
16	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	18
16	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	18
16	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	16
16	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	17
17	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	18
17	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	17
17	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	17
17	MNROAD	Wright	2.0	10.0	5	24.0	7" Grain + Clay	C5_RCA	17
18	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_RAP	16
18	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_RAP	17
18	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_RAP	15

Road	District	County	Begin RP	End RP	HMA [in]	Base [in]	SG [in]	Base Type	Avg_Drops
18	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_RAP	16
19	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_AGG	18
19	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_AGG	17
19	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_AGG	17
19	MNROAD	Wright	2.0	10.0	5.25	24.0	7" Grain + Clay	C5_AGG	16

Table 8. Description of columns and data in project final dataset

Column	Description
District	District number or MnROAD
Road / Cell	Name of the road or MnROAD test cell
Section / Lane	Control Section Number or MnROAD cell FWD test location
Begin RP (District)	Section beginning MnDOT Reference Point (RP)
End RP (District)	Section end MnDOT Reference Point (RP)
Base Type	Approximate characterization of base type, FDR (Blend of Reclaimed Asphalt and Base Aggregate) OR C5/6 (Gradation) of Recycled Asphalt (RAP), Recycled PCC (RCA), or Virgin Aggregate (AGG)
Low-High Probability	Approximate estimate % of recycled materials (RAP or PCC) in base material
Base Const Yr	Year that base containing reclaimed materials was constructed
First Test (MnROAD)	Date of first FWD test performed on test cell whose basin is included in this dataset
Last Test (MnROAD)	Date of last FWD test performed on test cell whose basin is included in this dataset
Num_Tests	Number of FWD test events
Test Date	Day in which FWD was performed (for MnROAD cells this is not relevant as many test events per MnROAD cell and location)
Avg_Drops	Average number of drops per event
COV D0 @ 9 kip (District)	Coefficient of variation in deflections directly under a 9 kip load (+/- 500 lb)
Avg Temp [°F]	Previous day's temperature
Backcalc	Method for FWD backcalculation (T=Tonn2010, TF - Tonn2010 Fortran Batch)
HMA_Thick	Thickness in inches of HMA for backcalc (assumed from design plans)
HMA_Avg	Average of HMA modulus (ksi)

Column	Description
HMA_St.Dev	Standard Deviation of HMA modulus (ksi)
Base_Thick	Thickness in inches of base layer using recycled materials or FDR for backcalc (assumed from design plans)
Base_Avg	Average of Base modulus (ksi)
Base_St.Dev	Standard Deviation of Base modulus (ksi)
SB_Avg	Average of Subgrade modulus (ksi)
SB_St.Dev	Standard Deviation of Subgrade modulus (ksi)
Lab (TriAx) [psi] E_lab	Modulus computed in lab using triaxial test (1-28A) from MnDOT records (psi)
Ratio E_field/E_lab	Ratio of backcalculated in-situ modulus to lab triaxial resilient modulus
Notes	Additional details

Table 9. Summary of final dataset for MnPAVE Flexible analysis

Road	District	Base [in]	Base Type	Low-High Probabilty	Base Const Yr	Base_Avg [ksi]	Base_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
TH011	D1	12.0	FDR	50%RAP-70%RAP	2010	32.9	8.1	37.6
TH053	D1	7.0	Mod. Class 5	100% PCC	2018	202.2	39.8	54.5
TH053	D1	7.0	Mod. Class 5	100% PCC	2018	305.3	141.1	54.5
TH071	D1	8.0	FDR	50%RAP-70%RAP	2011	34.5	8.7	37.6
TH001	D2	9.0	FDR	60%RAP-75%RAP	?	61.7	18.9	23.1
TH001	D2	12.0	FDR	60%RAP-75%RAP	2009	65.9	16.3	23.1
TH001	D2	8.0	FDR	60%RAP-75%RAP	?	91.6	27.4	23.1
TH001	D2	8.0	FDR	60%RAP-75%RAP	?	74.4	22.1	23.1
TH002	D2	11.0	FDR	60%RAP-75%RAP	2015	43.1	11.3	37.6
TH006	D2	12.0	?	?-?	2004	64.0	39.5	--
TH006	D2	12.0	?	?-?	2004	32.7	8.7	--
TH006	D2	12.0	?	?-?	2004	33.0	8.2	--
TH009	D2	10.0	FDR	60%RAP-75%RAP	?	98.1	34.5	23.1
TH009	D2	10.0	FDR	60%RAP-75%RAP	?	99.2	27.5	23.1
TH009	D2	10.0	FDR	60%RAP-75%RAP	?	64.2	17.4	23.1
TH009	D2	10.0	FDR	60%RAP-75%RAP	?	53.7	13.4	23.1
TH009	D2	10.0	FDR	60%RAP-75%RAP	?	53.7	14.6	23.1

Road	District	Base [in]	Base Type	Low-High Probabilty	Base Const Yr	Base_Avg [ksi]	Base_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
TH009	D2	9.0	FDR	60%RAP-75%RAP	2013	83.2	27.7	23.1
TH011	D2	12.0	FDR+Geogrid	60%RAP-75%RAP	?	29.1	7.7	23.1
TH011	D2	12.0	FDR+Geogrid	60%RAP-75%RAP	?	28.1	10.9	23.1
TH011	D2	12.0	FDR	60%RAP-75%RAP	2012	66.4	14.4	23.1
TH011	D2	8.0	FDR	60%RAP-75%RAP	?	81.8	24.9	23.1
TH011	D2	8.0	FDR	60%RAP-75%RAP	2012	72.7	18.1	23.1
TH032	D2	12.0	FDR	60%RAP-75%RAP	2015	66.0	14.6	23.1
TH032	D2	12.0	FDR	60%RAP-75%RAP	?	87.1	22.5	23.1
TH032	D2	8.0	FDR	60%RAP-75%RAP	?	47.1	11.5	23.1
TH032	D2	8.0	FDR	60%RAP-75%RAP	?	58.0	14.9	23.1
TH032	D2	8.0	FDR	60%RAP-75%RAP	?	39.4	8.2	23.1
TH032	D2	12.0	FDR	60%RAP-75%RAP	?	77.1	14.6	23.1
TH032	D2	12.0	FDR	60%RAP-75%RAP	?	76.2	13.7	23.1
TH032	D2	8.0	FDR	60%RAP-75%RAP	2009	48.0	10.8	23.1
TH034	D2	8.0	FDR	60%RAP-75%RAP	?	69.6	25.7	23.1
TH034	D2	8.0	FDR	60%RAP-75%RAP	?	42.9	10.9	23.1
TH059	D2	12.0	CIR	?-?	2005	50.4	18.2	--
TH064	D2	10.0	CIR	?-?	2006	148.4	64.1	--
TH064	D2	10.0	CIR	?-?	2006	130.0	45.5	--
TH064	D2	10.0	CIR	?-?	2006	91.5	41.4	--
TH064	D2	10.0	CIR	?-?	2006	93.6	39.7	--
TH071	D2	10.0	FDR	60%RAP-75%RAP	?	27.5	2.7	23.1
TH071	D2	10.0	?	?-?	?	41.9	9.1	--
TH071	D2	10.0	FDR	60%RAP-75%RAP	?	30.5	3.9	23.1
TH071	D2	22.0	?	?-?	2017	48.3	8.7	--
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	108.0	27.2	23.1
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	123.6	32.0	23.1
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	97.0	10.3	23.1
TH071	D2	8.0	CIR	?-?	1999	38.3	14.7	37.6
TH071	D2	7.0	Class 6	60%RAP-75%RAP	?	43.8	15.9	17.4
TH071	D2	7.0	Class 6	60%RAP-75%RAP	?	63.5	19.0	17.4
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	59.1	12.9	23.1
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	93.0	46.8	23.1

Road	District	Base [in]	Base Type	Low-High Probabilty	Base Const Yr	Base_Avg [ksi]	Base_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	94.6	39.0	23.1
TH071	D2	10.0	FDR	60%RAP-75%RAP	?	66.3	27.4	23.1
TH071	D2	10.0	FDR	60%RAP-75%RAP	?	72.1	21.0	23.1
TH071	D2	8.0	FDR	60%RAP-75%RAP	?	49.5	12.2	23.1
TH071	D2	12.0	CIR	?-?	2005	37.5	11.0	--
TH072	D2	9.0	?	?-?	2006?2011?	82.8	20.6	--
TH072	D2	10.0	?	?-?	2006?2011?	125.8	32.6	--
TH072	D2	10.0	FDR	60%RAP-75%RAP	2011	92.9	17.8	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	89.2	18.1	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	79.1	4.5	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	76.7	7.2	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	86.5	6.4	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	82.8	16.5	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	81.3	16.3	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	70.4	9.0	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	78.5	13.2	23.1
TH072	D2	10.0	FDR	60%RAP-75%RAP	?	82.7	13.3	23.1
TH072	D2	10.0	?	?-?	2006?2011?	86.4	32.1	--
TH089	D2	8.0	FDR	60%RAP-75%RAP	?	29.2	22.2	23.1
TH089	D2	8.0	FDR	60%RAP-75%RAP	2001	34.5	20.2	23.1
TH089	D2	8.0	FDR	60%RAP-75%RAP	?	24.1	14.7	23.1
TH089	D2	8.0	?	?-?	?	60.1	29.3	--
TH089	D2	8.0	?	?-?	?	30.5	7.8	--
TH113	D2	9.0	Mill Overlay	?-?	?	42.3	11.5	--
TH113	D2	9.0	FDR	60%RAP-75%RAP	2006	35.4	11.8	23.1
TH113	D2	9.0	FDR	60%RAP-75%RAP	?	70.9	26.5	23.1
TH172	D2	10.0	CIR	60%RAP-75%RAP	2002	28.7	18.5	--
TH200	D2	8.0	FDR	60%RAP-75%RAP	?	48.0	21.2	23.1
TH200	D2	8.0	FDR	60%RAP-75%RAP	2003	54.8	19.2	23.1
TH238	D3	8.0	FDR	60%RAP-75%RAP	2017	72.1	27.4	23.1
TH055	D4	5.0	FDR	?-?	?	117.0	34.7	--
TH059	D4	10.0	FDR	60%RAP-75%RAP	2016	61.2	33.0	23.1
TH062	D7	10.0	FDR	50/50	2014	42.1	12.9	37.6

Road	District	Base [in]	Base Type	Low-High Probabilty	Base Const Yr	Base_Avg [ksi]	Base_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
TH083	D7	15.5	FDR	?-?	?	34.1	13.2	--
TH109	D7	18.0	FDR	50/50	?	32.5	10.7	37.6
TH023	D8	18.0	CIR	?-?	2002	4.3	0.9	--
TH023	D8	12.0	CIR	?-?	2000	9.1	2.9	--
TH023	D8	12.0	CIR	?-?	2000	23.0	6.6	--
TH023	D8	12.0	FDR	50/50	2002	16.7	6.7	37.6
TH023	D8	12.0	FDR	50/50	2002	18.9	6.1	37.6
16	MNROAD	24.0		C5_RCA	2008	41.5	6.9	37.6
16	MNROAD	24.0		C5_RCA	2008	45.4	6.3	37.6
16	MNROAD	24.0		C5_RCA	2008	32.8	6.0	37.6
16	MNROAD	24.0		C5_RCA	2008	35.9	5.7	37.6
17	MNROAD	24.0		C5_RCA	2008	35.7	4.2	37.6
17	MNROAD	24.0		C5_RCA	2008	35.7	6.8	37.6
17	MNROAD	24.0		C5_RCA	2008	30.6	4.9	37.6
17	MNROAD	24.0		C5_RCA	2008	33.5	6.3	37.6
18	MNROAD	24.0		C5_RAP	2008	30.6	3.9	32.4
18	MNROAD	24.0		C5_RAP	2008	33.5	5.1	32.4
18	MNROAD	24.0		C5_RAP	2008	29.6	4.3	32.4
18	MNROAD	24.0		C5_RAP	2008	31.6	4.1	32.4
19	MNROAD	24.0		C5_AGG	2008	22.1	2.0	14.1
19	MNROAD	24.0		C5_AGG	2008	22.4	2.0	14.1
19	MNROAD	24.0		C5_AGG	2008	19.8	2.1	14.1
19	MNROAD	24.0		C5_AGG	2008	19.9	1.9	14.1

CHAPTER 6: CONCLUSIONS

MnDOT's mechanistic-empirical flexible pavement design procedure, MnPAVE Flexible, recognizes the use of unbound recycled materials (e.g., Cold In-place Recycling, Rubblized Concrete) in its software. Currently, the relevant mechanistic properties assumed for recycled materials within MnPAVE Flexible are estimates developed by MnDOT during the software development stages. That is, they are not values supported by dedicated studies of Minnesota recycled materials, including findings from the various MnDOT research studies on recycled materials.

The developers of MnPAVE Flexible at MnDOT recognized the need to revise and incorporate unbound recycled base material properties into the MnPAVE-Flexible design procedure using available MnDOT resources. After reviewing previously performed research studies, MnDOT determined that MnDOT laboratory and field test data were potential untapped resources for information to improve MnPAVE Flexible's estimate of the structural performance of unbound bases containing recycled materials. MnDOT focused on the potential for existing pavement data — and analysis thereof — to provide information on pavement layer input properties in the MnPAVE Flexible design procedure.

Therefore, the research performed in this study develops a dataset that describes the field and laboratory performance of unbound bases from 106 road sections containing recycled materials in Minnesota. This dataset provides a compact view of backcalculated layer properties (from falling-weight deflection data) per road section. This view includes summary statistics on backcalculated layer properties, estimates of possible errant data in raw deflection basins, associated laboratory resilient modulus (MR) values, and other brief but insightful measures that allow MnDOT research engineers to consider which road sections to include and exclude in determining a basis for MnPAVE Flexible material inputs.

In addition to the final dataset, the project report concisely documents the effort that resulted in the MnPAVE Flexible unbound recycled base dataset. This effort, while straightforward, is extensive given the volume of data reviewed and analyzed and the condition of that data prior to analysis (i.e., much of the data was not supported with documentation and/or required cleaning/validation).

The final dataset from the project will assist the MnDOT developers of MnPAVE Flexible to better predict pavement performance and improve design. If successfully implemented, improvements to MnPAVE-Flexible will ensure the service life of road infrastructure in Minnesota and lower road maintenance costs. Improvements to the representation of unbound recycled materials in design procedures could also lead to their increased use in pavements, which can potentially lower construction costs.

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APPENDIX A
SELECTED ROAD SECTION LOCATIONS

Table 1 – Road section locations

District	Road	Section	Begin RP	End RP	HMA [in]	Base [in]	Base Type	Base Const Yr	Low-High Probabilty
D1	TH011	3604-26	0.1	3.1	6	12	FDR	2010	50%RAP-70%RAP
D1	TH053	6917	34	31	7	7	Mod. Class 5	2018	100% PCC
D1	TH053	6917	29	27	7	7	Mod. Class 5	2018	100% PCC
D1	TH071	3611-15,3611-23	0.1	3.2	4.5	8	FDR	2011	50%RAP-70%RAP
D2	TH001	SP4502-05,SP6901-07	0.1	3.1	5	9	FDR	--	60%RAP-75%RAP
D2	TH001	4502	17.6	31	5	12	FDR	2009	60%RAP-75%RAP
D2	TH001	5701	31.1	37.8	5	8	FDR	--	60%RAP-75%RAP
D2	TH001	5701B	37.9	44.4	5	8	FDR	--	60%RAP-75%RAP
D2	TH002	6005	71.6	74.3	6	11	FDR	2015	60%RAP-75%RAP
D2	TH006	3107A	109.3	119.6	4.5	12	--	2004	--
D2	TH006	3107B	119.4	130.1	4.5	12	--	2004	--
D2	TH006	3107B-1	119.4	128.3	4.5	12	--	2004	--
D2	TH009	6010B	210.3	210.6	4.5	10	FDR	--	60%RAP-75%RAP
D2	TH009	6010A	207.5	210.2	4.5	10	FDR	--	60%RAP-75%RAP
D2	TH009	5408-11,6010-12	0.1	3.1	4.5	10	FDR	--	60%RAP-75%RAP
D2	TH009	6010C	210.7	214.5	4.5	10	FDR	--	60%RAP-75%RAP
D2	TH009	6010D	214.6	225.7	4.5	10	FDR	--	60%RAP-75%RAP
D2	TH009	5408	193.6	207.4	5	9	FDR	2013	60%RAP-75%RAP
D2	TH011	3604A	148.3	158	6	12	FDR+Geogrid	--	60%RAP-75%RAP
D2	TH011	3604B	158.1	166.7	6	12	FDR+Geogrid	--	60%RAP-75%RAP
D2	TH011	6802	67.8	70.7	4.5	12	FDR	2012	60%RAP-75%RAP

District	Road	Section	Begin RP	End RP	HMA [in]	Base [in]	Base Type	Base Const Yr	Low-High Probabilty
D2	TH011	6802A	48.3	57.9	4.5	8	FDR	--	60%RAP-75%RAP
D2	TH011	6802	58	67.7	4.5	8	FDR	2012	60%RAP-75%RAP
D2	TH032	4503	108.1	116.3	4.5	12	FDR	2015	60%RAP-75%RAP
D2	TH032	4504	121	127	4.5	12	FDR	--	60%RAP-75%RAP
D2	TH032	6006-13	0	3.1	4.5	8	FDR	--	60%RAP-75%RAP
D2	TH032	6006B	60.8	62.4	4.5	8	FDR	--	60%RAP-75%RAP
D2	TH032	6006A	59	60.7	4.5	8	FDR	--	60%RAP-75%RAP
D2	TH032	5704	105.2	108	4.5	12	FDR	--	60%RAP-75%RAP
D2	TH032	4503A	116.4	120.9	4.5	12	FDR	--	60%RAP-75%RAP
D2	TH032	5405	48.2	58.9	4.5	8	FDR	2009	60%RAP-75%RAP
D2	TH034	2902A	77.3	80.1	5.5	8	FDR	--	60%RAP-75%RAP
D2	TH034	2902B	80.2	93.3	5.5	8	FDR	--	60%RAP-75%RAP
D2	TH059	4505	363.3	377	7.9	12	CIR	2005	--
D2	TH064	2913	260.8	266.6	7.5	10	CIR	2006	--
D2	TH064	2913	267.2	301	7.5	10	CIR	2006	--
D2	TH064	2913	301.5	324.7	7.5	10	CIR	2006	--
D2	TH064	2913	325.2	342.1	7.5	10	CIR	2006	--
D2	TH071	3611B	384.5	384.6	5	10	FDR	--	60%RAP-75%RAP
D2	TH071	?	375.2	384.4	5	10	--	--	--
D2	TH071	3611C	384.7	385	5	10	FDR	--	60%RAP-75%RAP
D2	TH071	2906	280.2	287.6	4.5	22	--	2017	--
D2	TH071	2904B	255.7	255.8	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	2904C	255.9	258.7	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	2904D	258.8	259.2	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	2905	259.3	260.6	6	8	CIR	1999	--

District	Road	Section	Begin RP	End RP	HMA [in]	Base [in]	Base Type	Base Const Yr	Low-High Probabilty
D2	TH071	0409N	306.9	308.2	6.5	7	Class 6	--	60%RAP-75%RAP
D2	TH071	0409S	308.2	306.9	6.5	7	Class 6	--	60%RAP-75%RAP
D2	TH071	2907N	303.8	306.8	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	2907S	306.8	306.4	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	2904A	251.4	255.6	6	8	FDR	--	60%RAP-75%RAP
D2	TH071	3611A	354.3	365	5	10	FDR	--	60%RAP-75%RAP
D2	TH071	3611B	365.1	375.2	5	10	FDR	--	60%RAP-75%RAP
D2	TH071	3611A	375.2	384.4	4.5	8	FDR	--	60%RAP-75%RAP
D2	TH071	2907	294.3	303.8	9.6	12	CIR	2005	--
D2	TH072	3903	50.9	62	4.5	9	--	2006?2011?	--
D2	TH072	3903-24	71.1	74.6	6	10	--	2006?2011?	--
D2	TH072	413	48	50.8	5	10	FDR	2011	60%RAP-75%RAP
D2	TH072	0413A	36.7	42.4	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS1	42.5	42.7	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS2	42.7	42.9	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS3	43	43.2	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS4	43.2	43.4	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS5	43.5	46	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS7	46.5	47	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS6	46	46.5	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	0413RS8	47	48	5	10	FDR	--	60%RAP-75%RAP
D2	TH072	3903-24	62	71	6	10	--	2006?2011?	--
D2	TH089	4508B	86.9	103.3	5	8	FDR	--	60%RAP-75%RAP
D2	TH089	415	74	79.6	5	8	FDR	2001	60%RAP-75%RAP
D2	TH089	4508A	79.7	81.3	5	8	FDR	--	60%RAP-75%RAP

District	Road	Section	Begin RP	End RP	HMA [in]	Base [in]	Base Type	Base Const Yr	Low-High Probabilty
D2	TH089	?	75.1	79.6	5	8	--	--	--
D2	TH089	?	79.7	80.5	5	8	--	--	--
D2	TH113	5413B	5.1	9	5	9	Mill Overlay	--	--
D2	TH113	5413	0	5	5	9	FDR	2006	60%RAP-75%RAP
D2	TH113	4407	9.1	14.8	5	9	FDR	--	60%RAP-75%RAP
D2	TH172	3904	0.1	11.5	8.6	10	CIR	2002	60%RAP-75%RAP
D2	TH200	5403	32	41.4	6	8	FDR	--	60%RAP-75%RAP
D2	TH200	4401	41.5	46.3	6	8	FDR	2003	60%RAP-75%RAP
D3	TH238	?	0.1	4	4	8	FDR	2017	60%RAP-75%RAP
D4	TH055	6107-03 ? 8607?	0	6.4	5	5	FDR	--	--
D4	TH059	5309-10	0.1	3.5	7	10	FDR	2016	60%RAP-75%RAP
D7	TH062	1704-27	0	3.3	4	10	FDR	2014	50/50
D7	TH083	8107-10,0711-16	0	3.2	5	15.5	FDR	--	--
D7	TH109	2212-11	0	3.6	5	18	FDR	--	50/50
D8	TH023	4105-08	48	52	12	18	CIR	2002	--
D8	TH023	4206-20	55	56	12	12	CIR	2000	--
D8	TH023	4206-20	59	61	12	12	CIR	2000	--
D8	TH023	5902-21	34	36	8	12	FDR	2002	50/50
D8	TH023	5902-21	40	43	8	12	FDR	2002	50/50
MNROAD	16	--	2	10	5	24	--	9/20/2008	C5_RCA
MNROAD	17	--	2	10	5	24	--	9/20/2008	C5_RCA
MNROAD	18	--	2	10	5.25	24	--	9/20/2008	C5_RAP
MNROAD	19	--	2	10	5.25	24	--	9/20/2008	C5_AGG

APPENDIX B
MNDOT LABORATORY RESILIENT MODULUS DATA

FILE_NAME	K1	K2	K3	K123_R_S	MIN_BULI	MAX_BUL	MIN_OCT	MAX_OCT	K4	K5	K6	K456_R_S	MIN_CON	MAX_CON	MIN_DEVI	MAX_DEV	N_TESTS
C5ECR3	1.34606	0.325311	0.634722	97.161	11.7388	95.8881	1.2914	16.9129	2.764835	0.206258	0.286853	96.379	2.9927	20.0078	2.7396	35.8777	15
C5ECR4	2.100756	0.600612	-0.35409	98.305	11.8097	95.9142	1.3217	16.9005	4.243585	0.445218	0.054385	98.945	2.991	20.0209	2.8038	35.8515	15
C5EJR1	3.129691	0.609287	-0.50559	95.335	12.1064	95.8613	1.3264	16.9061	6.017527	0.467758	0.003478	97.039	3.0275	20.0101	2.8137	35.8633	15
C5EJR2	2.12052	0.163756	0.6054	94.089	14.5472	95.938	2.5598	16.9069	3.414184	0.095288	0.262143	94.031	3.039	20.0245	5.4301	35.8651	13
C5EJR3	2.605188	0.563059	-0.34007	98.225	16.8625	95.9073	2.1642	16.9184	4.992876	0.393612	0.059747	98.209	2.9816	20.0258	4.5909	35.8894	13
C5EKR1	2.935302	0.749043	-0.68829	98.792	14.4179	95.9068	2.1702	16.8755	6.272948	0.526803	0.009841	99.469	3.0076	20.0362	4.6036	35.7983	14
C5EKR2	2.273904	0.71673	-0.40233	99.41	11.5598	95.9404	1.334	16.9207	5.264868	0.500663	0.085837	99.061	2.91	20.0296	2.8299	35.8943	14
C5ELR1	1.832741	0.792479	-0.2487	99.336	11.7915	95.8214	1.2971	16.913	5.001708	0.53342	0.195893	98.602	3.0053	19.9812	2.7515	35.878	15
C5FBR2	3.058767	0.593803	-0.79872	97.341	14.4796	95.9617	2.1472	16.9322	5.122843	0.443394	-0.11738	99.563	2.981	20.0166	4.5549	35.9186	14
C5FCR1	2.254399	0.767365	-0.62218	99.455	11.8846	95.8988	1.3213	16.9254	5.12232	0.544304	0.035397	98.996	3.0149	20.0071	2.8029	35.9043	15
C5FCR2	2.099552	0.698777	-0.50136	99.111	11.9741	95.8992	1.3211	16.9475	4.518232	0.494107	0.066921	99.544	3.0463	20.02	2.8026	35.9512	15
C5FCR3	3.331322	0.444727	-0.35359	91.28	12.0639	96.1288	1.3512	16.9124	5.390045	0.327979	0.008077	92.68	3.0659	20.0991	2.8664	35.8766	15
C5FIR2	1.657391	0.568681	-0.25044	98.886	11.8181	95.904	1.3065	16.9225	3.317968	0.397494	0.10564	98.545	3.0032	20.0314	2.7715	35.8981	15
C5FIR3	1.08483	0.211204	0.779144	86.417	11.739	95.9709	1.2783	16.8962	1.987879	0.068927	0.355421	93.029	2.9825	20.043	2.7117	35.8422	15
C5FIR4	1.090612	0.018629	1.29187	95.877	11.6997	95.9712	1.2731	16.9095	1.922852	-0.00459	0.36163	88.07	2.9933	20.0358	2.7007	35.8706	15
C5FJR1	1.75759	0.493191	-0.20561	98.261	11.7715	96.0635	1.3087	16.9124	3.238209	0.36114	0.075889	98.776	2.9543	20.0623	2.7762	35.8766	15
C5FJR2	1.331649	0.280559	0.709069	96.539	14.4929	95.9122	1.2923	16.9382	2.628181	0.142288	0.33063	98.928	2.8467	20.0435	2.7414	35.9314	15
C5FKR1	2.328477	0.452796	-0.12742	97.759	11.8714	95.9106	1.3394	16.931	4.178078	0.323065	0.095162	97.743	2.9961	20.0301	2.8413	35.9161	15
C5FKR3	3.016709	0.479052	-0.36114	96.657	14.4706	96.1256	2.1084	16.9502	5.085319	0.334395	0.036358	95.429	3.0419	20.0563	4.4725	35.9567	14
C5FLR1	2.36731	0.454865	-0.24638	98.154	11.7458	95.9801	1.3218	16.9138	4.066061	0.33801	0.049137	98.891	2.9557	20.0335	2.8041	35.8795	15
C5FLR2	1.942102	0.455425	0.051854	99.406	11.7896	95.9193	1.3058	16.922	3.763637	0.315825	0.153523	99.336	3.0016	20.0075	2.7701	35.8969	15
C5FOR1	4.801539	0.699346	-0.87351	97.596	14.5294	95.6115	2.1648	16.9195	8.877102	0.469674	-0.0953	98.485	3.0149	19.9479	4.5923	35.8917	14
C5GAR1	1.994581	0.634964	-0.45196	98.957	11.8384	95.9155	1.3052	16.9196	4.051385	0.467849	0.045265	99.503	2.9502	20.0324	2.7688	35.892	15
C5GBR1	2.076604	0.420776	-0.06671	96.111	11.7054	95.7281	1.2858	16.9165	3.673886	0.315633	0.08573	96.634	2.9905	20.0169	2.7275	35.8853	15
C5GBR2	2.644453	0.659178	-0.55402	99.415	15.9491	95.8868	2.5282	16.9228	5.296096	0.468976	0.014253	99.643	3.5287	20.0061	5.3631	35.8986	13
C5GBR3	1.700131	0.283625	0.27004	96.686	12.1073	95.8012	1.2989	16.9134	2.835405	0.192675	0.161348	95.895	2.8823	19.9835	2.7554	35.8787	15
C5GBR4	2.011099	0.600443	-0.29871	99.078	11.9203	96.0368	1.3137	16.9237	4.132327	0.432895	0.086845	99.404	3.0445	20.0928	2.7867	35.9007	15
C5GBR5	2.033813	0.608007	-0.4934	98.088	11.6295	95.9655	1.3048	16.9254	3.911058	0.451735	0.022763	98.835	2.951	20.0204	2.7678	35.9042	15
C5GCR1	1.619751	0.603849	-0.34461	97.482	11.7515	95.8795	1.3104	16.9225	3.298812	0.451211	0.057799	98.237	2.9785	19.9982	2.7798	35.8981	15
C5GCR2	1.896785	0.632689	-0.27837	98.616	11.4956	95.8402	1.2878	16.9299	4.0892	0.426255	0.135205	97.624	2.887	20.038	2.7318	35.9137	15
C5GCR3	1.223644	0.397433	0.351347	97.906	14.5237	95.8151	2.1557	16.8669	2.469373	0.262967	0.238736	97.306	3.015	20.0323	4.573	35.78	14
C5GIR2	0.999874	0.489391	0.253902	98.504	11.7953	95.8935	1.3019	16.9188	2.212115	0.337144	0.219002	98.235	3.0061	20.0153	2.7618	35.8902	15
C5GIR3	1.269084	0.475787	0.069566	97.668	11.497	95.9563	1.2882	16.9229	2.563374	0.3499	0.142839	97.881	2.9214	20.0215	2.7327	35.8989	15
C5GJR1	1.500158	0.503235	-0.05111	99.037	11.6613	95.8244	1.3189	16.8792	2.989601	0.364371	0.123879	99.234	2.9064	20.0319	2.7978	35.8061	15
C5GJR2	1.587056	0.557589	-0.31639	96.92	11.8012	95.9003	1.2878	16.8838	3.071454	0.427594	0.042701	98.541	3.0031	20.0295	2.7318	35.8159	15
C5GJR3	0.827994	0.133497	1.219086	93.833	12.1979	96.0334	1.2835	16.9204	1.648331	0.039282	0.417204	94.87	3.1204	20.0504	2.7227	35.8936	15
C5GJR5	3.300561	0.702176	-1.04785	97.913	17.0757	95.8462	3.7536	16.9365	5.79971	0.502591	-0.1752	98.693	3.0377	19.9822	7.9627	35.9278	11
C5GKR2	3.828753	0.259099	-0.18097	95.998	11.8409	95.8645	1.2774	16.8329	5.1238	0.19133	0.010591	97.444	2.9951	20.0608	2.7098	35.708	15
C5GKR3	2.28449	0.428879	-0.06236	99.113	12.0327	96.1939	1.3174	16.9293	4.070691	0.299678	0.105848	98.796	3.0549	20.0938	2.7947	35.9125	15
C5GKR4	1.16208	0.61844	-0.07719	99.268	11.8413	95.9134	1.3364	16.9232	2.684057	0.431593	0.166753	99.194	2.9917	20.015	2.835	35.8995	15
C5GKR5					56.8789	95.9257	12.6736	16.9236					9.9977	20.0084	26.8849	35.9004	3
C5GLR1	0.899629	0.643755	0.084639	97.088	11.7654	95.8447	1.2859	16.8965	2.29648	0.435215	0.23124	96.767	2.9391	20.0072	2.7279	35.843	15
C5GLR2	0.982309	0.693283	-0.00342	98.966	11.7773	96.0624	1.2382	16.9329	2.576895	0.448953	0.246519	98.727	2.9771	20.0474	2.6267	35.9202	15
C5GLR3	2.068824	0.331498	-0.0298	84.853	14.4861	95.8815	2.4968	16.9219	3.245173	0.219139	0.10434	83.482	3.0516	20.0197	5.2966	35.8968	13
C5GLR4	1.321296	0.530838	0.003865	96.383	14.3866	95.8634	2.1246	16.8971	2.782852	0.359148	0.174657	96.199	2.9897	20.0065	4.5069	35.8441	14
C5HBR1	2.304742	0.422963	-0.16418	98.052	11.8132	95.9157	1.2885	16.8662	3.908646	0.303604	0.072811	97.991	2.9895	20.0467	2.7333	35.7786	15
C5HBR2	2.444251	0.521631	-0.44329	97.678	14.3947	96.081	2.1336	16.9807	4.24878	0.382691	3.53E-05	98.805	2.9787	20.0211	4.526	36.0216	14
C5HBR3	2.205682	0.645035	-0.56385	96.64	11.6807	96.0202	1.2941	16.9099	4.364347	0.500745	-0.01056	99.203	2.9762	20.0508	2.7451	35.8713	15
C5HCR3	2.682969	0.633121	-0.55443	98.835	14.3666	95.7729	2.087	16.8809	5.186912	0.453576	0.008246	99.613	2.9666	20.0045	4.4273	35.8099	14
C5HCR4	2.063132	0.453452	-0.24292	96.889	11.4806	95.5729	1.303	16.8632	3.532893	0.327583	0.059839	96.945	2.8803	19.9749	2.764	35.7722	15
C5HIR1	1.725494	0.437334	-0.26934	96.316	11.5535	95.9272	1.2611	16.906	2.870278	0.334491	0.030351	98.16	2.9595	20.0229	2.6752	35.8631	15
C5HIR2	1.835592	0.345891	-0.20846	87.263	11.731	77.8481	1.2963	12.683	2.747444	0.243335	0.055319	87.914	2.9817	20.0032	2.7499	26.9047	14
C5HJR1	1.958011	0.605918	-0.57103	92.97	11.7021	96.0334	1.27	16.9332	3.661346	0.481261	-0.03192	96.599	3.0015	20.0376	2.694	35.9207	15
C5HJR2	1.792551	0.655627	-0.63318	89.44	11.5622	95.905	1.2748	16.889	3.513231	0.526062	-0.04707	93.584	2.9396	20.0334	2.7043	35.8269	15
C5HJR3	1.434694	0.688906	-0.42674	98.538	14.2706	96.1263	2.1393	16.9508	3.167746	0.488348	0.070047	98.577	2.9795	20.0632	4.5382	35.9581	14
C5HKR3	1.62882	0.223136	0.51082	95.128	11.6888	95.7843	1.2559	16.8581	2.753465	0.139316	0.218351	94.433	2.9577	20.0111	2.6643	35.7614	15
C5HKR5	0.942682	0.465034	0.326641	97.759	11.9756	95.876	1.32	16.9062	2.057561	0.281485	0.27441	98.435	3.0156	20.0314	2.8001	35.8635	15
C5HKR6	1.349809	0.273267	0.32568	88.049	11.7813	95.8244	1.2888	16.889	2.253015	0.154365	0.208676	89.666	2.9904	20.0081	2.734	35.827	15
C5HLR5	0.671143	-0.01729	1.900763	95.551	11.6826	95.8733	1.2772	16.8918	1.433081	-0.08696	0.575842	96.584	2.991	20.016	2.7093	35.833	15
C5HLR6	0.621769	-0.00359	1.992021	93.905	11.4781	95.7837	1.1081	16.9184	1.40009	-0.09892	0.613029	98.53	3.0369	19.9907	2.3506	35.8894	15
C6M1103A	1.302172	0.587588	-0.22847	99.187	11.4806	94.9602	1.2659	16.9097	2.717222	0.428022	0.097332	99.677	2.9314	19.6965	2.6853	35.8709	14
C6M1103B	2.126712	0.407771	-0.09343	99.516	11.7282	95.3111	1.2635	16.9229	3.628953	0.286079	0.097152	99.527	3.0127	19.8087	2.6804	35.899	15
C6M195A	0.949709	0.699355	-0.16204	99.693	12.2521	95.6596	1.2536	16.9172	2.37014	0.487949	0.169901	99.638	3.1972	19.9265	2.6593	35.8868	15
C6M195B	0.964703	0.657876	-0.09636	99.666	12.2372	95.6182	1.271	16.9673	2.337244	0.460881	0.170376	99.72	3.172	19.9019	2.6962	35.9931	14
C6M195D	1.135991	0.615365	-0.12953	99.483	12.0879	95.3909	1.277	16.916	2.562046	0.440973	0.1398	99.612	3.1244	19.8375	2.709	35.8842	15
C6M195E	1.16293	0.603305	-0.14127	99.457	12.1247	95.5291	1.2779	16.9092	2.561438	0.425676	0.14102	99.559	3.137	19.8864	2.7108	35.8698	15
C6M195F	0.882733	0.71395	-0.14584	99.747	11.9318	95.2361	1.2761	16.9201	2.263119	0.495208	0.181312	99.654	3.0679	19.7898	2.7071	35.893	15
C6M2100A	1.477559	0.582348	-0.25638	99.692	12.022	95.4854	1.2676	16.9429	3.011338	0.412406	0.102566	99.6	3.1043	19.8533	2.6889	35.9414	15
C6M2100B	1.408764	0.529229	-0.06842	99.839	11.6792	95.0103	1.2642	16.9218	2.879206	0.367137	0.144534	99.836	2.9986	19.7046	2.6818	35.8966	15
C6M2103A	1.989423	0.450982	-0.18747	98.013	12.2693	95.6326	1.3061	16.9452	3.487756	0.340553	0.059235	99.187	3.165	19.8955	2.7707	35.9463	15
B_1_16_98	1.023921	0.481066	-1.46217	95.352	10.1239	38.6598	1.941	6.9107	1.154809	0.290073	-0.11979	98.915	2	8	4.1175	14.6598	16
B_2_16_98	1.067482	0.451317	-1.68334	94.522	10.1279	38.7494	1.9459	6.9529	1.061393	0.271331	-0.18006	98.503	2	8	4.1279	14.7494	15
C1314R2	1.041409	0.741913	-0.25415	99.15	11.3139	94.5981	1.2591	16.9061	2.650929	0.509761	0.166709	99.088	2.8809	19.5783	2.6709	35.8632	15
C16I13A	8.864882	0.066768	-2.57372	93.979	9.4546	27.0654	1.5277	4.2685	3.991657	0.037723	-0.45483	95.718	2.034	6.0037	3.2408	9.0549	11
C16I14A	1.468402	0.297196	-5.43819	94.95	8.0196	26.7902	0.8089	4.1554	0.442464	0.209203	-0.59138	98.799	2.0185	6.0059	1.716	8.815	15
C16I14B	2.915109	0.071267	-3.08305	98.242	8.0275	26.7978	0.8579	4.2546	1.287606	0.048894	-0.35868	97.511	2.038	6.0051	1.8199	9.0254	15
C16J1118	3.654667	0.308643	-0.11983	93.022	11.4649	95.0682	1.2907	16.9356	5.418745	0.251445	0.020897	96.376	2.9083	19.7141	2.738	35.9259	15
C16O3A	3.2286	0.137066	-5.61282	93.432	7.8792	26.877	0.8138	4.1777	0.739984	0.092831	-0.64573	98.308	2.0287	6.0054	1.7264	8.8622	15
C17I13A	5.624536	0.060839	-2.19403	99.103	8.1039	26.5599	0.9219	4.2566	3.051441	0.044222	-0.31466	97.597	2.0091	6.0017	1.9556	9.0296	13
C17I14A	3.704741	0.208423	-5.70783	91.69	8.0436	26.8247	0.8861	4.1658	0.935419	0.140326	-0.63018	98.218	2.0044	6.0022	1.8796	8.8371	12
C17I14B	1.668167	0.248952	-5.333	94.416	7.8933	26.3983	0.8215	4.1414	0.495068	0.176196	-0.57946	98.869	2.01	6.0025	1.7427	8.7853	14
C17O5A	1.419183	0.401506	-3.85117	89.597	7.9767	26.8221	0.8611	4.2596	0.78431	0.281322	-0.37389	98.068	2.0056	5.9995	1.8267	9.0359	15
C17O5B	1.504458	0.26438	-4.60586	93.439	7.9641	26.914	0.8546	4.2525	0.546325	0.183684	-0.5047	99.119	2.0042	5.9963	1.8128	9.0208	15
C18O11B	4.208461	0.074904	-3.39076	98.453	7.5749	26.7154	0.6719	4.1998	1.546477	0.043875	-0.50781	98.45	2.0106	6.0037	1.4253	8.9091	13
C18O12A	2.68966	0.109725	-3.31466	97.143	7.681	26.7777	0.7157	4.2608	1.201492	0.080831	-0.35572	95.755	2.007	5.9989	1.5183	9.0384	15
C18O5A	4.617354	0.143026	-5.16062	96.757	8.0594	26.8316	0.829	4.158	1.202056	0.103349	-0.62078	98.103	2.004	6.0038	1.7587	8.8204	15
C18O5B	6.714479	0.070507	-2.90661	98.316	9.5018	26.9314	0.9314	4.2956	2.882945	0.044334	-0.42941	99.097	2.007	5.9996	1.9757	9.1124	13
C19I11B	3.958007	0.016342	-2.43605	99.137	8.1324	26.9708	0.6939	4.2235	1.967001	0.018795	-0.30634	96.528	2.02	6.0048	1.4721	8.9594	15
C19I12A	1.3822	0.43192	-6.29547	93.083	9.5099	26.4726	0.8175	3.9989	0.359902	0.248699	-0.67608	97.911	2.0202	6.0043	1.7343	8.4829	14
C19O5A	1.117561	0.332649	-3.57229	90.769	7.927	26.7568	0.803	4.1847	0.618724	0.235872	-0.34782	98.395	2.0223	6.004	1.7033	8.8772	15
C19O5B	2.039786	0.098109	-3.39482	96.651	8.0194	26.9746	0.8019	4.224	0.851567	0.066197	-0.38874	99.099	2.0318	6.0047	1.701	8.9605	15
C19O6A	1.656095	0.343997	-4.5315	95.844	7.9441	26.8128	0.8382	4.1846	0.6969	0.235619	-0.45735	97.391	2.018	6.0032	1.7782	8.8768	15
C19O6B	4.610645	0.054037	-2.47408	98.126	7.9115	27.2254	0.8288	4.3442	2.384058	0.036749	-0.28655	97.702	2.0109	6.0036	1.7581	9.2154	15
C1HOR1	1.362364	0.629125	-0.20433	99.497	11.408	95.6931	1.2286	16.8953	3.033939	0.445994	0.128823	99.6	2.9339	20.0683	2.6064	35.8403	15
C1IOR1	0.739591	0.626049	0.251359	97.798	11.7103	95.3153	1.2708	16.9044	1.960516	0.392391	0.304504	98.161	3.0048	19.822	2.6959	35.8596	14
C1IOR3	1.12975	0.815756	-0.59938	98.233	12.0679	95.1275	1.2519	16.9047	2.766555	0.575312	0.085846	97.972	3.1367	19.7587	2.6558	35.8604	15
C1IOR4	0.803193	0.709154	-0.17831	98.868	15.3264	95.2137	2.1035	16.8996	2.023046	0.502907	0.153621	99.043	3.3202	19.8719	4.4622	35.8495	14
C20J1119	3.163748	0.327264	-0.1301	94.686	11.452	94.8753	1.3091	16.8727	4.788994	0.259914	0.028207	97.304	2.8917	19.6943	2.777	35.7923	15
C20J1122	2.870486	0.30692	-0.13103	93.108	11.4404	94.9554	1.2805	16.8867	4.220617	0.245687	0.022471	96.073	2.9079	19.719	2.7164	35.8222	15
C20J1124	3.515159	0.354723	-0.30744	95.001	14.014	94.8742	2.1375	16.8363	5.118843	0.266467	-0.00888	97.992	2.9149	19.7247	4.5343	35.7151	14
C20J1129	3.561486	0.364343	-0.45786	94.341	13.9913	94.7696	2.15	16.8368	4.935239	0.27218	-0.04862	97.659	2.8979	19.688	4.5608	35.7162	14
C22I12A	3.333502	0.176236	-5.88474	91.398	7.9706	26.9431	0.8205	4.2236	0.737417	0.127553	-0.68402	97.932	2.0376	6.0061	1.7405	8.9596	15

C22I12B	4.08997	0.145017	-2.36699	97.822	9.8327	26.956	1.7116	4.2129	2.299553	0.086193	-0.32128	96.758	2.0392	6.0064	3.6308	8.937	12
C22I1A	5.038013	0.123933	-4.16766	98.523	9.6039	26.973	1.6426	4.337	1.543043	0.079309	-0.61364	98.694	2.0364	6.0051	3.4844	9.2001	12
C22I1B	3.464559	0.176886	-2.75141	95.749	8.0401	26.9246	0.8681	4.2213	1.941914	0.118362	-0.29142	96.508	2.0408	6.0059	1.8416	8.9547	15
C22O3A					7.8705	19.8146	0.8386	0.849					2.0305	6.0045	1.779	1.8011	3
C22O9A	1.33272	0.280641	-3.89706	94.455	7.9877	26.9217	0.8483	4.1991	0.619691	0.198289	-0.40523	98.92	2.03	6.0052	1.7996	8.9077	15
C22O9B	3.379873	0.21091	-6.19919	92.492	8.0322	26.9523	0.8441	4.2133	0.695574	0.136406	-0.72159	98.463	2.0122	6.0059	1.7905	8.9378	15
C26031A	1.435548	0.716128	-0.65646	98.658	11.8884	95.4347	1.2344	16.9426	2.982804	0.50595	0.040486	97.892	3.0891	19.8314	2.6187	35.9406	15
C26032A	2.389452	0.632957	-1.11563	97.215	11.5356	77.069	1.2661	12.6691	3.71487	0.453901	-0.08516	94.668	2.9499	19.7322	2.6859	26.8753	14
C26036A	1.444913	0.69316	-0.69557	98.257	11.3031	94.8549	1.239	16.8462	2.858314	0.485365	0.027735	97.09	2.8916	19.7141	2.6283	35.7363	15
C262BR1	0.549054	0.238908	-6.59628	91.59	8.027	23.0676	0.8384	2.4903	0.151023	0.184471	-0.5564	93.563	2.0828	6.0439	1.7786	5.2826	9
C263AR1	0.484213	0.107152	-3.19598	78.159	7.7425	26.9479	0.8234	4.234	0.212818	0.077213	-0.38434	91.342	1.9896	6.003	1.7467	8.9816	15
C27CL1B	2.571994	0.085674	-4.20041	98.379	7.9867	26.8826	0.8402	4.1769	0.837003	0.05977	-0.48723	98.034	2.0498	6.0081	1.7823	8.8606	15
C27O1A	4.11509	0.043937	-4.29722	97.165	7.9791	26.8519	0.8336	4.2222	1.225998	0.045103	-0.52561	99.213	2.0504	6.0077	1.7684	8.9567	12
C27O1B	5.460257	0.022319	-4.39982	90.827	9.7567	26.8542	1.6516	4.2147	1.356583	0.016914	-0.68442	92.501	2.0502	6.0075	3.5036	8.9407	12
C27O2A	4.467722	0.031889	-2.70252	98.982	9.7342	26.872	1.6888	4.2021	1.952437	0.0184	-0.40561	96.167	2.0492	6.0142	3.5826	8.9141	12
C27O2B	4.308496	0.07032	-2.43997	97.482	9.5617	26.9304	1.6076	4.218	2.157817	0.039976	-0.34703	94.402	2.0498	6.0172	3.4103	8.9478	12
C27O3D	1.38458	0.333596	-4.42746	95.055	9.7146	23.4196	0.8415	2.536	0.698021	0.226895	-0.35209	92.924	2.0513	6.0144	1.7852	5.3797	7
C27O4A	4.368503	-0.00912	-3.80873	91.355	8.0729	26.792	0.8245	4.1745	1.312386	-0.03078	-0.49695	98.665	2.0485	6.0065	1.7491	8.8555	15
C2HOR1	1.67735	0.690769	-0.54562	99.163	12.0032	95.215	1.2904	16.959	3.532829	0.497272	0.049431	99.201	3.0885	19.7465	2.7374	35.9755	15
C2HOR2	1.50657	0.596242	-0.29217	98.247	11.9913	95.5196	1.2845	16.9912	3.064605	0.39846	0.123329	97.468	3.0879	19.8277	2.7248	36.0437	15
C2IOR2	0.836618	0.951478	-0.40397	99.309	12.2021	95.4566	1.2629	16.9094	2.679923	0.653483	0.194846	98.835	3.1743	19.8654	2.6791	35.8702	15
C2JOR1	0.734647	0.966154	-0.52403	97.57	12.0257	77.2365	1.284	12.6578	2.298974	0.639827	0.213534	96.737	3.0994	19.7862	2.7237	26.8514	14
C3328R2	0.723462	0.794716	-0.28903	99.324	12.1349	95.4655	1.2843	16.947	1.959645	0.559931	0.15908	99.328	3.1307	19.8395	2.7244	35.95	15
C3HOR1	1.736102	0.620304	-0.52856	98.463	11.9911	95.5644	1.3264	16.9236	3.344222	0.456649	0.022487	99.309	3.0522	19.9085	2.8138	35.9004	15
C3IOR2	0.723462	0.794716	-0.28903	99.324	12.1349	95.4655	1.2843	16.947	1.959645	0.559931	0.15908	99.328	3.1307	19.8395	2.7244	35.95	15
C4IOR1	0.830227	0.743653	-0.32056	98.753	11.5706	77.6052	1.2747	12.6927	2.064388	0.488676	0.187702	97.923	2.9549	19.8973	2.704	26.9252	14
C4IOR2	1.440765	0.372355	0.007853	97.976	11.2133	93.113	1.2896	16.91	2.437907	0.255075	0.119677	98.121	2.8015	19.3084	2.7357	35.8716	15
C5035R4	2.455866	0.475195	-0.05628	99.133	14.75	90.151	1.2453	16.9185	4.688925	0.341504	0.119048	99.32	3.5518	18.0872	2.6416	35.8895	15
C5035R5	1.619823	0.622555	-0.11938	99.605	12.4455	96.2249	1.2565	16.988	3.701041	0.439314	0.149126	99.628	2.9236	20.0687	2.6655	36.0369	15
C503R1	3.752155	0.373812	-0.14265	96.107	11.5339	95.0981	1.258	16.9097	6.024855	0.289389	0.043239	97.936	2.955	19.7447	2.6686	35.8708	15
C503R2	3.042313	0.396629	-0.11903	95.673	11.8384	95.1788	1.2987	16.8761	5.098082	0.309258	0.05257	97.41	3.0272	19.7931	2.7549	35.7996	15
C503R4	1.676355	0.605145	-0.23136	98.692	9.6727	90.578	1.1857	17.0223	3.581524	0.428822	0.110435	99.421	2.3856	18.1642	2.5152	36.1098	15
C5075R1	2.071453	0.518601	-0.22048	97.165	10.1263	94.4866	1.2454	16.9611	3.938649	0.381744	0.077528	97.978	2.4948	19.5138	2.6418	35.98	15
C510R2B	1.338545	0.603996	-0.16507	98.74	11.5454	95.0855	1.282	16.9427	2.907165	0.405801	0.157346	98.571	2.9418	19.7257	2.7195	35.9408	15
C5EAR1	2.475798	0.629973	-0.43517	99.334	14.4505	96.0367	2.5812	16.9246	5.035276	0.448112	0.036637	98.994	2.9911	20.0483	5.4757	35.9025	13
C5EBR1	2.835295	0.416757	-0.32385	97.197	14.3412	95.9268	2.5129	16.9278	4.470479	0.290405	0.006306	96.794	3.0034	20.0077	5.3306	35.9092	13
C5EBR2	2.811602	0.766515	-0.64895	95.749	11.7515	95.9459	1.2906	16.9076	6.392883	0.591998	0.000258	98.783	3.0028	20.0303	2.7379	35.8664	15
C5EBR3	2.384562	0.615364	-0.36889	99.108	11.806	95.8947	1.3325	16.9311	4.875242	0.436642	0.054982	98.907	2.9906	19.9991	2.8267	35.9164	15
C6M2103B	1.939295	0.450655	-0.12461	98.975	12.2451	95.4732	1.3019	16.9129	3.482754	0.332474	0.084356	99.587	3.1611	19.8651	2.7618	35.8778	15
C6M2105A	2.1699	0.418199	-0.07666	97.572	11.6955	95.0645	1.2997	16.9124	3.81117	0.315702	0.080085	98.402	2.9768	19.7293	2.7572	35.8767	15
C6M2105B	2.098667	0.449691	-0.13349	99.351	12.1386	95.5252	1.3159	16.9239	3.744724	0.326585	0.087001	99.641	3.1133	19.8748	2.7916	35.9009	15
C6M295A	0.999445	0.670746	-0.09818	99.703	12.1917	95.6877	1.2423	16.9417	2.453428	0.455196	0.191513	99.528	3.1847	19.9166	2.6353	35.9387	15
C6M295B	1.000757	0.633379	-0.03569	99.66	12.2773	95.6378	1.2982	16.9451	2.399915	0.439886	0.185341	99.667	3.1742	19.9008	2.754	35.9459	15
C6OM100A	1.39982	0.482014	-0.07192	98.725	11.5854	94.9983	1.3105	16.9559	2.686055	0.351375	0.109772	99.12	2.9351	19.6781	2.78	35.9689	15
C6OM100B	1.163879	0.646291	-0.19798	99.122	12.2644	95.5703	1.3104	16.9173	2.664724	0.464291	0.129667	99.392	3.1612	19.8968	2.7799	35.887	15
C6OM103A	1.30207	0.587569	-0.22832	99.188	11.4806	94.9596	1.2658	16.9094	2.717097	0.427993	0.097383	99.677	2.9314	19.6964	2.6852	35.8703	14
C6OM103B	1.132533	0.600045	-0.07869	99.65	12.031	95.3	1.3038	16.8994	2.545314	0.416297	0.164028	99.597	3.0869	19.8237	2.7658	35.849	15
C6OM103C	1.119583	0.60008	-0.08098	99.763	11.4582	94.9089	1.2746	16.9223	2.514437	0.415691	0.163276	99.739	2.9181	19.6704	2.7039	35.8977	15
C6OM103J	1.239805	0.360155	0.020866	92.494	14.6491	95.3688	2.1402	16.922	2.074062	0.248879	0.117355	92.644	3.0639	19.824	4.54	35.8969	14
C6OM103K	1.422905	0.406165	0.016304	98.174	11.7291	95.3309	1.2327	16.9288	2.535238	0.281787	0.128597	98.187	3.0375	19.8065	2.6149	35.9114	15
C6OM105A	1.184748	0.602982	-0.14797	99.713	12.0832	95.5089	1.2765	16.9368	2.601943	0.426816	0.137176	99.73	3.1205	19.8602	2.7079	35.9283	15
C6OM105B	1.11132	0.66584	-0.27955	99.596	12.2326	95.5108	1.299	16.9128	2.527502	0.479502	0.112218	99.738	3.156	19.8778	2.7557	35.8774	15
C6OM105C	1.275169	0.43498	0.037339	98.137	11.5568	95.0617	1.286	16.9231	2.40047	0.321892	0.120102	98.358	2.9419	19.7304	2.7281	35.8993	15
C6OM105H	0.589859	0.008147	1.683974	96.879	11.2028	94.8643	1.1351	16.9308	1.198315	-0.04385	0.489975	94.679	2.9305	19.6496	2.408	35.9156	15
C6OM95A	0.976563	0.574791	0.029024	99.135	12.1378	95.5479	1.2702	16.9208	2.214332	0.39485	0.18886	99.191	3.1477	19.8848	2.6945	35.8944	15
C6OM95C	0.957973	0.70958	-0.18652	99.613	12.225	95.4609	1.2736	16.9213	2.39912	0.492738	0.169195	99.513	3.1735	19.8587	2.7017	35.8955	15
C6OM95G	0.959462	0.681809	-0.19062	99.399	11.7275	95.0496	1.2709	16.898	2.309842	0.476296	0.155892	99.405	3.0042	19.7481	2.6959	35.846	15
C6P1100A	1.194648	0.57975	-0.12392	99.336	11.3516	94.722	1.285	16.9168	2.569255	0.413037	0.13256	99.571	2.875	19.6154	2.726	35.886	15
C6P195A	1.020738	0.669015	-0.14332	99.577	11.6402	95.1061	1.2928	16.9228	2.461213	0.465394	0.16664	99.648	2.966	19.7358	2.7424	35.8987	15
C_1_10_98					32.8128	38.7669	6.9612	6.9828					6	8	14.7669	14.8128	2
C_1_12_103					16.4868	38.8855	4.9435	7.0171					2	8	10.4868	14.8855	4
C_1_13_98					16.2771	38.8044	3.4866	6.9789					2	8	7.3961	14.8044	5
C_1_8_98	1.781178	0.491561	-1.78629	95.155	9.4322	38.914	1.618	7.056	1.822425	0.302877	-0.17626	98.6	2	8	3.4322	14.9681	16
C_1_95_103	2.109468	0.501231	-1.76935	96.091	16.7537	38.9712	5.0693	7.0575	1.965723	0.229165	-0.2359	93.927	2	8	10.7537	14.9712	7
C_2_10_98					16.6068	38.8223	5.0001	7.0001					2	8	10.6068	14.8494	5
C_2_12_103					16.5249	34.6153	4.9596	6.9822					2	8	10.521	14.8115	5
C_2_13_98	0.997576	0.586526	-1.2047	97.752	13.3296	38.6775	3.4552	6.9191	1.377445	0.348468	-0.07898	96.854	2	8	7.3296	14.6775	6
C_2_8_103					16.8158	39.0248	5.0986	7.1057					2	8	10.8158	15.0735	5
C_2_8_98	1.676936	0.514468	-1.63754	95.919	10.2445	38.9926	2.0009	7.08	1.837703	0.30483	-0.14918	98.619	2	8	4.2445	15.0189	16
C_2_95_103	2.737877	0.685213	-2.72104	99.473	13.6393	39.1306	3.6012	7.1326	2.23584	0.317827	-0.32736	96.652	2	8	7.6393	15.1306	9
D1FOR1	1.814175	0.581579	-0.2704	98.637	11.8344	95.8229	1.3309	16.9088	3.677539	0.41644	0.093771	98.999	3.002	19.987	2.8232	35.869	15
D1GOR1	2.183599	0.426923	-0.16435	98.064	12.2939	95.9179	1.3052	16.9109	3.724721	0.310035	0.074376	98.786	3.1751	20.0194	2.7688	35.8734	15
D1HNR1	1.419114	0.557865	-0.31502	98.988	11.7543	95.9268	1.3111	16.8903	2.729609	0.3989	0.075848	99.208	2.9907	20.0324	2.7813	35.8297	15
D1HNR4	1.223401	0.67608	-0.50632	98.129	12.5969	95.8914	1.2811	16.9074	2.57335	0.498527	0.045158	99.132	3.2931	20.0108	2.7177	35.8661	15
D2GPR1	0.935913	0.810638	-0.26741	98.95	11.5116	95.9027	1.247	16.9059	2.593721	0.532614	0.208067	98.295	2.8326	20.0173	2.6453	35.8629	14
D2GPR2	0.736894	0.86904	-0.30405	98.183	11.409	95.7342	1.214	16.7661	2.175982	0.553444	0.24517	97.369	2.9265	20.056	2.5754	35.5664	14
D2HOR2	0.970267	0.808119	-0.51142	99.351	11.3472	95.9961	1.2535	16.9128	2.442429	0.574359	0.102061	99.218	2.8961	20.0395	2.659	35.8776	15
D2HOR3	1.022447	0.74896	-0.38463	99.372	11.6101	95.9564	1.2587	16.9353	2.49991	0.534248	0.11387	99.608	2.9764	20.0296	2.6701	35.9251	15
D3GPR1	1.385115	0.703952	-0.43086	99.016	11.6968	95.73	1.285	16.7982	3.119889	0.506176	0.084393	99.311	2.9903	20.0319	2.7259	35.6343	15
D3GPR2	0.99472	0.855575	-0.46365	99.622	11.9086	95.897	1.2807	16.9239	2.729153	0.603984	0.129986	99.558	3.0049	20.0067	2.7168	35.901	15
D3HOR1	0.995142	0.833049	-0.52637	99.32	11.835	96.0856	1.2627	16.9301	2.586571	0.604263	0.089178	99.742	3.0516	20.0572	2.6787	35.9141	15
D3HOR2	0.850558	0.863344	-0.41972	99.651	11.7074	95.9501	1.2694	16.9183	2.399208	0.603025	0.151366	99.405	3.003	20.0203	2.6927	35.8891	15
D3HOR3	0.948749	0.793357	-0.39494	99.212	11.8568	96.0311	1.2754	16.9229	2.448583	0.550796	0.141318	99	3.0504	20.0441	2.7056	35.8989	15
D3_12_17	1.661239	0.805617	-0.68125	99.608	17.4312	96.1574	3.9745	17.0448	3.729584	0.498037	0.055797	99.887	3	20	8.4312	36.1574	8
D3_9_24	1.901441	0.791337	-0.66181	99.542	17.4704	96.4185	3.993	17.1678	4.21223	0.483547	0.080683	99.792	3	20	8.4704	36.4185	7
D4HOR1	1.120518	0.723155	-0.41781	99.001	11.5724	95.9222	1.2563	16.9036	2.603725	0.51407	0.100363	99.147	2.9691	20.0214	2.6651	35.8579	15
D4HOR2	1.311661	0.643445	-0.36292	98.318	11.6956	95.9867	1.2827	16.9378	2.784361	0.45239	0.097518	98.403	2.9915	20.0232	2.721	35.9304	15
D6_11_14	0.855382	0.929525	-0.64225	98.593	16.985	95.9517	2.1435	16.9478	2.427846	0.65995	0.060261	99.62	3	20	4.5471	35.9517	13
D6_12_23	1.11775	0.709199	-0.41248	99.415	14.6556	95.9169	2.213	16.9314	2.515645	0.474389	0.105536	99.386	3	20	4.6944	35.9169	14
D9_11_25	0.578408	0.914711	-0.7329	98.177	11.1095	95.8329	0.9944	16.8918	1.552326	0.691978	0.04046	99.468	3	20	2.1095	35.8329	14
D9_12_30	0.557831	1.090341	-1.02736	98.641	11.2884	40.2339	1.0788	6.14	1.771691	0.731352	0.181656	98.423	3	10	2.2884	13.025	6
D_1_11_103	3.818863	0.26595	-0.73509	88.764	10.4594	39.1702	2.1022	7.2332	4.06312	0.138669	-0.07413	87.901	2	8	4.4594	15.3438	16
D_1_11_98	2.236458	0.630912	-1.50233	97.092	13.4802	39.006	2.049	7.0767	2.918936	0.348879	-0.09911	98.56	2	8	4.3465	15.012	15
D_1_13_103					13.6258	38.9901	3.5949	7.1111					2	8	7.6258	15.0849	12
D_1_14_98	2.535162	0.207893	-1.41434	97.462	13.4866	38.708	1.985	6.961	1.952328	0.109952	-0.23461	95.377	2	8	4.2108	14.7666	13
D_1_16_103	3.168365	0.123954	-0.98079	97.28	10.1861	38.7184	1.9672	6.9968	2.606864	0.072949	-0.15322	94.936	2	8	4.1731	14.8425	16
D_1_18_98	2.099805	0.091074	-1.63488	99.185	9.8282	37.3073	1.8046	6.2731	1.324795	0.056346	-0.27694	95.05	2	8	3.8282	13.3073	16
D_2_11_103	1.900284	0.677656	-1.5746	97.452	10.3359	39.0667	2.0315	7.1349	2.628844	0.392007	-0.08433	97.187	2	8	4.3095	15.1354	15
D_2_13_103					21.1262	39.0559	3.5612	7.1305					2	8	7.5543	15.1262	9
D_2_14_98	2.45019	0.260589	-1.50933	97.975	10.2578	38.9159	2.0072	7.0351	1.994403	0.15484	-0.21666	98.767	2	8	4.2578	14.9237	16
D_2_16_103	3.568003	0.155945	-1.09991	98.132	13.4096	38.7039	2.0279	6.9805	2.875192	0.083245	-0.2082	97.373	2	8	4.3017	14.8078	14
D_2_18_98	1.9091	0.198396	-1.93412	98.645	10.256	38.7563	2.0063	6.9722	1.221051	0.119126	-0.33203	97.294	2	8	4.256	14.7903	15
F3_5_10_8					17.4609	96.451	3.9885	17.1832					3	20	8.4609	36.451	6

