GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-034

PROHIBITING THE OPERATION OF CERTAIN MOTOR VEHICLES ON MOBILITY AUTHORITY TOLL FACILITIES PURSUANT TO THE HABITUAL VIOLATOR PROGRAM

WHEREAS, Transportation Code, Chapter 372, Subchapter C, authorizes toll project entities, including the Central Texas Regional Mobility Authority (Mobility Authority), to exercise various remedies against certain motorists with unpaid toll violations; and

WHEREAS, Transportation Code §372.106 provides that a "habitual violator" is a registered owner of a vehicle who a toll project entity determines:

(1) was issued at least two written notices of nonpayment that contained:

(A) in the aggregate, 100 or more events of nonpayment within a period of one year, not including events of nonpayment for which: (i) the registered owner has provided to the toll project entity information establishing that the vehicle was subject to a lease at the time of nonpayment, as provided by applicable toll project entity law; or (ii) a defense of theft at the time of the nonpayment has been established as provided by applicable toll project entity law; and

(B) a warning that the failure to pay the amounts specified in the notices may result in the toll project entity's exercise of habitual violator remedies; and

(2) has not paid in full the total amount due for tolls and administrative fees under those notices; and

WHEREAS, the Mobility Authority previously determined that the individuals listed in Exhibit A are habitual violators, and these determinations are now considered final in accordance with Transportation Code, Chapter 372, Subchapter C; and

WHEREAS, Transportation Code §372.109 provides that a final determination that a person is a habitual violator remains in effect until (1) the total amount due for the person's tolls and administrative fees is paid; or (2) the toll project entity, in its sole discretion, determines that the amount has been otherwise addressed; and

WHEREAS, Transportation Code §372.110 provides that a toll project entity, by order of its governing body, may prohibit the operation of a motor vehicle on a toll project of the entity if: (1) the registered owner of the vehicle has been finally determined to be a habitual violator; and

(2) the toll project entity has provided notice of the prohibition order to the registered owner; and

WHEREAS, the Executive Director recommends that the Board prohibit the operation of the motor vehicles listed in Exhibit A on the Mobility Authority's toll roads, including (1) 183A Toll; (2) 290 Toll; (3) 71 Toll; (4) MoPac Express Lanes; (5) 45SW Toll; and (6) 183 Toll.

NOW THEREFORE, BE IT RESOLVED that the motor vehicles listed in Exhibit A are prohibited from operation on the Mobility Authority's toll roads, effective August 31, 2022; and

BE IT FURTHER RESOLVED that the Mobility Authority shall provide notice of this resolution to the individuals listed in Exhibit A, as required by Transportation Code §372.110; and

BE IT IS FURTHER RESOLVED that the prohibition shall remain in effect for the motor vehicles listed in Exhibit A until the respective habitual violator determinations are terminated, as provided by Transportation Code §372.110.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August 2022.

Submitted and reviewed by:

James M. Bass
Executive Director

Approved:

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A

LIST OF PROHIBITED VEHICLES

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

#	NAME	COUNTY	ZIP CODE	LP	STATE	TOLLS
1	AMY MICHELLE ESPARZA	WILLIAMSON	78626	1RJWB	TX	171
2	MICHAEL JAY MORROW	WILLIAMSON	78634	4RLTR	TX	126
3	BRADLEY TOWNS FBO HAYDEN TOWNS	BURNET	78654	6RVHF	TX	160
4	SCOTTA ANN BROOKS	TRAVIS	78653	AG45377	TX	176
5	SANDY CASTRO FRANCISCO JAVIER SILLERO	BASTROP	78617	AJ22400	TX	215
6	BLUE WHALE MOVING AND STORAGE	TRAVIS	78724	AV80890	TX	498
7	JAMES BRIAN SANDERS	WILLIAMSON	78641	B17179T	TX	194
8	CESAR SERRANO DURAN	TRAVIS	78617	BA68406	TX	127
9	EILEEN SHERRIE CONNETT	TRAVIS	78653	BCB5852	TX	480
10	AIMEE E BEATTY	TRAVIS	78704	BE41447	TX	162
11	PABLO GARCIA	TRAVIS	78653	BHY0194	TX	272
12	TAMMY MARIE AGUA	TRAVIS	78749	BKN2381	TX	474
13	JENNIFER STEEKEN	COMAL	78130	BLK6866	TX	125
14	JOSHALYN ELAINE WALKER	TRAVIS	78653	BNC2388	TX	1387
15	DANIEL KEESLING	WILLIAMSON	78642	BP5N276	TX	128
16	ISAAC CHABOLLA	HAYS	78640	BR17700	TX	231
17	TAMI YVONNE MCMAHON	WILLIAMSON	78665	BV38182	TX	361
18	RUDY CONTRERAS	BEXAR	78211	BZ72456	TX	372
19	OMAR VERA CORTEZ	LAMPASAS	76550	CF2P555	TX	129
20	VANESSA YOUNG GRIFFITH	WOOD	75494	CJV4091	TX	665
21	SCOTT BIBLE	BURNET	78611	CMC5548	TX	249
22	PATRICK JOSEPH RATLIFF	TRAVIS	78653	CT5D023	TX	437
23	MYRAH JANELLE ONTIVEROZ ELIBERTO S ONTIVEROZ	TRAVIS	78741	CTC4343	TX	638
24	PERRY ANDREW GIUFFRE	MILAM	76567	CVT8578	TX	181
25	JULIUS DEAN LEVITCH	TRAVIS	78660	CZ1M107	TX	209
26	RAMON HUMBERTO DE LUNA	MAVERICK	78852	DDB8748	TX	421
27	ESCAMILLA JUAN M GALLARDO	TRAVIS	78745	DDG8642	TX	352
28	HAROLD STORER GERALDINE STORER	MCLENNAN	76705	DDY0800	TX	128

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

29	JAMES RAMIREZ	WILLIAMSON	78642	DFX9204	TX	144
30	CARMEN MICHELLE PIPITONE	WILLIAMSON	78641	DG9S655	TX	1367
31	CELESTE WHITTON	TRAVIS	78745	DLH1915	TX	513
32	MANUEL LOPEZ CASTRO	BEXAR	78230	DNM3613	TX	312
33	MARTIN BANDA BEATRIZ MAR BETANCOURT-BANDA	TRAVIS	78653	DNM6874	TX	495
34	ROBBIE R BROWN WHITNEY BETH BROWN	BASTROP	78957	DR2S061	TX	151
35	CHARLES EMBRY FOSTER JR	WILLIAMSON	78729	DSJ1483	TX	819
36	DARIUS RAMONE SMITH BAYTINA LEE SMITH	TRAVIS	78660	DSJ2387	TX	167
37	BENIGNO MEDRANO MARIA MEDRANO	TRAVIS	78617	DWC4248	TX	259
38	TROY NIELSON TAYLOR	TRAVIS	78617	DXW7383	TX	208
39	KENNETH SERRANO	TRAVIS	78749	FBL2550	TX	523
40	DEBORAH LEE MOORE	TRAVIS	78745	FHD0607	TX	155
41	CHERIE ANNETTE MIRANDA	CALDWELL	78616	FJL1593	TX	745
42	MEGAN RENEE MCCROHAN	WILLIAMSON	76574	FKW6838	TX	172
43	JOEL CASTILLO IRUEGAS	TARRANT	76155	FLW7834	TX	285
44	MARY ANN GARCIA	TRAVIS	71447	FNX7563	LA	664
45	JOHN MARK GILBERT JR	WILLIAMSON	78641	FVW9745	TX	137
46	ROXANA SOLIS ALVARADO	HAYS	78610	FXL2438	TX	303
47	ORALIA ANDRADE HERNANDEZ	WILLIAMSON	78664	GBC0164	TX	465
48	ADAM RAY MESSICK	WILLIAMSON	78634	GBC7694	TX	481
49	ROSARIA ALVITER	TRAVIS	78704	GCJ5712	TX	471
50	MARIA TERESA ROBINSON	EL PASO	79915	GGG2617	TX	329
51	DANIELLE BOEHM	WILLIAMSON	78665	GJX7987	TX	349
52	BLANCA NORA GARCIA	HAYS	78610	GKR6849	TX	743
53	CINNAMON WALKER	TRAVIS	78721	GNB5802	TX	125
54	GILBERT JIMENEZ	BASTROP	78602	GRS6805	TX	250
55	DEVON JERELL SAMS	TRAVIS	78660	GSV3500	TX	471
56	JUAN EDUARDO RODRIGUEZ	TRAVIS	78704	GSX2004	TX	222
57	JUAN C CASTELLANOS	BEXAR	78221	GSY1411	TX	164
58	WILLIAM JOSEPH COOK FARRAH GAIL COOK	BASTROP	78957	GWH0137	TX	282
59	DONICE MICHELLE DELACRUZ	TRAVIS	78724	GWZ0964	TX	914
60	LISA MARIE VASQUEZ	TRAVIS	78741	GZB9086	TX	151
61	HAVEN MEDRANO	WILLIAMSON	78626	GZC0260	TX	191
62	SISAY DEME	TRAVIS	78728	HCL5897	TX	136

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

63	BERNICE B MOYE	VICTORIA	77901	HDN6044	TX	371
64	TERRY Z NIXON	HAYS	78640	HFD8071	TX	138
65	ADRIAN HERNANDEZ	TRAVIS	78724	HGB4359	TX	194
66	LILIAN XIOMARA PEREZ-SOSA ESTEBAN DE JESUS MORALES	TRAVIS	78617	HHP4912	TX	359
67	ROBERT WILLIAM GARDNER JR	TRAVIS	78758	HJK8952	TX	338
68	MATTHEW LAWSON FARMER	LAMPASAS	76550	HKS5686	TX	325
69	CLARENCE HUGH EVANS	FORT BEND	77479	HKY7051	TX	168
70	ANDREA M MUNIZ	TRAVIS	78660	HLZ6040	TX	263
71	ROGER LEE PATTERSON	WILLIAMSON	78646	HMD9073	TX	439
72	MOSES KWADZD AMEKU	TRAVIS	78752	HMH9423	TX	599
73	JAZZMINE TRIM	TRAVIS	78754	HNP1305	TX	1504
74	CHRISTOPHER WILLIAM LUDEN	TRAVIS	78741	HPF0293	TX	308
75	SAMUEL L GUZMAN	HAYS	78610	HPM1211	TX	532
76	JORGE VILCHIS GONZALEZ	COMAL	78130	HRX9928	TX	424
77	GODOFREDO TREJO ORTIZ	WILLIAMSON	78664	HTM6880	TX	196
78	LAURA KATHERINE CANNON	WILLIAMSON	78613	HVC2748	TX	345
79	JOSHUA WALTER BERNAL	WILLIAMSON	78634	HWY1944	TX	824
80	RICHARD NISHAN BEDROSSIAN	BASTROP	78612	HXZ9229	TX	324
81	MARTHA JARAMILLO ROCHA SAMUEL OBED ROCHA	TRAVIS	78744	HYB4962	TX	169
82	MISTY MILLSAP	TRAVIS	33543	HYB6800	FL	1433
83	CAYETANO MENDOZA CASTILLO	CALDWELL	78644	HZK5529	TX	554
84	EDRIC BERNANRD COLEMAN AUDREY FRANKLIN COLEMAN	TRAVIS	78660	JBM7221	TX	493
85	LANDON ELZIE GOODING	WILLIAMSON	78641	JBN2893	TX	609
86	ERNEST EUGENE SCHUMACHER	BELL	76549	JCR2475	TX	1144
87	PRISCILLA SANCHEZ	WILLIAMSON	78664	JCR7630	TX	102
88	JORGE PAREDES MANJARREZ	TRAVIS	78752	JDG5946	TX	109
89	HECTOR MANUEL ACOSTA ALANIS	TRAVIS	78741	JDJ4573	TX	524
90	ROBERT AUGUST FAGG KRISTI LYNN FAGG	WILLIAMSON	78665	JDJ4809	TX	695
91	SCOTT S. CROSBIE	BASTROP	78602	JDJ9315	TX	571
92	QUANTINA SHAY GAMEZ MATTHEW ALLEN KOTARA	BASTROP	78602	JGN9360	TX	1574
93	GABRIEL MORENO	TRAVIS	78745	JKV9058	TX	1114
94	KASEY CAIN	MILAM	76567	JLB7746	TX	260
95	TAYLOR PAYTON GLOVER	WILLIAMSON	76574	JLD2284	TX	247
96	DANNY LEE SHIPP	BASTROP	78602	JLK2401	TX	1111

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

97	MANUEL DEJESUS REYES	TRAVIS	78724	JLK3017	TX	317
98	DIEGO ARMANDO RODRIGUEZ SR	TRAVIS	78653	JMF9022	TX	437
99	MARK QUINCY LEBARON-STUBBS	WILLIAMSON	78628	JMR0565	TX	197
100	GUILLERMINA MORALES MARIO MARTINEZ	TRAVIS	78660	JRG6597	TX	210
101	NICOLE KYNA HOLMES	TRAVIS	78754	JRH3586	TX	334
102	ALEXANDER JACOB CASTRO	TRAVIS	78741	JRH4817	TX	615
103	JUAN R NEAVES SANDOVAL	BEXAR	78238	JRM3215	TX	147
104	MARTHA ARROYO GUTIERREZ	BASTROP	78602	JSB0352	TX	1273
105	BONNIE J HINKSTON	BASTROP	78602	JVG4992	TX	203
106	MARTA MAAZ	ELLIS	75165	JVM4021	TX	353
107	CRISTINA MACIAS OCAMPO	TRAVIS	78653	JWH2604	TX	364
108	GEORGE EDWARD FREEMAN JR	WILLIAMSON	78717	JWH5329	TX	88
109	JESSE JIMMIE SALAS	TRAVIS	78747	JWH8144	TX	162
110	NICHOLAS HOWARD WHITTEMORE	WILLIAMSON	78613	JWJ2299	TX	448
111	PAIGE Y CARUTHER	TRAVIS	78653	JWJ6892	TX	739
112	AIVERY JAMES SCHEFFER	WILLIAMSON	78641	JXD4194	TX	561
113	DONNIE RAY RICHARDSON	TRAVIS	78721	JYD4492	TX	634
114	DAVID EARL WAITS	BASTROP	78602	JYR4063	TX	190
115	DAVID ANTONIO LEONARD	BASTROP	78612	JYV9390	TX	519
116	DYSHAWN ARKEEM COLEMAN	TRAVIS	78728	KBM7659	TX	430
117	WILSON NOE RODRIGUEZ	TRAVIS	78617	KBY3471	TX	901
118	RAYMUNDO RUIZ	EL PASO	79849	KCB1623	TX	522
119	PATRICK RABON TARLTON	TRAVIS	78645	KCH6040	TX	740
120	GLENN CARL BURNETT	HAYS	78610	KFY0319	TX	377
121	HENRRI CAMPOS-HERNANDEZ ANGELICA MARIA MARTINEZ	HAYS	78640	KFY0343	TX	1659
122	DORIS ELAINE PRESTON	TRAVIS	78758	KGW0196	TX	936
123	ELISA WEBB MOUTRAY-OLER	TRAVIS	78704	KGW2083	TX	337
124	AISHA MALIK	TRAVIS	78758	KGZ8326	TX	101
125	NICHOLAS CHARLES SARGENT	WILLIAMSON	78641	KJD5889	TX	624
126	JOSE RICARDO VARGAS	WILLIAMSON	78681	KKB8978	TX	194
127	MARIA GUADALUPE RAMON	WILLIAMSON	78717	KKC1250	TX	615
128	JIMMY RAY CUDJO	TRAVIS	78758	KLF8990	TX	430
129	REBA ANN GLAZE THOMAS HAROLD JONES	TRAVIS	78723	KNJ6483	TX	788
130	SAMANTHA LANEIGH STARETT	TRAVIS	78653	KNN5770	TX	595

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

131	ANTHONY FITZGERALD DAILY JR STEPHANIE R LOTT	TRAVIS	78660	KNP8447	TX	353
132	BRIAN CRAIG DUNMAN	TRAVIS	78715	KNT4817	TX	417
133	SANDRA MICHELLE RANDOLPH	GONZALES	78629	KPW3751	TX	830
134	CAMPBELL & ASSOCIATES INC	WILLIAMSON	78633	KRD0350	TX	365
135	FRANCISCO VENEGAS III	COMAL	78163	KRF5256	TX	620
136	GEORGE REYES III	HAYS	78610	KRR2134	TX	106
137	JOHN GERARD LUNA	TRAVIS	78744	KSC6631	TX	803
138	YVETTE CAVAZOS	TRAVIS	78724	KSD7148	TX	564
139	JUAN DAVID DOMINGUEZ	TRAVIS	78753	KSZ1164	TX	235
140	MIGEL HERRERA	HAYS	78640	KTP8338	TX	1054
141	DANIEL GOMEZ	TRAVIS	78744	KTP8581	TX	186
142	KRISSY ANNETTE HASTINGS	TRAVIS	78744	KTR4007	TX	373
143	CLAUDIA MORALES RODOLFO MARROQUIN	TRAVIS	78660	KTX3208	TX	532
144	ANNA B RODRIGUEZ	TRAVIS	78653	KWV3624	TX	442
145	SHANNON MUGRAGE	TRAVIS	60099	KXC8452	IL	603
146	KENYA SALINAS	TRAVIS	78660	KXD5519	TX	117
147	DIONNE LENE ROSS	WILLIAMSON	78664	KYD1837	TX	957
148	JUDY ROJAS ANDY R ROJAS CORTINA	TRAVIS	78617	KYD6409	TX	395
149	JAIME HERRERA	TRAVIS	78617	KYD7751	TX	703
150	MICHELE RODRIGUEZ	TRAVIS	78757	KYT8659	TX	882
151	MARQUISHA JAMI GARY	BELL	76549	KYY9131	TX	397
152	MERCEDES SKY ALLEN	WILLIAMSON	78613	LBB7339	TX	1307
153	MARCUS QINN SIMS ANGELA CORREA	LUBBOCK	79411	LCJ6552	TX	153
154	GERARDO ALFREDO CHACON DELSID	HARRIS	77014	LCP7998	TX	336
155	ROD KERR	TRAVIS	78645	LCX7282	TX	582
156	JOHN DYLAN ELIZONDO	TRAVIS	78756	LDX7849	TX	154
157	GERARDO GARCIA LEAL SARA LEAL-ROLDAN	TRAVIS	78753	LDX8214	TX	462
158	TASHA WINGWOOD	TRAVIS	78724	LDX9114	TX	165
159	AMBER LIANNE BORAWSKI	TRAVIS	78728	LDY1915	TX	163
160	JUAN RAMON PEREZ	BASTROP	78621	LDY5992	TX	289
161	SARAH FARRAR	TRAVIS	78617	LDZ4032	TX	1105
162	CLAYTON WAYNE SCRIBNER	HANSFORD	79081	LFN6929	TX	365
163	PORSHE L TARVER	GALVESTON	77568	LFW1823	TX	394
164	DENNIS FOWLER	TRAVIS	78660	LGT5142	TX	558

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

165	DIANE S JOHNSON	WILLIAMSON	78717	LGT5832	TX	619
166	JOSE MIGUEL MARTINEZ	TRAVIS	78753	LGT6282	TX	624
167	BRETT MICHAEL CROFT RONALD W CROFT	TRAVIS	78660	LGT6786	TX	852
168	VICTORIA PEREZ	TRAVIS	78702	LGT7424	TX	241
169	ALEJANDRA TALIA CORPUS	TRAVIS	78741	LHF3867	TX	176
170	DAVID WAYNE MILLER	LEE	78947	LHH0200	TX	781
171	JENIFER ANAIS REYES MARTINEZ	BASTROP	78612	LHS9767	TX	481
172	HEATHER MARIE MADISON	CALDWELL	78648	LHT2841	TX	153
173	SHAQUAE CRATELL HADDLEY DRED MILLER BARR III	TRAVIS	30066	LJF3283	GA	914
174	TERRI PHILLIPS CHANDLER	HAYS	78666	LJJ2681	TX	288
175	RUBEN REYES JR ROLANDO MONSIVAIS NAVA	WILLIAMSON	78615	LKB0298	TX	101
176	STACY R WILLIAMS	TRAVIS	78730	LKB2719	TX	107
177	RAYMOND MICHAEL WORTEL	TRAVIS	78748	LKB6015	TX	297
178	ALEXIS OLIVIA MCDONALD	HARRIS	77047	LKY5401	TX	278
179	ANGEL DEJESUS GONZALEZ	HARRIS	77008	LKZ3977	TX	749
180	PATRICIA ANN CONTRERAS ROEL CONTRERAS	BASTROP	78957	LLJ7066	TX	173
181	DANIEL LARRY GARCIA	TRAVIS	78660	LMH5568	TX	206
182	MORGAN DANIEL BOOKSH	TRAVIS	78753	LMJ4978	TX	126
183	PATTERSON ELECTRIC, INC.	TRAVIS	78766	LMJ8085	TX	169
184	NATHAN A MENKIN	WILLIAMSON	78641	LMK2552	TX	145
185	ROSEMARY HENDRICKS TOWNSEND	BEXAR	78240	LML8378	TX	702
186	MEGAN MARIE SALINAS	WILLIAMSON	78665	LMP3404	TX	226
187	MICHAEL ANTHONY MALDONADO	TRAVIS	78617	LMP7013	TX	1058
188	RICHARD LEE ROGERS	BASTROP	78602	LMZ1808	TX	243
189	VANESSA SALAZAR OSMAR CORTEZ	TRAVIS	78752	LNK5012	TX	327
190	SAGAY OSA OMOREGIE ISAIAH A SIMMONS	TRAVIS	78754	LNK7453	TX	742
191	MICHELLE ANN LAROUX	WILLIAMSON	78641	LNT2575	TX	840
192	ELISA TORRES BALDERAS	TRAVIS	78660	LNT2941	TX	316
193	DARRYL DEWAYNE WILLIAMS	TRAVIS	78704	LNT3775	TX	388
194	ZACHARY TY NORROD	MCCULLOCH	76825	LNT9968	TX	119
195	KATRINA NEWCOMB	WILLIAMSON	78626	LNV8058	TX	288
196	CARLISLE TEXAS INTERESTS,. LLC	TRAVIS	78735	LPT7443	TX	367
197	APRIL WILLIAMS	TRAVIS	78728	LRH3659	TX	387
198	ENVIRONMENTAL SAFETY SERVICES	HAYS	78737	LRJ2814	TX	378

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

199	TANNIA YULISSA AVILA SALVADOR GONZALEZ RODRIGUEZ	TRAVIS	78725	LRJ4745	TX	535
200	SILAS ALEXY PADILLA	TRAVIS	78733	LRJ4871	TX	665
201	JOSE LEANDRO CAMPOS CAYENTE	BEXAR	78216	LRY9047	TX	356
202	SHARAIN MARIE FALEIDE	TRAVIS	78741	LRZ0463	TX	184
203	PEGGY HERRERA GONZALEZ	TRAVIS	78653	LSS4879	TX	253
204	ISMAEL RODRIGUEZ	EL PASO	79938	LTD4002	TX	197
205	RENE GIL	TRAVIS	78617	LVD4553	TX	189
206	FREDY JOSE JARQUIN JARQUIN SAMANTHA VICTORIA JARQUIN	BELL	76502	LVK6769	TX	262
207	JAIME JAFET RIVERA PEREZ	TRAVIS	78660	LVK7747	TX	146
208	JONATHAN DANIEL PANZER	TRAVIS	78759	LVL3085	TX	282
209	KEDIN ADONAY HERNANDEZ MATEO	TRAVIS	78724	LVL5828	TX	214
210	ADRIAN LEONARD VARELA	WILLIAMSON	78665	LVN5644	TX	302
211	BENIGNO RAMIREZ FAJARDO	TRAVIS	78744	LWN3565	TX	116
212	JOHN ANTHONY PEREZ	TRAVIS	78653	LWX3544	TX	265
213	DAPHNE OLIVIER TREVINO	TRAVIS	78748	LXD8591	TX	1524
214	LILLIE AVERY BERRY DYLAN DALLAS REAVES	RUSK	75652	LXF5997	TX	550
215	MICHAEL A SEID	TRAVIS	78701	LXF6875	TX	172
216	JOHNATHAN CHARLES MEZA	TRAVIS	78754	LXR0523	TX	292
217	TEXAS HEAVY EQUIPMENT REPAIR, LLC	LAMPASAS	76550	LXT2307	TX	515
218	JENNIFER BAILEY	WILLIAMSON	78641	LYR5379	TX	678
219	MARISA VICTORIA GONZALEZ	BELL	76502	LYY5466	TX	148
220	MICHAEL ANTHONY CASTILLO	CALDWELL	78616	LZR2559	TX	456
221	Tracy Samilpa	BASTROP	78621	LZR3368	TX	784
222	SKYE TAMMY NUNEZ	WILLIAMSON	78664	LZR4609	TX	123
223	VICTORIA ANN RUCKER KATHERINE DUDLEY KEMPER	BURNET	78611	MBF5376	TX	215
224	KOBIE RYAN COCKRELL ROY EDWARD COCKRELL	LAMPASAS	76550	MBH7907	TX	678
225	GIOVANNIE CAJBON POP	BASTROP	78612	MCH1091	TX	1119
226	FABIAN NICOLAS SOLORZANO	TRAVIS	78747	MCH1457	TX	189
227	JAMEEL EVERETT BROWN ANGEL CALDWELL	TRAVIS	78741	MCH1762	TX	966
228	HENRIETTA RUIZ GARZA	TRAVIS	78660	MCH2079	TX	413
229	JONNATHAN ALEXANDER PONCE LEIVA	TRAVIS	78741	MCH3221	TX	645
230	CARMINA CLEMENTE DIONISIO CHAVEZ	BASTROP	78621	MCH4791	TX	667
231	JAMES TRAVIS KINNEY RAQUEL VEGA KINNEY	HAYS	78676	MCJ1292	TX	266
232	LATASHA NICOLE PAYTON	WILLIAMSON	78664	MCJ1679	TX	196

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233	LEVI ISSAU GUTIERREZ HERNANDEZ	TRAVIS	78714	MCV4010	TX	524
234	ARIANA LEE ROBLES	TRAVIS	78723	MCX3957	TX	280
235	JORY MARCO NETTLES	TRAVIS	78741	MCX9752	TX	756
236	PAUL CHRISTIAN GUERRA KIRSTIE TURNER GUERRA	BURNET	78654	MDH3904	TX	682
237	FELICIA ANN LEYVA	WILLIAMSON	78665	MDM8729	TX	213
238	TRAVIS JOHN HOFMANN AMANDA JO HOFMAN	WILLIAMSON	78642	MGY3394	TX	589
239	SETH DANIEL VILLANUEVA	TRAVIS	78728	MHB9051	TX	119
240	GONZALO MARTINEZ-GARCIA	WILLIAMSON	78634	MHB9473	TX	228
241	BRANDON ROLLINS	TRAVIS	78759	MHD0123	TX	425
242	SELENA YVETTE BENAVIDES	TRAVIS	78744	MHD1357	TX	310
243	HANNAH ELAINIA LITTLETON	WILLIAMSON	78641	MHD2286	TX	282
244	NATASHA M BREHM	WILLIAMSON	78717	MHZ9251	TX	666
245	PHILLIP FEATHERSTON	HAYS	78610	MJY2316	TX	186
246	SUNNY HYDE	WILLIAMSON	78613	MKD9842	TX	1106
247	RODOLFO RANGEL ZUBIETA	BEXAR	78223	MKR8134	TX	1190
248	MICHELLE GONZALEZ BARRON	TRAVIS	78617	MKV6263	TX	1095
249	JUANA MIRELES GARCIA	TRAVIS	78617	MKV8928	TX	144
250	JUAN MANUEL MANUEL REYES MARLA MARIEL REYES	HIDALGO	78574	MKW5067	TX	344
251	BRANDY SHAVON MIZE EUNICE JACKSON EDMONDSON	WILLIAMSON	78664	MKW8291	TX	503
252	VALERIE LAVON HERVEY	TRAVIS	78721	MKY6903	TX	422
253	TARA ANN DUDLEY	HAYS	78640	MLL3251	TX	289
254	LOREN CARTER UTESCH	WILLIAMSON	78613	MLM1535	TX	493
255	TYRONE ALLAN BARTOS	TRAVIS	78728	MLP1590	TX	239
256	CHRISTINA ANN ELLINGSON KADEN MICHAEL HEWITT ELLINGSON	BASTROP	78602	MLP1963	TX	109
257	KAYLA ALEXANDRA GIRGUS	WILLIAMSON	78641	MLP2242	TX	241
258	JOSHUA DANE VINCIK	WILLIAMSON	78641	MLP6583	TX	483
259	JOEL MEDRANO-CRUZ	BASTROP	78612	MLP7559	TX	446
260	RONNIE EARL GREEN	MILAM	76567	MLV6170	TX	643
261	CODY BIRCH RORY BIRCH	CALDWELL	78648	MMG9718	TX	709
262	CRYSTAL LEE KEITH	BASTROP	78602	MMX1965	TX	869
263	SHANA NICOLE QUINTANILLA	BASTROP	78602	MMX2110	TX	364
264	BEAUTY TOWNSEND	TRAVIS	78617	MMX2492	TX	280
265	REBECCA A SALAZAR	TRAVIS	78702	MMY1982	TX	178
266	CHRISTINA MARIE CHANY	TRAVIS	78741	MMY2741	TX	769