F3_5_1_8	1.054001	0.833936	-0.45634	98.927	11.7446	96.0269	1.2938	16.9832	2.785872	0.567392	0.142381	98.486	3	20	2.7446	36.0269	15
F6_12_3	1.537724	1.09943	-1.5158	98.608	17.2485	96.1847	3.8884	17.0576	3.686421	0.698892	-0.15246	99.365	3	20	8.2485	36.1847	7
F6_1_9	1.710785	0.89539	-0.86164	99.457	14.5699	96.301	2.6257	17.1124	3.908314	0.533666	0.075988	99.567	3	20	5.5699	36.301	8
F8_5_12_2	1.348038	0.741911	-0.37559	98.964	14.5976	96.4334	2.6387	17.1749	3.280922	0.522517	0.091148	99.517	3	20	5.5976	36.4334	13
F8_5_1_12	1.741239	0.665236	-0.48043	96.781	12.0573	95.731	1.4412	16.8437	3.666821	0.504401	0.024097	99.241	3	20	3.0573	35.731	15
H11_12_5	1.108686	0.794719	-0.60512	98.831	14.5036	95.8773	2.5944	16.9127	2.63988	0.558702	0.036646	99.027	3	20	5.5036	35.8773	13
H11_1_16	1.693874	0.686955	-0.69827	98.063	14.5781	95.9863	2.2045	16.9641	3.297248	0.479885	-0.01285	99.636	3	20	4.6765	35.9863	14
H3_10_10	1.512241	0.802009	-0.83263	98.582	17.1918	96.0323	3.8616	16.9858	3.244814	0.525984	-0.03185	99.544	3	20	8.1918	36.0323	8
0801RM2A	1.048804	0.037225	0.583426	93.545	14.6507	95.4457	2.1437	16.9039	1.404715	0.008306	0.205022	94.52	3.068	19.8663	4.5475	35.8587	14
0901RM1A	1.533153	0.380572	-0.21404	94.607	11.9739	95.5181	1.2945	16.9307	2.41401	0.300862	0.019613	97.229	3.076	19.8677	2.746	35.9155	15
0901RM2A	1.124015	0.430056	-0.22217	96.386	11.9607	95.4964	1.2872	16.9221	1.889387	0.332586	0.036071	98.318	3.0767	19.8698	2.7306	35.8971	15
1001RM1A	1.07907	0.64471	-0.30086	98.605	14.0068	96.266	1.2422	16.9743	2.369174	0.48938	0.077797	99.454	3.7853	20.091	2.6351	36.008	15
1001RM2A	1.371758	0.490156	-0.19956	97.549	13.4771	95.8891	1.299	16.9183	2.530187	0.377343	0.060091	98.762	3.5519	20.0066	2.7556	35.8891	15
1101RM1A	2.591527	0.264019	-0.37664	74.813	12.5496	95.371	1.2748	16.9038	3.249187	0.239806	-0.07889	90.632	3.2622	19.8376	2.7043	35.8585	15
1101RM2A	2.574194	0.302218	-0.28201	93.516	13.9068	93.6637	2.1471	16.9512	3.51384	0.222786	-0.00946	96.079	2.8116	19.2356	4.5547	35.9589	14
1415C5R1	0.973856	0.647353	-0.43969	97.4	11.6119	78.0242	1.2105	12.6737	2.026919	0.448457	0.098813	97.224	3.0045	20.044	2.5678	26.8849	14
1415R3	1.220644	0.729943	-0.54619	99.039	11.8202	95.8603	1.2716	16.925	2.720495	0.529711	0.055149	99.537	2.9523	20.0447	2.6974	35.9034	15
1415R4	1.200076	0.731917	-0.58151	97.347	11.6578	95.8785	1.2928	16.9067	2.659138	0.554668	0.020464	99.317	2.9553	20.0181	2.7425	35.8645	15
16C6R1	1.791024	0.744286	-0.664	96.74	12.121	95.9556	1.2743	16.9572	3.844629	0.530467	0.030602	97.547	3.137	19.9968	2.7033	35.9717	12
26EBR1	1.246011	0.252704	0.265935	85.46	11.067	95.7031	1.2295	16.8194	1.977731	0.154532	0.170559	86.822	2.8196	20.0204	2.6082	35.6793	15
26EJR1	2.78482	0.758655	-1.31153	93.55	11.7135	95.8968	1.273	16.9115	4.786211	0.583699	-0.25934	97.67	3.0044	20.0287	2.7004	35.8746	15
26EJR2	1.629743	0.626816	-0.50426	99.184	11.5204	95.8746	1.2841	16.9009	3.193489	0.452702	0.040665	99.203	2.9216	20.016	2.7239	35.8522	15
26FBR1	1.034938	0.668387	-0.24875	99.431	11.0812	94.1317	1.3011	16.9033	2.377438	0.449918	0.155729	98.963	2.771	19.7316	2.76	35.8572	15
26FBR2	1.290814	0.532063	-0.23161	98.369	11.3515	94.6879	1.3102	16.9106	2.482634	0.38424	0.084941	98.702	2.8565	19.6267	2.7794	35.8729	15
26FCR1	1.414447	0.663221	-0.38076	99.509	11.672	93.7686	1.2748	16.9768	3.069365	0.473536	0.089162	99.588	2.9888	19.3355	2.7044	36.0133	15
26FCR2	0.931878	0.691037	-0.03817	99.236	11.7573	95.9013	1.2593	16.9139	2.416892	0.47037	0.21132	99.124	3.0151	20.0275	2.6714	35.8799	15
26FDR1	1.049616	0.627735	0.021664	98.908	11.4864	96.1364	1.2905	16.9171	2.545492	0.414499	0.221844	98.837	2.893	20.093	2.7376	35.8865	15
26FDR2	1.178618	0.608879	-0.08156	99.685	14.4566	95.8348	2.1164	16.9166	2.677355	0.418298	0.166183	99.527	3.0369	20.0052	4.4896	35.8854	14
26FFR2	2.82817	0.615789	-1.02514	97.599	11.7212	96.1167	1.2776	17.0158	4.393147	0.451653	-0.14852	98.372	3.0031	20.017	2.7103	36.096	14
26FHR1	0.907472	0.688273	0.06762	97.884	11.1869	96.1896	1.2521	16.9551	2.436581	0.448344	0.261634	97.843	2.8436	20.0741	2.6561	35.9673	15
26FJR1	1.335607	0.641061	-0.31706	99.239	12.8098	94.8394	1.2812	16.8962	2.876465	0.445695	0.111331	99.072	3.2475	19.6664	2.7179	35.8423	14
26FJR2	1.758831	0.625977	-0.5999	97.829	10.9477	95.6113	1.2937	16.8964	3.32464	0.467888	-0.00676	99.335	2.7326	19.9427	2.7443	35.8428	15
26FJR3	1.259293	0.548043	-0.27524	99.094	11.3906	95.5839	1.032	16.8835	2.427868	0.390173	0.086825	99.206	3.0637	19.9228	2.1891	35.8154	15
26FKR1	1.210905	0.728336	-0.47263	98.867	11.653	77.7366	1.2629	12.6714	2.788274	0.507215	0.112919	98.494	2.9907	20.0074	2.679	26.8801	14
26FKR2	1.085443	0.584081	-0.18225	97.876	12.0081	78.0425	1.2897	12.6658	2.285741	0.386781	0.161472	97.574	3.0907	20.0606	2.7359	26.8683	14
26FLR1	0.918433	0.711185	0.009264	97.97	14.4877	95.9478	2.0974	16.9014	2.494747	0.47967	0.236562	97.743	3.0529	20.0434	4.4494	35.8533	14
26FNR2	1.194376	0.630454	-0.37981	99.153	11.7422	95.8819	1.2715	16.8871	2.47584	0.446029	0.082295	99.093	2.9553	20.0216	2.6973	35.823	14
26FPR1	1.487422	0.628633	-0.35079	99.519	11.7417	95.7667	1.2641	16.899	3.148338	0.443979	0.103544	99.162	2.9694	20.0063	2.6816	35.8482	15
26GBR1	1.308306	0.652187	-0.35131	99.361	10.6059	95.8759	1.1944	16.9019	2.834849	0.471492	0.089224	99.556	2.6907	20.0209	2.5337	35.8544	15
26GBR2	1.191238	0.394373	0.030568	96.759	11.4879	96.0562	1.2515	16.9155	2.098277	0.276009	0.125821	96.839	2.9444	20.0577	2.6548	35.8833	14
26GFR1	1.543197	0.696376	-0.79411	98.702	11.8409	77.8917	1.2694	12.6087	2.988629	0.494154	0.01618	98.167	3.0148	20.0048	2.6928	26.7471	14
26GFR2	1.75638	0.50296	-0.52581	95.151	11.7276	95.8255	1.2989	16.897	2.874573	0.37919	-0.01645	96.833	2.9872	20.0019	2.7553	35.8439	15
26GFR3	1.503083	0.697862	-0.60749	98.38	11.3235	95.9025	1.2328	16.9089	3.101329	0.482344	0.060542	96.966	2.9028	20.0435	2.6151	35.8692	14
26GGR1	1.451522	0.656305	-0.55964	98.362	11.6341	96.0704	1.2647	16.9607	2.903195	0.483896	0.024101	99.075	2.9838	20.0397	2.6829	35.979	15
26GGR2	1.365503	0.679624	-0.5483	98.359	11.7398	96.1815	1.252	16.925	2.836176	0.511426	0.019418	99.49	3.0013	20.1053	2.6559	35.9034	14
26GJR4	1.569909	0.41503	-0.17971	97.184	11.8208	77.9316	1.2623	12.6653	2.627676	0.308127	0.06221	98.014	3.0477	20.0206	2.6778	26.8672	14
26GJR5	1.724523	0.568659	-0.53653	95.59	11.6297	95.7689	1.2365	16.7476	3.095593	0.44261	-0.01837	98.485	2.99	20.0933	2.6231	35.527	15
26GKR1	1.006097	0.716608	-0.287	99.008	11.7122	95.8107	1.2531	16.8519	2.437951	0.493315	0.148895	98.724	2.9537	20.0245	2.6581	35.7483	15
26GNR1	1.819212	0.518427	-0.44297	97.368	11.7266	95.9317	1.2764	16.9096	3.144389	0.381537	0.019245	97.938	2.9854	20.021	2.7077	35.8707	15
26GNR2	1.37682	0.235318	0.018306	84.52	11.939	78.1052	1.2391	12.6785	1.935773	0.173044	0.06601	85.228	3.0071	20.0375	2.6285	26.8951	14
26GPR1	1.588476	0.524658	-0.29309	99.049	11.9651	95.8945	1.3032	16.9092	2.928469	0.357308	0.092331	98.225	3.0584	20.011	2.7645	35.8699	15
26HNR1	1.429136	0.476526	-0.46449	97.072	12.0643	94.7724	1.2867	16.8991	2.306402	0.350671	0.003516	97.453	3.1105	19.6413	2.7295	35.8485	15
26HNR2	1.266702	0.233576	0.081729	81.972	11.6699	93.3356	1.2875	16.912	1.803743	0.129584	0.12985	84.017	2.9787	19.2864	2.7312	35.8757	15
26HOR1	1.059049	0.714333	-0.35115	97.855	11.1663	95.8138	1.2209	16.9027	2.493958	0.498117	0.127114	97.843	2.8588	20.0075	2.59	35.8561	15
2776MRA2	4.701556	0.083593	-3.64792	93.396	7.9268	27.0163	0.8427	4.2477	1.755309	0.054731	-0.43489	98.524	2.0034	6.004	1.7877	9.0108	15
2776MRB2	3.771081	0.02935	-2.29273	97.581	7.9211	26.8957	0.854	4.2051	1.984379	0.017712	-0.27188	95.719	2.0068	5.997	1.8115	8.9204	15
2776PRA3	3.417231	0.139247	-3.2093	96.103	7.9133	27.031	0.756	4.2709	1.592648	0.092714	-0.353	97.221	2.0019	5.9935	1.6037	9.0599	15
2777MRA2	4.194517	0.048806	-2.03692	97.91	7.8517	26.946	0.7863	4.2433	2.458987	0.034016	-0.23361	96.574	2.0024	6.003	1.6681	9.0014	15
2777MRB2	2.707031	0.182794	-2.99104	94.293	7.9251	27.0132	0.8129	4.2438	1.443075	0.12958	-0.31578	96.618	2.0029	6.0038	1.7244	9.0025	15
2777PRA2	3.967301	0.119855	-5.36836	91.038	7.8592	26.9759	0.821	4.2299	0.932894	0.084844	-0.6422	98.779	2.0081	6.0013	1.7417	8.9729	15
2777PRB2	2.743142	0.101167	-3.40807	97.471	7.9159	26.8824	0.8357	4.2225	1.146987	0.069244	-0.39012	97.528	2.0057	5.9946	1.7728	8.9573	15
2779MRA2	3.817814	0.039746	-3.29809	97.872	7.8613	26.9072	0.8218	4.2533	1.51921	0.031886	-0.39597	98.531	2.0029	6.0035	1.7433	9.0227	15
2779PRA1	4.798471	0.010258	-2.94172	90.478	9.6359	26.8719	1.6024	4.2025	1.859071	0.0029	-0.46152	95.175	2.0058	6.0002	3.3991	8.9148	12
2779PRB1	2.093791	0.242518	-3.98552	93.537	7.9638	26.8761	0.8322	4.1939	0.889893	0.163151	-0.42547	97.107	2.005	5.9947	1.7654	8.8965	15
2882PRA2	4.349001	0.150541	-2.51329	96.433	9.5736	27.0248	1.679	4.2562	2.349195	0.089866	-0.34158	94.988	2.0023	5.9987	3.5616	9.0287	12
2882PRB1	2.316552	0.158263	-3.60446	91.087	7.8923	25.2035	0.8418	3.3905	1.098536	0.110687	-0.33641	94.53	2.0067	6.0038	1.7857	7.1923	9
2883MRA1	2.798996	0.147289	-3.14983	97.596	9.5673	25.2021	1.673	3.393	1.304136	0.094374	-0.39685	96.516	2.0027	6.003	3.5489	7.1976	9
2883PRB1					21.482	21.482	1.6416	1.6416					5.9999	5.9999	3.4824	3.4824	1
2885PRA2	1.24488	0.125034	-4.62821	96.528	7.8959	26.8489	0.8241	4.1661	0.379453	0.076738	-0.51466	98.341	2.004	6.0046	1.7483	8.8376	14
3364MRB2	2.495466	0.073997	-2.75813	96.429	7.9379	27.0066	0.8291	4.242	1.215222	0.051325	-0.31991	98.681	2.014	6.0048	1.7589	8.9986	15
3364PRA2	4.544906	0.033615	-2.35464	98.644	9.6589	26.9951	1.6248	4.2641	2.212386	0.019022	-0.35682	98.102	2.0107	6.0053	3.4468	9.0456	12
3364PRB1	2.718545	0.098556	-4.41239	94.188	8.0326	26.8762	0.819	4.1821	0.827303	0.062757	-0.52283	98.796	2.0085	6.0035	1.7374	8.8715	15
3366MRA1	3.155838	0.141265	-4.05152	94.968	7.912	26.9813	0.8208	4.2528	1.146055	0.099091	-0.46287	99.082	2.009	6.0048	1.7413	9.0215	15
3366MRB2					19.7933	23.3169	0.8401	2.5006					6.0034	6.0041	1.7821	5.3047	3
3367MRB2	2.983436	0.155832	-5.13315	92.487	7.9303	27.0232	0.8422	4.2475	0.791356	0.108909	-0.6032	98.762	2.0305	6.0051	1.7866	9.0102	15
3367PRB2	2.656669	0.087416	-3.08115	99.056	7.7702	26.8387	0.7921	4.1625	1.214717	0.056465	-0.33797	95.39	2.0034	6.0041	1.6802	8.8301	15
3470MRA2	4.080369	0.000532	-2.81649	97.13	7.9491	26.9139	0.8484	4.2347	1.76871	0.021485	-0.38182	97.217	2.0134	6.0054	1.7996	8.9831	13
3470PRA1	6.321055	-0.05204	-1.00559	97.027	11.3093	27.0064	2.4317	4.2865	4.195321	-0.03027	-0.20023	94.61	2.0037	6.0018	5.1583	9.0931	9
3470PRB1	8.99828	-0.05646	-1.61888	98.977	11.4718	26.939	2.424	4.2701	4.769357	-0.03544	-0.31996	99.705	2.0029	6.0019	5.1421	9.0583	9
3471MRA1	2.59238	0.187565	-4.62966	93.531	7.9926	26.8661	0.8397	4.1794	0.8529	0.141446	-0.53468	96.209	2.0066	6.0025	1.7814	8.8658	15
GWT023FPRC1	0.767938	1.001203	-0.64266	98.978	10.656	119.1382	0.7807	27.928	2.325819	0.611614	0.159746	97.034	3	19.9708	1.656	59.2443	22
GWT023GORC(	1.045528	0.834619	-0.60476	97.469	10.6324	118.7264	0.7994	27.8106	2.631783	0.585372	0.073467	98.812	2.9763	19.9104	1.6958	58.9952	23
GWT023FPRC1	0.916114	0.810092	-0.46318	93.793	10.5337	159.2242	0.7972	46.9116	2.358437	0.524421	0.12938	93.53	2.9461	19.9037	1.6911	99.5145	27
GWT023GPRC1	0.773582	0.487744	-0.01323	95.591	10.7263	119.1523	0.8138	27.9178	1.566592	0.361799	0.12375	96.325	3	19.982	1.7263	59.2225	22
GWT023GPRC2	0.56124	0.934381	-0.52086	97.611	10.5318	79.122	0.8174	9.3464	1.671599	0.628679	0.165914	95.976	2.9256	19.9	1.7339	19.8266	14
GWT023GPRC1	0.812129	0.899987	-0.60136	97.026	10.5317	119.3203	0.79	28.1028	2.191272	0.562094	0.125758	95.316	2.9496	19.9025	1.6758	59.6149	24
GWT023GORC1	0.774625	0.836123	-0.55208	98.967	10.6332	99.2196	0.7835	21.113	1.982461	0.563154	0.104804	97.527	2.9883	19.9342	1.6621	44.7874	20
UM_SAT_RAP1	1.204917	1.309538	-1.10895	98.437	10.4237	195.665	0.6712	63.9531	4.558565	0.837669	0.074336	96.117	3	20	1.4237	135.665	30
UM_SAT_AGG1	0.237189	2.257472	-1.93547	-168.932	14.7656	157.4438	2.7179	48.1896	1.77368	1.013176	0.426051	-202.706	3	20	5.7656	102.2256	23
UM_SAT_RAP2	0.526449	0.866732	-0.06122	96.351	10.3639	158.2725	0.6429	48.5773	1.745175	0.509756	0.322823	95.718	3	20	1.3639	103.0481	29
UM_SAT_RAP5	0.964724	1.263086	-1.04672	98.365	11.8612	196.4871	1.3344	64.3406	3.556931	0.822412	0.072963	97.475	3	20	2.8308	136.4871	29
UM_SAT_RAP5	0.753229	1.205743	-0.88071	94.453	14.7302	195.8314	2.2945	64.0315	2.871133	0.833851	0.082262	96.045	3	20	4.8674	135.8314	27
UM_SAT_RAP2	0.441859	1.304367	-0.87222	99.317	10.3242	118.6769	0.6242	27.6605	1.863085	0.838251	0.191445	96.617	3	20	1.3242	58.6769	24
UM_SAT_RAP7	1.294205	1.036408	-0.89279	83.084	11.8816	196.7311	1.3095	64.4556	3.864393	0.73232	0.000719	84.072	3	20	2.7778	136.7311	28
UM_SAT_RAP7	0.805602	1.257683	-0.96469	98.383	10.3922	195.0821	0.6563	63.6783	3.066575	0.816361	0.104157	97.303	3	20	1.3922	135.0821	30
UM_SAT_PCC5	0.957612	1.069981	-0.87823	82.138	17.812	196.2213	2.2849	64.2153	3.167502	0.825458	-0.02046	90.542	3	20	4.8469	136.2213	25
UM_SAT_PCC7	0.883487	0.996949	-0.67288	79.502	10.473	197.1445	0.6944	64.6505	2.783545	0.705995	0.077404	81.801	3	20	1.473	137.1445	27
UM_SAT_PCC1	1.255995	1.034493	-0.89381	79.464	17.8398	195.9125	2.2908	64.0698	3.956793	0.82092	-0.0464	92.044	3	20	4.8596	135.9125	25
UM_SAT_PCC2	0.943113	1.079522	-0.9857	86.676	10.473	196.5826	0.6944	64.3857	2.958289	0.816523	-0.04106	97.035	3	20	1.473	136.5826	27
UM_SAT_PCC2	0.407832	0.883335	0.169672	88.627	10.381	118.4257	0.651	27.5421	1.594718	0.611583	0.315973	85.206	3	20	1.381	58.4257	22
UM_SAT_PCC5	0.689613	1.086975	-0.65202	92.984	10.4536	194.3	0.6852	63.3096	2.391116	0.69596	0.163222	92.464	3	20	1.4536	134.3	29
UM_SAT_PCC1	0.945769	1.20437	-0.88602	93.054	11.9445	196.1121	1.388	64.1638	3.599442	0.833846	0.074921	94.209	3	20	2.9445	136.1121	28
UM_SAT_PCC7	0.630157	1.186078	-0.59508	96.435	10.4375	195.1894	0.6776	63.7289	2.541337	0.725831	0.242157	95.516	3	20	1.4375	135.1894	30

UM_SAT_FS15_	0.413447	1.065599	-0.30582	98.649	11.0372	99.5653	0.9604	18.8188	1.656243	0.734521	0.230759	97.338	3	20	2.0372	39.9207	22
UM_SAT_FS5_	0.311389	0.828022	0.313322	89.369	11.6212	117.319	1.2356	27.0205	1.120501	0.402955	0.417096	81.139	3	20	2.6212	57.319	20
UM_SAT_FS15	0.396204	1.208508	-0.5956	98.626	10.3351	117.7791	0.6294	27.2373	1.664836	0.75335	0.239596	96.34	3	20	1.3351	57.7791	22
UM_SAT_FS10_	0.391021	0.928247	-0.22835	98.205	10.3959	117.3813	0.6581	27.0498	1.340065	0.639354	0.220026	97.837	3	20	1.3959	57.3813	21
UM_SAT_FS10	0.42273	0.814549	0.186409	81.949	11.778	118.3178	1.2819	34.5623	1.509235	0.529391	0.324124	76.653	3	20	2.7193	73.3178	23
UM_SAT_FS5_	0.485268	1.244048	-0.75611	99.031	10.4047	157.9844	0.6622	46.1903	1.995887	0.790136	0.18316	97.305	3	20	1.4047	97.9844	25
UM_SAT_FA5_/	0.781283	1.437228	-1.23376	97.144	10.4233	194.1259	0.6709	63.2275	3.442166	0.96772	0.047477	97.628	3	20	1.4233	134.1259	30
UM_SAT_FA5_/	0.594115	1.401976	-1.02604	97.395	10.4386	196.818	0.6782	64.4966	2.681745	0.894083	0.137295	94.632	3	20	1.4386	136.818	29
UM_SAT_FA5_/	0.441153	1.275864	-0.70863	96.132	10.3884	193.8561	0.6545	63.1004	1.920793	0.787494	0.223699	93.23	3	20	1.3884	133.8561	30
UM_SAT_FA5_/	0.520905	1.338269	-0.98108	92.92	17.6782	157.6805	2.3066	48.0603	2.34912	0.96067	0.068472	96.371	3	20	4.893	101.9513	24
UM_SAT_FA5_/	0.830347	1.431154	-1.21113	93.635	11.843	195.6503	1.3091	63.9462	3.691211	0.972159	0.046732	94.409	3	20	2.777	135.6503	29
UM_SAT_FA5_/	1.024305	1.093191	-0.71664	95.429	14.8239	193.8293	2.7454	63.0877	3.400988	0.672136	0.161727	94.596	3	20	5.8239	133.8293	23
UM_SAT_FA15	0.693929	1.158541	-1.02515	85.453	23.4825	194.3789	3.4077	63.3468	2.429235	0.893371	-0.04239	96.253	3	20	7.2288	134.3789	21
UM_SAT_FA15_	1.105447	1.126962	-1.01601	82.292	17.7686	195.6875	1.3381	63.9637	3.730785	0.87747	-0.05439	94.426	3	20	2.8385	135.6875	27
UM_SAT_FA15	0.4271	1.132351	-0.68167	91.329	10.3674	196.5694	0.6446	64.3794	1.554126	0.723353	0.176181	92.408	3	20	1.3674	136.5694	30
UM_SAT_FA15	0.980701	1.28884	-1.17428	92.008	10.4779	193.8346	0.6967	63.0902	3.725746	0.929117	-0.01998	97.839	3	20	1.4779	133.8346	30
UM_SAT_FA15	0.698994	1.075317	-0.78279	84.448	17.6796	195.4996	1.3118	63.8751	2.411003	0.809506	0.033127	90.29	3	20	2.7827	135.4996	27
UM_SAT_FA15_	0.595017	1.280373	-0.97716	94.915	10.4357	196.3068	0.6768	64.2556	2.417193	0.901963	0.059127	96.774	3	20	1.4357	136.3068	29
UM_SAT_FA15	0.453741	1.232252	-0.8787	94.76	10.3831	196.27	0.652	64.2383	1.798589	0.85002	0.092697	95.814	3	20	1.3831	136.27	30
REM002BQRC2	3.45246	0.724784	-0.67599	91.276	10.5064	157.01	0.8003	48.5866	7.286838	0.523219	-0.02002	98.711	2.93	19.9	1.6977	103.0678	29
REM002BQRC2	4.559533	0.596923	-0.54741	86.931	10.6882	196.0412	0.8139	64.268	8.578027	0.449842	-0.0246	97.941	2.9872	19.9033	1.7264	136.3331	30
REM002BQRC2	4.987886	0.622013	-0.67726	77.06	10.6188	156.8117	0.7981	48.2531	9.270746	0.492753	-0.08081	96.237	2.9699	19.9	1.693	102.3603	29
C7T061HORC2	1.023518	1.005349	-0.72822	97.906	10.63	196.7734	0.7752	64.6109	3.052192	0.650117	0.098209	96.996	2.9952	19.9043	1.6445	137.0604	30
C7T061ENRC2	1.351593	0.956209	-0.71013	96.349	10.4275	156.0037	0.8117	45.5715	3.870693	0.651146	0.068844	98.655	2.9013	19.784	1.7218	96.6718	28
C7T061INRC23	1.24342	0.998544	-0.78421	96.015	10.4695	156.5062	0.7866	45.6386	3.651306	0.681848	0.055181	98.745	2.9322	19.9	1.6686	96.8141	28
C7T061GORC2	0.770926	0.517914	0.312129	94.368	10.4402	117.2254	0.7912	34.231	1.892715	0.347888	0.273139	95.534	2.9029	19.7907	1.6783	72.6149	24
C7T061EORC2	1.407671	0.925395	-0.6153	94.702	10.4511	195.0205	0.7854	63.7917	4.107737	0.652971	0.077615	98.106	2.9232	19.8997	1.6662	135.3226	30
C7T061FORC2	1.40996	0.944147	-0.66703	95.37	10.5557	193.2585	0.7562	62.96	4.096135	0.659564	0.069509	98.488	2.9795	19.9002	1.6042	133.5583	30
C7T061ENRC2	1.127842	0.663218	-0.36506	89.859	10.5867	118.1394	0.8213	27.5508	2.51266	0.460923	0.097091	94.674	2.9481	19.8998	1.7423	58.444	23
C7T061GORC2	0.85066	0.578739	-0.01359	92.544	10.3791	156.3519	0.7662	45.6222	2.011701	0.416798	0.177357	94.042	2.9091	19.8597	1.6254	96.7792	28
C5M006GORC2	0.720012	0.758348	-0.51658	95.791	10.4526	98.8698	0.7749	18.4742	1.703628	0.573297	0.058265	96.317	2.9276	19.9	1.6437	39.1897	17
C5M006HPRC2	0.904823	1.079787	-0.86748	98.907	10.47	117.7512	0.7879	27.3656	2.773842	0.673541	0.108511	96.672	2.9307	19.9	1.6713	58.0512	25
C5M006GPRC2	1.132502	0.987173	-0.82896	96.913	10.5191	190.376	0.7685	61.6143	3.161324	0.657006	0.043632	97.403	2.9563	19.9	1.6303	130.7036	30
C5M006HPRC2	0.566399	1.008734	-0.3046	97.764	11.8195	117.3622	1.3066	27.1846	2.021329	0.61105	0.283233	96.583	2.9059	19.8984	2.7717	57.6672	19
C5M006GPRC2	1.094331	1.006406	-0.82284	97.199	10.5956	157.0894	0.7966	45.9098	3.142508	0.665812	0.056056	97.887	2.9541	19.9	1.6897	97.3894	28
PCC25PCT	1.003724	1.079514	-0.98569	86.677	10.4729	196.5824	0.6943	64.3856	3.14837	0.816509	-0.04105	97.035	3	20	1.4729	136.5824	27
MNRD_103PCT	0.473885	0.498897	-3.10797	97.643	10.5033	38.4339	1.9299	6.5686	0.302361	0.301484	-0.43615	93.156	2.116	8.3108	4.094	13.9341	16
TH_98PCT_S22	1.264474	0.361195	-3.47475	97.962	10.3288	38.5414	1.8891	6.4238	0.586373	0.220277	-0.55646	97.517	2.0798	8.4437	4.0074	13.6269	16
MNRD_98PCT_	2.067713	0.799475	-3.07882	94.604	10.4325	39.2872	1.9322	6.607	2.006559	0.483386	-0.32866	94.551	2.0743	8.4706	4.0988	14.0155	16
TH_103PCT_S0	0.330094	0.284928	-4.8496	93.926	10.3465	31.2012	1.9018	3.0831	0.111539	0.198605	-0.61026	94.781	2.1025	8.2321	4.0342	6.5402	8
TH_98PCT_S50	0.958934	0.246523	-3.96246	97.904	10.9006	37.8984	2.0272	6.3158	0.323335	0.151808	-0.68762	96.599	2.0597	8.202	4.3003	13.3979	15
MNRD_98PCT_	1.087865	0.823649	-3.32937	97.141	9.987	38.0606	1.6768	6.4869	1.007568	0.511189	-0.36337	97.675	2.1212	8.1622	3.557	13.7607	16
MNRD_103PCT	4.167946	1.367886	-3.45569	97.863	10.5433	38.8415	1.9279	6.6033	7.602631	0.831619	-0.21283	96.638	2.1512	8.285	4.0897	14.0078	16
TH_103PCT_S2	0.607706	0.422277	-3.67482	97.256	10.3481	38.0455	1.8236	6.2576	0.29186	0.263386	-0.54955	94.096	2.0875	8.2879	3.8684	13.2743	16
TH_98PCT_S50	0.233955	0.153685	-4.27382	91.23	9.6581	30.9998	1.5476	2.7918	0.085282	0.114002	-0.49635	93.606	2.0808	8.3592	3.2829	5.9223	8
MNRD_98PCT_	0.225857	0.643294	-1.78858	79.475	10.2176	38.3897	1.8586	6.3776	0.282723	0.397293	-0.14189	80.966	2.0887	8.3018	3.9428	13.5289	16
TH_103PCT_S5	4.267117	1.026791	-3.33262	93.553	10.9323	39.2232	2.1486	6.9295	4.933882	0.600708	-0.32771	91.751	2.1128	8.2964	4.5578	14.6997	16
MNRD_103PCT	1.152017	0.69432	-3.72146	97.312	10.943	39.9085	2.0669	6.7952	0.745762	0.408515	-0.51452	94.509	2.0846	8.2911	4.3846	14.4147	16
TH_98PCT_S0_	0.434711	0.222921	-5.04902	91.625	9.9821	30.9342	1.604	2.8057	0.137597	0.158127	-0.584	91.914	2.1236	8.3274	3.4025	5.9519	8
C6T371FORC1	1.325111	0.732307	-0.70475	93.906	10.5875	119.4244	0.7782	28.1152	2.7502	0.521177	0.006932	96.727	2.9763	19.9277	1.6509	59.6413	23
C6T371HORC1	0.939383	0.922643	-0.85148	97.283	10.3716	119.5331	0.7809	28.276	2.38426	0.644562	0.027171	98.718	2.9051	19.8566	1.6564	59.9825	23
C6T371GORC1	1.06413	0.884891	-0.81724	96.579	10.528	119.0812	0.8045	27.9926	2.607976	0.623605	0.020834	98.447	2.9291	19.9	1.7067	59.3812	23
C6T371GORC1	1.177248	0.8423	-0.82361	94.806	10.4582	119.2194	0.827	28.1991	2.724865	0.599959	0.007565	98.071	2.9006	19.8	1.7543	59.8194	22
C6T371FORC1	1.195959	0.616186	-0.44867	84.044	10.6875	119.7072	0.7955	28.1935	2.399421	0.462914	0.029592	87.956	3	19.9666	1.6875	59.8074	23
C6T371HORC1	0.620058	1.022409	-0.89446	97.227	10.5983	100.3254	0.7944	19.1452	1.805043	0.737059	0.061397	95.684	2.971	19.9041	1.6852	40.6132	17
C6T371FORC0	1.529066	0.850001	-0.9595	88.526	10.3289	119.2537	0.7679	28.2153	3.403694	0.661329	-0.09335	97.58	2.9	19.8	1.6289	59.8537	22
C7T061HNRC1	1.253237	0.681888	-0.20143	96.649	10.5565	193.8029	0.7837	63.2114	3.08082	0.453653	0.172366	98.002	2.9587	19.9063	1.6624	134.0916	30
C7T061HNRC1	1.974644	0.779916	-0.7106	81.876	10.5058	198.6201	0.7895	65.4876	4.576324	0.605235	-0.03848	96.24	2.9398	19.9	1.6747	138.9201	30
C7T061HORC1	1.848907	0.793555	-0.69882	88.892	10.3926	158.0705	0.7979	46.6551	4.299225	0.57741	-0.00808	97.022	2.8989	19.7007	1.6926	98.9705	25
C7T061INRC19	1.05106	0.483381	0.130766	96.852	10.6781	119.5566	0.8118	28.1857	2.251831	0.32712	0.203153	97.579	2.985	19.9219	1.722	59.7909	23
C7T061HNRC1	1.598544	0.827241	-0.6073	93.039	10.4944	198.9615	0.7937	65.6483	4.062551	0.590277	0.04467	98.393	2.9356	19.9001	1.6837	139.2611	30
C7T061HNRC1	1.496356	1.006703	-0.93084	90.168	10.5457	158.8569	0.7787	46.7421	4.070347	0.666957	0.016113	91.727	2.9646	19.9038	1.6518	99.155	28
GBI035FORC1	1.831718	0.65667	-0.55789	91.669	10.5003	119.3441	0.799	28.1165	3.687925	0.480298	0.022378	97.097	2.9352	19.9	1.6949	59.6441	22
GBI035JKRD1	1.754582	0.669616	-1.40679	91.753	6.7301	72.2559	0.4555	17.232	2.616419	0.515204	-0.10944	90.881	1.919	11.9004	0.9662	36.5547	20
GBI035KKRD1	1.703207	0.604613	-0.98105	92.747	6.747	72.0354	0.4467	17.1247	2.772601	0.479221	-0.05397	96.588	1.9283	11.9028	0.9475	36.327	20
GBT047JKRD1	1.841344	0.602252	-0.98702	94.14	6.9115	72.2586	0.4506	17.1886	2.975046	0.4766	-0.05297	97.687	1.9852	11.932	0.9559	36.4626	20
GBT047JLRD1	2.320501	0.541592	-0.65904	93.406	6.8978	72.5234	0.4691	17.3487	3.940094	0.435708	-0.00928	98.093	1.9619	11.9088	0.9952	36.8021	20
GBT047KKRD1	1.796902	0.580768	-0.93582	93.344	6.9803	72.3868	0.4621	17.2255	2.879859	0.466703	-0.05377	98.477	2	11.9486	0.9803	36.5409	20
GBT047JKRD1	1.974227	0.632119	-1.12951	93.016	6.9943	72.2899	0.4699	17.1944	3.135736	0.496841	-0.07246	95.932	1.9992	11.9384	0.9967	36.4748	20
GBT047JLRD1	2.345674	0.592571	-0.74451	93.715	6.9839	72.4019	0.4638	17.2187	4.139628	0.475667	-0.01534	97.816	2	11.9635	0.9839	36.5263	20
GBT047JMRD1	2.180588	0.578255	-0.67832	94.921	6.975	72.1656	0.4767	17.1396	3.866304	0.459666	-0.00147	98.654	1.9855	11.9366	1.0112	36.3586	20
GBT047KLRD1	1.859527	0.634762	-1.05368	91.437	6.785	72.1841	0.448	17.1985	3.086158	0.517085	-0.06994	97.717	1.9341	11.9003	0.9503	36.4835	20
GBT047KLRD1	1.880132	0.615633	-0.80137	94.386	6.788	72.1369	0.4709	17.176	3.35489	0.492702	-0.0207	98.701	1.9193	11.9004	0.999	36.4358	20
GBT047KKRD1	1.708807	0.552008	-0.74735	95.489	6.7728	72.2917	0.4684	17.2483	2.824158	0.430802	-0.01512	98.39	1.9264	11.9009	0.9936	36.5891	20
GBT047KLRD1	1.929269	0.573829	-0.74503	95.56	6.7849	72.1945	0.4698	17.2037	3.294214	0.446743	-0.00789	98.589	1.9218	11.9	0.9966	36.4945	20
GBT047KLRD1	2.111047	0.555155	-0.75458	93.444	7.0045	72.5258	0.4746	17.2644	3.510935	0.445678	-0.02575	97.968	1.9992	11.9675	1.0069	36.6233	20
GBT047KMRD1	1.624355	0.65535	-0.85897	95.878	6.8236	72.2191	0.4585	17.2147	2.987397	0.515727	-0.01571	99.135	1.9442	11.9006	0.9726	36.518	20
P2T052GORD1	2.869312	0.665265	-1.08227	90.783	6.8507	72.2445	0.4731	17.2215	4.943699	0.549607	-0.07767	98.373	1.9339	11.9072	1.0037	36.5324	19
P2T052GMRD1	1.609006	0.652315	-1.44224	93.204	6.7386	59.9957	0.4601	11.4531	2.304087	0.500883	-0.11831	91.412	1.9209	11.9001	0.976	24.2957	17
P2T052GNRD1	2.107272	0.691358	-1.18514	90.98	6.8763	72.3213	0.4406	17.2033	3.610925	0.565579	-0.08566	97.695	1.9759	11.9425	0.9346	36.4938	20
P2T052GORD1	2.43761	0.686623	-1.03975	94.484	6.731	72.1402	0.4678	17.1777	4.363051	0.543438	-0.0463	98.318	1.9129	11.9003	0.9923	36.4395	20
P2T052GMRD1	1.544979	0.742263	-1.37053	92.732	6.8214	72.3335	0.4742	17.258	2.615111	0.582347	-0.09339	95.533	1.9385	11.9079	1.0059	36.6098	19
P2T052GNRD1	2.09903	0.690682	-1.19129	92.484	6.7591	72.2166	0.4645	17.2135	3.56321	0.555451	-0.08004	97.94	1.9246	11.9007	0.9853	36.5154	17
P2T052GNRD1	1.948331	0.687461	-1.11634	95.072	6.8794	71.951	0.4665	17.0771	3.361763	0.528751	-0.04815	96.776	1.9595	11.9172	0.9896	36.2259	20
P2T052HNRD1	1.764257	0.707137	-1.22534	91.655	6.8644	72.1406	0.4777	17.1774	3.037339	0.574864	-0.08762	98.375	1.9388	11.9006	1.0133	36.4387	20
P2T052HNRD1	1.818924	0.720424	-1.39815	91.094	6.8669	72.2858	0.466	17.2401	2.965301	0.578475	-0.11326	96.333	1.9499	11.9046	0.9885	36.5719	20
P2T052HMRD1	1.407806	0.73911	-1.36447	93.016	6.9467	72.2359	0.4468	17.2097	2.378459	0.583558	-0.0956	96.685	1.9584	11.9102	0.9478	36.5074	20
P2T052HORD1	1.595213	0.835352	-1.19103	96.908	6.8206	72.1504	0.4483	17.1823	3.310768	0.642562	-0.02711	98.569	1.9476	11.9015	0.9511	36.4491	20
P2T052IMRD1	1.450959	0.740091	-1.3291	92.472	6.9935	72.428	0.4683	17.2035	2.500651	0.594487	-0.09573	97.555	2	11.9855	0.9935	36.4942	20
P2T052HORD1	1.384307	0.860006	-1.13311	98.165	6.8724	72.2778	0.4737	17.2395	3.033647	0.650973	-0.00309	98.863	1.9537	11.9024	1.0049	36.5705	20
P2T052IORD1	1.216194	0.900682	-1.2079	98.558	6.8249	72.1386	0.4649	17.1763	2.722254	0.665296	0.006139	97.791	1.9415	11.902	0.9861	36.4364	20
P2T052IORD1	1.130614	0.918027	-1.20335	98.57	6.7165	72.2385	0.4518	17.2243	2.59336	0.672683	0.015463	97.363	1.9171	11.9001	0.9584	36.5382	20
P2T052INRD1	1.628868	0.716013	-1.16843	94.299	6.9955	72.3484	0.4765	17.2311	2.886227	0.56691	-0.06353	98.03	1.9949	11.9326	1.0107	36.5526	20
P2T052IMRD1	1.174648	0.745193	-1.51828	93.832	6.8349	60.0705	0.4647	11.4835	1.94201	0.582661	-0.09187	97.297	1.9478	11.9034	0.9858	24.3602	18
P2T052INRD1	1.419761	0.784847	-1.22229	95.324	6.9488	72.2316	0.4885	17.2128	2.721346	0.620044	-0.05682	98.595	1.9708	11.9064	1.0363	36.5138	20
P2T052IMRD1	1.202755	0.728352	-1.27385	93.729	6.9256	71.7189	0.4822	16.9613	2.075896	0.573571	-0.07862	96.96	1.9615	11.9129	1.0229	35.9803	20
SGT052GNRD1	2.126984	0.699015	-1.17832	92.989	6.8021	72.1544	0.4804	17.1844	3.669367	0.55632	-0.07177	97.964	1.9188	11.9037	1.019	36.4535	20
SGT052GMRD1	1.448724	0.641301	-1.33906	96.121	6.7468	72.3695	0.4532	17.2862	2.128671	0.493244	-0.10438	94.522	1.9232	11.9	0.9614	36.6695	20
SGT052GMRD1	1.42928	0.675954	-1.35274	94.786	6.8444	72.3493	0.4738	17.2593	2.189697	0.512977	-0.09405	92.763	1.9464	11.9137	1.0051	36.6125	20
SGT052GNRD1	1.946399	0.772641	-1.12145	96.674	6.9569	72.4739	0.4542	17.2679	3.782373	0.590566	-0.02838	97.551	1.9974	11.951	0.9634	36.6307	20
C6T016EPRC0	2.886762	0.591288	-0.69028	43.911	17.8363	159.426	1.4717	47.0136	5.432212	0.556404	-0.14477	78.487	2.9	19.8994	3.1219	99.7308	25
C6T016FNRC0	1.564379	0.85221	-0.66939	90.719	10.2102	159.9978	0.7119	47.2809	4.029603	0.618044	0.031459	98.109	2.9	19.9	1.5102	100.2978	27
C6T016FNRC01	1.721833	0.879291	-0.85914	79.523	10.2517	199.5237	0.7315	65.9147	4.355362	0.699848	-0.07577	96.873	2.9	19.8992	1.5517	139.8262	30