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267	NATIVIDAD MORAN CORTEZ MARCO ANTONIO JUAREZ	TRAVIS	78724	MMZ0050	TX	909
268	KELVIN JOHNSON	WILLIAMSON	78665	MMZ1066	TX	677
269	AUTUMN NICHOLE ROBERTS	TRAVIS	78745	MMZ4962	TX	734
270	CAMERON CHASE CAMP	TRAVIS	78750	MMZ5300	TX	168
271	SHERRY LYNN HUDSON	WILLIAMSON	78615	MNB3755	TX	114
272	GARY WAYNE DAWSON	BASTROP	78662	MNF7244	TX	136
273	MARISSA ANNE LOPEZ	TRAVIS	78745	MNF7980	TX	137
274	EDWARD LOPEZ JR	WILLIAMSON	78634	MNP4544	TX	520
275	FRANCISCO J VALENCIA PARRA	WILLIAMSON	76574	MNP5373	TX	1221
276	JOSE ANTONIO SANTIAGO VIDAL	TRAVIS	78744	MNZ0043	TX	204
277	DARRELL SIMMS	TRAVIS	78723	MNZ2237	TX	607
278	ORLANDO GONZALES	WILLIAMSON	78634	MNZ4784	TX	1298
279	RACHAEL MICHELLE HARNER	TRAVIS	78728	MNZ7167	TX	760
280	HANNAH RAYE COSTA	WILLIAMSON	78641	MNZ7410	TX	1178
281	STACEY LYNN BLAKE	BURNET	78608	MPJ1451	TX	232
282	PAMELA DALE LADUE KIMBERLY MICHELLE LADUE	BASTROP	78602	MPL6549	TX	113
283	BRITTANY PARKER BASS	WILLIAMSON	78641	MRG4036	TX	314
284	DEL ROSARIO RIOS ROCHA	BEXAR	78211	MRG5044	TX	674
285	KRISTINA C GARRISON-CLARK	WILLIAMSON	78641	MRZ1769	TX	584
286	COLLEEN FOSTER ROBERT P FOSTER	WILLIAMSON	78642	MSD7174	TX	146
287	SARAHI MARTINEZ JUDITH MARTINEZ	TRAVIS	78617	MSF0929	TX	316
288	ARMANDO LOPEZ	BASTROP	78612	MSF1861	TX	236
289	MARY FRANCIS SHELBY	TRAVIS	78724	MSF6888	TX	634
290	JUMAANE TREVION CHRISTOPHE	TRAVIS	78757	MSF7099	TX	228
291	ANTONIO HUNG OLIVERA	TRAVIS	78758	MSF8471	TX	748
292	MARIA T MARISCAL	TRAVIS	78747	MSM0374	TX	149
293	NORBERTO CARBAJAL BENITEZ	BASTROP	78602	MSN6575	TX	467
294	DONALD LEE ETHRIDGE SANDY ETHRIDGE	WILLIAMSON	78641	MSV9184	TX	844
295	MARK A LINDSAY	HAYS	78666	MSW0073	TX	135
296	KENNISHA LAQUAN MOFFETT HERBERT RAY MOFFETT JR	WILLIAMSON	78664	MTB3352	TX	755
297	TAYLER WILLIAMS	WILLIAMSON	78641	MTB3797	TX	211
298	ROBIN LESHUN CANADA MELVIN DEAN CANADA JR	WILLIAMSON	78665	MTB3842	TX	843
299	JOHN FERNANDES LYDIA ZARAGOSA FERNANDES	TRAVIS	78734	MTB3897	TX	107
300	JOSE JACIEL JAIMES	WILLIAMSON	78634	MTB7143	TX	137

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301	ANDREW BENJAMIN BRADY	TRAVIS	78754	MTX1878	TX	297
302	SHAWNTECA DEVONNA BLANTON	TRAVIS	78758	MTX4884	TX	762
303	DAVID GARZA	TRAVIS	78660	MTX4918	TX	404
304	CESAR RODARTE	WILLIAMSON	78665	MTX5414	TX	291
305	MARIA DOLORES HERNANDEZ-VARGAS	TRAVIS	78721	MTX5580	TX	426
306	ASHLEIGH NICOLE REYES SAMUEL AARON REYES	BASTROP	78621	MTX5893	TX	573
307	SARAH MARIE ROBINSON-DURST	HAYS	78640	MTY2521	TX	689
308	JERRY WAYNE JOHNSON JR	TRAVIS	78724	MTY5767	TX	427
309	ROY EDWIN GRAHAM JR	TRAVIS	78653	MVF2491	TX	500
310	BOBBY THOMPSON JR	HARRIS	77373	MVK2749	TX	180
311	LEVAR DESON MILLER	TRAVIS	78744	MVY7041	TX	227
312	FRANCISCO ZENDEJAS	TRAVIS	78617	MVY7634	TX	120
313	RENITA KAY MARSHALL	HAYS	78610	MWK1512	TX	1303
314	IRIS ANN OCHOA	WILLIAMSON	78626	MWT5674	TX	140
315	DAVID RYMAN DEGNAN	TRAVIS	78738	MWT9497	TX	159
316	STACEY MICHELE GREENE ERIC VERNE GREENE	TRAVIS	78660	MWW4285	TX	254
317	SARAH ANTONIA FRENGEL	WILLIAMSON	78613	MWY2146	TX	334
318	OMAR RAMIREZ ROSAS	TRAVIS	78645	MXP3781	TX	238
319	JOSE LUIS MATA	TRAVIS	78758	MXP4109	TX	147
320	ELODIA G CALDERON	BASTROP	78662	MXP4204	TX	251
321	FRANCIS ECHEVESTRE	TRAVIS	78760	MXP5822	TX	789
322	JOEL URDIALES FLORES SAUL ANGEL URDIALES LEAL	WILLIAMSON	78642	MXP7668	TX	218
323	JOSE ISMAEL VARGAS MEJIA	TRAVIS	78753	MXP8441	TX	431
324	BEHZAD CAZARES MASOUMI	TRAVIS	78759	MXP9084	TX	133
325	KEILA FABIOLA AGUILAR PRECIADO	TRAVIS	78724	MXP9558	TX	1527
326	MODERN DIESEL LLC	HAYS	78640	MXR0893	TX	243
327	JESSICA YBARRA	TRAVIS	78754	MXR3327	TX	1680
328	DANIELLE ELIZABETH FROEHLICH	WILLIAMSON	78613	MXR4192	TX	140
329	BETTY JEAN MEDELLIN	TRAVIS	78744	MXR4835	TX	691
330	BERNARDO DIAZ VAZQUEZ	NUECES	78380	MXS9680	TX	181
331	JOE RYAN SWINT	HAYS	78610	MXW0120	TX	250
332	CECILIA SAENZ ALVAREZ ADRIAN ALVAREZ	WILLIAMSON	78717	MYB7604	TX	187
333	DONOVAN KENDRICK LANGLEY	TRAVIS	78758	MYB9936	TX	522
334	MARTHA E CAMARENA	CALDWELL	78655	MYJ2098	TX	208

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335	RAUL DOMINGO ORTIZ SANCHEZ	TRAVIS	78723	MYJ2779	TX	374
336	CLENTON DOUGLAS CRUMLEY	WILLIAMSON	78641	MYL4707	TX	852
337	LATYAH SIMONE MILLS ALETRA MONIQUE NIEVES-JACKSON	WILLIAMSON	78641	MYR6672	TX	520
338	FELIZ LUISA RODRIGUEZ	FAYETTE	78945	MYR9056	TX	241
339	MICHAEL YOUNG GORTON	WILLIAMSON	78628	MYR9922	TX	494
340	JESUS ANTONIO MENDOZA CONCHI	TRAVIS	78660	MYS0602	TX	675
341	ANA BERENICE SORTO	TRAVIS	78617	MYS1087	TX	473
342	JASON ALLAN WILKINS	BASTROP	78612	MYS1510	TX	313
343	KRISTINA MARIE TOVAR NANCY SANDOVAL TOVAR	HAYS	78610	MYS1872	TX	808
344	JOHN WILLIAM KENNEDY	TRAVIS	78701	MYS2860	TX	416
345	ELIAS HEREBIA JR	TRAVIS	78744	MYS4549	TX	1664
346	JOSE RODRIGUEZ SALAZAR	TRAVIS	78617	MYS4633	TX	424
347	STEVIE RAYANN GONZALES	TRAVIS	78724	MYS7368	TX	139
348	SHANNON KNOWLES LASATER MADELEINE CHANCE LASATER	TRAVIS	78730	MYS7426	TX	829
349	JOSEPH HAYWOOD SCHNAU	TRAVIS	78745	MYT0472	TX	761
350	JOSE M CERVANTES REYES	TRAVIS	78617	MZB9983	TX	210
351	DANIEL VAZQUEZ BARRON	TRAVIS	78748	MZC4542	TX	108
352	MARTIN RENE CASTILLO	TRAVIS	78753	MZC4552	TX	338
353	LACARRIA BRIDGITA DARRELLE LEE COURTNEY JAMES WILLIAMS	TRAVIS	78754	MZD2484	TX	647
354	SAUL RODRIGUEZ SOTELO	TRAVIS	78724	NBC5753	TX	234
355	JOHN EDWARD CLEE-CHARLTON	HAYS	78666	NBL3423	TX	103
356	CHRISTOPHER LEE FISHER	WILLIAMSON	78634	NBL4186	TX	393
357	VANESSA CONTRERAS GONZALEZ	TRAVIS	78724	NBN3381	TX	877
358	DOMINQUE NICOLE HOBBS	TRAVIS	78758	NBN3861	TX	156
359	MARK GARVEY	WILLIAMSON	78729	NBN5164	TX	854
360	JENNIFER ANNE CARRIER	WILLIAMSON	78642	NBN5498	TX	479
361	CRAIG LAMONT ROBERTS-SHERN	TRAVIS	78660	NBW7687	TX	903
362	DESIREE NICOLE GONZALEZ	TRAVIS	78723	NBX9484	TX	149
363	JESSE SCOTT OLIVO	NUECES	78414	NCD0790	TX	132
364	FREDDIE JOE NASH JR	BASTROP	78621	NCD3751	TX	187
365	DERRICK R COULTER	WILLIAMSON	76578	NCD5184	TX	375
366	JEFFREY RYAN LANZA	TRAVIS	78723	NCD5912	TX	199
367	LISA MARIE RENDON-BARA RICHARD RENE BARA	TRAVIS	78744	NCD7909	TX	245
368	ALEXIS RAMOS AYALA	TRAVIS	78728	NCF2526	TX	135

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369	DA TREANA DUSHAWNN CRAWFORD	TRAVIS	78744	NCF6766	TX	826
370	JESUS AMADOR LAMAS MARIA JUANITA SEGOVIA	HAYS	78666	NCF7048	TX	1733
371	SERGIO ISIDRO TRISTAN BRAVO	WILLIAMSON	78634	NCF7597	TX	131
372	CARL PHILLIP JONES	BASTROP	78602	NCF7801	TX	291
373	VANESA N VERA VICTOR RODRIGUEZ-TREJO	TRAVIS	78702	NCF8101	TX	629
374	ROBERT JENKINS JR	TRAVIS	78617	NCF8223	TX	1232
375	LEE ANN RAMIREZ	TRAVIS	78744	NCF9000	TX	568
376	DARREN MCKNIGHT	TRAVIS	78724	NCG0402	TX	1166
377	JAWNTA ANDRE MANSON	TRAVIS	78702	NCG0602	TX	629
378	JUAN FLORES	TRAVIS	78721	NCG0800	TX	504
379	JAIRO JUAREZ	BASTROP	78602	NCG1238	TX	1141
380	JUANITA YOUNG	TRAVIS	78752	NCG1273	TX	257
381	LARRY MANUEL ROMAN VAQUERA	WILLIAMSON	78664	NCG1305	TX	370
382	WHITNEY MICHELL NICO	HARRIS	77032	NCG1526	TX	669
383	ORALIA BAUTISTA ANDRES ROMERO	TRAVIS	78741	NCG1698	TX	601
384	SELECT AUTO GLASS JOSE SANDOVAL HERNANDEZ	TRAVIS	78757	NCG2463	TX	433
385	DESTIN J MILLER	TRAVIS	78745	NCG3114	TX	403
386	JOHN STEVE JIMENEZ	BASTROP	78621	NCG3410	TX	174
387	MILEENA NICOLE LEDESMA	TRAVIS	78728	NCK9019	TX	886
388	JOSEPH NEAL JR	BASTROP	78621	NCK9196	TX	236
389	JONATHON E JOHNSON	WILLIAMSON	78641	NCK9613	TX	204
390	STACY HART	TRAVIS	78750	NCL1771	TX	316
391	KEVIN DANIEL LEE	BASTROP	78621	NCN1209	TX	760
392	WENDY DEBORAH WILLIAMS	BASTROP	78621	NCN1681	TX	500
393	MICHELLE LEANNE STARK	TRAVIS	78726	NCX5693	TX	309
394	ADALBERTO JAIMES	WILLIAMSON	78664	NCX6309	TX	108
395	BETTINA RAYE ARVIEW KATHLEEN YVONNE HARRIS	COMAL	78130	NDC5716	TX	413
396	MARY JAMES	TRAVIS	78660	NDC5767	TX	118
397	JOE ANGEL MARTINEZ	TRAVIS	78653	NDG5682	TX	189
398	MYRON NICHOLAS APLON	TRAVIS	78660	NDN7730	TX	228
399	ADAM R CALDERON	TRAVIS	78723	NDN8278	TX	519
400	FIDEL FLORES TORRES OLIVIA P FLORES	TRAVIS	78724	NDN8509	TX	182
401	TRAVIS COUNTY C/O PURCHASING	TRAVIS	78701	NDP0729	TX	220
402	TRAVIS COUNTY C/O PURCHASING	TRAVIS	78701	NDP0743	TX	232

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403	AMANDA KATHRYN RITCHINGS	TRAVIS	78731	NDP0867	TX	374
404	TRISHAN MARIE TURNER	TRAVIS	78704	NDP2578	TX	189
405	CRYSTAL SILLERO HUERTA OCHOA	TRAVIS	78758	NDP3634	TX	608
406	RENESHA LANELL JONES	TRAVIS	78758	NDP3650	TX	362
407	JUAN DIAZ YANEZ	TRAVIS	78748	NDP4857	TX	581
408	DAWN LEE MATHIS	WILLIAMSON	76574	NDP5194	TX	461
409	SANTOS JOE HERNANDEZ ESPERANZA GONZALES	GOLIAD	77963	NDP6963	TX	110
410	GEORGINA CHAVIZ CABRERA REYNALDO BENITEZ CASTRO	TRAVIS	78752	NDP7154	TX	250
411	AURORA CABADAS GISELA CABADAS	WILLIAMSON	78613	NDP7167	TX	953
412	CHANTELLA SHASTA JOHNSON	TRAVIS	78653	NDP9309	TX	174
413	ADRIAN NOVELLA VARGAS	CALDWELL	78644	NDR0810	TX	169
414	ANGELINA NUNEZ LUIS MIGUEL PEREZ MARTINEZ	TRAVIS	78617	NDR2189	TX	168
415	OSVALDO EZEQUIEL AMBRIZ TOVAR LORENA ENRIQUEZ VILLAF	TRAVIS	78758	NDR3596	TX	515
416	DESIREE GUADALUPE MENDIETA	TRAVIS	78617	NDR4297	TX	195
417	GLORIA DURON ADAM CASTILLO	TRAVIS	78617	NDR5044	TX	163
418	CYNTHIA DIANE PREVOST	BELL	76502	NDR5695	TX	373
419	GAVIN ALEXANDER MACIAS	WILLIAMSON	78664	NDW9770	TX	914
420	CHRISTOPHER L GARCIA YULIANA SERRANO GARCIA	TRAVIS	78653	NDX1543	TX	276
421	JONATHAN RAY EFFINGER	HAYS	78666	NDZ7729	TX	870
422	ARNULF TIMOTHY LAFUENTE	WILLIAMSON	78641	NDZ7749	TX	131
423	JACK HAYES BUTLER	BASTROP	78602	NFP6530	TX	272
424	ANNA MARIE STERLING	TRAVIS	78744	NFT1273	TX	569
425	JOAN FERRIS / JESSICA KRUSE	WILLIAMSON	78626	NFW8490	TX	308
426	DANIELLE NICHOLE BURKETT	WILLIAMSON	78613	NFW9397	TX	1086
427	KEVIN CHRISTOPHER CORTEZ	WILLIAMSON	78634	NFX0417	TX	142
428	HARMONY KAY THORSEN	WILLIAMSON	78613	NFX0881	TX	108
429	MARK ANTHONY FELDER	CALDWELL	78644	NFX1165	TX	508
430	COREY DEWAYNE MACK	TRAVIS	78758	NFZ7860	TX	360
431	CHARLES CHRISTOPHER MILLER	TRAVIS	78660	NFZ8361	TX	508
432	MYRA M REYES	BASTROP	78621	NFZ9766	TX	102
433	ERNESTO GONZALEZ MARTINEZ	HAYS	78640	NGB2237	TX	588
434	MARTHA ALICIA LAYTON BENIGNO LAYTON III	TRAVIS	78617	NGB2620	TX	629
435	TIMOTHY SEAN JOHNSON	TRAVIS	78660	NGB3069	TX	257
436	DORIS JEAN HILL	TRAVIS	78723	NGB3277	TX	128

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437	SADIE SOLECE WOOTEN	TRAVIS	78745	NGB4918	TX	56
438	GABRIELLA DENISE RICHARD	TRAVIS	78724	NGB4992	TX	118
439	JASMINE MONEA SHAW	TRAVIS	78653	NGB5123	TX	492
440	ERIN ANN FLORES	BASTROP	78621	NGB5281	TX	255
441	OLIVA DAHI NAJERA	TRAVIS	78759	NGB5333	TX	1363
442	SABRINA ANN GUERRERO	TRAVIS	78617	NGB5576	TX	367
443	PETRA AVILA VILLALOVOS	CALDWELL	78616	NGB6009	TX	519
444	HORACE HERMAN HUNTER SR	TRAVIS	78660	NGB6591	TX	118
445	CARLOS E PACHO NORMA D PACHO	TRAVIS	78660	NGB7566	TX	300
446	GARIS BERNARD HICKERSON	TRAVIS	78753	NGB7922	TX	356
447	SHEILA MARIE SLAUGHTER KEIRA SIMONE NEAL	WILLIAMSON	78681	NGC1056	TX	505
448	DIANA HERNANDEZ PEDRAZA	TRAVIS	78724	NGC1906	TX	135
449	THOMAS RUIZ	TRAVIS	78753	NGC2034	TX	569
450	ANTONIO ALEXIS RAMIREZ	TRAVIS	78724	NGC2234	TX	213
451	BENJAMIN RODRIGUEZ MADRID	TRAVIS	78747	NGC2464	TX	377
452	ANTOINETTE LAVON SNEED	TRAVIS	78723	NGC2553	TX	1431
453	GUADALUPE GONZALEZ JR	TRAVIS	78754	NGC3677	TX	183
454	LATONYA SHAWNTE JOHNSON	WILLIAMSON	78717	NGC4005	TX	137
455	BENJAMIN TRAVIS PATTON	TRAVIS	78724	NGC4170	TX	755
456	WHITNEY ROSE HARRIS	TRAVIS	78702	NGC4732	TX	391
457	NICOLE MARIE MORGAS	WILLIAMSON	78641	NGC5347	TX	2836
458	SEAN CRAIG ROBERTSON	TRAVIS	78704	NGN6170	TX	510
459	LUIS MANUEL SALDANA-RODRIGUEZ	BASTROP	78612	NGS1791	TX	927
460	UMIEKA JANAI CROWDER	TRAVIS	78741	NGS1907	TX	847
461	JESSIE ALLEN HERZBERG	BASTROP	78621	NGS1941	TX	257
462	JORGE GONZALEZ GONZALEZ	TRAVIS	78617	NGT7828	TX	441
463	LEE ROY REYES	HIDALGO	78574	NGY6024	TX	148
464	PATRICK LARON BROWN	DALLAS	75115	NHC0939	TX	430
465	FRANK DAVID RIOS MONREAL	TRAVIS	78617	NHG5339	TX	148
466	LATONIA DIONNE CORNELIUS	HARRIS	77083	NHT9634	TX	575
467	JUBRIL OLATUNDE BELLO	BELL	21075	NHX7371	MD	150
468	DARLENE LILLIAN PARKER SCOTT RAYMOND PARKER	WILLIAMSON	78642	NHX8234	TX	680
469	OBERLYN JOSEPH SALINAS	WILLIAMSON	78628	NHY0378	TX	162
470	ADAM JOSEPH GEORGE KALI SKY GEORGE	WILLIAMSON	78641	NHY1931	TX	399

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471	PHILLIP DAVID HALES	TRAVIS	78734	NJJ7062	TX	383
472	DAVID VARELA ESTRADA	BASTROP	78621	NJJ7480	TX	452
473	JAMES COHEN	BASTROP	78612	NJM3748	TX	176
474	YOLANDA YVETTE MILLER	BASTROP	78602	NJR7178	TX	255
475	FRANCISCO XAVIER ULLOA	CALDWELL	78616	NJR8708	TX	466
476	IRONIA NIESON ELLISON	WILLIAMSON	78665	NJW1212	TX	485
477	GABINA BASAVE RODRIGUEZ	CALDWELL	78616	NJX0138	TX	737
478	MIGUEL ANGEL RANGEL MARIA ESTHER RANGEL	BEXAR	78211	NKR7905	TX	170
479	RICHARD CORDERO	HAYS	78640	NKS5716	TX	207
480	JOSHUA RENE ABEITA ARIELA MONIQUE ABEITA	HAYS	78640	NKS5762	TX	784
481	RYAN NELSON MCNEEL	TRAVIS	78722	NKX7620	TX	177
482	AURTRIESS RAQUEL JOHNSON- HENRY	TRAVIS	78725	NKX8483	TX	1590
483	TOBIAS DEAN FREEMAN	TRAVIS	78753	NKX9073	TX	514
484	PABLO PONCE MELO	BASTROP	78621	NKY0118	TX	392
485	LAURA ANGELA CLARK	TRAVIS	78752	NKY0641	TX	193
486	EVARISTO HERNANDEZ HERNANDEZ	WILLIAMSON	78674	NKY2001	TX	544
487	COURTNEY STRANGE	TRAVIS	78723	NKY2781	TX	493
488	DONTRELL LEMEK CLEMONS	TRAVIS	78758	NKY3443	TX	1957
489	MAKAYLA SIMCOE	TRAVIS	78747	NKY4081	TX	180
490	JAKAVIA JANAEE MONIQUE DIGGS SHONTRIEL UNIQUE ROGERS	TRAVIS	78753	NKY5571	TX	259
491	SHAWN EDWARD FOWLER-CARR	TRAVIS	78702	NKY5804	TX	683
492	JOHNISHA FAYE TERRY	TRAVIS	78759	NKY6228	TX	109
493	ROBERT DAVID LOEBL	BASTROP	78659	NKY6879	TX	426
494	ERBIN EDGARDO FLORES FEDERICO PEREZ V	TRAVIS	78744	NKY6994	TX	373
495	YADIRA RAMIREZ	TRAVIS	78660	NKY7366	TX	1192
496	JOSHUA RHYMES	WILLIAMSON	76527	NKY7599	TX	343
497	OSCAR VARGAS JR	BASTROP	78621	NKY7710	TX	446
498	VICTOR PENA JR	TRAVIS	78741	NKY8506	TX	140
499	KELLY GREEN	TRAVIS	78724	NKY8808	TX	152
500	COREY W. SEDWICK	TRAVIS	78723	NKY8998	TX	173
501	VANESSA LEAN PAZOS	TRAVIS	78617	NKY9279	TX	372
502	BRAZIA PARKS	TRAVIS	78723	NKY9446	TX	941
503	JOCELYN NICOLE ZAVALIJA	TRAVIS	78653	NKY9741	TX	214
504	JUAN AVALOS	BASTROP	78612	NKY9783	TX	384

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505	MAYA AEKINS BROWN QUNICY BROWN	TRAVIS	78653	NKY9826	TX	539
506	KIMBERLY MARIE MIDAY	TRAVIS	78754	NKZ0444	TX	130
507	KARLA ITZEL LOPEZ JUAREZ FRANCISCO RAUL OLVERA RUIZ	WILLIAMSON	78634	NKZ0587	TX	231
508	QUANISHA NICOLE CARTER	TRAVIS	78753	NKZ0589	TX	209
509	COLBY AVERY LEWIS SHANKLIN	WILLIAMSON	76537	NKZ1228	TX	104
510	AMANDA SHANTE GRISBY	TRAVIS	78660	NKZ2453	TX	381
511	MARIO MEDRANO JR	WILLIAMSON	78626	NKZ3909	TX	608
512	EDGARDO CORONA	GUADALUPE	78108	NLG8630	TX	417
513	MARK CARDENAS	HAYS	78640	NLH7214	TX	490
514	KEISHA NICOLE DEBNAM	TRAVIS	78725	NLJ4172	TX	229
515	ANDREA NICOLE BUCCELLI CHRISTOPHER AARON BUCCELLI	WILLIAMSON	78628	NLJ5497	TX	117
516	ALEXIS RENE MARQUART	TRAVIS	78741	NLJ5917	TX	593
517	SHAWNDRELL AMARYALLIS ASHLEY	WILLIAMSON	78729	NLJ6197	TX	143
518	ANDREW JACOB LEMASTER	TRAVIS	78759	NLJ8578	TX	617
519	ASHLYNN RENEE STEEN	WILLIAMSON	78641	NLJ8853	TX	128
520	MARCELO DELLARETTI SILVA	WILLIAMSON	78613	NLK9610	TX	1474
521	KIMBERLY D MCGRUDER DARIEN M CARTER	Rockwall	75032	NMK6215	TX	159
522	PASCUAL MORENO MATA	WILLIAMSON	78641	NMK6552	TX	161
523	EZRA JAMES COLEMAN	COLLIN	75035	NMV2670	TX	782
524	NATHAN ALLAN BOYER CIERRA MARIE BOYER	BASTROP	78957	NMV8671	TX	332
525	BETHANY ELIZABETH MYERS SETH MICHAEL OVERTON	BASTROP	78621	NNC2339	TX	1086
526	BRITTNEY RENE FORD	BASTROP	78602	NND2287	TX	896
527	YANEISY ANTONIO LUA	BEXAR	78251	NND5715	TX	1251
528	MICHAEL RAY OCHOA	TRAVIS	78741	NND9997	TX	1479
529	CELESTINO FUENTES ARELLANO YOLANDA MARAGARITA ARELLANO	WILLIAMSON	78641	NNG1958	TX	468
530	JANIE GODINEZ	TRAVIS	78752	NNG8020	TX	291
531	TAYLOR REED PERIO	BASTROP	78612	NNH8663	TX	502
532	RICHARD LEWIS RIBBLE III	WILLIAMSON	78641	NNL0493	TX	1441
533	KAITLYN MEREDITH NEAL MICHAEL BRENT NEAL	HAYS	78640	NNL0508	TX	676
534	MICHAEL DAVID LUNA JR	BASTROP	78602	NNL0772	TX	389
535	LASHAWN EVETTE CLAY MICHAEL EUGENE JONES III	TRAVIS	78745	NNL1242	TX	198
536	CAYLA ROESEMAN	TRAVIS	78653	NNL1820	TX	2425
537	JAYME ELISE STAR WRIGHT	TRAVIS	78702	NNL2683	TX	299
538	YASMINE MEDRANO REY TBONE CASTILLO	TRAVIS	78617	NNL3380	TX	618

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539	MANUEL A ALVAREZ GOMEZ	TRAVIS	78702	NNL3669	TX	202
540	RUBY VICTORIA RODRIGUEZ ADAN RODRIGUEZ	TRAVIS	78721	NNL4181	TX	1338
541	EMMANUEL GERMAN AGUIRRE-PANTOJ A	TRAVIS	78724	NNL5913	TX	303
542	JUSTIN GREGORY MCLEMORE	WILLIAMSON	78642	NNL6686	TX	419
543	CRYSTAL GALINDO	TRAVIS	78741	NNL8946	TX	201
544	DULCE ESCAMILLA	TRAVIS	78660	NNL9397	TX	343
545	LUIS MIGUEL SALAS ESQUIVEL	TRAVIS	78753	NNL9618	TX	203
546	MIRANDA SOFIA CARTER SOFIA MARIE SALAZAR	TRAVIS	78728	NNL9966	TX	406
547	JEKAILA DENISE HOUSTON	TRAVIS	78653	NNM0638	TX	245
548	EFRAIN SALAZAR	TRAVIS	78617	NNM0895	TX	727
549	JASON MICHAEL GALIZIA	TRAVIS	78750	NNM1084	TX	151
550	JENNIFER DAWN KINSEY	BASTROP	78621	NNM1265	TX	686
551	MARCUS HALL	TRAVIS	78653	NNM1326	TX	444
552	MICHAEL DEWAYNE WILLIAMS	WILLIAMSON	78664	NNM1804	TX	182
553	KASHA SUBER	HAYS	78666	NNM1994	TX	721
554	MICHAEL RAY BYRUM	TRAVIS	78745	NNM2360	TX	401
555	GEORGE LEON REBECCA PEREZ	CALDWELL	78616	NNM3710	TX	423

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556	JOSEPHINE ALMAGUER	TRAVIS	78741	NNM3713	TX	172
557	MELISSA RODRIGUEZ	BASTROP	78621	NNM3746	TX	630
558	ALBERT EZELL	WILLIAMSON	78664	NNM4466	TX	366
559	FONTAE OCKLETREE	WILLIAMSON	78665	NNM4471	TX	370
560	MARTIN MARQUEZ	WILLIAMSON	78641	NNM4505	TX	809
561	COLBY SHANKLIN	WILLIAMSON	76537	NNM4617	TX	200
562	KAYTE TAYLOR	TRAVIS	78754	NNM4652	TX	1024
563	BOBBY DEMITRO	TRAVIS	78728	NNM4857	TX	658
564	NAZAYAH TURNER CHANCETON CHASE	WILLIAMSON	78729	NNM4966	TX	367
565	JOHN MORGAN WILLIAMS JR	TRAVIS	78760	NNM5274	TX	341
566	BRIAN AVILAS JAIMES	BASTROP	78612	NNM5334	TX	149
567	SHARNELL LOUIS	TRAVIS	78725	NNM6106	TX	394
568	JONATHAN LESLIE JONES JR	TRAVIS	78719	NNM6199	TX	641
569	JOE GARZA	TRAVIS	78753	NNM6284	TX	666
570	SALLY GARZA	TRAVIS	78725	NNM7051	TX	113
571	DAMION DESHUN SIBLEY	TRAVIS	78723	NNM7581	TX	113
572	AUSTEN KEITH SCHEPPLER ELEA A MARTINEZ RODRIGUEZ	COMAL	78070	NNM7810	TX	479
573	TREVOR MICHAEL ROBINSON	HAYS	78610	NNM8247	TX	722
574	ADALBERTO LEDESMA	TRAVIS	78766	NNM8550	TX	647
575	RANDY ALLEN TRABER	TRAVIS	78759	NNM9097	TX	225
576	DANIEL RESHARD BOWEN	BELL	76502	NNR4721	TX	278
577	MELISSA YVETTE SIERRA	HIDALGO	78574	NNW5959	TX	294
578	DEMETRICE TIWAN DAVIS	MCLENNAN	76710	NNW9193	TX	869
579	JACOB LYTTLE FRITSCH	TRAVIS	78759	NPF2016	TX	783
580	RAND MARTIN FREDRICKSON II GAMALIEL ELIMELECH OLVERA	TRAVIS	78728	NPF4719	TX	497
581	MELINDA MICHELLE SHAW	TRAVIS	78617	NPF6188	TX	519
582	ERICA MARIE FUENTES	BELL	76541	NPH7197	TX	377
583	SONDRA MARIE SAMPSON	BELL	76549	NPH9201	TX	128
584	AMBROSE D ROACH	BELL	76549	NPL2552	TX	251
585	HERLINDA MORAN DAVILA	TRAVIS	78653	NPL6464	TX	828
586	JEYMI JAQUELINE JARAMILLO ABELINO	TRAVIS	78617	NPX0644	TX	326
587	KEAYRA DAJANAY FOSTER	TRAVIS	78725	NPX1957	TX	583
588	TAYLER LANE CHISM LARISSA REBERTA CHISM	LAMPASAS	76853	NPX2345	TX	153
589	RIGOBERTO NOVELLA DE LA TORRE	BASTROP	78602	NPX5617	TX	146

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590	ASHLEY MICHELLE THOMPSON	WILLIAMSON	78613	NPX5870	TX	679
591	KAYLA ELIZABETH REYNOLDS	TRAVIS	78758	NPX6675	TX	459
592	IVAN OLIVO JR	HIDALGO	78503	NPX7174	TX	577
593	ROBERTO EULISES CONTRERAS	WILLIAMSON	76578	NPY4388	TX	315
594	PEDRO MANUEL ARROYO	WILLIAMSON	76574	NPY4445	TX	335
595	EFRAIN REALZOLA	WILLIAMSON	76530	NPY4624	TX	320
596	LARON ONEAL CARO	TRAVIS	78723	NRL2907	TX	741
597	MANUEL A GUZMAN HARO	TRAVIS	78617	NRL3170	TX	517
598	THOMAS HERNANDEZ TINA HERNANDEZ	TRAVIS	78741	NRL3776	TX	873
599	NATHAN EDWARD MANN	TRAVIS	78725	NRL4133	TX	1190
600	KENNETH J RUFFIN JR	HAYS	78666	NRL4895	TX	305
601	JOEL ELPIDIO MATA ARISTA	CALDWELL	78616	NRL4961	TX	778
602	MARLENE MARIE DUNCAN KENNETH COLE CHASE	TRAVIS	78617	NRL6524	TX	119
603	BETSABE OCHOA CERVANTES JESUS DANIEL LUJAN	TRAVIS	78753	NRL7043	TX	503
604	RAY C HALL	TRAVIS	78721	NRL7431	TX	898
605	MARIAH LYNN RAMOS DANDY LEE EAST JR	TRAVIS	78753	NRL7645	TX	403
606	PHILSANI DLAMINI	TRAVIS	78744	NRL7699	TX	120
607	BRITTANY NICOLA EVERS	TRAVIS	78758	NRL7895	TX	751
608	KARLA A PENA SANABRIA	BELL	76501	NRL8143	TX	301
609	EDWIN LEONEL LOPEZ CRUZ	BEXAR	78211	NRL8252	TX	196
610	MELODY LOUISE SOMERVILLE	WILLIAMSON	78628	NRL9057	TX	144
611	HECTOR ANDRES VASQUEZ	TRAVIS	78758	NRM0882	TX	151
612	EDRIC DEWAYNE BROOKS	TRAVIS	78721	NRM1694	TX	698
613	ELIDA SAENZ VAQUERA	TRAVIS	78741	NRM1899	TX	286
614	VIRGINIA NAIOMI GONZALES	TRAVIS	78702	NRM2494	TX	282
615	ANNA CRISTINA MARTINEZ	BELL	76542	NRM3581	TX	1011
616	BEYANIRA ADORNO JIMENEZ	TRAVIS	78741	NRM4028	TX	863
617	KASANDRA MONIQUE M MARMOLEJO	TRAVIS	78702	NRM4220	TX	181
618	ISIDRO VENCES TINOCO	TRAVIS	78653	NRM6692	TX	555
619	TAVION ALEX HALL	TRAVIS	78761	NRM6836	TX	158
620	JOSEPH MICHAEL LIMON	TRAVIS	78728	NRM7533	TX	782
621	VIRNITA FLORA DEANNA MARIE STRONG	WILLIAMSON	78729	NRM7550	TX	103
622	LESLIAN LATAZSHIA MCMORRIS	WILLIAMSON	78664	NRM7558	TX	118
623	MARIA MARBELLA ALVARADO DIAZ	TRAVIS	78724	NRS2851	TX	419

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624	CHRISTIAN JESUS MILIAN GUZMAN	CALDWELL	78644	NRX6877	TX	104
625	BRENDA HAYNES	CALDWELL	78644	NRX7658	TX	147
626	CHRISTOPHER ALLEN RAINES	WILLIAMSON	78642	NRY8962	TX	593
627	JYNA LYNN LECKBEE	WILLIAMSON	78642	NRY9331	TX	1849
628	SHARON BOUDREAUX WOMACK	WILLIAMSON	78641	NRY9467	TX	665
629	CHARLOTTE DANIELLE MARTIN CHRISTOPHER LEE MARTIN	WILLIAMSON	78641	NRY9655	TX	457
630	Ashley Klebs	WILLIAMSON	78626	NRZ0034	TX	301
631	TODD MICHAEL WHITMAN KYMBERLY DAWN WHITMAN	WILLIAMSON	78626	NRZ0517	TX	500
632	BRYAN ATWOOD LOTT	TRAVIS	78724	NRZ0527	TX	1472
633	STACY DUANE CAMPBELL	WILLIAMSON	78633	NRZ3870	TX	454
634	M A SMITH CONTRACTING COMPANY INC	TRAVIS	78728	NRZ4147	TX	915
635	TRISTAN LANCE BREWER	TRAVIS	78728	NRZ4545	TX	250
636	BRANDIE STEINER LIPSCOMB	WILLIAMSON	78641	NSB4615	TX	137
637	MARCUS ALLEN TURNER	WILLIAMSON	78613	NSB5441	TX	540
638	GWENDA JOLEN ELLIOTT	EASTLAND	76471	NSG6154	TX	624
639	CHRISTIAN IVAN REYNA-CARREON	BASTROP	78602	NSL2757	TX	554
640	KEITH MICHAEL BAUM	BASTROP	78602	NSL2962	TX	385
641	ERNEST WALTER HELLRIEGEL	TRAVIS	78732	NSL3155	TX	282
642	CARMEN BARBOZA JAIMES	BASTROP	78621	NSL3228	TX	170
643	SHARON DENISE GILLESPIE DARRELL COLEMAN	TRAVIS	78754	NSL3881	TX	956
644	MARY BARTON ROBERTS KENNEDY TASHANNA CALDWELL	TRAVIS	78723	NSL4235	TX	2815
645	JAMES PHILLIP MCCRADY KAELI RENEE FARRIS	BASTROP	78650	NSL4325	TX	223
646	ASHLEY DAWN ABBEY	FAYETTE	78945	NSL4408	TX	487
647	ROCHELLE WHITE-MOORE FELICIA RENEE MOORE	TRAVIS	78617	NSL4556	TX	1258
648	MARIA ELENA RUIZ GUZMAN	CALDWELL	78616	NTK8302	TX	991
649	CLS UTILITIES INC	TRAVIS	78721	NTK9009	TX	2529
650	JAYME LYNNAY LIGHT NIKOLAS REY BROCK	TRAVIS	78653	NTK9388	TX	685
651	CHRISTOPHER TRISTAN MCGINTY	HAYS	78610	NTK9408	TX	196
652	HOWARD LOVING	TRAVIS	78653	NTL0002	TX	158
653	BELINDA RUIZ-RUIZ	TRAVIS	78744	NTL0047	TX	443
654	ALFRED MENDEZ ASHLEIGH NICOLE MENDEZ	HAYS	78640	NTM4129	TX	559
655	MARILYN NGUYEN	TRAVIS	78660	NTP3339	TX	298
656	MARK AVILA SOLIS	TRAVIS	78617	NTV0579	TX	244
657	IHECHI UGORJI	TRAVIS	78754	NTX6267	TX	188

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658	J ROSA DESANTIAGO	BASTROP	78621	NTX6514	TX	1949
659	JIMMY DARRELL KING JR	WILLIAMSON	78628	NTX7932	TX	540
660	MIRIAM ANAYA MUNOZ	TRAVIS	78758	NTX8827	TX	611
661	ARNOLDO ICHICH CAAL TIMOTEO ICHICH CAAL	TRAVIS	78753	NTX8984	TX	804
662	MOSES SAMUEL YBARRA	TRAVIS	78653	NTY0391	TX	107
663	ROSE LINDA RIVERA	TRAVIS	78727	NTY0679	TX	386
664	MIZAEL ALVARADO ALMA DAMARIS MUNOZ MARTINEZ	TRAVIS	78723	NTY3691	TX	491
665	VICTOR A TORRES	TRAVIS	78748	NTY4072	TX	360
666	DERRICK JEROME WRIGHT	TRAVIS	78754	NTY4271	TX	338
667	JOANA FLORES	TRAVIS	78617	NTY5236	TX	290
668	DECRAYON LARAY BANKS	TRAVIS	78653	NTY5384	TX	159
669	REYNA G LEWIS	WILLIAMSON	78664	NTY5385	TX	164
670	JOSHUA CHRISTOPHER COHEN	TRAVIS	78701	NTY6167	TX	318
671	MIGUEL ANGEL GARCIA	WILLIAMSON	78641	NTY6185	TX	670
672	BRITTANY LEA POTTS	TRAVIS	78725	NTY6278	TX	1863
673	CARIN MARIE CABALES	WILLIAMSON	78613	NTY6365	TX	956
674	AUSTIN ALLAN MORIN	BELL	76501	NTY6488	TX	217
675	DESTINY FAITH JONES	BASTROP	78621	NTY6605	TX	621
676	SARAH ALFRED GANGURA	TRAVIS	78660	NTY7213	TX	516
677	JAMIE CHRISTOPHER SVRCEK TONI MARIE SVRCEK	BASTROP	78659	NTY7473	TX	572
678	VICTORIA RODRIGUEZ	CALDWELL	78616	NTY7571	TX	381
679	ABRAHAM ALEXIS NINO	BASTROP	78602	NTY8929	TX	656
680	BELINDA LIANE GARNER	TRAVIS	78728	NTY8981	TX	351
681	FRANCISCO AVILES MALDONADO	BASTROP	78612	NTY9410	TX	270
682	SARAH TOVAH MATZ	HAYS	78610	NTY9412	TX	517
683	BALDEMAR VELA	TRAVIS	78653	NTY9484	TX	562
684	JIMMY T BOWSER	TRAVIS	78725	NTY9663	TX	462
685	PARIS ANTOINE JONES	TRAVIS	78653	NTY9666	TX	301
686	MARIE WHITE FINNEN	TRAVIS	78727	NTY9699	TX	331
687	QUINCY VASHAWN WOOLEY	TRAVIS	78754	NTY9914	TX	274
688	VANESSA LOUISE CISNEROS EDMUNDO CISNEROS IBARRA	BASTROP	78621	NTZ0279	TX	739
689	BRANDY VONTRICE BEASLEY	TRAVIS	78724	NTZ0714	TX	358
690	TAYLOR DANIELLE BARNETT GINA MARIE AYERS BARNETT	VICTORIA	77968	NTZ1281	TX	773
691	AUGUSTINE BENEVIDEZ	TRAVIS	78744	NTZ1487	TX	311

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692	DOUGLAS BRIAN GORTON	BASTROP	78621	NTZ1806	TX	1339
693	GABRIELLE GLORIA ZUNIGA	TRAVIS	78748	NTZ1939	TX	117
694	ARMANDO ROBLES	MILAM	76567	NTZ1942	TX	119
695	PAULA LUCIO	TRAVIS	78745	NTZ2841	TX	218
696	ASHLEY NICHOLE HERNANDEZ	HAYS	78666	NVD0696	TX	263
697	RUBEN EDUARDO DELGADO MARISSA V ALEMAN	BASTROP	78612	NVD0714	TX	298
698	KRISTLE KATONIA WALLACE	WILLIAMSON	78626	NVG2592	TX	403
699	QTRUE MOVEMENT LLC	WILLIAMSON	78613	NVG3696	TX	1412
700	GINGER LEE BROWN	WILLIAMSON	78641	NVG3699	TX	519
701	MELANIE MCCURRY FORSTER	WILLIAMSON	78613	NVG5343	TX	243
702	MARIA DEJESUS PACHECO JEREMY PACHECO	BEXAR	78223	NVZ3063	TX	150
703	HERACLIO GONZALEZ JR	TRAVIS	78745	NWB5751	TX	196
704	DAISY MARTINEZ DIAZ	BURNET	78605	NWF4963	TX	416
705	TIMOTHY DEAN PRIESTER	MONTGOMERY	77355	NWF5126	TX	110
706	KAYLA SHOLLENBERGER	WILLIAMSON	78641	NWF5752	TX	757
707	KIERA MICHELLE DENNY	WILLIAMSON	76537	NWK9012	TX	415
708	RODERICK LAMON STUBBLEFIELD	WILLIAMSON	78641	NWN8259	TX	988
709	LILLIE MAE PIPER	BASTROP	78602	NWS2140	TX	125
710	JULIETA SALINAS	TRAVIS	78653	NWS2917	TX	1275
711	GINA MARIE MARTINEZ	CALDWELL	78616	NWS2965	TX	693
712	PREMIER COMMERCIAL FLOORS LLC	WILLIAMSON	78641	NWS3310	TX	196
713	REYNA LIZETTE OLVERA	CALDWELL	78616	NWS4492	TX	1126
714	MELISSA YVETTE SIERRA	HIDALGO	78574	NWS9959	TX	920
715	michael west	WILLIAMSON	78613	NWV6546	TX	111
716	BRIANNA ENAYE TAYLOR	BELL	76542	NWV8497	TX	530
717	EBONY LATRICA CONNOR	CORYELL	76522	NWV9124	TX	628
718	ROBERT EARL GILFILLAN	WICHITA	76302	NWV9203	TX	962
719	TYLER JOSEPH HANBERRY	WILLIAMSON	78641	NWY0820	TX	860
720	YASCHIKA DEKENYA MOSES	WILLIAMSON	76574	NXJ0735	TX	133
721	AARON JOSEPH KNOCK MICHAEL ANTHONY PENA	BASTROP	78621	NXJ1166	TX	1551
722	JACKSON WALKER EAST	WILLIAMSON	78613	NXJ1394	TX	868
723	MARIA ELENA ROMO NAVARRO	WILLIAMSON	78729	NXJ1505	TX	293
724	CARRIE LYNN SMITH	WILLIAMSON	78664	NXJ2770	TX	2220
725	DARREN KYLE WEST	WILLIAMSON	78664	NXJ2827	TX	478

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726	TAYANNA NICOLE CLARK	TRAVIS	78660	NXJ2988	TX	314
727	TYLER DOUGLAS HALL	TRAVIS	78754	NXJ3282	TX	320
728	ASHLEE MICHELLE PARMLEY	WILLIAMSON	78613	NXJ3536	TX	773
729	ELIZABETH ANN MARTINEZ-FINE	WILLIAMSON	78641	NXJ3568	TX	960
730	ERIC ROSS BROWN	TRAVIS	78752	NXJ4377	TX	1500
731	ITZEL CERVANTES GARCIA	HAYS	78640	NXJ5359	TX	335
732	TAMMY LOU HAVARD	WILLIAMSON	78729	NXK6935	TX	315
733	FEYSI G GARCIA REGALADO HUMBERTO YESCAS JR	TRAVIS	78724	NXK8359	TX	933
734	LORENZA LAMAR RAY	TRAVIS	78617	NXK9636	TX	685
735	KASARA SANCHEZ MEDRANO	TRAVIS	78745	NXL0589	TX	313
736	LYNDEE PENA MATTHEWS	WILLIAMSON	78641	NXL0747	TX	1309
737	DEBORAH ANN HARMAN	TRAVIS	78660	NXL0786	TX	436
738	TERESA JESUS AMAYA ERVEY AMAYA GARCIA	TRAVIS	78617	NXL0831	TX	248
739	JONATHAN JAVIER TREJO WILKINS	TRAVIS	78725	NXL1297	TX	640
740	CANDLE TIENLDA BUAPHAN	TRAVIS	78724	NXL3229	TX	1421
741	FRANCISCA LUCINDA JIMENEZ	WALLER	77423	NXL3377	TX	657
742	GLENDA MARIE WEST	BASTROP	78621	NXL3466	TX	166
743	GEORGE REYES LEYVA	TRAVIS	78660	NXL4044	TX	515
744	STACIE JEAN ONTIVEROS	BASTROP	78621	NXL4496	TX	789
745	CHRISTOPHER JAMES STAMPER	WILLIAMSON	78681	NXL6261	TX	638
746	FIDENCIO NINO JR	TRAVIS	78617	NXL6631	TX	509
747	JOSE A GONZALEZ SESMAS	CALDWELL	78616	NXL7678	TX	424
748	JESSICA DAWN WASHINGTON	TRAVIS	78747	NXL8029	TX	2064
749	GABRIELA ANN RAMIREZ	HAYS	78666	NXL9002	TX	1597
750	ISAIAH ROY HERRERA	TRAVIS	78744	NXL9015	TX	337
751	CRYSTAL BETH HERNANDEZ	HAYS	78640	NXL9265	TX	403
752	CHRISTOPHER M SIMMONS	TRAVIS	78725	NXM0827	TX	1692
753	ANTHONY JARMAINE SWAIN	TRAVIS	78724	NXM0845	TX	172
754	MARCELL DEON MILLIGAN	TRAVIS	78745	NXM1017	TX	550
755	SHANNON DIANE CAMPBELL	WILLIAMSON	78641	NXM1115	TX	492
756	BREANNA ANITA CHACON	TRAVIS	78660	NXM1274	TX	344
757	KEREN DEYANIRA HERNANDEZ ANA MARIA PEREZ	TRAVIS	78728	NXM1297	TX	430
758	RAMADAN ABDUL-MALIK	TRAVIS	78702	NXM1431	TX	363
759	CORLENA LASHAY LAWRENCE	TRAVIS	78653	NXM1646	TX	1367

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

760	GLENDA AZUCENA RODAS	TRAVIS	78744	NXM1698	TX	183
761	ADRIAN RODRIGUEZ	TRAVIS	78653	NXM2129	TX	1177
762	ANICE GOUGISHA	TRAVIS	78721	NXM2238	TX	931
763	RICHARD ZACHARY BARR	TRAVIS	78744	NXM2246	TX	876
764	PARKER DAVID JACKSON	BASTROP	78602	NXM2412	TX	843
765	FRIZZELL CANARY SUTHERLIN III	WILLIAMSON	78613	NXM2539	TX	805
766	EVERARDO ABUNDO JAIMES	TRAVIS	78617	NXM2578	TX	506
767	SHETERRA DOSHANAE VINCENT	TRAVIS	78723	NXM2645	TX	602
768	SUSAN VELLEJO CONSTANCIO	TRAVIS	78617	NXM2713	TX	363
769	PHILLIP BRADLEY MILES II	CALDWELL	78644	NXM2863	TX	543
770	KEANA ADAIR VILLARREAL	WILLIAMSON	78641	NXM3635	TX	1458
771	CATARINA MARTINEZ GUEVARA	TRAVIS	78724	NXM3841	TX	1301
772	TYRASHAE RENIA LATRICE BERRY	TRAVIS	78721	NXM3923	TX	179
773	STEPHANIE NERIO	TRAVIS	78725	NXM4053	TX	463
774	ANGEL GUTIERREZ	TRAVIS	78748	NXM4054	TX	168
775	VERONICA L JOHNSON	TRAVIS	78749	NXM4060	TX	2022
776	SHAWN MICHAEL GODWIN	TRAVIS	78748	NXM4180	TX	171
777	ZACARIAS PALACIOS JR MARIA GRACIELA RODRIGUEZ	WILLIAMSON	76527	NXM4854	TX	774
778	RONALD LEE COOK JR	BASTROP	78602	NXR6261	TX	385
779	TIHNA SHANELL KOUKA	BASTROP	78621	NXZ3539	TX	801
780	FRANK CECIL GREEN JR	TRAVIS	78747	NYC2751	TX	1942
781	CURTIS RUGELY JR	WILLIAMSON	78664	NYH1437	TX	649
782	ALICE COLLEEN CASTIMORE	BASTROP	78612	NYH1889	TX	848
783	DAMONSHAE LASHANNON FOLEY	TRAVIS	78653	NYH1914	TX	801
784	JAMIE LEA WILSON	BURNET	78611	NYJ2170	TX	968
785	KRISTEN DIANNE SCARLETT	WILLIAMSON	78642	NYX1673	TX	884
786	JENNIFER MARY PRIETTO	WILLIAMSON	78634	NYX8829	TX	867
787	ISAAC RUSTICO OWENS	TRAVIS	78723	NYX9618	TX	215
788	JUSTIN DAVID RICHARDSON	TRAVIS	78617	NYY0666	TX	2303
789	REBECCA DAWN TALAVERA	TRAVIS	78617	NYY0832	TX	550
790	CHRISTOPHER LOU DE LOS SANTOS	WILLIAMSON	78641	NYY0991	TX	137
791	DWAYNE a HARDY	TRAVIS	78744	NYY1129	TX	178
792	BERNARD LASHAY FOX	WILLIAMSON	78613	NYY1440	TX	904
793	MICHAEL FREDERICK TAYLOR	TRAVIS	78660	NYY1554	TX	957