C6T016FNRC02	1.688439	1.134125	-1.41879	86.774	14.8378	119.5818	2.7224	28.2284	4.553139	0.821864	-0.12611	98.348	2.9078	19.9001	5.775	59.8815	15
C6T016FNRC01	2.487057	1.088364	-1.53767	74.903	14.9092	199.0242	2.9269	65.6779	6.108823	0.853206	-0.26508	98.533	2.9001	19.9001	6.2089	139.3239	20
C6T016GORC0	2.196744	0.906496	-1.17442	71.429	11.7893	159.4283	1.444	49.2934	4.988045	0.72566	-0.17493	96.794	2.9087	19.9015	3.0631	104.567	26
C6T016GORC0	1.816908	0.92427	-0.95918	83.023	10.2739	159.0368	0.7408	46.8278	4.584265	0.699596	-0.07826	98.231	2.9008	19.9	1.5715	99.3368	28
C6T016FNRC02	1.334162	0.951659	-0.91944	87.76	10.2148	119.5409	0.6823	28.2082	3.505265	0.685576	-0.00973	97.652	2.9212	19.9008	1.4474	59.8386	24
3471MRA4	2.082517	0.224385	-3.54246	95.208	7.8789	26.9171	0.8199	4.2361	0.996	0.156381	-0.37137	97.247	2.0227	6.0046	1.7392	8.9862	15
3472PRB1	3.701977	0.06891	-2.4078	98.242	7.9311	26.9753	0.8044	4.2306	1.993441	0.043123	-0.271	93.924	2.0035	6.0028	1.7064	8.9745	15
3473MRA2	2.426746	0.108354	-2.79082	98.228	7.8639	26.9865	0.8458	4.2393	1.231076	0.073015	-0.30985	96.736	2.0032	6.0035	1.7943	8.9929	15
3473MRB1	2.312919	0.15667	-2.64846	97.001	7.9186	27.0059	0.8415	4.2528	1.305958	0.106126	-0.28099	96.742	2.003	6.004	1.7851	9.0215	15
3575MRA2	3.333014	0.167723	-3.25398	96.661	7.9437	27.0123	0.773	4.2439	1.591238	0.110572	-0.35084	98.23	2.0035	6.0035	1.6397	9.0027	15
3575MRB1	2.617522	0.228822	-4.34165	93.084	7.8957	27.0215	0.7958	4.2495	0.98065	0.156008	-0.47426	98.066	2.0029	6.0023	1.6882	9.0146	15
3575PRB1	2.947163	0.042421	-3.34919	98.074	7.9507	26.8998	0.8481	4.2072	1.156679	0.029382	-0.39931	97.325	2.0195	6.005	1.7992	8.9248	15
3577MRA1	3.319613	0.262651	-3.11576	90.603	7.8294	27.0186	0.8389	4.2506	1.863458	0.173706	-0.3147	94.235	2.009	6.0023	1.7795	9.0169	15
3577PRA1	5.335683	0.121969	-2.33354	95.115	9.7099	26.9115	1.571	4.2196	2.965079	0.079403	-0.32533	98.831	2.0135	6.0054	3.3326	8.9512	12
3577PRB1	1.650461	0.248838	-3.94447	93.414	7.9437	26.902	0.8487	4.2112	0.713313	0.165545	-0.41936	96.292	2.0153	6.0047	1.8004	8.9333	15
3578MRA1	4.563142	0.125277	-1.73295	95.409	7.9652	27.0117	0.8434	4.2958	3.222792	0.08655	-0.18605	96.973	2.0146	6.0039	1.7892	9.1127	15
3578MRB2	1.529979	0.166843	-3.76693	94.938	7.9646	26.9436	0.8562	4.2126	0.626601	0.116807	-0.4234	98.694	2.0291	6.005	1.8163	8.9364	15
3578PRA1	7.677611	0.037647	-1.7225	69.727	11.5793	26.9624	2.5397	4.2397	4.424263	0.015586	-0.30656	71.186	2.0069	6.0039	5.3876	8.9938	9
3578PRB2	3.208445	0.009036	-2.70085	98.434	7.8888	26.8723	0.8405	4.2133	1.464778	0.007657	-0.32543	97.521	2.018	6.0045	1.783	8.9378	15
3600RM1A	2.46991	0.28718	-0.29797	88.312	12.7279	95.5566	1.2715	16.9242	3.294608	0.243163	-0.0359	95.78	3.3436	19.885	2.6972	35.9017	15
3600RM2A	2.558182	0.258192	-0.22988	89.42	12.071	95.951	1.2896	16.9495	3.367623	0.213754	-0.01936	95.258	3.1107	20.0022	2.7356	35.9554	15
3700RM1A	1.518678	0.337	-0.01574	96.739	11.924	95.4569	1.2696	16.8957	2.435796	0.255609	0.074979	97.268	3.0767	19.8754	2.6931	35.8411	15
3700RM2A	0.997453	0.453181	-0.02689	98.516	12.0099	95.5644	1.2763	16.9138	1.864126	0.314738	0.1318	98.433	3.1009	19.8949	2.7074	35.8796	15
371C62R	1.868172	0.472832	-0.36462	96.514	11.7891	95.9592	1.2733	16.9506	3.139506	0.360846	0.013531	98.544	3.0024	20.0057	2.701	35.9576	15
371C63R	1.747089	0.771066	-0.84567	94.419	12.9849	95.9334	1.2275	16.9119	3.67747	0.604761	-0.06473	98.881	2.9912	20.0224	2.6039	35.8756	15
371SG1R	2.161778	0.462553	-0.50135	94.293	16.7538	95.8801	3.7783	16.9085	3.386371	0.330247	-0.05149	96.983	2.913	20.0243	8.0149	35.8684	12
371SG3R	1.339708	0.607206	-0.44018	98.031	11.744	95.7737	1.2533	16.8178	2.630162	0.447602	0.043272	99.154	3.0272	20.0326	2.6587	35.6759	15
371SG4R	2.019611	0.453949	-0.54367	92.712	11.8071	95.965	1.3191	16.9139	3.079335	0.366196	-0.06094	98.3	3.003	20.0284	2.7983	35.8798	15
3900RM2A	1.628492	0.383188	-0.30378	91.138	11.9448	95.4841	1.2861	16.9224	2.486554	0.315689	-0.01737	96.256	3.0722	19.8634	2.7283	35.8979	15
3900RM3A	1.438572	0.371408	-0.13754	95.732	11.9787	95.4671	1.2976	16.9103	2.306518	0.289718	0.042231	97.46	3.0754	19.8677	2.7527	35.8721	15
52PSG1R	2.08202	0.491211	-0.29365	97.523	11.7343	96.2231	1.2691	17.0324	3.693536	0.36662	0.044307	98.963	2.8342	20.0307	2.6921	36.1311	15
52PSG2R	1.620856	0.623845	-0.59323	94.269	14.4016	95.9004	2.1026	16.9058	3.058102	0.456697	-0.01246	96.053	3.0075	20.0132	4.4604	35.8625	14
52PSG3R	1.383611	0.639922	-0.31386	99.199	11.8544	95.8857	1.2965	16.9051	2.992651	0.462004	0.094668	99.65	3.0216	20.0135	2.7502	35.8612	15
52SG1R	2.164764	0.619381	-0.71982	96.725	14.6138	95.6568	2.5243	16.9133	3.8617	0.450254	-0.0688	97.709	2.7256	19.9312	5.3548	35.8786	13
52SG2R	1.148695	0.685456	-0.50898	98.78	11.9027	96.0024	1.2748	16.9206	2.433725	0.484787	0.068219	98.417	3.066	20.0361	2.7042	35.894	15
52SG3R	1.149251	0.4633	-0.16904	86.478	11.4366	95.77	1.2654	16.8094	2.032076	0.283824	0.141319	85.864	2.9174	20.0373	2.6844	35.6582	15
61CHHR1	1.119004	0.435699	0.094924	86.774	47.6453	95.3287	4.1986	16.9206	2.149322	0.301836	0.159987	88.687	9.9241	19.8143	8.9066	35.8941	8
62CHHR1	0.885858	0.188482	0.924395	90.715	11.8372	95.3285	1.2188	16.9329	1.675114	0.061249	0.373909	95.924	3.0817	19.8484	2.5855	35.9202	15
722FNR1	1.824343	0.421128	-0.09866	97.105	13.928	95.5809	1.3514	16.9166	3.153356	0.283629	0.112833	96.626	3.6743	19.9101	2.8667	35.8855	15
723FNR1	0.600629	0.144887	1.519691	95.399	12.5871	95.4606	1.2715	16.9025	1.371881	0.026184	0.51967	98.311	3.2836	19.8814	2.6972	35.8555	14
723GNR2	0.914829	0.651079	-0.00327	98.882	11.7754	95.9679	1.2699	16.9105	2.275185	0.442881	0.208489	98.683	3.021	20.0318	2.6939	35.8727	15
A1INR1	1.723434	0.533617	-0.57037	93.575	11.7847	94.3112	1.3126	16.9213	2.892783	0.400927	-0.01805	95.472	2.9937	19.4719	2.7845	35.8956	15
A1INR3	1.398373	0.571224	-0.54029	97.233	11.9439	96.0086	1.2987	16.9193	2.503391	0.426325	0.001646	98.449	3.0624	20.0392	2.7549	35.8912	15
A1JNR2	1.245772	0.51247	-0.45987	96.76	11.643	77.9167	1.2508	12.6826	2.120633	0.341921	0.067155	94.824	2.9965	20.0046	2.6534	26.904	14
A2_5_12_11	2.282568	0.814664	-0.95465	96.378	14.6871	96.6363	2.6809	17.2705	4.970304	0.587998	-0.04893	99.638	3	20	5.6871	36.6363	9
A2_5_9_23					28.6629	95.948	6.4408	16.946					5	20	13.6629	35.948	5
A5_10_23	1.839995	0.951457	-1.02476	99.214	17.4544	96.245	3.9855	17.0861	4.392421	0.596173	-0.02352	99.957	3	20	8.4544	36.245	8
A5_12_15	2.122192	0.902938	-1.04389	97.755	17.2384	96.9311	3.8836	17.4095	4.932255	0.627074	-0.11685	99.777	3	20	8.2384	36.9311	8
A7_5_11_5	0.767061	0.750294	-0.45435	98.548	14.4018	95.8655	2.1415	16.9071	1.824559	0.529779	0.082555	98.506	3	20	4.5429	35.8655	14
A7_5_12_16	1.293205	0.936178	-0.7173	99.434	14.6644	96.3949	2.6702	17.1567	3.535313	0.637759	0.055471	99.587	3	20	5.6644	36.3949	12
B1EOR1	2.059862	0.494113	-0.33822	97.389	11.218	94.2096	1.2149	16.8916	3.606675	0.370805	0.03238	99.212	2.871	19.4769	2.5771	35.8325	15
B1EOR2	1.688616	0.578236	-0.32168	98.789	10.8778	93.4574	1.24	16.9525	3.336999	0.412485	0.079656	99.397	2.748	19.1803	2.6304	35.9617	15
B1FOR1	1.602949	0.602316	-0.44388	97.678	11.9955	95.8712	1.317	16.9272	3.12114	0.445142	0.038189	98.82	2.9936	19.9989	2.7939	35.908	15
B2GPR1	1.201693	0.755444	-0.36424	99.386	11.7965	95.7837	1.3065	16.87	2.987234	0.534573	0.125752	99.463	3.0072	20.0078	2.7715	35.7868	15
B2GPR2	0.778367	0.897614	-0.45764	99.48	11.7185	95.7441	1.3009	16.9619	2.279567	0.645869	0.129826	99.777	2.9777	19.9367	2.7596	35.9816	15
B2GPR3	1.244412	0.81248	-0.58406	98.26	11.8022	95.9343	1.3317	16.935	3.078433	0.604059	0.050693	99.234	2.9924	20.0045	2.825	35.9246	15
B2_1_16_103	4.268415	0.163105	-0.56846	96.968	10.2856	39.0618	2.0203	7.1718	4.255399	0.085948	-0.06014	97.111	2	8	4.2856	15.2138	16
B2_1_195_103	2.639427	0.107934	-0.72395	93.048	10.2462	39.0575	1.9999	7.1003	2.334015	0.064	-0.1131	93.742	2	8	4.2425	15.0619	15
B2_1_22_98	2.218748	0.041832	-0.76573	98.407	10.1716	38.7944	1.9665	7.0035	1.770766	0.025069	-0.13952	93.145	2	8	4.1716	14.8566	16
B2_1_24_103	3.291353	0.02214	-0.59153	95.919	13.4996	38.8265	3.4968	6.9931	2.702442	0.011915	-0.1402	93.773	2	8	7.4179	14.8345	11
B2_1_27_98	2.518426	0.013614	-0.6998	98.432	10.2345	39.0911	1.9961	7.114	1.97698	0.008269	-0.1408	95.805	2	8	4.2345	15.0911	16
B2_2_16_103					21.0379	38.9497	7.0474	7.1386					2	8	14.9497	15.1434	4
B2_2_195_103	3.568885	0.049046	-0.59587	96.85	16.8131	39.0361	3.5412	7.0881	3.01613	0.023027	-0.1336	95.697	2	8	7.512	15.0361	11
B2_2_22_98	2.833491	0.022073	-0.60742	98.215	13.4804	38.863	3.4582	7.0432	2.311412	0.011577	-0.14328	95.988	2	8	7.336	14.9409	12
B2_2_24_103	2.815759	0.037813	-0.60908	98.254	13.5635	38.9407	2.0702	7.1301	2.342276	0.016607	-0.11736	96.216	2	8	4.3915	15.1253	15
B2_2_27_98	2.13366	0.020173	-0.88477	98.315	13.348	34.6312	3.4639	5.0116	1.586312	0.011432	-0.18884	98.215	2	8	7.348	10.6312	6
B3GPR1	1.588683	0.551725	-0.24445	98.272	11.7642	95.9276	1.2951	16.9198	3.124759	0.398429	0.088869	98.957	3.0056	20.0157	2.7474	35.8923	15
B3GPR2	1.364302	0.593043	-0.21236	99.136	11.7631	95.9213	1.2942	16.9214	2.877974	0.419422	0.117115	99.384	3.0059	20.0089	2.7454	35.8957	15
B4FOR1	1.588139	0.33293	-0.0121	89.706	11.6908	95.8967	1.2478	16.9064	2.501849	0.197934	0.137029	90.516	2.965	20.0239	2.6471	35.864	15
B4FOR2	2.649199	0.684207	-1.31207	75.672	14.3189	96.0513	2.503	16.951	4.111453	0.546839	-0.29864	86.102	3.003	20.0309	5.3098	35.9586	13
B4FOR3	1.442785	0.662948	-0.47886	96.565	14.5883	95.856	2.115	16.9131	3.018743	0.487331	0.028729	98.402	3.049	19.9926	4.4866	35.8782	14
B4FOR4	1.209715	0.636912	-0.31114	98.477	14.287	96.0423	2.1227	16.9096	2.610481	0.458667	0.081792	99.312	2.9608	20.0572	4.5029	35.8707	14
C7C042FORC0	1.84179	0.693305	-0.77328	83.597	10.6036	119.9447	0.7559	28.3217	3.611571	0.552719	-0.06557	96.614	3	19.9551	1.6036	60.0794	22
C7C042FORC0	1.814761	0.75228	-0.8345	84.39	10.6974	159.3416	0.8002	46.8758	3.715991	0.549549	-0.05632	96.67	3	19.9714	1.6974	99.4386	28
RLF 98PCT S2	0.210606	0.282015	-3.07416	98.697	9.7263	33.6263	1.5748	4.0548	0.117763	0.192341	-0.37294	97.292	2.1141	8.3416	3.3408	8.6016	12
RLF 98PCT S5	2.90292	1.018896	-4.54511	83.929	10.2504	38.7917	1.8509	6.6033	2.137191	0.611533	-0.58123	83.479	2.108	8.2814	3.9263	14.0078	16
RLF_98PCT_S2	1.147461	0.604186	-3.80112	98.023	10.7956	38.5343	2.0782	6.5197	0.648257	0.363811	-0.55998	98.696	2.1047	8.3215	4.4085	13.8305	16
RW 103PCT S	0.483731	-1.23541	4.643338	46.641	10.4857	101.7264	1.8879	6.6349	0.467161	-0.77145	0.538711	30.825	2.0797	31.1445	4.0048	14.0747	16
RLF 103PCT S	2.638335	0.774128	-3.12764	92.17	10.8203	39.2086	2.1125	6.8655	2.304085	0.440237	-0.37609	87.361	2.0768	8.2747	4.4812	14.5639	15
RLF_103PCT_S	0.246207	0.296478	-3.06553	98.58	10.3499	34.0055	1.8497	4.3486	0.134644	0.196655	-0.41091	98.645	2.1226	8.3381	3.9237	9.2249	12
RLF 103PCT S	2.107797	0.615426	-3.88908	96.274	10.7808	39.1082	2.0792	6.7902	1.143933	0.36121	-0.58948	95.183	2.0821	8.3007	4.4107	14.4041	16
RW 103PCT S	0.772993	0.844384	-1.84146	96.456	10.8526	39.4935	2.0785	6.8954	1.231997	0.503535	-0.07348	96.936	2.137	8.2887	4.4091	14.6273	16
RW 98PCT S0	0.491346	0.787551	-1.246	97.837	10.4285	38.4789	1.8266	6.5518	0.912282	0.472194	0.038234	93.49	2.0965	8.2592	3.8748	13.8984	16
RW_98PCT_S5	1.406789	1.19863	-3.35389	97.982	10.3931	38.6922	1.9061	6.5827	2.117365	0.725859	-0.24374	95.838	2.1034	8.3183	4.0434	13.964	16
RW 98PCT S2	2.151929	0.880986	-3.38975	93.901	10.3156	38.9335	1.9249	6.6228	2.03972	0.531349	-0.39655	95.876	2.0774	8.3377	4.0833	14.049	15
RW 103PCT S	3.464429	1.033263	-3.78525	92.625	11.0894	39.45	2.1425	6.887	3.348665	0.593773	-0.43898	91.401	2.106	8.2801	4.5449	14.6096	16
RW_98PCT_S5	1.262711	1.30598	-3.69097	97.17	10.3201	38.6303	1.8594	6.57	1.981131	0.794173	-0.25909	94.601	2.1022	8.2899	3.9443	13.937	15
CR3 S 7 8 2 I	1.729918	0.8957	-0.90429	85.603	10.4748	158.3559	0.6952	48.5592	4.278467	0.680191	-0.06621	98.52	3	20	1.4748	103.0095	29
CR3 T 5 7 1 I	2.236051	0.569835	-0.57005	77.972	11.9747	197.2173	1.3446	64.6848	4.064207	0.461042	-0.05702	97.324	3	20	2.8524	137.2173	29
CR3 T 8 8 1 I	1.903222	1.360615	-2.97432	-861.594	10.4613	158.214	0.6889	48.5786	2.382824	0.54802	-0.38685	-1041.5	3	20	1.4613	103.0508	29
CR3_T_5_7_2_I	2.069454	0.627662	-0.62517	76.358	10.4733	196.4067	0.6945	64.3028	4.02318	0.516464	-0.06755	96.665	3	20	1.4733	136.4067	30
CR3 S 5 1 2 I	3.440876	0.601267	-0.92698	53.17	11.9525	194.1049	1.3532	63.2177	5.677585	0.542179	-0.22126	93.756	3	20	2.8707	134.1049	28
CR3 S 7 8 1 I	1.993666	0.601743	-0.53703	62.436	17.7834	195.937	1.336	64.0813	4.025037	0.546005	-0.07112	87.169	3	20	2.8342	135.937	27
CR3_U_5_7_2_I	3.346137	0.411277	-0.53876	19.823	14.956	158.2297	1.3491	48.5646	5.167532	0.461795	-0.16496	50.973	3	20	2.8618	103.0211	26
CR3 V 5 2 2 I	2.198142	0.764678	-0.79135	85.163	10.5434	197.1924	0.7275	64.6731	4.721008	0.581914	-0.06455	99.133	3	20	1.5434	137.1924	30
CR3 U 8 7 1 I	1.350009	0.815404	-0.52058	75.656	10.4707	157.8347	0.6933	48.3624	3.694488	0.65902	0.026964	84.784	3	20	1.4707	102.5922	29
CR3 U 8 7 2 I	1.489977	1.56112	-3.1302	-547.315	10.4284	157.511	0.6734	48.1194	2.244466	0.635955	-0.34064	-680.327	3	20	1.4284	102.0767	29
CR3_U_5_7_1_I	2.490631	0.682268	-0.77766	79.861	11.9552	196.9852	1.3931	64.5754	4.790014	0.532361	-0.09295	97.912	3	20	2.9552	136.9852	26
CR3 T 8 8 2 I	1.506098	0.787967	-0.74885	82.774	11.906	197.01	1.3699	64.5871	3.463651	0.617718	-0.05095	97.989	3	20	2.906	137.01	27
CR3 V 5 2 1 I	2.365869	0.745873	-0.73076	87.668	10.5143	197.2401	0.7139	64.6956	5.065983	0.559572	-0.04273	99.335	3	20	1.5143	137.2401	30
CR3_W_7_2_1_	1.750972	1.000427	-0.97199	94.984	10.5003	197.098	0.7073	64.6286	4.690532	0.690231	-0.01766	98.541	3	20	1.5003	137.098	30
CR3 V 8 2 MA	1.020503	1.243882	-1.14529	98.361	10.4531	195.9399	0.685	64.0827	3.457239	0.802066	0.03675	96.856	3	20	1.4531	135.9399	30
CR3 W 7 2 2	2.042262	0.878217	-0.89795	89.196	11.913	197.0229	1.3407	64.5932	4.870556	0.64699	-0.05758	99.149	3	20	2.8441	137.0229	29

CR3_V_8_1_MA	1.214483	1.107554	-1.03147	97.844	10.4568	197.1811	0.6868	64.6678	3.594979	0.721236	0.024274	97.159	3	20	1.4568	137.1811	30
CR3_W_4_7_2_	2.811037	0.890116	-1.00159	88.649	10.5015	197.2321	0.7078	64.6918	6.461908	0.652558	-0.09218	98.737	3	20	1.5015	137.2321	30
C7C042EORC2	2.81844	0.63723	-0.87601	70.624	12.0342	118.4959	1.5257	27.7167	4.891581	0.536279	-0.13715	92.396	2.9243	19.9	3.2366	58.7959	21
C5T014JNRC18	1.069136	0.964359	-1.06633	94.309	10.4274	119.3653	0.7251	28.1247	2.64624	0.693397	-0.02743	97.901	2.9576	19.9039	1.5382	59.6615	23
C5T014JNRC18	1.132893	0.910375	-0.91756	96.025	10.5221	99.9706	0.7458	21.1398	2.766705	0.647541	0.003112	98.542	2.98	19.9193	1.582	44.8444	21
C7C042EPRC1	3.398873	0.732518	-1.07965	61.461	12.1308	118.7844	1.4986	34.895	6.242423	0.612113	-0.21722	94.231	2.9839	19.9223	3.179	74.0236	23
C7C042FORC0	2.396634	0.72374	-0.92178	75.506	10.5921	159.6634	0.7526	47.0394	4.545031	0.551207	-0.11057	93.674	2.9979	19.9592	1.5965	99.7856	28
C7C042HPRC0	1.390909	0.896978	-0.83729	94.107	10.4615	159.1334	0.7941	48.6373	3.381824	0.590566	0.025444	96.165	2.9257	19.9	1.6846	103.1752	29
C7C042GPRC0	2.32665	0.728647	-0.78022	80.337	10.4878	195.617	0.7812	64.07	4.744895	0.544997	-0.06562	94.22	2.9395	19.9013	1.6571	135.913	30
C7C042GPRC0	1.28205	0.636434	-0.54924	94.345	10.5091	99.4379	0.8195	18.7326	2.495968	0.452059	0.027013	97.103	2.9215	19.9	1.7384	39.7379	18
C7C042HPRC0	0.800706	0.981227	-0.59233	97.81	10.5394	100.0187	0.8	21.1482	2.429394	0.616978	0.17948	96.183	2.9449	19.9	1.6972	44.8621	20
C7C042HPRC0	0.775048	1.04067	-0.72441	97.673	10.5485	119.5589	0.8055	28.2119	2.411455	0.661012	0.158192	96.112	2.9464	19.9042	1.7087	59.8465	22
C7C042GPRC0	1.76169	0.829186	-0.86417	86.804	10.6675	159.889	0.7861	47.1568	3.949472	0.59382	-0.03811	96.645	3	19.9634	1.6675	100.0347	28
C7T200GNRC0	1.713664	0.547231	-0.69776	87.642	10.4962	99.8664	0.8103	18.9357	2.792971	0.444089	-0.0642	94.633	2.9194	19.8996	1.7189	40.1688	17
C7T200FORC07	2.863155	0.780482	-0.98865	81.245	11.9239	119.0131	1.4612	28.0994	5.718435	0.579645	-0.10807	97.659	2.9004	19.8017	3.0996	59.6078	22
C7T200GORC0	2.043822	0.666687	-0.82658	89.611	10.4923	119.716	0.8322	28.2947	3.683135	0.4877	-0.05481	95.277	2.9058	19.898	1.7653	60.0221	23
C7T200FPRC07	3.169866	0.805424	-1.00383	81.507	10.3596	159.5515	0.7639	49.4714	6.465115	0.598626	-0.12531	95.979	2.9131	19.9	1.6204	104.9447	29
C7T200GNRC0	2.35724	0.709562	-1.0961	85.467	10.626	99.7614	0.8101	21.0989	4.023798	0.543172	-0.13853	97.49	2.9635	19.902	1.7184	44.7576	21
C7T200GPRC0	2.920617	0.788789	-0.99384	83.781	10.5245	159.6655	0.822	49.5998	5.801185	0.569796	-0.10083	95.455	2.9216	19.9	1.7437	105.217	29
C7T200GPRC0	2.135566	0.990663	-1.20558	90.478	10.5819	159.9265	0.7985	49.1538	5.009159	0.672706	-0.08398	93.917	2.9607	19.9021	1.6939	104.271	29
C7T200HNRC0	2.043648	0.822223	-1.02941	90.768	10.404	119.6984	0.7847	28.3611	4.210238	0.603488	-0.06957	97.204	2.9131	19.8451	1.6646	60.163	22
C7T200HORC0	1.135325	1.14783	-1.09988	96.553	10.4932	119.9314	0.8231	28.4483	3.523494	0.788988	0.029202	96.501	2.9143	19.8612	1.746	60.3479	23
C7T200GPRC0	2.406401	0.89604	-1.0587	89.884	10.4745	119.672	0.7961	35.3419	5.341345	0.620475	-0.07476	95.782	2.9264	19.9	1.6888	74.9715	26
C7T200HORC0	1.726015	0.937518	-0.88389	97.843	10.4767	119.9918	0.8251	28.4234	4.386271	0.634359	0.04399	98.02	2.9027	19.8989	1.7502	60.2952	23
C7T200HORC0	1.42525	1.046111	-1.24438	95.327	10.586	119.9382	0.76	28.3621	3.595455	0.719782	-0.02988	94.948	2.9893	19.9244	1.6123	60.1651	23
C7T200HORC0	1.348393	1.054943	-0.96697	98.125	10.6876	119.7311	0.7957	28.248	3.856893	0.691447	0.077119	96.556	2.9989	19.936	1.6879	59.9231	23
FRT006ENRC1	2.857397	0.720376	-0.93969	82.854	10.5946	118.9942	0.8017	27.9516	5.293739	0.527518	-0.1022	97.33	2.9634	19.9	1.7007	59.2942	23
FRT006FMRC0	2.538846	0.649633	-0.79657	90.43	10.3266	99.5491	0.7467	21.0514	4.557212	0.542545	-0.09576	98.263	2.9105	19.8512	1.584	44.6567	19
FRT006FNRC0	2.283573	0.785194	-0.81916	97.22	10.439	119.6922	0.7957	28.2849	4.825314	0.550007	-0.00871	98.183	2.9154	19.8969	1.6879	60.0014	23
FRT006FMRC0	1.614102	0.702296	-0.74663	94.041	10.4453	99.8894	0.7175	18.9402	3.183827	0.567538	-0.05594	98.446	2.9666	19.9037	1.5221	40.1781	18
FRT006ENRC1	2.856944	0.585425	-0.82331	87.086	10.4664	120.0981	0.7849	35.543	4.554367	0.431475	-0.08488	92.075	2.9338	19.9	1.6651	75.3981	24
FRT006FMRC0	1.675778	0.641693	-0.78785	92.287	10.3789	100.1771	0.7828	21.042	2.995842	0.51236	-0.06509	97.263	2.9061	19.8903	1.6605	44.6369	19
FRT006GMRC0	2.181854	0.754197	-0.96745	93.329	10.4678	119.9538	0.8055	28.4061	4.148876	0.551013	-0.08067	97.567	2.9178	19.8984	1.7088	60.2585	22
FRT006GNRC0	1.851123	0.757464	-0.83175	93.918	10.6568	119.6272	0.8447	28.2495	3.773946	0.550087	-0.03557	97.822	2.9535	19.9003	1.7918	59.9263	22
FRT006GNRC0	2.439106	0.768777	-0.89529	91.959	11.8456	119.8438	1.3571	28.352	4.852713	0.526454	-0.04755	97.372	2.9232	19.9	2.8789	60.1438	23
FRT006GNRC0	2.523058	0.734563	-0.7638	95.441	10.3776	159.7873	0.7862	49.4367	5.020749	0.481477	-0.00731	96.3	2.9033	19.8004	1.6678	104.8712	29
FRT006FORC0	2.729057	0.676185	-0.67059	84.338	10.4458	159.8032	0.8138	49.0093	5.393795	0.492532	-0.03735	93.582	2.9065	19.8666	1.7264	103.9644	29
FRT006FNRC0	1.721296	0.749819	-0.72159	91.678	10.4195	119.9913	0.7966	35.3503	3.674102	0.563097	-0.02796	97.641	2.9099	19.8924	1.6898	74.9894	24
FRT006GMRC0	2.213957	0.778608	-0.96531	94.084	10.325	119.1224	0.7544	34.971	4.36026	0.565409	-0.0677	97.714	2.9082	19.8563	1.6004	74.1847	24
UM_UNSAT_RA	1.959378	0.958627	-0.9051	90.999	14.849	195.6846	2.2917	63.9623	5.231814	0.698467	-0.03156	98.517	3	20	4.8615	135.6846	27
UM_UNSAT_RA	1.165196	1.314423	-1.095	99.502	10.424	195.8414	0.6713	64.0363	4.395974	0.813769	0.097661	95.317	3	20	1.424	135.8414	30
UM_UNSAT_RA	1.801057	1.06408	-0.96766	97.641	10.4486	195.4655	0.6829	63.8591	5.189889	0.697742	0.024788	95.706	3	20	1.4486	135.4655	30
UM_UNSAT_RA	2.870044	0.626068	-0.73221	59.764	23.7802	195.7276	2.3064	63.9826	5.33341	0.536024	-0.11579	87.185	3	20	4.8927	135.7276	22
UM_UNSAT_AG	1.183272	0.611834	-0.51087	64.338	17.853	157.3803	2.293	45.9055	2.421285	0.541042	-0.04984	81.602	3	20	4.8642	97.3803	21
UM_UNSAT_PC	1.806684	1.015829	-0.92955	89.365	10.4788	196.6456	0.6971	64.4154	5.19774	0.740751	-0.02253	96.688	3	20	1.4788	136.6456	29
UM_UNSAT_PC	1.406367	1.043003	-0.94719	90.656	10.499	196.8694	0.7066	64.5209	4.104611	0.732014	-0.00605	94.219	3	20	1.499	136.8694	28
UM_UNSAT_PC	1.193093	0.97587	-0.60273	94.832	14.89	196.2739	1.3319	64.2401	3.722718	0.670519	0.111338	96.614	3	20	2.8253	136.2739	28
UM_UNSAT_FS	1.29427	0.671175	-0.63423	81.458	10.4813	157.1263	0.6983	45.7858	2.622539	0.513626	-0.02584	94.639	3	20	1.4813	97.1263	27
UM_UNSAT_FS	2.167768	0.696995	-1.12423	49.531	23.7035	157.724	6.9313	48.357	3.756624	0.615588	-0.2447	84.882	3	20	14.7035	102.5806	13
UM_UNSAT_FS	1.020421	0.650613	-0.35708	86.754	10.4859	118.9495	0.7005	34.1174	2.263038	0.464585	0.07942	88.132	3	20	1.4859	72.374	26
UM_UNSAT_PC	2.058946	0.838995	-1.11529	60.516	29.6654	195.6105	9.7418	63.9274	4.196274	0.641625	-0.16002	74.263	3	20	20.6654	135.6105	11
UM_UNSAT_FA	3.325742	0.869449	-1.38237	63.566	23.6965	196.3625	6.928	64.2819	6.354745	0.706343	-0.27442	87.123	3	20	14.6965	136.3625	12
UM_UNSAT_FA	0.953714	1.126385	-1.01779	91.688	10.4732	157.9393	0.6945	46.169	3.045404	0.795496	-0.00421	96.26	3	20	1.4732	97.9393	28
UM_UNSAT_FA	1.966877	0.997595	-0.8004	96.9	14.861	195.8581	1.3119	64.0441	5.563969	0.642865	0.071845	95.705	3	20	2.783	135.8581	28
UM_UNSAT_FA	14.9886	0.244719	-1.38148	25.08	29.5211	196.5135	9.6737	64.3531	13.84392	0.634903	-0.69181	53.131	3	20	20.5211	136.5135	9
UM_UNSAT_FA	0.609315	1.484839	-1.27389	97.266	10.3627	118.0547	0.6424	27.3673	2.750958	0.962403	0.074108	95.49	3	20	1.3627	58.0547	23
UM_UNSAT_FA	1.363212	0.854281	-0.8475	70.625	29.6279	197.0686	2.3016	64.6147	3.385613	0.707674	-0.09178	90.932	3	20	4.8824	137.0686	21
C7T200ENRC21	2.459067	0.708335	-0.85244	82.893	10.4255	156.4772	0.7616	47.7441	4.688754	0.529064	-0.08593	97.419	2.9367	19.9	1.6156	101.2805	29
C7T200FNRC22	1.564173	0.982322	-1.13286	93.727	10.5339	118.4275	0.8124	27.7031	3.84251	0.705033	-0.03959	97.382	2.9369	19.888	1.7234	58.7672	23
C5C014GNRC2	0.933404	0.662759	-0.51091	87.038	10.4432	118.1347	0.7924	27.5464	1.967822	0.518273	0.007278	93.562	2.9155	19.9	1.681	58.4347	23
C5C014ENRC2	1.001923	0.961716	-0.90716	97.917	10.5165	117.2367	0.768	27.1231	2.631048	0.666825	0.036705	98.331	2.9585	19.9	1.6291	57.5367	23
C6T023FORC2	1.19766	0.918146	-0.9253	96.545	10.6024	117.5589	0.8546	27.2766	2.939526	0.643259	0.012277	98.111	2.9298	19.8993	1.8129	57.8624	23
C6T016FNRC21	1.356453	0.649594	-0.41709	82.711	10.572	118.9939	0.8408	35.0032	2.971432	0.509456	0.021577	91.674	2.927	19.9	1.7837	74.253	24
C6T016FNRC21	0.734972	0.364019	0.585227	82.762	10.5661	99.2057	0.8256	21.2518	1.696768	0.363241	0.185068	78.304	2.9167	19.8999	1.7513	45.0819	20
C6T023FORC2	1.031669	0.958894	-0.8879	95.659	10.4485	118.2101	0.7564	34.653	2.739976	0.690192	0.015513	98.38	2.948	19.9	1.6045	73.5101	24
GWT023EORC2	1.123444	0.843937	-0.60252	96.472	10.557	119.9715	0.7758	35.0668	2.856487	0.55929	0.088285	98.491	2.9661	19.9057	1.6457	74.3878	23
GWT023EORC2	1.176484	0.674998	-0.55009	95.853	10.5464	99.5817	0.8547	18.8004	2.420701	0.475014	0.0423	98.138	2.911	19.9	1.8132	39.8817	20
FRT006FORC2	2.420061	0.777308	-0.77417	90.775	10.35	187.9895	0.759	60.4784	5.21231	0.551064	-0.03018	97.031	2.9133	19.8997	1.6101	128.2941	30
FRT006EORC2	2.722809	0.778454	-0.93155	81.705	10.6911	157.1057	0.8206	47.899	5.547679	0.58087	-0.09304	96.192	2.9733	19.9119	1.7408	101.6092	29
P2T052ENRD22	1.404778	0.881999	-1.36021	98.242	7.0472	59.1135	0.5805	11.0372	3.006934	0.660245	-0.00742	99.228	1.9383	11.9	1.2314	23.4135	18
P2T052FNRD23	1.215053	0.653372	-1.15398	99.14	7.0997	70.8125	0.52	16.5457	1.933041	0.467282	-0.03986	92.789	1.9982	11.9046	1.1031	35.0987	20
P2T052EORD21	1.789664	0.684159	-0.88667	94.268	8.06	70.5575	0.9811	16.3743	3.409219	0.552163	-0.0259	98.788	1.9929	11.9408	2.0812	34.7352	18
P2T052GNRD22	1.456361	0.754272	-1.19365	94.254	7.9708	70.5389	0.8305	16.4117	2.709411	0.60348	-0.0669	98.757	1.9706	11.9088	1.7617	34.8145	19
P2T052ENRD22	1.3526	0.832478	-1.13223	98.608	7.2487	70.6549	0.591	16.4416	2.839375	0.624782	-0.01079	98.689	1.9979	11.9264	1.2537	34.8779	20
P2T052FNRD22	1.3274	0.86266	-1.31841	98.226	6.9637	70.3683	0.524	16.3428	2.706628	0.65053	-0.03704	97.946	1.9508	11.9	1.1115	34.6683	20
REM004BQRC2	5.711136	0.653314	-0.64291	87.796	10.5128	195.6352	0.7765	64.0805	11.09597	0.483643	-0.03851	98.224	2.9296	19.9	1.6471	135.9352	30
REM004BQRC2	6.105611	0.669054	-0.84824	78.115	12.1132	196.3632	1.2263	64.4235	11.08271	0.517408	-0.12344	97.49	2.9718	19.9004	2.6013	136.6628	29
REM004BQRC2	4.73788	0.686829	-0.65337	89.67	10.4352	196.1336	0.7581	64.3154	9.58801	0.50248	-0.02736	98.287	2.9368	19.9	1.6082	136.4336	30
REM004BQRC2	5.885962	0.669962	-0.72597	83.612	10.4783	189.0311	0.7899	60.9673	11.30905	0.506818	-0.07077	97.287	2.9331	19.9	1.6757	129.3311	30
REM004BQRC2	5.181483	0.709658	-0.7998	79.209	10.5534	189.0233	0.8408	60.9636	10.28924	0.55028	-0.09587	96.678	2.9233	19.9	1.7835	129.3233	30
REM004BQRC2	5.613295	0.716813	-0.80859	80.734	12.1241	195.6513	1.3803	64.0881	11.17766	0.549399	-0.09449	96.304	2.9599	19.9013	2.928	135.9513	29
REM004BQRC2	3.776101	0.76817	-0.7262	92.411	10.6257	196.9424	0.8042	64.6969	8.246894	0.545515	-0.02024	98.319	2.9524	19.9001	1.7059	137.2428	30
REM004BQRC2	4.108237	0.502659	-0.38257	91.24	10.3551	195.591	0.756	64.0596	7.204432	0.361583	0.018565	95.946	2.9142	19.9	1.6037	135.891	30
REM004BQRC2	2.933217	0.460691	-0.18621	95.881	10.4493	196.8376	0.7768	64.6473	5.299251	0.320205	0.086348	96.771	2.931	19.9	1.6479	137.1376	30
REM004BQRC2	4.465881	0.763399	-0.7656	91.577	12.0546	193.3876	1.3568	63.0205	9.46378	0.53921	-0.0346	96.839	2.9711	19.9008	2.8783	133.6867	29
REM004BQRC2	3.188016	0.624509	-0.49234	92.163	10.5622	192.568	0.7909	62.6346	6.217789	0.418102	0.036147	92.689	2.9464	19.9	1.6777	132.868	30
REM004BQRC2	3.903175	0.735134	-0.67734	92.944	10.657	182.3674	0.7931	57.8231	8.258222	0.512777	-0.00555	97.136	2.9916	19.9041	1.6823	122.6612	30
REM004BQRC3	4.613841	0.759363	-0.75962	89.175	10.6514	193.9415	0.8254	63.285	9.862392	0.552389	-0.0436	98.231	2.9477	19.9	1.7508	134.2478	30
REM004BQRC2	5.125952	0.806594	-0.85774	88.891	10.7154	192.6913	0.8245	62.6906	11.17112	0.585215	-0.06472	97.507	2.9869	19.9034	1.7491	132.9869	30
REM004BQRC2	3.781558	0.783756	-0.73018	94.447	10.9171	189.4918	0.9037	61.166	8.352516	0.542428	-0.00762	98.214	3	19.9168	1.9171	129.7527	30
REM004AORC3	21.84577	0.191759	-0.52985	54.038	14.6973	195.2996	2.6933	63.922	22.827	0.189139	-0.16273	81.587	2.9824	19.9021	5.7133	135.5989	24
REM004ANRC3	18.82785	0.062766	-0.36049	41.13	15.3522	194.1368	3.0883	63.3741	18.35213	0.143748	-0.17399	80.526	2.9295	19.9	6.5513	134.4368	25
REM004BQRC3	4.824763	0.740805	-0.81256	83.715	12.1308	192.4485	1.2778	62.5772	9.867646	0.554938	-0.08155	96.463	2.9663	19.9014	2.7106	132.7463	29
C5M006GORC2	0.843064	0.919721	-0.89545	94.837	10.519	118.3219	0.7583	27.6344	2.097522	0.643401	0.020165	95.294	2.9696	19.9001	1.6087	58.6215	22
C5M006HORC2	0.985594	0.96502	-0.83464	96.677	10.4251	157.1897	0.7785	45.9965	2.666179	0.639333	0.052273	97.767	2.9151	19.9	1.6514	97.5734	28
C5M006HORC2	0.887099	0.832166	-0.86432	98.031	10.4938	117.6807	0.7994	27.3324	1.958568	0.564201	0.014439	95.132	2.92	19.9	1.6959	57.9809	22
C5M006IORC24	0.627125	0.557634	0.078614	97.856	10.6557	78.8977	0.8243	13.6284	1.425776	0.409855	0.164254	97.832	2.969	19.9	1.7487	28.9101	14
SGT052FMRD1	1.688015	0.711643	-1.21822	94.357	6.7401	72.1299	0.4722	17.1731	2.890026	0.544369	-0.06002	95.3	1.9128	11.9005	1.0017	36.4297	20
P2T052HMRD1	1.353387	0.699451	-1.39905	92.847	6.726	72.2124	0.4668	17.2116	2.129429	0.553011	-0.11252	95.726	1.912	11.9004	0.9901	36.5112	20
GWT023FPRC1	0.703526	0.644837	0.028074	95.043	10.6628	99.1686	0.7917	20.9642	1.816288	0.444413	0.21367	94.229	2.9942	19.9285	1.6795	44.4719	20
TH200_Y_5_7_	1.225737	1.138633	-0.98914	99.158	10.4439	156.9716	0.6807	47.9247	3.794039	0.699638	0.09167	95.908	3	20	1.4439	101.6637	29
TH200_Y_5_7_	1.151091	1.187061	-1.05179	98.873	10.463	157.2505	0.6896	48.2793	3.744543	0.747779	0.075644	96.53	3	20	1.463	102.4158	28
TH23_X_3_5_2_	1.826735	0.793786	-0.68248	92.499	10.4939	157.6477	0.7042	48.3578	4.249551	0.568873	0.012833	98.474	3	20	1.4939	102.5824	29

TH200_Y_3_7_1	1.962035	0.887403	-0.8148	95.181	10.4891	158.2959	0.702	48.6259	4.830868	0.610135	0.013397	99.044	3	20	1.4891	103.151	29
UM_SAT_AGG1	0.592605	1.175336	-0.89329	68.976	14.8036	119.0614	2.7358	34.6145	2.215787	0.851545	0.026082	68.099	3	20	5.8036	73.4285	18
UM_SAT_RAP1	1.157884	1.170219	-0.91253	98.896	10.4524	196.553	0.6846	64.3717	3.91946	0.73216	0.104766	95.769	3	20	1.4524	136.553	30
NDSU_CF1	1.353108	0.509168	-0.04335	75.412	11.4578	200.6672	0.8758	66.1697	3.078893	0.568537	0.075107	94.592	3.1	20.2	1.8578	140.3672	28
NDSU_CF2	1.259133	0.779305	-0.47182	93.966	10.8295	201.8707	0.8625	66.7371	3.046421	0.486821	0.12584	92.795	3	20.2	1.8295	141.5707	24
NDSU_CF4	1.07555	0.68509	-0.36131	82.137	11.1904	121.307	0.3808	34.0695	2.425146	0.443448	0.123492	81.467	3	20	0.8077	72.2723	25
NDSU_CN1	1.29385	0.463491	-0.06158	79.305	9.7817	159.7346	0.3685	46.8739	2.605213	0.385738	0.091399	85.559	3	20.2	0.7817	99.4346	26
NDSU_CN2	0.92202	0.644347	-0.11671	81.045	9.8679	201.3728	0.4092	66.3609	2.347532	0.469719	0.169894	94.248	2.7	20.3	0.8679	140.7728	26
NDSU_CN3	0.743138	0.655215	-0.19209	89.557	10.3623	121.0884	0.6422	28.7973	1.782807	0.456857	0.145547	90.582	3	20.2	1.3623	61.0884	23
NDSU_CN4	1.142865	0.325371	0.283785	44.974	3.3533	119.5424	0.5358	28.0685	2.287792	0.418385	0.018161	43.926	0.7	20.1	1.1367	59.5424	21
NDSU_RF2	3.667011	0.610544	-0.75128	60.05	15.4461	201.2952	2.2517	66.6072	6.365651	0.474538	-0.09213	77.251	2.9	20	4.7766	141.2952	27
NDSU_RF3	2.135981	0.819689	-0.94135	92.904	11.05	196.0929	0.9664	64.1548	4.388836	0.57514	-0.04374	91.81	2.9	20	2.05	136.0929	27
NDSU_RF1	2.80156	0.619459	-0.56985	78.56	11.5294	200.0406	1.1924	66.0158	5.217509	0.41862	0.007497	85.007	2	20	2.5294	140.0406	29
NDSU_RF4	3.511309	0.684148	-1.01421	83.258	17.0631	144.6563	3.801	46.9784	5.923516	0.553821	-0.15044	91.339	3	20	8.0631	99.6563	19
NDSU_RNOMC:	3.591982	0.638484	-0.85139	70.36	11.2026	150.2376	1.0383	49.6095	6.309916	0.552159	-0.13635	94.761	2.8	20	2.2026	105.2376	25
NDSU_RN2	3.40832	0.471565	-0.30082	21.267	15.0014	202.0047	2.4048	66.9417	5.822824	0.296855	0.152327	46.96	3.2	20.2	5.1014	142.0047	21
NDSU_RN3	1.631139	0.657175	-0.45856	89.662	9.4549	121.3865	0.9216	35.5211	3.514044	0.513615	0.037862	94.813	2.5	20.1	1.9549	75.3515	26
NDSU_RN4	2.557347	0.461625	-0.56136	57.487	11.3884	119.5956	0.9845	28.0936	3.910457	0.390554	-0.06448	76.123	2.9	20.2	2.0884	59.5956	22
NDSU_RN1	2.5616	0.576746	-0.39975	35.432	11.336	202.1269	1.1012	66.9992	4.937239	0.383989	0.141245	59.841	3	20	2.336	142.1269	25
NDSU_SF1	1.777806	0.752999	-0.71813	91.097	10.1048	201.5716	0.5208	66.0304	3.756584	0.524589	-0.00465	96.319	2.9	20.5	1.1048	140.0716	30
NDSU_SF4	3.360729	0.671121	-1.27056	74.597	23.5409	119.9947	6.8547	28.2818	4.931026	0.543095	-0.19554	85.904	3	20	14.5409	59.9947	10
NDSU_SN4	1.870481	0.355034	-0.16424	69.53	10.2287	100.6141	0.4378	20.9436	2.923966	0.289839	0.025931	70.471	3	20	0.9287	44.4282	19
NDSU_SN1	1.536657	0.471953	-0.03385	42.842	11.1175	122.4634	0.9982	33.6121	3.183611	0.351547	0.188281	76.014	3	20.2	2.1175	71.3021	24
NDSU_SN2	2.000122	0.391188	-0.08263	38.641	11.563	199.356	1.0668	65.4102	3.491088	0.272572	0.151577	68.558	3	20.2	2.263	138.756	27
NDSU_SN3	1.43871	0.439262	0.236491	64.115	11.1702	121.0432	0.8816	34.6313	3.281404	0.420398	0.135453	61.86	3	20	1.8702	73.4641	23
NDSU_VN4	1.956718	0.626857	-1.72	-482.392	10.6323	115.1145	0.7695	25.9812	2.22418	0.670978	-0.41386	-473.72	3	20	1.6323	55.1145	21
NDSU_TF3	2.157195	0.704583	-0.711	76.395	10.8544	148.5853	0.8742	48.8306	4.45698	0.590256	-0.05263	89.708	3	20	1.8544	103.5853	26
NDSU_TF4	2.771525	0.621263	-0.4147	38.297	9.5517	145.272	0.9672	47.2687	6.12799	0.580204	-0.00663	47.831	2.5	20.5	2.0517	100.272	26
NDSU_VN1	2.830627	0.646718	-0.99049	48.973	11.5506	197.9049	1.061	65.1504	4.83068	0.612169	-0.22639	88.476	3.1	20.1	2.2506	138.2049	29
NDSU_TF2	2.512291	0.642384	-0.55674	86.034	13.3106	121.7973	1.9511	36.2026	5.061926	0.517476	-0.00583	95.155	3	21	4.139	76.7973	23
NDSU_TF1	2.30769	0.727217	-0.65348	89.064	12.3087	203.9697	1.1355	67.1609	4.955747	0.555382	-0.00413	95.826	3.3	20.5	2.4087	142.4697	27
NDSU_VN2	2.002335	0.589147	-0.75032	58.679	14.0869	149.9034	1.1252	49.0277	3.50694	0.553898	-0.126	89.599	3.1	20.8	2.3869	104.0034	27
NDSU_UF2	2.939877	0.528485	-0.81348	50.34	14.0045	198.4803	2.3591	65.2803	4.557274	0.481384	-0.18822	92.075	2.5	20.1	5.0045	138.4803	26
NDSU_TN2	2.762868	0.67029	-0.76412	75.866	14.165	201.5247	2.1637	66.7154	5.304806	0.560188	-0.08688	93.17	3	20	4.5899	141.5247	25
NDSU_TN1	1.883645	0.868698	-0.91628	94.416	12.3271	150.7007	1.0027	49.8278	4.162451	0.583596	-0.00697	91.728	3.2	20	2.1271	105.7007	26
NDSU_TN3	2.12041	0.682869	-0.90989	72.654	11.0524	120.8834	0.9675	35.7718	3.787504	0.546491	-0.09755	86.657	3	20	2.0524	75.8834	24
NDSU_TN4	0.870736	0.159731	2.322797	29.992	10.4746	120.0932	0.4123	28.611	3.532228	0.06008	0.588679	13.114	3	20.3	0.8746	60.6932	23
NDSU_UF1	2.997802	0.335839	-0.536	37.3	13.8601	196.4126	1.9237	64.3055	3.995172	0.344182	-0.14132	87.948	3	20	4.0808	136.4126	27
NDSU_UN2	3.409706	0.390868	-0.60607	46.122	17.5469	198.941	4.0291	65.4974	4.757796	0.375012	-0.15156	91.902	2.9	20	8.5469	138.941	13
NDSU_UN1	4.537522	0.479818	-0.77006	80.677	18.4723	201.0017	4.041	66.4688	6.273981	0.35235	-0.12779	86.856	3	20	8.5723	141.0017	22
NDSU_UN4	2.251901	0.287626	-0.44184	6.802	13.4236	141.076	1.7758	45.2906	3.150543	0.467915	-0.20028	59.222	3	20	3.767	96.076	24
NDSU_VF2	2.60433	0.612154	-0.80343	64.772	11.3005	122.0273	1.0845	35.9262	4.565458	0.559272	-0.13658	93.548	3	20.2	2.3005	76.2111	25
NDSU_VF4	2.93579	1.072065	-5.24522	-3758.04	10.7652	96.8465	0.8321	18.2302	1.100943	0.362638	-0.64326	-4742.5	3	20	1.7652	38.6722	17
NDSU_VF1	2.544317	0.629603	-0.8031	66.393	10.7005	201.2496	1.0845	66.3029	4.571095	0.568664	-0.12935	95.39	2.8	20.2	2.3005	140.6496	27
NDSU_WN2	2.631465	0.781747	-0.8449	85.294	11.3608	202.9975	1.1129	67.2682	5.649807	0.61986	-0.07087	98.038	3	20.1	2.3608	142.6975	26
NDSU_WN4	2.212163	0.398125	-0.11017	45.783	11.1065	120.1117	0.993	34.2935	4.081151	0.448101	-0.01586	55.969	3	20	2.1065	72.7475	23
NDSU_WF2	2.441743	0.737975	-0.78151	83.62	12.6267	201.6244	1.144	66.7624	5.032764	0.572317	-0.06155	97.311	3.3	20.2	2.4267	141.6244	29
NDSU_WF4	3.957859	1.012821	-3.73374	-3094.34	13.5215	119.4636	1.8131	28.0314	2.528019	0.508146	-0.55953	-3484.42	3	20	3.8462	59.4636	19
NDSU_WN1	1.709271	0.883226	-0.80256	95.243	12.8854	201.6497	0.983	66.7743	4.151131	0.615397	0.023105	96.257	3.2	20	2.0854	141.6497	28
NDSU_WF1	2.468541	0.871226	-0.9598	88.884	13.9906	202.1931	2.3526	66.889	5.519365	0.619336	-0.06081	95.561	3	20.2	4.9906	141.8931	26
NDSU_SF2	2.178859	0.652754	-0.7129	84.242	11.2923	200.0716	1.0806	66.0304	4.033324	0.480037	-0.04995	95.908	2.9	20.1	2.2923	140.0716	29
C5FBR1	1.725156	0.541871	-0.10821	95.975	11.8758	92.1242	1.2822	16.8759	3.536555	0.38498	0.127047	95.442	3.05	19.276	2.7201	35.7992	15
M5GPR5	1.285235	0.495382	0.226397	85.347	11.4149	95.4037	1.286	16.8854	2.851725	0.36171	0.190752	85.299	2.894	19.86	2.728	35.8194	15
RRB24RM	1.042551	0.512837	0.171502	98.372	11.7797	95.3244	1.2785	16.9067	2.281032	0.317893	0.245208	98.977	3.024	19.838	2.7121	35.8646	15
C507R1	0.985821	0.515452	0.256716	97.543	11.5907	95.1675	1.2723	16.9018	2.235994	0.306962	0.282038	98.5	2.944	19.77	2.6989	35.8542	15
C5T014EMRC2(	1.362264	0.528934	-0.55953	90.705	10.5509	99.8238	0.8081	21.3012	2.283677	0.416298	-0.02495	94.573	2.9449	19.9	1.7142	45.1866	19
C7T200GPRC2'	1.425865	1.060483	-0.99941	97.945	10.5385	119.3809	0.7845	28.1256	4.028851	0.697947	0.05742	95.799	2.9509	19.9068	1.6641	59.6634	22
C7T200FNRC22	2.094171	0.876175	-0.99533	89.828	10.5174	156.3663	0.7874	45.5689	4.726049	0.625221	-0.05991	98.66	2.9445	19.9	1.6704	96.6663	28
REM002BQRC2	4.400426	0.648028	-0.63174	89.07	12.0762	195.6701	1.3309	64.0969	8.505089	0.476447	-0.03287	98.379	2.9823	19.9002	2.8232	135.9701	29
REM002BQRC2	4.99815	0.61608	-0.6581	78.723	10.5212	196.1176	0.7834	64.3079	9.283324	0.486177	-0.07417	97.053	2.9355	19.9	1.6618	136.4176	30
REM002DQRC2	1.767215	0.901397	-0.62763	97.596	10.4572	184.0737	0.784	58.6347	4.755415	0.579694	0.098886	96.673	2.9304	19.8989	1.6632	124.383	30
REM002CQRC2	1.725263	0.496917	-0.04246	97.575	10.3793	182.4768	0.7763	57.9088	3.50794	0.331075	0.159174	95.894	2.9085	19.8923	1.6467	122.8431	30
C5T014HNRC1ε	1.620417	0.764464	-0.89852	85.381	10.6631	119.2925	0.7879	35.0854	3.272102	0.599313	-0.09549	96.274	2.9966	19.947	1.6714	74.4274	24
C5T014GNRC1ε	1.864819	0.75705	-1.01292	85.366	10.6155	119.1861	0.7935	35.0888	3.528928	0.579238	-0.10748	94.762	2.9774	19.9155	1.6833	74.4345	24
C5T014HNRC17	1.4468	0.788749	-0.90066	89.592	10.4395	120.4637	0.756	35.7065	3.003692	0.584252	-0.04965	95.689	2.9421	19.9018	1.6037	75.7449	24
C5T014INRC17	1.388777	0.797187	-0.90457	90.923	10.5986	119.6495	0.7844	35.3144	2.913171	0.591173	-0.05143	96.942	2.978	19.9111	1.664	74.9131	24
C5T014INRC18	1.430225	0.732684	-0.6309	80.395	10.6393	119.1345	0.789	35.0051	3.178093	0.592803	-0.02867	90.459	2.9878	19.9282	1.6736	74.2571	24
GWT023FPRC1	1.068896	0.790767	-0.45515	97.482	10.8465	159.1668	0.8986	46.8788	2.700829	0.522605	0.115324	98.632	2.9739	19.9073	1.9062	99.445	28
C6T016FORC0(	2.297414	0.703842	-0.73033	61.011	11.3788	119.3905	1.2628	35.1246	4.957135	0.627958	-0.11902	89.546	2.9	19.7925	2.6788	74.5105	23
C6T016FORC01	1.718911	0.843993	-0.79543	81.137	11.8567	119.6387	1.2398	28.3968	4.212218	0.655302	-0.04978	96.459	2.9	19.8	2.63	60.2387	22
C6T016FORC0(	1.780645	0.850175	-0.79644	83.698	14.85	159.6637	2.4011	47.2612	4.391387	0.653595	-0.04762	97.821	2.9	19.8025	5.0935	100.2562	25
C6T016FORC01	0.996715	0.618243	-0.27325	65.71	10.2676	119.7684	0.7341	35.0846	2.284097	0.482709	0.109515	85.071	2.9034	19.9	1.5573	74.4256	24
GWT023FORC1	0.848818	0.510316	-0.11981	96.824	10.4661	80.5497	0.7925	14.1046	1.670272	0.38659	0.092467	97.872	2.9283	19.9	1.6811	29.9204	16
GWT023EPRC1	1.311493	0.798102	-0.59566	94.568	10.5724	159.5227	0.8187	47.1037	3.166666	0.549011	0.052098	98.431	2.9097	19.9	1.7368	99.9221	28
CR3_S_5_1_1_I	2.584295	0.617365	-0.65552	77.08	11.9803	197.1299	1.3437	64.6436	4.842475	0.510212	-0.08508	97.397	3	20	2.8503	137.1299	27
TTT053FORD04	1.493816	0.639016	-0.80703	90.654	6.6057	72.1732	0.3983	17.1937	2.770135	0.521802	-0.02195	96.014	1.911	11.9	0.8449	36.4732	20
GWT023EPRC2	1.495369	0.790426	-0.79225	88.193	10.6547	119.802	0.8048	35.0682	3.282895	0.565954	-0.02683	97.518	2.9695	19.9127	1.7073	74.3909	26
GWT023FORC(	1.016811	0.860401	-0.68146	95.971	10.6278	119.1642	0.7832	34.889	2.541649	0.568539	0.068369	98.224	2.9856	19.9295	1.6613	74.0107	27
GWT023FORC(	0.754177	0.456377	0.146307	97.204	10.511	99.8356	0.7984	18.9201	1.554317	0.344767	0.151979	96.712	2.932	19.9	1.6937	40.1356	18
C5T014CMRC1	3.195314	0.710732	-1.22549	60.644	14.9197	119.1697	2.0965	34.7872	5.292335	0.590853	-0.24648	95.062	2.927	19.8962	4.4474	73.7947	23
C5T014DMRC1	2.955991	0.764503	-1.13745	67.085	10.5408	159.4012	0.8018	46.988	5.46188	0.605105	-0.18301	92.945	2.9457	19.9082	1.7009	99.6766	28
C5T014DMRC2(	2.659587	0.75417	-1.13345	67.586	10.3967	119.9817	0.7745	35.4298	4.817097	0.583712	-0.17591	89.389	2.9179	19.9	1.6429	75.158	27
C5T014ENRC17	2.490564	0.853237	-1.13912	73.544	12.0184	158.5095	1.2704	46.5675	5.186472	0.655992	-0.1562	93.824	2.9541	19.9083	2.6949	98.7845	27
C5T014FNRC1ε	1.86027	0.815608	-1.02436	81.733	10.5898	158.4591	0.7648	46.549	3.794502	0.590195	-0.0912	94.021	2.9773	19.9147	1.6223	98.7453	28
C7C042FPRC1ς	2.449895	0.697041	-0.9237	68.807	11.9884	159.1295	1.1592	46.8715	4.492691	0.539642	-0.12513	89.709	2.919	19.9	2.4591	99.4295	27
C7C042GORC0	1.660946	0.729169	-0.76504	88.398	10.4904	99.4814	0.7905	18.7531	3.404792	0.550994	-0.03203	96.657	2.9121	19.9	1.6768	39.7814	18
C7C042FPRC0ς	2.633865	0.766374	-1.02547	73.271	12.1303	159.0465	1.3344	49.3036	5.06053	0.581679	-0.13449	91.578	2.979	19.9159	2.8308	104.5887	28
C7C042GORC0	1.472366	0.693555	-0.68201	91.574	10.4568	99.7383	0.7778	18.8742	2.982936	0.565395	-0.03606	97.203	2.9192	19.9	1.65	40.0383	18
C7C042FPRC0ς	2.47113	0.779875	-1.01331	74.62	10.6574	159.5823	0.7986	49.1419	4.889343	0.595074	-0.13001	93.56	2.9878	19.9107	1.6941	104.2456	29
FRT006FORC0ς	2.637809	0.825479	-0.98823	91.999	10.5743	159.034	0.7914	46.8262	5.401688	0.557766	-0.06371	94.666	2.9621	19.9013	1.6789	99.3333	28
FRT006GNRC0(	2.197081	0.78322	-0.86755	93.478	10.455	159.3228	0.8273	47.104	4.403081	0.490643	-0.00206	90.99	2.9	19.8	1.7549	99.9227	27
FRT006GNRC0'	1.811074	0.705594	-0.90275	90.652	10.3917	119.0866	0.7956	28.1044	3.331215	0.515722	-0.06427	96.744	2.901	19.8251	1.6877	59.6185	22
FRT006GNRC0'	2.538927	0.823914	-1.3507	81.756	10.4145	119.5079	0.8057	28.2736	4.541491	0.619931	-0.17474	90.618	2.9018	19.8435	1.7091	59.9774	22
FRT006GNRC0(	2.910625	0.694652	-0.8763	89.723	12.0361	119.6318	1.4841	28.2521	5.352662	0.526159	-0.08404	97.441	2.9418	19.9003	3.1482	59.9318	21
FRT006GNRC0!	1.935036	0.728806	-0.94215	90.294	10.595	120.1392	0.7861	28.4913	3.619108	0.537731	-0.07206	97.118	2.9574	19.9015	1.6677	60.4391	23
FRT006GORC0!	2.535042	0.649856	-0.36063	59.983	10.7082	159.511	0.8052	46.992	5.824478	0.522164	0.040597	65.672	3	19.945	1.7082	99.685	28
SGT052GORD1	2.394737	0.777979	-1.14626	95.884	6.8454	72.1561	0.4681	17.1778	4.678219	0.609164	-0.04227	98.876	1.9332	11.9096	0.993	36.4396	20
SGT052HNRD1	2.068144	0.694648	-1.23881	93.945	6.9558	72.3826	0.4822	17.2498	3.437767	0.543285	-0.07846	96.275	1.9759	11.9324	1.023	36.5923	20
SGT052GORD1	2.566832	0.685734	-0.96938	95.879	6.8946	72.1635	0.488	17.1861	4.702353	0.532707	-0.02501	98.64	1.9383	11.9044	1.0351	36.4573	20
SGT052HNRD1	1.865623	0.731274	-1.2732	92.257	6.9633	72.5256	0.4541	17.2634	3.264754	0.598215	-0.09761	98.218	2	11.9793	0.9633	36.6212	19
SGT052HMRD1	1.459544	0.800235	-1.63435	91.532	6.9883	60.2012	0.4659	11.4487	2.518582	0.647134	-0.11739	98.698	2	11.9731	0.9883	24.2863	19
SGT052HMRD1	1.572097	0.711087	-1.17666	94.751	7.5921	72.1589	0.7113	17.1869	2.749089	0.554824	-0.05835	97.278	1.9011	11.9	1.5089	36.4589	18
SGT052HORD1	2.103135	0.725515	-1.07058	94.705	7.937	72.3813	0.8258	17.2501	3.937603	0.574732	-0.04248	98.62	1.9748	11.9295	1.7518	36.5929	18

SGT052IMRD14	1.335122	0.726902	-1.1793	94.404	6.7947	72.1769	0.4544	17.1946	2.394805	0.576539	-0.06448	98.217	1.9435	11.901	0.964	36.4753	20
SGT052INRD16	1.46028	0.765011	-1.18678	94.743	6.7755	72.167	0.4781	17.1902	2.759108	0.603443	-0.05562	98.509	1.9203	11.9003	1.0141	36.466	20
SGT052IMRD15	1.325316	0.684077	-1.53471	93.784	6.7906	59.9937	0.4698	11.4461	2.007536	0.522227	-0.09018	95.84	1.9272	11.9042	0.9966	24.2809	16
SGT052HORD1	2.479055	0.724345	-1.1162	94.351	6.8499	72.2642	0.4599	17.2338	4.542781	0.571081	-0.05033	98.208	1.9493	11.9019	0.9756	36.5584	20
SGT052INRD15	1.421706	0.783839	-1.14711	96.345	6.7568	72.3281	0.4768	17.2666	2.786881	0.603081	-0.03276	98.218	1.906	11.9002	1.0114	36.6281	20
C507R2B	1.33189	0.598105	-0.15064	98.616	11.5265	94.9804	1.2799	16.9103	2.887047	0.401811	0.159481	98.491	2.9371	19.7491	2.7152	35.8722	15
C507R4A	0.570116	0.302416	1.140257	93.586	11.7008	89.9964	1.2862	16.888	1.363698	0.108516	0.502705	99.231	2.722	18.058	2.7284	35.8248	14
REM003BPRC2	4.287212	0.742527	-0.71965	93.471	10.6317	194.416	0.7692	63.5053	8.984491	0.520274	-0.01944	98.284	2.9999	19.9012	1.6317	134.7151	30
REM003CPRC2	4.679951	0.69699	-0.69213	85.319	10.5564	195.332	0.7568	63.9376	9.400293	0.506277	-0.03362	94.054	2.9837	19.9003	1.6054	135.632	27
REM003DPRC2	2.48509	0.867836	-0.67523	95.639	10.6007	196.4578	0.7946	64.4683	6.40505	0.602655	0.041664	98.766	2.9707	19.9002	1.6855	136.7579	30
REM003CPRC2	4.948498	0.663423	-0.72304	82.278	12.0934	193.6628	1.2852	63.1477	9.449096	0.504222	-0.07407	96.506	2.9812	19.9023	2.7263	133.9565	29
REM003BQRC2	5.248158	0.687903	-0.70428	90.371	12.0853	192.2815	1.3343	62.4995	10.31079	0.493794	-0.04048	98.252	2.9731	19.9	2.8305	132.5815	29
REM003DPRC2	1.646678	1.094718	-0.82699	99.529	10.6593	157.2263	0.787	48.1843	5.225338	0.682284	0.109776	97.126	2.9808	19.9003	1.6695	102.2144	29
REM002AORC3	14.15772	0.214336	-0.56757	58.753	17.8753	183.5361	4.2605	58.4209	15.00338	0.196407	-0.16722	80.861	2.9047	19.8993	9.0379	123.9295	23
REM002APRC3	15.52698	0.209077	-0.5374	40.114	14.9374	194.8921	2.7799	63.7196	17.23675	0.252829	-0.19378	91.16	3	19.9197	5.897	135.1698	26
REM002BQRC2	4.013707	0.665127	-0.69443	87.895	12.1876	156.973	1.314	45.8474	7.726988	0.49934	-0.04956	99.164	2.9932	19.9089	2.7873	97.257	25
REM003APRC3	19.40978	0.214103	-0.40793	51.703	14.8869	195.5371	2.6716	64.0326	21.58664	0.147606	-0.07409	44.735	2.9914	19.9017	5.6674	135.8336	25
REM003BQRC3	4.090836	0.636068	-0.72488	80.166	11.6325	193.6035	1.3425	63.1227	7.489415	0.492514	-0.08189	96.228	2.9147	19.9001	2.848	133.9035	28
REM003BQRC3	4.76961	0.647336	-0.67713	81.253	10.1169	193.1836	0.6381	62.9248	9.149887	0.508101	-0.06625	96.723	2.9057	19.9	1.3536	133.4836	30
REM003BQRC2	4.562235	0.787901	-0.83673	93.549	12.0277	156.4444	1.4705	45.6057	9.653476	0.557371	-0.03905	98.625	2.9633	19.9	3.1194	96.7444	24
REM003BQRC2	5.96776	0.654717	-0.74844	84.528	12.1584	156.9003	1.3503	45.82	10.77364	0.453002	-0.04992	84.837	2.9916	19.9021	2.8645	97.1989	23
REM003APRC3	20.58734	0.200043	-0.40288	53.231	14.8207	195.1543	2.8537	63.8678	22.51266	0.139684	-0.0779	47.185	2.915	19.9	6.0537	135.4841	25
H3_1_14	1.3119	0.6811	-0.26742	98.96	24.2558	96.125	4.3632	17.0295	3.049906	0.461512	0.113486	99.631	5	20	9.2558	36.125	9
H7_12_4	1.425631	0.74964	-0.69173	99.169	14.53	96.0915	2.6069	17.0137	3.088358	0.536891	-0.01863	99.487	3	20	5.53	36.0915	13
H7_1_15	1.952301	0.734001	-0.82556	97.077	14.5944	95.9046	2.2064	16.9256	3.914999	0.529036	-0.06968	98.003	3	20	4.6804	35.9046	13
J3_5_10_14					17.2765	95.7101	3.9016	16.8339					3	20	8.2765	35.7101	6
J3_5_1_20					14.5981	78.4619	2.639	8.703					3	20	5.5981	18.4619	5
J6_10_16	1.567708	0.661774	-0.40221	99.401	14.6379	96.0751	2.2094	17.006	3.359773	0.460845	0.063153	99.89	3	20	4.6868	36.0751	14
J6_1_21	1.523906	0.643043	-0.30378	99.948	14.3307	95.751	2.5129	16.8532	3.320884	0.481709	0.064306	99.96	3	20	5.3307	35.751	8
J8_5_10_15	2.110854	0.771485	-0.97781	96.106	14.7912	96.0151	2.73	16.9777	4.226734	0.55273	-0.08883	99.568	3	20	5.7912	36.0151	13
J8_5_1_22	1.612324	0.580849	-0.28545	99.107	11.8279	95.9713	1.3331	16.957	3.250273	0.418486	0.082068	99.689	3	20	2.8279	35.9713	14
M5EOR1	1.262906	0.595563	-0.16293	98.977	14.1289	95.5152	2.166	16.9504	2.72431	0.411875	0.134158	99.19	2.9032	19.8527	4.5948	35.9571	14
M5EOR2	1.294425	0.604414	-0.14645	99.372	11.4626	95.273	1.3007	16.8425	2.844323	0.417571	0.149059	99.452	2.9011	19.8483	2.7592	35.7283	15
M5EOR3	1.414781	0.555567	-0.16097	98.529	11.6806	96.049	1.3042	16.906	2.886231	0.385931	0.128305	98.695	2.9626	20.0724	2.7666	35.863	15
M5EPR1	1.631876	0.64842	-0.24107	99.296	11.363	95.5064	1.2542	16.9476	3.68561	0.465043	0.11527	99.791	2.9008	19.852	2.6606	35.9512	13
M5EPR2	1.96291	0.643546	-0.29466	99.51	14.1175	95.4779	2.1743	16.9361	4.293363	0.450805	0.101977	99.657	2.9004	19.8508	4.6124	35.9269	14
M5EQR1	2.301724	0.680664	-0.29109	99.57	14.303	95.5742	2.6372	16.9789	5.326151	0.476854	0.101486	99.739	2.9029	19.8522	5.5943	36.0178	13
M5EQR2	2.721614	0.647843	-0.41318	99.056	11.4361	95.5292	1.2866	16.9608	5.696334	0.465046	0.070928	99.709	2.9021	19.8504	2.7292	35.9793	15
M5EQR3	2.778299	0.632646	-0.25496	99.648	14.0972	95.1309	2.1032	16.7719	6.061034	0.430899	0.125242	98.957	2.9029	19.8508	4.4616	35.5787	14
M5EQR4	1.862648	0.75639	-0.19278	99.146	11.3973	95.4969	1.2691	16.9447	4.980639	0.5318	0.172389	99.082	2.9002	19.8507	2.6922	35.9452	15
M5FOR1	1.213386	0.628443	-0.50106	97.742	14.4646	77.9957	2.143	12.6746	2.403612	0.449956	0.040951	98.616	3.0039	20.0447	4.546	26.887	13
M5FOR2	0.890433	0.706678	-0.30889	99.31	11.8721	78.1983	1.2774	12.6778	2.127821	0.500203	0.13559	99.519	3.052	20.097	2.7098	26.8937	14
M5FOR4	1.012315	0.593548	-0.32182	98.044	11.8013	77.887	1.2697	12.6623	2.042972	0.397115	0.127295	97.506	3.036	20.005	2.6934	26.8608	14
M5FPR1	1.187429	0.643103	-0.1142	99.73	11.8761	95.9535	1.2879	16.9019	2.792872	0.445419	0.168625	99.649	3.048	20.0459	2.7321	35.8542	15
M5FPR2	1.387259	0.608133	-0.3434	98.638	11.7553	96.069	1.3016	16.9049	2.836316	0.442968	0.073755	99.287	2.9974	20.0773	2.7612	35.8607	15
M5FQR1	0.900743	0.754391	-0.00251	99.272	14.1642	95.544	2.1492	16.9618	2.589253	0.512618	0.239503	98.917	2.9059	19.8542	4.5591	35.9814	14
M5FQR2	1.173089	0.768001	-0.25105	99.612	12.0603	95.9672	1.2981	16.9099	3.102918	0.531149	0.17235	99.497	3.0361	20.032	2.7538	35.8713	15
M5GOR1	0.878735	0.638006	-0.16196	98.969	11.3333	95.4578	1.2335	16.9205	2.016562	0.450852	0.144099	99.36	2.9056	19.855	2.6166	35.8939	15
M5GOR2	0.817053	0.712326	-0.27599	98.515	11.416	95.5503	1.2761	16.9662	1.993526	0.520248	0.115875	99.367	2.9021	19.8533	2.7071	35.9909	15
M5GOR3	0.742168	0.736612	-0.15357	98.197	11.4283	95.4702	1.2757	16.9314	1.971107	0.551416	0.135234	98.865	2.9074	19.8511	2.7061	35.9169	14
M5GPR1	1.339715	0.655804	-0.20881	99.511	11.3066	95.7092	1.2186	17.0374	3.088899	0.460245	0.140622	99.615	2.9072	19.8563	2.585	36.1419	15
M5GPR2	1.036187	0.671227	-0.21582	98.969	16.7771	95.5312	2.154	16.9581	2.435556	0.467087	0.129886	99.384	2.9035	19.8525	4.5693	35.9737	13
M5GPR3	1.206739	0.723298	-0.22584	99.645	11.427	95.3345	1.2766	16.8691	3.035236	0.505512	0.158054	99.634	2.9063	19.8504	2.7081	35.7848	15
M5GPR4	1.038209	0.708063	-0.32458	99.283	11.4218	95.48	1.2727	16.9368	2.453167	0.496772	0.126455	99.363	2.9073	19.8513	2.6998	35.9284	15
M5GPR6	0.857823	0.749866	-0.27384	99.103	11.414	95.4733	1.2694	16.9327	2.20018	0.532839	0.14435	99.358	2.907	19.8512	2.6929	35.9197	15
M5GPR7	0.864895	0.81024	-0.22633	99.178	14.2233	95.8215	2.1782	17.0953	2.461274	0.566492	0.171153	99.333	2.9058	19.8529	4.6206	36.2647	14
M5GQR1	0.685838	0.834331	-0.1866	99.127	11.4838	95.4594	1.3019	16.9275	2.04675	0.577235	0.207827	98.883	2.9074	19.8503	2.7617	35.9086	15
M5GQR2	0.801522	0.732602	0.086396	99.762	11.3829	95.7164	1.2609	17.0436	2.315334	0.490261	0.266044	99.547	2.9027	19.8542	2.6748	36.1549	15
M5GQR3	0.875606	0.766195	-0.20519	99.219	11.5094	95.4694	1.3129	16.9311	2.361573	0.538309	0.173296	99.31	2.9081	19.8511	2.7851	35.9163	15
M5GQR4	0.735976	0.866012	-0.21056	98.952	14.2355	95.4809	2.597	16.9395	2.288418	0.610897	0.175559	99.085	2.9089	19.8492	5.509	35.9341	13
M5GQR6	0.75019	0.880422	-0.22804	98.735	11.4419	95.5162	1.2813	16.9568	2.352288	0.616738	0.202329	98.629	2.9079	19.8505	2.7181	35.9708	15
M5GQR7	0.640899	0.802199	-0.00093	98.072	11.3799	95.4741	1.253	16.9305	1.973431	0.553846	0.248382	97.744	2.907	19.853	2.6581	35.9151	14
M5GQR8	0.74186	0.986643	-0.63086	98.154	11.4752	77.9335	1.2782	12.6685	2.308547	0.698276	0.141823	98.211	2.9213	20.0044	2.7114	26.874	14
N3_1_26					17.2162	95.991	3.8731	16.9663					3	20	8.2162	35.991	6
N3_9_22	1.952141	0.593004	-0.31462	97.022	14.5688	96.0139	2.6252	16.9771	4.191107	0.4939	-0.01631	99.299	3	20	5.5688	36.0139	12
N5_5_10_17	1.719947	0.844425	-0.65547	99.924	14.5049	95.7687	2.595	16.8615	4.018012	0.49513	0.117139	99.745	3	20	5.5049	35.7687	11
N5_5_1_27	2.018391	0.923949	-1.03037	99.729	17.3887	95.7642	3.9545	16.8594	4.651118	0.575886	-0.03839	99.544	3	20	8.3887	35.7642	6
N8_10_22	1.057772	1.093658	-1.16517	99.494	14.6359	95.7211	2.6568	16.8391	2.733638	0.636239	0.077821	99.253	3	20	5.6359	35.7211	7
N8_1_28	1.477124	0.754618	-0.58965	98.854	14.5255	95.8545	2.1971	16.902	3.350607	0.542727	0.029415	99.672	3	20	4.6608	35.8545	14
RVMR001A	3.128678	0.165148	-0.24115	40.142	12.2785	95.1247	1.2541	16.9165	3.621854	0.177262	-0.08019	64.915	3.2058	19.7465	2.6603	35.8853	15
RVMR001B	2.80201	0.180414	-0.11701	86.337	12.0623	94.4267	1.2776	16.7646	3.46005	0.15144	-0.00336	92.3	3.1169	19.6241	2.7103	35.5631	14
RVMR001C	1.297417	0.380217	-0.16367	98.289	12.888	95.4131	1.2727	16.9345	2.073405	0.280598	0.057007	98.958	3.3951	19.833	2.6998	35.9236	15
RVMR051A	3.026001	0.205198	-3.26379	91.261	7.5401	26.7602	0.9266	4.3551	1.481102	0.15098	-0.39404	95.692	1.8553	5.8412	1.9656	9.2387	13
RVMR051B	2.435413	0.204158	-2.95587	97.003	7.3864	26.6187	0.8415	4.2843	1.335656	0.135971	-0.3065	96.367	1.8566	5.8438	1.7851	9.0885	15
RVMR058A	2.955491	0.321753	-5.88006	88.275	7.4576	26.3413	0.8839	4.1916	0.809117	0.248309	-0.67337	97.606	1.8556	5.8428	1.875	8.8918	15
RVMR059A	2.490135	0.054453	-1.69593	97.204	7.2145	26.5867	0.7715	4.2711	1.640972	0.036925	-0.18377	87.857	1.8555	5.8421	1.6366	9.0604	15
RVMR059B	6.175225	0.073805	-4.13	97.107	9.2671	26.4324	1.6346	4.2337	1.785249	0.052887	-0.64162	98.54	1.8562	5.8417	3.4676	8.9811	12
RVMR059C	1.366537	0.212886	-4.0436	96.681	7.4291	26.4238	0.8333	4.192	0.550119	0.139274	-0.4337	96.691	1.8584	5.844	1.7677	8.8926	15
RVMR059D	1.245392	0.216048	-4.80503	96.486	7.6499	26.4774	0.8417	4.1678	0.401264	0.141524	-0.52849	97.016	1.9035	5.8903	1.7854	8.8412	15
RVMR060A	1.107883	0.289646	-5.34189	96.176	7.4229	26.3387	0.8454	4.1902	0.336355	0.188447	-0.57025	96.213	1.8548	5.8415	1.7933	8.8888	15
RVMR060B	0.673078	0.377364	-4.96188	94.224	7.4148	26.25	0.8459	4.1641	0.257858	0.249182	-0.50292	96.21	1.8566	5.8423	1.7944	8.8334	15
RVMR062A	1.189561	0.324627	-3.43383	95.379	7.3873	26.4142	0.8549	4.2247	0.679464	0.22962	-0.33493	96.982	1.8551	5.8408	1.8135	8.962	15
RVMR062C	0.666479	0.994572	-5.02852	93.598	7.2971	26.2966	0.8085	4.1333	0.590415	0.665796	-0.32527	89.23	1.8582	5.8429	1.715	8.768	14
RVMR068A	3.667265	0.255121	-3.32974	94.659	9.1451	26.5417	1.0169	4.2521	1.748747	0.155919	-0.43867	96.149	1.855	5.8406	2.1572	9.02	13
RVMR069A	4.615507	0.165527	-4.2379	95.694	7.7393	26.4575	1.0194	4.2351	1.590911	0.10992	-0.51253	98.517	1.8552	5.8419	2.1625	8.9841	15
RVMR069B	2.048804	0.183937	-2.35619	97.769	7.4899	26.6804	0.901	4.3144	1.298052	0.122748	-0.24505	95.704	1.8574	5.8433	1.9114	9.1522	15
RVMR069C	2.307506	0.263956	-4.14066	91.925	7.3582	26.5112	0.8376	4.2335	0.979605	0.194019	-0.44853	95.547	1.8582	5.8435	1.7769	8.9807	14
RVMR070A	2.631183	0.204701	-2.53618	95.554	7.4893	26.7447	0.8111	4.3489	1.641966	0.137148	-0.25377	94.492	1.8545	5.8403	1.7207	9.2255	15
RVMR071A	4.772132	0.087881	-2.95357	93.541	11.0001	26.4498	1.7014	4.2286	1.973457	0.041632	-0.47204	97.971	1.8564	5.8427	3.6093	8.9701	10
RVMR088A	1.368416	0.444562	-4.03894	93.584	7.4267	26.4988	0.8213	4.231	0.760029	0.301651	-0.37283	98.11	1.8568	5.8438	1.7422	8.9753	15
RVMR090A	3.282801	0.160122	-3.40395	95.535	9.3184	26.5468	0.9286	4.3694	1.34446	0.07376	-0.43644	97.518	1.8567	5.8433	1.9699	9.2688	13
RVMR091A	3.623085	0.161673	-3.5527	97.626	9.1367	26.7475	0.9284	4.3464	1.48291	0.087451	-0.42594	96.784	1.857	5.8432	1.9695	9.2201	14
RVMR092A	4.750945	-0.06278	-1.73	86.631	11.1525	25.9759	1.6665	4.291	2.4815	-0.04171	-0.29341	85.905	1.8578	5.8433	3.5351	9.1026	11
RVMR093A	1.81839	0.231701	-4.49944	95.602	7.4235	26.5124	0.8625	4.2323	0.650637	0.153398	-0.49378	96.755	1.6996	5.8452	1.8296	8.978	15
RVMR105A	5.198975	0.052772	-2.26887	93.768	9.2299	26.4887	1.6542	4.2239	2.69818	0.039621	-0.34211	89.562	1.8573	5.8435	3.5091	8.9603	12
RVMR106A	1.255244	0.206651	-5.05443	96.391	7.3853	26.3259	0.8196	4.1546	0.374178	0.136322	-0.55363	97.848	1.8569	5.8432	1.7386	8.8133	15
RVMR185B	1.724204	0.330277	-0.19046	97.691	11.9249	94.3961	1.2509	16.8441	2.54344	0.248411	0.03073	98.948	3.0895	19.5556	2.6535	35.7317	15
RVMR186A	3.293975	0.219791	-0.04723	96.134	11.3801	93.9971	1.3009	16.9539	4.415778	0.166258	0.039168	97.181	2.8696	19.3441	2.7595	35.9647	15
RVMR216A	1.265564	0.028078	-3.04776	97.373	7.4182	26.6439	0.7988	4.2418	0.537566	0.030719	-0.37434	95.111	1.9075	5.895	1.6946	8.9981	14
RVMR217A	1.592486	0.013047	-1.90877	97.663	7.5895	26.7905	0.8761	4.2963	0.913715	0.006409	-0.2339	94.203	1.9086	5.8958	1.8585	9.1138	15
RVMR236A	2.588173	0.091176	-3.24285	97.972	7.5049	26.9273	0.8317	4.3531	1.112194	0.069119	-0.39536	88.753	1.9105	5.8986	1.7643	9.2343	13
RVMR236B	6.303003	0.039087	-1.45292	93.929	9.1673	26.5191	0.9794	4.2087	4.218056	0.03101	-0.20924	95.819	1.909	5.8972	2.0776	8.9279	13
RVMR237A	2.304768	0.112893	-3.29439	97.029	7.4411	26.8241	0.8034	4.3053	1.009489	0.080386	-0.38048	96.09	1.9096	5.8976	1.7043	9.1329	15

RVMR257A	1.655812	0.194019	-4.06268	93.269	7.5566	26.686	0.8464	4.2456	0.639711	0.133513	-0.45591	98.339	1.9103	5.8969	1.7955	9.0062	15
RVMR258B					11.1318	27.1353	1.7681	4.4526					1.9099	5.8969	3.7508	9.4454	10
RVMR259A					13.3645	26.4375	2.56	4.3205					1.9117	5.8993	5.4305	9.1652	7
RVMR267A	2.084831	0.249774	-2.83392	96.061	7.4678	26.7412	0.7792	4.3076	1.274857	0.168858	-0.27015	94.6	1.9121	5.8987	1.653	9.1378	15
RVMR270A	2.552873	0.181882	-4.23648	95.045	7.5177	26.6893	0.8409	4.2418	0.934875	0.140991	-0.49233	98.986	1.9102	5.8978	1.7839	8.9982	14
RVMR271A	1.546825	0.161108	-2.45822	98.651	7.5011	26.6122	0.8155	4.2361	0.938472	0.109975	-0.24917	96.923	1.9101	5.8968	1.73	8.9861	15
RVMR272A	3.451601	-0.0804	-2.44434	87.746	7.4729	26.8662	0.8184	4.3561	1.497808	-0.03354	-0.35082	95.231	1.9102	5.8964	1.7362	9.2407	15
THINWALLTES	2.925623	0.033029	-3.93767	99.344	9.7257	37.1316	1.7716	6.5952	0.734798	0.025083	-0.75795	97.56	1.9	7.8961	3.7581	13.9906	16
C6T023FPRC02	2.041486	0.81922	-0.8933	87.419	10.2705	159.5889	0.7401	47.2273	4.380875	0.566387	-0.0353	94.592	2.9	19.8015	1.5699	100.1842	28
C6T023EORC02	1.928652	0.824234	-0.99524	85.611	11.7704	119.5581	1.2491	35.2426	4.033607	0.592778	-0.07967	96.53	2.9031	19.8999	2.6498	74.7609	25
C6T023FORC02	1.905407	0.737708	-0.94995	85.61	10.4793	119.7435	0.7952	28.3032	3.572851	0.543367	-0.07823	91.091	2.9288	19.9011	1.6868	60.0401	23
C6T023FORC02	1.081944	0.923064	-0.91713	92.953	10.2903	99.8085	0.7448	18.9076	2.686554	0.656103	0.007156	95.61	2.9027	19.8998	1.5799	40.109	19
C6T023EORC0	1.742019	0.877314	-1.0591	89.685	10.3808	159.7823	0.7923	47.1889	3.768537	0.608265	-0.07002	96.958	2.9	19.8932	1.6807	100.1028	28
TTT053JMRD03	1.12945	0.698443	-0.9302	93.313	6.7463	71.9535	0.4617	17.0893	2.155933	0.552264	-0.02053	97.349	1.916	11.9006	0.9794	36.2518	20
TTT053JNRC02	0.918239	0.80062	-0.61585	92.453	10.4935	160.589	0.7824	47.5581	2.201234	0.561936	0.049662	98.496	2.9446	19.901	1.6597	100.8859	26
C6T023EPRC02	3.422412	0.866577	-1.36385	78.888	17.6309	119.446	4.2021	35.0941	6.310357	0.623906	-0.19886	87.357	2.9056	19.8997	8.9141	74.4458	14
C6T023EPRC02	4.715615	1.041832	-1.85491	73.996	17.7451	159.3511	4.2638	47.0544	9.077716	0.787918	-0.3442	88.877	2.9001	19.8446	9.0449	99.8174	19
C6T023FPRC00	1.701033	0.863361	-0.94177	92.486	10.3999	119.4964	0.8013	28.3297	3.856237	0.634597	-0.04235	97.48	2.9	19.8	1.6999	60.0964	23
C6T023FMRC0	4.736085	0.93904	-1.85167	65.82	23.4553	159.4989	6.9494	47.0454	7.96446	0.752582	-0.3816	87.356	2.9045	19.9002	14.7419	99.7985	4
CR3 W 4 7 1	2.729348	0.129952	0.246149	-5.322	10.5447	197.157	0.7282	64.6564	4.098303	0.223325	0.027568	-5.786	3	20	1.5447	137.157	29
C6T016FNRC01	1.398123	1.038119	-1.15739	88.947	10.416	119.9464	0.8089	35.3272	3.693424	0.735229	-0.0621	98.457	2.9	19.8999	1.716	74.9403	25
C5C014INRC00	1.188257	0.859022	-0.93925	83.557	11.814	119.149	1.2767	28.0245	2.721921	0.632842	-0.06033	96.43	2.9001	19.9	2.7083	59.449	20
C5C014HNRC0	1.593407	0.860674	-1.17383	71.687	11.8516	119.9302	1.2143	28.3928	3.336806	0.672398	-0.16403	95.582	2.9	19.9	2.5758	60.2302	23
TTT053IMRD03	1.181421	0.703179	-0.98896	93.47	6.7861	72.0372	0.4773	17.1288	2.21202	0.551852	-0.02818	97.062	1.9223	11.9008	1.0124	36.3356	20
C5C014INRC00	1.144873	0.87762	-1.03922	81.809	10.2606	119.2799	0.7357	35.2588	2.573652	0.650997	-0.09379	97.27	2.9	19.8	1.5606	74.7952	26
TTT053HORD0	1.247144	0.647735	-0.75294	94.751	6.7935	72.0723	0.4879	17.1459	2.362509	0.500323	0.010301	97.601	1.9195	11.9001	1.0349	36.3719	20
TTT053HNRD0	1.001937	0.639091	-0.7282	94.236	6.9502	72.3296	0.4487	17.2125	1.898842	0.502058	0.007643	97.427	1.9992	11.953	0.9518	36.5131	20
TTT053JORD03	1.213697	0.757278	-1.35344	86.972	6.7607	72.1672	0.4524	17.1904	2.172079	0.651185	-0.13251	98.815	1.9252	11.9005	0.9598	36.4663	20
TTT053JNRD03	1.297834	0.671739	-0.95117	92.974	6.654	72.1071	0.4476	17.164	2.365003	0.534634	-0.03449	97.61	1.9013	11.899	0.9494	36.4104	20
TTT053INRD01	2.377041	0.609628	-1.46716	62.618	15.7723	72.1577	1.9193	17.1863	3.366064	0.593651	-0.23392	93.53	3.9	11.9	4.0715	36.4576	13
TTT053HNRD0	1.236009	0.653416	-0.80262	94.657	6.7107	71.9518	0.4759	17.1814	2.319978	0.51034	-0.00198	98.02	1.9002	11.8348	1.0095	36.4473	20
TTT053HPRD0	1.523878	0.626536	-0.76685	93.061	6.4521	72.2814	0.3472	17.2992	2.807366	0.500817	-0.00801	97.583	1.9038	11.868	0.7365	36.6971	20
TTT053HORD0	1.627646	0.649773	-0.92733	92.682	6.963	72.0265	0.454	17.1206	2.913122	0.528573	-0.04331	98.638	1.9602	11.9034	0.963	36.3182	20
TTT053HORD0	1.158736	0.580587	-0.4441	95.667	6.9201	71.9266	0.5456	17.0774	2.258666	0.447198	0.056996	98.15	1.9158	11.9002	1.1574	36.2266	20
TTT053INRD04	0.997998	0.535243	-0.66093	90.526	6.7549	59.9968	0.4793	11.4616	1.6944	0.451311	-0.02812	98.082	1.9098	11.9	1.0168	24.3137	19
TTT053IORD03	1.333223	0.630029	-0.79899	91.91	6.7036	72.1867	0.4498	17.2	2.440859	0.508296	-0.01782	97.383	1.9165	11.9	0.9542	36.4867	19
TTT053IORD04	1.28258	0.636577	-0.79354	92.79	6.749	72.0988	0.4659	17.1586	2.372322	0.511226	-0.01491	97.722	1.9136	11.9	0.9884	36.3988	20
TTT053IORD04	1.257172	0.62951	-0.71784	94.031	6.8478	72.2117	0.5201	17.2118	2.357016	0.490684	0.008914	97.665	1.9099	11.9	1.1032	36.5117	20
TTT053IORD04	1.177781	0.623417	-0.68896	94.74	6.7737	71.9862	0.4744	17.1055	2.211458	0.482004	0.017639	97.548	1.9224	11.9	1.0064	36.2862	20
TTT053IORD04	1.262931	0.668362	-0.90224	93.456	6.6912	72.011	0.4643	17.1172	2.333668	0.529494	-0.02367	97.66	1.9021	11.9	0.985	36.311	20
RLF 98PCT S0	0.542673	0.46311	-4.16831	98.44	10.1987	37.1457	1.7732	5.9876	0.235285	0.290897	-0.60552	94.318	2.0886	8.4238	3.7616	12.7016	15
TTT053INRD03	1.028771	0.652193	-0.87451	92.533	6.732	72.0672	0.4699	17.1437	1.877473	0.516543	-0.02181	96.793	1.9114	11.9	0.9968	36.3672	20
C7T200GNRC0	2.232803	0.694983	-0.76131	84.315	11.9042	119.7543	1.4212	35.3102	4.37632	0.551884	-0.07614	95.759	2.9191	19.8974	3.0148	74.9042	23
C7T200GNRC0	2.671504	0.695874	-0.83786	86.046	11.7537	118.7313	1.4608	28.1155	5.082726	0.542069	-0.07489	97.921	2.885	19.6964	3.0988	59.642	22
C7T200GORC0	2.50007	0.766284	-0.8472	92.998	10.5693	119.3805	0.8359	28.1348	5.113474	0.564613	-0.05859	97.482	2.932	19.8992	1.7733	59.683	23
C7T200GORC0	2.982527	0.736356	-0.96861	76.454	12.0563	119.8941	1.3134	35.3882	5.674253	0.564775	-0.1222	97.23	2.9524	19.9018	2.7862	75.0697	25
C7T200HNRC0	1.926168	0.810624	-1.05441	88.835	10.3577	119.4587	0.7798	28.3121	3.861936	0.599211	-0.08192	96.153	2.9012	19.8	1.6541	60.059	22
TH200 Y 3 7 2	1.852509	0.912028	-0.79044	91.963	10.4565	195.1229	0.6866	63.6976	4.873708	0.660005	0.000605	98.535	3	20	1.4565	135.1229	30
TH23_X_3_5_1	2.071195	0.804546	-0.8041	88.758	10.4758	157.7756	0.6957	48.4292	4.65532	0.594319	-0.03653	99.018	3	20	1.4758	102.7338	29
TH23 X 5 4 2	1.618259	0.851856	-0.73802	91.941	10.4949	157.7622	0.7047	48.3801	3.986803	0.612921	0.002331	97.918	3	20	1.4949	102.6297	29
TH23 X 5 4 1	1.638007	0.867661	-0.77375	94.753	11.9188	196.4521	1.3352	64.3241	4.001937	0.603157	0.007678	98.829	3	20	2.8324	136.4521	28
C5T014FNRC1	1.801713	0.842895	-1.02189	82.931	10.6201	158.9202	0.7719	46.7279	3.81156	0.601816	-0.07616	94.047	2.994	19.943	1.6374	99.1249	28
C5T014EMRC1	1.947955	0.800157	-0.99058	80.893	10.6765	120.1677	0.8048	35.5128	3.953009	0.582623	-0.08996	93.635	2.9898	19.9343	1.7072	75.334	26
C5T014FNRC17	1.889723	0.833503	-1.07587	81.387	10.3184	119.1491	0.7505	35.0959	3.861903	0.603133	-0.10291	94.219	2.9077	19.8558	1.5921	74.4497	26
C5T014GNRC1	1.594146	0.807954	-1.02745	86.982	10.4982	118.9893	0.8301	27.9538	3.24407	0.613879	-0.08825	97.225	2.9125	19.8968	1.7608	59.299	22
C5T014ENRC2	2.436244	0.820968	-1.11475	71.069	12.0984	159.6856	1.5439	47.1337	4.909191	0.636605	-0.15948	93.399	2.9365	19.9	3.2751	99.9856	26
C5M083FQRC3	2.493444	1.033783	-0.64494	99.303	10.4786	161.2129	0.6921	47.8111	8.018263	0.651226	0.159411	97.828	3.0032	19.9367	1.4682	101.4226	28
C5M083GQRC3	1.06145	0.975446	-0.68061	98.626	10.2037	199.0675	0.6958	65.8368	3.065646	0.613847	0.118231	97.743	2.9092	19.8103	1.476	139.661	30
C5M083FQRC3	1.18892	0.710254	-0.45096	95.57	10.3242	159.6763	0.7644	49.9217	2.680421	0.470288	0.092441	96.725	2.9009	19.8	1.6215	105.8999	29
C5M083GQRC3	0.801939	0.792045	-0.29425	97.563	10.3533	120.0017	0.7264	28.4322	2.108069	0.466836	0.221315	97.317	2.9345	19.8977	1.5409	60.3138	22
C5M006HQRC2	0.721053	0.918938	-0.42344	97.441	12.0323	157.3823	1.4358	46.0473	2.189153	0.583508	0.179285	95.531	2.9717	19.9004	3.0457	97.681	25
C5M006IORC25	0.69311	1.02281	-0.68318	95.087	10.6736	118.1288	0.7891	27.5336	2.175772	0.677569	0.138155	92.681	2.9994	19.9071	1.674	58.4075	22
C5M006HPRC2	0.704218	0.967269	-0.54174	97.553	10.4884	117.803	0.7957	34.4462	2.159255	0.62493	0.172972	96.132	2.9335	19.9	1.6879	73.0715	24
C5M006GQRC2	1.084465	0.982798	-0.63209	98.197	10.4351	196.5257	0.7666	64.5026	3.3135	0.646802	0.118879	98.108	2.9241	19.9	1.6263	136.8306	30
C5M006GQRC2	0.602821	1.09331	-0.55634	98.592	10.6959	118.0886	0.8007	27.5163	2.153017	0.667802	0.241033	96.868	2.9978	19.9059	1.6986	58.3709	22
C5M006GQRC2	0.603668	1.122571	-0.52334	98.9	10.5951	157.28	0.795	45.9996	2.228563	0.631908	0.282747	96.425	2.9569	19.9	1.6864	97.58	28
C5M006EPRC3	1.190478	0.807704	-0.54414	89.23	10.5624	196.1955	0.8281	64.4855	3.05449	0.585215	0.050384	91.953	2.9222	19.8722	1.7567	136.7944	30
C5M006HQRC2	0.590458	1.012125	-0.4073	98.729	10.4922	118.046	0.7816	34.1857	2.021378	0.618281	0.255088	97.328	2.9447	19.9	1.658	72.5189	24
C5M006HQRC2	0.560574	1.023566	-0.34662	98.76	10.6606	118.268	0.8133	27.6075	2.014103	0.633399	0.272175	97.513	2.9742	19.9012	1.7253	58.5644	22
C5M006FPRC3	1.067311	0.956257	-0.63253	97.374	10.621	191.9385	0.7737	62.3394	3.149476	0.637618	0.1036	98.075	2.9387	19.9	1.6414	132.2418	30
C3M019GORC2	1.077956	0.787111	-0.46469	89.85	10.5658	118.0656	0.7682	34.2984	2.802805	0.578034	0.073667	94.124	2.9638	19.9	1.6297	72.7578	27
C5M006GPRC3	1.143706	0.956908	-0.67191	96.792	10.4523	195.0366	0.7887	63.8359	3.315948	0.639727	0.088383	97.942	2.926	19.8938	1.673	135.4163	30
C3M019FPRC3	1.041429	0.776422	-0.38368	94.734	10.7135	189.311	0.8079	61.0829	2.747089	0.554974	0.107972	96.111	2.9998	19.9163	1.7139	129.5765	30
C5M006HPRC3	1.018321	1.077878	-0.80213	97.457	9.5264	198.7377	0.7361	65.2768	3.149459	0.655751	0.128389	95.752	2.6534	20.0882	1.5615	138.4731	30
C5M020GORC3	1.15804	0.923299	-0.67614	96.123	10.6202	117.5832	0.7705	33.7531	3.215898	0.629973	0.067826	98.105	2.9607	19.9021	1.6345	71.6011	26
C5M020GPRC3	1.056035	0.959764	-0.70971	97.452	10.4679	195.8363	0.7806	64.2001	2.9836	0.626819	0.086605	97.638	2.9344	19.8824	1.6559	136.189	30
C5M020GPRC3	0.978195	1.029185	-0.77894	98.478	10.6948	191.6954	0.7991	62.2148	2.938546	0.664426	0.090585	97.814	2.9997	19.9163	1.6951	131.9776	30
C5M020FPRC2	1.181312	0.895775	-0.6094	96.646	10.5311	185.4866	0.7752	59.2966	3.248232	0.607319	0.08521	98.018	2.959	19.9001	1.6445	125.7871	30
C5M020HPRC3	0.693475	1.062073	-0.78783	99.238	10.5442	118.4851	0.7968	34.767	2.163411	0.687479	0.128875	96.704	2.9441	19.8974	1.6903	73.752	24
C3M023GNRC2	0.780944	0.776461	-0.08747	68.817	10.6636	117.7636	0.8301	27.3713	2.424273	0.63313	0.142949	69.175	2.9675	19.9001	1.7609	58.0632	22
C3M023FORC2	1.223515	0.775328	-0.54945	92.282	10.5698	157.2067	0.7724	45.9644	2.96534	0.571245	0.03552	97.447	2.9633	19.9009	1.6385	97.5052	26
C3M023FORC3	1.170284	0.632341	-0.47047	92.657	10.4927	156.3147	0.8055	45.5961	2.36752	0.44112	0.04188	95.304	2.9231	19.8636	1.7088	96.7239	28
C3M023GORC3	1.066151	0.868089	-0.74621	94.016	10.5261	156.4979	0.7569	45.6289	2.654417	0.597749	0.033316	97.775	2.9601	19.9015	1.6056	96.7934	28
C3M023FORC2	1.096714	0.834946	-0.62537	94.9	10.5186	157.0928	0.7537	45.9106	2.762991	0.579099	0.056615	97.988	2.9714	19.9005	1.5989	97.3912	28
C3M023HORC2	1.03126	0.918945	-0.82482	94.63	10.6082	117.8167	0.7848	27.3965	2.68486	0.669699	0.021074	98.777	2.9592	19.9002	1.6649	58.1168	22
C7M072GORC3	1.940156	0.89048	-0.7426	90.117	10.475	193.372	0.7151	63.0136	5.125377	0.660209	0.000378	97.788	2.9275	19.9003	1.5169	133.672	27
C7M072HORC3	1.738268	0.939927	-0.86644	92.184	10.2582	156.5959	0.6972	47.9721	4.555851	0.669311	-0.00988	98.266	2.9091	19.9	1.4789	101.7643	29
C7M072GORC3	1.683786	0.99835	-0.83141	95.296	10.4675	155.7918	0.6948	47.9989	4.869049	0.699815	0.027918	99.024	2.9934	19.9012	1.4738	101.8209	29
C7M072GPRC3	1.045376	0.998246	-0.72464	98.344	10.4045	117.8055	0.6621	27.3705	3.030863	0.611786	0.135015	96.269	2.9994	19.9146	1.4045	58.0616	23
C7M072HORC3	1.853653	0.957392	-0.89037	92.013	10.4334	156.4473	0.6843	45.6066	4.942797	0.687292	-0.01739	98.409	2.9825	19.9009	1.4515	96.7462	28
C7M072HORC3	1.224638	1.190182	-1.01829	99.073	10.1405	156.7613	0.6633	47.8859	4.057659	0.751213	0.075025	96.325	2.9055	19.8999	1.4071	101.5814	29
C7M072HPRC3	1.009881	0.902408	-0.56131	98.501	10.1047	97.2762	0.6622	20.2567	2.795261	0.576118	0.156859	97.271	2.9	19.6	1.4047	42.971	21
C5M083FQRC3	1.266977	0.767794	-0.38597	95.955	10.3549	159.7314	0.7265	49.5329	3.264254	0.531067	0.11588	96.498	2.9366	19.8928	1.5412	105.0752	29
C5M083EPRC3	1.254792	0.903219	-0.68404	96.961	10.3222	199.9081	0.7132	66.0954	3.298806	0.58505	0.077926	96.878	2.9253	19.9	1.513	140.2096	30
C5M083GPRC3	0.968245	0.934374	-0.58237	92.383	10.3388	88.5822	0.6893	20.6852	2.835432	0.645869	0.121011	93.786	2.9549	19.9001	1.4623	43.88	20
C7M072HPRC3	1.236345	1.116467	-0.8768	98.503	10.3742	159.7073	0.6931	47.1439	3.954569	0.699585	0.100594	96.489	2.9671	19.9007	1.4704	100.0073	28
C5M083FORC3	1.176231	0.922833	-0.80472	95.759	10.2696	120.1841	0.6469	28.5121	3.088471	0.668242	0.02789	98.534	2.9629	19.9003	1.3722	60.4832	22
C7M072GPRC3	0.996487	0.998027	-0.6582	99.135	10.2271	158.9426	0.695	46.7891	2.929623	0.583741	0.170601	96.611	2.9128	19.8999	1.4742	99.2546	28

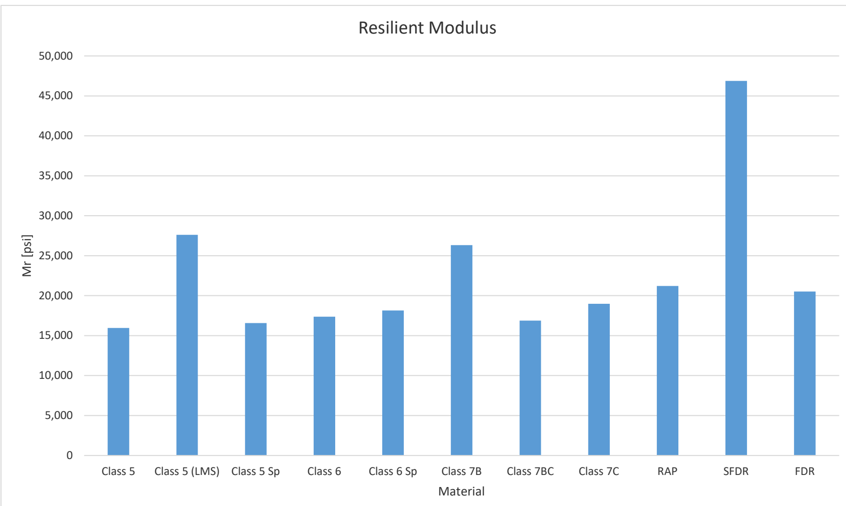
WESLEA inputs:

Layer	Thickness [in]	Resilient Modulus [psi]
Asphalt	5	500,000
Agg Base	12	-
Soil	-	12,000

Load Input	Values
Tire pressure	100 psi
Load magnitude	9000 lb

RESILIENT MODULUS

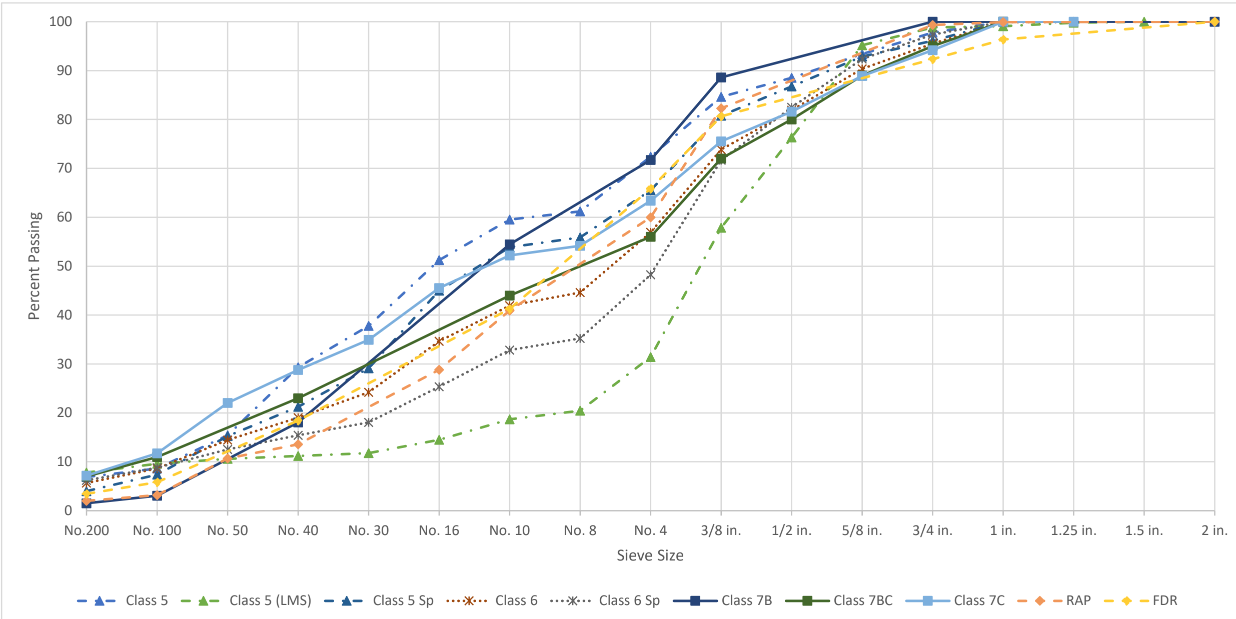
Material	Mr [psi]	Stdev	Count	
Class 5	15,967	6,948	81	
Class 5 (LMS)	27,605	4,838	26	
Class 5 Sp	16,575	7,278	33	
Class 6	17,366	6,774	64	
Class 6 Sp	18,143	5,352	31	
Class 7B	26,329	10,093	17	
Class 7BC	16,884	4,311	7	
Class 7C	18,977	6,631	68	
RAP	21,222	4,152	58	Not including fly ash material
SFDR	46,866	6,829	28	
FDR	20,521	7,107	22	
Class 3	7,534	3,525	23	Not included in plot
Soil	29,174	20,375	122	Not included in plot
SFDR (EE)	204,716	38,496	6	Not included in plot



GRADATION

PP [mm]	50	37.5	31.5	25	19	16	12.5	9.5	4.75	2.36	2	1.18	0.6	0.425	0.3	0.15	0.075
Sieve size [in]	2	1.5	1.25	1	0.75	0.625	0.5	0.375	0.187	0.0937	0.0787	0.0469	0.0234	0.0165	0.0117	0.0059	0.0029
Microns	50800	38100	31750	25400	19000	16000	12700	9510	4760	2380	2000	1190	595	420	297	149	74
Microns^0.45	131.11	115.19	106.12	95.98	84.22	77.96	70.26	61.69	45.18	33.07	30.58	24.21	17.72	15.15	12.96	9.50	6.94
Material																	
Class 5	100.00		100.00	100.00	97.77	93.37	88.51	84.61	72.37	61.21	59.55	51.22	37.79	29.33	15.41	8.64	6.89
Class 5 (LMS)		100.00	99.80	99.07	98.83	95.16	76.31	57.87	31.44	20.45	18.70	14.51	11.78	11.20	10.59	9.58	7.80
Class 5 Sp				100.00	96.12	92.88	86.76	80.76	65.52	55.88	53.88	45.00	29.12	21.24	15.24	7.36	4.01
Class 6			99.93	99.92	95.52	90.37	81.91	73.85	56.92	44.64	41.94	34.65	24.22	19.02	14.44	8.66	5.66
Class 6 Sp				100.00	97.38	92.39	82.47	71.67	48.25	35.22	32.84	25.34	18.05	15.42	12.54	8.79	6.22
Class 7B	100.00			100.00	100.00			88.59	71.71		54.47			18.06		3.06	1.53
Class 7BC				100.00	95.00	89.00	80.00	72.00	56.00		44.00			23.00		11.00	7.00
Class 7C			100.00	100.00	94.17	88.88	81.62	75.53	63.38	54.15	52.20	45.53	34.95	28.80	22.05	11.73	7.17
RAP	100.00			99.92	99.34			82.28	59.98		40.93	28.85		13.58	10.67	3.17	2.02
SFDR																	
FDR	100.00			96.35	92.33			80.63	65.85		41.28			18.43		5.83	3.45
Class 3	100.00	100.00	100.00	100.00	99.78	99.30	97.83	95.87	88.91	82.93	80.52	73.87	56.33	41.26	27.53	15.74	10.88
Soil																	
SFDR (EE)																	

Sieve size	No.200	No. 100	No. 50	No. 40	No. 30	No. 16	No. 10	No. 8	No. 4	3/8 in.	1/2 in.	5/8 in.	3/4 in.	1 in.	1.25 in.	1.5 in.	2 in.
Sieve size [in]	0.0029	0.0059	0.0117	0.0165	0.0234	0.0469	0.0787	0.0937	0.187	0.375	0.5	0.625	0.75	1	1.25	1.5	2
Class 5	7	9	15	29	38	51	60	61	72	85	89	93	98	100	100		100
Class 5 (LMS)	8	10	11	11	12	15	19	20	31	58	76	95	99	99	100	100	
Class 5 Sp	4	7	15	21	29	45	54	56	66	81	87	93	96	100			
Class 6	6	9	14	19	24	35	42	45	57	74	82	90	96	100	100		
Class 6 Sp	6	9	13	15	18	25	33	35	48	72	82	92	97	100			
Class 7B	2	3		18			54		72	89			100	100			100
Class 7BC	7	11		23			44		56	72	80	89	95	100			
Class 7C	7	12	22	29	35	46	52	54	63	76	82	89	94	100	100		
RAP	2	3	11	14		29	41		60	82			99	100			100
SFDR																	
FDR	3	6		18			41		66	81			92	96			100



Percent Passing
100
90
80
70
60
50
40
30
20
10
0
No.200
No. 100
No. 50
No. 40
No. 30
No. 16
No. 10
No. 8
No. 4
3/8 in.
1/2 in.
5/8 in.
3/4 in.
1 in.
1.25 in.
1.5 in.
2 in.
Sieve Size
Class 5
Class 5 (LMS)
Class 5 Sp
Class 6
Class 6 Sp
Class 7B
Class 7BC
Class 7C
RAP
FDR

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulks Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT
C3M019GORC287	0308GR102	Cell 3	6495.2071	5.07	1.8101934	15	1.07796	0.78711	-0.46469	89.85
C3M019FPRC302	0308GR103	Cell 3	6406.913	5.07	1.8101934	15	1.04143	0.77642	-0.38368	94.734
C3M023GNRC272	2308GR101	Cell 23	4972.337	5.07	1.8101934	15	0.78094	0.77646	-0.08747	68.817
C3M023FORC282	2308GR102	Cell 23	7392.21	5.07	1.8101934	15	1.22352	0.77533	-0.54945	92.282
C3M023HORC286	2308GR103	Cell 23	5179.0378	5.07	1.8101934	15	1.03126	0.91894	-0.82482	94.63
C3M023FORC300	2308GR104	Cell 23	8308.8947	5.07	1.8101934	15	1.17028	0.63234	-0.47047	92.657
C3M023GORC301	2308GR105	Cell 23	5703.9418	5.07	1.8101934	15	1.06615	0.86809	-0.74621	94.016
C3M023FORC275	2308GR106	Cell 23	6164.057	5.07	1.8101934	15	1.09671	0.83495	-0.62537	94.9
D3GPR1		BLUE EARTH CO CSAH 90 MANKATO	9154.3938	5.07	1.8101934	15	1.38512	0.70395	-0.43086	99.016
D3GPR2		BLUE EARTH CO CSAH 90 MANKATO	5573.0588	5.07	1.8101934	15	0.99472	0.85558	-0.46365	99.622
D3HOR2		BLUE EARTH CO CSAH 90 MANKATO	4750.2964	5.07	1.8101934	15	0.85056	0.86334	-0.41972	99.651
D3HOR1		BLUE EARTH CO CSAH 90 MANKATO	5669.288	5.07	1.8101934	15	0.99514	0.83305	-0.52637	99.32
D3HOR3		BLUE EARTH CO CSAH 90 MANKATO	5724.9803	5.07	1.8101934	15	0.94875	0.79336	-0.39494	99.212
D4HOR1		BLUE EARTH CO CSAH 90 MANKATO	7266.7888	5.07	1.8101934	15	1.12052	0.72316	-0.41781	99.001
D4HOR2		BLUE EARTH CO CSAH 90 MANKATO	9318.893	5.07	1.8101934	15	1.31166	0.64345	-0.36292	98.318
D1HNR1		BLUE EARTH CO CSAH 90 MANKATO	11105.559	5.07	1.8101934	15	1.41911	0.55787	-0.31502	98.988
D1FOR1		BLUE EARTH CO CSAH 90 MANKATO	13915.203	5.07	1.8101934	15	1.81417	0.58158	-0.2704	98.637
D1GOR1		BLUE EARTH CO CSAH 90 MANKATO	19990.83	5.07	1.8101934	15	2.1836	0.42692	-0.16435	98.064
D1HNR4		BLUE EARTH CO CSAH 90 MANKATO	8256.43	5.07	1.8101934	15	1.2234	0.67608	-0.50632	98.129
D2GPR1		BLUE EARTH CO CSAH 90 MANKATO	5627.3099	5.07	1.8101934	15	0.93591	0.81064	-0.26741	98.95
D2GPR2		BLUE EARTH CO CSAH 90 MANKATO	4145.9333	5.07	1.8101934	15	0.73689	0.86904	-0.30405	98.183
D2HOR2		BLUE EARTH CO CSAH 90 MANKATO	5686.0997	5.07	1.8101934	15	0.97027	0.80812	-0.51142	99.351
D2HOR3		BLUE EARTH CO CSAH 90 MANKATO	6476.0236	5.07	1.8101934	15	1.02245	0.74896	-0.38463	99.372
		Average	7,534							
		Stdev	3,525							
		Count	23							

XLS_FILE_NAME	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
C3M019GORC287	10.5658	118.066	0.7682	34.2984	2.80281	0.57803	0.07367	94.124	2.9638	19.9	1.6297	72.7578	27	9.6	127.6	0.075	0.768
C3M019FPRC302	10.7135	189.311	0.8079	61.0829	2.74709	0.55497	0.10797	96.111	2.9998	19.9163	1.7139	129.577	30	9.6	127.6	0.075	0.768
C3M023GNRC272	10.6636	117.764	0.8301	27.3713	2.42427	0.63313	0.14295	69.175	2.9675	19.9001	1.7609	58.0632	22	8.9	129.35	0.075	0.823
C3M023FORC282	10.5698	157.207	0.7724	45.9644	2.96534	0.57125	0.03552	97.447	2.9633	19.9009	1.6385	97.5052	26	8.9	129.35	0.075	0.823
C3M023HORC286	10.6082	117.817	0.7848	27.3965	2.68486	0.6697	0.02107	98.777	2.9592	19.9002	1.6649	58.1168	22	8.9	129.35	0.075	0.823
C3M023FORC300	10.4927	156.315	0.8055	45.5961	2.36752	0.44112	0.04188	95.304	2.9231	19.8636	1.7088	96.7239	28	8.9	129.35	0.075	0.823
C3M023GORC301	10.5261	156.498	0.7569	45.6289	2.65442	0.59775	0.03332	97.775	2.9601	19.9015	1.6056	96.7934	28	8.9	129.35	0.075	0.823
C3M023FORC275	10.5186	157.093	0.7537	45.9106	2.76299	0.5791	0.05661	97.988	2.9714	19.9005	1.5989	97.3912	28	8.9	129.35	0.075	0.823
D3GPR1	11.6968	95.73	1.285	16.7982	3.11989	0.50618	0.08439	99.311	2.9903	20.0319	2.7259	35.6343	15	8.5	128	0.075	0.647
D3GPR2	11.9086	95.897	1.2807	16.9239	2.72915	0.60398	0.12999	99.558	3.0049	20.0067	2.7168	35.901	15	8.5	128	0.075	0.647
D3HOR2	11.7074	95.9501	1.2694	16.9183	2.39921	0.60303	0.15137	99.405	3.003	20.0203	2.6927	35.8891	15	8.5	128	0.075	0.732
D3HOR1	11.835	96.0856	1.2627	16.9301	2.58657	0.60426	0.08918	99.742	3.0516	20.0572	2.6787	35.9141	15	8.5	128	0.075	0.647
D3HOR3	11.8568	96.0311	1.2754	16.9229	2.44858	0.5508	0.14132	99	3.0504	20.0441	2.7056	35.8989	15	8.5	128	0.075	0.647
D4HOR1	11.5724	95.9222	1.2563	16.9036	2.60373	0.51407	0.10036	99.147	2.9691	20.0214	2.6651	35.8579	15	8.5	127.5	0.078	0.668
D4HOR2	11.6956	95.9867	1.2827	16.9378	2.78436	0.45239	0.09752	98.403	2.9915	20.0232	2.721	35.9304	15	8.5	127.5	0.078	0.668
D1HNR1	11.7543	95.9268	1.3111	16.8903	2.72961	0.3989	0.07585	99.208	2.9907	20.0324	2.7813	35.8297	15	8	126.9	0.081	0.704
D1FOR1	11.8344	95.8229	1.3309	16.9088	3.67754	0.41644	0.09377	98.999	3.002	19.987	2.8232	35.869	15	8	126.9	0.081	0.704
D1GOR1	12.2939	95.9179	1.3052	16.9109	3.72472	0.31004	0.07438	98.786	3.1751	20.0194	2.7688	35.8734	15	8	126.9	0.081	0.704
D1HNR4	12.5969	95.8914	1.2811	16.9074	2.57335	0.49853	0.04516	99.132	3.2931	20.0108	2.7177	35.8661	15	8	126.9	0.081	0.704
D2GPR1	11.5116	95.9027	1.247	16.9059	2.59372	0.53261	0.20807	98.295	2.8326	20.0173	2.6453	35.8629	14	8.2	127.8	0.075	0.732
D2GPR2	11.409	95.7342	1.214	16.7661	2.17598	0.55344	0.24517	97.369	2.9265	20.056	2.5754	35.5664	14	8.2	127.8	0.075	0.732
D2HOR2	11.3472	95.9961	1.2535	16.9128	2.44243	0.57436	0.10206	99.218	2.8961	20.0395	2.659	35.8776	15	8.2	127.8	0.075	0.732
D2HOR3	11.6101	95.9564	1.2587	16.9353	2.49991	0.53425	0.11387	99.608	2.9764	20.0296	2.6701	35.9251	15	8.2	127.8	0.075	0.732

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C3M019GORC287	0	0				100	100	100	100	99	92		82			40		17	11.7
C3M019FPRC302	0	0				100	100	100	100	99	92		82			40		17	11.7
C3M023GNRC272	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
C3M023FORC282	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
C3M023HORC286	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
C3M023FORC300	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
C3M023GORC301	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
C3M023FORC275	0	0	100	100	100	100	99.5	98.5	97.5	96	88.5		78			40		17.5	12.7
D3GPR1	0	0			100	100	100	100	98	96	89	84	83	76	58	44	29	16	10.5
D3GPR2	0	0			100	100	100	100	98	96	89	84	83	76	58	44	29	16	10.5
D3HOR2	0	0			100	100	100	99	97	95	88	82	80	72	55	41	27	15	10.2
D3HOR1	0	0			100	100	100	100	98	96	89	84	83	76	58	44	29	16	10.5
D3HOR3	0	0			100	100	100	100	98	96	89	84	83	76	58	44	29	16	10.5
D4HOR1	0	0			100	100	99	99	98	96	89	85	84	76	57	42	27	14	9.8
D4HOR2	0	0			100	100	99	99	98	96	89	85	84	76	57	42	27	14	9.8
D1HNR1	0	0			100	100	100	100	98	95	89	82	80	73	56	41	27	14	9.5
D1FOR1	0	0			100	100	100	100	98	95	89	82	80	73	56	41	27	14	9.5
D1GOR1	0	0			100	100	100	100	98	95	89	82	80	73	56	41	27	14	9.5
D1HNR4	0	0			100	100	100	100	98	95	89	82	80	73	56	41	27	14	9.5
D2GPR1	0	0			100	100	100	99	97	95	88	82	80	72	55	41	27	15	10.2
D2GPR2	0	0			100	100	100	99	97	95	88	82	80	72	55	41	27	15	10.2
D2HOR2	0	0			100	100	100	99	97	95	88	82	80	72	55	41	27	15	10.2
D2HOR3	0	0			100	100	100	99	97	95	88	82	80	72	55	41	27	15	10.2
		Average	100	100	100	100	99.7826	99.3043	97.8261	95.8696	88.913	82.9333	80.5217	73.8667	56.3333	41.2609	27.5333	15.7391	10.8783