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

794	KAREN COOKS SCALES	TRAVIS	78752	NYY2335	TX	1446
795	TAMI CAY CAMPBELL	TRAVIS	78758	NYY2344	TX	123
796	CULLAN PARKER PAYNE	WILLIAMSON	78641	NYY2560	TX	846
797	ANGELA PACHECO HERNANDEZ JUAN GONZALO VASQUEZ	BASTROP	78602	NYY2639	TX	764
798	CHRISTAL LIANE MASON	TRAVIS	78653	NYY3618	TX	1094
799	MARIA FERNANDA GARCIA RIOS	TRAVIS	78653	NYY3879	TX	151
800	CLIFFORD JACKSON CLIFFORD JACKSON JR	WILLIAMSON	78641	NYY4119	TX	1204
801	ANTONIO OTREIL RANDLE	WILLIAMSON	78641	NYY4137	TX	521
802	SASHA MAE GIBSON	WILLIAMSON	78641	NYY4814	TX	1944
803	RUBEN DAVILA	TRAVIS	78734	NYY6452	TX	164
804	JAMES DOUGLAS MANNS ALISA CHRISTINE MUNOZ CASTRO	WILLIAMSON	78613	NYY7280	TX	770
805	MARIA NATALIA SOSA AMAYA	TRAVIS	78753	NYY7552	TX	170
806	TEDRICK STERLING	TRAVIS	78741	NYY7856	TX	168
807	MARIO FERNANDEZ JR	CAMERON	78520	NYY8708	TX	2694
808	MARKESHA MARCHELLE TIPPS GLORIA ANN NORFLEET	BASTROP	78602	NYY8788	TX	1206
809	JEREMY CARNELL BRISCOE	TRAVIS	78754	NYZ2100	TX	1856
810	MERCEDES J SIMMONS	TRAVIS	78617	NYZ2286	TX	759
811	DAVID GRES	CALDWELL	78644	NYZ2299	TX	379
812	NOVALEE MARIANNA MANZANO	TRAVIS	78617	NYZ3316	TX	319
813	FELIPE CASTILLO III LORENA JUAREZ	HAYS	78640	NYZ4071	TX	420
814	AVERY JORDAN ALLEN	TRAVIS	78645	NYZ4079	TX	703
815	ARTURO MUNIZ ZAMUDIO	TRAVIS	78721	NYZ5333	TX	861
816	VICTORIA VIRGINIA ARKADIE	LAVACA	77995	NYZ5492	TX	156
817	ALFREDO MEMBRENO CHICAS NINFA LEE SAIZ	SAN SABA	76877	NYZ5493	TX	267
818	MAURICE WALKER III	TRAVIS	78617	NYZ5710	TX	1134
819	RAYLER ENRIQUE RODRIGUEZ SANCHEZ	TRAVIS	78752	NYZ6080	TX	395
820	ESTELLA BRIONES LOPEZ MELISSA JEAN LOPEZ	TRAVIS	78723	NYZ6620	TX	1643
821	HERBERT ALLEN PATRIDGE	WILLIAMSON	76574	NYZ6942	TX	222
822	MIGUEL DE JESUS ANTONIO ALONZO TREVINO	TRAVIS	78750	NYZ7182	TX	745
823	FIDENCIA GOMEZ URIETA	TRAVIS	78702	NYZ7817	TX	178
824	ASHLEY MARIE SAPOUCKEY	TRAVIS	78759	NYZ7999	TX	646
825	PEDRO GONZALEZ	TRAVIS	78762	NYZ8029	TX	406
826	JAVIER CARRASCO	TRAVIS	78617	NYZ8096	TX	318
827	JOSE ARMANDO ARREDONDO PEREZ	TRAVIS	78744	NYZ8128	TX	541

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

828	ALBERICO ROCAMORA	TRAVIS	78745	NYZ8285	TX	1010
829	SEAN CARNEY	TRAVIS	78645	NYZ8440	TX	207
830	WESLEY ROBINSON REGINA HAMILTON	TRAVIS	78724	NYZ8613	TX	1770
831	ELIZABETH AGUIRRE	TRAVIS	78724	NYZ8617	TX	1269
832	CHRISTOPHER DAVID BENAVIDES	TRAVIS	78753	NYZ8962	TX	1367
833	MARISOL GARZA	TRAVIS	78759	NZB0348	TX	1721
834	AMANDA GAYLE WILOTH	WILLIAMSON	78634	NZB1414	TX	373
835	CHRISTIAN ANTHONY PEREZ	TRAVIS	78653	NZB1726	TX	1450
836	LUIS ALBERTO BUSTAMANTE JR	BASTROP	78659	NZB2056	TX	406
837	MARK DOUGLAS DWYER LAURIE M DWYER	TRAVIS	78660	NZB2466	TX	883
838	TAQUIA ANN JANETTE COLLINS	TRAVIS	78723	NZB3107	TX	867
839	MICAH CAPRI ANTOINEICE WESLEY	TRAVIS	78754	NZB4164	TX	254
840	VICTORIA ROSE ALEXANDER LISA PATCHIN ALEXANDER	WILLIAMSON	78665	NZB6637	TX	289
841	JESUS R MARTINEZ	TRAVIS	78617	NZB6987	TX	905
842	GREGORY C WALLACE APRIL MARCET WALLACE	TRAVIS	78660	NZB7175	TX	507
843	ALESHIA LORAINE VILLARREAL EVA FREDERICKE CRAIG	TRAVIS	78617	NZB7490	TX	1282
844	JUAN M LARES MANUEL LARES JR	TRAVIS	78721	NZB8465	TX	1706
845	DAVID VARELA ESTRADA	BASTROP	78621	NZB8674	TX	864
846	YOHNARAN LOPEZ JIMENEZ	TRAVIS	78617	NZB8693	TX	174
847	LARRY PATRICK PEREZ JR	BASTROP	78612	NZB8764	TX	348
848	KENNETH EARL CLARK	WILLIAMSON	78633	NZH1479	TX	198
849	LUIS DANIEL NINO OLIVA	CALDWELL	78616	NZR1781	TX	383
850	KIMBERLY ANN MARTINEZ	CALDWELL	78644	NZR2125	TX	110
851	LARRY C HALL	TRAVIS	78758	NZX0341	TX	303
852	MARTIN ANDRADE BELMONTES	TRAVIS	78723	PBG7205	TX	453
853	LUIS ESCOBEDO	TRAVIS	78724	PBK6420	TX	722
854	EDMUND MANUEL PEREZ JR ANGIE MIRELES PEREZ	BEXAR	78249	PBV2287	TX	417
855	HILLARIO PENA	WILLIAMSON	78628	PBZ8069	TX	448
856	ANDRES ALVARES ESPANA	BELL	76501	PCB2636	TX	124
857	JAVIER HERNANDEZ BANDA	TRAVIS	78758	PCB2643	TX	139
858	MARY JEANETTE ROBINSON	TRAVIS	78653	PCB5366	TX	1050
859	ALCESTEE RENEE DRISDALE	TRAVIS	78653	PCB7697	TX	474
860	KENNESA AMIYA BONTON	TRAVIS	78744	PCB9174	TX	194
861	CRISTINA ANN DAVILA	TRAVIS	78734	PCB9184	TX	127

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

862	CHARLES ANTHONY NIESEN	BASTROP	78612	PCB9276	TX	200
863	ANGEL DE DIOS JUAREZ	BASTROP	78612	PCB9587	TX	162
864	LASHONDRA SHABRE WASHINGTON DERRICK LAMONT SORRELLS	TRAVIS	78653	PCC2999	TX	1282
865	JESUS ALVAREZ AGUIRRE	TRAVIS	78653	PCC3965	TX	842
866	RAYVELL DASHAWN TAYLOR	WILLIAMSON	78613	PCC5987	TX	1023
867	LUIS FERNANDO DAVILA RAMIEZ	HAYS	78640	PCG7466	TX	336
868	ELIZABETH REYNOLDS	TRAVIS	78741	PCH1394	TX	498
869	JONATHAN FELIX A RODRIGUEZ	CALDWELL	78616	PCH1753	TX	422
870	ELIJAH WILLIAM AVANTE JACKSON	WILLIAMSON	78641	PCJ3273	TX	222
871	AUNDRICK JUMON RICHARD STEPHANIE MARIE RICHARD	WILLIAMSON	78641	PCJ3814	TX	636
872	JESSICA ELAINE HILTON	WILLIAMSON	76574	PCJ6439	TX	969
873	CODY LYNN MURRAY DEBBIE L MURRAY	TRAVIS	78727	PCJ8971	TX	91
874	NICHOLAS GRIFFITH	WILLIAMSON	76527	PCJ9025	TX	999
875	GUADALUPE CARLOS GARZA	HAYS	78666	PDX7820	TX	383
876	JEREMY JOE FERNANDEZ	BELL	76548	PDY1101	TX	1952
877	DEBORAH LYNN BLESSING	BELL	76542	PDY3202	TX	364
878	MARK DOUGLAS BROWN II	WILLIAMSON	78641	PFC2511	TX	2390
879	MORGAN JENISE STURGIS CHRISTOPHER THOMAS WELLS	WILLIAMSON	78641	PFC4660	TX	2274
880	SHIM SOLOMAN OCRAN	TRAVIS	78723	PFP0736	TX	1873
881	MIRANDA LYNN MILLS	TRAVIS	78724	PFP0767	TX	4242
882	DANIEL MAURICE TAYLOR	TRAVIS	78745	PFP3747	TX	1024
883	FELICIA LASHAWN HUDSON	TRAVIS	78753	PFP4663	TX	1174
884	JARAE LATRICE JACKSON	TRAVIS	78759	PFP5309	TX	632
885	JESSICA IDELL MERCER	WILLIAMSON	78641	PFP7854	TX	1663
886	ANGELA HILL PATTERSON	TRAVIS	78721	PFR3723	TX	487
887	JOSE LUIS DECTOR	BASTROP	78602	PFR3907	TX	174
888	KAMRI K EION BLAYLOCK	TRAVIS	78725	PFR4874	TX	310
889	GRACE LYNN MCFADDEN	WILLIAMSON	78641	PFR4958	TX	262
890	MIGUEL ANGEL DURAN ALVARDO	BASTROP	78621	PFX9443	TX	332
891	MEGAN RHAE ORME	BASTROP	78621	PFY0203	TX	1394
892	JENNIFER MARIE KILLGORE	TRAVIS	78653	PGF2250	TX	1859
893	ALBERTO B THOMPSON	TRAVIS	78730	PGF9625	TX	170
894	FLOR PINEDA ZARATE	BASTROP	78612	PGR8396	TX	2522
895	SUNNY MURILLO JR GABINO ANGEL DURON JR	TRAVIS	78758	PJK6004	TX	617

CTRMA Prohibited Vehicles

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

896	CYNDEL FORREST	TRAVIS	78747	PJK6375	TX	3576
897	HUNTER THOMAS CRYER FAITH NICOLE WILLIAMS	HAYS	78737	PJK7298	TX	1079
898	KAMISHA HARVILLE	TRAVIS	78723	PJL6114	TX	1005
899	KETRYKE D ELLISON	TRAVIS	78758	PJW9514	TX	1993
900	JACOB RICHARD CINTRON	HARRIS	77429	PKT0380	TX	366
901	IKE ISHMALE LYONS	TRAVIS	78702	R492941	TX	151
902	KEILMAN TRANSPORTATION	BEXAR	78257	T0611H	TX	466
903	YUDEL NICOLAS-JUSTO	TRAVIS	78761	T8329K	TX	553
904	TREVOR A RICH-JONES	WILLIAMSON	78641	TRJ15	TX	402
905	VICTOR AMBROSE BEASON	BEXAR	78240	TWC092	TX	151

GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-035

APPROVING AN INTERLOCAL AGREEMENT WITH THE TEXAS DEPARTMENT OF TRANSPORTATION TO CO-LOCATE PERSONNEL AT TxTAG CUSTOMER SERVICE CENTERS

WHEREAS, since 2016, the Central Texas Regional Mobility Authority ("Mobility Authority") and the Texas Department of Transportation ("TxDOT") have co-located staff at the TxTag Customer Service Center (CSC) to provide walk-up services to their respective customers; and

WHEREAS, the current interlocal agreement between the Mobility Authority and TxDOT for co-located personnel has expired and both agencies wish to continue their co-location arrangement by entering into a new interlocal agreement at no cost to either agency; and

WHEREAS, the Executive Director recommends that the Board of Directors approve a new interlocal agreement with TxDOT for the co-location of personnel at TxTag Customer Service Centers in the form or substantially same form attached hereto as Exhibit A.

NOW THEREFORE, BE IT RESOLVED that the proposed interlocal agreement is hereby approved; and

BE IT FURTHER RESOLVED that the Executive Director is authorized and directed to finalize and execute the interlocal agreement on behalf of the Mobility Authority in the form or substantially same form as Exhibit A hereto.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August 2022.

Submitted and reviewed by:

James M. Bass
Executive Director

Approved:

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A

THE STATE OF TEXAS §

THE COUNTY OF TRAVIS §

INTERLOCAL AGREEMENT

THIS CONTRACT is entered into by the Contracting Parties under Government Code, Chapter 791.

I. CONTRACTING PARTIES:

The Texas Department of Transportation	TxDOT
Central Texas Regional Mobility Authority	Local Government

II. PURPOSE: To better serve the public, the Texas Department of Transportation desires to share office space with the Local Government at locations managed by TxDOT.

III. STATEMENT OF SERVICES TO BE PERFORMED: The Local Government will undertake and carry out services described in **Attachment A**, Scope of Services.

IV. CONTRACT PAYMENT: The total amount of this contract shall not exceed **$0.00** and shall conform to the provisions of **Attachment B**, Budget.

V. TERM OF CONTRACT: This contract begins when fully executed by both parties and terminates on **September 01, 2024** or when otherwise terminated as provided in this Agreement.

VI. LEGAL AUTHORITY:
THE PARTIES certify that the services provided under this contract are services that are properly within the legal authority of the Contracting Parties

The governing body, by resolution or ordinance, dated August 31, 2022, has authorized the Local Government to provide the scope of services.

This contract incorporates the provisions of **Attachment A,** Scope of Services**, Attachment B,** Budget**, Attachment C,** General Terms and Conditions, **Attachment D,** Resolution or Ordinance and **Attachment E,** Location Map Showing Project.

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

By _____ Date _____
AUTHORIZED SIGNATURE

James Bass
TYPED OR PRINTED NAME AND TITLE

Title Executive Director

FOR THE STATE OF TEXAS
Executed for the Executive Director and approved for the Texas Transportation Commission for the purpose and effect of activating and/or carrying out the orders, established policies or work programs heretofore approved and authorized by the Texas Transportation Commission.

By _____ Date _____
Kenneth Stewart
Director of Contract Services

ATTACHMENT A

Scope of Services

I. TxDOT will house representatives and equipment of the Local Government at locations managed by TxDOT to provide customer service to customers with inquiries on Local Government back-office system.

II. Local Government shall respond to Local Government billing issues and any and all inquiries with their own equipment and back-office system.

III. Local Government shall not operate outside of the hours of operations of TxDOT for any and all locations.

IV. TxDOT reserves the right to add or delete locations under this contract. TxDOT will coordinate with the Local Government for locations to be added. TxDOT will provide ten business days written notice to the Local Government for locations to be deleted.

V. Local Government representative(s) shall not be granted access to or use any TxDOT equipment or back-office system. TxDOT employee(s) will not be granted access to or use any Local Government equipment or Local Government back-office system.

ATTACHMENT B

Budget

No funds shall be exchanged under this agreement.

ATTACHMENT C

General Terms and Conditions

Article 1. Additional Work

A. If the Local Government is of the opinion that any assigned work is beyond the scope of this contract and constitutes additional work, it shall promptly notify TxDOT in writing. The written notice shall present the relevant facts and show how the work constitutes additional work.
B. If TxDOT in its sole discretion finds that the work does constitute additional work, TxDOT shall so advise the Local Government and a written amendment will be executed. The Local Government shall not perform any proposed additional work or incur any additional costs before the execution of an amendment.
C. TxDOT shall not be responsible for actions by the Local Government or for any costs incurred by the Local Government relating to additional work that is performed before an amendment is executed or that is outside the scope of the contract, as amended.

Article 2. Amendments

This contract may only be amended by written agreement executed by both parties before the contract is terminated.

Article 3. Notice to Proceed

If Attachment A requires a notice to proceed, the Local Government shall not proceed with any work or incur any costs until TxDOT issues a written notice to the Local Government authorizing work to begin. Any costs incurred by the Local Government before receiving the notice are not eligible for reimbursement.

Article 4. Conflicts Between Agreements

If the terms of this contract conflict with the terms of any other contract between the parties, the most recent contract shall prevail.

Article 5. Nonconforming Work

If the Local Government submits work that does not comply with the terms of this contract, TxDOT shall instruct the Local Government to make any revisions that are necessary to bring the work into compliance with the contract. No additional compensation shall be paid for this work.

Article 6. Termination

This contract terminates at the end of the contract term, when all services and obligations contained in this contract have been satisfactorily completed, by mutual written agreement, or 30 days after either party gives notice to the other party, whichever occurs first. TxDOT shall compensate the Local Government only for those eligible expenses that are incurred during this contract and that are directly attributable to the completed portion of the work covered by this contract and only if the work has been completed in a manner satisfactory and acceptable to TxDOT. The Local Government shall neither incur nor be reimbursed for any new obligations after the date of termination.

Article 7. Funding – Not Applicable

TxDOT shall pay for services from appropriation items or accounts from which like expenditures would normally be paid. Payments received by the Local Government shall be credited to the current appropriation items or accounts from which expenditures of that character were originally made. If for any reason subcontractors and suppliers, if any, are not paid before TxDOT reimburses the Local Government for their services, the Local Government shall pay the subcontractors and suppliers all undisputed amounts due for work no more than 10 days after the Local Government receives

payment for the work unless a different time is specified by law. This requirement also applies to all lower-tier subcontractors and suppliers and must be incorporated in all subcontracts. If the Local Government fails to comply with this Article, TxDOT may withhold payments and suspend work until the subcontractors and suppliers are paid. The Local Government is authorized to submit requests for reimbursement no more frequently than monthly and no later than ninety (90) days after costs are incurred.

Article 8. Basis for Calculating Reimbursement Costs – Not Applicable

TxDOT will reimburse the Local Government for actual costs incurred in carrying out the services authorized in Attachment A, Scope of Services, subject to the cost categories and estimated costs set forth in Attachment B, Budget. TxDOT shall compensate the Local Government for only those eligible expenses incurred during this contract that are directly attributable to the completed portion of the work covered by this contract, provided that the work has been completed in a manner satisfactory and acceptable to TxDOT. The Local Government shall not incur or be reimbursed for any new obligations after the effective date of termination. The Local Government shall bill TxDOT for actual travel expenses, not to exceed the limits reimbursable under state law. Out-of-state or out-of-country travel by the Local Government requires prior approval by TxDOT.

Article 9. Gratuities

Any person who is doing business with or who reasonably speaking may do business with TxDOT under this contract may not make any offer of benefits, gifts, or favors to employees of TxDOT.

Article 10. Conflict of Interest

The Local Government shall not assign a representative to a project if the representative:

A. owns an interest in or is an officer or employee of a business entity that has or may have a contract with the state relating to the project;
B. has a direct or indirect financial interest in the outcome of the project;
C. has performed services regarding the subject matter of the project for an entity that has a direct or indirect financial interest in the outcome of the project or that has or may have a contract with TxDOT; or
D. is a current part-time or full-time employee of TxDOT.

Article 11. Local Government Resources

All representatives of the Local Government shall have adequate knowledge and experience to enable them to perform the duties assigned to them. The Local Government certifies that it currently has adequate qualified personnel in its employment or engaged to perform the work required under this contract or will be able to obtain adequate qualified personnel from sources other than TxDOT. On receipt of written notice from TxDOT detailing supporting factors and evidence, the Local Government shall remove from the project any representative of the Local Government who is incompetent or whose conduct becomes detrimental to the work. Unless otherwise specified, the Local Government shall furnish all equipment, materials, supplies, and other resources required to perform the work.

Article 12. Assignment Subcontracts – Not Applicable

A subcontract may not be executed by the Local Government without prior written authorization by TxDOT. Subcontracts in excess of $25,000 shall contain all applicable terms and conditions of this contract. No subcontract will relieve the Local Government of its responsibility under this contract. Neither party shall assign any interest in this agreement.

Article 13. Responsibilities of the Parties
Each party acknowledges that it is not an agent, servant, or employee of the other party. Each party is responsible for its own acts and deeds and for those of its agents, servants, or employees.

Article 14. Disputes
The Local Government shall be responsible for the settlement of all contractual and administrative issues arising out of procurements entered in support of contract services. TxDOT shall be responsible for the settlement of any dispute concerning this contract unless the dispute involves a subcontract.

Article 15. No Assignment
Neither party shall assign, sublet, or transfer any interest in this agreement.

Article 16. Remedies
This agreement shall not be considered as specifying the exclusive remedy for any default, but either party may avail itself of any remedy existing at law or in equity, and all remedies shall be cumulative.

Article 17. License for TxDOT Logo Use
A. Grant of License; Limitations: The Local Government is granted a limited revocable non-exclusive license to use the registered TxDOT trademark logo (TxDOT Flying "T") on any deliverables prepared under this contract that are the property of the State. The Local Government may not make any use of the registered TxDOT trademark logo on any other materials or documents unless it first submits that request in writing to the State and receives approval for the proposed use. The Local Government agrees that it shall not alter, modify, dilute, or otherwise misuse the registered TxDOT trademark logo or bring it into disrepute.
B. Notice of Registration Required: The Local Government's use of the Flying "T" under this article shall be followed by the capital letter R enclosed within a circle (®) that gives notice that the Flying "T" is registered in the United States Patent and Trademark Office (USPTO).
C. No Assignment or Sublicense: The Local Government may not assign or sublicense the rights granted by this article without the prior written consent of the State.
D. Term of License: The license granted to the Local Government by this article shall terminate at the end of the term specified by this contract.

Article 18. Records and Ownership – Not Applicable
A. The Local Government agrees to maintain all books, documents, papers, accounting records, and other evidence pertaining to costs at its office during the contract period and for four years from the date of final payment under the contract. These materials shall be made available for inspection and copying by TxDOT, by the State Auditor's Office, and by their authorized representatives. If the contract is federally funded, these materials shall also be made available for inspection and copying by the U.S. Department of Transportation and by the Office of the Inspector General.
B. After completion or termination of this contract, all documents prepared by the Local Government or furnished to the Local Government by TxDOT shall be delivered to and become the property of TxDOT. All sketches, photographs, calculations, and other data prepared under this contract shall be made available, on request, to TxDOT without restriction or limitation of further use.
C. TxDOT shall own all title to, all interests in, all rights to, and all intellectual property (including copyrights, trade and service marks, trade secrets, and patentable devices or methods) arising from or developed under this contract.
D. Except to the extent that a specific provision of this contract states to the contrary, all equipment purchased by the Local Government or its subcontractors under this contract shall be owned by TxDOT and will be delivered to TxDOT at the time the contract is completed or terminated.

E. The State Auditor may conduct an audit or investigation of any entity receiving funds from TxDOT directly under the contract or indirectly through a subcontract under the contract. Acceptance of funds directly under the contract or indirectly through a subcontract under this contract acts as acceptance of the authority of the State Auditor, under the direction of the legislative audit committee, to conduct an audit or investigation in connection with those funds. An entity that is the subject of an audit or investigation must provide the State Auditor with access to any information the State Auditor considers relevant to the investigation or audit.

Article 19. Reference to Costs Principles and Circulars

Reimbursement with state or federal funds will be limited to costs determined to be reasonable and allowable under cost principles establish in OMB Circular A-21, "Cost Principles for Educational Institutions," or 2 CFR 200. The parties shall comply with the requirements of the Single Audit Act of 1984, P.L. 98-502, ensuring that the single audit report includes the coverage stipulated in 2 CFR 200.

Article 20. Equal Employment Opportunity

The Local Government agrees to comply with Executive Order 11246, entitled “Equal Employment Opportunity,” as amended by Executive Order 11375 and as supplemented by Department of Labor regulations, 41 CFR Part 60. The Local Government agrees to consider minority universities for subcontracts when the opportunity exists. The Local Government warrants that it has developed and has on file appropriate affirmative action programs as required by applicable rules and regulations of the Secretary of Labor.

Article 21. Civil Rights Compliance

A. Compliance with Regulations: The Local Government will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made part of this agreement.
B. Nondiscrimination: The Local Government, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The Local Government will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
C. Solicitations for Subcontracts, Including Procurement of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Local Government for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier will be notified by the Local Government of the Local Government’s obligations under this contract and the Acts and Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.
D. Information and Reports: The Local Government will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and facilities as may be determined by the State or the FHWA to be pertinent to ascertain compliance with such Acts, Regulations or directives. Where any information required of the Local Government is in the exclusive possession of another who fails or refuses to furnish this information, the Local Government will so certify to the State or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

E. Sanctions for Noncompliance: In the event of the Local Government's noncompliance with the Nondiscrimination provisions of this contract, the State will impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:
   a. withholding of payments to the Local Government under the contract until the Local Government complies and/or
   b. cancelling, terminating, or suspending of the contract, in whole or in part.

F. Incorporation of Provisions: The Local Government will include the provisions of paragraphs (A) through (F) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The Local Government will take such action with respect to any subcontract or procurement as the State or the FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Local Government becomes involved in, or is threatened with, litigation with a subcontractor or supplier because of such direction, the Local Government may request the State to enter into such litigation to protect the interests of the State. In addition, the Local Government may request the United States to enter into such litigation to protect the interests of the United States.

Article 22. Noncollusion

The Local Government warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for the Local Government, to solicit or secure this Agreement, and that it has not paid or agreed to pay any company or person, other than a bona fide employee, any fee, commission, percentage, brokerage fee, gift, or any other consideration contingent upon or resulting from the award or making of this Agreement. If the Local Government breaches or violates this warranty, the Texas Department of Transportation shall have the right to annul this Agreement without liability or, in its discretion, to deduct from the Agreement price or consideration, or otherwise recover the full amount of such fee, commission, brokerage fee, contingent fee, or gift.

Article 23. Lobbying Certification

In executing this agreement, each signatory certifies that:

A. No federal appropriated funds have been paid or will be paid by or on behalf of the parties to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

B. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with federal contracts, grants, loans, or cooperative agreements, the signatory for the Local Government shall complete and submit the federal Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

C. The parties shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This statement is a material representation of fact upon which reliance was placed when this agreement was made or entered into. Submission of this statement is a prerequisite for making or entering into this agreement imposed by Title 31 U.S.C. §1352. Any person who fails to file the

required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each failure.

By executing this agreement, the parties affirm this lobbying certification with respect to the Project and affirm this certification of the material representation of facts upon which reliance will be made.

Article 24. Compliance with Laws
The parties shall comply with all federal, state, and local laws, statutes, ordinances, rules, and regulations and with the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of this agreement. After receiving a written request from TxDOT, the Local Government shall furnish TxDOT with satisfactory proof of its compliance with this Article.

Article 25. Signatory Warranty
Each signatory warrants that the signatory has necessary authority to execute this agreement on behalf of the entity represented.

Article 26. Notices
All notices to either party shall be delivered personally or sent by certified U.S. mail, postage prepaid, addressed to that party at the following address:

Local Government:	Central Texas Regional Mobility Authority Director of Operations 3300 North Interstate 35 Suite #300 Austin, Texas 78705
TxDOT:	Texas Department of Transportation Director of Contract Services 125 East 11th Street Austin, Texas 78701

All notices shall be deemed given on the date delivered in person or deposited in the mail. Either party may change the above address by sending written notice of the change to the other party. Either party may request in writing that notices shall be delivered personally or by certified U.S. mail, and that request shall be carried out by the other party.

Article 27. Pertinent Non-Discrimination Authorities
During the performance of this contract, the Local Government, for itself, its assignees, and successors in interest agree to comply with the following nondiscrimination statutes and authorities; including but not limited to:

A. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
B. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects).
C. Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), as amended, (prohibits discrimination on the basis of sex).
D. Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.) as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27.

E. The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age).
F. Airport and Airway Improvement Act of 1982, (49 U.S.C. Chapter 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex).
G. The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, subrecipients and contractors, whether such programs or activities are Federally funded or not).
H. Titles II and III of the Americans with Disabilities Act, which prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38.
I. The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex).
J. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations.
K. Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, the parties must take reasonable steps to ensure that LEP persons have meaningful access to the programs (70 Fed. Reg. at 74087 to 74100).
L. Title IX of the Education Amendments of 1972, as amended, which prohibits the parties from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq.).

ATTACHMENT D

Resolution or Ordinance

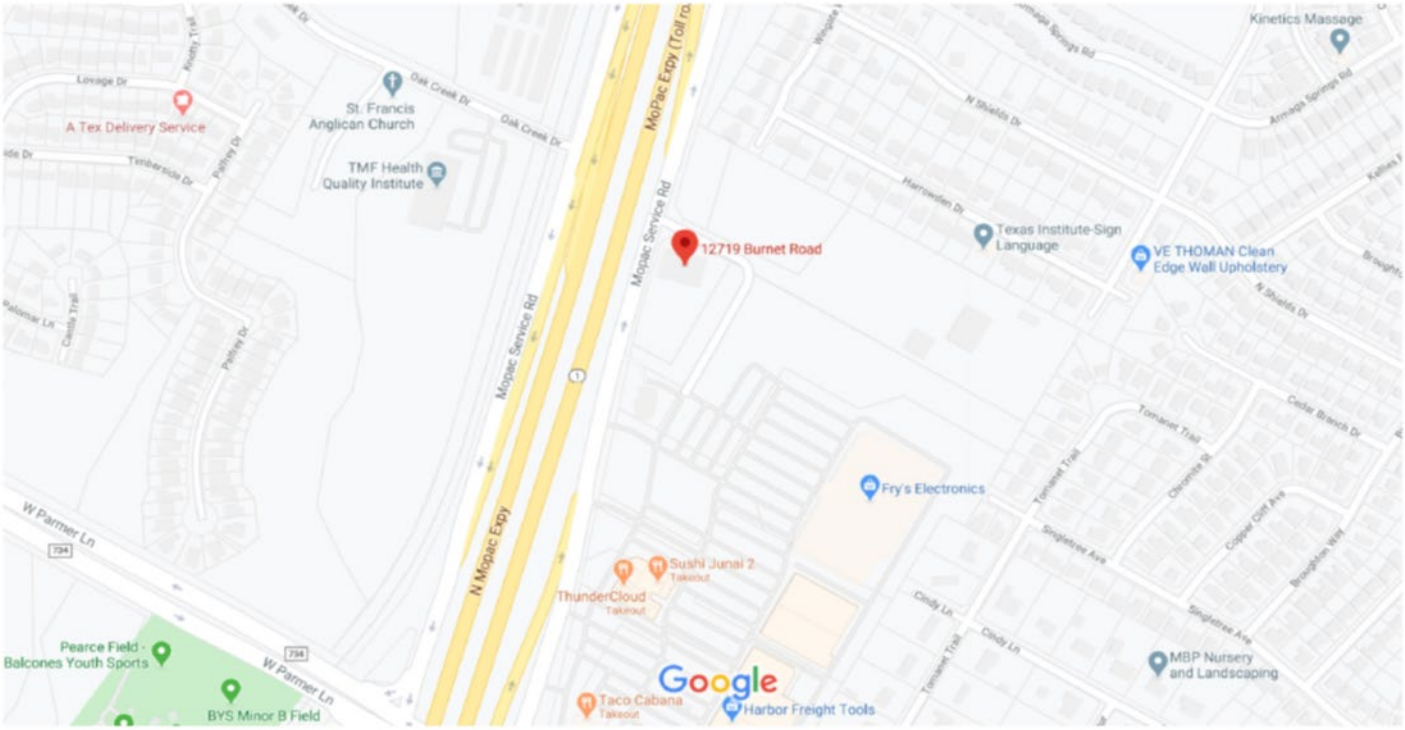
ATTACHMENT E

Location Maps Showing Project

Google Maps

12719 Burnet Rd

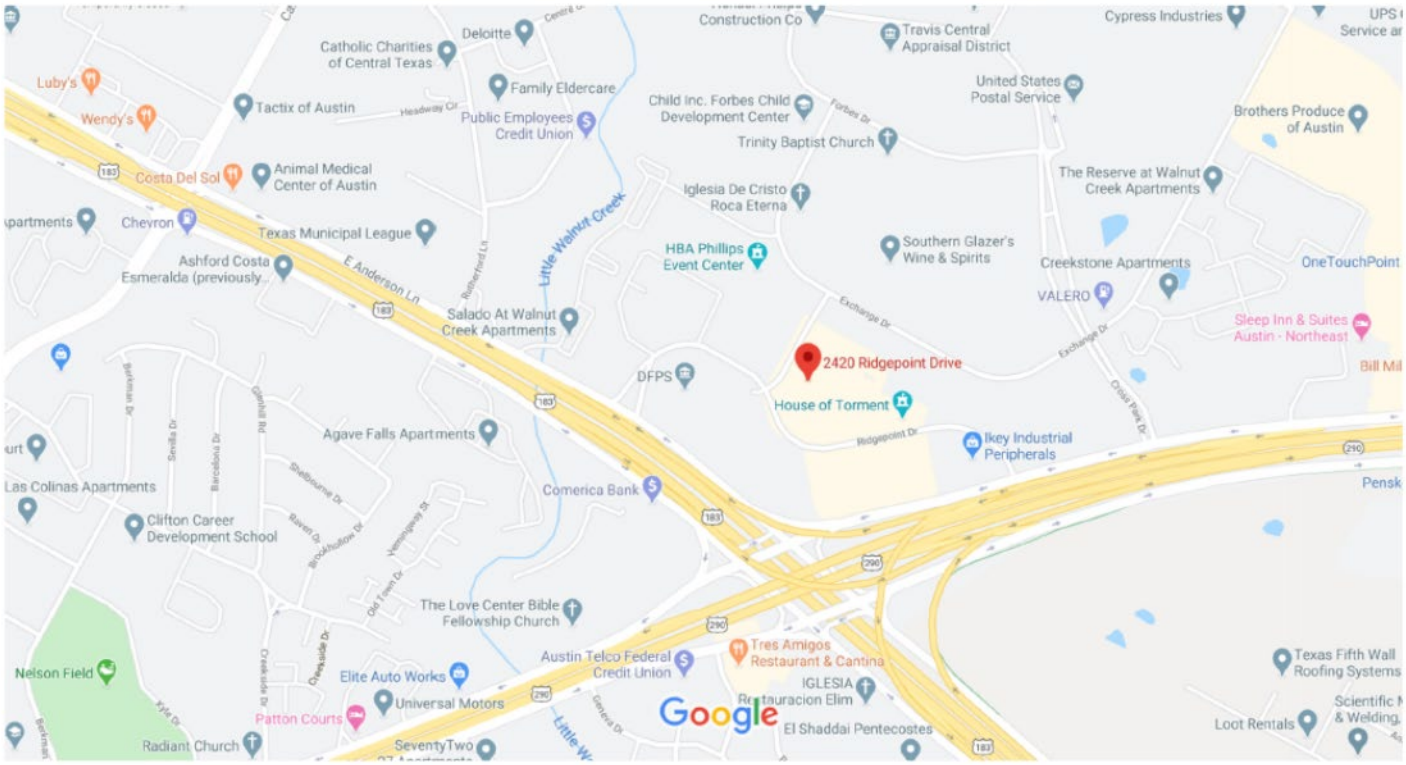
TOD-CSC



Google Maps

2420 Ridgepoint Dr

TOD-TOC



MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-036

ACCEPT THE UNAUDITED FINANCIAL STATEMENTS FOR JUNE 2022 AND FINANCIAL STATEMENTS FOR JULY 2022

WHEREAS, the Central Texas Regional Mobility Authority (Mobility Authority) is empowered to procure such goods and services as it deems necessary to assist with its operations and to study and develop potential transportation projects, and is responsible to insure accurate financial records are maintained using sound and acceptable financial practices; and

WHEREAS, close scrutiny of the Mobility Authority's expenditures for goods and services, including those related to project development, as well as close scrutiny of the Mobility Authority's financial condition and records is the responsibility of the Board and its designees through procedures the Board may implement from time to time; and

WHEREAS, the Board has adopted policies and procedures intended to provide strong fiscal oversight and which authorize the Executive Director, working with the Mobility Authority's Chief Financial Officer, to review invoices, approve disbursements, and prepare and maintain accurate financial records and reports; and

WHEREAS, the Executive Director, working with the Chief Financial Officer, has reviewed and authorized the disbursements necessary for the month of June 2022 and has caused unaudited financial statements to be prepared and attached to this resolution as Exhibit A; and

WHEREAS, the Executive Director, working with the Chief Financial Officer, has reviewed and authorized the disbursements necessary for the month of July 2022 and has caused financial statements to be prepared and attached to this resolution as Exhibit B.

NOW THEREFORE, BE IT RESOLVED, that the Board of Directors accepts the unaudited financial statements for June 2022 and financial statements for July 2022, attached hereto as Exhibit A and Exhibit B, respectively.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August 2022.

Submitted and reviewed by:

James M. Bass
Executive Director

Approved:

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A

Unaudited Financial Statements for June 2022

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
REVENUE				
Operating Revenue				
Toll Revenue - Tags	105,220,500	116,864,712	111.07%	81,151,817
Video Tolls	31,433,500	44,959,803	143.03%	24,308,922
Fee Revenue	13,921,000	12,987,462	93.29%	9,859,905
Total Operating Revenue	**150,575,000**	**174,811,977**	**116.10%**	**115,320,645**
Other Revenue				
Interest Income	1,230,764	1,749,818	142.17%	491,783
Grant Revenue	2,180,000	922,679	42.32%	852,471
Misc Revenue	320,000	226,580	70.81%	158,631
Gain/Loss on Sale of Asset	-	20,905	-	-
Total Other Revenue	**3,730,764**	**2,919,983**	**78.27%**	**1,502,886**
TOTAL REVENUE	**$154,305,764**	**$177,731,960**	**115.18%**	**116,823,531**
EXPENSES				
Salaries and Benefits				
Salary Expense-Regular	4,940,743	3,804,541	77.00%	4,275,170
Salary Reserve	80,000	-	-	-
TCDRS	1,016,106	739,110	72.74%	415,467
FICA	238,665	200,208	83.89%	206,364
FICA MED	74,643	56,356	75.50%	64,648
Health Insurance Expense	584,978	387,467	66.24%	459,928
Life Insurance Expense	6,714	5,807	86.49%	9,172
Auto Allowance Expense	10,200	10,413	102.08%	6,375
Other Benefits	209,200	154,071	73.65%	186,859
Unemployment Taxes	5,184	4,375	84.40%	5,230
Total Salaries and Benefits	**7,166,434**	**5,362,347**	**74.83%**	**5,629,213**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Administrative				
Administrative and Office Expenses				
Accounting	9,000	8,230	91.44%	9,049
Auditing	144,550	143,975	99.60%	135,475
Financial Advisors	-	141,373	-	-
Human Resources	30,000	28,152	93.84%	9,976
Legal	-	67,171	-	-
IT Services	285,000	136,745	47.98%	189,504
Internet	450	-	-	-
Software Licenses	514,500	443,722	86.24%	297,478
Cell Phones	24,800	20,458	82.49%	20,548
Local Telephone Service	105,000	91,281	86.93%	89,352
Overnight Delivery Services	200	81	40.48%	66
Local Delivery Services	50	18	35.62%	12
Copy Machine	16,000	13,992	87.45%	16,536
Repair & Maintenance-General	10,000	2,273	22.73%	5,776
Meeting Facilities	-	1,300	-	-
Meeting Expense	13,250	5,053	38.13%	1,676
Toll Tag Expense	3,000	2,020	67.33%	1,500
Parking / Local Ride Share	2,750	113	4.13%	49
Mileage Reimbursement	4,800	342	7.12%	279
Insurance Expense	651,000	538,353	82.70%	522,056
Rent Expense	575,000	657,199	114.30%	554,627
Building Parking	11,000	1,763	16.02%	251
Legal Services	342,500	369,983	108.02%	278,371
Total Administrative and Office Expenses	**2,742,850**	**2,673,595**	**97.48%**	**2,132,581**
Office Supplies				
Books & Publications	4,250	3,643	85.72%	4,307
Office Supplies	11,000	1,436	13.06%	4,119
Misc Office Equipment	4,500	732	16.28%	7,591
Computer Supplies	186,950	234,598	125.49%	47,240
Copy Supplies	1,500	117	7.80%	496
Other Reports-Printing	5,000	-	-	-
Office Supplies-Printed	5,000	171	3.42%	170
Postage Expense	650	582	89.52%	441
Total Office Supplies	**218,850**	**241,279**	**110.25%**	**64,365**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Communications and Public Relations				
Graphic Design Services	75,000	-	-	-
Website Maintenance	100,000	56,591	56.59%	35,036
Research Services	275,000	10,109	3.68%	142,046
Communications and Marketing	500,000	16,527	3.31%	126,901
Advertising Expense	800,000	324,813	40.60%	192,219
Direct Mail	85,000	32,500	38.24%	-
Video Production	179,000	16,526	9.23%	19,526
Photography	10,000	424	4.24%	-
Radio	75,000	-	-	-
Other Public Relations	-	-	-	10,576
Promotional Items	10,000	6,491	64.91%	1,260
Annual Report printing	5,600	780	13.92%	553
Direct Mail Printing	40,000	-	-	770
Other Communication Expenses	15,000	14,599	97.32%	3,342
Total Communications and Public Relations	**2,169,600**	**479,359**	**22.09%**	**532,229**
Employee Development				
Subscriptions	50,560	123	0.24%	1,767
Agency Memberships	57,942	37,320	64.41%	41,106
Continuing Education	11,000	1,729	15.72%	695
Professional Development	14,000	240	1.71%	-
Other Licenses	1,850	554	29.94%	758
Seminars and Conferences	45,500	7,943	17.46%	(6,731)
Travel	89,500	22,310	24.93%	-
Total Employee Development	**270,352**	**70,218**	**25.97%**	**37,595**
Financing and Banking Fees				
Trustee Fees	60,000	57,038	95.06%	58,263
Bank Fee Expense	2,000	3,220	161.00%	1,309
Continuing Disclosure	4,000	6,184	154.59%	3,500
Arbitrage Rebate Calculation	10,000	13,967	139.67%	9,975
Rating Agency Expense	50,000	12,000	24.00%	24,500
Total Financing and Banking Fees	**126,000**	**92,408**	**73.34%**	**97,546**
Total Administrative	**5,527,652**	**3,556,859**	**64.35%**	**2,864,315**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Operations and Maintenance				
Operations and Maintenance Consulting				
GEC-Trust Indenture Support	521,829	394,100	75.52%	394,051
GEC-Financial Planning Support	243,804	229,254	94.03%	112,228
GEC-Toll Ops Support	1,314,155	794,422	60.45%	259,988
GEC-Roadway Ops Support	1,186,339	848,569	71.53%	681,329
GEC-Technology Support	1,438,856	521,558	36.25%	666,424
GEC-Public Information Support	-	179,929	-	98,066
GEC-General Support	1,473,429	1,099,209	74.60%	697,034
General System Consultant	1,653,940	1,161,533	70.23%	505,924
Traffic Modeling	67,000	41,834	62.44%	212,774
Traffic and Revenue Consultant	175,000	562,946	321.68%	443,099
Total Operations and Maintenance Consulting	**8,074,352**	**5,833,354**	**72.25%**	**4,070,916**
Roadway Operations and Maintenance				
Roadway Maintenance	4,487,800	4,812,244	107.23%	2,816,531
Landscape Maintenance	2,302,400	1,928,983	83.78%	2,189,365
Signal & Illumination Maint	50,000	-	-	-
Maintenance Supplies-Roadway	350,000	103,703	29.63%	95,980
Tools & Equipment Expense	25,000	138	0.55%	2,400
Gasoline	30,000	11,496	38.32%	11,307
Repair & Maintenance - Vehicles	10,000	4,300	43.00%	6,123
Natural Gas	2,500	5,137	205.49%	3,201
Electricity - Roadways	250,000	207,646	83.06%	184,844
Total Roadway Operations and Maintenance	**7,507,700**	**7,073,648**	**94.22%**	**5,309,751**
Toll Processing and Collection Expense				
Image Processing	3,000,000	3,855,545	128.52%	2,375,578
Tag Collection Fees	6,041,000	8,645,357	143.11%	5,993,382
Court Enforcement Costs	75,000	-	-	-
DMV Lookup Fees	250	-	-	-
Total Processing and Collection Expense	**9,116,250**	**12,500,901**	**137.13%**	**8,368,960**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Toll Operations Expense				
Generator Fuel	3,000	-	-	3,459
Fire and Burglar Alarm	500	452	90.47%	493
Refuse	2,200	1,797	81.67%	1,801
Water - Irrigation	7,500	5,554	74.05%	3,913
Electricity	500	558	111.65%	825
ETC spare parts expense	50,000	(87,945)	-175.89%	161,341
Repair & Maintenance Toll Equip	75,000	54,037	72.05%	-
Law Enforcement	450,000	424,967	94.44%	213,102
ETC Maintenance Contract	5,390,000	3,215,993	59.67%	3,894,435
ETC Toll Management Center System Operation	642,852	655,418	101.95%	543,402
ETC Development	1,140,000	730,355	64.07%	1,245,965
ETC Testing	200,000	27,872	13.94%	1,687
Total Toll Operations Expense	**7,961,552**	**5,029,059**	**63.17%**	**6,070,422**
Total Operations and Maintenance	**32,659,854**	**30,436,962**	**93.19%**	**23,820,050**
Other Expenses				
Special Projects and Contingencies				
HERO	148,000	147,829	99.88%	147,829
Special Projects	150,000	-	-	28,662
71 Express Net Revenue Payment	4,000,000	2,367,352	59.18%	125,812
Technology Initiatives	185,000	41,395	22.38%	165,179
Other Contractual Svcs	370,000	224,425	60.66%	497,455
Contingency	300,000	-	-	20,000
Total Special Projects and Contingencies	**5,153,000**	**2,781,001**	**53.97%**	**984,936**
Non Cash Expenses				
Amortization Expense	1,125,000	1,393,885	123.90%	879,481
Amort Expense - Refund Savings	2,715,425	8,954,542	329.77%	2,253,331
Dep Exp - Furniture & Fixtures	2,614	2,614	99.99%	2,614
Dep Expense - Equipment	2,500	2,500	100.00%	2,500
Dep Expense - Autos & Trucks	43,085	36,879	85.59%	33,886
Dep Expense - Buildng & Toll Fac	176,748	176,748	100.00%	176,748
Dep Expense - Highways & Bridges	49,342,469	50,621,544	102.59%	33,760,010
Dep Expense - Toll Equipment	4,060,300	4,074,433	100.35%	3,607,108
Dep Expense - Signs	1,202,171	1,016,571	84.56%	1,016,571
Dep Expense - Land Improvements	1,163,209	884,934	76.08%	884,934
Depreciation Expense - Computers	192,000	189,081	98.48%	191,364
Undevelopable Projects	-	-	-	973,161
Total Non Cash Expenses	**60,025,522**	**67,353,730**	**112.21%**	**43,781,707**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending June 30, 2022

	Budget Amount FY 2022	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Total Other Expenses	**65,178,522**	**70,134,731**	**107.60%**	**44,766,644**
Non Operating Expenses				
Bond Issuance Expense	1,227,474	4,829,764	393.47%	10,790,299
Loan Fee Expense	50,000	39,500	79.00%	28,000
Interest Expense	83,789,516	79,736,470	95.16%	52,207,941
Community Initiatives	57,500	52,670	91.60%	64,050
Total Non Operating Expenses	**85,124,490**	**84,658,404**	**99.45%**	**63,090,289**
TOTAL EXPENSES	**195,656,952**	**194,149,303**	**99.23%**	**140,170,510**

Central Texas Regional Mobility Authority
Balance Sheet
as of June 30, 2022

	as of 06/30/2022		as of 06/30/2021	
ASSETS				
Current Assets				
Cash				
Regions Operating Account	$ 3,657,535		$ 958,546	
Cash in TexStar	41,741		440,201	
Regions Payroll Account	85,526		49,454	
Restricted Cash				
Goldman Sachs FSGF 465	837,065,766		853,213,581	
Restricted Cash - TexSTAR	187,919,467		164,287,110	
Overpayments account	291,166		719,372	
Total Cash and Cash Equivalents		1,029,061,201		1,019,668,263
Accounts Receivable				
Accounts Receivable	2,770,089		2,770,089	
Due From Other Agencies	70,401		69,958	
Due From TTA	507,475		3,108,055	
Due From NTTA	1,191,298		993,962	
Due From HCTRA	1,874,680		1,311,247	
Due From TxDOT	5,169,588		139,239	
Interest Receivable	695,361		1,217,669	
Total Receivables		12,278,891		9,610,219
Short Term Investments				
Treasuries	-		269,380,948	
Agencies	112,437,186		-	
Total Short Term Investments		112,437,186		269,380,948
Total Current Assets		1,153,777,279		1,298,659,431
Total Construction in Progress		289,563,146		154,987,561
Fixed Assets (Net of Depreciation and Amortization)				
Computers	98,507		287,588	
Computer Software	1,779,401		2,649,775	
Furniture and Fixtures	2,178		4,792	
Equipment	9,624		120,463	
Autos and Trucks	93,882		39,532	
Buildings and Toll Facilities	4,417,019		4,593,766	
Highways and Bridges	1,715,598,347		1,762,644,372	
Toll Equipment	20,215,727		22,476,043	
Signs	13,125,973		13,691,941	
Land Improvements	6,199,269		7,084,203	
Right of way	88,149,606		88,149,606	
Leasehold Improvements	44,711		90,854	
Total Fixed Assets		1,849,734,244		1,901,832,936
Other Assets				
Intangible Assets-Net	169,529,377		124,491,541	
2005 Bond Insurance Costs	3,433,925		3,647,433	
Prepaid Insurance	128,063		153,896	
Deferred Outflows (pension related)	637,414		641,074	
Pension Asset	591,247		591,247	
Total Other Assets		174,320,026		129,525,191
Total Assets		**$ 3,467,394,695**		**$ 3,485,005,119**

Central Texas Regional Mobility Authority
Balance Sheet
as of June 30, 2022

	as of 06/30/2022		as of 06/30/2021	
LIABILITIES				
Current Liabilities				
Accounts Payable	$ 43,706,184		$ 57,681,317	
Construction Payable	5,443,829		12,942,586	
Overpayments	294,629		722,663	
Interest Payable	52,313,400		40,725,151	
Deferred Compensation Payable	4,155		8,777	
TCDRS Payable	116,999		95,364	
Due to other Agencies	3,051		7,455	
Due to TTA	548,450		464,893	
Due to NTTA	-		71,991	
Due to HCTRA	134,560		97,752	
Due to Other Entities	923,972		1,065,668	
71E TxDOT Obligation - ST	1,818,107		1,523,691	
Total Current Liabilities		105,307,337		115,407,307
Long Term Liabilities				
Compensated Absences	268,014		372,715	
Deferred Inflows (pension related)	109,052		109,052	
Long Term Payables		377,067		481,768
Bonds Payable				
Senior Lien Revenue Bonds:				
Senior Lien Revenue Bonds 2010	87,602,054		81,306,347	
Senior Lien Revenue Bonds 2011	18,839,934		18,566,006	
Senior Refunding Bonds 2013	3,475,000		7,080,000	
Senior Lien Revenue Bonds 2015	10,000,000		298,790,000	
Senior Lien Refunding Revenue Bonds 2016	70,790,000		348,295,000	
Senior Lien Revenue Bonds 2018	44,345,000		44,345,000	
Senior Lien Revenue Bonds 2020A	50,265,000		50,265,000	
Senior Lien Refunding Bonds 2020B	55,600,000		56,205,000	
Senior Lien Refunding Bonds 2020C	138,435,000		138,435,000	
Senior Lien Revenue Bonds 2020E	167,160,000		167,160,000	
Senior Lien Revenue Bonds 2021B	255,075,000		255,075,000	
Senior Lien Refunding Bonds 2021D	274,625,000		-	
Senior Lien Refunding Bonds 2021E	335,610,000		-	
Sn Lien Rev Bnd Prem/Disc 2013	894,559		2,683,676	
Sn Lien Revenue Bnd Prem 2015	-		17,187,834	
Senior Lien Premium 2016 Revenue Bonds	7,602,180		38,960,844	
Sn Lien Revenue Bond Premium 2018	3,149,791		3,416,364	
Senior Lien Revenue Bond Premium 2020A	11,345,407		11,468,715	
Senior Lien Refunding Bond Premium 2020B	11,771,656		12,306,731	
Senior Lien Revenue Bonds Premium 2020E	25,855,922		27,571,309	
Senior Lien Revenue Bonds Premium 2021B	53,526,531		53,751,122	
Senior Lien Refunding Bonds Premium 2021D	44,841,645		-	
Total Senior Lien Revenue Bonds		1,670,809,679		1,632,868,948

Central Texas Regional Mobility Authority
Balance Sheet
as of June 30, 2022

	as of 06/30/2022		as of 06/30/2021	
Sub Lien Revenue Bonds:				
Sub Lien Refunding Bonds 2013	2,725,000		5,320,000	
Sub Lien Refunding Bonds 2016	72,605,000		73,055,000	
Subordinated Lien BANs 2018	-		46,020,000	
Sub Lien Refunding Bonds 2020D	98,580,000		99,705,000	
Subordinated Lien BANs 2020F	110,875,000		110,875,000	
Subordinate Lien Refunding Bonds 2020G	61,570,000		61,570,000	
Subordinated Lien BANs 2021C	244,185,000		244,185,000	
Sub Refunding 2013 Prem/Disc	190,874		572,621	
Sub Refunding 2016 Prem/Disc	5,791,814		6,614,610	
Sub Lien BANS 2018 Premium	-		264,566	
Subordinated Lien BANs 2020F Premium	10,007,162		14,010,026	
Subordinated Lien Refunding Bonds Premium 2020G	7,168,220		7,572,191	
Sub Lien BANS 2021C Premium	34,252,548		41,864,226	
Total Sub Lien Revenue Bonds		647,950,617		711,628,241
Other Obligations				
TIFIA Note 2021	351,303,701		305,252,740	
71E TxDOT Obligation - LT	55,077,264		57,263,411	
Regions 2017 MoPAC Note	-		24,990,900	
Regions 2022 MoPac Loan	24,990,900		-	
Total Other Obligations		431,371,866		387,507,051
Total Long Term Liabilities		2,750,509,229		2,732,486,008
Total Liabilities		**2,855,816,565**		**2,847,893,315**
NET ASSETS				
Contributed Capital		121,462,104		121,462,104
Net Assets Beginning		513,461,917		546,491,657
Current Year Operations		(23,345,892)		(30,841,957)
Total Net Assets		**611,578,129**		**637,111,804**
Total Liabilities and Net Assets		**$ 3,467,394,695**		**$ 3,485,005,119**

Central Texas Regional Mobility Authority
Statement of Cash Flow
as of June 2022

Cash flows from operating activities:		
Receipts from toll revenues	$	171,192,962
Receipts from interest income		576,813
Payments to vendors		(47,029,240)
Payments to employees		(5,446,376)
Net cash flows provided by (used in) operating activities		119,294,159
Cash flows from capital and related financing activities:		
2018 BAN Redemption		(5,957,859)
Bond Refunding		110,441,743
Issuance Expense		(4,829,764)
Payments on bonds		(142,293,157)
Interest payments		(75,855,309)
Acquisition of capital assets - non project		(3,141,456)
Acquisitions of construction in progress		(124,529,325)
Net cash flows provided by (used in) capital and related financing activities		(246,165,126)
Cash flows from investing activities:		
Interest Receivable		(1,512,133)
Interest income		2,558,102
Purchase of investments		(510,998,386)
Proceeds from sale or maturity of investments		644,704,190
Net cash flows provided by (used in) investing activities		136,263,905
Net increase (decrease) in cash and cash equivalents		9,392,938
Cash and cash equivalents at beginning of period		1,019,668,263
Cash and cash equivalents at end of period	$	1,029,061,201
Reconciliation of change in net assets to net cash provided by operating activities:		
Operating income	$	42,148,811
Adjustments to reconcile change in net assets to net cash provided by operating activities:		
Depreciation and amortization		69,282,887
Changes in assets and liabilities:		
(Increase) decrease in accounts receivable		(2,146,364)
(Increase) decrease in prepaid expenses and other assets		25,833
(Decrease) increase in accounts payable		(1,128,197)
Increase (decrease) in accrued expenses		11,107,529
(Increase) in deferred outflows of resources		3,660
Total adjustments		77,145,348
Net cash flows provided by (used in) operating activities	$	119,294,159
Reconciliation of cash and cash equivalents:		
Unrestricted cash and cash equivalents	$	74,331,931
Restricted cash and cash equivalents		954,729,270
Total	$	1,029,061,201