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI
C5035R4	0099GR001	Stockpile	35272.3813	14.5	5.1995919	15	2.45587	0.47519	-0.05628	99.133	14.75	90.151
C503R2	0099GR002	Stockpile	42916.6034	14.5	5.1995919	15	3.04231	0.39663	-0.11903	95.673	11.8384	95.1788
C503R4	0099GR003	Stockpile	22794.6982	14.5	5.1995919	15	1.67635	0.60514	-0.23136	98.692	9.6727	90.578
C507R2B	0099GR004	Stockpile	18560.6571	14.5	5.1995919	15	1.33189	0.59811	-0.15064	98.616	11.5265	94.9804
C507R4A	0099GR005	Stockpile	11790.878	14.5	5.1995919	15	0.57012	0.30242	1.14026	93.586	11.7008	89.9964
C510R2B	0099GR006	Stockpile	18570.633	14.5	5.1995919	15	1.33855	0.604	-0.16507	98.74	11.5454	95.0855
C5035R5	0099GR008	Stockpile	22780.6239	14.5	5.1995919	15	1.61982	0.62255	-0.11938	99.605	12.4455	96.2249
C5075R1	0099GR009	Stockpile	28292.0182	14.5	5.1995919	15	2.07145	0.5186	-0.22048	97.165	10.1263	94.4866
C5M006F	0608GR101	Cell 6	12794.1236	14.5	5.1995919	15	1.06731	0.95626	-0.63253	97.374	10.621	191.939
C5M083G	8307GR101	Cell 83	10672.8847	14.5	5.1995919	15	0.80194	0.79205	-0.29425	97.563	10.3533	120.002
C5M083G	8307GR103	Cell 83	12536.8245	14.5	5.1995919	15	1.06145	0.97545	-0.68061	98.626	10.2037	199.068
C5M083F	8307GR104	Cell 83	29747.3792	14.5	5.1995919	15	2.49344	1.03378	-0.64494	99.303	10.4786	161.213
C5M083F	8307GR105	Cell 83	15105.7871	14.5	5.1995919	15	1.18892	0.71025	-0.45096	95.57	10.3242	159.676
C5M006H	0608GR102	Cell 6	10085.1822	14.5	5.1995919	15	0.90482	1.07979	-0.86748	98.907	10.47	117.751
C5M006G	0608GR103	Cell 6	8962.48272	14.5	5.1995919	15	0.72001	0.75835	-0.51658	95.791	10.4526	98.8698
C5M006G	0608GR104	Cell 6	9336.95711	14.5	5.1995919	15	0.84306	0.91972	-0.89545	94.837	10.519	118.322
C5M006H	0608GR105	Cell 6	11111.818	14.5	5.1995919	15	0.98559	0.96502	-0.83464	96.677	10.4251	157.19
C5M006I(	0608GR106	Cell 6	9372.60869	14.5	5.1995919	15	0.62712	0.55763	0.07861	97.856	10.6557	78.8977
C5M006G	0608GR107	Cell 6	12786.4214	14.5	5.1995919	15	1.1325	0.98717	-0.82896	96.913	10.5191	190.376
C5M006G	0608GR108	Cell 6	12375.275	14.5	5.1995919	15	1.09433	1.00641	-0.82284	97.199	10.5956	157.089
C5M006H	0608GR109	Cell 6	8675.73263	14.5	5.1995919	15	0.70422	0.96727	-0.54174	97.553	10.4884	117.803
C5M006H	0608GR110	Cell 6	7493.37101	14.5	5.1995919	15	0.5664	1.00873	-0.3046	97.764	11.8195	117.362
C5M006I(	0608GR111	Cell 6	8174.92607	14.5	5.1995919	15	0.69311	1.02281	-0.68318	95.087	10.6736	118.129
C5M006H	0608GR112	Cell 6	9212.9587	14.5	5.1995919	15	0.72105	0.91894	-0.42344	97.441	12.0323	157.382
C5M006H	0608GR113	Cell 6	7572.11427	14.5	5.1995919	15	0.59046	1.01213	-0.4073	98.729	10.4922	118.046
C5M006G	0608GR114	Cell 6	12997.0048	14.5	5.1995919	15	1.08446	0.9828	-0.63209	98.197	10.4351	196.526
C5M006G	0608GR115	Cell 6	7381.67164	14.5	5.1995919	15	0.60282	1.09331	-0.55634	98.592	10.6959	118.089
C5M006G	0608GR116	Cell 6	7463.46301	14.5	5.1995919	15	0.60367	1.12257	-0.52334	98.9	10.5951	157.28
C5M006E	0608GR117	Cell 6	14686.0833	14.5	5.1995919	15	1.19048	0.8077	-0.54414	89.23	10.5624	196.196
C5M006G	0608GR118	Cell 6	13547.2316	14.5	5.1995919	15	1.14371	0.95691	-0.67191	96.792	10.4523	195.037
C5M020F	2008GR101	Cell 20	14271.4599	14.5	5.1995919	15	1.18131	0.89577	-0.6094	96.646	10.5311	185.487
C5M020G	2008GR102	Cell 20	11206.6672	14.5	5.1995919	15	0.9782	1.02919	-0.77894	98.478	10.6948	191.695
C5M020G	2008GR103	Cell 20	12365.9551	14.5	5.1995919	15	1.05604	0.95976	-0.70971	97.452	10.4679	195.836
C5M020H	2008GR104	Cell 20	7920.0306	14.5	5.1995919	15	0.69348	1.06207	-0.78783	99.238	10.5442	118.485
C5M006H	0608GR119	Cell 6	11577.3943	14.5	5.1995919	15	1.01832	1.07788	-0.80213	97.457	9.5264	198.738
C5M020G	2008GR105	Cell 20	13705.4613	14.5	5.1995919	15	1.15804	0.9233	-0.67614	96.123	10.6202	117.583
C5M006H	0608GR120	Cell 6	9929.03384	14.5	5.1995919	15	0.8871	0.83217	-0.86432	98.031	10.4938	117.681
C5M006H	0608GR121	Cell 6	7321.10897	14.5	5.1995919	15	0.56057	1.02357	-0.34662	98.76	10.6606	118.268
C5M083F	8307GR106	Cell 83	14818.9253	14.5	5.1995919	15	1.25479	0.90322	-0.68404	96.961	10.3222	199.908
C5M083F	8307GR107	Cell 83	13389.1824	14.5	5.1995919	15	1.17623	0.92283	-0.80472	95.759	10.2696	120.184
C5M083G	8307GR108	Cell 83	11787.6154	14.5	5.1995919	15	0.96825	0.93437	-0.58237	92.383	10.3388	88.5822
C5M083F	8307GR109	Cell 83	16405.2335	14.5	5.1995919	15	1.26698	0.76779	-0.38597	95.955	10.3549	159.731
61CHHR1		OLMSTED CR 117	16833.4282	14.5	5.1995919	15	1.119	0.4357	0.09492	86.774	47.6453	95.3287
62CHHR1		OLMSTED CR 117	17186.9711	14.5	5.1995919	15	0.88586	0.18848	0.9244	90.715	11.8372	95.3285
C5C014INRC003		CR 14	12996.8514	14.5	5.1995919	15	1.18826	0.85902	-0.93925	83.557	11.814	119.149
C5C014INRC004		CR 14	12145.9265	14.5	5.1995919	15	1.14487	0.87762	-1.03922	81.809	10.2606	119.28
C5C014HNRC010		CR 14	16232.706	14.5	5.1995919	15	1.59341	0.86067	-1.17383	71.687	11.8516	119.93
CR3_T_5_7_1_FEB22		CR 3 (Wright)	27453.8357	14.5	5.1995919	15	2.23605	0.56983	-0.57005	77.972	11.9747	197.217
CR3_T_5_7_2_FEB28		CR 3 (Wright)	24968.9182	14.5	5.1995919	15	2.06945	0.62766	-0.62517	76.358	10.4733	196.407
CR3_T_8_8_1_FEB23		CR 3 (Wright)	11166.4979	14.5	5.1995919	15	1.90322	1.36061	-2.97432	-861.594	10.4613	158.214
CR3_T_8_8_2_MAR24		CR 3 (Wright)	17467.2733	14.5	5.1995919	15	1.5061	0.78797	-0.74885	82.774	11.906	197.01
C5T014GNRC182		Stockpile in pit (TH 14'	19973.3518	14.5	5.1995919	15	1.86482	0.75705	-1.01292	85.366	10.6155	119.186
C5T014HNRC178		Stockpile in pit (TH 14'	16025.3934	14.5	5.1995919	15	1.4468	0.78875	-0.90066	89.592	10.4395	120.464
C5T014HNRC183		Stockpile in pit (TH 14'	17965.7666	14.5	5.1995919	15	1.62042	0.76446	-0.89852	85.381	10.6631	119.293
C5T014INRC179		Stockpile in pit (TH 14'	15362.8269	14.5	5.1995919	15	1.38878	0.79719	-0.90457	90.923	10.5986	119.65
C5T014INRC184		Stockpile in pit (TH 14'	17202.8845	14.5	5.1995919	15	1.43023	0.73268	-0.6309	80.395	10.6393	119.135
1415C5R1		TH14-15 STOCKPILE	12425.7851	14.5	5.1995919	15	0.97386	0.64735	-0.43969	97.4	11.6119	78.0242
1415R3		TH14-15 STOCKPILE	15064.1382	14.5	5.1995919	15	1.22064	0.72994	-0.54619	99.039	11.8202	95.8603
1415R4		TH14-15 STOCKPILE	14652.3339	14.5	5.1995919	15	1.20008	0.73192	-0.58151	97.347	11.6578	95.8785
C5T014JNRC180		Stockpile in pit (TH 14'	12464.6145	14.5	5.1995919	15	1.13289	0.91037	-0.91756	96.025	10.5221	99.9706
C5T014JNRC185		Stockpile in pit (TH 14'	11237.0156	14.5	5.1995919	15	1.06914	0.96436	-1.06633	94.309	10.4274	119.365
C5T014CMRC173		Stockpile in pit (TH 14'	32109.269	14.5	5.1995919	15	3.19531	0.71073	-1.22549	60.644	14.9197	119.17
C5T014DMRC174		Stockpile in pit (TH 14'	30485.6577	14.5	5.1995919	15	2.95599	0.7645	-1.13745	67.085	10.5408	159.401
C5T014DMRC207		Stockpile in pit (TH 14'	27465.7727	14.5	5.1995919	15	2.65959	0.75417	-1.13345	67.586	10.3967	119.982
C5T014ENRC175		Stockpile in pit (TH 14'	25643.0549	14.5	5.1995919	15	2.49056	0.85324	-1.13912	73.544	12.0184	158.51
C5T014FNRC186		Stockpile in pit (TH 14'	19840.6006	14.5	5.1995919	15	1.86027	0.81561	-1.02436	81.733	10.5898	158.459
C5T014ENRC204		Stockpile in pit (TH 14'	25280.2063	14.5	5.1995919	15	2.43624	0.82097	-1.11475	71.069	12.0984	159.686
C5T014FNRC176		Stockpile in pit (TH 14'	19838.1057	14.5	5.1995919	15	1.88972	0.8335	-1.07587	81.387	10.3184	119.149
C5T014FNRC181		Stockpile in pit (TH 14'	19223.6011	14.5	5.1995919	15	1.80171	0.84289	-1.02189	82.931	10.6201	158.92
C5T014GNRC177		Stockpile in pit (TH 14'	16988.0632	14.5	5.1995919	15	1.59415	0.80795	-1.02745	86.982	10.4982	118.989
C5T014EMRC187		Stockpile in pit (TH 14'	20993.6554	14.5	5.1995919	15	1.94796	0.80016	-0.99058	80.893	10.6765	120.168
C5T014EMRC208		Stockpile in pit (TH 14'	16787.9328	14.5	5.1995919	15	1.36226	0.52893	-0.55953	90.705	10.5509	99.8238
C5C014GNRC238		CR 14	11653.1649	14.5	5.1995919	15	0.9334	0.66276	-0.51091	87.038	10.4432	118.135
C5C014ENRC241		CR 14	11050.9975	14.5	5.1995919	15	1.00192	0.96172	-0.90716	97.917	10.5165	117.237
NDSU_CN1		TH 10	18555.9419	14.5	5.1995919	15	1.29385	0.46349	-0.06158	79.305	9.7817	159.735
NDSU_CN2		TH 10	12973.7897	14.5	5.1995919	15	0.92202	0.64435	-0.11671	81.045	9.8679	201.373
NDSU_CF1		TH 10	19501.6289	14.5	5.1995919	15	1.35311	0.50917	-0.04335	75.412	11.4578	200.667
NDSU_CF2		TH 10	15882.8603	14.5	5.1995919	15	1.25913	0.77931	-0.47182	93.966	10.8295	201.871
NDSU_CF4		TH 10	14046.094	14.5	5.1995919	15	1.07555	0.68509	-0.36131	82.137	11.1904	121.307
NDSU_CN3		TH 10	10219.2861	14.5	5.1995919	15	0.74314	0.65522	-0.19209	89.557	10.3623	121.088
NDSU_CN4		TH 10	18230.5204	14.5	5.1995919	15	1.14286	0.32537	0.28378	44.974	3.3533	119.542
		Average	15,967									
		Stdev	6,948									
		Count	81									

XLS_FILE_NAME	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
C5035R4	1.2453	16.9185	4.68892	0.3415	0.11905	99.32	3.5518	18.0872	2.6416	35.8895	15	7.2	134.2	0.357	6.718
C503R2	1.2987	16.8761	5.09808	0.30926	0.05257	97.41	3.0272	19.7931	2.7549	35.7996	15	7.2	134.2	0.357	6.718
C503R4	1.1857	17.0223	3.58152	0.42882	0.11043	99.421	2.3856	18.1642	2.5152	36.1098	15	7.2	134.2	0.357	6.718
C507R2B	1.2799	16.9103	2.88705	0.40181	0.15948	98.491	2.9371	19.7491	2.7152	35.8722	15	7.1	141.5	0.097	6.22
C507R4A	1.2862	16.888	1.3637	0.10852	0.5027	99.231	2.722	18.058	2.7284	35.8248	14	7.1	141.5	0.097	6.22
C510R2B	1.282	16.9427	2.90717	0.4058	0.15735	98.571	2.9418	19.7257	2.7195	35.9408	15	7.1	141.5	0.097	6.22
C5035R5	1.2565	16.988	3.70104	0.43931	0.14913	99.628	2.9236	20.0687	2.6655	36.0369	15	7.2	134.2	0.357	6.718
C5075R1	1.2454	16.9611	3.93865	0.38174	0.07753	97.978	2.4948	19.5138	2.6418	35.98	15	7.1	141.5	0.097	6.22
C5M006F	0.7737	62.3394	3.14948	0.63762	0.1036	98.075	2.9387	19.9	1.6414	132.242	30	9.55	124.7	0.172	2.057
C5M083G	0.7264	28.4322	2.10807	0.46684	0.22132	97.317	2.9345	19.8977	1.5409	60.3138	22				
C5M083G	0.6958	65.8368	3.06565	0.61385	0.11823	97.743	2.9092	19.8103	1.476	139.661	30				
C5M083F	0.6921	47.8111	8.01826	0.65123	0.15941	97.828	3.0032	19.9367	1.4682	101.423	28				
C5M083F	0.7644	49.9217	2.68042	0.47029	0.09244	96.725	2.9009	19.8	1.6215	105.9	29				
C5M006H	0.7879	27.3656	2.77384	0.67354	0.10851	96.672	2.9307	19.9	1.6713	58.0512	25	9.55	124.7	0.172	2.057
C5M006G	0.7749	18.4742	1.70363	0.5733	0.05826	96.317	2.9276	19.9	1.6437	39.1897	17	9.55	124.7	0.172	2.057
C5M006G	0.7583	27.6344	2.09752	0.6434	0.02017	95.294	2.9696	19.9001	1.6087	58.6215	22	9.55	124.7	0.172	2.057
C5M006H	0.7785	45.9965	2.66618	0.63933	0.05227	97.767	2.9151	19.9	1.6514	97.5734	28	9.55	124.7	0.172	2.057
C5M006I(	0.8243	13.6284	1.42578	0.40986	0.16425	97.832	2.969	19.9	1.7487	28.9101	14	9.55	124.7	0.172	2.057
C5M006G	0.7685	61.6143	3.16132	0.65701	0.04363	97.403	2.9563	19.9	1.6303	130.704	30	9.55	124.7	0.172	2.057
C5M006G	0.7966	45.9098	3.14251	0.66581	0.05606	97.887	2.9541	19.9	1.6897	97.3894	28	9.55	124.7	0.172	2.057
C5M006H	0.7957	34.4462	2.15925	0.62493	0.17297	96.132	2.9335	19.9	1.6879	73.0715	24	9.55	124.7	0.172	2.057
C5M006H	1.3066	27.1846	2.02133	0.61105	0.28323	96.583	2.9059	19.8984	2.7717	57.6672	19	9.55	124.7	0.172	2.057
C5M006I(	0.7891	27.5336	2.17577	0.67757	0.13816	92.681	2.9994	19.9071	1.674	58.4075	22	9.55	124.7	0.172	2.057
C5M006H	1.4358	46.0473	2.18915	0.58351	0.17929	95.531	2.9717	19.9004	3.0457	97.681	25	9.55	124.7	0.172	2.057
C5M006H	0.7816	34.1857	2.02138	0.61828	0.25509	97.328	2.9447	19.9	1.658	72.5189	24	9.55	124.7	0.172	2.057
C5M006G	0.7666	64.5026	3.3135	0.6468	0.11888	98.108	2.9241	19.9	1.6263	136.831	30	9.55	124.7	0.172	2.057
C5M006G	0.8007	27.5163	2.15302	0.6678	0.24103	96.868	2.9978	19.9059	1.6986	58.3709	22	9.55	124.7	0.172	2.057
C5M006G	0.795	45.9996	2.22856	0.63191	0.28275	96.425	2.9569	19.9	1.6864	97.58	28	9.55	124.7	0.172	2.057
C5M006E	0.8281	64.4855	3.05449	0.58522	0.05038	91.953	2.9222	19.8722	1.7567	136.794	30	9.55	124.7	0.172	2.057
C5M006G	0.7887	63.8359	3.31595	0.63973	0.08838	97.942	2.926	19.8938	1.673	135.416	30	9.55	124.7	0.172	2.057
C5M020F	0.7752	59.2966	3.24823	0.60732	0.08521	98.018	2.959	19.9001	1.6445	125.787	30	9.3	129.15	0.077	1.137
C5M020G	0.7991	62.2148	2.93855	0.66443	0.09058	97.814	2.9997	19.9163	1.6951	131.978	30	9.3	129.15	0.077	1.137
C5M020G	0.7806	64.2001	2.9836	0.62682	0.0866	97.638	2.9344	19.8824	1.6559	136.189	30	9.3	129.15	0.077	1.137
C5M020H	0.7968	34.767	2.16341	0.68748	0.12887	96.704	2.9441	19.8974	1.6903	73.752	24	9.3	129.15	0.077	1.137
C5M006H	0.7361	65.2768	3.14946	0.65575	0.12839	95.752	2.6534	20.0882	1.5615	138.473	30	9.55	124.7	0.172	2.057
C5M020G	0.7705	33.7531	3.2159	0.62997	0.06783	98.105	2.9607	19.9021	1.6345	71.6011	26	9.3	129.15	0.077	1.137
C5M006H	0.7994	27.3324	1.95857	0.5642	0.01444	95.132	2.92	19.9	1.6959	57.9809	22	9.55	124.7	0.172	2.057
C5M006H	0.8133	27.6075	2.0141	0.6334	0.27217	97.513	2.9742	19.9012	1.7253	58.5644	22	9.55	124.7	0.172	2.057
C5M083F	0.7132	66.0954	3.29881	0.58505	0.07793	96.878	2.9253	19.9	1.513	140.21	30				
C5M083F	0.6469	28.5121	3.08847	0.66824	0.02789	98.534	2.9629	19.9003	1.3722	60.4832	22				
C5M083G	0.6893	20.6852	2.83543	0.64587	0.12101	93.786	2.9549	19.9001	1.4623	43.88	20				
C5M083F	0.7265	49.5329	3.26425	0.53107	0.11588	96.498	2.9366	19.8928	1.5412	105.075	29				
61CHHR1	4.1986	16.9206	2.14932	0.30184	0.15999	88.687	9.9241	19.8143	8.9066	35.8941	8	8.2	133.4	0.075	7.058
62CHHR1	1.2188	16.9329	1.67511	0.06125	0.37391	95.924	3.0817	19.8484	2.5855	35.9202	15	9.7	138.7	0.075	6.201
C5C014INRC003	1.2767	28.0245	2.72192	0.63284	-0.06033	96.43	2.9001	19.9	2.7083	59.449	20	11.3	124.47	0.108	1.846
C5C014INRC004	0.7357	35.2588	2.57365	0.651	-0.09379	97.27	2.9	19.8	1.5606	74.7952	26	11.3	124.47	0.108	1.846
C5C014HNRC010	1.2143	28.3928	3.33681	0.6724	-0.16403	95.582	2.9	19.9	2.5758	60.2302	23	11.3	124.47	0.108	1.846
CR3_T_5_7_1_FEB22	1.3446	64.6848	4.06421	0.46104	-0.05702	97.324	3	20	2.8524	137.217	29	8.8	127	0	0
CR3_T_5_7_2_FEB28	0.6945	64.3028	4.02318	0.51646	-0.06755	96.665	3	20	1.4733	136.407	30	8.8	127	0	0
CR3_T_8_8_1_FEB23	0.6889	48.5786	2.38282	0.54802	-0.38685	-1041.5	3	20	1.4613	103.051	29	8.8	127	0	0
CR3_T_8_8_2_MAR24	1.3699	64.5871	3.46365	0.61772	-0.05095	97.989	3	20	2.906	137.01	27	8.8	127	0	0
C5T014GNRC182	0.7935	35.0888	3.52893	0.57924	-0.10748	94.762	2.9774	19.9155	1.6833	74.4345	24	9.57	125.53	0.125	1.016
C5T014HNRC178	0.756	35.7065	3.00369	0.58425	-0.04965	95.689	2.9421	19.9018	1.6037	75.7449	24	9.57	125.53	0.125	1.016
C5T014HNRC183	0.7879	35.0854	3.2721	0.59931	-0.09549	96.274	2.9966	19.947	1.6714	74.4274	24	9.57	125.53	0.125	1.016
C5T014INRC179	0.7844	35.3144	2.91317	0.59117	-0.05143	96.942	2.978	19.9111	1.664	74.9131	24	9.57	125.53	0.125	1.016
C5T014INRC184	0.789	35.0051	3.17809	0.5928	-0.02867	90.459	2.9878	19.9282	1.6736	74.2571	24	9.57	125.53	0.125	1.016
1415C5R1	1.2105	12.6737	2.02692	0.44846	0.09881	97.224	3.0045	20.044	2.5678	26.8849	14	9	127.1	0.1	0.841
1415R3	1.2716	16.925	2.7205	0.52971	0.05515	99.537	2.9523	20.0447	2.6974	35.9034	15	9	127.1	0.1	0.841
1415R4	1.2928	16.9067	2.65914	0.55467	0.02046	99.317	2.9553	20.0181	2.7425	35.8645	15	9	127.1	0.1	0.841
C5T014JNRC180	0.7458	21.1398	2.76671	0.64754	0.00311	98.542	2.98	19.9193	1.582	44.8444	21	9.57	125.53	0.125	1.016
C5T014JNRC185	0.7251	28.1247	2.64624	0.6934	-0.02743	97.901	2.9576	19.9039	1.5382	59.6615	23	9.57	125.53	0.125	1.016
C5T014CMRC173	2.0965	34.7872	5.29233	0.59085	-0.24648	95.062	2.927	19.8962	4.4474	73.7947	23	9.57	125.53	0.125	1.016
C5T014DMRC174	0.8018	46.988	5.46188	0.6051	-0.18301	92.945	2.9457	19.9082	1.7009	99.6766	28	9.57	125.53	0.125	1.016
C5T014DMRC207	0.7745	35.4298	4.8171	0.58371	-0.17591	89.389	2.9179	19.9	1.6429	75.158	27	9.57	125.53	0.125	1.016
C5T014ENRC175	1.2704	46.5675	5.18647	0.65599	-0.1562	93.824	2.9541	19.9083	2.6949	98.7845	27	9.57	125.53	0.125	1.016
C5T014FNRC186	0.7648	46.549	3.7945	0.59019	-0.0912	94.021	2.9773	19.9147	1.6223	98.7453	28	9.57	125.53	0.125	1.016
C5T014ENRC204	1.5439	47.1337	4.90919	0.63661	-0.15948	93.399	2.9365	19.9	3.2751	99.9856	26	9.57	125.53	0.125	1.016
C5T014FNRC176	0.7505	35.0959	3.8619	0.60313	-0.10291	94.219	2.9077	19.8558	1.5921	74.4497	26	9.57	125.53	0.125	1.016
C5T014FNRC181	0.7719	46.7279	3.81156	0.60182	-0.07616	94.047	2.994	19.943	1.6374	99.1249	28	9.57	125.53	0.125	1.016
C5T014GNRC177	0.8301	27.9538	3.24407	0.61388	-0.08825	97.225	2.9125	19.8968	1.7608	59.299	22	9.57	125.53	0.125	1.016
C5T014EMRC187	0.8048	35.5128	3.95301	0.58262	-0.08996	93.635	2.9898	19.9343	1.7072	75.334	26	9.57	125.53	0.125	1.016
C5T014EMRC208	0.8081	21.3012	2.28368	0.4163	-0.02495	94.573	2.9449	19.9	1.7142	45.1866	19	9.57	125.53	0.125	1.016
C5C014GNRC238	0.7924	27.5464	1.96782	0.51827	0.00728	93.562	2.9155	19.9	1.681	58.4347	23	10.55	125	0.136	3.449
C5C014ENRC241	0.768	27.1231	2.63105	0.66682	0.03671	98.331	2.9585	19.9	1.6291	57.5367	23				
NDSU_CN1	0.3685	46.8739	2.60521	0.38574	0.0914	85.559	3	20.2	0.7817	99.4346	26	6.4	138.7	0	0
NDSU_CN2	0.4092	66.3609	2.34753	0.46972	0.16989	94.248	2.7	20.3	0.8679	140.773	26	6.4	138.7	0	0
NDSU_CF1	0.8758	66.1697	3.07889	0.56854	0.07511	94.592	3.1	20.2	1.8578	140.367	28	6.4	138.7	0	0
NDSU_CF2	0.8625	66.7371	3.04642	0.48682	0.12584	92.795	3	20.2	1.8295	141.571	24	6.4	138.7	0	0
NDSU_CF4	0.3808	34.0695	2.42515	0.44345	0.12349	81.467	3	20	0.8077	72.2723	25	6.4	138.7	0	0
NDSU_CN3	0.6422	28.7973	1.78281	0.45686	0.14555	90.582	3	20.2	1.3623	61.0884	23	6.4	138.7	0	0
NDSU_CN4	0.5358	28.0685	2.28779	0.41839	0.01816	43.926	0.7	20.1	1.1367	59.5424	21	6.4	138.7	0	0

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C5035R4					100	100	93	85	77	69	51	32	28	22	13	11	9	5	3.8
C503R2					100	100	93	85	77	69	51	32	28	22	13	11	9	5	3.8
C503R4					100	100	93	85	77	69	51	32	28	22	13	11	9	5	3.8
C507R2B						100	94	86	79	71	53	39	36	31	22	19	15	11	9.4
C507R4A						100	94	86	79	71	53	39	36	31	22	19	15	11	9.4
C510R2B						100	94	86	79	71	53	39	36	31	22	19	15	11	9.4
C5035R5					100	100	93	85	77	69	51	32	28	22	13	11	9	5	3.8
C5075R1						100	94	86	79	71	53	39	36	31	22	19	15	11	9.4
C5M006F					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M083G																			
C5M083G																			
C5M083F																			
C5M083F																			
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006I(					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006I(					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006E					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006G					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M020F						100	99			94	86		74.5			35.5	0	0	10.2
C5M020G						100	99			94	86		74.5			35.5	0	0	10.2
C5M020G						100	99			94	86		74.5			35.5	0	0	10.2
C5M020H						100	99			94	86		74.5			35.5	0	0	10.2
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M020G						100	99			94	86		74.5			35.5	0	0	10.2
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M006H					100	100	98.5	95.5	91	85.5	72.5	62	59.5	50	35.5	26	18	8	5.7
C5M083F																			
C5M083F																			
C5M083G																			
C5M083F																			
61CHHR1							100	97	86	72	44	33	30	24	20	18	17	15	12.6
62CHHR1						100	100	97	88	76	50	33	29	22	17	16	15	14	11.7
C5C014INRC003						100	96.3	93.7	90	86.7	78.3	65.7	62.3	52.7	37.3	29.7	21.7	12	7.9
C5C014INRC004						100	96.3	93.7	90	86.7	78.3	65.7	62.3	52.7	37.3	29.7	21.7	12	7.9
C5C014HNRC010						100	96.3	93.7	90	86.7	78.3	65.7	62.3	52.7	37.3	29.7	21.7	12	7.9
CR3_T_5_7_1_FEB22			100			100	98.7			92.2	81.7		54.7			30.2	0	11.4	8.3
CR3_T_5_7_2_FEB28			100			100	98.7			92.2	81.7		54.7			30.2	0	11.4	8.3
CR3_T_8_8_1_FEB23			100			100	98.7			92.2	81.7		54.7			30.2	0	11.4	8.3
CR3_T_8_8_2_MAR24			100			100	98.7			92.2	81.7		54.7			30.2	0	11.4	8.3
C5T014GNRC182						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014HNRC178						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014HNRC183						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014INRC179						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014INRC184						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
1415C5R1						100	97	92	89	85	77	74	72	67	53	42	27	12	8.6
1415R3						100	97	92	89	85	77	74	72	67	53	42	27	12	8.6
1415R4						100	97	92	89	85	77	74	72	67	53	42	27	12	8.6
C5T014JNRC180						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014JNRC185						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014CMRC173						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014DMRC174						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014DMRC207						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014ENRC175						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014FNRC186						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014ENRC204						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014FNRC176						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014FNRC181						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014GNRC177						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014EMRC187						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5T014EMRC208						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5C014GNRC238						100	97.7	94.3	90.3	87	78.3	72	70.3	64	49.3	38.7	24.3	11	7.6
C5C014ENRC241						100	95	90.7	85	80.7	69.3	60.7	57.7	49.3	35.3	28	20	10.7	6.6
NDSU_CN1			100			100				84	69		58			24	0	5	3.2
NDSU_CN2			100			100				84	69		58			24	0	5	3.2
NDSU_CF1			100			100				84	69		58			24	0	5	3.2
NDSU_CF2			100			100				84	69		58			24	0	5	3.2
NDSU_CF4			100			100				84	69		58			24	0	5	3.2
NDSU_CN3			100			100				84	69		58			24	0	5	3.2
NDSU_CN4			100			100				84	69		58			24	0	5	3.2
		Average	100		100	100	97.775	93.3696	88.5071	84.6125	72.3736	61.2107	59.5528	51.2214	37.7875	29.3333	15.4097	8.64306	6.89306

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_RSQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI
C5HBR3		OLMSTED CO STOCKPILE (CR117)	25394.882	14.01	6.7599408	14.7	2.20568	0.64503	-0.56385	96.64	11.6807	96.0202	1.2941	16.9099
C5HCR3		OLMSTED CO STOCKPILE (CR117)	31018.033	14.01	6.7599408	14.7	2.68297	0.63312	-0.55443	98.835	14.3666	95.7729	2.087	16.8809
C5HCR4		OLMSTED CO STOCKPILE (CR117)	27068.399	14.01	6.7599408	14.7	2.06313	0.45345	-0.24292	96.889	11.4806	95.5729	1.303	16.8632
C5EAR1		OLMSTED CO STOCKPILE (CR117)	29948.536	14.01	6.7599408	14.7	2.4758	0.62997	-0.43517	99.334	14.4505	96.0367	2.5812	16.9246
C5EBR1		OLMSTED CO STOCKPILE (CR117)	36141.113	14.01	6.7599408	14.7	2.8353	0.41676	-0.32385	97.197	14.3412	95.9268	2.5129	16.9278
C5EBR2		OLMSTED CO STOCKPILE (CR117)	31162.878	14.01	6.7599408	14.7	2.8116	0.76651	-0.64895	95.749	11.7515	95.9459	1.2906	16.9076
C5EBR3		OLMSTED CO STOCKPILE (CR117)	29598.14	14.01	6.7599408	14.7	2.38456	0.61536	-0.36889	99.108	11.806	95.8947	1.3325	16.9311
C5ECR3		OLMSTED CO STOCKPILE (CR117)	24767.45	14.01	6.7599408	14.7	1.34606	0.32531	0.63472	97.161	11.7388	95.8881	1.2914	16.9129
C5ECR4		OLMSTED CO STOCKPILE (CR117)	26240.492	14.01	6.7599408	14.7	2.10076	0.60061	-0.35409	98.305	11.8097	95.9142	1.3217	16.9005
C5FBR1		OLMSTED CO STOCKPILE (CR117)	23716.561	14.01	6.7599408	14.7	1.72516	0.54187	-0.10821	95.975	11.8758	92.1242	1.2822	16.8759
C5FBR2		OLMSTED CO STOCKPILE (CR117)	32301.872	14.01	6.7599408	14.7	3.05877	0.5938	-0.79872	97.341	14.4796	95.9617	2.1472	16.9322
C5FCR1		OLMSTED CO STOCKPILE (CR117)	25240.315	14.01	6.7599408	14.7	2.2544	0.76737	-0.62218	99.455	11.8846	95.8988	1.3213	16.9254
C5FCR2		OLMSTED CO STOCKPILE (CR117)	24687.399	14.01	6.7599408	14.7	2.09955	0.69878	-0.50136	99.111	11.9741	95.8992	1.3211	16.9475
C5GAR1		OLMSTED CO STOCKPILE (CR117)	23968.963	14.01	6.7599408	14.7	1.99458	0.63496	-0.45196	98.957	11.8384	95.9155	1.3052	16.9196
C5GBR1		OLMSTED CO STOCKPILE (CR117)	29169.161	14.01	6.7599408	14.7	2.0766	0.42078	-0.06671	96.111	11.7054	95.7281	1.2858	16.9165
C5GBR2		OLMSTED CO STOCKPILE (CR117)	30539.206	14.01	6.7599408	14.7	2.64445	0.65918	-0.55402	99.415	15.9491	95.8868	2.5282	16.9228
C5GBR3		OLMSTED CO STOCKPILE (CR117)	27305.397	14.01	6.7599408	14.7	1.70013	0.28362	0.27004	96.686	12.1073	95.8012	1.2989	16.9134
C5GBR5		OLMSTED CO STOCKPILE (CR117)	24091.409	14.01	6.7599408	14.7	2.03381	0.60801	-0.4934	98.088	11.6295	95.9655	1.3048	16.9254
C5GCR1		OLMSTED CO STOCKPILE (CR117)	20301.825	14.01	6.7599408	14.7	1.61975	0.60385	-0.34461	97.482	11.7515	95.8795	1.3104	16.9225
C5GCR2		OLMSTED CO STOCKPILE (CR117)	24343.662	14.01	6.7599408	14.7	1.89678	0.63269	-0.27837	98.616	11.4956	95.8402	1.2878	16.9299
C5HBR1		OLMSTED CO STOCKPILE (CR117)	31198.4	14.01	6.7599408	14.7	2.30474	0.42296	-0.16418	98.052	11.8132	95.9157	1.2885	16.8662
C5HBR2		OLMSTED CO STOCKPILE (CR117)	29630.177	14.01	6.7599408	14.7	2.44425	0.52163	-0.44329	97.678	14.3947	96.081	2.1336	16.9807
C5GBR4		OLMSTED CO STOCKPILE (CR117)	25652.711	14.01	6.7599408	14.7	2.0111	0.60044	-0.29871	99.078	11.9203	96.0368	1.3137	16.9237
C5GJR2		CLASS 5 MODIFIED PRECOMPACTION (CR117)	20150.32	14.01	6.7599408	14.7	1.58706	0.55759	-0.31639	96.92	11.8012	95.9003	1.2878	16.8838
C5FCR3		OLMSTED CO STOCKPILE (CR117)	41932.456	14.01	6.7599408	14.7	3.33132	0.44473	-0.35359	91.28	12.0639	96.1288	1.3512	16.9124
C5HKR6		OLMSTED CO STOCKPILE (CR117)	22151.179	14.01	6.7599408	14.7	1.34981	0.27327	0.32568	88.049	11.7813	95.8244	1.2888	16.889
		Average	27,605											
		Stdev	4,838											
		Count	26											

XLS_FILE_NAME	K4	K5	K6	K456_RSQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
C5HBR3	4.36435	0.50074	-0.01056114	99.203	2.9762	20.0508	2.7451	35.8713	15	7.5	125.4	0.286	9.952
C5HCR3	5.18691	0.45358	0.00824615	99.613	2.9666	20.0045	4.4273	35.8099	14	7.5	125.4	0.3	9.343
C5HCR4	3.53289	0.32758	0.05983948	96.945	2.8803	19.9749	2.764	35.7722	15	7.5	125.4	0.3	9.291
C5EAR1	5.03528	0.44811	0.03663721	98.994	2.9911	20.0483	5.4757	35.9025	13	7.5	125.4	0.275	9.291
C5EBR1	4.47048	0.2904	0.00630576	96.794	3.0034	20.0077	5.3306	35.9092	13	7.5	125.4	0.286	9.952
C5EBR2	6.39288	0.592	0.00025776	98.783	3.0028	20.0303	2.7379	35.8664	15	7.5	125.4	0.392	10.092
C5EBR3	4.87524	0.43664	0.05498153	98.907	2.9906	19.9991	2.8267	35.9164	15	7.5	125.4	0.53	9.952
C5ECR3	2.76483	0.20626	0.28685333	96.379	2.9927	20.0078	2.7396	35.8777	15	7.5	125.4	0.392	9.481
C5ECR4	4.24358	0.44522	0.05438494	98.945	2.991	20.0209	2.8038	35.8515	15	7.5	125.4	0.375	10.106
C5FBR1	3.53655	0.38498	0.12704685	95.442	3.05	19.276	2.7201	35.7992	15	7.5	125.4	0.3	9.291
C5FBR2	5.12284	0.44339	-0.11738094	99.563	2.981	20.0166	4.5549	35.9186	14	7.5	125.4	0.275	9.193
C5FCR1	5.12232	0.5443	0.03539656	98.996	3.0149	20.0071	2.8029	35.9043	15	7.5	125.4	0.375	10.106
C5FCR2	4.51823	0.49411	0.06692127	99.544	3.0463	20.02	2.8026	35.9512	15	7.5	125.4	0.275	9.193
C5GAR1	4.05139	0.46785	0.04526487	99.503	2.9502	20.0324	2.7688	35.892	15	7.5	125.4	0.275	9.685
C5GBR1	3.67389	0.31563	0.08572968	96.634	2.9905	20.0169	2.7275	35.8853	15	7.5	125.4	0.275	9.685
C5GBR2	5.2961	0.46898	0.01425318	99.643	3.5287	20.0061	5.3631	35.8986	13	7.5	125.4	0.284	9.751
C5GBR3	2.83541	0.19267	0.16134787	95.895	2.8823	19.9835	2.7554	35.8787	15	7.5	125.4	0.35	9.904
C5GBR5	3.91106	0.45174	0.0227628	98.835	2.951	20.0204	2.7678	35.9042	15	7.5	125.4	0.53	9.547
C5GCR1	3.29881	0.45121	0.05779907	98.237	2.9785	19.9982	2.7798	35.8981	15	7.5	125.4	0.3	9.95
C5GCR2	4.0892	0.42625	0.13520494	97.624	2.887	20.038	2.7318	35.9137	15	7.5	125.4	0.35	9.615
C5HBR1	3.90865	0.3036	0.07281076	97.991	2.9895	20.0467	2.7333	35.7786	15	7.5	125.4	0.35	9.605
C5HBR2	4.24878	0.38269	0.00003525	98.805	2.9787	20.0211	4.526	36.0216	14	7.5	125.4	0.375	10.106
C5GBR4	4.13233	0.4329	0.08684524	99.404	3.0445	20.0928	2.7867	35.9007	15	7.9	127.9	0.496	9.907
C5GJR2	3.07145	0.42759	0.04270077	98.541	3.0031	20.0295	2.7318	35.8159	15	8	139.9	0.075	10.41
C5FCR3	5.39005	0.32798	0.0080766	92.68	3.0659	20.0991	2.8664	35.8766	15	7.5	125.4	0.35	9.615
C5HKR6	2.25302	0.15437	0.20867562	89.666	2.9904	20.0081	2.734	35.827	15	8	139.9	0.075	10.41

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C5HBR3	0	0	0			100	100	96.3	76	56.7	29.7	20	18.3	14.3	11.7	11	10.7	9.7	7.7
C5HCR3	0	0	0				100	97	78.7	60	31.7	20.7	18.7	14.3	11.7	11	10.3	9.3	7.6
C5HCR4	0	0	0			100	100	97	78.3	60	32.7	20.7	18.7	14.3	11.3	11	10.3	9.3	7.5
C5EAR1	0	0	0			100	100	97	78.3	60	32.7	21	19.3	15	12.3	11.7	11	10	8.2
C5EBR1	0	0	0			100	100	96.3	76	56.7	29.7	20	18.3	14.3	11.7	11	10.7	9.7	7.7
C5EBR2	0	0	0				100	96	75.3	55.7	28.7	18.7	17	13.3	11	10.3	10	9	7.2
C5EBR3	0	0	0			100	100	96	76	56.7	30	18	16.3	12.7	10.3	10	9.3	8.7	7
C5ECR3	0	0	0			100	100	96.7	78	59	31.7	20	18	13.7	11	10.3	10	9	7.3
C5ECR4	0	0	0				100	96.5	75.5	55.5	29	19	17.5	13.5	11	10.5	10	9	7.2
C5FBR1	0	0	0			100	100	97	78.3	60	32.7	20.7	18.7	14.3	11.3	11	10.3	9.3	7.5
C5FBR2	0	0	0				100	97	79.3	60.7	33	22.7	20.7	15.7	12.7	12	11.3	10.3	8.4
C5FCR1	0	0	0				100	96.5	75.5	55.5	29	19	17.5	13.5	11	10.5	10	9	7.2
C5FCR2	0	0	0				100	97	79.3	60.7	33	22.7	20.7	15.7	12.7	12	11.3	10.3	8.4
C5GAR1	0	0	0		100	99	99.3	96.3	77.7	58	30.7	20.7	19	15	12.3	11.7	11.3	10.3	8.5
C5GBR1	0	0	0		100	99	99.3	96.3	77.7	58	30.7	20.7	19	15	12.3	11.7	11.3	10.3	8.5
C5GBR2	0	0	0				100	96.7	77	57.7	30.7	20	18.3	14.3	11.7	11.3	10.7	9.7	7.9
C5GBR3	0	0	0				100	96.7	76.7	57	29.7	19.3	17.7	13.7	11.3	10.7	10	9.3	7.5
C5GBR5	0	0	0				100	97	78.3	58.7	31.3	18.7	16.7	12.7	10.3	9.7	9	8	6.5
C5GCR1	0	0	0				100	96.7	76.3	56.7	30	19.7	18	14	11.3	10.7	10.3	9.3	7.5
C5GCR2	0	0	0			100	99.7	96.7	77.3	58.3	31	19	17.7	13.7	11.3	10.7	10	9.3	7.5
C5HBR1	0	0	0	100	99	99	99.7	96.3	77.3	58.3	31.3	20	18.3	14	11.3	10.7	10	9	7.4
C5HBR2	0	0	0				100	96.5	75.5	55.5	29	19	17.5	13.5	11	10.5	10	9	7.2
C5GBR4	0	0	0				100	96	76.5	57	30.5	18.5	16.5	13	10.5	10.5	9.5	9	7.2
C5GJR2	0	0	0	100	100	95	86	78	66	57	39	27	25	20	16	15	14	12	10.4
C5FCR3	0	0	0			100	99.7	96.7	77.3	58.3	31	19	17.7	13.7	11.3	10.7	10	9.3	7.5
C5HKR6	0	0	0	100	100	95	86	78	66	57	39	27	25	20	16	15	14	12	10.4
			Average	100	99.8	99.0714	98.8346	95.1615	76.3115	57.8731	31.4423	20.4538	18.6962	14.5077	11.7808	11.2	10.5885	9.58077	7.80385

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT
M5FPR1	0094GR001	Stockpile	22077.2593	14.5	5.2938728	14.7	1.63188	0.64842	-0.24107	99.296
M5FPR2	0094GR002	Stockpile	26123.3145	14.5	5.2938728	14.7	1.96291	0.64355	-0.29466	99.51
M5FQR1	0094GR004	Stockpile	17513.8132	14.5	5.2938728	14.7	1.26291	0.59556	-0.16293	98.977
M5FQR2	0094GR005	Stockpile	18039.9427	14.5	5.2938728	14.7	1.29442	0.60441	-0.14645	99.372
M5FOR1	0094GR007	Stockpile	15158.1578	14.5	5.2938728	14.7	1.21339	0.62844	-0.50106	97.742
M5GOR1	0094GR009	Stockpile	12182.74	14.5	5.2938728	14.7	0.87873	0.63801	-0.16196	98.969
M5GOR2	0094GR010	Stockpile	10926.06	14.5	5.2938728	14.7	0.81705	0.71233	-0.27599	98.515
M5GOR3	0094GR011	Stockpile	10302.034	14.5	5.2938728	14.7	0.74217	0.73661	-0.15357	98.197
M5GPR1	0094GR024	Stockpile	18303.5439	14.5	5.2938728	14.7	1.33972	0.6558	-0.20881	99.511
M5GPR2	0094GR025	Stockpile	14123.2005	14.5	5.2938728	14.7	1.03619	0.67123	-0.21582	98.969
M5GPR3	0094GR026	Stockpile	16385.5224	14.5	5.2938728	14.7	1.20674	0.7233	-0.22584	99.645
M5GPR4	0094GR027	Stockpile	13678.3122	14.5	5.2938728	14.7	1.03821	0.70806	-0.32458	99.283
M5GPR5	0094GR028	Stockpile	20118.4613	14.5	5.2938728	14.7	1.28524	0.49538	0.2264	85.347
M5GPR6	0094GR029	Stockpile	11472.915	14.5	5.2938728	14.7	0.85782	0.74987	-0.27384	99.103
M5GPR7	0094GR030	Stockpile	11728.1087	14.5	5.2938728	14.7	0.8649	0.81024	-0.22633	99.178
M5EQR1	0094GR034	Stockpile	30650.5179	14.5	5.2938728	14.7	2.30172	0.68066	-0.29109	99.57
M5EQR2	0094GR035	Stockpile	34921.8449	14.5	5.2938728	14.7	2.72161	0.64784	-0.41318	99.056
M5EQR3	0094GR036	Stockpile	37434.7853	14.5	5.2938728	14.7	2.7783	0.63265	-0.25496	99.648
M5EQR4	0094GR037	Stockpile	25538.5934	14.5	5.2938728	14.7	1.86265	0.75639	-0.19278	99.146
M5FQR1	0094GR038	Stockpile	13094.6833	14.5	5.2938728	14.7	0.90074	0.75439	-0.00251	99.272
M5GOR1	0094GR039	Stockpile	9411.28639	14.5	5.2938728	14.7	0.68584	0.83433	-0.1866	99.127
M5GOR2	0094GR040	Stockpile	11978.8431	14.5	5.2938728	14.7	0.80152	0.7326	0.0864	99.762
M5GOR3	0094GR041	Stockpile	11958.0124	14.5	5.2938728	14.7	0.87561	0.76619	-0.20519	99.219
M5GOR6	0094GR042	Stockpile	10157.561	14.5	5.2938728	14.7	0.75019	0.88042	-0.22804	98.735
M5GOR7	0094GR043	Stockpile	9315.59725	14.5	5.2938728	14.7	0.6409	0.8022	-0.00093	98.072
M5FPR1	0094GR047	Stockpile	16704.8982	14.5	5.2938728	14.7	1.18743	0.6431	-0.1142	99.73
M5FPR2	0094GR049	Stockpile	18196.4073	14.5	5.2938728	14.7	1.38726	0.60813	-0.3434	98.638
M5GOR8	0094GR063	Stockpile	8861.32423	14.5	5.2938728	14.7	0.74186	0.98664	-0.63086	98.154
M5FQR2	0094GR069	Stockpile	15795.88	14.5	5.2938728	14.7	1.17309	0.768	-0.25105	99.612
M5EOR3	0001GR042	Stockpile	19642.5831	14.5	5.2938728	14.7	1.41478	0.55557	-0.16097	98.529
M5FOR2	0001GR043	Stockpile	11788.3607	14.5	5.2938728	14.7	0.89043	0.70668	-0.30889	99.31
M5FOR4	0001GR044	Stockpile	13369.4398	14.5	5.2938728	14.7	1.01231	0.59355	-0.32182	98.044
M5GOR4	0094GR077	Stockpile	10020.8026	14.5	5.2938728	14.7	0.73598	0.86601	-0.21056	98.952
		Average	16,575							
		Stdev	7,278							
		Count	33							

XLS_FILE_NAME	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
M5FPR1	11.363	95.5064	1.2542	16.9476	3.68561	0.46504	0.11527	99.791	2.9008	19.852	2.6606	35.9512	13	0	0	0.195	3.122
M5FPR2	14.1175	95.4779	2.1743	16.9361	4.29336	0.4508	0.10198	99.657	2.9004	19.8508	4.6124	35.9269	14	0	0	0.195	3.122
M5FQR1	14.1289	95.5152	2.166	16.9504	2.72431	0.41187	0.13416	99.19	2.9032	19.8527	4.5948	35.9571	14	0	0	0.195	3.122
M5FQR2	11.4626	95.273	1.3007	16.8425	2.84432	0.41757	0.14906	99.452	2.9011	19.8483	2.7592	35.7283	15	0	0	0.195	3.122
M5FOR1	14.4646	77.9957	2.143	12.6746	2.40361	0.44996	0.04095	98.616	3.0039	20.0447	4.546	26.887	13	0	0	0.173	3.506
M5GOR1	11.3333	95.4578	1.2335	16.9205	2.01656	0.45085	0.1441	99.36	2.9056	19.855	2.6166	35.8939	15	0	0	0.195	3.122
M5GOR2	11.416	95.5503	1.2761	16.9662	1.99353	0.52025	0.11587	99.367	2.9021	19.8533	2.7071	35.9909	15	0	0	0.195	3.122
M5GOR3	11.4283	95.4702	1.2757	16.9314	1.97111	0.55142	0.13523	98.865	2.9074	19.8511	2.7061	35.9169	14	0	0	0.195	3.122
M5GPR1	11.3066	95.7092	1.2186	17.0374	3.0889	0.46024	0.14062	99.615	2.9072	19.8563	2.585	36.1419	15	0	0	0.195	3.122
M5GPR2	16.7771	95.5312	2.154	16.9581	2.43556	0.46709	0.12989	99.384	2.9035	19.8525	4.5693	35.9737	13	0	0	0.195	3.122
M5GPR3	11.427	95.3345	1.2766	16.8691	3.03524	0.50551	0.15805	99.634	2.9063	19.8504	2.7081	35.7848	15	0	0	0.195	3.122
M5GPR4	11.4218	95.48	1.2727	16.9368	2.45317	0.49677	0.12645	99.363	2.9073	19.8513	2.6998	35.9284	15	0	0	0.195	3.122
M5GPR5	11.4149	95.4037	1.286	16.8854	2.85172	0.36171	0.19075	85.299	2.894	19.86	2.728	35.8194	15	0	0	0.195	3.122
M5GPR6	11.414	95.4733	1.2694	16.9327	2.20018	0.53284	0.14435	99.358	2.907	19.8512	2.6929	35.9197	15	0	0	0.195	3.122
M5GPR7	14.2233	95.8215	2.1782	17.0953	2.46127	0.56649	0.17115	99.333	2.9058	19.8529	4.6206	36.2647	14	0	0	0.195	3.122
M5EQR1	14.303	95.5742	2.6372	16.9789	5.32615	0.47685	0.10149	99.739	2.9029	19.8522	5.5943	36.0178	13	0	0	0.195	3.122
M5EQR2	11.4361	95.5292	1.2866	16.9608	5.69633	0.46505	0.07093	99.709	2.9021	19.8504	2.7292	35.9793	15	0	0	0.195	3.122
M5EQR3	14.0972	95.1309	2.1032	16.7719	6.06103	0.4309	0.12524	98.957	2.9029	19.8508	4.4616	35.5787	14	0	0	0.195	3.122
M5EQR4	11.3973	95.4969	1.2691	16.9447	4.98064	0.5318	0.17239	99.082	2.9002	19.8507	2.6922	35.9452	15	0	0	0.195	3.122
M5FQR1	14.1642	95.544	2.1492	16.9618	2.58925	0.51262	0.2395	98.917	2.9059	19.8542	4.5591	35.9814	14	0	0	0.195	3.122
M5GOR1	11.4838	95.4594	1.3019	16.9275	2.04675	0.57723	0.20783	98.883	2.9074	19.8503	2.7617	35.9086	15	0	0	0.195	3.122
M5GOR2	11.3829	95.7164	1.2609	17.0436	2.31533	0.49026	0.26604	99.547	2.9027	19.8542	2.6748	36.1549	15	0	0	0.195	3.122
M5GOR3	11.5094	95.4694	1.3129	16.9311	2.36157	0.53831	0.1733	99.31	2.9081	19.8511	2.7851	35.9163	15	0	0	0.195	3.122
M5GOR6	11.4419	95.5162	1.2813	16.9568	2.35229	0.61674	0.20233	98.629	2.9079	19.8505	2.7181	35.9708	15	0	0	0.195	3.122
M5GOR7	11.3799	95.4741	1.253	16.9305	1.97343	0.55385	0.24838	97.744	2.907	19.853	2.6581	35.9151	14	0	0	0.195	3.122
M5FPR1	11.8761	95.9535	1.2879	16.9019	2.79287	0.44542	0.16862	99.649	3.048	20.0459	2.7321	35.8542	15	0	0	0.173	3.506
M5FPR2	11.7553	96.069	1.3016	16.9049	2.83632	0.44297	0.07375	99.287	2.9974	20.0773	2.7612	35.8607	15	0	0	0.173	3.506
M5GOR8	11.4752	77.9335	1.2782	12.6685	2.30855	0.69828	0.14182	98.211	2.9213	20.0044	2.7114	26.874	14	0	0	0.195	3.122
M5FQR2	12.0603	95.9672	1.2981	16.9099	3.10292	0.53115	0.17235	99.497	3.0361	20.032	2.7538	35.8713	15	0	0	0.173	3.506
M5EOR3	11.6806	96.049	1.3042	16.906	2.88623	0.38593	0.1283	98.695	2.9626	20.0724	2.7666	35.863	15	0	0	0.173	3.506
M5FOR2	11.8721	78.1983	1.2774	12.6778	2.12782	0.5002	0.13559	99.519	3.052	20.097	2.7098	26.8937	14	0	0	0.173	3.506
M5FOR4	11.8013	77.887	1.2697	12.6623	2.04297	0.39711	0.1273	97.506	3.036	20.005	2.6934	26.8608	14	0	0	0.173	3.506
M5GOR4	14.2355	95.4809	2.597	16.9395	2.28842	0.6109	0.17556	99.085	2.9089	19.8492	5.509	35.9341	13	0	0	0.173	3.506

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
M5FPR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FPR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FQR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FQR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FOR1	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5GOR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR3	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR3	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR4	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR5	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR6	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GPR7	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5EQR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5EQR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5EQR3	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5EQR4	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FQR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR1	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR2	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR3	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR6	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5GOR7	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FPR1	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5FPR2	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5GOR8	0	0	0	0	0	100	96	93	87	81	66	56	54	45	29	21	15	7	3.5
M5FQR2	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5EOR3	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5FOR2	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5FOR4	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
M5GOR4	0	0	0	0	0	100	96.5	92.5	86	80	64	55.5	53.5	45	29.5	22	16	8.5	5.6
					Average	100	96.1212	92.8788	86.7576	80.7576	65.5152	55.8788	53.8788	45	29.1212	21.2424	15.2424	7.36364	4.00909