INVESTMENTS by FUND

		Balance June 30, 2022			
Renewal & Replacement Fund				TexSTAR	187,961,208.26
TexSTAR	1,797.37			Goldman Sachs	831,270,243.35
Goldman Sachs	181,412.60			Agencies & Treasury Notes	112,443,328.23
Agencies/ Treasuries		183,209.97			
Grant Fund					$ 1,131,674,779.84
TexSTAR	455,407.36				
Goldman Sachs	7,190,682.73				
Agencies/ Treasuries	2,444,963.65	10,091,053.74			
Senior Debt Service Reserve Fund					
TexSTAR	90,867,655.57				
Goldman Sachs	7,251,130.95				
Agencies/ Treasuries	9,999,851.33	108,118,637.85			
2010 Senior Lien Debt Service Account					
Goldman Sachs	60,706.58	60,706.58			
2011 Sr Debt Service Accountt					
Goldman Sachs	1,866,241.00	1,866,241.00			
2013 Sr Debt Service Accountt					
Goldman Sachs	1,825,479.07	1,825,479.07			
2013 Sub Debt Service Account					
Goldman Sachs	1,431,490.53	1,431,490.53			
2013 Sub Debt Service Reserve Fund					
Goldman Sachs	123.38	782,237.58			15,022,277.42
TexSTAR	782,114.20				
2015 Sr Debt Service Account					
Goldman Sachs	4,735,100.22	4,735,100.22			
2015 Sr Capitalized Interest					
Goldman Sachs	-	-			
TexSTAR	-				
2016 Sr Lien Rev Refunding Debt Service Account					
Goldman Sachs	10,072,779.22	10,072,779.22			
2016 Sub Lien Rev Refunding Debt Service Account					
Goldman Sachs	2,231,727.36	2,231,727.36			
2016 Sub Lien Rev Refunding DSR					
Goldman Sachs	7,003,244.16				
Agencies/ Treasuries	-	7,003,244.16			
Operating Fund					
TexSTAR	41,741.21				
TexSTAR-Trustee	2,812,256.12				
Goldman Sachs	7,513,564.16	10,367,561.49			
Revenue Fund					
Goldman Sachs	10,854,129.84	10,854,129.84			
General Fund					
TexSTAR	91,019,805.97				
Goldman Sachs	27,033,921.13				
Agencies/ Treasuries	-	118,053,727.10			
71E Revenue Fund					
Goldman Sachs	21,469,624.56	21,469,624.56			
MoPac Revenue Fund					
Goldman Sachs	-	0.00			
MoPac General Fund					
Goldman Sachs	11,210,817.82	11,210,817.82			
MoPac Operating Fund					
Goldman Sachs	1,073,777.97	1,073,777.97			
MoPac Loan Repayment Fund					
Goldman Sachs	415,997.90	415,997.90			
2015B Project Account					
Goldman Sachs	42,019,159.00				
TexSTAR	350,544.90	42,369,703.90			
2015 TIFIA Project Account					
Goldman Sachs	39,333,415.31				
TexSTAR	696,412.83				
Agencies/ Treasuries	-	40,029,828.14			
2011 Sr Financial Assistance Fund					
Goldman Sachs	1,361,829.50	1,361,845.51			
TexSTAR	16.01				
2018 Sr Lien Project Cap I					
Goldman Sachs	1,307,643.00	1,307,643.00			
2018 Sr Lien Project Account					
Goldman Sachs	11,036,644.92				
TexSTAR	933,456.72	11,970,101.64			
2020A Senior Lien Debt Service Account					
Goldman Sachs	1,918,773.22	1,918,773.22			
2020 SH 45SW Project Account					
Goldman Sachs	0.00	0.00			
2020B Senior Lien Debt Service Account					
Goldman Sachs	1,661,903.00	1,661,903.00			
2020C Senior Lien Debt Service Account					
Goldman Sachs	1,890,710.68	1,890,710.68			
2020D Sub Lien Debt Service Account					
Goldman Sachs	2,055,327.37	2,055,327.37			
2020D Sub Debt Service Reserve Fund					
Goldman Sachs	8,129,250.44	8,129,250.44			
2020E Senior Lien Project Account					
Goldman Sachs	151,670,156.11	151,670,156.11			
2020E Senior Lien Project Cap Interest					
Goldman Sachs	25,444,086.40	25,444,086.40			
2020F Sub Lien Project Account					
Goldman Sachs	34,777,300.21	34,777,300.21			
2020F Sub Lien Deb Service Account					
Goldman Sachs	2,773,548.11	2,773,548.11			
2020G Sub Lien Debt Service Account					
Goldman Sachs	1,277,070.38	1,277,070.38			
2020G Sub Lien Debt Service Reserve Account					
Goldman Sachs	2,458,251.27	2,458,251.27			
2021A Sub Lien Debt Service Reserve Account					
Goldman Sachs	9,935,511.71	9,935,511.71			28,308,495.16
2021A Sub Debt Service Account					
Goldman Sachs	95.85	95.85			
2021B Senior Lien Cap I Project Fund					
Goldman Sachs	51,883,416.24	51,883,416.24			
2021B Senior Lien Project Account					
Goldman Sachs	130,476,203.64				
Agencies/ Treasuries	99,998,513.25	230,474,716.89			
2021C Sub Lien Cap I Project Fund					
Goldman Sachs	1,337.63	1,337.63			
2021C Sub Lien Project Account					
Goldman Sachs	168,089,363.47	168,089,363.47			
2021C Sub Lien Debt Service Account					
Goldman Sachs	6,106,972.39	6,106,972.39			
2021D Senior Lien Debt Service Account					
Goldman Sachs	5,849,898.28	5,849,898.28			
2021E Senior Lien Debt Service Account					
Goldman Sachs	6,390,424.04	6,390,424.04			
		$ 1,131,674,779.84			

CTRMA INVESTMENT REPORT

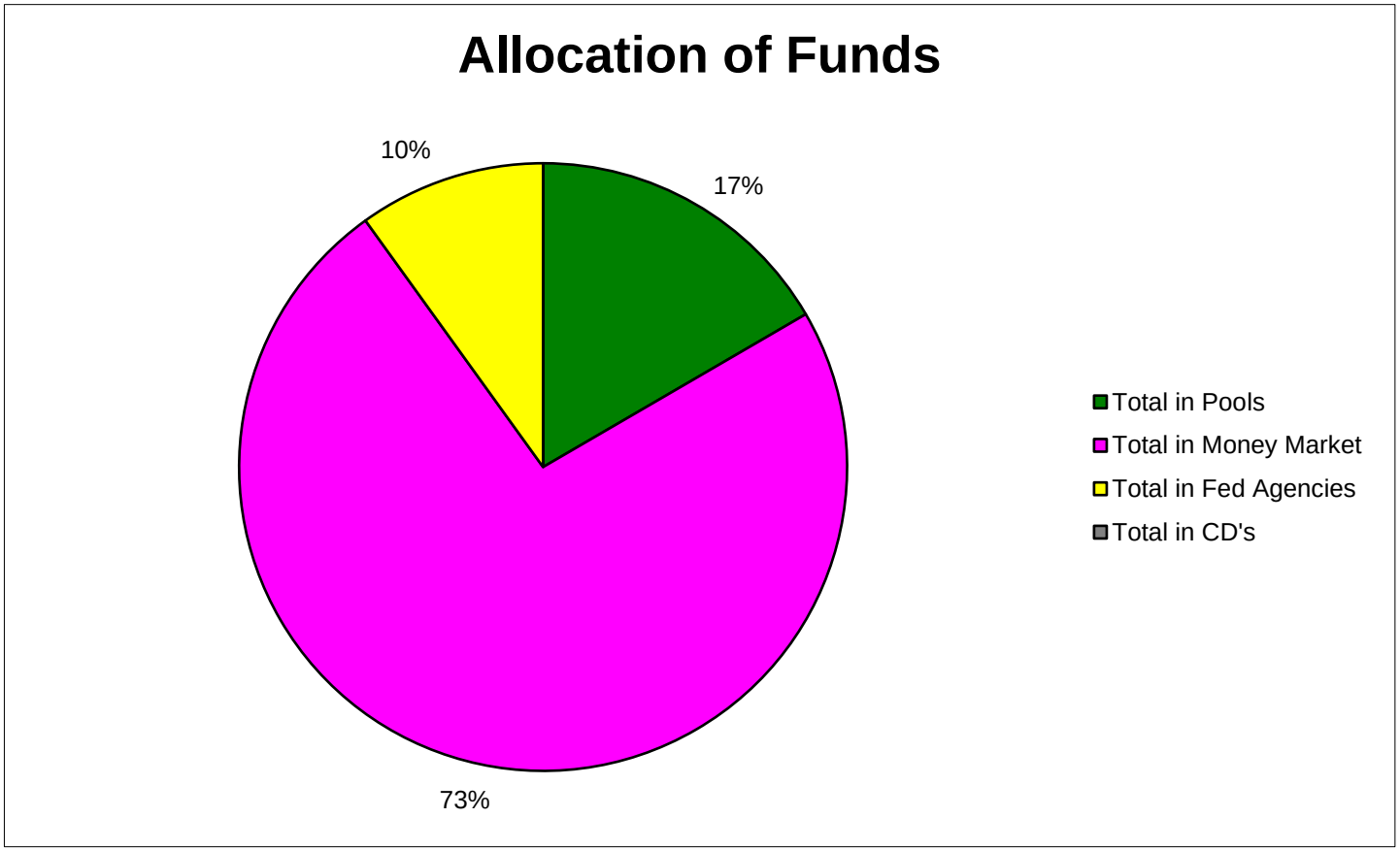
	Month Ending 6/30/2022						
	Balance 6/1/2022	Additions	Discount Amortization	Accrued Interest	Withdrawals	Balance 6/30/2022	Rate June
Amount in Trustee TexStar							
2011 Sr Lien Financial Assist Fund	16.01			0.00		16.01	0.9850%
2013 Sub Lien Debt Service Reserve	781,481.52			632.68		782,114.20	0.9850%
General Fund	90,946,178.12			73,627.85		91,019,805.97	0.9850%
Trustee Operating Fund	6,108,482.06	3,000,000.00		3,774.06	6,300,000.00	2,812,256.12	0.9850%
Renewal and Replacement	1,795.91			1.46		1,797.37	0.9850%
Grant Fund	455,038.96			368.40		455,407.36	0.9850%
Senior Lien Debt Service Reserve Fund	90,794,150.83			73,504.74		90,867,655.57	0.9850%
2015B Sr Ln Project	350,261.32			283.58		350,544.90	0.9850%
2015C TIFIA Project	695,849.49			563.34		696,412.83	0.9850%
2018 Sr Lien Project Account	932,701.63			755.09		933,456.72	0.9850%
	191,065,955.85	3,000,000.00		153,511.20	6,300,000.00	187,919,467.05	
Amount in TexStar Operating Fund	40,905.65	6,300,000.00		835.56	6,300,000.00	41,741.21	0.9850%
Goldman Sachs							
Operating Fund	7,513,144.70	3,000,000.00		3,996.19	3,003,576.73	7,513,564.16	1.0310%
2020 SH 45SW Project Account	0.00			154.66	154.66	0.00	1.0310%
2020A Senior Lien Debt Service Account	1,708,489.78	209,578.23		705.21		1,918,773.22	1.0310%
2020B Senior Lien Debt Service Account	1,384,439.68	276,791.59		671.73		1,661,903.00	1.0310%
2020C Senior Lien Debt Service Account	1,686,584.84	203,359.62		766.22		1,890,710.68	1.0310%
2020D Sub Lien Debt Service Account	1,712,183.95	342,312.67		830.75		2,055,327.37	1.0310%
2020D Sub Debt Service Reserve Fund	8,124,928.17			4,322.27		8,129,250.44	1.0310%
2020E Sr Lien Project Account	131,387,760.85	20,212,500.00		69,895.26		151,670,156.11	1.0310%
2020E Sr Ln Project Cap Interest	25,430,557.93			13,528.47		25,444,086.40	1.0310%
2020F Sub Lien Project Account	40,048,198.08			21,866.83	5,292,764.70	34,777,300.21	1.0310%
2020F Sub Lien Debt Service Account	2,310,478.64	461,948.43		1,121.04		2,773,548.11	1.0310%
2020G Sub Lien Debt Service Account	1,063,851.68	212,702.52		516.18		1,277,070.38	1.0310%
2020G Sub Debt Service Reserve Fund	2,361,154.09	95,863.53		1,233.65		2,458,251.27	1.0310%
2021A Sub Debt Service Reserve Fund	9,382,861.08	547,787.33		4,863.30		9,935,511.71	1.0310%
2021A Sub Debt Service Account	95.80			0.05		95.85	1.0310%
2021B Senior Lien Cap I Project Fund	51,855,830.13			27,586.11		51,883,416.24	1.0310%
2021B Senior Lien Project Account	130,406,830.21			69,373.43		130,476,203.64	1.0310%
2021C Sub Lien Cap I Project Fund	1,336.92			0.71		1,337.63	1.0310%
2021C Sub Lien Project Account	70,278,858.11	100,914,825.00		36,811.99	3,141,131.63	168,089,363.47	1.0310%
2021C Sub Lien Debt Service Account	5,087,287.85	1,017,216.22		2,468.32		6,106,972.39	1.0310%
2021D Senior Lien Debt Service Account	4,873,145.76	974,388.10		2,364.42		5,849,898.28	1.0310%
2021E Senior Lien Debt Service Account	5,323,439.46	1,064,401.67		2,582.91		6,390,424.04	1.0310%
2011 Sr Financial Assistance Fund	1,361,105.42			724.08		1,361,829.50	1.0310%
2010 Senior DSF	60,674.30			32.28		60,706.58	1.0310%
2011 Senior Lien Debt Service Account	1,554,672.76	310,813.91		754.33		1,866,241.00	1.0310%
2013 Senior Lien Debt Service Account	1,520,740.19	304,001.01		737.87		1,825,479.07	1.0310%
2013 Sub Debt Service Reserve Fund	123.31			0.07		123.38	1.0310%
2013 Subordinate Debt Service Account	1,192,541.98	238,369.91		578.64		1,431,490.53	1.0310%
2015A Sr Lien Debt Service Account	4,732,582.59			2,517.63		4,735,100.22	1.0310%
2015B Project Account	41,996,817.58			22,341.42		42,019,159.00	1.0310%
2015C TIFIA Project Account	40,412,796.38			22,236.26	1,101,617.33	39,333,415.31	1.0310%
2016 Sr Lien Rev Refunding Debt Service Account	8,921,952.29	1,146,348.85		4,478.08		10,072,779.22	1.0310%
2016 Sub Lien Rev Refunding Debt Service Account	1,859,120.91	371,704.41		902.04		2,231,727.36	1.0310%
2016 Sub Lien Rev Refunding DSR	6,999,520.56			3,723.60		7,003,244.16	1.0310%
2018 Sr Lien Project Cap I	1,306,947.73			695.27		1,307,643.00	1.0310%
2018 Sr Lien Project Account	11,546,019.72	22,504.01		6,148.00	538,026.81	11,036,644.92	1.0310%
Grant Fund	7,186,859.47			3,823.26		7,190,682.73	1.0310%
Renewal and Replacement	333,783.16			66.27	152,436.83	181,412.60	1.0310%
Revenue Fund	8,432,960.76	19,789,948.80		4,165.72	17,372,945.44	10,854,129.84	1.0310%
General Fund	23,080,887.32	4,436,672.80		12,206.28	495,845.27	27,033,921.13	1.0310%
Senior Lien Debt Service Reserve Fund	7,247,275.61			3,855.34		7,251,130.95	1.0310%
71E Revenue Fund	20,883,864.70	849,452.52		10,965.83	274,658.49	21,469,624.56	1.0310%
MoPac Revenue Fund	62,640.33	1,140,683.67		267.30	1,203,591.30	0.00	1.0310%
MoPac General Fund	10,030,032.74	1,203,591.30		3,960.63	26,766.85	11,210,817.82	1.0310%
MoPac Operating Fund	1,894,081.54			1,123.09	821,426.66	1,073,777.97	1.0310%
MoPac Loan Repayment Fund	414,791.53			1,206.37		415,997.90	1.0310%
	704,974,250.59	159,347,766.10		373,169.36	33,424,942.70	831,270,243.35	
Amount in Fed Agencies and Treasuries							
Amortized Principal	232,623,961.62		(125.20)	946,816.81	121,127,325.00	112,443,328.23	
	232,623,961.62		(125.20)	946,816.81		112,443,328.23	
Certificates of Deposit							
Total in Pools	191,106,861.50	9,300,000.00		154,346.76	12,600,000.00	187,961,208.26	
Total in GS FSGF	704,974,250.59	159,347,766.10		373,169.36	33,424,942.70	831,270,243.35	
Total in Fed Agencies and Treasuries	232,623,961.62	0.00	(125.20)	946,816.81	121,127,325.00	112,443,328.23	
Total Invested	1,128,705,073.71	168,647,766.10		1,474,332.93	167,152,267.70	1,131,674,779.84	

All Investments in the portfollio are in compliance with the CTRMA's Investment policy and the relevent provisions of the Public Funds Investment Act Chapter 2256.023

José Hernández, CFO

Mary Temple, Controller

6/30/2022


Allocation of Funds
10%
17%
73%
Total in Pools
Total in Money Market
Total in Fed Agencies
Total in CD's

Amount of Investments As of June 30, 2022

Agency	CUSIP #	COST	Book Value	Market Value	Yield to Maturity	Purchased	Matures	FUND
Treasury	912828XW5	MATURED	MATURED	MATURED	0.0529%	9/24/2021	6/30/2022	2021C Sub Project
Agency - Federal Home Loan Bank	313379Q69	MATURED	MATURED	MATURED	0.0550%	9/24/2021	6/10/2022	2020E Sr Project
Agency - Federal Home Loan Bank	313379Q69a	MATURED	MATURED	MATURED	0.0550%	9/24/2021	6/10/2022	2021C Sub Project
Agency - Federal Farm Credit	3133EM5T5	2,444,854.60	2,444,963.65	2,437,176.00	0.0076%	9/24/2021	9/21/2022	Grant Fund
Agency - Federal Farm Credit	3133EM5T5a	9,999,405.30	9,999,851.33	9,968,000.00	0.0076%	9/24/2021	9/21/2022	Sr Lien DSR
Agency - Federal Farm Credit	3133EM5T5b	99,994,053.00	99,998,513.25	99,680,000.00	0.0076%	9/24/2021	9/21/2022	2021B Sr Project
		112,438,312.90	112,443,328.23	112,085,176.00				

Agency	CUSIP #	COST	Cummulative Amortization	Book Value	Maturity Value		Interest Income		
							Accrued Interest	Amortization	Interest Earned
Treasury	912828XW5	MATURED	MATURED	MATURED	78,760,000.00		114,858.33		114,858.33
Agency - Federal Home Loan Bank	313379Q69	MATURED	MATURED	MATURED	20,000,000.00		35,416.67		35,416.67
Agency - Federal Home Loan Bank	313379Q69a	MATURED	MATURED	MATURED	21,240,000.00		37,612.50		37,612.50
Agency - Federal Farm Credit	3133EM5T5	2,444,854.60	109.04	2,444,963.64	2,445,000.00		142.62	12.11	154.73
Agency - Federal Farm Credit	3133EM5T5a	9,999,405.30	446.03	9,999,851.33	10,000,000.00		583.33	(632.89)	(49.56)
Agency - Federal Farm Credit	3133EM5T5b	99,994,053.00	4,460.26	99,998,513.26	100,000,000.00		5,833.33	495.58	6,328.91
		112,438,312.90	5,015.33	112,443,328.23	232,445,000.00		194,446.78	(125.20)	194,321.58

ESCROW FUNDS

Travis County Escrow Fund - Elroy Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	3,824,536.53	220,375.67	2,114.32		4,047,026.52

Travis County Escrow Fund - Ross Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	139,736.05		74.75		139,810.80

Travis County Escrow Fund - Old San Antonio Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	54,916.20		29.92		54,946.12

Travis County Escrow Fund - Old Lockhart Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	243,165.62	100,000.00	130.16		343,295.78

Travis County Escrow Fund - County Line Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	387,932.40		208.56		388,140.96

Travis County Escrow Fund - South Pleasant Valley Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	343,530.41		183.14		343,713.55

Travis County Escrow Fund - Thaxton Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	147,298.34		79.24		147,377.58

Travis County Escrow Fund - Pearce Lane Road

	Balance 6/1/2022	Additions	Accrued Interest	Withdrawals	Balance 6/30/2022
Goldman Sachs	330,033.64		177.03		330,210.67

TexSTAR

MONTHLY NEWSLETTER JUNE 2022

PERFORMANCE

As of June 30, 2022

Current Invested Balance	$9,799,299,684.61
Weighted Average Maturity (1)	35 Days
Weighted Average Life (2)	51 Days
Net Asset Value	0.999363
Total Number of Participants	989
Management Fee on Invested Balance	0.06%*
Interest Distributed	$8,532,537.35
Management Fee Collected	$490,533.20
% of Portfolio Invested Beyond 1 Year	2.50%
Standard & Poor's Current Rating	AAAm

Rates reflect historical information and are not an indication of future performance.

June Averages

Average Invested Balance	$9,947,138,859.12
Average Monthly Yield, on a simple basis	0.9850%
Average Weighted Maturity (1)	42 Days
Average Weighted Life (2)	57 Days

Definition of Weighted Average Maturity (1) & (2)

(1) This weighted average maturity calculation uses the SEC Rule 2a-7 definition for stated maturity for any floating rate instrument held in the portfolio to determine the weighted average maturity for the pool. This Rule specifies that a variable rate instruction to be paid in 397 calendar days or less shall be deemed to have a maturity equal to the period remaining until the next readjustment of the interest rate. (2) This weighted average maturity calculation uses the final maturity of any floating rate instruments held in the portfolio to calculate the weighted average maturity for the pool.

The maximum management fee authorized for the TexSTAR Cash Reserve Fund is 12 basis points. This fee may be waved in full or in part in the discretion of the TexSTAR co-administrators at any time as provided for in the TexSTAR Information Statement.

NEW PARTICIPANTS

We would like to welcome the following entity who joined the TexSTAR program in June:

* Waller County Municipal Utility District No. 33

ECONOMIC COMMENTARY

Market review

The end of the quarter brought growing fears of a recession to the market with economic data beginning to cool as the Federal Reserve (Fed) grappled with the highest inflation in 40 years. Persistent inflationary pressures caused the Fed to take aggressive action, leading to a surge in interest rates. Higher rates and Quantitative Tightening (QT) contributed to a significant tightening in financial conditions, as the dollar appreciated, mortgage rates jumped, and equity prices plummeted. Combined with falling consumer confidence and massive fiscal drag, the risk of a near-term recession increased. Higher mortgage rates led to a sixth monthly fall in the June homebuilder confidence and a -14% and -7% month-over-month (m/m) move down in May housing starts and permits. Business sentiment appeared to be eroding with a decline in the June Philadelphia Fed survey and a lower-than-expected decline in jobless claims. Lastly, higher inflation and lower confidence started to weigh on consumer spending with May retail sales -0.3% m/m (due to autos) and +0.1% ex-auto and gasoline (softest pace this year).

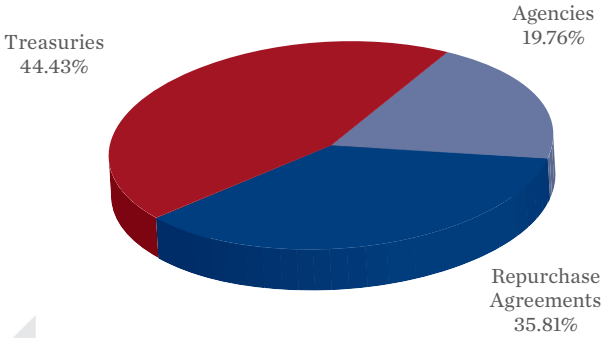
The May CPI report showed hotter-than-expected inflation, despite hopes for a moderation. Headline CPI rose 1.0% m/m and 8.6% year-over-year (y/y), while Core CPI jumped 0.6% m/m and 6.0% y/y. While surges in energy and food prices led to the upside in headline CPI, core inflation continued to accelerate as airfares, new vehicle prices and shelter costs rose solidly. The inflation surge doesn't appear to be cooling off just yet as higher costs for groceries, gasoline, and everyday goods and services continued to inflict pain on consumer wallets, pandemic savings, and wage gains. Supply chain woes have yet to ease. Even with a dip in sales, a chronic lack of auto inventory pushed prices higher for new and used vehicles, up 1% and 1.8%, respectively. Higher home prices continued to feed into owner's equivalent rent, with the index accelerating to 0.6% m/m, breaking out from its recent 0.4-0.5% pace.

Consumer sentiment weakened considerably with rapidly rising prices for food and energy likely playing a significant role. University of Michigan Consumer sentiment for June disappointed, at 50.2 versus 58.1 expected and 58.4 in May, plunging to its worst level in the history of the series going back to the 1970s.