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVSTRESS_PSI	MAX_DEVSTRESS_PSI	N_TESTS
B4FOR1		US169 ONAMIA	23140.798	14.48	5.4117239	15	1.58814	0.33293	-0.0121	89.706	11.6908	95.8967	1.2478	16.9064	2.50185	0.19793	0.13703	90.516	2.965	20.0239	2.6471	35.864	15
B4FOR2		US169 ONAMIA	25546.806	14.48	5.4117239	15	2.6492	0.68421	-1.31207	75.672	14.3189	96.0513	2.503	16.951	4.11145	0.54684	-0.29864	86.102	3.003	20.0309	5.3098	35.9586	13
B4FOR3		US169 AT TH610	18071.282	14.48	5.4117239	15	1.44279	0.66295	-0.47886	96.565	14.5883	95.856	2.115	16.9131	3.01874	0.48733	0.02873	98.402	3.049	19.9926	4.4866	35.8782	14
B4FOR4		US169 ONAMIA	15976.218	14.48	5.4117239	15	1.20972	0.63691	-0.31114	98.477	14.287	96.0423	2.1227	16.9096	2.61048	0.45867	0.08179	99.312	2.9608	20.0572	4.5029	35.8707	14
B1EOR2		ANOKA COUNTY (CR17)	22246.941	14.48	5.4117239	15	1.68862	0.57824	-0.32168	98.789	10.8778	93.4574	1.24	16.9525	3.337	0.41249	0.07966	99.397	2.748	19.1803	2.6304	35.9617	15
B1EOR1		US169 ONAMIA	27031.942	14.48	5.4117239	15	2.05986	0.49411	-0.33822	97.389	11.218	94.2096	1.2149	16.8916	3.60668	0.3708	0.03238	99.212	2.871	19.4769	2.5771	35.8325	15
B1FOR1		US169 ONAMIA	20317.314	14.48	5.4117239	15	1.60295	0.60232	-0.44388	97.678	11.9955	95.8712	1.317	16.9272	3.12114	0.44514	0.03819	98.82	2.9936	19.9989	2.7939	35.908	15
B2GPR1		US169 ONAMIA	15580.403	14.48	5.4117239	15	1.20169	0.75544	-0.36424	99.386	11.7965	95.7837	1.3065	16.87	2.98723	0.53457	0.12575	99.463	3.0072	20.0078	2.7715	35.7868	15
B2GPR2		US169 ONAMIA	9779.6645	14.48	5.4117239	15	0.77837	0.89761	-0.45764	99.48	11.7185	95.7441	1.3009	16.9619	2.27957	0.64587	0.12983	99.777	2.9777	19.9367	2.7596	35.9816	15
B2GPR3		US169 ONAMIA	15047.08	14.48	5.4117239	15	1.24441	0.81248	-0.58406	98.26	11.8022	95.9343	1.3317	16.935	3.07843	0.60406	0.05069	99.234	2.9924	20.0045	2.825	35.9246	15
B3GPR1		US169 AT TH610	21451.808	14.48	5.4117239	15	1.58868	0.55172	-0.24445	98.272	11.7642	95.9276	1.2951	16.9198	3.12476	0.39843	0.08887	98.957	3.0056	20.0157	2.7474	35.8923	15
B3GPR2		US169 AT TH610	18596.691	14.48	5.4117239	15	1.3643	0.59304	-0.21236	99.136	11.7631	95.9213	1.2942	16.9214	2.87797	0.41942	0.11711	99.384	3.0059	20.0089	2.7454	35.8957	15
C6T023FORC025		Roadway 37+410 16' RT	11765.928	14.48	5.4117239	15	1.08194	0.92306	-0.91713	92.953	10.2903	99.8085	0.7448	18.9076	2.68655	0.6561	0.00716	95.61	2.9027	19.8998	1.5799	40.109	19
C6T016EPRC001		Stockpile in Pit (TH16)	33875.583	14.48	5.4117239	15	2.88676	0.59129	-0.69028	43.911	17.8363	159.426	1.4717	47.0136	5.43221	0.5564	-0.14477	78.487	2.9	19.8994	3.1219	99.7308	25
C6T023FORC024		Roadway 37+410 16' RT	20566.245	14.48	5.4117239	15	1.90541	0.73771	-0.94995	85.61	10.4793	119.744	0.7952	28.3032	3.57285	0.54337	-0.07823	91.091	2.9288	19.9011	1.6868	60.0401	23
C6T023EPRC026		Roadway 37+410 16' RT	32382.509	14.48	5.4117239	15	3.42241	0.86658	-1.36385	78.888	17.6309	119.446	4.2021	35.0941	6.31036	0.62391	-0.19886	87.357	2.9056	19.8997	8.9141	74.4458	14
C6T023EORC027		Roadway 37+410 16' RT	20496.943	14.48	5.4117239	15	1.92865	0.82423	-0.99524	85.611	11.7704	119.558	1.2491	35.2426	4.03361	0.59278	-0.07967	96.53	2.9031	19.8999	2.6498	74.7609	25
C6T023EPRC028		Roadway 37+410 16' RT	38152.229	14.48	5.4117239	15	4.71562	1.04183	-1.85491	73.996	17.7451	159.351	4.2638	47.0544	9.07772	0.78792	-0.3442	88.877	2.9001	19.8446	9.0449	99.8174	19
C6T016FNRC013		Stockpile in Pit (TH16)	14076.9	14.48	5.4117239	15	1.39812	1.03812	-1.15739	88.947	10.416	119.946	0.8089	35.3272	3.69342	0.73523	-0.0621	98.457	2.9	19.8999	1.716	74.9403	25
C6T016FNRC002		Stockpile in Pit (TH16)	18405.749	14.48	5.4117239	15	1.56438	0.85221	-0.66939	90.719	10.2102	159.998	0.7119	47.2809	4.0296	0.61804	0.03146	98.109	2.9	19.9	1.5102	100.298	27
C6T016FORC005		Stockpile in Pit (TH16)	20132.874	14.48	5.4117239	15	1.78065	0.85018	-0.79644	83.698	14.85	159.664	2.4011	47.2612	4.39139	0.65359	-0.04762	97.821	2.9	19.8025	5.0935	100.256	25
C6T016FORC007		Stockpile in Pit (TH16)	26578.215	14.48	5.4117239	15	2.29741	0.70384	-0.73033	61.011	11.3788	119.391	1.2628	35.1246	4.95714	0.62796	-0.11902	89.546	2.9	19.7925	2.6788	74.5105	23
C6T023FPRC009		Roadway 37+440 (TH23)	18372.635	14.48	5.4117239	15	1.70103	0.86336	-0.94177	92.486	10.3999	119.496	0.8013	28.3297	3.85624	0.6346	-0.04235	97.48	2.9	19.8	1.6999	60.0964	23
C6T016FORC016		Stockpile in Pit (TH16)	13324.228	14.48	5.4117239	15	0.99671	0.61824	-0.27325	65.71	10.2676	119.768	0.7341	35.0846	2.2841	0.48271	0.10951	85.071	2.9034	19.9	1.5573	74.4256	24
C6T016FNRC012		Stockpile in Pit (TH16)	22210.066	14.48	5.4117239	15	2.48706	1.08836	-1.53767	74.903	14.9092	199.024	2.9269	65.6779	6.10882	0.85321	-0.26508	98.533	2.9001	19.9001	6.2089	139.324	20
C6T371GORC112		Stockpile in Pit (TH371)	11947.157	14.48	5.4117239	15	1.06413	0.88489	-0.81724	96.579	10.528	119.081	0.8045	27.9926	2.60798	0.6236	0.02083	98.447	2.9291	19.9	1.7067	59.3812	23
C6T371GORC113		Stockpile in Pit (TH371)	13199.252	14.48	5.4117239	15	1.17725	0.8423	-0.82361	94.806	10.4582	119.219	0.827	28.1991	2.72486	0.59996	0.00757	98.071	2.9006	19.8	1.7543	59.8194	22
C6T371HORC114		Stockpile in Pit (TH371)	6780.9425	14.48	5.4117239	15	0.62006	1.02241	-0.89446	97.227	10.5983	100.325	0.7944	19.1452	1.80504	0.73706	0.0614	95.684	2.971	19.9041	1.6852	40.6132	17
C6T016FORC014		Stockpile in Pit (TH16)	19442.834	14.48	5.4117239	15	1.71891	0.84399	-0.79543	81.137	11.8567	119.639	1.2398	28.3968	4.21222	0.6553	-0.04978	96.459	2.9	19.8	2.63	60.2387	22
C6T016FNRC015		Stockpile in Pit (TH16)	19080.698	14.48	5.4117239	15	1.72183	0.87929	-0.85914	79.523	10.2517	199.524	0.7315	65.9147	4.35536	0.69985	-0.07577	96.873	2.9	19.8992	1.5517	139.826	30
C6T016GORC017		Stockpile in Pit (TH16)	22043.707	14.48	5.4117239	15	2.19674	0.9065	-1.17442	71.429	11.7893	159.428	1.444	49.2934	4.98804	0.72566	-0.17493	96.794	2.9087	19.9015	3.0631	104.567	26
C6T023EORC018		TH 23	18132.104	14.48	5.4117239	15	1.74202	0.87731	-1.0591	89.685	10.3808	159.782	0.7923	47.1889	3.76854	0.60826	-0.07002	96.958	2.9	19.8932	1.6807	100.103	28
C6T023FMRC019		Roadway Sta. 37+440	38416.277	14.48	5.4117239	15	4.73609	0.93904	-1.85167	65.82	23.4553	159.499	6.9494	47.0454	7.96446	0.75258	-0.3816	87.356	2.9045	19.9002	14.7419	99.7985	4
C6T016GORC020		Stockpile in Pit (TH16)	19499.45	14.48	5.4117239	15	1.81691	0.92427	-0.95918	83.023	10.2739	159.037	0.7408	46.8278	4.58427	0.6996	-0.07826	98.231	2.9008	19.9	1.5715	99.3368	28
C6T016FNRC021		Stockpile in Pit (TH16)	15639.857	14.48	5.4117239	15	1.68844	1.13413	-1.41879	86.774	14.8378	119.582	2.7224	28.2284	4.55314	0.82186	-0.12611	98.348	2.9078	19.9001	5.775	59.8815	15
C6T016FNRC022		Stockpile in Pit (TH16)	14492.018	14.48	5.4117239	15	1.33416	0.95166	-0.91944	87.76	10.2148	119.541	0.6823	28.2082	3.50526	0.68558	-0.00973	97.652	2.9212	19.9008	1.4474	59.8386	24
C6T023FPRC023		Roadway Sta. 37+440 (TH23)	22402.31	14.48	5.4117239	15	2.04149	0.81922	-0.8933	87.419	10.2705	159.589	0.7401	47.2273	4.38087	0.56639	-0.0353	94.592	2.9	19.8015	1.5699	100.184	24
371C62R		TH52 GRADE	24322.145	14.48	5.4117239	15	1.86817	0.47283	-0.36462	96.514	11.7891	95.9592	1.2733	16.9506	3.13951	0.36085	0.01353	98.544	3.0024	20.0057	2.701	35.9576	15
371C63R		TH52 GRADE	19474.191	14.48	5.4117239	15	1.74709	0.77107	-0.84567	94.419	12.9849	95.9334	1.2275	16.9119	3.67747	0.60476	-0.06473	98.881	2.9912	20.0224	2.6039	35.8756	15
16C6R1		TH16 STOCKPILE	21142.323	14.48	5.4117239	15	1.79102	0.74429	-0.664	96.74	12.121	95.9556	1.2743	16.9572	3.84463	0.53047	0.0306	97.547	3.137	19.9968	2.7033	35.9717	12
GWT023FORC098		Roadway Windrow, Station 37+250 12'RT (TH23)	11916.674	14.48	5.4117239	15	1.01681	0.8604	-0.68146	95.971	10.6278	119.164	0.7832	34.889	2.54165	0.56854	0.06837	98.224	2.9856	19.9295	1.6613	74.0107	27
GWT023FORC099		Roadway Windrow, Station 37+250 12'RT (TH23)	11527.068	14.48	5.4117239	15	0.75418	0.45638	0.14631	97.204	10.511	99.8356	0.7984	18.9201	1.55432	0.34477	0.15198	96.712	2.932	19.9	1.6937	40.1356	18
GWT023FORC101		Roadway Windrow, Station 37+250 12'RT (TH23)	11925.614	14.48	5.4117239	15	0.84882	0.51032	-0.11981	96.824	10.4661	80.5497	0.7925	14.1046	1.67027	0.38659	0.09247	97.872	2.9283	19.9	1.6811	29.9204	16
C6T371FORC006		Stockpile in Pit (TH371)	16427.023	14.48	5.4117239	15	1.52907	0.85	-0.9595	88.526	10.3289	119.254	0.7679	28.2153	3.40369	0.66133	-0.09335	97.58	2.9	19.8	1.6289	59.8537	22
C6T371FORC107		Stockpile in Pit (TH371)	15132.817	14.48	5.4117239	15	1.19596	0.61619	-0.44867	84.044	10.6875	119.707	0.7955	28.1935	2.39942	0.46291	0.02959	87.956	3	19.9666	1.6875	59.8074	23
C6T371FORC108		Stockpile in Pit (TH371)	15446.661	14.48	5.4117239	15	1.32511	0.73231	-0.70475	93.906	10.5875	119.424	0.7782	28.1152	2.7502	0.52118	0.00693	96.727	2.9763	19.9277	1.6509	59.6413	23
C6T371HORC110		Stockpile in Pit (TH371)	10428.066	14.48	5.4117239	15	0.93938	0.92264	-0.85148	97.283	10.3716	119.533	0.7809	28.276	2.38426	0.64456	0.02717	98.718	2.9051	19.8566	1.6564	59.9825	23
GWT023FPRC102		Roadway Windrow, Station 37+250 12'RT (TH23)	10332.288	14.48	5.4117239	15	0.70353	0.64484	0.02807	95.043	10.6628	99.1686	0.7917	20.9642	1.81629	0.44441	0.21367	94.229	2.9942	19.9285	1.6795	44.4719	20
C6T016FNRC214		Stockpile in Pit (TH16)	17325.633	14.48	5.4117239	15	1.35645	0.64959	-0.41709	82.711	10.572	118.994	0.8408	35.0032	2.97143	0.50946	0.02158	91.674	2.927	19.9	1.7837	74.253	24
C6T023FORC237		Roadway 38+410 16' RT (TH23)	12991.961	14.48	5.4117239	15	1.19766	0.91815	-0.9253	96.545	10.6024	117.559	0.8546	27.2766	2.93953	0.64326	0.01228	98.111	2.9298	19.8993	1.8129	57.8624	23
C6T023FORC239		Roadway 38++410 (TH23)	11316.353	14.48	5.4117239	15	1.03167	0.95889	-0.8879	95.659	10.4485	118.21	0.7564	34.653	2.73998	0.69019	0.01551	98.38	2.948	19.9	1.6045	73.5101	24
GWT023FPRC103		Roadway Windrow, Station 37+250 12'RT (TH23)	13462.114	14.48	5.4117239	15	1.0689	0.79077	-0.45515	97.482	10.8465	159.167	0.8986	46.8788	2.70083	0.5226	0.11532	98.632	2.9739	19.9073	1.9062	99.445	26
GWT023FPRC104		Roadway Windrow, Station 37+250 12'RT (TH23)	11505.582	14.48	5.4117239	15	0.91611	0.81009	-0.46318	93.793	10.5337	159.224	0.7972	46.9116	2.35844	0.52442	0.12938	93.53	2.9461	19.9037	1.6911	99.5145	27
GWT023FPRC106		Roadway Windrow, Station 37+250 12'RT (TH23)	9090.7543	14.48	5.4117239	15	0.76794	1.0012	-0.64266	98.978	10.656	119.138	0.7807	27.928	2.32582	0.61161	0.15975	97.034	3	19.9708	1.656	59.2443	27
GWT023GORC097		Roadway Windrow, Station 37+250 12'RT (TH23)	12556.249	14.48	5.4117239	15	1.04553	0.83462	-0.60476	97.469	10.6324	118.726	0.7994	27.8106	2.63178	0.58537	0.07347	98.812	2.9763	19.9104	1.6958	58.9952	23
GWT023GORC105		Roadway Windrow, Station 37+250 12'RT (TH23)	9457.5199	14.48	5.4117239	15	0.77462	0.83612	-0.55208	98.967	10.6332	99.2196	0.7835	21.113	1.98246	0.56315	0.1048	97.527	2.9883	19.9342	1.6621	44.7874	20
GWT023GPRC100		Roadway Windrow, Station 37+250 12'RT (TH23)	11241.6	14.48	5.4117239	15	0.77358	0.48774	-0.01323	95.591	10.7263	119.152	0.8138	27.9178	1.56659	0.3618	0.12375	96.325	3	19.982	1.7263	59.2225	27
GWT023GPRC109		Roadway Windrow, Station 37+250 12'RT (TH23)	9754.0343	14.48	5.4117239	15	0.81213	0.89999	-0.60136	97.026	10.5317	119.32	0.79	28.1028	2.19127	0.56209	0.12576	95.316	2.9496	19.9025	1.6758	59.6149	24
GWT023GPRC202		Roadway Windrow, Station 37+250 12'RT (TH23)	6909.4134	14.48	5.4117239	15	0.56124	0.93438	-0.52086	97.611	10.5318	79.122	0.8174	9.3464	1.6716	0.62868	0.16591	95.976	2.9256	19.9	1.7339	19.8266	14
GWT023EPRC194		Roadway Windrow, Station 37+250 12'RT (TH23)	15804.052	14.48	5.4117239	15	1.31149	0.7981	-0.59566	94.568	10.5724	159.523	0.8187	47.1037	3.16667	0.54901	0.0521	98.431	2.9097	19.9	1.7368	99.9221	28
GWT023EPRC201		Roadway Windrow, Station 37+250 12'RT (TH23)	16944.908	14.48	5.4117239	15	1.49537	0.79043	-0.79225	88.193	10.6547	119.802	0.8048	35.0682	3.2829	0.56595	-0.02683	97.518	2.9695	19.9127	1.7073	74.3909	26
C6T016FNRC213		Stockpile in Pit (TH16)	12908.403	14.48	5.4117239	15	0.73497	0.36402	0.58523	82.762	10.5661	99.2057	0.8256	21.2518	1.69677	0.36324	0.18507	78.304	2.9167	19.8999	1.7513	45.0819	20
GWT023EORC209		Roadway Windrow, Station 37+250 12'RT (TH23)	14407.814	14.48	5.4117239	15	1.17648	0.675	-0.55009	95.853	10.5464	99.5817	0.8547	18.8004	2.4207	0.47501	0.0423	98.138	2.911	19.9	1.8132	39.8817	20
GWT023EORC210		Roadway Windrow, Station 37+250 12'RT (TH23)	13499.563	14.48	5.4117239	15	1.12344	0.84394	-0.60252	96.472	10.557	119.972	0.7758	35.0668	2.85649	0.55929	0.08829	98.491	2.9661	19.9057	1.6457	74.3878	23
		Average	17,366																				
		Stdev	6,774																				
		Count	64																				

XLS_FILE_NAME	OPT_MOIST_PCT	MAX_DENS_PCF	D10	D60	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
B4FOR1																							
B4FOR2																							
B4FOR3																							
B4FOR4																							
B1EOR2																							
B1EOR1																							
B1FOR1																							
B2GPR1																							
B2GPR2																							
B2GPR3																							
B3GPR1																							
B3GPR2																							
C6T023FORC025	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T016EPRC001	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T023FORC024	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T023EPRC026	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T023EORC027	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T023EPRC028	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T016FNRC013	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FNRC002	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FORC005	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FORC007	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T023FPRC009	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T016FORC016	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FNRC012	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T371GORC112	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T371GORC113	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T371HORC114	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T016FORC014	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FNRC015	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016GORC017	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T023EORC018	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T023FMRC019	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T016GORC020	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FNRC021	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T016FNRC022	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
C6T023FPRC023	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
371C62R	8.35	127.85	0.235	2.86	0	0	0	0		100	94.5	91	84.5	78.5	65	58	55.5	47	30.5	21.5	12.5	5.5	3.7
371C63R	8.35	127.85	0.235	2.86	0	0	0	0		100	94.5	91	84.5	78.5	65	58	55.5	47	30.5	21.5	12.5	5.5	3.7
16C6R1	8.6	127.4	0.083	7.465	0	0	0	0		100	96	88	79	68	45	35	33	27	23	21	19	14	9.3
GWT023FORC098	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023FORC099	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023FORC101	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
C6T371FORC006	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T371FORC107	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T371FORC108	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
C6T371HORC110	7.67	129.73	0.207	4.081	0	0	0	0		100	94.7	90	82.3	75	61.7	53.7	51.7	44	30.3	22.3	14.7	6.7	4.5
GWT023FPRC102	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
C6T016FNRC214	8.6	127.4	0.083	7.465	0	0	0	0		100	96	88	79	68	45	35	33	27	23	21	19	14	9.3
C6T023FORC237	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
C6T023FORC239	6.6	133	0.202	3.122	0	0	0	0	100	100	95	90	82	76	66	56	53	45	29	21	14	7	4.4
GWT023FPRC103	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023FPRC104	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023FPRC106	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023GORC097	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023GORC105	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023GPRC100	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023GPRC109	6.2	125.2	0.158	2.531	0	0	0	0	98	96	94	91	86	81	69	59	56	48	35	28	22	9	4.2
GWT023GPRC202	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023EPRC194	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023EPRC201	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
C6T016FNRC213	8.6	127.4	0.131	7.043	0	0	0	0		100	96	89.3	81.3	70	47	30.3	27.7	22	18.3	16.7	15.3	11.3	7.7
GWT023EORC209	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
GWT023EORC210	7	130.4	0.198	5.332	0	0	0	0	100	100	96	92	82	75	57	44	41	33	22	17	13	8	5.1
								Average	99.9259	99.9231	95.5173	90.3692	81.9096	73.8462	56.9212	44.6365	41.9365	34.6538	24.2173	19.0173	14.4442	8.65577	5.66154

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI
C6M295A	0001GR001	Stockpile	14068.698	14.44	5.5342891	14.7	0.99944	0.67075	-0.09818	99.703	12.1917	95.6877	1.2423	16.9417
C6OM105A	0001GR002	Stockpile	16433.731	14.44	5.5342891	14.7	1.18475	0.60298	-0.14797	99.713	12.0832	95.5089	1.2765	16.9368
C6OM105B	0001GR003	Stockpile	14763.94	14.44	5.5342891	14.7	1.11132	0.66584	-0.27955	99.596	12.2326	95.5108	1.299	16.9128
C6OM103C	0001GR004	Stockpile	15866.663	14.44	5.5342891	14.7	1.11958	0.60008	-0.08098	99.763	11.4582	94.9089	1.2746	16.9223
C6OM103A	0001GR005	Stockpile	17608.167	14.44	5.5342891	14.7	1.30207	0.58757	-0.22832	99.188	11.4806	94.9596	1.2658	16.9094
C6OM95A	0001GR006	Stockpile	14341.371	14.44	5.5342891	14.7	0.97656	0.57479	0.02902	99.135	12.1378	95.5479	1.2702	16.9208
C6M2103A	0001GR007	Stockpile	27323.372	14.44	5.5342891	14.7	1.98942	0.45098	-0.18747	98.013	12.2693	95.6326	1.3061	16.9452
C6M2103B	0001GR008	Stockpile	27175.469	14.44	5.5342891	14.7	1.9393	0.45065	-0.12461	98.975	12.2451	95.4732	1.3019	16.9129
C6M2105A	0001GR009	Stockpile	30894.237	14.44	5.5342891	14.7	2.1699	0.4182	-0.07666	97.572	11.6955	95.0645	1.2997	16.9124
C6M2105B	0001GR010	Stockpile	29325.882	14.44	5.5342891	14.7	2.09867	0.44969	-0.13349	99.351	12.1386	95.5252	1.3159	16.9239
C6M195D	0001GR011	Stockpile	15847.022	14.44	5.5342891	14.7	1.13599	0.61536	-0.12953	99.483	12.0879	95.3909	1.277	16.916
C6OM95C	0001GR012	Stockpile	13100.505	14.44	5.5342891	14.7	0.95797	0.70958	-0.18652	99.613	12.225	95.4609	1.2736	16.9213
C6OM100A	0001GR013	Stockpile	19937.632	14.44	5.5342891	14.7	1.39982	0.48201	-0.07192	98.725	11.5854	94.9983	1.3105	16.9559
C6M1103B	0001GR014	Stockpile	30123.108	14.44	5.5342891	14.7	2.12671	0.40777	-0.09343	99.516	11.7282	95.3111	1.2635	16.9229
C6P1100A	0001GR015	Stockpile	16705.836	14.44	5.5342891	14.7	1.19465	0.57975	-0.12392	99.336	11.3516	94.722	1.285	16.9168
C6M195E	0001GR016	Stockpile	16165.574	14.44	5.5342891	14.7	1.16293	0.60331	-0.14127	99.457	12.1247	95.5291	1.2779	16.9092
C6M195F	0001GR017	Stockpile	12228.556	14.44	5.5342891	14.7	0.88273	0.71395	-0.14584	99.747	11.9318	95.2361	1.2761	16.9201
C6OM95G	0001GR018	Stockpile	13110.156	14.44	5.5342891	14.7	0.95946	0.68181	-0.19062	99.399	11.7275	95.0496	1.2709	16.898
C6OM103B	0001GR019	Stockpile	16061.915	14.44	5.5342891	14.7	1.13253	0.60004	-0.07869	99.65	12.031	95.3	1.3038	16.8994
C6OM105C	0001GR020	Stockpile	18823.284	14.44	5.5342891	14.7	1.27517	0.43498	0.03734	98.137	11.5568	95.0617	1.286	16.9231
C6P195A	0001GR021	Stockpile	14163.087	14.44	5.5342891	14.7	1.02074	0.66901	-0.14332	99.577	11.6402	95.1061	1.2928	16.9228
C6OM103J	0001GR022	Stockpile	18229.516	14.44	5.5342891	14.7	1.23981	0.36016	0.02087	92.494	14.6491	95.3688	2.1402	16.922
C6OM105H	0001GR023	Stockpile	14848.702	14.44	5.5342891	14.7	0.58986	0.00815	1.68397	96.879	11.2028	94.8643	1.1351	16.9308
C6OM103K	0001GR024	Stockpile	20874.111	14.44	5.5342891	14.7	1.42291	0.40616	0.0163	98.174	11.7291	95.3309	1.2327	16.9288
C6OM100B	0001GR049	Stockpile	15876.07	14.44	5.5342891	14.7	1.16388	0.64629	-0.19798	99.122	12.2644	95.5703	1.3104	16.9173
C6M2100A	0001GR050	Stockpile	19804.823	14.44	5.5342891	14.7	1.47756	0.58235	-0.25638	99.692	12.022	95.4854	1.2676	16.9429
C6M2100B	0001GR051	Stockpile	20070.564	14.44	5.5342891	14.7	1.40876	0.52923	-0.06842	99.839	11.6792	95.0103	1.2642	16.9218
C6M195A	0001GR052	Stockpile	13091.848	14.44	5.5342891	14.7	0.94971	0.69936	-0.16204	99.693	12.2521	95.6596	1.2536	16.9172
C6M195B	0001GR053	Stockpile	13590.673	14.44	5.5342891	14.7	0.9647	0.65788	-0.09636	99.666	12.2372	95.6182	1.271	16.9673
C6M295B	0001GR054	Stockpile	14380.837	14.44	5.5342891	14.7	1.00076	0.63338	-0.03569	99.66	12.2773	95.6378	1.2982	16.9451
C6M1103A	0001GR055	Stockpile	17608.693	14.44	5.5342891	14.7	1.30217	0.58759	-0.22847	99.187	11.4806	94.9602	1.2659	16.9097
		Average	18,143											
		Stdev	5,352											
		Count	31											

XLS_FILE_NAME	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
C6M295A	2.45343	0.4552	0.19151	99.528	3.1847	19.9166	2.6353	35.9387	15	7.45	130	0.15	6.617
C6OM105A	2.60194	0.42682	0.13718	99.73	3.1205	19.8602	2.7079	35.9283	15	7.45	130	0.198	6.692
C6OM105B	2.5275	0.4795	0.11222	99.738	3.156	19.8778	2.7557	35.8774	15	7.45	130	0.189	7.761
C6OM103C	2.51444	0.41569	0.16328	99.739	2.9181	19.6704	2.7039	35.8977	15	7.45	130	0.204	6.57
C6OM103A	2.7171	0.42799	0.09738	99.677	2.9314	19.6964	2.6852	35.8703	14	7.45	130	0.182	6.769
C6OM95A	2.21433	0.39485	0.18886	99.191	3.1477	19.8848	2.6945	35.8944	15	7.45	130	0.208	6.589
C6M2103A	3.48776	0.34055	0.05923	99.187	3.165	19.8955	2.7707	35.9463	15	7.45	130	0.198	7.009
C6M2103B	3.48275	0.33247	0.08436	99.587	3.1611	19.8651	2.7618	35.8778	15	7.45	130	0.189	6.579
C6M2105A	3.81117	0.3157	0.08009	98.402	2.9768	19.7293	2.7572	35.8767	15	7.45	130	0.198	6.717
C6M2105B	3.74472	0.32658	0.087	99.641	3.1133	19.8748	2.7916	35.9009	15	7.45	130	0.169	6.359
C6M195D	2.56205	0.44097	0.1398	99.612	3.1244	19.8375	2.709	35.8842	15	7.45	130	0.189	7.055
C6OM95C	2.39912	0.49274	0.16919	99.513	3.1735	19.8587	2.7017	35.8955	15	7.45	130	0.22	6.823
C6OM100A	2.68605	0.35137	0.10977	99.12	2.9351	19.6781	2.78	35.9689	15	7.45	130	0.198	6.769
C6M1103B	3.62895	0.28608	0.09715	99.527	3.0127	19.8087	2.6804	35.899	15	7.45	130	0.193	6.683
C6P1100A	2.56925	0.41304	0.13256	99.571	2.875	19.6154	2.726	35.886	15	7.45	130	0.188	6.715
C6M195E	2.56144	0.42568	0.14102	99.559	3.137	19.8864	2.7108	35.8698	15	7.45	130	0.182	6.536
C6M195F	2.26312	0.49521	0.18131	99.654	3.0679	19.7898	2.7071	35.893	15	7.45	130	0.198	6.931
C6OM95G	2.30984	0.4763	0.15589	99.405	3.0042	19.7481	2.6959	35.846	15	7.45	130	0.198	6.717
C6OM103B	2.54531	0.4163	0.16403	99.597	3.0869	19.8237	2.7658	35.849	15	7.45	130	0.188	6.715
C6OM105C	2.40047	0.32189	0.1201	98.358	2.9419	19.7304	2.7281	35.8993	15	7.45	130	0.188	6.493
C6P195A	2.46121	0.46539	0.16664	99.648	2.966	19.7358	2.7424	35.8987	15	7.45	130	0.192	6.935
C6OM103J	2.07406	0.24888	0.11736	92.644	3.0639	19.824	4.54	35.8969	14	7.45	130	0.182	6.666
C6OM105H	1.19831	-0.04385	0.48998	94.679	2.9305	19.6496	2.408	35.9156	15	7.45	130	0.189	6.579
C6OM103K	2.53524	0.28179	0.1286	98.187	3.0375	19.8065	2.6149	35.9114	15	7.45	130	0.198	7.009
C6OM100B	2.66472	0.46429	0.12967	99.392	3.1612	19.8968	2.7799	35.887	15	7.45	130	0.182	6.769
C6M2100A	3.01134	0.41241	0.10257	99.6	3.1043	19.8533	2.6889	35.9414	15	7.45	130	0.189	6.897
C6M2100B	2.87921	0.36714	0.14453	99.836	2.9986	19.7046	2.6818	35.8966	15	0	0	0.182	6.644
C6M195A	2.37014	0.48795	0.1699	99.638	3.1972	19.9265	2.6593	35.8868	15	7.45	130	0.234	7.009
C6M195B	2.33724	0.46088	0.17038	99.72	3.172	19.9019	2.6962	35.9931	14	7.45	130	0.189	6.536
C6M295B	2.39992	0.43989	0.18534	99.667	3.1742	19.9008	2.754	35.9459	15	7.45	130	0.182	6.717
C6M1103A	2.71722	0.42802	0.09733	99.677	2.9314	19.6965	2.6853	35.8709	14	7.45	130	0.182	6.692

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C6M295A	0	0	0	0	0	100	98	94	84	72	49	36	33	26	19	16	14	10	8.7
C6OM105A	0	0	0	0	0	100	97.5	92.8	82.8	72	48.5	35	32.5	25	17.8	15	12.3	8.5	6.1
C6OM105B	0	0	0	0	0	100	96	90	78	67	43	33	31	24	17	15	12	9	6.1
C6OM103C	0	0	0	0	0	100	97.3	92.5	83.3	72.5	49.3	35.8	33.3	25	17.5	14.8	12	8.5	6
C6OM103A	0	0	0	0	0	100	97	92.3	82.3	71.5	48.3	35.5	33	25.8	18.5	15.8	12.8	9	6.4
C6OM95A	0	0	0	0	0	100	97.5	92.8	83	72.3	49.3	34.5	32	24.5	17.3	14.8	12	8.3	5.9
C6M2103A	0	0	0	0	0	100	97.3	91.8	81.5	70.5	47	34	31.8	24.5	17.5	15	12.3	8.5	6.1
C6M2103B	0	0	0	0	0	100	97.8	93.3	83.5	72.8	49	35.8	33.3	25.5	18	15.5	12.5	8.8	6.2
C6M2105A	0	0	0	0	0	100	97.5	92.5	82.5	71.8	48.5	35.3	32.8	25.3	17.8	15.3	12.3	8.5	6.1
C6M2105B	0	0	0	0	0	100	97.5	93	83.8	73.5	50.5	38	35.5	27.8	20	17	13.8	9.8	6.8
C6M195D	0	0	0	0	0	100	97.3	91.8	81.3	70.3	47	34.5	32.3	25	18	15.3	12.5	8.8	6.2
C6OM95C	0	0	0	0	0	100	97	92	82	71.3	48	34	31.5	24	17	14.5	11.8	8.3	5.9
C6OM100A	0	0	0	0	0	100	97.3	92.3	82.3	71.5	48.3	35	32.8	25.3	17.8	15.3	12.3	8.5	6.1
C6M1103B	0	0	0	0	0	100	97.3	92.3	82.7	72	48.7	35.3	33	25.3	18	15.3	12.3	8.7	6.2
C6P1100A	0	0	0	0	0	100	97.3	92.3	82.5	72	48.3	35.5	33.3	25.8	18.5	15.8	12.8	8.8	6.3
C6M195E	0	0	0	0	0	100	97.5	92.8	83.5	73	49.3	36	33.8	26	18.5	15.8	12.8	9	6.4
C6M195F	0	0	0	0	0	100	97.5	92.3	82.3	71	47	34.5	32.3	25	17.8	15.3	12.3	8.5	6.1
C6OM95G	0	0	0	0	0	100	97.5	92.5	82.5	71.8	48.5	35.3	32.8	25.3	17.8	15.3	12.3	8.5	6.1
C6OM103B	0	0	0	0	0	100	97.3	92.3	82.5	72	48.3	35.5	33.3	25.8	18.5	15.8	12.8	8.8	6.3
C6OM105C	0	0	0	0	0	100	97.8	92.8	83.5	72.8	49.8	36.3	33.8	26	18.5	15.8	12.8	8.8	6.3
C6P195A	0	0	0	0	0	100	97.5	92	81.8	70.8	47.5	34.8	32.3	25	17.8	15.3	12.3	8.8	6.1
C6OM103J	0	0	0	0	0	100	97.5	92.8	83	72	48.8	35.5	33	25.5	18.3	15.5	12.8	9	6.4
C6OM105H	0	0	0	0	0	100	97.8	93.3	83.5	72.8	49	35.8	33.3	25.5	18	15.5	12.5	8.8	6.2
C6OM103K	0	0	0	0	0	100	97.3	91.8	81.5	70.5	47	34	31.8	24.5	17.5	15	12.3	8.5	6.1
C6OM100B	0	0	0	0	0	100	97.5	92.3	82.3	71.5	48.3	35.8	33.5	26	18.5	15.8	12.8	9	6.3
C6M2100A	0	0	0	0	0	100	97.3	91.8	81.8	71	47.5	34.8	32.5	25	18	15.3	12.5	8.8	6.2
C6M2100B	0	0	0	0	0	100	97.5	93	83	72.3	48.8	36	33.5	26	18.5	15.8	13	9	6.4
C6M195A	0	0	0	0	0	100	97	91.5	81.5	70.5	47	33.3	31	23.5	16.8	14.3	11.5	8.3	5.8
C6M195B	0	0	0	0	0	100	97.5	92.8	83.5	73	49.3	35.8	33.3	25.8	18.3	15.5	12.5	8.8	6.2
C6M295B	0	0	0	0	0	100	97.3	92.3	82.3	71.8	48.5	35.5	33.3	25.8	18.5	15.8	13	9	6.4
C6M1103A	0	0	0	0	0	100	97.3	92	82.5	72	48.5	35.8	33.5	26	18.5	15.8	12.8	9	6.4
Average						100	97.3774	92.3871	82.4677	71.671	48.2516	35.2226	32.8419	25.3387	18.0484	15.4194	12.5387	8.79355	6.21935

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT
NDSU	RNOMC3	TH19-101	35444.253	20.22	15.117943	14.7	3.59198	0.63848	-0.85139	70.36
NDSU	WN2	TH22	27304.705	20.22	15.117943	14.7	2.63146	0.78175	-0.8449	85.294
NDSU	UF1	TH19-101	33572.485	20.22	15.117943	14.7	2.9978	0.33584	-0.536	37.3
NDSU	UF2	TH19-101	28770.914	20.22	15.117943	14.7	2.93988	0.52849	-0.81348	50.34
NDSU	UN1	TH19-101	45085.854	20.22	15.117943	14.7	4.53752	0.47982	-0.77006	80.677
NDSU	UN2	TH19-101	36982.356	20.22	15.117943	14.7	3.40971	0.39087	-0.60607	46.122
NDSU	UN4	TH19-101	26544.598	20.22	15.117943	14.7	2.2519	0.28763	-0.44184	6.802
NDSU	VF1	TH19-104	25905.112	20.22	15.117943	14.7	2.54432	0.6296	-0.8031	66.393
NDSU	VF2	TH19-104	26362.911	20.22	15.117943	14.7	2.60433	0.61215	-0.80343	64.772
NDSU	VF4	TH19-104	1487.1723	20.22	15.117943	14.7	2.93579	1.07206	-5.24522	-3758.04
NDSU	VN1	TH19-104	25381.026	20.22	15.117943	14.7	2.83063	0.64672	-0.99049	48.973
NDSU	VN2	TH19-104	20891.103	20.22	15.117943	14.7	2.00233	0.58915	-0.75032	58.679
NDSU	VN4	TH19-104	10407.038	20.22	15.117943	14.7	1.95672	0.62686	-1.72	-482.392
NDSU	WF1	TH22	24298.475	20.22	15.117943	14.7	2.46854	0.87123	-0.9598	88.884
NDSU	WF2	TH22	26130.724	20.22	15.117943	14.7	2.44174	0.73798	-0.78151	83.62
NDSU	WN1	TH22	18875.93	20.22	15.117943	14.7	1.70927	0.88323	-0.80256	95.243
NDSU	WN4	TH22	34152.304	20.22	15.117943	14.7	2.21216	0.39813	-0.11017	45.783
		Average	26,329							
		Stdev	10,093							
		Count	17							

XLS_FILE_NAME	MNROAD_ID	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60
NDSU	RNOMC3	11.2026	150.238	1.0383	49.6095	6.30992	0.55216	-0.13635	94.761	2.8	20	2.2026	105.238	25	5.9	122.5	0	0
NDSU	WN2	11.3608	202.998	1.1129	67.2682	5.64981	0.61986	-0.07087	98.038	3	20.1	2.3608	142.698	26	5.25	133.7	0	0
NDSU	UF1	13.8601	196.413	1.9237	64.3055	3.99517	0.34418	-0.14132	87.948	3	20	4.0808	136.413	27	5.9	122.5	0	0
NDSU	UF2	14.0045	198.48	2.3591	65.2803	4.55727	0.48138	-0.18822	92.075	2.5	20.1	5.0045	138.48	26	5.9	122.5	0	0
NDSU	UN1	18.4723	201.002	4.041	66.4688	6.27398	0.35235	-0.12779	86.856	3	20	8.5723	141.002	22	5.9	122.5	0	0
NDSU	UN2	17.5469	198.941	4.0291	65.4974	4.7578	0.37501	-0.15156	91.902	2.9	20	8.5469	138.941	13	5.9	122.5	0	0
NDSU	UN4	13.4236	141.076	1.7758	45.2906	3.15054	0.46792	-0.20028	59.222	3	20	3.767	96.076	24	5.9	122.5	0	0
NDSU	VF1	10.7005	201.25	1.0845	66.3029	4.57109	0.56866	-0.12935	95.39	2.8	20.2	2.3005	140.65	27	7	129.3	0	0
NDSU	VF2	11.3005	122.027	1.0845	35.9262	4.56546	0.55927	-0.13658	93.548	3	20.2	2.3005	76.2111	25	7	129.3	0	0
NDSU	VF4	10.7652	96.8465	0.8321	18.2302	1.10094	0.36264	-0.64326	-4742.5	3	20	1.7652	38.6722	17	7	129.3	0	0
NDSU	VN1	11.5506	197.905	1.061	65.1504	4.83068	0.61217	-0.22639	88.476	3.1	20.1	2.2506	138.205	29	7	129.3	0	0
NDSU	VN2	14.0869	149.903	1.1252	49.0277	3.50694	0.5539	-0.126	89.599	3.1	20.8	2.3869	104.003	27	7	129.3	0	0
NDSU	VN4	10.6323	115.115	0.7695	25.9812	2.22418	0.67098	-0.41386	-473.72	3	20	1.6323	55.1145	21	7	129.3	0	0
NDSU	WF1	13.9906	202.193	2.3526	66.889	5.51936	0.61934	-0.06081	95.561	3	20.2	4.9906	141.893	26	5.25	133.7	0	0
NDSU	WF2	12.6267	201.624	1.144	66.7624	5.03276	0.57232	-0.06155	97.311	3.3	20.2	2.4267	141.624	29	5.25	133.7	0	0
NDSU	WN1	12.8854	201.65	0.983	66.7743	4.15113	0.6154	0.02311	96.257	3.2	20	2.0854	141.65	28	5.25	133.7	0	0
NDSU	WN4	11.1065	120.112	0.993	34.2935	4.08115	0.4481	-0.01586	55.969	3	20	2.1065	72.7475	23	5.25	133.7	0	0

XLS_FILE_NAME	MNROAD_ID	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
NDSU	RNOMC3	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	WN2	0	0	100			100	100			84	59		40			11		2	1
NDSU	UF1	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	UF2	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	UN1	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	UN2	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	UN4	0	0	100			100	100			91	78		62			20		3	1.4
NDSU	VF1	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	VF2	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	VF4	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	VN1	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	VN2	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	VN4	0	0	100			100	100			90	76		59			22		4	2.1
NDSU	WF1	0	0	100			100	100			84	59		40			11		2	1
NDSU	WF2	0	0	100			100	100			84	59		40			11		2	1
NDSU	WN1	0	0	100			100	100			84	59		40			11		2	1
NDSU	WN4	0	0	100			100	100			84	59		40			11		2	1
			Average	100			100	100			88.5882	71.7059		54.4706			18.0588		3.05882	1.52941

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ PCT	MIN_BULKSTRESS PSI	MAX_BULKSTRESS PSI	MIN_OCTASTRESS PSI	MAX_OCTASTRESS PSI
C7M072GOF	7210GR102	Cell 72	22364.4	14.49	5.3457273	14.7	1.94016	0.89048	-0.7426	90.117	10.475	193.372	0.7151	63.0136
C7M072HOR	7210GR103	Cell 72	12903.863	14.49	5.3457273	14.7	1.22464	1.19018	-1.01829	99.073	10.1405	156.761	0.6633	47.8859
C7M072HOR	7210GR104	Cell 72	20390.437	14.49	5.3457273	14.7	1.85365	0.95739	-0.89037	92.013	10.4334	156.447	0.6843	45.6066
C7M072HOR	7210GR105	Cell 72	19268.452	14.49	5.3457273	14.7	1.73827	0.93993	-0.86644	92.184	10.2582	156.596	0.6972	47.9721
C7M072GOF	7210GR106	Cell 72	18852.564	14.49	5.3457273	14.7	1.68379	0.99835	-0.83141	95.296	10.4675	155.792	0.6948	47.9989
C7M072GPR	7210GR107	Cell 72	12098.732	14.49	5.3457273	14.7	1.04538	0.99825	-0.72464	98.344	10.4045	117.806	0.6621	27.3705
C7M072HPR	7210GR110	Cell 72	12312.243	14.49	5.3457273	14.7	1.00988	0.90241	-0.56131	98.501	10.1047	97.2762	0.6622	20.2567
		Average	16,884											
		Stdev	4,311											
		Count	7											

XLS_FILE_NAME	K4	K5	K6	K456_R_SQ PCT	MIN_CONFSTRESS PSI	MAX_CONFSTRESS PSI	MIN_DEVISTRESS PSI	MAX_DEVISTRESS PSI	N_TESTS	OPT_MOIST	MAX_DENS PCF	D10	D60
C7M072GOF	5.12538	0.66021	0.00038	97.788	2.9275	19.9003	1.5169	133.672	27	0	0	0.126	5.649
C7M072HOR	4.05766	0.75121	0.07503	96.325	2.9055	19.8999	1.4071	101.581	29	0	0	0.126	5.649
C7M072HOR	4.9428	0.68729	-0.01739	98.409	2.9825	19.9009	1.4515	96.7462	28	0	0	0.126	5.649
C7M072HOR	4.55585	0.66931	-0.00988	98.266	2.9091	19.9	1.4789	101.764	29	0	0	0.126	5.649
C7M072GOF	4.86905	0.69981	0.02792	99.024	2.9934	19.9012	1.4738	101.821	29	0	0	0.126	5.649
C7M072GPR	3.03086	0.61179	0.13502	96.269	2.9994	19.9146	1.4045	58.0616	23	0	0	0.126	5.649
C7M072HPR	2.79526	0.57612	0.15686	97.271	2.9	19.6	1.4047	42.971	21	0	0	0.126	5.649

XLS_FILE_NAME	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP 2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C7M072GOF	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072HOR	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072HOR	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072HOR	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072GOF	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072GPR	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
C7M072HPR	0	0	0	0	0	100	95	89	80	72	56		44			23		11	7
					Average	100	95	89	80	72	56		44			23		11	7

XLS_FILE_NAME	MNROAD_ID	LOCATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
C7M072HPR	7210GR108	Cell 72	13373.568	14.42	5.6521402	14.7	1.23635	1.11647	-0.8768	98.503	10.3742	159.707	0.6931	47.1439	3.95457	0.69959	0.10059	96.489	2.9671	19.9007	1.4704	100.007	28																							
C7M072GPR	7210GR109	Cell 72	11599.92	14.42	5.6521402	14.7	0.99649	0.99803	-0.6582	99.135	10.2271	158.943	0.695	46.7891	2.92962	0.58374	0.1706	96.611	2.9128	19.8999	1.4742	99.2546	28																							
C1IOR1		US12 COKATO	11657.221	14.42	5.6521402	14.7	0.73959	0.62605	-0.25136	97.798	11.7103	95.3153	1.2708	16.9044	1.96052	0.39239	0.3045	98.161	3.0048	19.822	2.6959	35.8596	14	10.1	128.3	0.212	6.34	0	0	0	0	100	100	91	82	73	67	55	46	44	35	24	18	13	7	5.1
C1IOR3		US12 COKATO	13452.361	14.42	5.6521402	14.7	1.12975	0.81576	-0.59938	98.233	12.0679	95.1275	1.2519	16.9047	2.76655	0.57531	0.08585	97.972	3.1367	19.7587	2.6558	35.8604	15	10.1	128.3	0.212	6.34	0	0	0	0	100	100	91	82	73	67	55	46	44	35	24	18	13	7	5.1
C2HOR1		US12 COKATO	20374.121	14.42	5.6521402	14.7	1.67735	0.69077	-0.54562	99.163	12.0032	95.215	1.2904	16.959	3.53283	0.49727	0.04943	99.201	3.0885	19.7465	2.7374	35.9755	15	9.9	130.8	0.212	10.41	0	0	0	0	100	100	86	74	64	58	45	40	39	33	24	18	13	7	4.7
C1HOR1		US12 COKATO	18513.387	14.42	5.6521402	14.7	1.36236	0.62913	-0.20433	99.497	11.408	95.6931	1.2286	16.8953	3.03394	0.44599	0.12882	99.6	2.9339	20.0683	2.6064	35.8403	15	10.1	128.3	0.212	6.34	0	0	0	0	100	100	91	82	73	67	55	46	44	35	24	18	13	7	5.1
C1IOR4		US12 COKATO	10990.588	14.42	5.6521402	14.7	0.80319	0.70915	-0.17831	98.868	15.3264	95.2137	2.1035	16.8996	2.02305	0.50291	0.15362	99.043	3.3202	19.8719	4.4622	35.8495	14	10.1	128.3	0.212	6.34	0	0	0	0	100	100	91	82	73	67	55	46	44	35	24	18	13	7	5.1
C2HOR2		US12 COKATO	19908.839	14.42	5.6521402	14.7	1.50657	0.59624	-0.29217	98.247	11.9913	95.5196	1.2845	16.9912	3.0646	0.39846	0.12333	97.468	3.0879	19.8277	2.7248	36.0437	15	9.9	130.8	0.212	10.41	0	0	0	0	100	100	86	74	64	58	45	40	39	33	24	18	13	7	4.7
C3IOR2		US12 COKATO	9533.6132	14.42	5.6521402	14.7	0.72346	0.79472	-0.28903	99.324	12.1349	95.4655	1.2843	16.947	1.95964	0.55993	0.15908	99.328	3.1307	19.8395	2.7244	35.95	15	10.5	127.7	0.15	5.848	0	0	0	0	100	100	89	80	72	67	57	47	44	36	27	21	16	10	6.6
C3HOR1		US12 COKATO	21233.885	14.42	5.6521402	14.7	1.7361	0.6203	-0.52856	98.463	11.9911	95.5644	1.3264	16.9236	3.34422	0.45665	0.02249	99.309	3.0522	19.9085	2.8138	35.9004	15	10.5	127.7	0.15	5.848	0	0	0	0	100	100	89	80	72	67	57	47	44	36	27	21	16	10	6.6
C4IOR1		US12 COKATO	10839.525	14.42	5.6521402	14.7	0.83023	0.74365	-0.32056	98.753	11.5706	77.6052	1.2747	12.6927	2.06439	0.48868	0.1877	97.923	2.9549	19.8973	2.704	26.9252	14	10.3	127.3	0.164	5.848	0	0	0	0	100	100	91	81	73	67	57	51	50	43	31	24	17	9	5.9
C4IOR2		US12 COKATO	21081.913	14.42	5.6521402	14.7	1.44076	0.37235	0.00785	97.976	11.2133	93.113	1.2896	16.91	2.43791	0.25507	0.11968	98.121	2.8015	19.3084	2.7357	35.8716	15	10.3	127.3	0.164	5.848	0	0	0	0	100	100	91	81	73	67	57	51	50	43	31	24	17	9	5.9
C3328R2		US12 COKATO	9533.6132	14.42	5.6521402	14.7	0.72346	0.79472	-0.28903	99.324	12.1349	95.4655	1.2843	16.947	1.95964	0.55993	0.15908	99.328	3.1307	19.8395	2.7244	35.95	15	10.5	127.7	0.15	5.848	0	0	0	0	100	100	89	80	72	67	57	47	44	36	27	21	16	10	6.6
C1314R2		US12 COKATO	13894.189	14.42	5.6521402	14.7	1.04141	0.74191	-0.25415	99.15	11.3139	94.5981	1.2591	16.9061	2.65093	0.50976	0.16671	99.088	2.8809	19.5783	2.6709	35.8632	15	10.1	128.3	0.212	6.34	0	0	0	0	100	100	91	82	73	67	55	46	44	35	24	18	13	7	5.1
C2JOR1		US12 COKATO	8938.9271	14.42	5.6521402	14.7	0.73465	0.96615	-0.52403	97.57	12.0257	77.2365	1.284	12.6578	2.29897	0.63983	0.21353	96.737	3.0994	19.7862	2.7237	26.8514	14	9.9	130.8	0.212	10.41	0	0	0	0	100	100	86	74	64	58	45	40	39	33	24	18	13	7	4.7
C2IOR2		US12 COKATO	10588.132	14.42	5.6521402	14.7	0.83662	0.95148	-0.40397	99.309	12.2021	95.4566	1.2629	16.9094	2.67992	0.65348	0.19485	98.835	3.1743	19.8654	2.6791	35.8702	15	9.9	130.8	0.212	10.41	0	0	0	0	100	100	86	74	64	58	45	40	39	33	24	18	13	7	4.7
C7C042FORC082		Roadway windrow (CSAH42 Steele)	20042.145	14.42	5.6521402	14.7	1.81476	0.75228	-0.8345	84.39	10.6974	159.342	0.8002	46.8758	3.71599	0.54955	-0.05632	96.67	3	19.9714	1.6974	99.4386	28	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042FORC081		CSAH42 Steele	20773.419	14.42	5.6521402	14.7	1.84179	0.69331	-0.77328	83.597	10.6036	119.945	0.7559	28.3217	3.61157	0.55272	-0.06557	96.614	3	19.9551	1.6036	60.0794	22	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042GPRC085		Roadway windrow, Station 201+76 12'LT (CSAH42)	26165.124	14.42	5.6521402	14.7	2.32665	0.72865	-0.78022	80.337	10.4878	195.617	0.7812	64.07	4.74489	0.545	-0.06562	94.22	2.9395	19.9013	1.6571	135.913	30	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042GPRC086		Roadway windrow, Station 201+76 12'LT (CSAH42)	15570.521	14.42	5.6521402	14.7	1.28205	0.63643	-0.54924	94.345	10.5091	99.4379	0.8195	18.7326	2.49597	0.45206	0.02701	97.103	2.9215	19.9	1.7384	39.7379	18	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042GPRC088		Roadway windrow, Station 201+76 12'LT (CSAH42)	19240.696	14.42	5.6521402	14.7	1.76169	0.82919	-0.86417	86.804	10.6675	159.889	0.7861	47.1568	3.94947	0.59382	-0.03811	96.645	3	19.9634	1.6675	100.035	28	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042HPRC087		Roadway windrow, Station 201+76 12'LT (CSAH42)	8822.6761	14.42	5.6521402	14.7	0.77505	1.04067	-0.72441	97.673	10.5485	119.559	0.8055	28.2119	2.41145	0.66101	0.15819	96.112	2.9464	19.9042	1.7087	59.8465	22	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042HPRC090		Roadway windrow, Station 201+76 12'LT (CSAH42)	15304.572	14.42	5.6521402	14.7	1.39091	0.89698	-0.83729	94.107	10.4615	159.133	0.7941	48.6373	3.38182	0.59057	0.02544	96.165	2.9257	19.9	1.6846	103.175	29	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042HPRC093		Roadway windrow, Station 201+76 12'LT (CSAH42)	9525.8195	14.42	5.6521402	14.7	0.80071	0.98123	-0.59233	97.81	10.5394	100.019	0.8	21.1482	2.42939	0.61698	0.17948	96.183	2.9449	19.9	1.6972	44.8621	20	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7T200FORC076		Station 1236+00, 24' LT Norman County (TH200)	30057.619	14.42	5.6521402	14.7	2.86316	0.78048	-0.98865	81.245	11.9239	119.013	1.4612	28.0994	5.71844	0.57985	-0.10807	97.659	2.9004	19.8017	3.0996	59.6078	22	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200FPRC077		Station 1236+00, 24' LT Norman County (CSAH 42)	33097.711	14.42	5.6521402	14.7	3.16987	0.80542	-1.00383	81.507	10.3596	159.552	0.7639	49.4714	6.46512	0.59863	-0.12531	95.979	2.9131	19.9	1.6254	104.945	29	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GNRC068		Station 1236+00, 24' LT Norman County (TH200)	19864.798	14.42	5.6521402	14.7	1.71366	0.54723	-0.69776	87.642	10.4962	99.8664	0.8103	18.9357	2.79297	0.44409	-0.0642	94.633	2.9194	19.8996	1.7189	40.1688	17	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GNRC079		Station 1236+00, 24' LT Norman County (TH200)	23928.958	14.42	5.6521402	14.7	2.35724	0.70956	-1.0961	85.467	10.626	99.7614	0.8101	21.0989	4.0238	0.54317	-0.13853	97.49	2.9635	19.902	1.7184	44.7576	21	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GORC071		Station 1236+00, 24' LT Norman County (TH200)	22667.416	14.42	5.6521402	14.7	2.04382	0.66669	-0.82658	89.611	10.4923	119.716	0.8322	28.2947	3.68313	0.4877	-0.05481	95.277	2.9058	19.898	1.7653	60.0221	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GPRC065		Station 1236+00, 24' LT Norman County (CSAH 42)	20807.321	14.42	5.6521402	14.7	2.13557	0.99066	-1.20558	90.478	10.5819	159.927	0.7985	49.1538	5.00916	0.67271	-0.08398	93.917	2.9607	19.9021	1.6939	104.271	29	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GPRC066		Station 1236+00, 24' LT Norman County (TH200)	30604.26	14.42	5.6521402	14.7	2.92062	0.78879	-0.99384	83.781	10.5245	159.666	0.822	49.5998	5.80119	0.5698	-0.10083	95.455	2.9216	19.9	1.7437	105.217	29	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GPRC074		Station 1236+00, 24' LT Norman County (TH200)	24638.56	14.42	5.6521402	14.7	2.4064	0.89604	-1.0587	89.884	10.4745	119.672	0.7961	35.3419	5.34135	0.62047	-0.07476	95.782	2.9264	19.9	1.6888	74.9715	26	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HNRC063		Station 1236+00, 24' LT Norman County (TH200)	21154.733	14.42	5.6521402	14.7	2.04365	0.82222	-1.02941	90.768	10.404	119.698	0.7847	28.3611	4.21024	0.60349	-0.06957	97.204	2.9131	19.8451	1.6646	60.163	22	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HORC064		Station 1236+00, 24' LT Norman County (TH200)	11414.198	14.42	5.6521402	14.7	1.13532	1.14783	-1.09988	96.553	10.4932	119.931	0.8231	28.4483	3.52349	0.78809	0.0292	96.501	2.9143	19.8612	1.746	60.3479	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7C042EORC203		Roadway windrow, Station 201+76 12'LT (CSAH42)	30777.523	14.42	5.6521402	14.7	2.81844	0.83723	-0.87601	70.624	10.0342	118.496	1.5257	27.7167	4.89158	0.53628	-0.13715	92.396	2.9243	19.9	3.2366	58.7959	21	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042EPRC199		Roadway windrow, Station 201+76 12'LT (CSAH42)	34672.687	14.42	5.6521402	14.7	3.39887	0.73252	-1.07965	61.461	12.1308	118.784	1.4986	34.895	6.24242	0.61211	-0.21722	94.231	2.6839	19.9223	3.179	74.0236	23	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7T200ENRC219		1236+00 plus 24' left (TH200)	27022.681	14.42	5.6521402	14.7	2.45907	0.70633	-0.85244	82.893	10.4255	156.477	0.7616	47.7441	4.68875	0.52906	-0.08593	97.419	2.9367	19.9	1.6156	101.281	29	7.5	126.7		2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GPRC211		Station 1236+00 24'Left Norman Co. (TH200)	14836.42	14.42	5.6521402	14.7	1.42587	1.06048	-0.99941	97.945	10.5385	119.381	0.7845	28.1256	4.02885	0.69795	0.05742	95.799	2.9509	19.9068	1.6641	59.6634	22	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HORC070		Station 1236+00, 24' LT Norman County (TH200)	18691.485	14.42	5.6521402	14.7	1.72602	0.93752	-0.88389	97.843	10.4767	119.992	0.8251	28.4234	4.38627	0.63436	0.04399	98.02	2.9027	19.8989	1.7502	60.2952	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HORC078		Station 1236+00, 24' LT Norman County (TH200)	14180.692	14.42	5.6521402	14.7	1.34839	1.05494	-0.96697	98.125	10.6876	119.731	0.7957	28.248	3.85689	0.69145	0.07712	96.556	2.9989	19.936	1.6879	59.9231	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HORC080		Station 1236+00, 24' LT Norman County (TH200)	13697.736	14.42	5.6521402	14.7	1.42525	1.04611	-1.24438	95.327	10.586	119.938	0.76	28.3621	3.59645	0.71978	-0.02988	94.948	2.9893	19.9244	1.6123	60.1651	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7C042FPRC091		Roadway windrow, Station 201+76 12'LT (CSAH42)	27328.688	14.42	5.6521402	14.7	2.63386	0.76637	-1.02547	73.271	12.1303	159.047	1.3344	49.3036	5.06053	0.58168	-0.13449	91.578	2.979	19.9159	2.8308	104.589	28	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042FPRC092		Roadway windrow, Station 201+76 12'LT (CSAH42)	25735.133	14.42	5.6521402	14.7	2.47113	0.77988	-1.01331	74.62	10.6574	159.582	0.7986	49.1419	4.68934	0.59507	-0.13001	93.56	2.9878	19.9107	1.6841	104.246	29	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042FPRC198		Roadway windrow, Station 201+76 12'LT (CSAH42)	26310.654	14.42	5.6521402	14.7	2.4499	0.69704	-0.9237	68.807	11.9684	159.13	1.1592	46.8715	4.49269	0.53964	-0.12513	89.709	2.919	19.9	2.4591	99.4295	27	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042GORC084		Roadway windrow, Station 201+76 12'LT (CSAH42)	17107.148	14.42	5.6521402	14.7	1.47237	0.69356	-0.68201	91.574	10.4568	99.7583	0.7778	18.8742	2.98294	0.56539	-0.03606	97.203	2.9192	19.9	1.65	40.0383	18	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7C042GORC089		Roadway windrow, Station 201+76 12'LT (CSAH42)	18771.033	14.42	5.6521402	14.7	1.66095	0.72917	-0.76504	88.398	10.4904	99.4814	0.7905	18.7531	3.40479	0.55099	-0.03203	96.657	2.9121	19.9	1.6768	39.7814	18	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7T200GNRC057		Station 1236+00, 24' LT Norman County (TH200)	25281.104	14.42	5.6521402	14.7	2.2328	0.69498	-0.76131	84.315	11.9042	119.754	1.4212	35.3102	4.37632	0.55198	-0.07614	95.759	2.9191	19.8674	3.0148	74.9042	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GNRC058		Station 1236+00, 24' LT Norman County (TH200)	29503.737	14.42	5.6521402	14.7	2.6715	0.69587	-0.83786	86.046	11.7537	118.731	1.4608	28.1155	5.08273	0.54207	-0.07489	97.921	2.885	19.6964	3.0988	59.642	22	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GORC059		Station 1236+00, 24' LT Norman County (TH200)	31542.359	14.42	5.6521402	14.7	2.98253	0.73636	-0.96861	76.454	12.0563	119.894	1.3134	35.3882	5.67425	0.56478	-0.1222	97.23	2.9524	19.9018	2.7862	75.0697	25	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200GORC061		Station 1236+00, 24' LT Norman County (TH200)	27489.479	14.42	5.6521402	14.7	2.50007	0.76828	-0.8472	92.998	10.5693	119.381	0.8359	28.1348	5.11347	0.56461	-0.05859	97.482	2.932	19.8992	1.7733	59.683	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T200HNRC062		Station 1236+00, 24' LT Norman County (TH200)	19781.553	14.42	5.6521402	14.7	1.92617	0.81062	-1.05441	88.835	10.3577	119.459	0.7798	28.3121	3.86194	0.59921	-0.08192	96.153	2.9012	19.8	1.6541	60.059	22	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T061HORC188		Test site	21323.901	14.42	5.6521402	14.7	1.84851	0.79306	-0.65682	89.692	10.5926	158.071	0.7979	46.6551	4.29923	0.57741	-0.00608	97.022	2.8989	19.7007	1.6926	98.9705	25	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061HNRC189		Test site	18981.267	14.42	5.6521402	14.7	1.59654	0.82724	-0.6073	93.035	10.4944	198.962	0.7937	63.6483	4.06255	0.59026	0.04467	99.393	2.9356	19.9001	1.6837	139.261	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061INRC191		Test site	15972.909	14.42	5.6521402	14.7	1.50106	0.48338	0.13077	96.852	10.6781	119.557	0.8118	28.1857	2.25183	0.32712	0.20315	97.579	2.985	19.9218	1.722	59.7909	23	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061HNRC192		Test site	17029.24	14.42	5.6521402	14.7	1.25324	0.68189	-0.20143	96.649	10.5565	193.803	0.7837	63.2114	3.08082	0.40365	0.17237	98.002	2.9587	19.9063	1.6624	134.092	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061HNRC193		Test site	22692.853	14.42	5.6521402	14.7	1.97464	0.77992	-0.7108	81.876	10.5058	158.62	0.7895	65.4876	4.57632	0.60523	-0.03848	96.24	2.9398	19.9	1.6747	138.92	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7C042FORC083		Roadway windrow, Station 201+76 12'LT (CSAH42)	25741.465	14.42	5.6521402	14.7	2.39663	0.72374	-0.92178	75.506	10.5921	159.663	0.7526	47.0394	4.54503	0.55121	-0.11057	93.674	2.9979	19.9592	1.5965	99.7856	28	8.5	132.2	0.075	1.8	0	0	0	0	100	100	94	89	83	79	70	63	61	56	47	41	34	19	10.3
C7T200FNRC224		1236+00 Plus 24' left (TH200)	21896.667	14.42	5.6521402	14.7	2.09417	0.87617	-0.99533	89.828	10.5174	156.366	0.7874	45.5689	4.72605	0.62522	-0.05991	98.66	2.9445	19.9	1.6704	96.6663	28	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T061ENRC228		Test site	14536.02	14.42	5.6521402	14.7	1.12784	0.66322	-0.36506	89.859	10.5867	118.139	0.8213	27.5508	2.51266	0.46092	0.09709	94.674	2.9481	19.8898	1.7423	58.444	23	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061ENRC229		Test Site (TH61)	15482.483	14.42	5.6521402	14.7	1.35159	0.95621	-0.71013	96.349	10.4275	156.004	0.8117	45.5715	3.87069	0.65115	0.06884	98.655	2.9013	19.784	1.7218	96.6718	28	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T200FNRC223		1236+00 plus 24' left (TH200)	15607.502	14.42	5.6521402	14.7	1.56417	0.98232	-1.13286	93.727	10.5339	118.428	0.8124	27.7031	3.84251	0.70503	-0.03959	97.382	2.9369	19.888	1.7234	58.7672	23	7.5	126.7	0.161	2.811	0	0	0	0	100	100	96	93	87	82	69	57	55	47	34	27	19	9	5.8
C7T061EORC231		test site (TH61)	16639.965	14.42	5.6521402	14.7	1.40767	0.9254	-0.6153	94.702	10.4511	195.021	0.7854	63.7917	4.10774	0.65297	0.07761	98.106	2.9232	19.8997	1.6662	135.323	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061FORC234		test site (TH61)	16382.952	14.42	5.6521402	14.7	1.40996	0.94415	-0.66703	95.37	10.5557	193.259	0.7562	62.96	4.09614	0.65956	0.06951	98.488	2.9795	19.9002	1.6042	133.558	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061GORC235		test site (TH61)	12311.733	14.42	5.6521402	14.7	0.85066	0.57874	-0.01359	92.544	10.5814	157.352	0.7662	45.6222	2.0117	0.4168	0.17736	94.042	2.9091	19.8597	1.6254	96.7792	28	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061INRC236		test site (TH61)	13892.878	14.42	5.6521402	14.7	1.24342	0.99854	-0.78421	96.015	10.4695	156.506	0.7966	45.6386	3.65131	0.68185	0.05518	98.745	2.9322	19.9	1.6686	96.8141	28	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061HORC232		test site (TH61)	11644.584	14.42	5.6521402	14.7	1.02352	1.00535	-0.72622	97.906	10.63	196.773	0.7752	64.6109	3.05219	0.65012	0.09821	96.996	2.9952	19.9043	1.6445	137.06	30	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061GORC233		test site (TH61)	12419.547	14.42	5.6521402	14.7	0.77093	0.51791	0.31213	94.368	10.4402	117.225	0.7912	34.231	1.89272	0.34789	0.27514	95.534	2.9029	19.7907	1.6783	72.6149	24	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
C7T061HNRC190		Test site	15937.594	14.42	5.6521402	14.7	1.49636	1.0067	-0.93084	90.168	10.5457	158.857	0.7787	46.7421	4.07035	0.66696	0.01611	91.727	2.9646	19.9038	1.6518	99.155	28	0	0	0.122	5.414	0	0	0	0		100	96.5	92	83	72.5	57.5	48.5	46.5	41	32	27	21	11.5	7.5
		Average	18.977																												Average	100	100	94.1667	88.8788	81.6212	75.5303	63.3788	54.1515	52.197	45.5303	34.9545	28.803	22.0455	11.7273	7.17121
		Stdev	6.631																																											
		Count	68																																												