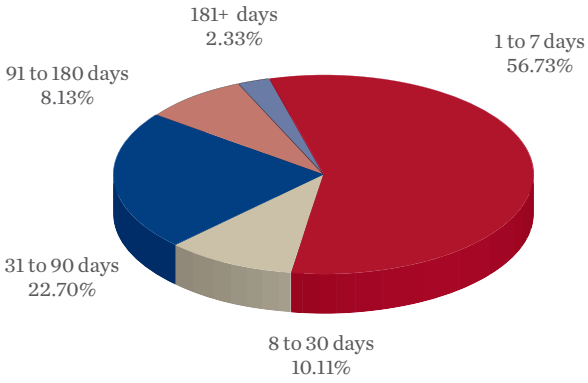
(continued page 4)

INFORMATION AT A GLANCE

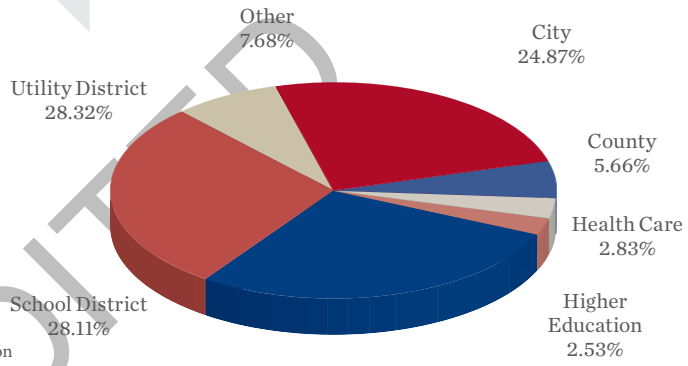
PORTFOLIO BY TYPE OF INVESTMENT AS OF JUNE 30, 2022



DISTRIBUTION OF PARTICIPANTS BY TYPE AS OF JUNE 30, 2022



PORTFOLIO BY MATURITY AS OF JUNE 30, 2022 (1)



(1) Portfolio by Maturity is calculated using WAM (1) definition for stated maturity. See page 1 for definition

HISTORICAL PROGRAM INFORMATION

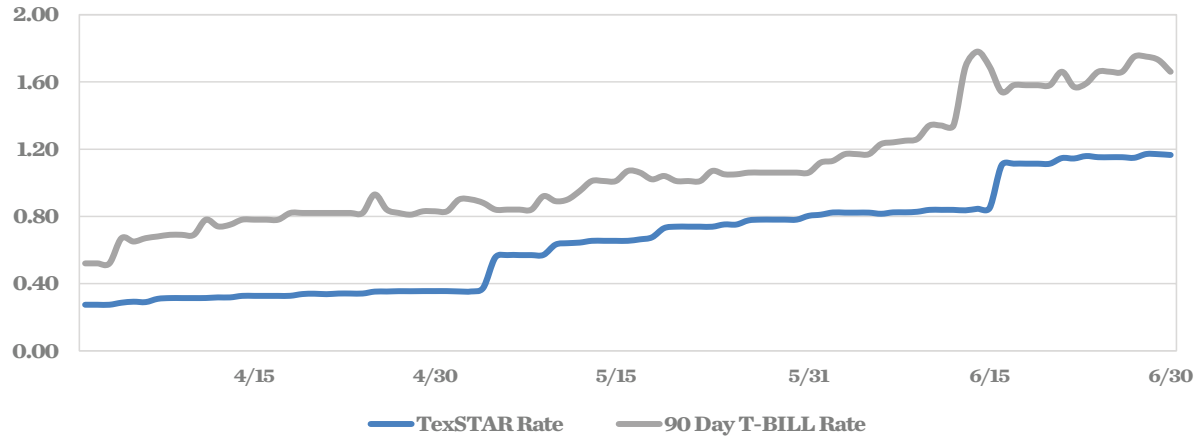
MONTH	AVERAGE RATE	BOOK VALUE	MARKET VALUE	NET ASSET VALUE	WAM (1)	WAL (2)	NUMBER OF PARTICIPANTS
Jun 22	0.9850%	$9,799,299,684.61	$9,793,062,348.93	0.999363	42	57	989
May 22	0.6459%	9,701,777,049.61	9,700,243,468.41	0.999841	43	61	988
Apr 22	0.3225%	8,985,925,505.16	8,984,338,322.90	0.999818	39	60	986
Mar 22	0.1070%	9,050,970,696.95	9,050,137,013.72	0.999907	27	38	981
Feb 22	0.0104%	9,779,113,455.23	9,778,353,196.78	0.999922	26	32	979
Jan 22	0.0100%	9,399,813,099.48	9,399,092,954.95	0.999923	31	38	977
Dec 21	0.0139%	8,763,539,414.27	8,763,577,847.71	1.000011	40	52	977
Nov 21	0.0102%	8,132,746,877.26	8,133,007,416.80	1.000032	47	62	965
Oct 21	0.0100%	8,641,191,692.82	8,641,540,291.95	1.000040	41	58	963
Sep 21	0.0100%	9,019,799,096.23	9,020,390,786.23	1.000065	43	62	958
Aug 21	0.0100%	8,945,411,473.29	8,945,978,474.21	1.000063	52	74	955
Jul 21	0.0100%	9,139,785,043.86	9,140,404,119.19	1.000071	41	68	949

PORTFOLIO ASSET SUMMARY AS OF JUNE 30, 2022

	BOOK VALUE	MARKET VALUE
Uninvested Balance	$ 971.05	$ 971.05
Accrual of Interest Income	2,205,692.85	2,205,692.85
Interest and Management Fees Payable	(8,535,141.93)	(8,535,141.93)
Payable for Investment Purchased	0.00	0.00
Repurchase Agreement	3,511,393,999.52	3,511,393,999.52
Government Securities	6,294,234,163.12	6,287,996,827.44
TOTAL	**$ 9,799,299,684.61**	**$ 9,793,062,348.93**

Market value of collateral supporting the Repurchase Agreements is at least 102% of the Book Value. The portfolio is managed by J.P. Morgan Chase & Co. and the assets are safekept in a separate custodial account at the Federal Reserve Bank in the name of TexSTAR. The only source of payment to the Participants are the assets of TexSTAR. There is no secondary source of payment for the pool such as insurance or guarantee. Should you require a copy of the portfolio, please contact TexSTAR Participant Services.

TEXSTAR VERSUS 90-DAY TREASURY BILL



This material is for information purposes only. This information does not represent an offer to buy or sell a security. The above rate information is obtained from sources that are believed to be reliable; however, its accuracy or completeness may be subject to change. The TexSTAR management fee may be waived in full or in part at the discretion of the TexSTAR co-administrators and the TexSTAR rate for the period shown reflects waiver of fees. This table represents historical investment performance/return to the customer, net of fees, and is not an indication of future performance. An investment in the security is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. Although the issuer seeks to preserve the value of an investment of $1.00 per share, it is possible to lose money by investing in the security. Information about these and other program details are in the fund's Information Statement which should be read carefully before investing. The yield on the 90-Day Treasury Bill ("T-Bill Yield") is shown for comparative purposes only. When comparing the investment returns of the TexSTAR pool to the T-Bill Yield, you should know that the TexSTAR pool consists of allocations of specific diversified securities as detailed in the respective Information Statements. The T-Bill Yield is taken from Bloomberg Finance L.P. and represents the daily closing yield on the then current 90-Day T-Bill. The TexSTAR yield is calculated in accordance with regulations governing the registration of open-end management investment companies under the Investment Company Act of 1940 as promulgated from time to time by the federal Securities and Exchange Commission.

DAILY SUMMARY FOR JUNE 2022

DATE	MNY MKT FUND EQUIV. [SEC Std.]	DAILY ALLOCATION FACTOR	INVESTED BALANCE	MARKET VALUE PER SHARE	WAM DAYS (1)	WAL DAYS (2)
6/1/2022	0.8098%	0.000022186	$9,841,202,274.35	0.999826	47	64
6/2/2022	0.8229%	0.000022545	$9,792,626,546.20	0.999803	47	63
6/3/2022	0.8219%	0.000022517	$9,704,552,414.57	0.999776	46	62
6/4/2022	0.8219%	0.000022517	$9,704,552,414.57	0.999776	46	62
6/5/2022	0.8219%	0.000022517	$9,704,552,414.57	0.999776	46	62
6/6/2022	0.8151%	0.000022332	$10,082,211,781.77	0.999734	45	61
6/7/2022	0.8235%	0.000022561	$10,127,223,608.67	0.999738	45	61
6/8/2022	0.8238%	0.000022570	$10,117,200,647.02	0.999709	44	60
6/9/2022	0.8271%	0.000022659	$10,164,207,273.43	0.999657	43	59
6/10/2022	0.8384%	0.000022970	$10,273,819,639.62	0.999540	45	57
6/11/2022	0.8384%	0.000022970	$10,273,819,639.62	0.999540	45	57
6/12/2022	0.8384%	0.000022970	$10,273,819,639.62	0.999540	45	57
6/13/2022	0.8356%	0.000022894	$10,278,933,419.80	0.999308	43	58
6/14/2022	0.8448%	0.000023144	$10,137,293,711.33	0.999102	43	58
6/15/2022	0.8494%	0.000023272	$10,060,318,482.15	0.999123	42	58
6/16/2022	1.1041%	0.000030250	$9,900,183,551.47	0.999204	43	59
6/17/2022	1.1133%	0.000030501	$9,867,287,390.97	0.999214	41	57
6/18/2022	1.1133%	0.000030501	$9,867,287,390.97	0.999214	41	57
6/19/2022	1.1133%	0.000030501	$9,867,287,390.97	0.999214	41	57
6/20/2022	1.1133%	0.000030501	$9,867,287,390.97	0.999214	41	57
6/21/2022	1.1467%	0.000031416	$9,997,329,417.85	0.999246	40	55
6/22/2022	1.1441%	0.000031345	$9,904,580,094.64	0.999289	40	55
6/23/2022	1.1587%	0.000031746	$9,865,902,166.71	0.999301	39	55
6/24/2022	1.1519%	0.000031560	$9,842,680,751.47	0.999246	38	53
6/25/2022	1.1519%	0.000031560	$9,842,680,751.47	0.999246	38	53
6/26/2022	1.1519%	0.000031560	$9,842,680,751.47	0.999246	38	53
6/27/2022	1.1484%	0.000031464	$9,735,396,796.33	0.999290	37	53
6/28/2022	1.1708%	0.000032078	$9,865,025,593.44	0.999365	36	52
6/29/2022	1.1698%	0.000032049	$9,812,922,742.89	0.999381	36	51
6/30/2022	1.1651%	0.000031920	$9,799,299,684.61	0.999363	35	51
Average	0.9850%	0.000026986	$9,947,138,859.12		42	57

ECONOMIC COMMENTARY (cont.)

Driving the move was a large drop in the consumer views of their current personal financial situation as well as drops in current and expected business conditions. Consumer confidence as measured by the Conference Board survey also declined from 103.2 in May to 98.7 in June. Stubbornly high inflation pushed the Fed to accelerate its rate hiking schedule. After May's 40-year high inflation print and decade high University of Michigan inflation expectations, the Federal Open Market Committee (FOMC) raised rates by 75 basis points (bps) to 1.50%-1.75%. Guidance was hawkish, with the median FOMC "dot" forecast showing rates up another 175 bps by year-end to a restrictive 3.4% (and +33 bps next year to 3.8%). To bring down inflation, the Fed's economic projections showed a willingness to tolerate lower growth (1.7% 2022 & 2023) and slightly higher unemployment (4.1% 2024). These forecasts outline a "soft landing", but the Fed's willingness to overtighten has increased recessionary risks over the next year, pushing U.S. equities further into a bear market and Treasury yields higher.

Despite increasing growth concerns, strength in the labor market continued into May, with nonfarm payrolls rising by a robust 390K. The unemployment rate remained steady at 3.6% for the third consecutive month, while the labor force participation rate ticked up to 62.3% from 62.2%, and wage growth continued at its moderate pace of 0.3%. The Job Openings and Labor Turnover Survey (JOLTS) also pointed to continued strength with 11.254 million job openings reported for May, a very high reading by historical standards, although down from its peak. Similarly, the number of quits remained very high in May (4.270 million) despite cooling in both May (-1.3%) and April (-2.7%). Flexibility in labor supply is likely allowing job gains in areas most in need (construction, leisure and hospitality, and education) while shedding jobs with excess (retail). Volatility remained elevated during the month. The six-month Treasury bill yield saw the largest increase on the month, rising 92 bps to end at 2.49%, while the two-year Treasury note yield increased 87 bps at its peak mid-month of 3.43% before ending the month up 40 bps at 2.96%.

Outlook

This year, so far, has been a very difficult one for investors with heavy losses in both equity and fixed income markets. On the positive side, the impact of COVID-19 on the economy continues to fade. However, in its place, investors face new challenges, with Russia's brutal invasion of Ukraine and China's zero Covid policy both contributing to sustained high inflation. In response, the Federal Reserve has turned much more hawkish, raising interest rates by 0.75% in June and promising further tightening in the months ahead. In response to persistent inflation pressures, the Fed has embarked on an even more hawkish rate tightening path and the runway for an economic "soft landing" is getting narrower. High inflation and Fed tightening have, in turn, led to fast rising mortgage rates and this, in combination with fiscal drag, an over-valued dollar, record-low consumer sentiment and stock market losses, is rapidly undermining economic momentum. As we enter the second half of 2022, there is a growing danger that the U.S. economy could slip into recession. On the positive side, while real GDP shrank in the first quarter, monthly data suggests it lodged solid growth in the second as the Omicron wave subsided and spending picked up in pandemic-impacted areas such as travel, restaurants, leisure and entertainment.

However, as the third quarter begins, there are gathering forces slowing economic momentum. The most important is fiscal drag, with the federal budget deficit likely to fall from 12.4% of GDP last fiscal year to less than 4% of GDP this year, reflecting an end to stimulus checks, enhanced unemployment benefits, enhanced child tax credits and a host of other programs that were supporting the income and spending of lower and middle-income households. In addition, the housing sector is being battered by a more than 2.5% surge in 30-year mortgage rates while U.S. exports are being impeded by a more than 8% rise in the trade-weighted dollar since the start of the year. This, along with collapsing consumer confidence in the face of fast-rising food and energy prices and a slumping stock market, threatens to slow the economy in the second half of the year, with a rising risk that the U.S. economy could fall into recession. The labor market continues to be a bright spot in an otherwise gloomy environment, with the unemployment rate remaining at 3.6% in May 2022 for the third consecutive month, just 0.1% above its 50-year low set in 2019. Even with this, there is a massive excess demand for labor, with job openings still far exceeding those who are unemployed. This excess demand should fade somewhat over the next few months reflecting slowing economic momentum and diminished business confidence.

TexSTAR

ECONOMIC COMMENTARY (cont.)

Inflation continues to run very hot with a May headline CPI showing an 8.6% year-over-year gain, well above market expectations. Today's high inflation largely reflects the impact of surging consumer spending, fueled by fiscal stimulus, colliding with supply shortages across major sectors of the economy. More recently, this has been amplified by a general recovery in airfares, hotel rates, and rents from their pandemic lows. The Russian invasion of Ukraine and China's attempts to maintain a "zero-COVID" policy are extending supply chain problems and year-over-year CPI inflation may not have peaked yet. By the end of 2022, we do expect some of the supply-chain issues to fade, allowing headline inflation to ease. However, the longer high inflation persists, the stickier it gets, and core consumption deflator inflation could remain above 3% year-over-year throughout 2022 and 2023. While longer term forces could cut inflation further by the middle of the decade, the potential persistence of inflation well above the Fed's 2% target over the next two years has major implications for monetary policy.

This information is an excerpt from an economic report dated June 2022 provided to TexSTAR by JP Morgan Asset Management, Inc., the investment manager of the TexSTAR pool.

Exhibit B

Financial Statements for July 2022

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
REVENUE				
Operating Revenue				
Toll Revenue - Tags	119,610,800	9,134,259	7.64%	9,255,638
Video Tolls	46,743,300	4,116,650	8.81%	3,960,828
Fee Revenue	13,845,900	836,807	6.04%	1,350,098
Total Operating Revenue	**180,200,000**	**14,087,716**	**7.82%**	**14,566,563**
Other Revenue				
Interest Income	3,190,301	865,599	27.13%	18,300
Grant Revenue	1,359,833	-	-	-
Misc Revenue	130,000	9,434	7.26%	28,831
Total Other Revenue	**4,680,134**	**875,033**	**18.70%**	**47,131**
TOTAL REVENUE	**$184,880,134**	**$14,962,748**	**8.09%**	**14,613,694**
EXPENSES				
Salaries and Benefits				
Salary Expense-Regular	4,621,321	207,828	4.50%	316,946
Salary Reserve	80,000	-	-	-
TCDRS	1,046,269	46,329	4.43%	47,432
FICA	232,304	11,155	4.80%	16,173
FICA MED	67,009	2,995	4.47%	4,571
Health Insurance Expense	580,271	27,663	4.77%	33,946
Life Insurance Expense	5,972	304	5.09%	513
Auto Allowance Expense	10,200	213	2.08%	425
Other Benefits	126,590	6,021	4.76%	7,367
Unemployment Taxes	4,608	10	0.22%	99
Total Salaries and Benefits	**6,774,544**	**302,517**	**4.47%**	**427,472**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Administrative				
Administrative and Office Expenses				
Accounting	9,500	634	6.67%	669
Auditing	190,000	-	-	-
Financial Advisors	108,000	18,000	16.67%	-
Human Resources	30,000	225	0.75%	44
Legal	70,000	1,770	2.53%	-
IT Services	350,000	11,092	3.17%	10,416
Internet	150	-	-	-
Software Licenses	557,500	15,472	2.78%	5,277
Cell Phones	24,200	810	3.35%	1,692
Local Telephone Service	10,000	7,421	74.21%	7,247
Overnight Delivery Services	250	-	-	29
Copy Machine	15,500	1,272	8.21%	1,272
Repair & Maintenance-General	8,000	-	-	-
Meeting Expense	12,750	-	-	78
Toll Tag Expense	3,000	-	-	200
Parking / Local Ride Share	2,800	-	-	-
Mileage Reimbursement	3,950	40	1.02%	11
Insurance Expense	651,250	42,688	6.55%	51,299
Rent Expense	731,203	62,007	8.48%	22,107
Building Parking	3,500	177	5.07%	-
Legal Services	443,000	340	0.08%	-
Total Administrative and Office Expenses	**3,224,553**	**161,949**	**5.02%**	**100,343**
Office Supplies				
Books & Publications	3,250	-	-	292
Office Supplies	7,750	939	12.12%	365
Misc Office Equipment	4,500	-	-	630
Computer Supplies	221,950	46,779	21.08%	3,015
Other Reports-Printing	5,000	-	-	-
Office Supplies-Printed	3,100	-	-	-
Postage Expense	550	-	-	112
Total Office Supplies	**246,100**	**47,718**	**19.39%**	**4,413**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Communications and Public Relations				
Graphic Design Services	75,000	-	-	-
Website Maintenance	111,500	10,114	9.07%	2,293
Research Services	140,000	-	-	-
Communications and Marketing	400,000	-	-	12,827
Advertising Expense	500,000	27,763	5.55%	33,377
Direct Mail	65,000	-	-	-
Video Production	82,500	25,790	31.26%	8,820
Photography	25,000	450	1.80%	199
Radio	50,000	-	-	-
Other Public Relations	2,500	-	-	-
Promotional Items	520,000	-	-	-
Annual Report printing	1,500	-	-	780
Direct Mail Printing	26,000	-	-	-
Other Communication Expenses	15,000	6,903	46.02%	280
Total Communications and Public Relations	**2,014,000**	**71,020**	**3.53%**	**58,576**
Employee Development				
Subscriptions	50,700	-	-	978
Agency Memberships	78,550	-	-	150
Continuing Education	4,800	-	-	-
Professional Development	19,150	-	-	-
Other Licenses	1,900	-	-	375
Seminars and Conferences	118,500	25,000	21.10%	-
Travel	93,500	-	-	-
Total Employee Development	**367,100**	**25,000**	**6.81%**	**1,503**
Financing and Banking Fees				
Trustee Fees	60,000	7,000	11.67%	3,763
Bank Fee Expense	3,240	165	5.08%	291
Continuing Disclosure	7,000	-	-	-
Arbitrage Rebate Calculation	15,000	-	-	-
Rating Agency Expense	50,000	31,000	62.00%	-
Total Financing and Banking Fees	**135,240**	**38,165**	**28.22%**	**4,053**
Total Administrative	**5,986,993**	**343,851**	**5.74%**	**168,887**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Operations and Maintenance				
Operations and Maintenance Consulting				
GEC-Trust Indenture Support	763,997	83,185	10.89%	98,638
GEC-Financial Planning Support	275,000	22,637	8.23%	4,595
GEC-Toll Ops Support	2,550,000	46,480	1.82%	84,167
GEC-Roadway Ops Support	1,411,139	41,289	2.93%	26,003
GEC-Technology Support	654,369	96,054	14.68%	145,638
GEC-Public Information Support	200,000	7,330	3.66%	13,992
GEC-General Support	1,360,000	73,112	5.38%	84,051
General System Consultant	1,159,640	-	-	27,953
Traffic Modeling	150,000	-	-	89
Traffic and Revenue Consultant	500,000	82,508	16.50%	-
Total Operations and Maintenance Consulting	**9,024,145**	**452,596**	**5.02%**	**485,125**
Roadway Operations and Maintenance				
Roadway Maintenance	1,868,052	(164,602)	-8.81%	148,296
Landscape Maintenance	2,949,320	-	-	199,715
Maintenance Supplies-Roadway	300,000	-	-	26,100
Tools & Equipment Expense	25,000	-	-	-
Gasoline	30,000	-	-	1,217
Repair & Maintenance - Vehicles	10,000	-	-	52
Natural Gas	2,500	386	15.45%	437
Electricity - Roadways	250,000	16,142	6.46%	14,071
Total Roadway Operations and Maintenance	**5,434,872**	**(148,074)**	**-2.72%**	**389,887**
Toll Processing and Collection Expense				
Image Processing	4,208,340	334,192	7.94%	-
Tag Collection Fees	8,453,846	684,299	8.09%	720,465
Court Enforcement Costs	10,000	-	-	-
DMV Lookup Fees	200	-	-	-
Total Processing and Collection Expense	**12,672,387**	**1,018,491**	**8.04%**	**720,465**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Toll Operations Expense				
Generator Fuel	3,000	-	-	-
Fire and Burglar Alarm	500	41	8.22%	-
Refuse	2,180	163	7.48%	131
Water - Irrigation	7,500	1,001	13.35%	423
Electricity	500	111	22.17%	-
ETC spare parts expense	200,000	-	-	-
Repair & Maintenance Toll Equip	50,000	31,491	62.98%	-
Law Enforcement	500,000	33,972	6.79%	26,200
ETC Maintenance Contract	6,000,000	-	-	-
Transaction Processing Maintenance Contract	1,500,000	-	-	-
ETC Toll Management Center System Operation	875,000	18,750	2.14%	18,750
ETC Development	559,000	-	-	-
ETC Testing	275,000	-	-	-
Total Toll Operations Expense	**9,972,680**	**85,529**	**0.86%**	**45,504**
Total Operations and Maintenance	**37,104,083**	**1,408,543**	**3.80%**	**1,640,982**
Other Expenses				
Special Projects and Contingencies				
HERO	149,000	-	-	12,319
Special Projects	100,000	-	-	-
71 Express Net Revenue Payment	5,000,000	-	-	-
Customer Relations	3,000	-	-	-
Technology Initiatives	75,000	-	-	3,457
Other Contractual Svcs	370,000	21,000	5.68%	8,500
Contingency	300,000	-	-	-
Total Special Projects and Contingencies	**5,997,000**	**21,000**	**0.35%**	**24,276**
Non Cash Expenses				
Amortization Expense	2,020,950	106,691	5.28%	116,593
Amort Expense - Refund Savings	9,073,105	443,426	4.89%	226,285
Dep Exp - Furniture & Fixtures	2,178	218	10.00%	426
Dep Expense - Autos & Trucks	46,496	4,446	9.56%	1,912
Dep Expense - Buildng & Toll Fac	176,748	14,729	8.33%	14,729
Dep Expense - Highways & Bridges	53,479,102	4,218,462	7.89%	4,218,462
Dep Expense - Toll Equipment	4,736,604	362,172	7.65%	339,536
Dep Expense - Signs	1,052,717	84,714	8.05%	84,714
Dep Expense - Land Improvements	884,934	73,745	8.33%	73,745
Depreciation Expense - Computers	64,319	15,757	24.50%	15,757
Total Non Cash Expenses	**71,537,153**	**5,324,359**	**7.44%**	**5,092,159**
Total Other Expenses	**77,534,153**	**5,345,359**	**6.89%**	**5,116,435**

Central Texas Regional Mobility Authority
Income Statement
For the Period Ending July 31, 2022

	Budget Amount FY 2023	Actual Year to Date	Percent of Budget	Actual Prior Year to Date
Non Operating Expenses				
Bond Issuance Expense	1,250,000	44,025	3.52%	70,285
Loan Fee Expense	14,500	-	-	-
Interest Expense	83,664,454	6,501,687	7.77%	6,852,684
Community Initiatives	150,000	-	-	-
Total Non Operating Expenses	**$ 85,078,954**	**$ 6,545,711**	**7.69%**	**$ 6,922,969**
TOTAL EXPENSES	**212,478,727**	**13,945,981**	**6.56%**	**14,276,745**

Central Texas Regional Mobility Authority
Balance Sheet
as of July 31, 2022

	as of 07/31/2022		as of 07/31/2021	
ASSETS				
Current Assets				
Cash				
Regions Operating Account	$ 2,247,557		$ 716,618	
Cash in TexStar	41,791		440,206	
Regions Payroll Account	135,268		196,181	
Restricted Cash				
Goldman Sachs FSGF 465	794,221,344		804,587,796	
Restricted Cash - TexSTAR	189,343,918		155,298,566	
Overpayments account	291,148		719,357	
Total Cash and Cash Equivalents		986,281,025		961,958,724
Accounts Receivable				
Accounts Receivable	2,770,089		2,770,089	
Due From Other Agencies	50,856		74,992	
Due From TTA	440,843		2,796,698	
Due From NTTA	912,874		1,243,937	
Due From HCTRA	1,666,354		1,777,368	
Due From TxDOT	164,602		139,239	
Interest Receivable	701,920		1,590,915	
Total Receivables		6,707,538		10,393,238
Short Term Investments				
Treasuries	-		269,006,794	
Agencies	112,437,061		-	
Total Short Term Investments		112,437,061		269,006,794
Total Current Assets		1,105,425,625		1,241,358,757
Total Construction in Progress		290,575,482		175,834,494
Fixed Assets (Net of Depreciation and Amortization)				
Computers	82,750		271,831	
Computer Software	1,676,555		2,537,028	
Furniture and Fixtures	1,960		4,574	
Equipment	9,624		120,255	
Autos and Trucks	89,436		37,621	
Buildings and Toll Facilities	4,402,290		4,579,037	
Highways and Bridges	1,711,797,583		1,758,430,962	
Toll Equipment	19,628,774		22,136,507	
Signs	13,041,649		13,630,492	
Land Improvements	6,125,524		7,010,458	
Right of way	88,149,606		88,149,606	
Leasehold Improvements	40,866		87,009	
Total Fixed Assets		1,845,046,619		1,896,995,380
Other Assets				
Intangible Assets-Net	181,949,241		124,212,763	
2005 Bond Insurance Costs	3,389,900		3,629,640	
Prepaid Insurance	85,376		102,598	
Deferred Outflows (pension related)	675,913		641,074	
Pension Asset	2,549,818		591,247	
Total Other Assets		188,650,247		129,177,321
Total Assets		**$ 3,429,697,972**		**$ 3,443,365,952**

Central Texas Regional Mobility Authority
Balance Sheet
as of July 31, 2022

	as of 07/31/2022		as of 07/31/2021	
LIABILITIES				
Current Liabilities				
Accounts Payable	$ 32,865,256		$ 47,922,524	
Construction Payable	5,389,022		12,492,868	
Overpayments	294,629		722,663	
Interest Payable	18,231,693		9,509,393	
TCDRS Payable	109,665		101,731	
Due to other Agencies	2,291		11,311	
Due to TTA	495,283		575,041	
Due to NTTA	-		92,078	
Due to HCTRA	121,804		133,980	
Due to Other Entities	79,760		1,140,162	
71E TxDOT Obligation - ST	1,818,107		1,523,691	
Total Current Liabilities		59,407,511		74,225,441
Long Term Liabilities				
Compensated Absences	268,014		372,715	
Deferred Inflows (pension related)	88,838		109,052	
Long Term Payables		356,852		481,768
Bonds Payable				
Senior Lien Revenue Bonds:				
Senior Lien Revenue Bonds 2010	88,156,800		81,821,210	
Senior Lien Revenue Bonds 2011	18,938,887		18,663,228	
Senior Refunding Bonds 2013	3,475,000		7,080,000	
Senior Lien Revenue Bonds 2015	10,000,000		298,790,000	
Senior Lien Refunding Revenue Bonds 2016	70,790,000		348,295,000	
Senior Lien Revenue Bonds 2018	44,345,000		44,345,000	
Senior Lien Revenue Bonds 2020A	50,265,000		50,265,000	
Senior Lien Refunding Bonds 2020B	55,600,000		56,205,000	
Senior Lien Refunding Bonds 2020C	138,435,000		138,435,000	
Senior Lien Revenue Bonds 2020E	167,160,000		167,160,000	
Senior Lien Revenue Bonds 2021B	255,075,000		255,075,000	
Senior Lien Refunding Bonds 2021D	274,625,000		-	
Senior Lien Refunding Bonds 2021E	335,610,000		-	
Sn Lien Rev Bnd Prem/Disc 2013	745,466		2,534,583	
Sn Lien Revenue Bnd Prem 2015	-		17,088,125	
Senior Lien Premium 2016 Revenue Bonds	7,529,266		38,630,302	
Sn Lien Revenue Bond Premium 2018	3,127,576		3,394,150	
Senior Lien Revenue Bond Premium 2020A	11,331,707		11,459,581	
Senior Lien Refunding Bond Premium 2020B	11,727,066		12,262,141	
Senior Lien Revenue Bonds Premium 2020E	25,712,973		27,428,360	
Senior Lien Revenue Bonds Premium 2021B	53,489,099		53,736,149	
Senior Lien Refunding Bonds Premium 2021D	44,810,932		-	
Total Senior Lien Revenue Bonds		1,670,949,772		1,632,667,830