XLS_FILE_NAME	MNROAD_ID	LOCATION	DESCRIPTION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS	OPT_MOIST	MAX_DENS_PCF	D10	D60	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
UM_SAT_FA15_AG10_RAP75_1			15% FA, 10% Agg, 75% RAP	12539.46849	14.3	3.700525	14.7	1.105447	1.126962	-1.01601	82.292	17.7686	195.6875	1.3381	63.9637	3.730765	0.87747	-0.05439	94.426	3	20	2.8385	135.6875	27	7.4	124.9	0	0	0	0	100			100	100			83.2			38.5	22.8		11.1	9.4		
UM_SAT_FA15_AG10_RAP75_2			15% FA, 10% Agg, 75% RAP	10688.20499	14.3	3.700525	14.7	0.980701	1.28884	-1.17428	92.008	10.4779	193.8346	0.6967	63.0962	3.725746	0.929117	-0.01668	97.826	3	20	1.4779	133.8346	30	7.4	124.9	0	0	0	0	100			100	100			83.2			38.5	22.8		11.1	9.4		
UM_UNSAT_FA15_AG10_RAP75_1			15% FA, 10% Agg, 75% RAP	6356.22478	14.55	4.313351	14.7	0.609315	1.484839	-1.27389	97.266	10.3627	118.0547	0.6424	27.3673	2.750968	0.982403	0.074108	95.49	3	20	1.3627	58.0547	23	7.4	124.9	0	0	0	0	100			100	100			83.2			38.5	22.8		11.1	9.4		
UM_SAT_FA15_AG35_RAP50_1			15% FA, 35% Agg, 50% RAP	8367.100745	14.3	3.700525	14.7	0.698994	1.075317	-0.78279	84.448	17.8796	195.4996	1.3118	63.8701	2.411003	0.809506	0.033127	90.29	3	20	2.7827	135.4996	27	8.6	123	0	0	0	0	100			100	100			88.5			44.9	29.9		14.7	12.6		
UM_SAT_FA15_AG35_RAP50_2			15% FA, 35% Agg, 50% RAP	6779.858203	14.3	3.700525	14.7	0.595017	1.280373	-0.97716	94.915	10.4357	196.3068	0.6768	64.2556	2.417193	0.901963	0.059127	96.774	3	20	1.4357	136.3068	29	8.6	123	0	0	0	0	100			100	100			88.5			44.9	29.9		14.7	12.6		
UM_UNSAT_FA15_AG35_RAP50_1			15% FA, 35% Agg, 50% RAP	10665.6963	14.55	4.313351	14.7	0.953714	1.126385	-1.01779	91.688	10.4732	157.9393	0.6945	46.169	3.045404	0.795496	-0.00421	98.26	3	20	1.4732	97.9393	28	8.6	123	0	0	0	0	100			100	100			88.5			44.9	29.9		14.7	12.6		
UM_SAT_FA15_AG60_RAP25_1			15% FA, 60% Agg, 25% RAP	5221.653313	14.3	3.700525	14.7	0.4271	1.132351	-0.68167	91.329	10.3674	196.5694	0.6446	64.3794	1.554126	0.723353	0.176181	92.408	3	20	1.3674	136.5694	30	10.2	121.7	0	0	0	0	100			100	100			88			52.7	36.9		17.4	14.7		
UM_SAT_FA15_AG60_RAP25_2			15% FA, 60% Agg, 25% RAP	7848.497557	14.3	3.700525	14.7	0.693929	1.158541	-1.02515	85.453	23.4625	194.3789	3.4077	63.3468	2.429235	0.893371	-0.04239	96.253	3	20	7.2288	134.3789	21	10.2	121.7	0	0	0	0	100			100	100			88			52.7	36.9		17.4	14.7		
UM_SAT_FA15_AG60_RAP25_3			15% FA, 60% Agg, 25% RAP	5292.692779	14.3	3.700525	14.7	0.453741	1.232252	-0.8787	94.76	10.3831	196.27	0.652	64.2283	1.798089	0.85002	0.092697	95.814	3	20	1.3831	136.27	30	10.2	121.7	0	0	0	0	100			100	100			88			52.7	36.9		17.4	14.7		
UM_UNSAT_FA15_AG60_RAP25_1			15% FA, 60% Agg, 25% RAP	15972.57533	14.55	4.313351	14.7	1.363212	0.854281	-0.8475	70.625	29.6279	197.0686	2.3016	64.6147	3.385613	0.707674	-0.09178	90.932	3	20	4.8824	137.0686	21	10.2	121.7	0	0	0	0	100			100	100			88			52.7	36.9		17.4	14.7		
			Average	9,552	8,105	10,998																																									
CR3_W_4_7_1_MAR2		CR 3 (Wright)	25% Agg, 75% RAP	43746.81672	14.04	6.7033723	14.7	2.729348	0.129952	0.246149	-5.322	10.5447	197.157	0.7282	64.6584	4.098303	0.223325	0.027568	-5.786	3	20	1.5447	137.157	29	7.2	127	0	0	0	0	100			99.6	95.5			81.8	59.8		21.3			6.7		2.4	1.7
CR3_W_4_7_2_MAR8		CR 3 (Wright)	25% Agg, 75% RAP	27227.15125	14.04	6.7033723	14.7	2.811037	0.890116	-1.00159	88.649	10.5015	197.2321	0.7078	64.6918	4.461908	0.652558	-0.09218	98.737	3	20	1.5015	137.2321	30	7.2	127	0	0	0	0	100			99.6	95.5			81.8	59.8		21.3			7.7		2.4	1.7
CR3_W_7_2_1_MAR7		CR 3 (Wright)	25% Agg, 75% RAP	17062.5082	14.04	6.7033723	14.7	1.750972	1.000427	-0.97199	94.984	10.5003	197.098	0.7073	64.6286	4.660532	0.690231	-0.01766	98.541	3	20	1.5003	137.098	30	7.2	127	0	0	0	0	100			99.6	95.5			81.8	59.8		21.3			8.7		2.4	1.7
CR3_W_7_2_2_MAR9		CR 3 (Wright)	25% Agg, 75% RAP	20577.57248	14.04	6.7033723	14.7	2.042262	0.878217	-0.89795	89.196	11.913	197.0229	1.3407	64.5932	4.670558	0.64698	-0.05758	99.146	3	20	2.8441	137.0229	29	7.2	127	0	0	0	0	100			99.6	95.5			81.8	59.8		21.3			9.7		2.4	1.7
			Average	27,154																																											
26FBR1	2600GR103	Cell 26	30% Reclaimed, 70% Class 6	13962.10463	14.5	5.3080149	14.7	1.034938	0.668387	-0.24875	99.431	11.0812	94.1317	1.3011	16.9033	2.377438	0.445918	0.155729	98.963	2.771	19.7316	2.76	35.8572	15																							
26FBR2	2600GR104	Cell 26	30% Reclaimed, 70% Class 6	17539.06006	14.5	5.3080149	14.7	1.290814	0.532063	-0.23161	98.369	11.3515	94.6879	1.3102	16.9106	2.482634	0.38424	0.064941	98.702	2.8565	19.6267	2.7794	35.8729	15																							
26FCR1	2600GR105	Cell 26	30% Reclaimed, 70% Class 6	18322.28847	14.5	5.3080149	14.7	1.414447	0.663221	-0.38076	99.509	11.672	93.7686	1.2748	16.9768	3.093065	0.473536	0.089162	99.589	2.9888	19.3355	2.7044	36.0133	15																							
26FCR2	2600GR106	Cell 26	30% Reclaimed, 70% Class 6	13410.82313	14.5	5.3080149	14.7	0.931878	0.691037	-0.03817	99.236	11.7573	94.9013	1.2593	16.9139	2.416892	0.47037	0.21132	99.124	3.0151	20.0275	2.6714	35.8799	15																							
26FDR1	2600GR107	Cell 26	30% Reclaimed, 70% Class 6	15399.75625	14.5	5.3080149	14.7	1.049616	0.627735	0.021664	98.908	11.4664	96.1364	1.2905	16.9171	2.545492	0.414499	0.221844	98.837	2.893	20.093	2.7376	35.8865	15																							
26FDR2	2600GR108	Cell 26	30% Reclaimed, 70% Class 6	16755.14911	14.5	5.3080149	14.7	1.178618	0.608879	-0.08156	99.685	14.4086	95.8348	2.1164	16.9166	2.677355	0.418298	0.166183	99.527	3.0389	20.0052	4.4896	35.8854	14																							
26GBR2	2600GR116	Cell 26	30% Reclaimed, 70% Class 6	17581.75198	14.5	5.3080149	14.7	1.191238	0.394373	0.030568	96.759	11.4876	96.0562	1.2515	16.9155	2.098277	0.276009	0.125821	96.839	2.9444	20.0577	2.6548	35.8833	14																							
26GBR1	2600GR130	Cell 26	30% Reclaimed, 70% Class 6	17104.50252	14.5	5.3080149	14.7	1.308306	0.652187	-0.35131	99.361	10.6059	95.8759	1.1944	16.9619	2.834849	0.471492	0.089224	99.556	2.8807	20.0209	2.5337	35.8544	15																							
26EBR1	2600GR170	Cell 26	30% Reclaimed, 70% Class 6	19812.58162	14.5	5.3080149	14.7	1.246011	0.252704	0.265935	85.46	11.067	95.7031	1.2295	16.8194	1.977731	0.154532	0.170559	86.822	2.8196	20.0204	2.6082	35.6793	15																							
			Average	16,654																																											
UM_SAT_FA5_AG20_RAP75_1			5% FA, 20% Agg, 75% RAP	12437.74611	14.28	3.662813	14.7	1.024305	1.093191	-0.71664	95.429	14.8239	193.8293	2.7454	63.0877	3.400988	0.672136	0.161727	94.596	3	20	5.8239	133.8293	23	6.6	128.6	0	0	0	0	100			100	100			84.7			33.6	19.3		7.9	6.5		
UM_SAT_FA5_AG20_RAP75_2			5% FA, 20% Agg, 75% RAP	8944.133629	14.28	3.662813	14.7	0.830347	1.431154	-1.21113	93.635	11.643	195.6503	1.3091	63.9462	3.691211	0.972159	0.046732	94.409	3	20	2.777	135.6503	29	6.6	128.6	0	0	0	0	100			100	100			84.7			33.6	19.3		7.9	6.5		
UM_UNSAT_FA5_AG20_RAP75_1			5% FA, 20% Agg, 75% RAP	20796.41108	14.13	6.42053	14.7	1.966877	0.997595	-0.8004	96.9	14.661	195.8581	1.3119	64.0441	5.563999	0.942865	0.071845	95.705	3	20	2.783	135.8581	28	6.6	128.6	0	0	0	0	100			100	100			84.7			33.6	19.3		7.9	6.5		
UM_SAT_FA5_AG45_RAP50_2			5% FA, 45% Agg, 50% RAP	8371.896473	14.28	3.662813	14.7	0.781283	1.437228	-1.23376	97.144	10.4233	194.1259	0.6709	63.2275	3.442166	0.96772	0.047477	97.828	3	20	1.4233	134.1259	30	7.4	128.9	0	0	0	0	100			100	100			88.7			48.6	31.9		12.6	10.1		
UM_SAT_FA5_AG45_RAP50_1			5% FA, 45% Agg, 50% RAP	6674.217376	14.28	3.662813	14.7	0.594115	1.401976	-1.02604	97.395	10.4386	196.818	0.6792	64.4088	3.681155	0.984928	0.137095	94.622	3	20	1.4386	136.818	29	7.4	128.9	0	0	0	0	100			100	100			88.7			48.6	31.9		12.6	10.1		
UM_UNSAT_FA5_AG45_RAP50_1			5% FA, 45% Agg, 50% RAP	132265.9162	14.13	6.42053	14.7	14.9886	0.244719	-1.38148	25.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	20	20.5211	136.5135	9	7.4	128.9	0	0	0	0	100			100	100			88.7			48.6	31.9		12.6	10.1		
UM_SAT_FA5_AG70_RAP25_2			5% FA, 70% Agg, 25% RAP	5921.537649	14.28	3.662813	14.7	0.520905	1.338269	-0.98108	92.92	17.6782	157.6805	2.3066	48.0603	2.34912	0.96067	0.068472	96.371	3	20	4.893	101.9513	24	8.2	128	0	0	0	0	100			100	100			82.9			44.3	29.6		11.8	9.4		
UM_SAT_FA5_AG70_RAP25_1			5% FA, 70% Agg, 25% RAP	5337.958148	14.28	3.662813	14.7	0.441153	1.275864	-0.70863	96.132	10.3884	193.8561	0.6545	63.1004	1.800793	0.787494	0.223699	93.23	3	20	1.3884	133.8561	30	8.2	128	0	0	0	0	100			100	100			82.9			44.3	29.6		11.8	9.4		
UM_UNSAT_FA5_AG70_RAP25_1			5% FA, 70% Agg, 25% RAP	28622.32272	14.13	6.42053	14.7	3.325742	0.869449	-1.38237	63.566	23.6965	196.3625	6.928	64.2619	6.354745	0.706343	-0.27442	87.123	3	20	14.6965	136.3625	12	8.2	128	0	0	0	0	100			100	100			82.9			44.3	29.6		11.8	9.4		
			Average	16,329	7,948	24,709																																									
26FJR1	2600GR111	Cell 26	50% Reclaimed, 50% Class 5	17659.9051	14.51	5.2985868	14.7	1.335607	0.641061	-0.31706	99.239	12.8098	94.8594	1.2812	16.8962	2.876465	0.445695	0.111531	99.072	3.2475	19.6664	2.7179	35.8423	14																							
26FJR2	2600GR112	Cell 26	50% Reclaimed, 50% Class 5	21321.04783	14.51	5.2985868	14.7	1.758831	0.625977	-0.5999	97.829	10.9427	95.6113	1.2637	16.8964	3.32468	0.467888	-0.00676	99.335	2.7326	19.9427	2.7443	35.8428	15																							
26FJR3	2600GR113	Cell 26	50% Reclaimed, 50% Class 5	16887.0328	14.51	5.2985868	14.7	1.259293	0.548043	-0.27524	99.094	11.3606	95.5839	1.032	16.8635	2.627808	0.395173	0.086825	99.206	2.5657	19.9228	2.1891	35.8154	15																							
26FKR1	2600GR114	Cell 26	50% Reclaimed, 50% Class 5	15245.07938	14.51	5.2985868	14.7	1.210905	0.728336	-0.47263	98.867	11.653	77.7366	1.2629	12.6714	2.788274	0.507215	0.112919	98.494	2.9907	20.0074	2.679	26.8801	14																							
26FKR2	2600GR115	Cell 26	50% Reclaimed, 50% Class 5	14971.34263	14.51	5.2985868	14.7	1.085443	0.584081	-0.18225	97.876	12.0081	78.0425	1.2897	12.6658	2.285741	0.386781	0.161472	97.574	3.0907	20.0606	2.7359	26.8683	14																							
26FLR1	2600GR127	Cell 26	50% Reclaimed, 50% Class 5	13414.83557	14.51	5.2985868	14.7	0.918433	0.711185	0.009264	97.97	14.4877	95.9478	2.0974	16.9014	2.494747	0.47967	0.236962	97.743	3.0529	20.0434	4.4494	35.8533	14																							
			Average	16,583																																											
NDSU_TN2		TH10	50% Reclaimed, 50% Class 5	29681.08426	14.08	6.6373757	14.7	2.762868	0.67029	-0.76412	75.866	14.165	201.5247	2.1637	66.7134	5.304806	0.580188	-0.08666	93.17	3	20	4.5899	141.5247	25	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TN3		TH10	50% Reclaimed, 50% Class 5	21563.31423	14.08	6.6373757	14.7	2.12041	0.682869	-0.90989	72.654	11.0524	120.8834	0.9675	35.7718	3.787506	0.546491	-0.09755	86.657	3	20	2.0524	75.8834	24	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TN4		TH10	50% Reclaimed, 50% Class 5	30206.35649	14.08	6.6373757	14.7	0.870736	0.159731	2.322797	29.992	10.4746	120.0932	0.4123	28.611	3.522229	0.06008	0.586679	13.114	3	20.3	0.8746	60.6932	23	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TF1		TH10	50% Reclaimed, 50% Class 5	25771.36364	14.08	6.6373757	14.7	2.30769	0.727217	-0.65348	89.064	12.3087	203.9697	1.1355	67.1609	4.993747	0.555362	-0.00413	95.826	3	20.5	2.4087	142.4697	27	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TF2		TH10	50% Reclaimed, 50% Class 5	29192.53777	14.08	6.6373757	14.7	2.512291	0.642384	-0.55674	86.034	13.3106	121.7973	1.9611	36.2026	5.061926	0.517476	-0.00583	95.155	3	21	4.139	76.7973	23	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TF4		TH10	50% Reclaimed, 50% Class 5	33986.12297	14.08	6.6373757	14.7	2.771525	0.621263	-0.4147	38.297	9.5517	145.272	0.9672	47.2687	6.12799	0.580204	-0.00663	47.831	2.5	20.5	2.0517	100.272	26	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TN1		TH10	50% Reclaimed, 50% Class 5	18957.62446	14.08	6.6373757	14.7	1.883645	0.868698	-0.91628	94.416	12.3271	150.7007	1.0027	49.8278	4.162461	0.583066	-0.00697	97.728	3.2	20	2.1271	105.7007	26	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
NDSU_TF3		TH10	50% Reclaimed, 50% Class 5	23602.79387	14.08	6.6373757	14.7	2.157195	0.704583	-0.711	76.395	10.8544	148.5853	0.6742	48.6306	4.45698	0.595256	-0.05263	89.708	3	20	1.8544	103.5853	26	5.2	136.5	0	0	0	0	100			100	100			78	59		44			16		3	1.6
			Average	26,620																																											
26EJR1	2600GR101	Cell 26	50% Reclaimed, 50% Class 6	26057.78784	14.36	5.7652773	14.7	2.78482	0.758655	-1.31153	93.55	11.7135	95.9948	1.273	16.9115	4.786211	0.583699	-0.25934	97.87	3.0044	20.0287	2.7004	35.8746	15																							
26EJR2	2600GR102	Cell 26	50% Reclaimed, 50% Class 6	19980.38267	14.36	5.7652773	14.7	1.629743	0.626814	-0.50426	99.184	11.5204	95.8748	1.2841	16.9009	3.150469	0.602702	0.040665	99.203	2.9216	20.016	2.7239	35.8522	15																							
26GJR4	2600GR122	Cell 26	50% Reclaimed, 50% Class 6	21535.25831	14.36	5.7652773	14.7	1.569909	0.41503	-0.17971	97.184	11.5208	77.0016	1.2623	12.6653	2.627676	0.308127	0.06221	98.014	3.0477	20.0206	2.6778	26.8672	14																							
26GJR5	2600GR123	Cell 26	50% Reclaimed, 50% Class 6	20946.28084	14.36	5.7652773	14.7	1.724523	0.568659	-0.53653	95.59	11.6297	95.7689	1.2365	16.7476	3.095593	0.44261	-0.01837	96.485	2.99	20.0933	2.6231	35.527	15																							
26GKR1	2600GR124	Cell 26	50% Reclaimed, 50% Class 6	13226.13044	14.36	5.7652773	14.7	1.006097	0.716608	-0.287	99.008	11.7122	95.8107	1.2531	16.8519	2.437951	0.493315	0.148895	98.724	2.9537	20.0245	2.6581	35.7483	15																							
26GNR1	2600GR125	Cell 26	50% Reclaimed, 50% Class 6	22817.93298	14.36	5.7652773	14.7	1.819212	0.518427	-0.44297	97.368	11.7266	95.9317	1.2764	16.9096	3.144389	0.381537	0.018245	97.938	2.9654	20.021	2.7077	35.8707	15																							
26GNR2	2600GR126	Cell 26	50% Reclaimed, 50% Class 6	20250.40316	14.36	5.7652773	14.7	1.37682	0.235318	0.018306	84.52	11.939	78.1052	1.2391	12.6785	1.935773	0.173044	0.06601	85.228	3.0071	20.0375	2.6285	26.8951	14																							
26GPR1	2600GR165	Cell 26	50% Reclaimed, 50% Class 6	20933.84594	14.36	5.7652773	14.7	1.588476	0.524658	-0.29309	99.049	11.9651	95.8945	1.3032	16.9092	2.928469	0.357308	0.092331	99.225	3.0584	20.011	2.7645	35.8699	15																							
26HNR1	2600GR166	Cell 26	50% Reclaimed, 50% Class 6	17815.59313	14.36	5.7652773	14.7	1.429136	0.476526	-0.46449	97.072	12.0643	94.7724	1.2867	16.8991	2.300402	0.350671	0.003516	97.453	3.1105	19.6413	2.7295	35.8485	15																							
26HOR1	2600GR168	Cell 26	50% Reclaimed, 50% Class 6	13630.56898	14.36	5.7652773	14.7	1.059049	0.714333	-0.35115	97.855	11.1663	95.8138	1.2209	16.9027	2.493958	0.498117	0.127114	97.843	2.8588	20.0075	2.59	35.8561	15																							
			Average	19,719																																											
26FNR2	2600GR128	Cell 26	50% Reclaimed, 50% Taconite	15399.75859	14.46	5.5012908	14.7	1.194376	0.630454	-0.37981	99.153	11.7422	95.8819	1.2715	16.8871	2.47584	0.446029	0.082295	99.093	2.9653	20.0216	2.6973	35.823	14																							
26FPR1	2600GR129	Cell 26	50% Reclaimed, 50% Taconite	19353.3261	14.46	5.5012908	14.7	1.487422	0.638633	-0.35079	99.519	11.7417	95.7667	1.2641	16.899	3.148338	0.443979	0.103544	99.162	2.9694	20.0063	2.6816	35.8482	15																							
26HNR2	2600GR167	Cell 26	50% Reclaimed, 50% Taconite	19037.31472	14.46	5.5012908	14.7	1.266702	0.233576	0.081729	81.972	11.6698	93.3356	1.2875	16.912	1.803743	0.129584	0.12985	84.017	2.9787	19.2864	2.7312	35.8757	15																							
			Average	17,930																																											
26FFR2	2600GR109	Cell 26	70% Reclaimed, 30% Class 6	29380.00596	14.4	5.6709964	14.7	2.82817	0.615789	-1.02514	97.599	11.7212	96.1167	1.2776	17.0158	4.393147	0.451653	-0.14852	98.372	3.0031	20.017	2.7103	36.096	14																							
26FHR1	2600GR110	Cell 26	70% Reclaimed, 30% Class 6	13445.23588	14.4	5.6709964	14.7	0.907472	0.688273	0.06762	97.884	11.1889	96.1896	1.2521	16.9551	2.436581	0.448344	0.261634	97.843	2.8436	20.0741	2.6561	35.9673	15																							
26GFR1	2600GR117	Cell 26	70% Reclaimed, 30% Class 6	17257.65254	14.4	5.6709964	14.7	1.543197	0.696376	-0.79411	98.702	11.8409	77.8917	1.2694	12.6087	2.869829	0.484154	-0.01618	98.167	3.0148	20.0048	2.6928	26.7471	14																							
26GFR2	2600GR118	Cell 26	70% Reclaimed, 30% Class 6	21524.19351	14.4	5.6709964	14.7	1.75638	0.50296	-0.52581	95.151	11.8297	95.7689	1.2689	16.897	2.874573	0.37919	-0.01645	96.853	2.9872	20.0019	2.7553	35.8439	15																							
26GFR3	2600GR119	Cell 26	70% Reclaimed, 30% Class 6	17863.73515	14.4	5.6709964	14.7	1.503083	0.697862	-0.60749	98.38	11.3235	95.9025	1.2326	16.9089	3.101329	0.482344	0.060542	96.966	2.9628	20.0435	2.6151	35.8692	14																							
26GGR1	2600GR120	Cell 26	70% Reclaimed, 30% Class 6	17537.42067	14.4	5.6709964	14.7	1.451522	0.656305	-0.55964	98.362	11.6341	96.0704	1.2647	16.9607	2.903195	0.483896	0.024101	99.075	2.9838	20.0397	2.6829	35.979	15																							
26GGR2	2600GR121	Cell 26	70% Reclaimed, 30% Class 6	16551.31291	14.4	5.6709964	14.7	1.365503	0.679624	-0.5483	98.359	11.7398	96.1815	1.252	16.925	2.836176	0.511426	0.019418	99.49	3.0013	20.1053	2.6559	35.9034	14																							
			Average	19,080																																											
CR3_U_5_7_1_FEB14		CR 3 (Wright)	75% Agg, 25% RAP	27288.7463	14.24	6.1612571	14.7	2.490631	0.682268	-0.77766	79.861	11.9552	196.9852	1.3931	64.5754	4.790014	0.532361	-0.09295	97.912	3	20	2.9552	136.9852	26	8.7	127	0	0	0	0	100			99.6	97.6			87.6	72.6		42.1			20.7		8.1	6
CR3_U_5_7_2_FEB19		CR 3 (Wright)	75% Agg, 25% RAP	40204.90521	14.24	6.1612571	14.7	3.346137	0.411277	-0.53876	19.823	14.956	158.2297	1.3491	49.5646	5.167532	0.461795	0.16498	80.973	3	20	2.8618	103.0211	26	8.7	127	0	0	0	0	100			99.6	97.6			87.6	72.6		42.1			21.7		8.1	6
CR3_U_8_7_1_FEB15		CR 3 (Wright)	75% Agg, 25% RAP	16115.90246	14.24	6.1612571	14.7	1.350009	0.815404	-0.52058	75.656	10.4707	157.6347	0.6933	46.3624	3.664488	0.65902	0.020604	84.784	3	20	1.4707	102.5922	29	8.7	127	0	0	0	0	100			99.6	97.6			87.6	72.6		42.1			22.7		8.1	6
CR3_U_8_7_2_FEB21		CR 3 (Wright)	75% Agg, 25% RAP	6967.534795	14.24	6.1612571	14.7	1.489977	1.56112	-3.1302	-547.315	10.4284	157.511	0.6734	48.1194	2.244466	0.655955	-0.34064	-680.327	3	20	1.4284	102.0767	29	8.7	127	0	0	0	0	100			99.6	97.6			87.6	72.6		42.1			23.7		8.1	6
			Average	22,644																																											
NDSU_SF2		TH10	75% Reclaimed, 25% Class 5	24125.26937	14.14	6.4111015	14.7	2.178859	0.652754	-0.7129	84.242	11.2923	200.0716	1.0806	66.0304	4.033324	0.480037	-0.04995	95.908	2.9	20.1	2.2923	140.0716	29	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SF1		TH10	75% Reclaimed, 25% Class 5	19571.09403	14.14	6.4111015	14.7	1.777806	0.752999	-0.71813	91.097	10.1048	201.5716	0.5208	66.0304	3.756584	0.524589	-0.00465	96.319	2.9	20.5	1.1048	140.0716	30	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SF4		TH10	75% Reclaimed, 25% Class 5	30388.34019	14.14	6.4111015	14.7	3.360729	0.671121	-1.27056	74.597	23.5409	119.9947	6.8547	28.2818	4.931026	0.543095	-0.19554	85.904	3	20	14.5409	59.9947	10	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SN1		TH10	75% Reclaimed, 25% Class 5	21908.47356	14.14	6.4111015	14.7	1.536657	0.471953	-0.03385	42.842	11.1175	122.4634	0.9982	33.6121	5.193611	0.351547	0.188261	76.014	3	20.2	2.1175	71.3021	24	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SN2		TH10	75% Reclaimed, 25% Class 5	28105.15555	14.14	6.4111015	14.7	2.000122	0.391188	-0.08263	38.641	11.563	199.356	1.0668	65.4102	3.491088	0.272572	0.115177	68.558	3	20.2	2.263	138.756	27	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SN3		TH10	75% Reclaimed, 25% Class 5	22649.35964	14.14	6.4111015	14.7	1.43871	0.439262	0.236491	64.115	11.1702	121.0432	0.8816	34.6313	3.281404	0.420398	0.135453	61.86	3	20	1.8702	73.4641	23	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
NDSU_SN4		TH10	75% Reclaimed, 25% Class 5	25554.36712	14.14	6.4111015	14.7	1.870481	0.355034	-0.16424	69.53	10.2287	100.6141	0.6734	20.9436	2.923986	0.269839	0.025931	70.471	3	20	0.9287	44.4282	19	5.7	134.8	0	0	0	0	100			100	100			74	54		39			11		1	0.4
			Average	24,615																										Average	100			99.92381	99.34286			82.27619	59.98261		40.93095	28.84737		13.58333	10.67368	3.173913	2.017391
			Total average	21,222																																											
			Stdev	4,152																																											
			Count	58																																											
			Fly Ash Only																																												
			Total average	13,103																																											
			Stdev	4,792																																											
			Count	2																																											
			All																																												
			Total average	19,716																																											
			Stdev	5,226																																											
			Count	60																																											

XLS FILE NAME	MNROAD_ID	LOCATION	Comments	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ PCT	MIN_BULKSTRESS PSI	MAX_BULKSTRESS PSI	MIN_OCTASTRESS PSI	MAX_OCTASTRESS PSI	K4	K5	K6	K456_R_SQ PCT	MIN_CONFSTRESS PSI	MAX_CONFSTRESS PSI	MIN_DEVISTRESS PSI	MAX_DEVISTRESS PSI	N TESTS
REM002BQRC270	0208GR102	Cell 2	50% RAP 50% Base plus 4% Emulsion (3 Day)	34681.8921	13.33	8.546564	14.7	3.45246	0.724784	-0.67599	91.276	10.5064	157.01	0.8003	48.5866	7.286838	0.523219	-0.02002	98.711	2.93	19.9	1.6977	103.0678	29
REM002BQRC273	0208GR103	Cell 2	50% RAP 50% Base plus 4% Emulsion (7 day)	40214.5841	13.33	8.546564	14.7	4.013707	0.665127	-0.69443	87.895	12.1876	156.973	1.314	45.8474	7.726988	0.49934	-0.04956	99.164	2.9932	19.9089	2.7873	97.257	25
REM002BQRC274	0208GR104	Cell 2	50% RAP 50% Base plus 4% Emulsion (7 Day)	49194.7476	13.33	8.546564	14.7	4.559533	0.596923	-0.54741	86.931	10.6882	196.0412	0.8139	64.268	8.578027	0.449842	-0.0246	97.941	2.9872	19.9033	1.7264	136.3331	30
REM002BQRC278	0208GR105	Cell 2	50% RAP 50% Base plus Emulsion (14 Day)	51163.7918	13.33	8.546564	14.7	4.99815	0.61608	-0.6581	78.723	10.5212	196.1176	0.7834	64.3079	9.283324	0.486177	-0.07417	97.053	2.9355	19.9	1.6618	136.4176	30
REM002BQRC279	0208GR106	Cell 2	50% RAP 50% Base plus 4% Emulsion (14 Day)	50582.86	13.33	8.546564	14.7	4.987886	0.622013	-0.67726	77.06	10.6188	156.8117	0.7981	48.2531	9.270746	0.492753	-0.08081	96.237	2.9699	19.9	1.693	102.3603	29
REM002BQRC269	0208GR110	Cell 2	50% RAP 50% Base plus Emulsion (3 Day)	45450.378	13.33	8.546564	14.7	4.400426	0.648028	-0.63174	89.07	12.0762	195.6701	1.3309	64.0969	8.505089	0.476447	-0.03287	98.379	2.9823	19.9002	2.8232	135.9701	29
REM003BQRC254	0308GR104	Cell 3	75% RAP 25% Base plus 3% Emulsion (3 Day)	42313.0781	13.33	8.546564	14.7	4.562235	0.787901	-0.83673	93.549	12.0277	156.4444	1.4705	45.6057	9.653476	0.557371	-0.03905	98.625	2.9633	19.9	3.1194	96.7444	24
REM003BPRC255	0308GR105	Cell 3	75% RAP 25% Base plus 3% Emulsion (3 Day)	42141.0112	13.33	8.546564	14.7	4.287212	0.742527	-0.71965	93.471	10.6317	194.416	0.7692	63.5053	8.984491	0.520274	-0.01944	98.284	2.9999	19.9012	1.6317	134.7151	30
REM003BQRC256	0308GR106	Cell 3	75% RAP 25% Base plus 3% Emulsion (7 Day)	52229.5561	13.33	8.546564	14.7	5.248158	0.687903	-0.70428	90.371	12.0853	192.2815	1.3343	62.4995	10.31079	0.493794	-0.04048	98.252	2.9731	19.9	2.8305	132.5815	29
REM003BQRC257	0308GR107	Cell 3	75% RAP 25% Base plus 3% Emulsion (7 Day)	58390.3972	13.33	8.546564	14.7	5.96776	0.654717	-0.74844	84.528	12.1584	156.9003	1.3503	45.82	10.77364	0.453002	-0.04992	84.837	2.9916	19.9021	2.8645	97.1989	23
REM003CPRC267	0308GR109	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day)	46793.1389	13.33	8.546564	14.7	4.679951	0.69699	-0.69213	85.319	10.5564	195.332	0.7568	63.9376	9.400293	0.506277	-0.03362	94.054	2.9837	19.9003	1.6054	135.632	27
REM003CPRC268	0308GR110	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day)	48942.8338	13.33	8.546564	14.7	4.948498	0.663423	-0.72304	82.278	12.0934	193.6628	1.2852	63.1477	9.449096	0.504222	-0.07407	96.506	2.9812	19.9023	2.7263	133.9565	29
REM003BQRC318	0308GR112	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day)	40534.4181	13.33	8.546564	14.7	4.090836	0.636068	-0.72488	80.166	11.6325	193.6035	1.3425	63.1227	7.489415	0.492514	-0.08189	96.228	2.9147	19.9001	2.848	133.9035	28
REM003BQRC319	0308GR113	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day)	48252.5738	13.33	8.546564	14.7	4.76961	0.647336	-0.67713	81.253	10.1169	193.1836	0.6381	62.9248	9.149887	0.508101	-0.06625	96.723	2.9057	19.9	1.3536	133.4836	30
REM004BQRC276	0408GR101	Cell 4	100% RAP plus 1.5% Emulsion (3 day)	58099.3968	13.33	8.546564	14.7	5.885962	0.669962	-0.72597	83.612	10.4783	189.0311	0.7899	60.9673	11.30905	0.506818	-0.07077	97.287	2.9331	19.9	1.6757	129.3311	30
REM004BQRC277	0408GR102	Cell 4	100% RAP plus 1.5% Emulsion (3 day)	49252.3341	13.33	8.546564	14.7	5.181483	0.709658	-0.7998	79.209	10.5534	189.0233	0.8408	60.9636	10.28924	0.55028	-0.09587	96.678	2.9233	19.9	1.7835	129.3233	30
REM004BQRC280	0408GR103	Cell 4	100% RAP plus 1.5% Emulsion (7 day)	48269.5383	13.33	8.546564	14.7	4.73788	0.686829	-0.65337	89.67	10.4352	196.1336	0.7581	64.3154	9.58801	0.50248	-0.02736	98.287	2.9368	19.9	1.6082	136.4336	30
REM004BQRC281	0408GR104	Cell 4	100% RAP plus 1.5% Emulsion (7 day)	58656.6786	13.33	8.546564	14.7	5.711136	0.653314	-0.64291	87.796	10.5128	195.6352	0.7765	64.0805	11.09597	0.483643	-0.03851	98.224	2.9296	19.9	1.6471	135.9352	30
REM004BQRC284	0408GR105	Cell 4	100% RAP plus 1.5% Emulsion (15 day)	56988.2351	13.33	8.546564	14.7	6.105611	0.669054	-0.84824	78.115	12.1132	196.3632	1.2263	64.4235	11.08271	0.517408	-0.12344	97.49	2.9718	19.9004	2.6013	136.6628	29
REM004BQRC285	0408GR106	Cell 4	100% RAP plus 1.5% Emulsion (15 day)	53105.1251	13.33	8.546564	14.7	5.613295	0.716813	-0.80859	80.734	12.1241	195.6513	1.3803	64.0881	11.17766	0.549399	-0.09449	96.304	2.9599	19.9013	2.928	135.9513	29
REM004BQRC294	0408GR109	Cell 4	100% RAP plus 0.75% Emulsion (3 day)	42894.7178	13.33	8.546564	14.7	4.465881	0.763399	-0.7656	91.577	12.0546	193.3876	1.3568	63.0205	9.46378	0.53921	-0.0346	96.839	2.9711	19.9008	2.8783	133.6867	29
REM004BQRC295	0408GR110	Cell 4	100% RAP plus 0.75% Emulsion (3 day)	35180.9619	13.33	8.546564	14.7	3.188016	0.624509	-0.49234	92.163	10.5622	192.568	0.7909	62.6346	6.217789	0.418102	0.036147	92.689	2.9464	19.9	1.6777	132.868	30
REM004BQRC296	0408GR111	Cell 4	100% RAP plus 0.75% Emulsion (7 day)	36913.0601	13.33	8.546564	14.7	3.776101	0.76817	-0.7262	92.411	10.6257	196.9424	0.8042	64.6969	8.246894	0.545515	-0.02024	98.319	2.9524	19.9001	1.7059	137.2428	30
REM004BQRC297	0408GR112	Cell 4	100% RAP plus 0.75% Emulsion (7 day)	48246.9533	13.33	8.546564	14.7	4.108237	0.502659	-0.38257	91.24	10.3551	195.591	0.756	64.0596	7.204432	0.361583	0.018565	95.946	2.9142	19.9	1.6037	135.891	30
REM004BQRC298	0408GR113	Cell 4	100% RAP plus 0.75% Emulsion (14 day)	46999.7308	13.33	8.546564	14.7	5.125952	0.806594	-0.85774	88.891	10.7154	192.6913	0.8245	62.6906	11.17112	0.585215	-0.06472	97.507	2.9869	19.9034	1.7491	132.9869	30
REM004BQRC299	0408GR114	Cell 4	100% RAP plus 0.75% Emulsion (14 day)	36842.869	13.33	8.546564	14.7	3.781558	0.783756	-0.73018	94.447	10.9171	189.4918	0.9037	61.166	8.352516	0.542428	-0.00762	98.214	3	19.9168	1.9171	129.7527	30
REM004BQRC306	0408GR115	Cell 4	100% RAP plus 0.75% Emulsion (14 day)	44455.1217	13.33	8.546564	14.7	4.613841	0.759363	-0.75962	89.175	10.6514	193.9415	0.8254	63.285	9.862392	0.552389	-0.0436	98.231	2.9477	19.9	1.7508	134.2478	30
REM004BQRC307	0408GR116	Cell 4	100% RAP plus 0.75% Emulsion (14 day)	45455.3544	13.33	8.546564	14.7	4.824763	0.740805	-0.81256	83.715	12.1308	192.4485	1.2778	62.5772	9.867646	0.554938	-0.08155	96.463	2.9663	19.9014	2.7106	132.7463	29
			Average	46,866																				
			Stdev	6,829																				
			Count	28																				
REM002AORC321	0208GR101	Cell 2	Fortress (50% RAP 50% Base) 3% emulsion	147506.615	16.59	13.519882	14.7	14.15772	0.214336	-0.56757	58.753	17.8753	183.5361	4.2605	58.4209	15.00338	0.196407	-0.16722	80.861	2.9047	19.8993	9.0379	123.9295	23
REM002APRC320	0208GR109	Cell 2	Fortress (50% RAP 50% Base) 3% Emulsion	164882.922	16.59	13.519882	14.7	15.52698	0.209077	-0.5374	40.114	14.9374	194.8921	2.7799	63.7196	17.23675	0.252829	-0.19378	91.16	3	19.9197	5.897	135.1698	26
REM003APRC322	0308GR114	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day) Fortress	238404.641	16.59	13.519882	14.7	20.58734	0.200043	-0.40288	53.231	14.8207	195.1543	2.8537	63.8678	22.51266	0.139684	-0.0779	47.185	2.915	19.9	6.0537	135.4841	25
REM003APRC323	0308GR115	Cell 3	75% RAP 25% Base plus 3% Emulsion (14 Day) Fortress	224410.815	16.59	13.519882	14.7	19.40978	0.214103	-0.40793	51.703	14.8869	195.5371	2.6716	64.0326	21.58664	0.147606	-0.07409	44.735	2.9914	19.9017	5.6674	135.8336	25
REM004ANRC324	0408GR117	Cell 4	100% RAP plus 0.75% Emulsion (14 day) Fortress	220450.329	16.59	13.519882	14.7	18.82785	0.062766	-0.36049	41.13	15.3522	194.1368	3.0883	63.3741	18.35213	0.143748	-0.17399	80.526	2.9295	19.9	6.5513	134.4368	25
REM004AORC325	0408GR118	Cell 4	100% RAP plus 0.75% Emulsion (14 day) Fortress	232639.637	16.59	13.519882	14.7	21.84577	0.191759	-0.52985	54.038	14.6973	195.2996	2.6933	63.922	22.827	0.189139	-0.16273	81.587	2.9824	19.9021	5.7133	135.5989	24
			Average	204,716																				
			Stdev	38,496																				
			Count	6																				

XLS_FILE_NAME	MNROAD_ID	LOCATION	MATERIAL_TYPE	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ_PCT
REM002D	0208GR107	Cell 2	50% RAP 50	18984.6468	13.76	7.3350543	14.7	1.767215	0.901397	-0.62763	97.596
REM002C	0208GR108	Cell 2	50% RAP 50	24123.8984	13.76	7.3350543	14.7	1.725263	0.496917	-0.04246	97.575
REM003D	0308GR108	Cell 3	75% RAP 25	15043.7208	13.39	8.3910005	14.7	1.646678	1.094718	-0.82699	99.529
REM003D	0308GR111	Cell 3	75% RAP 25	24834.2357	13.39	8.3910005	14.7	2.48509	0.867836	-0.67523	95.639
REM004B	0408GR107	Cell 4	100% RAP N	37972.195	13.39	8.3910005	14.7	2.933217	0.460691	-0.18621	95.881
REM004B	0408GR108	Cell 4	100% RAP N	39454.0177	13.39	8.3910005	14.7	3.903175	0.735134	-0.67734	92.944
CR3_S_7_8_1_DEC31	CR 3 (Wrigh	IN-SITU RAP		24113.963	14.35	5.8737003	14.7	1.993666	0.601743	-0.53703	62.436
CR3_S_7_8_2_MAR26	CR 3 (Wrigh	IN-SITU RAP		18363.1551	14.35	5.8737003	14.7	1.729918	0.8957	-0.90429	85.603
CR3_V_5_2_1_MAR15	CR 3 (Wrigh	50 PCT AGG		26718.7119	14.35	5.8737003	14.7	2.365869	0.745873	-0.73076	87.668
CR3_V_5_2_2_MAR19	CR 3 (Wrigh	50 PCT AGG		24312.9201	14.35	5.8737003	14.7	2.198142	0.764678	-0.79135	85.163
CR3_V_8_1_MAR16	CR 3 (Wrigh	50 PCT AGG		12289.3226	14.35	5.8737003	14.7	1.214483	1.107554	-1.03147	97.844
CR3_V_8_2_MAR23	CR 3 (Wrigh	50 PCT AGG		9906.19708	14.35	5.8737003	14.7	1.020503	1.243882	-1.14529	98.361
TH23_X_3_5_2_APR1	TH23 (D1)	IN-SITU RAP		20943.3644	14.35	5.8737003	14.7	1.826735	0.793786	-0.68248	92.499
TH200_Y_3_7_1_MAY9	TH200 (D4)	IN-SITU RAP		21467.4667	14.35	5.8737003	14.7	1.962035	0.887403	-0.8148	95.181
TH200_Y_5_7_1_MAY10	TH200 (D4)	IN-SITU RAP		11546.4364	14.35	5.8737003	14.7	1.151091	1.187061	-1.05179	98.873
TH200_Y_5_7_2_JUN4	TH200 (D4)	IN-SITU RAP		12571.5677	14.35	5.8737003	14.7	1.225737	1.138633	-0.98914	99.158
CR3_S_5_1_1_FEB7	CR 3 (Wrigh	IN-SITU RAP		30025.8538	14.35	5.8737003	14.7	2.584295	0.617365	-0.65552	77.08
CR3_S_5_1_2_FEB11	CR 3 (Wrigh	IN-SITU RAP		36505.5285	14.35	5.8737003	14.7	3.440876	0.601267	-0.92698	53.17
TH23_X_3_5_1_MAR29	TH23 (D1)	IN-SITU RAP		22788.8862	14.35	5.8737003	14.7	2.071195	0.804546	-0.8041	88.758
TH23_X_5_4_1_MAR30	TH23 (D1)	IN-SITU RAP		18179.8209	14.35	5.8737003	14.7	1.638007	0.867661	-0.77375	94.753
TH23_X_5_4_2_APR2	TH23 (D1)	IN-SITU RAP		18184.5349	14.35	5.8737003	14.7	1.618259	0.851856	-0.73802	91.941
TH200_Y_3_7_2_JUN3	TH200 (D4)	IN-SITU RAP		20423.6059	14.35	5.8737003	14.7	1.852509	0.912028	-0.79044	91.963
			Average	20,521							
			Stdev	7,107							
			Count	22							

XLS_FILE_NAME	MIN_BULKSTRESS_PSI	MAX_BULKSTRESS_PSI	MIN_OCTASTRESS_PSI	MAX_OCTASTRESS_PSI	K4	K5	K6	K456_R_SQ_PCT	MIN_CONFSTRESS_PSI	MAX_CONFSTRESS_PSI	MIN_DEVISTRESS_PSI	MAX_DEVISTRESS_PSI	N_TESTS
REM002D	10.4572	184.0737	0.784	58.6347	4.755415	0.579694	0.098886	96.673	2.9304	19.8989	1.6632	124.383	30
REM002C	10.3793	182.4768	0.7763	57.9088	3.50794	0.331075	0.159174	95.894	2.9085	19.8923	1.6467	122.8431	30
REM003D	10.6593	157.2263	0.787	48.1843	5.225338	0.682284	0.109776	97.126	2.9808	19.9003	1.6695	102.2144	29
REM003D	10.6007	196.4578	0.7946	64.4683	6.40505	0.602655	0.041664	98.766	2.9707	19.9002	1.6855	136.7579	30
REM004B	10.4493	196.8376	0.7768	64.6473	5.299251	0.320205	0.086348	96.771	2.931	19.9	1.6479	137.1376	30
REM004B	10.657	182.3674	0.7931	57.8231	8.258222	0.512777	-0.00555	97.136	2.9916	19.9041	1.6823	122.6612	30
CR3_S_7_8_1_DEC31	17.7834	195.937	1.336	64.0813	4.025037	0.546005	-0.07112	87.169	3	20	2.8342	135.937	27
CR3_S_7_8_2_MAR26	10.4748	158.3559	0.6952	48.5592	4.278467	0.680191	-0.06621	98.52	3	20	1.4748	103.0095	29
CR3_V_5_2_1_MAR15	10.5143	197.2401	0.7139	64.6956	5.065983	0.559572	-0.04273	99.335	3	20	1.5143	137.2401	30
CR3_V_5_2_2_MAR19	10.5434	197.1924	0.7275	64.6731	4.721008	0.581914	-0.06455	99.133	3	20	1.5434	137.1924	30
CR3_V_8_1_MAR16	10.4568	197.1811	0.6868	64.6678	3.594979	0.721236	0.024274	97.159	3	20	1.4568	137.1811	30
CR3_V_8_2_MAR23	10.4531	195.9399	0.685	64.0827	3.457239	0.802066	0.03675	96.856	3	20	1.4531	135.9399	30
TH23_X_3_5_2_APR1	10.4939	157.6477	0.7042	48.3578	4.249551	0.568873	0.012833	98.474	3	20	1.4939	102.5824	29
TH200_Y_3_7_1_MAY9	10.4891	158.2959	0.702	48.6259	4.830868	0.610135	0.013397	99.044	3	20	1.4891	103.151	29
TH200_Y_5_7_1_MAY10	10.463	157.2505	0.6896	48.2793	3.744543	0.747779	0.075644	96.53	3	20	1.463	102.4158	28
TH200_Y_5_7_2_JUN4	10.4439	156.9716	0.6807	47.9247	3.794039	0.699638	0.09167	95.908	3	20	1.4439	101.6637	29
CR3_S_5_1_1_FEB7	11.9803	197.1299	1.3437	64.6436	4.842475	0.510212	-0.08508	97.397	3	20	2.8503	137.1299	27
CR3_S_5_1_2_FEB11	11.9525	194.1049	1.3532	63.2177	5.677585	0.542179	-0.22126	93.756	3	20	2.8707	134.1049	28
TH23_X_3_5_1_MAR29	10.4758	157.7756	0.6957	48.4292	4.65532	0.594319	-0.03653	99.018	3	20	1.4758	102.7338	29
TH23_X_5_4_1_MAR30	11.9188	196.4521	1.3352	64.3241	4.001937	0.603157	0.007678	98.829	3	20	2.8324	136.4521	28
TH23_X_5_4_2_APR2	10.4949	157.7622	0.7047	48.3801	3.986803	0.612921	0.002331	97.918	3	20	1.4949	102.6297	29
TH200_Y_3_7_2_JUN3	10.4565	195.1229	0.6866	63.6976	4.873708	0.660005	0.000605	98.535	3	20	1.4565	135.1229	30

XLS_FILE_NAME	OPT_MOIST	MAX_DENS_PCF	D10	D60	PP_75MM	PP_63MM	PP_50MM	PP_37_5MM	PP_31_5MM	PP_25MM	PP_19MM	PP_16MM	PP_12_5MM	PP_9_5MM	PP_4_75MM	PP_2_36MM	PP_2MM	PP_1_18MM	PP_600UM	PP_425UM	PP_300UM	PP_150UM	PP_075UM
REM002D																							
REM002C																							
REM003D																							
REM003D																							
REM004B																							
REM004B																							
CR3_S_7_8_1_DEC31	7.8	127	0	0	0	0	100			90.8	84.6			71.8	59.9		27.7			15.5		4.8	3.3
CR3_S_7_8_2_MAR26	7.8	127	0	0	0	0	100			90.8	84.6			71.8	59.9		27.7			16.5		4.8	3.3
CR3_V_5_2_1_MAR15	8	127	0	0	0	0	100			98.7	94.3			81.3	64.2		28.8			11.9		4.6	3.5
CR3_V_5_2_2_MAR19	8	127	0	0	0	0	100			98.7	94.3			81.3	64.2		28.8			12.9		4.6	3.5
CR3_V_8_1_MAR16	8	127	0	0	0	0	100			98.7	94.3			81.3	64.2		28.8			13.9		4.6	3.5
CR3_V_8_2_MAR23	8	127	0	0	0	0	100			98.7	94.3			81.3	64.2		28.8			14.9		4.6	3.5
TH23_X_3_5_2_APR1	5.4	130	0	0	0	0	100			99.6	99.4			89.8	73.4		56.4			21.4		5.3	3
TH200_Y_3_7_1_MAY9	5.7	134	0	0	0	0	100			96.3	91			79.6	65.9		52.2			21.9		8.6	4
TH200_Y_5_7_1_MAY10	5.7	134	0	0	0	0	100			96.3	91			79.6	65.9		52.2			23.9		8.6	4
TH200_Y_5_7_2_JUN4	5.7	134	0	0	0	0	100			96.3	91			79.6	65.9		52.2			24.9		8.6	4
CR3_S_5_1_1_FEB7	7.8	127	0	0	0	0	100			90.8	84.6			71.8	59.9		27.7			13.5		4.8	3.3
CR3_S_5_1_2_FEB11	7.8	127	0	0	0	0	100			90.8	84.6			71.8	59.9		27.7			14.5		4.8	3.3
TH23_X_3_5_1_MAR29	5.4	130	0	0	0	0	100			99.6	99.4			89.8	73.4		56.4			20.4		5.3	3
TH23_X_5_4_1_MAR30	5.4	130	0	0	0	0	100			99.6	99.4			89.8	73.4		56.4			22.4		5.3	3
TH23_X_5_4_2_APR2	5.4	130	0	0	0	0	100			99.6	99.4			89.8	73.4		56.4			23.4		5.3	3
TH200_Y_3_7_2_JUN3	5.7	134	0	0	0	0	100			96.3	91			79.6	65.9		52.2			22.9		8.6	4
						Average	100			96.35	92.325			80.625	65.85		41.275			18.425		5.825	3.45

XLS_FILE_NAME	MNROAD_ID	LOCATION	MNDOT_SPECIFICATION	Mr	Bulk Stress	Octahedral Stress	Pa	K1	K2	K3	K123_R_SQ PCT	MIN_BULKSTRESS PSI	MAX_BULKSTRESS PSI	MIN_OCTASTRESS PSI	MAX_OCTASTRESS PSI	K4	K5	K6	K456_R_SQ PCT	MIN_CONFSTRESS SS PSI
B2 2 27 98		TH23	CLAY	28092.743	3.74	1.4377838	15	2.13366	0.02017	-0.88477	98.315	13.348	34.6312	3.4639	5.0116	1.58631	0.01143	-0.18884	98.215	2
RVMR216A		ST LOUIS COUNTY (US53)	CLAY	13470.867	3.74	1.4377838	15	1.26556	0.02808	-3.04776	97.373	7.4182	26.6439	0.7988	4.2418	0.53757	0.03072	-0.37434	95.111	1.9075
RVMR217A		ST LOUIS COUNTY (US53)	CLAY	19243.379	3.74	1.4377838	15	1.59249	0.01305	-1.90877	97.663	7.5895	26.7905	0.8761	4.2963	0.91372	0.00641	-0.2339	94.203	1.9086
RVMR236A		ITASCA COUNTY (TH6)	CLAY	24813.601	3.74	1.4377838	15	2.58817	0.09118	-3.24285	97.972	7.5049	26.9273	0.8317	4.3531	1.11219	0.06912	-0.39536	88.753	1.9105
RVMR236B		ITASCA COUNTY (TH6)	CLAY	76691.643	3.74	1.4377838	15	6.303	0.03909	-1.45292	93.929	9.1673	26.5191	0.9794	4.2087	4.21806	0.03101	-0.20924	95.819	1.909
RVMR237A		ITASCA COUNTY (TH6)	CLAY	21346.434	3.74	1.4377838	15	2.30477	0.11289	-3.29439	97.029	7.4411	26.8241	0.8034	4.3053	1.00949	0.08039	-0.38048	96.09	1.9096
B 1 16 98		TH23	CLAY	6797.6545	3.74	1.4377838	15	1.02392	0.48107	-1.46217	95.352	10.1239	38.6598	1.941	6.9107	1.15481	0.29007	-0.11979	98.915	2
B 2 16 98		TH23	CLAY	7230.5988	3.74	1.4377838	15	1.06748	0.45132	-1.68334	94.522	10.1279	38.7494	1.9459	6.9529	1.06139	0.27133	-0.18006	98.503	2
B2 1 16 103		TH23	CLAY	47598.059	3.74	1.4377838	15	4.26841	0.16311	-0.56846	96.968	10.2856	39.0618	2.0203	7.1718	4.2554	0.08595	-0.06014	97.111	2
B2 1 195 103		TH23	CLAY	31284.332	3.74	1.4377838	15	2.63943	0.10793	-0.72395	93.048	10.2462	39.0575	1.9999	7.1003	2.33402	0.064	-0.1131	93.742	2
B2 1 22 98		TH23	CLAY	28676.492	3.74	1.4377838	15	2.21875	0.04183	-0.76573	98.407	10.1716	38.7944	1.9665	7.0035	1.77077	0.02507	-0.13952	93.145	2
B2 1 24 103		TH23	CLAY	44417.909	3.74	1.4377838	15	3.29135	0.02214	-0.59153	95.919	13.4996	38.8265	3.4968	6.9931	2.70244	0.01192	-0.1402	93.773	2
B2 1 27 98		TH23	CLAY	34040.325	3.74	1.4377838	15	2.51843	0.01361	-0.6998	98.432	10.2345	39.0911	1.9961	7.114	1.97698	0.00827	-0.1408	95.805	2
B2 2 195 103		TH23	CLAY	46402.985	3.74	1.4377838	15	3.56888	0.04905	-0.59587	96.85	16.8131	39.0361	3.5412	7.0881	3.01613	0.02303	-0.1336	95.697	2
B2 2 22 98		TH23	CLAY	38185.776	3.74	1.4377838	15	2.83349	0.02207	-0.60742	98.215	13.4804	38.863	3.4582	7.0432	2.31141	0.01158	-0.14328	95.988	2
B2 2 24 103		TH23	CLAY	37132.239	3.74	1.4377838	15	2.81576	0.03781	-0.60908	98.254	13.5635	38.9407	2.0702	7.1301	2.34228	0.01661	-0.11736	96.216	2
C27CL1B	2793SG101	Cell 27	CLAY	22721.156	3.74	1.4377838	15	2.57199	0.08567	-4.20041	98.379	7.9867	26.8826	0.8402	4.1769	0.837	0.05977	-0.48723	98.034	2.0498
C27O1B	2793SG103	Cell 27	CLAY	51636.086	3.74	1.4377838	15	5.46026	0.02232	-4.39982	90.827	9.7567	26.8542	1.6516	4.2147	1.35658	0.01691	-0.68442	92.501	2.0502
RVMR059A		WRIGHT COUNTY (TH25)	CLAY LOAM	29002.853	3.74	1.4377838	15	2.49014	0.05445	-1.69593	97.204	7.2145	26.5867	0.7715	4.2711	1.64097	0.03693	-0.18377	87.857	1.8555
RVMR059C		WRIGHT COUNTY (TH25)	CLAY LOAM	10292.387	3.74	1.4377838	15	1.36654	0.21289	-4.0436	96.681	7.4291	26.4238	0.8333	4.192	0.55012	0.13927	-0.4337	96.691	1.8584
RVMR059D		WRIGHT COUNTY (TH25)	CLAY LOAM	8698.8803	3.74	1.4377838	15	1.24539	0.21605	-4.80503	96.486	7.6499	26.4774	0.8417	4.1678	0.40126	0.14152	-0.52849	97.016	1.9035
RVMR060A		WRIGHT COUNTY (TH25)	CLAY LOAM	6654.9385	3.74	1.4377838	15	1.10788	0.28965	-5.34189	96.176	7.4229	26.3387	0.8454	4.1902	0.33635	0.18845	-0.57025	96.213	1.8548
RVMR060B		WRIGHT COUNTY (TH25)	CLAY LOAM	3715.114	3.74	1.4377838	15	0.67308	0.37736	-4.96188	94.224	7.4148	26.25	0.8459	4.1641	0.25786	0.24918	-0.50292	96.21	1.8566
RVMR106A		WRIGHT COUNTY (TH25)	CLAY LOAM	8676.8999	3.74	1.4377838	15	1.25524	0.20665	-5.05443	96.391	7.3853	26.3259	0.8196	4.1546	0.37418	0.13632	-0.55363	97.848	1.8569
2885PRA2	2899SG109	Cell 28 STA 185 + 00 + 95	CLAY LOAM	10012.748	3.74	1.4377838	15	1.24488	0.12503	-4.62821	96.528	7.8959	26.8489	0.8241	4.1661	0.37945	0.07674	-0.51466	98.341	2.004
RVMR059B		WRIGHT COUNTY (TH25)	CLAY LOAM	55811.347	3.74	1.4377838	15	6.17522	0.0738	-4.13	97.107	9.2671	26.4324	1.6346	4.2337	1.78525	0.05289	-0.64162	98.54	1.8562
RVMR068A		ISANTI COUNTY (TH47)	LOAM	27865.129	3.74	1.4377838	15	3.66726	0.25512	-3.32974	94.659	9.1451	26.5417	1.0169	4.2521	1.74875	0.15592	-0.43867	96.149	1.855
RVMR071A		FREEBORN COUNTY (TH13)	LOAM	47216.256	3.74	1.4377838	15	4.77213	0.08788	-2.95357	93.541	11.0001	26.4498	1.7014	4.2286	1.97346	0.04163	-0.47204	97.971	1.8564
RVMR088A		ISANTI COUNTY (TH47)	LOAM	7509.0158	3.74	1.4377838	15	1.36842	0.44456	-4.03894	93.584	7.4267	26.4988	0.8213	4.231	0.76003	0.30165	-0.37283	98.11	1.8568
RVMR090A		LYON COUNTY TH23)	LOAM	28211.586	3.74	1.4377838	15	3.2828	0.16012	-3.40395	95.535	9.3184	26.5468	0.9286	4.3694	1.34446	0.07376	-0.43644	97.518	1.8567
RVMR091A		LYON COUNTY TH23)	LOAM	30641.586	3.74	1.4377838	15	3.62308	0.16167	-3.5527	97.626	9.1367	26.7475	0.9284	4.3464	1.48291	0.08745	-0.42594	96.784	1.857
RVMR092A		LYON COUNTY TH23)	LOAM	64759.955	3.74	1.4377838	15	4.75094	-0.06278	-1.73	86.631	11.1525	25.9759	1.6665	4.291	2.4815	-0.04171	-0.29341	85.905	1.8578
RVMR093A		LYON COUNTY TH23)	LOAM	12791.571	3.74	1.4377838	15	1.81839	0.2317	-4.49944	95.602	7.4235	26.5124	0.8625	4.2323	0.65064	0.1534	-0.49378	96.755	1.6996
2776MRA2	2799SG101	Cell 27 STA 176 + 30 - 95	LOAM	43856.1	3.74	1.4377838	15	4.70156	0.08359	-3.64792	93.396	7.9268	27.0163	0.8427	4.2477	1.75531	0.05473	-0.43489	98.524	2.0034
2776MRB2	2799SG102	Cell 27 STA 176 + 30 - 95	LOAM	42995.167	3.74	1.4377838	15	3.77108	0.02935	-2.29273	97.581	7.9211	26.8957	0.854	4.2051	1.98438	0.01771	-0.27188	95.719	2.0068
2776PRA3	2799SG103	Cell 27	LOAM	30771.951	3.74	1.4377838	15	3.41723	0.13925	-3.2093	96.103	7.9133	27.031	0.756	4.2709	1.59265	0.09271	-0.353	97.221	2.0019
2777MRA2	2799SG105	Cell 27 STA 177 + 80 - 95	LOAM	47691.109	3.74	1.4377838	15	4.19452	0.04881	-2.03692	97.91	7.8517	26.946	0.7863	4.2433	2.45899	0.03402	-0.23361	96.574	2.0024
2777PRA2	2799SG106	Cell 27 STA 177 + 80 + 95	LOAM	29991.893	3.74	1.4377838	15	3.9673	0.11986	-5.36836	91.038	7.8592	26.9759	0.821	4.2299	0.93289	0.08484	-0.6422	98.779	2.0081
2777PRB2	2799SG107	Cell 27	LOAM	25545.217	3.74	1.4377838	15	2.74314	0.10117	-3.40807	97.471	7.9159	26.8824	0.8357	4.2225	1.14699	0.06924	-0.39012	97.528	2.0057
2779MRA2	2799SG108	Cell 27 STA 179 + 30 - 95	LOAM	39070.163	3.74	1.4377838	15	3.81781	0.03975	-3.29809	97.872	7.8613	26.9072	0.8218	4.2533	1.51921	0.03189	-0.39597	98.531	2.0029
2779PRA1	2799SG109	Cell 27 STA 179 + 30 + 95	LOAM	52857.236	3.74	1.4377838	15	4.79847	0.01026	-2.94172	90.478	9.6359	26.8719	1.6024	4.2025	1.85907	0.0029	-0.46152	95.175	2.0058
2779PRB1	2799SG110	Cell 27 STA 179 + 30 + 95	LOAM	15225.352	3.74	1.4377838	15	2.09379	0.24252	-3.98552	93.537	7.9638	26.8761	0.8322	4.1939	0.88989	0.16315	-0.42547	97.107	2.005
2882PRB1	2899SG104	Cell 28 STA 182 + 00 + 95	LOAM	19588.634	3.74	1.4377838	15	2.31655	0.15826	-3.60446	91.087	7.8923	25.2035	0.8418	3.3905	1.09854	0.11069	-0.33641	94.53	2.0067
3364MRB2	3399SG101	Cell 33	LOAM	25627.391	3.74	1.4377838	15	2.49547	0.074	-2.75813	96.429	7.9379	27.0066	0.8291	4.242	1.21522	0.05132	-0.31991	98.681	2.014
3364PRA2	3399SG102	Cell 33	LOAM	51219.397	3.74	1.4377838	15	4.54491	0.03361	-2.35464	98.644	9.6589	26.9951	1.6248	4.2641	2.21239	0.01902	-0.35682	98.102	2.0107
3364PRB1	3399SG103	Cell 33	LOAM	23133.89	3.74	1.4377838	15	2.71854	0.09856	-4.41239	94.188	8.0326	26.8762	0.819	4.1821	0.8273	0.06276	-0.52283	98.796	2.0085
3366MRA1	3399SG104	Cell 33	LOAM	26197.72	3.74	1.4377838	15	3.15584	0.14127	-4.05152	94.968	7.912	26.9813	0.8208	4.2528	1.14606	0.09909	-0.46287	99.082	2.009
3367MRB2	3399SG106	Cell 33	LOAM	21946.822	3.74	1.4377838	15	2.98344	0.15583	-5.13315	92.487	7.9303	27.0232	0.8422	4.2475	0.79136	0.10891	-0.6032	98.762	2.0305
3367PRB2	3399SG107	Cell 33	LOAM	25990.957	3.74	1.4377838	15	2.65667	0.08742	-3.08115	99.056	7.7702	26.8387	0.7921	4.1625	1.21472	0.05646	-0.33797	95.39	2.0034
3470MRA2	3499SG101	Cell 34	LOAM	46084.852	3.74	1.4377838	15	4.08037	0.00053	-2.81649	97.13	7.9491	26.9139	0.8484	4.2347	1.76871	0.02148	-0.38182	97.217	2.0134
3470PRA1	3499SG102	Cell 34	LOAM	90842.382	3.74	1.4377838	15	6.32106	-0.05204	-1.00559	97.027	11.3093	27.0064	2.4317	4.2865	4.19532	-0.03027	-0.20023	94.61	2.0037
3470PRB1	3499SG103	Cell 34	LOAM	122866.58	3.74	1.4377838	15	8.99828	-0.05646	-1.61888	98.977	11.4718	26.939	2.424	4.2701	4.76936	-0.03544	-0.31996	99.705	2.0029
3472PRB1	3499SG104	Cell 34	LOAM	39555.58	3.74	1.4377838	15	3.70198	0.06891	-2.4078	98.242	7.9311	26.9753	0.8044	4.2306	1.99344	0.04312	-0.271	93.924	2.0035
3473MRA2	3499SG005	Cell 34	LOAM	23704.374	3.74	1.4377838	15	2.42675	0.10835	-2.79082	98.228	7.8639	26.9865	0.8458	4.2393	1.23108	0.07302	-0.30985	96.736	2.0032
3473MRB1	3499SG106	Cell 34	LOAM	21429.562	3.74	1.4377838	15	2.31292	0.15667	-2.64846	97.001	7.9186	27.0059	0.8415	4.2528	1.30596	0.10613	-0.28099	96.742	2.003
3575MRA2	3599SG101	Cell 35	LOAM	28746.128	3.74	1.4377838	15	3.33301	0.16772	-3.25398	96.661	7.9437	27.0123	0.773	4.2439	1.59124	0.11057	-0.35084	98.23	2.0035
3575MRB1	3599SG102	Cell 35	LOAM	18760.018	3.74	1.4377838	15	2.61752	0.22882	-4.34165	93.084	7.8957	27.0215	0.7958	4.2495	0.98065	0.15601	-0.47426	98.066	2.0029
3575PRB1	3599SG103	Cell 35	LOAM	29907.044	3.74	1.4377838	15	2.94716	0.04242	-3.34919	98.074	7.9507	26.8998	0.8481	4.2072	1.15668	0.02938	-0.39931	97.325	2.0195
3577PRA1	3599SG104	Cell 35	LOAM	53386.732	3.74	1.4377838	15	5.33568	0.12197	-2.33354	95.115	9.7099	26.9115	1.571	4.2196	2.96508	0.0794	-0.32533	98.831	2.0135
3577PRB1	3599SG105	Cell 35	LOAM	11943.898	3.74	1.4377838	15	1.65046	0.24884	-3.94447	93.414	7.9437	26.902	0.8487	4.2112	0.71331	0.16554	-0.41936	96.292	2.0153
3578MRA1	3599SG106	Cell 35	LOAM	48070.659	3.74	1.4377838	15	4.56314	0.12528	-1.73295	95.409	7.9652	27.0117	0.8434	4.2958	3.22279	0.08655	-0.18605	96.973	2.0146
3578MRB2	3599SG107	Cell 35	LOAM	12593.971	3.74	1.4377838	15	1.52998	0.16684	-3.76693	94.938	7.9646	26.9436	0.8562	4.2126	0.6266	0.11681	-0.4234	98.694	2.0291
3578PRB2	3599SG109	Cell 35	LOAM	36206.311	3.74	1.4377838	15	3.20844	0.00904	-2.70085	98.434	7.8888	26.8723	0.8405	4.2133	1.46478	0.00766	-0.32543	97.521	2.018
3471MRA1	3499SG107	Cell 34	LOAM	19137.93	3.74	1.4377838	15	2.59238	0.18756	-4.62966	93.531	7.9926	26.8661	0.8397	4.1794	0.8529	0.14145	-0.53468	96.209	2.0066
3471MRA4	3499SG108	Cell 34	LOAM	16179.227	3.74	1.4377838	15	2.08252	0.22438	-3.54246	95.208	7.8789	26.9171	0.8199	4.2361	0.996	0.15638	-0.37137	97.247	2.0227
3577MRA1	3599SG110	Cell 35	LOAM	25468.424	3.74	1.4377838	15	3.31961	0.26265	-3.11576	90.603	7.8294	27.0186	0.8389	4.2506	1.86346	0.17371	-0.3147	94.235	2.009
C16I13A	1693SG101	Cell 16	LOAM	93539.834	3.74	1.4377838	15	8.86488	0.06677	-2.57372	93.979	9.4546	27.0654	1.5277	4.2685	3.99166	0.03772	-0.45483	95.718	2.034
C16I14A	1693SG102	Cell 16	LOAM	8651.7502	3.74	1.4377838	15	1.4684	0.2972	-5.43819	94.95	8.0196	26.7902	0.8089	4.1554	0.44246	0.2092	-0.59138	98.799	2.0185
C16I14B	1693SG103	Cell 16	LOAM	29151.589	3.74	1.4377838	15	2.91511	0.07127	-3.08305	98.242	8.0275	26.7978	0.8579	4.2546	1.28761	0.04889	-0.35868	97.511	2.038
C16O3A	1693SG104	Cell 16	LOAM	23301.569	3.74	1.4377838	15	3.2286	0.13707	-5.61282	93.432	7.8792	26.877	0.8138	4.1777	0.73998	0.09283	-0.64573	98.308	2.0287
C17I13A	1793SG101	Cell 17	LOAM	61990.042	3.74	1.4377838	15	5.62454	0.06084	-2.19403	99.103	8.1039	26.5599	0.9219	4.2566	3.05144	0.04422	-0.31466	97.597	2.0091
C17I14A	1793SG102	Cell 17	LOAM	24035.877	3.74	1.4377838	15	3.70474	0.20842	-5.70783	91.69	8.0436	26.8247	0.8861	4.1658	0.93542	0.14033	-0.63018	98.218	2.0044
C17I14B	1793SG103	Cell 17	LOAM	10603.285	3.74	1.4377838	15	1.66817	0.24895	-5.333	94.416	7.8933	26.3983	0.8215	4.1414	0.49507	0.1762	-0.57946	98.869	2.01
C17O5A	1793SG104	Cell 17	LOAM	8406.3519	3.74	1.4377838	15	1.41918	0.40151	-3.85117	89.597	7.9767	26.8221	0.8611	4.2596	0.78431	0.28132	-0.37389	98.068	2.0056
C17O5B	1793SG105	Cell 17	LOAM	10020.24	3.74	1.4377838	15	1.50446	0.26438	-4.60586	93.439	7.9641	26.914	0.8546	4.2525	0.54633	0.18368	-0.5047	99.119	2.0042
C18O11B	1893SG101	Cell 18	LOAM	40691.004	3.74	1.4377838	15	4.20846	0.0749	-3.39076	98.453	7.5749	26.7154	0.6719	4.1998	1.54648	0.04388	-0.50781	98.45	2.0106
C18O12A	1893SG102	Cell 18	LOAM	24972.244	3.74	1.4377838	15	2.68966	0.10972	-3.31466	97.143	7.681	26.7777	0.7157	4.2608	1.20149	0.08083	-0.35572	95.755	2.007
C18O5A	1893SG103	Cell 18	LOAM	34478.418	3.74	1.4377838	15	4.61735	0.14303	-5.16062	96.757	8.0594	26.8316	0.829	4.158	1.20206	0.10335	-0.62078	98.103	2.004
C18O5B	1893SG104	Cell 18	LOAM	68331.683	3.74	1.4377838	15	6.71448	0.07051	-2.90661	98.316	9.5018	26.9314	0.9314	4.2956	2.88295	0.04433	-0.42941	99.097	2.007
C19I11B	1993SG101	Cell 19	LOAM	45326.762	3.74	1.4377838	15	3.95801	0.01634	-2.43605	99.137	8.1324	26.9708	0.6939	4.2235	1.967	0.01879	-0.30634	96.528	2.02
C19I12A	1993SG102	Cell 19	LOAM	6251.7508	3.74	1.4377838	15	1.3822	0.43192	-6.29547	93.083	9.5099	26.4726	0.8175	3.9989	0.3599	0.2487	-0.67608	97.911	2.0202
C19O5A	1993SG103	Cell 19	LOAM	7465.7669	3.74	1.4377838	15	1.11756	0.33265	-3.57229	90.769	7.927	26.7568	0.803	4.1847	0.61872	0.23587	-0.34782	98.395	2.0223
C19O5B	1993SG104	Cell 19	LOAM	19098.583	3.74	1.4377838	15	2.03979	0.09811	-3.39482	96.651	8.0194	26.9746	0.8019	4.224	0.85157	0.0662	-0.38874	99.099	2.0318
C19O6A	1993SG105	Cell 19	LOAM	9960.2259	3.74	1.4377838	15	1.65609	0.344	-4.5315	95.844	7.9441	26.8128	0.8382	4.1846	0.6969	0.23562	-0.45735	97.391	2.018
C19O6B	1993SG106	Cell 19	LOAM	49967.876	3.74	1.4377838	15	4.61064	0.05404	-2.47408	98.126	7.9115	27.2254	0.8288	4.3442	2.38406	0.03675	-0.28655	97.702	2.0109
C22I12A	2293SG001	Cell 22	LOAM	22231.411	3.74	1.4377838	15	3.3335	0.17624	-5.88474	91.398	7.9706	26.9431	0.8205	4.2236	0.73742	0.12755	-0.68402	97.932	2.0376
C22I12B	2293SG002	Cell 22	LOAM	39528.179	3.74	1.4377838	15	4.08997	0.14502	-2.36699	97.822	9.8327	26.956	1.7116	4.2129	2.29955	0.08619	-0.32128	96.758	2.0392
C22I1A	2293SG003	Cell 22	LOAM	42364.709	3.74	1.4377838	15	5.03801	0.12393	-4.16766	98.523	9.6039	26.973	1.6426	4.337	1.54304	0.07931	-0.61364	98.694	2.0364
C22I1B	2293SG004	Cell 22	LOAM	30925.101	3.74	1.4377838	15	3.46456	0.17689	-2.75141	95.749	8.0401	26.9246	0.8681	4.2213	1.94191	0.11836	-0.29142	96.508	2.0408
C22O9A	2293SG007	Cell 22	LOAM	9274.6126	3.74	1.4377838	15	1.33272	0.28064	-3.89706	94.455	7.9877	26.9217	0.8483	4.1991	0.61969	0.19829	-0.40523	98.92	2.03
C22O9B	2293SG008	Cell 22	LOAM	20874.277	3.74	1.4377838	15	3.37987	0.21091	-6.19919	92.492	8.0322	26.9523	0.8441	4.2133	0.69557	0.13641	-0.72159	98.463	2.0122
RVMR062A		STEARNS CO 363 FT N OF CR 43 (US55	SANDY LOA	8138.9693	3.74	1.4377838	15	1.18956	0.32463	-3.43383	95.379	7.3873	26.4142	0.8549	4.2247	0.67946	0.22962	-0.33493	96.982	1.8551
RVMR062C		STEARNS CO 363 FT N OF CR 43 (US55	SANDY LOA	1570.7116	3.74	1.4377838	15	0.66648	0.99457	-5.02852	93.598	7.2971	26.2966	0.8085	4.1333	0.59042	0.6658	-0.32527	89.23	1.8582
RVMR105A		WRIGHT COUNTY	SANDY LOA	57532.759	3.74	1.4377838	15	5.19897	0.05277	-2.26887	93.768	9.2299	26.4887	1.6542	4.2239	2.69818	0.03962	-0.34211	89.562	1.8573
RVMR267A		MEDFORD ROUNDABOUT (I35)	SANDY LOA	16713.314	3.74	1.4377838	15	2.08483	0.24977	-2.83392	96.061	7.4678	26.7412	0.7792	4.3076	1.27486	0.16886	-0.27015	94.6	1.9121
2777MRB2	2799SG104	Cell 27 STA 177 + 80 - 95	SANDY LOA	23438.658	3.74	1.4377838	15	2.70703	0.18279	-2.99104	94.293	7.9251	27.0132	0.8129	4.2438	1.44308	0.12958	-0.31578	96.618	2.0029
RVMR051A		KANDIYOHI COUNTY (TH23)	SANDY LOA	24770.621	3.74	1.4377838	15	3.026	0.2052	-3.26379	91.261	7.5401	26.7602	0.9266	4.3551	1.4811	0.15098	-0.39404	95.692	1.8553
RVMR051B		KANDIYOHI COUNTY (TH23)	SANDY LOA	20546.505	3.74	1.4377838	15	2.43541	0.20416	-2.95587	97.003	7.3864	26.6187	0.8415	4.2843	1.33566	0.13597	-0.3065	96.367	1.8566
RVMR058A		STEARNS CO 800 FT N OF CR 43	SANDY LOA	16157.853	3.74	1.4377838	15	2.95549	0.32175	-5.88006	88.275	7.4576	26.3413	0.8839	4.1916	0.80912	0.24831	-0.67337	97.606	1.8556
RVMR272A		CITY OF ROCHESTER (50AVE)	SILTY CLAY	45088.862	3.74	1.4377838	15	3.4516	-0.0804	-2.44434	87.746	7.4729	26.8662	0.8184	4.3561	1.49781	-0.03354	-0.35082	95.231	1.9102
RVMR270A		CITY OF ROCHESTER (50AVE)	SILTY CLAY	19703.252	3.74	1.4377838	15	2.55287	0.18188	-4.23648	95.045	7.5177	26.6893	0.8409	4.2418	0.93488	0.14099	-0.49233	98.986	1.9102
RVMR271A		CITY OF ROCHESTER (50AVE)	SILTY CLAY	14499.913	3.74	1.4377838	15	1.54682	0.16111	-2.45822	98.651	7.5011	26.6122	0.8155	4.2361	0.93847	0.10997	-0.24917	96.923	1.9101
D 1 11 103		SILTY CLAY LOAM	RED LAKE F	36422.36	3.74	1.4377838	15	3.81886	0.26595	-0.73509	88.764	10.4594	39.1702	2.1022	7.2332	4.06312	0.13867	-0.07413	87.901	2
D 1 11 98		SILTY CLAY LOAM	RED LAKE F	12048.992	3.74	1.4377838	15	2.23646	0.63091	-1.50233	97.092	13.4802	39.006	2.049	7.0767	2.91894	0.34888	-0.09911	98.56	2
D 1 14 98		SILTY CLAY LOAM	RED LAKE F	24571.033	3.74	1.4377838	15	2.53516	0.20789	-1.41434	97.462	13.4866	38.708	1.985	6.961	1.95233	0.10995	-0.23461	95.377	2
D 1 16 103		SILTY CLAY LOAM	RED LAKE F	35869.104	3.74	1.4377838	15	3.16837	0.12395	-0.98079	97.28	10.1861	38.7184	1.9672	6.9968	2.60686	0.07295	-0.15322	94.936	2
D 1 18 98		SILTY CLAY LOAM	RED LAKE F	23393.826	3.74	1.4377838	15	2.0998	0.09107	-1.63488	99.185	9.8282	37.3073	1.8046	6.2731	1.3248	0.05635	-0.27694	95.05	2
D 2 11 103		SILTY CLAY LOAM	RED LAKE F	9538.782	3.74	1.4377838	15	1.90028	0.67766	-1.5746	97.452	10.3359	39.0667	2.0315	7.1349	2.62884	0.39201	-0.08433	97.187	2
D 2 14 98		SILTY CLAY LOAM	RED LAKE F	21899.942	3.74	1.4377838	15	2.45019	0.26059	-1.50933	97.975	10.2578	38.9159	2.0072	7.0351	1.9944	0.15484	-0.21666	98.767	2
D 2 16 103		SILTY CLAY LOAM	RED LAKE F	38235.443	3.74	1.4377838	15	3.568	0.15595	-1.09991	98.132	13.4096	38.7039	2.0279	6.9805	2.87519	0.08324	-0.2082	97.373	2
D 2 18 98		SILTY CLAY LOAM	RED LAKE F	17857.759	3.74	1.4377838	15	1.9091	0.1984	-1.93412	98.645	10.256	38.7563	2.0063	6.9722	1.22105	0.11913	-0.33203	97.294	2
C 1 95 103		SILTY LOAM	RED WING	13238.227	3.74	1.4377838	15	2.10947	0.50123	-1.76935	96.091	16.7537	38.9712	5.0693	7.0575	1.96572	0.22917	-0.2359	93.927	2
C 1 8 98		SILTY LOAM	RED WING	11309.041	3.74	1.4377838	15	1.78118	0.49156	-1.78629	95.155	9.4322	38.914	1.618	7.056	1.82243	0.30288	-0.17626	98.6	2
RVMR069A		SILTY LOAM	ISANTI COU	36424.423	3.74	1.4377838	15	4.61551	0.16553	-4.2379	95.694	7.7393	26.4575	1.0194	4.2351	1.59091	0.10992	-0.51253	98.517	1.8552
RVMR069B		SILTY LOAM	ISANTI COU	18792.697	3.74	1.4377838	15	2.0488	0.18394	-2.35619	97.769	7.4899	26.6804	0.901	4.3144	1.29805	0.12275	-0.24505	95.704	1.8574
RVMR069C		SILTY LOAM	ISANTI COU	16060.019	3.74	1.4377838	15	2.30751	0.26396	-4.14066	91.925	7.3582	26.5112	0.8376	4.2335	0.9796	0.19402	-0.44853	95.547	1.8582
RVMR070A		SILTY LOAM	ISANTI COU	23067.569	3.74	1.4377838	15	2.63118	0.2047	-2.53618	95.554	7.4893	26.7447	0.8111	4.3489	1.64197	0.13715	-0.25377	94.492	1.8545
RVMR257A		SILTY LOAM	LAKE COUN	12774.627	3.74	1.4377838	15	1.65581	0.19402	-4.06268	93.269	7.5566	26.686	0.8464	4.2456	0.63971	0.13351	-0.45591	98.339	1.9103
C 2 13 98		SILTY LOAM	RED WING	5871.9665	3.74	1.4377838	15	0.99758	0.58653	-1.2047	97.752	13.3296	38.6775	3.4552	6.9191	1.37744	0.34847	-0.07898	96.854	2
C 2 8 98		SILTY LOAM	RED WING	10462.767	3.74	1.4377838	15	1.67694	0.51447	-1.63754	95.919	10.2445	38.9926	2.0009	7.08	1.8377	0.30483	-0.14918	98.619	2
C 2 95 103		SILTY LOAM	RED WING	12221.789	3.74	1.4377838	15	2.73788	0.68521	-2.72104	99.473	13.6393	39.1306	3.6012	7.1326	2.23584	0.31783	-0.32736	96.652	2

Average 29,174
Stdev 20,375
Count 122

Average 100 99.9306 99.8215 99.3496 98.2223 94.7339 91.2595 86.7752 81.0793 74.0851 66.6909

```
SELECT  "FILE_NAME","K1","K2","K3","K123_R_SQ_PCT","MIN_BULKSTRESS_PSI","MAX_BULKSTRESS_PSI","MIN_OCTASTRESS_PSI","MAX_OCTASTRESS_PSI","K4","K5","K6","K456_R_SQ_PCT","MIN_CONFSTRESS_PSI","MAX_CONFSTRESS_PSI","MIN_DEVISTRESS_PSI","MAX_DEVISTRESS_PSI","N_TESTS" FROM "MNR"."MR_K123"
```

APPENDIX C
RAW FWD DATA

016MDLD050712.mdb	016OWPD061509.mdb	017MDLD091410.mdb	017OWPP050714.mdb
016MDLD050714.mdb	016OWPD062411.mdb	017MDLD091813.mdb	017OWPP050813.mdb
016MDLD050813.mdb	016OWPD062416.mdb	017MDLD092812.mdb	017OWPP052610.mdb
016MDLD052610.mdb	016OWPD070813.mdb	017MDLD092915.mdb	017OWPP060614.mdb
016MDLD060614.mdb	016OWPD072710.mdb	017MDLD102711.mdb	017OWPP061015.mdb
016MDLD060812.mdb	016OWPD082115.mdb	017MDLD111609.mdb	017OWPP061509.mdb
016MDLD060915.mdb	016OWPD090811.mdb	017MDLD111710.mdb	017OWPP062411.mdb
016MDLD061509.mdb	016OWPD091409.mdb	017MDLP050712.mdb	017OWPP062416.mdb
016MDLD062411.mdb	016OWPD091813.mdb	017MDLP050714.mdb	017OWPP070513.mdb
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016MDLD070813.mdb	016OWPD092915.mdb	017MDLP052610.mdb	017OWPP090811.mdb
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016MDLD102111.mdb	016OWPP052610.mdb	017MDLP090811.mdb	017OWPP111609.mdb
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018OWPP050514.mdb	019MDLP070113.mdb	019OWPP111609.mdb	4206 MNTH23 TS4.mdb
018OWPP050613.mdb	019MDLP072610.mdb	6917TS1 USTH53.mdb	4206 MNTH23 TS5.mdb
018OWPP050712.mdb	019MDLP090711.mdb	6917TS2 USTH53.mdb	5902 MNTH23 TS1.mdb
018OWPP051215.mdb	019MDLP091509.mdb	4502.mdb	5902 MNTH23 TS2.mdb
018OWPP052610.mdb	019MDLP092013.mdb	5701.mdb	4105 MNTH23 TS3.mdb

018OWPP060614.mdb	019MDLP092712.mdb	5701B.mdb	4206 MNTH23 TS4.mdb
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018OWPP091913.mdb	019OWPD061509.mdb	6006A.mdb	TH1ATONN2010.xlsm
TH1BTONN2010.xlsm	TH71-06-3611B-TONN2010.xlsm	12-6010C.xlsx	
TH200ATONN2010.xlsm	TH71-06-3611C-TONN2010.xlsm	12-6010D.xlsx	
TH200BTONN2010.xlsm	TH72-06-0413-TONN2010.xlsm	07-5413.xls	
TH2EfostonTONN2010.xlsm	TH89-01-4508A-TONN2010.xlsm	07-5413B.xls	
TH32ATONN2010.xlsm	TH89-02-0415-TONN2010.xlsm	04-4401.xls	
TH32BTONN2010.xlsm	TH89-02-4508B-TONN2010.xlsm	04-5403.xls	
TH32CTONN2010.xlsm	10-4502.xlsx	05-3107A.xls	
TH34ATONN2010.xlsm	10-5701.xlsx	05-3107B.xls	
TH34BTONN2010.xlsm	10-5701B.xlsx	05-3107B-1.xls	
TH59TONN2010.xlsm	11-3604A.xlsx	05-3107A.xls	
TH64ATONN2010.xlsm	11-3604B.xlsx	05-3107B.xls	
TH64BTONN2010.xlsm	16-6802.xlsx	05-3107B-1.xls	
TH64CTONN2010.xlsm	13-6802A.xlsx	06-3611A.xls	
TH64DTONN2010.xlsm	16-6005E.xlsx	06-3611B.xls	
TH6TONN2010.xlsm	16-4503.xlsx	06-3611C.xls	
TH710409ATONN2010.xlsm	16-4503A.xlsx	06-3611A.xls	
TH710409BTONN2010.xlsm	16-4504.xlsx	06-3611B.xls	
TH71-2905ATONN2010.xlsm	16-5704.xlsx	06-3611C.xls	
TH71-2905CTONN2010.xlsm	10-5405.xlsx	06-0413.xls	
TH71-361131ATONN2010.xlsm	10-6006A.xlsx	06-3903.xls	
TH71-3611ATONN2010.xlsm	10-6006B.xlsx	02-0415.xls	
TH71-3611BTONN2010.xlsm	12-2902A.xlsx	02-4508A.xls	
TH71TONN2010.xlsm	12-2902B.xlsx	02-4508B.xls	
TH7262-71TONN2010.xlsm	12-0409N.xlsx		
TH7271-74TONN2010.xlsm	12-0409S.xlsx		
TH72ATONN2010.xlsm	12-2907N.xlsx		

TH72BTONN2010.xlsm	12-2907S.xlsx		
TH72CTONN2010.xlsm	10-2904A.xlsx		
TH72DTONN2010.xlsm	10-2904B.xlsx		
TH72ETONN2010.xlsm	10-2904C.xlsx		
TH72FTONN2010.xlsm	10-2904D.xlsx		
TH72GTONN2010.xlsm	10-2905.xlsx		
TH72HTONN2010.xlsm	18-2906 USTH71.xlsx		
TH72ITONN2010.xlsm	12-3611A.xlsx		
TH72LOWTONN2010.xlsm	12-3611B.xlsx		
TH89ATONN2010.xlsm	12-0413A.xlsx		
TH89BTONN2010.xlsm	12-0413RS1.xlsx		
TH9northadaATONN2010.xlsm	12-0413RS2.xlsx		
TH9northadaBTONN2010.xlsm	12-0413RS3.xlsx		
TH9northadaCTONN2010.xlsm	12-0413RS4.xlsx		
TH9northadaDTONN2010.xlsm	12-0413RS5.xlsx		
TH9southadaTONN2010.xlsm	12-0413RS6.xlsx		
TH113-07-5413B-TONN2010.xlsm	12-0413RS7.xlsx		
TH113-07-5413-TONN2010.xlsm	12-0413RS8.xlsx		
TH200-04-4401-TONN2010.xlsm	14-5408.xlsx		
TH200-04-5403-TONN2010.xlsm	12-6010A.xlsx		
TH71-06-3611A-TONN2010.xlsm	12-6010B.xlsx		

APPENDIX D
ELMOD BACKCALCULATION RESULTS

Table 1 Elmod Results: Backcalculated elastic moduli. Elmod allows a 5 layers system and Subgrade. In this table, the base is represented by Layer 2 unless the design plans showed multiple layers below the paved layer.

Districts	Cell	Lane	HMA [in]	HMA [ksi]		Layer 2 [in]	Layer 2 [ksi]		Layer 3 [in]	Layer 3 [ksi]		Layer 4 [in]	Layer 4 [ksi]		SG [ksi]	
				Avg	**StDev**		**Avg**	**StDev**		**Avg**	**StDev**		**Avg**	**StDev**	**Avg**	**StDev**
D2	TH001	--	5	543.1	82.0	*8.0*	91.6	27.4	--	--	--	--	--	--	20.9	4.0
D2	TH011	--	6	406.7	85.3	*12.0*	29.1	7.7	--	--	--	--	--	--	11.3	2.6
D2	TH011	--	6	491.3	99.2	*12.0*	28.1	10.9	--	--	--	--	--	--	9.9	2.3
D2	TH032	--	4.5	287.4	61.5	*12.0*	77.1	19.3	--	--	--	--	--	--	16.1	4.8
D2	TH032	--	4.5	316.7	63.9	*12.0*	108.8	25.1	--	--	--	--	--	--	4.6	17.7
D2	TH032	--	4.5	387.8	101.9	*8.0*	132.3	84.4	--	--	--	--	--	--	18.9	4.2
D2	TH032	--	4.5	393.8	112.1	*8.0*	116.5	17.9	--	--	--	--	--	--	23.3	3.4
D2	TH071	--	6	355.5	61.9	*8.0*	94.9	88.7	--	--	--	--	--	--	15.3	5.7
D2	TH071	--	4.5	262.2	33.1	*22.0*	52.8	9.6	--	--	--	--	--	--	30.8	10.6
D2	TH071	--	6.5	412.2	65.2	*7.0*	43.8	15.9	--	--	--	--	--	--	27.5	6.1
D2	TH071	--	6.5	429.9	71.3	*7.0*	63.5	19.0	--	--	--	--	--	--	25.4	9.5
D2	TH071	--	6	432.9	141.7	*8.0*	180.1	9.9	--	--	--	--	--	--	18.3	1.4
D2	TH071	--	6	316.2	101.4	*8.0*	150.3	26.2	--	--	--	--	--	--	20.9	1.8
D2	TH071	--	6	347.1	59.4	*8.0*	143.6	34.2	--	--	--	--	--	--	18.6	4.2
D2	TH071	--	6	294.0	44.3	*8.0*	137.6	30.5	--	--	--	--	--	--	25.7	8.1
D8	TH023	--	12	525.2	620.6	*18.0*	11.3	5.7	--	--	--	--	--	--	14.0	3.7
D8	TH023	--	12	660.6	155.5	*12.0*	25.6	9.9	--	--	--	--	--	--	17.2	3.7
D8	TH023	--	12	143.0	50.1	*12.0*	27.5	11.9	--	--	--	--	--	--	21.3	7.4
D8	TH023	--	8	488.2	90.5	*12.0*	40.2	11.1	--	--	--	--	--	--	15.7	4.4
D8	TH023	--	8	474.9	163.4	*12.0*	45.8	20.4	--	--	--	--	--	--	11.9	3.1
MnRoad	16	MDLD	5	291.4	83.5	12.0	37.3	11.3	12.0	114.3	73.5	7.0	25.8	9.6	25.1	6.1
MnRoad	16	MDLP	5	351.1	86.4	12.0	42.2	12.3	12.0	100.4	52.7	7.0	29.1	19.8	25.0	6.0
MnRoad	16	OWPD	5	313.9	89.6	12.0	29.9	10.0	12.0	89.2	46.4	7.0	26.0	11.8	25.2	5.7
MnRoad	16	OWPP	5	285.5	82.1	12.0	35.4	18.1	12.0	88.1	41.0	7.0	22.7	8.5	23.2	6.0

Districts	Cell	Lane	HMA [in]	HMA [ksi]		Layer 2 [in]	Layer 2 [ksi]		Layer 3 [in]	Layer 3 [ksi]		Layer 4 [in]	Layer 4 [ksi]		SG [ksi]	
MnRoad	17	MDLD	5	256.7	78.7	12.0	31.6	8.5	12.0	94.9	46.4	7.0	21.5	10.6	23.8	5.7
MnRoad	17	MDLP	5	284.1	71.1	12.0	28.8	10.4	12.0	125.6	65.4	7.0	25.1	12.6	24.3	6.0
MnRoad	17	OWPD	5	284.3	83.4	12.0	25.8	8.4	12.0	87.8	44.1	7.0	22.1	10.8	23.2	5.6
MnRoad	17	OWPP	5	234.3	66.5	12.0	27.8	8.8	12.0	123.1	67.2	7.0	21.0	9.3	22.7	5.4
MnRoad	18	MDLD	5.25	124.3	34.9	12.0	20.6	5.6	12.0	122.3	61.2	7.0	28.6	19.1	25.5	6.4
MnRoad	18	MDLP	5.25	148.3	39.6	12.0	20.2	6.2	12.0	153.7	90.4	7.0	37.8	25.0	27.3	6.6
MnRoad	18	OWPD	5.25	131.4	36.1	12.0	20.6	5.2	12.0	103.9	74.8	7.0	33.0	26.4	26.6	6.5
MnRoad	18	OWPP	5.25	125.4	34.6	12.0	20.9	4.8	12.0	113.1	42.0	7.0	36.3	20.8	26.7	6.4
MnRoad	19	MDLD	5.25	209.7	308.7	12.0	13.3	3.3	12.0	97.8	50.8	7.0	59.3	44.3	25.6	6.3
MnRoad	19	MDLP	5.25	158.4	163.4	12.0	13.6	3.3	12.0	107.8	78.0	7.0	64.3	47.1	25.0	5.9
MnRoad	19	OWPD	5.25	190.5	218.7	12.0	10.8	2.3	12.0	76.1	38.5	7.0	82.4	59.6	28.9	7.5
MnRoad	19	OWPP	5.25	259.8	664.4	12.0	11.6	3.2	12.0	74.5	24.8	7.0	88.3	58.1	25.8	6.6

APPENDIX E
TONN2010 BACKCALCULATION RESULTS

Table 1A - Compacted version of the delivered database listing the backcalculated results.

District	Road	Section	Backcalc	COV D0 @ 9kip	HMA [in]	HMA_Avg [ksi]	HMA_St.Dev [ksi]	Base [in]	Base_Avg [ksi]	Base_St.Dev [ksi]	SB_Avg [ksi]	SB_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
D1	TH011	3604-26	T	20%	6.0	489.4	187.9	12.0	32.9	8.1	11.1	3.0	37.6
D1	TH053	6917	T	21%	7.0	1204.4	350.0	7.0	202.2	39.8	21.3	3.4	54.5
D1	TH053	6917	T	25%	7.0	1135.5	217.2	7.0	305.3	141.1	36.7	8.9	54.5
D1	TH071	3611-15,3611-23	T	18%	4.5	591.4	154.3	8.0	34.5	8.7	15.3	2.5	37.6
D2	TH001	SP4502-05,SP6901-07	T	13%	5.0	504.9	138.1	9.0	61.7	18.9	17.2	2.5	23.1
D2	TH001	4502	T	12%	5.0	709.6	112.9	12.0	65.9	16.3	19.5	4.1	23.1
D2	TH001	5701	T	11%	5.0	543.1	82.0	8.0	91.6	27.4	20.9	4.0	23.1
D2	TH001	5701B	T	11%	5.0	566.3	115.1	8.0	74.4	22.1	23.8	4.6	23.1
D2	TH002	6005	T	15%	6.0	568.0	75.4	11.0	43.1	11.3	15.1	3.7	37.6
D2	TH006	3107A	T	24%	4.5	2059.7	1269.1	12.0	64.0	39.5	11.3	2.8	--
D2	TH006	3107B	T	16%	4.5	448.4	153.1	12.0	32.7	8.7	7.7	1.5	--
D2	TH006	3107B-1	T	16%	4.5	408.9	77.2	12.0	33.0	8.2	7.9	1.4	--
D2	TH009	6010B	T	28%	4.5	1457.6	741.3	10.0	98.1	34.5	14.4	1.5	23.1
D2	TH009	6010A	T	13%	4.5	725.6	126.8	10.0	99.2	27.5	16.2	2.6	23.1
D2	TH009	5408-11,6010-12	T	18%	4.5	729.6	363.6	10.0	64.2	17.4	7.8	0.8	23.1
D2	TH009	6010C	T	11%	4.5	700.8	82.9	10.0	53.7	13.4	11.0	1.2	23.1
D2	TH009	6010D	T	18%	4.5	569.5	162.5	10.0	53.7	14.6	9.2	1.3	23.1
D2	TH009	5408	T	15%	5.0	305.9	91.5	9.0	83.2	27.7	14.1	2.7	23.1
D2	TH011	3604A	T	17%	6.0	406.7	85.3	12.0	29.1	7.7	11.3	2.6	23.1
D2	TH011	3604B	T	15%	6.0	491.3	99.2	12.0	28.1	10.9	9.9	2.3	23.1
D2	TH011	6802	T	18%	4.5	518.4	110.6	12.0	66.4	14.4	17.7	4.0	23.1
D2	TH011	6802A	T	13%	4.5	517.9	162.9	8.0	81.8	24.9	29.7	4.9	23.1
D2	TH011	6802	T	13%	4.5	487.8	100.6	8.0	72.7	18.1	28.8	5.9	23.1
D2	TH032	4503	TF	12%	4.5	531.3	127.5	12.0	66.0	14.6	15.4	3.9	23.1

District	Road	Section	Backcalc	COV D0 @ 9kip	HMA [in]	HMA_Avg [ksi]	HMA_St.Dev [ksi]	Base [in]	Base_Avg [ksi]	Base_St.Dev [ksi]	SB_Avg [ksi]	SB_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
D2	TH032	4504	T	12%	4.5	334.7	97.6	12.0	87.1	22.5	17.1	2.9	23.1
D2	TH032	6006-13	T	11%	4.5	391.2	127.8	8.0	47.1	11.5	19.1	2.9	23.1
D2	TH032	6006B	T	11%	4.5	624.0	171.1	8.0	58.0	14.9	27.6	3.9	23.1
D2	TH032	6006A	T	14%	4.5	556.7	76.9	8.0	39.4	8.2	23.9	3.8	23.1
D2	TH032	5704	T	14%	4.5	526.3	78.6	12.0	77.1	14.6	12.9	1.7	23.1
D2	TH032	4503A	T	12%	4.5	423.7	112.7	12.0	76.2	13.7	18.9	4.0	23.1
D2	TH032	5405	T	11%	4.5	488.4	84.7	8.0	48.0	10.8	20.6	3.8	23.1
D2	TH034	2902A	TF	8%	5.5	370.3	87.1	8.0	69.6	25.7	27.9	4.4	23.1
D2	TH034	2902B	T	13%	5.5	508.3	84.3	8.0	42.9	10.9	29.7	5.2	23.1
D2	TH059	4505	T	18%	7.9	426.2	114.9	12.0	50.4	18.2	15.3	6.0	--
D2	TH064	2913	TF	13%	7.5	970.0	231.4	10.0	148.4	64.1	22.0	3.2	--
D2	TH064	2913	TF	15%	7.5	755.2	198.0	10.0	130.0	45.5	21.4	3.2	--
D2	TH064	2913	TF	16%	7.5	523.0	127.4	10.0	91.5	41.4	21.2	3.7	--
D2	TH064	2913	T	12%	7.5	429.3	109.2	10.0	93.6	39.7	19.2	4.0	--
D2	TH071	3611B	T	3%	5.0	668.1	17.3	10.0	27.5	2.7	19.5	1.5	23.1
D2	TH071	?	T	11%	5.0	412.7	93.1	10.0	41.9	9.1	20.7	3.1	--
D2	TH071	3611C	T	6%	5.0	408.9	77.4	10.0	30.5	3.9	21.5	3.0	23.1
D2	TH071	2906	T	15%	4.5	337.5	52.5	22.0	48.3	8.7	20.1	8.9	--
D2	TH071	2904B	T	4%	6.0	624.1	124.7	8.0	108.0	27.2	19.9	4.5	23.1
D2	TH071	2904C	T	8%	6.0	267.8	26.7	8.0	123.6	32.0	24.6	3.7	23.1
D2	TH071	2904D	T	6%	6.0	412.9	118.1	8.0	97.0	10.3	19.8	2.3	23.1
D2	TH071	2905	TF	13%	6.0	574.8	112.5	8.0	38.3	14.7	17.3	3.5	37.6
D2	TH071	0409N	T	16%	6.5	404.1	63.9	7.0	43.8	15.9	27.5	6.1	17.4
D2	TH071	0409S	T	10%	6.5	447.7	74.2	7.0	63.5	19.0	25.4	9.5	17.4
D2	TH071	2907N	T	9%	6.0	542.4	107.6	8.0	59.1	12.9	21.5	3.2	23.1

District	Road	Section	Backcalc	COV D0 @ 9kip	HMA [in]	HMA_Avg [ksi]	HMA_St.Dev [ksi]	Base [in]	Base_Avg [ksi]	Base_St.Dev [ksi]	SB_Avg [ksi]	SB_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
D2	TH071	2907S	T	15%	6.0	432.5	126.0	8.0	93.0	46.8	25.6	4.2	23.1
D2	TH071	2904A	TF	10%	6.0	419.4	130.6	8.0	94.6	39.0	26.1	5.0	23.1
D2	TH071	3611A	T	18%	5.0	360.4	105.7	10.0	66.3	27.4	16.0	3.6	23.1
D2	TH071	3611B	T	14%	5.0	338.3	90.8	10.0	72.1	21.0	16.3	4.2	23.1
D2	TH071	3611A	T	11%	4.5	561.7	125.9	8.0	49.5	12.2	21.2	2.8	23.1
D2	TH071	2907	T	11%	9.6	238.4	37.4	12.0	37.5	11.0	12.1	2.6	--
D2	TH072	3903	TF	19%	4.5	972.7	1002.8	9.0	82.8	20.6	10.3	2.3	--
D2	TH072	3903-24	T	16%	6.0	897.1	421.7	10.0	125.8	32.6	14.8	3.0	--
D2	TH072	0413	TF	13%	5.0	342.2	356.5	10.0	92.9	17.8	10.8	2.2	23.1
D2	TH072	0413A	T	16%	5.0	377.8	71.6	10.0	89.2	18.1	13.2	3.8	23.1
D2	TH072	0413RS1	T	7%	5.0	2044.9	480.2	10.0	79.1	4.5	8.0	0.4	23.1
D2	TH072	0413RS2	T	9%	5.0	1452.5	295.1	10.0	76.7	7.2	7.7	0.7	23.1
D2	TH072	0413RS3	T	9%	5.0	851.6	176.3	10.0	86.5	6.4	8.7	0.6	23.1
D2	TH072	0413RS4	T	11%	5.0	636.7	168.6	10.0	82.8	16.5	9.2	1.4	23.1
D2	TH072	0413RS5	T	11%	5.0	375.3	69.7	10.0	81.3	16.3	10.2	1.8	23.1
D2	TH072	0413RS7	T	10%	5.0	331.7	59.3	10.0	70.4	9.0	7.7	1.1	23.1
D2	TH072	0413RS6	T	11%	5.0	247.9	52.2	10.0	78.5	13.2	8.6	1.4	23.1
D2	TH072	0413RS8	T	11%	5.0	291.6	43.7	10.0	82.7	13.3	8.6	1.1	23.1
D2	TH072	3903-24	T	20%	6.0	433.0	154.3	10.0	86.4	32.1	12.0	3.5	--
D2	TH089	4508B	T	32%	5.0	338.6	209.9	8.0	29.2	22.2	11.0	3.2	23.1
D2	TH089	0415	T	24%	5.0	353.6	124.7	8.0	34.5	20.2	8.2	2.1	23.1
D2	TH089	4508A	T	14%	5.0	576.7	797.7	8.0	24.1	14.7	7.4	1.1	23.1
D2	TH089	?	T	24%	5.0	263.7	107.5	8.0	60.1	29.3	11.1	2.2	--
D2	TH089	?	T	14%	5.0	218.2	25.6	8.0	30.5	7.8	10.9	1.9	--
D2	TH113	5413B	T	14%	5.0	222.8	46.9	9.0	42.3	11.5	11.6	2.3	--

District	Road	Section	Backcalc	COV D0 @ 9kip	HMA [in]	HMA_Avg [ksi]	HMA_St.Dev [ksi]	Base [in]	Base_Avg [ksi]	Base_St.Dev [ksi]	SB_Avg [ksi]	SB_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab
D2	TH113	5413	T	17%	5.0	244.7	57.5	9.0	35.4	11.8	13.6	3.3	23.1
D2	TH113	4407	T	18%	5.0	552.8	262.6	9.0	70.9	26.5	11.0	1.7	23.1
D2	TH172	3904	TF	19%	8.6	403.9	148.7	10.0	28.7	18.5	11.8	2.8	--
D2	TH200	5403	T	14%	6.0	432.0	65.3	8.0	48.0	21.2	16.5	2.7	23.1
D2	TH200	4401	T	18%	6.0	479.8	116.3	8.0	54.8	19.2	13.9	3.8	23.1
D3	TH238	?	T	--	4.0	783.0	199.0	8.0	72.1	27.4	13.6	2.4	23.1
D4	TH055	6107-03 ? 8607?	T	--	5.0	708.5	225.6	5.0	117.0	34.7	13.5	2.9	--
D4	TH059	5309-10	T	--	7.0	724.4	157.5	10.0	61.2	33.0	11.2	2.5	23.1
D7	TH062	1704-27	T	--	4.0	716.8	148.6	10.0	42.1	12.9	12.9	2.2	37.6
D7	TH083	8107-10,0711-16	T	--	5.0	1358.5	265.8	15.5	34.1	13.2	11.1	2.5	--
D7	TH109	2212-11	T	0%	5.0	692.2	207.1	18.0	32.5	10.7	10.5	3.1	37.6
D8	TH023	4105-08	T	14%	12.0	515.8	79.3	18.0	4.3	0.9	3.1	1.3	--
D8	TH023	4206-20	T	13%	12.0	619.0	127.1	12.0	9.1	2.9	6.1	3.3	--
D8	TH023	4206-20	TF	12%	12	289.1	108.0	12.0	23.0	6.6	22.6	6.9	--
D8	TH023	5902-21	T	16%	8	743.9	120.5	12.0	16.7	6.7	12.4	2.3	37.6
D8	TH023	5902-21	T	28%	8	812.9	128.6	12.0	18.9	6.1	15.3	4.8	37.6

Table 2 Compacted version of the delivered database listing the backcalculated results.

Cell	Avg_Drops	Backcalc	HMA [in]	HMA_Avg [ksi]	HMA_St.Dev [ksi]	Base [in]	Base_Avg [ksi]	Base_St.Dev [ksi]	SB_Avg [ksi]	SB_St.Dev [ksi]	Lab (TriAx) [ksi] E_lab	Ratio E_field/E_lab
16	18	TF	5	406.3	386.5	24.0	41.5	6.9	22.1	2.5	37.6	1.1
16	18	TF	5	524.1	485.2	24.0	45.4	6.3	22.2	2.7	37.6	1.2
16	16	TF	5	403.6	361.0	24.0	32.8	6.0	22.2	2.6	37.6	0.9
16	17	TF	5	414.3	408.9	24.0	35.9	5.7	21.0	2.9	37.6	1.0
17	18	TF	5	468.2	391.5	24.0	35.7	4.2	22.8	2.2	37.6	1.0
17	17	TF	5	480.4	402.5	24.0	35.7	6.8	23.6	2.8	37.6	0.9
17	17	TF	5	420.8	340.6	24.0	30.6	4.9	21.9	2.3	37.6	0.8
17	17	TF	5	372.9	307.0	24.0	33.5	6.3	22.3	2.6	37.6	0.9
18	16	TF	5.25	297.4	189.6	24.0	30.6	3.9	22.6	2.7	32.4	0.9
18	17	TF	5.25	333.9	210.3	24.0	33.5	5.1	24.4	2.8	32.4	1.0
18	15	TF	5.25	302.6	193.5	24.0	29.6	4.3	22.4	2.8	32.4	0.9
18	16	TF	5.25	282.0	165.9	24.0	31.6	4.1	22.8	2.9	32.4	1.0
19	18	TF	5.25	306.4	171.5	24.0	22.1	2.0	21.7	2.2	14.1	1.6
19	17	TF	5.25	315.4	162.3	24.0	22.4	2.0	21.9	2.2	14.1	1.6
19	17	TF	5.25	286.4	125.4	24.0	19.8	2.1	19.8	2.1	14.1	1.4
19	16	TF	5.25	250.5	113.0	24.0	19.9	1.9	19.8	2.0	14.1	1.4

APPENDIX F
SURVEY TO MNDOT ENGINEERS

DRAFT SURVEY

Dear MnDOT Materials and Soils Engineers,

OMRR is beginning an implementation project entitled "Implementation of Recycled Base Material Properties for MnPAVE."

MnDOT's pavement design procedure, MnPAVE, includes a set of recycled materials (i.e. Cold In-Place Recycled, Stabilized Full Depth Reclamation, and Rubblized Concrete) to account for the use of recycled materials in base layers. However, the default properties for these materials do not properly reflect the varying ratio of recycled material to virgin aggregates typically used in pavements reconstructions and do not fully apply the findings of previous sponsored research studies.

The objectives of this project are to:

1. Characterize typical Minnesota recycled base materials using results of previous sponsored research, existing MnDOT pavements, and MnROAD. Verify that the values represent field conditions.
2. Implement these updated values in MnPAVE. Calibrate (or modify) MnPAVE to account for performance of Minnesota pavements with recycled material base layers.

In order to meet these objectives we are seeking bituminous-surfaced designs that meet the following criteria:

- Constructed within the past _ years
- Aggregate base (virgin or recycled)
- FDR or SFDR
- CIR
- Existing post-construction FWD data

Please provide the SP # and year constructed.

Thanks in advance for your assistance.