Central Texas Regional Mobility Authority
Balance Sheet
as of July 31, 2022

	as of 07/31/2022		as of 07/31/2021	
Sub Lien Revenue Bonds:				
Sub Lien Refunding Bonds 2013	2,725,000		5,320,000	
Sub Lien Refunding Bonds 2016	72,605,000		73,055,000	
Subordinated Lien BANs 2018	-		46,020,000	
Sub Lien Refunding Bonds 2020D	98,580,000		99,705,000	
Subordinated Lien BANs 2020F	110,875,000		110,875,000	
Subordinate Lien Refunding Bonds 2020G	61,570,000		61,570,000	
Subordinated Lien BANs 2021C	244,185,000		244,185,000	
Sub Refunding 2013 Prem/Disc	159,062		540,809	
Sub Refunding 2016 Prem/Disc	5,723,693		6,545,599	
Sub Lien BANS 2018 Premium	-		176,378	
Subordinated Lien BANs 2020F Premium	9,673,590		13,676,454	
Subordinated Lien Refunding Bonds Premium 2020G	7,134,555		7,538,527	
Sub Lien BANS 2021C Premium	33,618,242		41,229,919	
Total Sub Lien Revenue Bonds		646,849,141		710,437,686
Other Obligations				
TIFIA Note 2021	351,950,431		305,850,163	
71E TxDOT Obligation - LT	55,077,264		57,263,411	
Regions 2017 MoPAC Note	-		24,990,900	
Regions 2022 MoPac Loan	24,690,900		-	
Total Other Obligations		431,718,595		388,104,473
Total Long Term Liabilities		2,749,874,359		2,731,691,757
Total Liabilities		**2,809,281,870**		**2,805,917,198**
	NET ASSETS			
Contributed Capital		121,462,104		121,462,104
Net Assets Beginning		515,649,090		515,649,090
Current Year Operations		(18,087,615)		337,559
Total Net Assets		**619,023,579**		**637,448,753**
Total Liabilities and Net Assets		**$ 3,428,305,449**		**$ 3,443,365,952**

Central Texas Regional Mobility Authority
Statement of Cash Flow
as of July 2022

Cash flows from operating activities:		
Receipts from toll revenues	$	19,665,628
Receipts from interest income		-
Payments to vendors		(4,454,048)
Payments to employees		(314,005)
Net cash flows provided by (used in) operating activities		14,897,575
Cash flows from capital and related financing activities:		
Issuance Expense		(44,025)
Payments on bonds / loans		(300,000)
Interest payments		(39,904,215)
Acquisition of capital assets - non project		(428,983)
Acquisitions of construction in progress		(14,710,555)
Net cash flows provided by (used in) capital and related financing activities		(55,387,777)
Cash flows from investing activities:		
Interest Receivable		(6,559)
Interest income		(865,599)
Purchase of investments		(7,024,375)
Proceeds from sale or maturity of investments		5,600,000
Net cash flows provided by (used in) investing activities		(2,289,974)
Net increase (decrease) in cash and cash equivalents		(42,780,176)
Cash and cash equivalents at beginning of period		1,029,061,201
Cash and cash equivalents at end of period	$	986,281,025

Reconciliation of change in net assets to net cash provided by operating activities:		
Operating income	$	21,615,151
Adjustments to reconcile change in net assets to net cash provided by operating activities:		
Depreciation and amortization		5,038,671
Changes in assets and liabilities:		
(Increase) decrease in accounts receivable		(5,584,472)
(Increase) decrease in prepaid expenses and other assets		42,688
(Decrease) increase in accounts payable		(2,655,451)
Increase (decrease) in accrued expenses		(3,559,012)
(Increase) in deferred outflows of resources		-
Total adjustments		(6,717,576)
Net cash flows provided by (used in) operating activities	$	14,897,575
Reconciliation of cash and cash equivalents:		
Unrestricted cash and cash equivalents	$	80,972,233
Restricted cash and cash equivalents		905,308,793
Total	$	986,281,025

INVESTMENTS by FUND

		Balance July 31, 2022		
Renewal & Replacement Fund			TexSTAR	189,385,708.46
TexSTAR	1,799.49		Goldman Sachs	788,903,086.31
Goldman Sachs	166,386.23		Agencies & Treasury Notes	112,443,885.48
Agencies/ Treasuries		168,185.72		
Grant Fund				$ 1,090,732,680.25
TexSTAR	455,949.23			
Goldman Sachs	7,196,832.84			
Agencies/ Treasuries	2,444,975.77	10,097,757.84		
Senior Debt Service Reserve Fund				
TexSTAR	90,975,776.37			
Goldman Sachs	7,257,332.76			
Agencies/ Treasuries	9,999,900.88	108,233,010.01		
2010 Senior Lien Debt Service Account				
Goldman Sachs	60,758.50	60,758.50		
2011 Sr Debt Service Accountt				
Goldman Sachs	2,178,145.29	2,178,145.29		
2013 Sr Debt Service Accountt				
Goldman Sachs	2,043,774.93	2,043,774.93		
2013 Sub Debt Service Account				
Goldman Sachs	1,602,691.60	1,602,691.60		
2013 Sub Debt Service Reserve Fund				
Goldman Sachs	123.49	783,168.31		15,187,643.73
TexSTAR	783,044.82			
2015 Sr Debt Service Account				
Goldman Sachs	4,489,150.10	4,489,150.10		
2016 Sr Lien Rev Refunding Debt Service Account				
Goldman Sachs	9,604,884.72	9,604,884.72		
2016 Sub Lien Rev Refunding Debt Service Account				
Goldman Sachs	959,382.57	959,382.57		
2016 Sub Lien Rev Refunding DSR				
Goldman Sachs	7,009,233.96			
Agencies/ Treasuries	-	7,009,233.96		
Operating Fund				
TexSTAR	41,790.90			
TexSTAR-Trustee	4,016,452.92			
Goldman Sachs	7,678,930.47	11,737,174.29		
Revenue Fund				
Goldman Sachs	9,386,231.77	9,386,231.77		
General Fund				
TexSTAR	91,128,107.81			
Goldman Sachs	29,020,889.80			
Agencies/ Treasuries	-	120,148,997.61		
71E Revenue Fund				
Goldman Sachs	22,282,110.97	22,282,110.97		
MoPac Revenue Fund				
Goldman Sachs	52,369.64	52,369.64		
MoPac General Fund				
Goldman Sachs	11,709,436.88	11,709,436.88		
MoPac Operating Fund				
Goldman Sachs	701,207.08	701,207.08		
MoPac Loan Repayment Fund				
Goldman Sachs	145,530.39	145,530.39		
2015B Project Account				
Goldman Sachs	42,055,097.52			
TexSTAR	350,962.03	42,406,059.55		
2015 TIFIA Project Account				
Goldman Sachs	38,654,578.39			
TexSTAR	697,241.47			
Agencies/ Treasuries	-	39,351,819.86		
2011 Sr Financial Assistance Fund				
Goldman Sachs	974,994.26	975,010.27		
TexSTAR	16.01			
2018 Sr Lien Debt Service Account				
Goldman Sachs	151,414.77	151,414.77		
2018 Sr Lien Project Cap I				
Goldman Sachs	200,136.40	200,136.40		
2018 Sr Lien Project Account				
Goldman Sachs	10,992,456.24			
TexSTAR	934,567.41	11,927,023.65		
2020A Senior Lien Debt Service Account				
Goldman Sachs	762,546.89	762,546.89		
2020B Senior Lien Debt Service Account				
Goldman Sachs	593,798.15	593,798.15		
2020C Senior Lien Debt Service Account				
Goldman Sachs	317,201.71	317,201.71		
2020D Sub Lien Debt Service Account				
Goldman Sachs	914,802.61	914,802.61		
2020D Sub Debt Service Reserve Fund				
Goldman Sachs	8,136,203.22	8,136,203.22		
2020E Senior Lien Project Account				
Goldman Sachs	151,796,381.44	151,796,381.44		
2020E Senior Lien Project Cap Interest				
Goldman Sachs	21,747,148.20	21,747,148.20		
2020F Sub Lien Project Account				
Goldman Sachs	28,893,756.83	28,893,756.83		
2020F Sub Lien Deb Service Account				
Goldman Sachs	465,274.28	465,274.28		
2020G Sub Lien Debt Service Account				
Goldman Sachs	214,233.89	214,233.89		
2020G Sub Lien Debt Service Reserve Account				
Goldman Sachs	2,556,190.73	2,556,190.73		
2021A Sub Lien Debt Service Reserve Account				
Goldman Sachs	10,491,644.87	10,491,644.87		28,976,441.09
2021A Sub Debt Service Account				
Goldman Sachs	95.93	95.93		
2021B Senior Lien Cap I Project Fund				
Goldman Sachs	46,060,891.04	46,060,891.04		
2021B Senior Lien Project Account				
Goldman Sachs	130,587,797.21			
Agencies/ Treasuries	99,999,008.83	230,586,806.04		
2021C Sub Lien Cap I Project Fund				
Goldman Sachs	1,338.77	1,338.77		
2021C Sub Lien Project Account				
Goldman Sachs	163,962,927.20	163,962,927.20		
2021C Sub Lien Debt Service Account				
Goldman Sachs	1,023,511.38	1,023,511.38		
2021D Senior Lien Debt Service Account				
Goldman Sachs	1,218,784.03	1,218,784.03		
2021E Senior Lien Debt Service Account				
Goldman Sachs	2,584,476.36	2,584,476.36		
		$ 1,090,732,680.25		

CTRMA INVESTMENT REPORT

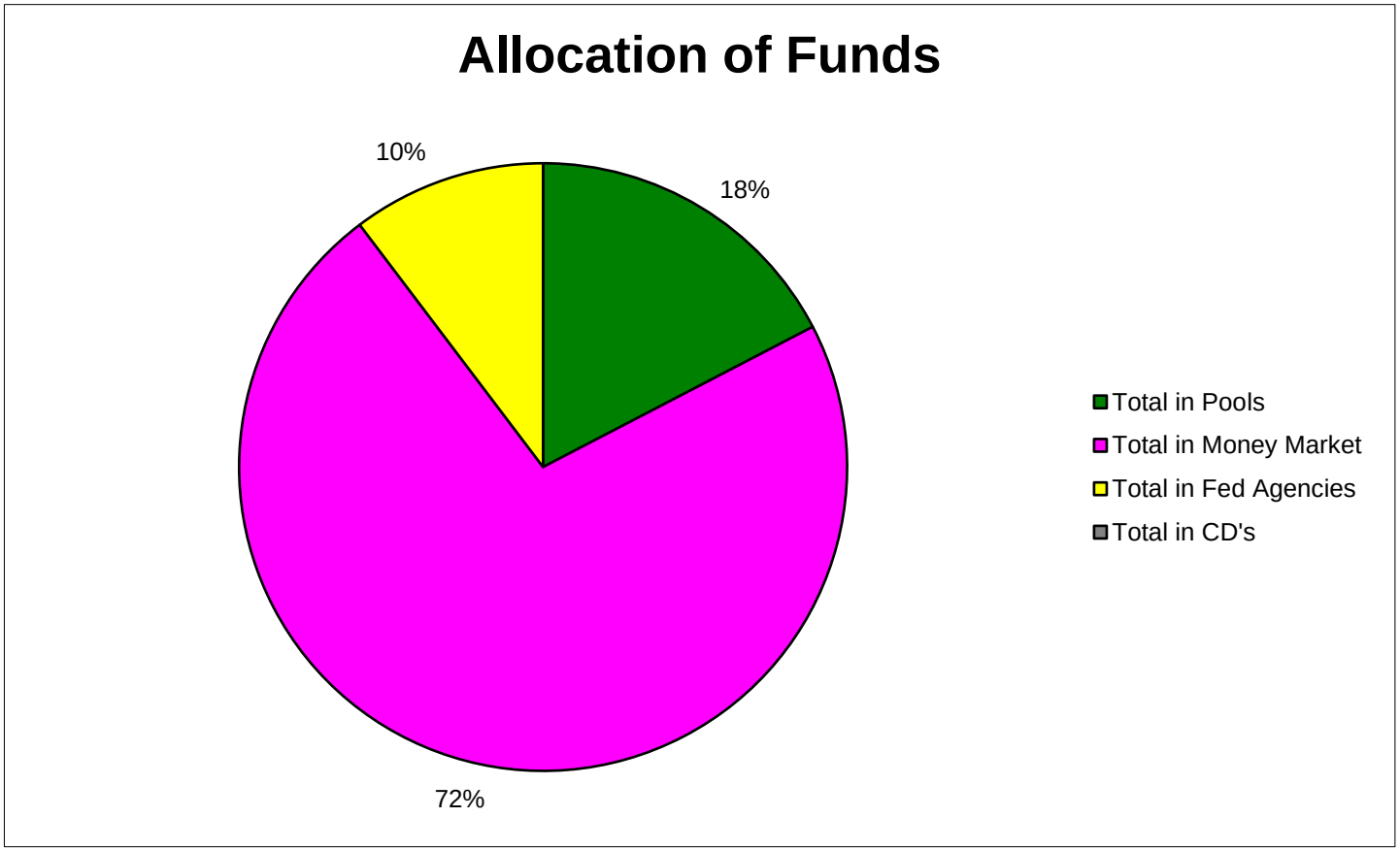
	Month Ending 7/31/2022						
	Balance 7/1/2022	Additions	Discount Amortization	Accrued Interest	Withdrawals	Balance 7/31/2022	Rate July
Amount in Trustee TexStar							
2011 Sr Lien Financial Assist Fund	16.01			0.00		16.01	1.4010%
2013 Sub Lien Debt Service Reserve	782,114.20			930.62		783,044.82	1.4010%
General Fund	91,019,805.97			108,301.84		91,128,107.81	1.4010%
Trustee Operating Fund	2,812,256.12	4,000,000.00		4,196.80	2,800,000.00	4,016,452.92	1.4010%
Renewal and Replacement	1,797.37			2.12		1,799.49	1.4010%
Grant Fund	455,407.36			541.87		455,949.23	1.4010%
Senior Lien Debt Service Reserve Fund	90,867,655.57			108,120.80		90,975,776.37	1.4010%
2015B Sr Ln Project	350,544.90			417.13		350,962.03	1.4010%
2015C TIFIA Project	696,412.83			828.64		697,241.47	1.4010%
2018 Sr Lien Project Account	933,456.72			1,110.69		934,567.41	1.4010%
	187,919,467.05	4,000,000.00		224,450.51	2,800,000.00	189,343,917.56	
Amount in TexStar Operating Fund	41,741.21	2,800,000.00		49.69	2,800,000.00	41,790.90	1.4010%
Goldman Sachs							
Operating Fund	7,513,564.16	4,161,990.24		6,426.89	4,003,050.82	7,678,930.47	1.5240%
2020A Senior Lien Debt Service Account	1,918,773.22	98,815.62		1,583.05	1,256,625.00	762,546.89	1.5240%
2020B Senior Lien Debt Service Account	1,661,903.00	276,450.46		1,344.69	1,345,900.00	593,798.15	1.5240%
2020C Senior Lien Debt Service Account	1,890,710.68	314,498.42		1,560.73	1,889,568.12	317,201.71	1.5240%
2020D Sub Lien Debt Service Account	2,055,327.37	341,898.96		1,663.02	1,484,086.74	914,802.61	1.5240%
2020D Sub Debt Service Reserve Fund	8,129,250.44			6,952.78		8,136,203.22	1.5240%
2020E Sr Lien Project Account	151,670,156.11			126,225.33		151,796,381.44	1.5240%
2020E Sr Ln Project Cap Interest	25,444,086.40			21,761.80	3,718,700.00	21,747,148.20	1.5240%
2020E Sr Lien Debt Service Account	0.00	3,718,700.00		0.00	3,718,700.00	0.00	1.5240%
2020F Sub Lien Project Account	34,777,300.21			31,269.05	5,914,812.43	28,893,756.83	1.5240%
2020F Sub Lien Debt Service Account	2,773,548.11	461,357.03		2,244.14	2,771,875.00	465,274.28	1.5240%
2020G Sub Lien Debt Service Account	1,277,070.38	212,430.20		1,033.31	1,276,300.00	214,233.89	1.5240%
2020G Sub Debt Service Reserve Fund	2,458,251.27	95,863.53		2,075.93		2,556,190.73	1.5240%
2021A Sub Debt Service Reserve Fund	9,935,511.71	547,787.33		8,345.83		10,491,644.87	1.5240%
2021A Sub Debt Service Account	95.85			0.08		95.93	1.5240%
2021B Senior Lien Cap I Project Fund	51,883,416.24			44,374.80	5,866,900.00	46,060,891.04	1.5240%
2021B Senior Lien Project Account	130,476,203.64			111,593.57		130,587,797.21	1.5240%
2021B Senior Lien Cap I Debt Service Account	0.00	5,866,900.00		0.00	5,866,900.00	0.00	1.5240%
2021C Sub Lien Cap I Project Fund	1,337.63			1.14		1,338.77	1.5240%
2021C Sub Lien Project Account	168,089,363.47	4,621,848.22		77,156.68	8,825,441.17	163,962,927.20	1.5240%
2021C Sub Lien Debt Service Account	6,106,972.39	1,016,222.72		4,941.27	6,104,625.00	1,023,511.38	1.5240%
2021C Sub Lien Cap I Debt Service Account	0.00	6,104,625.00		0.00	6,104,625.00	0.00	1.5240%
2021D Senior Lien Debt Service Account	5,849,898.28	973,027.48		4,733.27	5,608,875.00	1,218,784.03	1.5240%
2021E Senior Lien Debt Service Account	6,390,424.04	1,062,950.10		5,170.63	4,874,068.41	2,584,476.36	1.5240%
2011 Sr Financial Assistance Fund	1,361,829.50			1,164.76	388,000.00	974,994.26	1.5240%
2010 Senior DSF	60,706.58			51.92		60,758.50	1.5240%
2011 Senior Lien Debt Service Account	1,866,241.00	310,394.25		1,510.04		2,178,145.29	1.5240%
2013 Senior Lien Debt Service Account	1,825,479.07	303,693.80		1,477.06	86,875.00	2,043,774.93	1.5240%
2013 Sub Debt Service Reserve Fund	123.38			0.11		123.49	1.5240%
2013 Subordinate Debt Service Account	1,431,490.53	238,167.79		1,158.28	68,125.00	1,602,691.60	1.5240%
2015A Sr Lien Debt Service Account	4,735,100.22			4,049.88	250,000.00	4,489,150.10	1.5240%
2015B Project Account	42,019,159.00			35,938.52		42,055,097.52	1.5240%
2015C TIFIA Project Account	39,334,415.31			33,799.92	713,636.84	38,654,578.39	1.5240%
2016 Sr Lien Rev Refunding Debt Service Account	10,072,779.22	1,065,326.81		8,297.44	1,541,518.75	9,604,884.72	1.5240%
2016 Sub Lien Rev Refunding Debt Service Account	2,231,727.36	371,230.70		1,805.76	1,645,381.25	959,382.57	1.5240%
2016 Sub Lien Rev Refunding DSR	7,003,244.16			5,989.80		7,009,233.96	1.5240%
2018 Sr Lien Project Cap I	1,307,643.00			1,118.40	1,108,625.00	200,136.40	1.5240%
2018 Sr Lien Debt Service Account	0.00	1,260,039.77		0.00	1,108,625.00	151,414.77	1.5240%
2018 Sr Lien Project Account	11,036,644.92	67,505.81		9,869.60	121,564.09	10,992,456.24	1.5240%
Grant Fund	7,190,682.73			6,150.11		7,196,832.84	1.5240%
Renewal and Replacement	181,412.60			221.69	15,248.06	166,386.23	1.5240%
Revenue Fund	10,854,129.84	14,119,017.81		4,584.66	15,591,500.54	9,386,231.77	1.5240%
General Fund	27,033,922.13	2,184,705.72		22,216.46	219,954.51	29,020,889.80	1.5240%
Senior Lien Debt Service Reserve Fund	7,251,130.95			6,201.81		7,257,332.76	1.5240%
71E Revenue Fund	21,469,624.56	980,530.23		18,042.80	186,086.62	22,282,110.97	1.5240%
MoPac Revenue Fund	0.00	739,691.05		291.18	687,612.59	52,369.64	1.5240%
MoPac General Fund	11,210,817.82	543,644.34		8,742.57	53,767.85	11,709,436.88	1.5240%
MoPac Operating Fund	1,073,777.97	100,821.24		1,168.37	474,560.50	701,207.08	1.5240%
MoPac Loan Repayment Fund	415,997.90	143,968.25		355.78	414,791.54	145,530.39	1.5240%
	831,271,244.35	52,304,102.88		634,664.91	95,306,925.83	788,903,086.31	
Amount in Fed Agencies and Treasuries							
Amortized Principal	112,443,328.23		(125.20)	682.45		112,443,885.48	
	112,443,328.23		(125.20)	682.45		112,443,885.48	
Certificates of Deposit							
Total in Pools	187,961,208.26	6,800,000.00		224,500.20	5,600,000.00	189,385,708.46	
Total in GS FSGF	831,271,244.35	52,304,102.88		634,664.91	95,306,925.83	788,903,086.31	
Total in Fed Agencies and Treasuries	112,443,328.23	0.00	(125.20)	682.45	0.00	112,443,885.48	
Total Invested	1,131,675,780.84	59,104,102.88		859,847.56	100,906,925.83	1,090,732,680.25	

All Investments in the portfollio are in compliance with the CTRMA's Investment policy and the relevent provisions of the Public Funds Investment Act Chapter 2256.023

José Hernández, CFO

Mary Temple, Controller

7/31/2022


Allocation of Funds
10%
18%
72%
Total in Pools
Total in Money Market
Total in Fed Agencies
Total in CD's

Amount of Investments As of **July 31, 2022**

Agency	CUSIP #	COST	Book Value	Market Value	Yield to Maturity	Purchased	Matures	FUND
Agency - Federal Farm Credit	3133EM5T5	2,444,854.60	2,444,975.77	2,437,591.65	0.0076%	9/24/2021	9/21/2022	Grant Fund
Agency - Federal Farm Credit	3133EM5T5a	9,999,405.30	9,999,900.88	9,699,700.00	0.0076%	9/24/2021	9/21/2022	Sr Lien DSR
Agency - Federal Farm Credit	3133EM5T5b	99,994,053.00	99,999,008.83	99,697,000.00	0.0076%	9/24/2021	9/21/2022	2021B Sr Project
		112,438,312.90	112,443,885.48	111,834,291.65				

Agency	CUSIP #	COST	Cummulative Amortization	Book Value	Maturity Value		Interest Income		
							Accrued Interest	Amortization	Interest Earned
Agency - Federal Farm Credit	3133EM5T5	2,444,854.60	121.16	2,444,975.76	2,445,000.00		142.62	12.11	154.73
Agency - Federal Farm Credit	3133EM5T5a	9,999,405.30	495.58	9,999,900.88	10,000,000.00		583.33	(632.89)	(49.56)
Agency - Federal Farm Credit	3133EM5T5b	99,994,053.00	4,955.84	99,999,008.84	100,000,000.00		5,833.33	495.58	6,328.91
		112,438,312.90	5,572.58	112,443,885.48	112,445,000.00		6,559.28	(125.20)	6,434.08

ESCROW FUNDS

Travis County Escrow Fund - Elroy Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	4,047,026.52		3,432.30	275,472.78	3,774,986.04

Travis County Escrow Fund - Ross Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	139,810.80		119.58	23,178.39	116,751.99

Travis County Escrow Fund - Old San Antonio Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	54,946.12		46.99	7,690.60	47,302.51

Travis County Escrow Fund - Old Lockhart Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	343,295.78		215.57	80,862.21	262,649.14

Travis County Escrow Fund - County Line Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	388,140.96		331.97	64,282.43	324,190.50

Travis County Escrow Fund - South Pleasant Valley Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	343,713.55		293.97	9,983.76	334,023.76

Travis County Escrow Fund - Thaxton Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	147,377.58		126.05	6,695.84	140,807.79

Travis County Escrow Fund - Pearce Lane Road

	Balance 7/1/2022	Additions	Accrued Interest	Withdrawals	Balance 7/31/2022
Goldman Sachs	330,210.67		282.42	12,887.35	317,605.74

TexSTAR

MONTHLY NEWSLETTER JULY 2022

PERFORMANCE

As of July 31, 2022	
Current Invested Balance	$9,799,798,062.32
Weighted Average Maturity (1)	33 Days
Weighted Average Life (2)	47 Days
Net Asset Value	0.999396
Total Number of Participants	990
Management Fee on Invested Balance	0.06%*
Interest Distributed	$12,171,530.43
Management Fee Collected	$499,684.50
% of Portfolio Invested Beyond 1 Year	2.50%
Standard & Poor's Current Rating	AAAm

Rates reflect historical information and are not an indication of future performance.

July Averages	
Average Invested Balance	$9,805,849,135.18
Average Monthly Yield, on a simple basis	1.4010%
Average Weighted Maturity (1)	34 Days
Average Weighted Life (2)	49 Days

Definition of Weighted Average Maturity (1) & (2)

(1) This weighted average maturity calculation uses the SEC Rule 2a-7 definition for stated maturity for any floating rate instrument held in the portfolio to determine the weighted average maturity for the pool. This Rule specifies that a variable rate instruction to be paid in 397 calendar days or less shall be deemed to have a maturity equal to the period remaining until the next readjustment of the interest rate.
(2) This weighted average maturity calculation uses the final maturity of any floating rate instruments held in the portfolio to calculate the weighted average maturity for the pool.

The maximum management fee authorized for the TexSTAR Cash Reserve Fund is 12 basis points. This fee may be waved in full or in part in the discretion of the TexSTAR co-administrators at any time as provided for in the TexSTAR Information Statement.

NEW PARTICIPANTS

We would like to welcome the following entity who joined the TexSTAR program in July:

* Fort Bend County Municipal Utility District No. 215

HOLIDAY REMINDER

In observance of **Labor Day, TexSTAR will be closed on Monday, September 5, 2022.** All ACH transactions initiated on Friday, September 2nd will settle on Tuesday, September 6th. Please plan accordingly for your liquidity needs.

ECONOMIC COMMENTARY

Market review

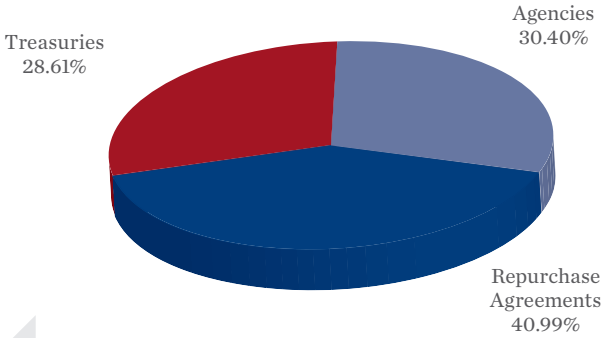
The markets continued to seesaw between concerns about excessively high inflation and increased recession risks as economic data weakened. U.S. Treasury yields increased following a strong labor market report and stubbornly high CPI inflation print for June, calming fears that the U.S. economy was quickly sliding into recession and supporting aggressive Federal Reserve (Fed) tightening. However, rates rallied strongly at the end of the month after markets believed the Fed had shifted focus, from inflation to growth risks, interpreting the July Federal Open Market Committee (FOMC) meeting as dovish, indicating a pivot toward easier policy early next year. However, inflation data suggest otherwise. The June CPI report showed even hotter-than-expected inflation. Headline CPI rose by 1.3% month over month (m/m) and Core CPI rose 0.7% m/m, translating to year-over-year gains of 9.1% and 5.9%, respectively. Headline CPI was propelled higher yet again by sharply higher energy and food prices. Energy prices rose a whopping 7.5% as gasoline prices surged 11.2% on the month, reflecting the toll of Russia's invasion of Ukraine on global energy markets. Food at home prices increased 1.0%, largely reflecting a spike in wheat and processed foods. Rental inflation continued to firm. Owner's equivalent rent, which holds a 24% weighting in CPI, rose by 0.7% m/m. Despite cooling in the Manheim Used Vehicle Index, consumer prices for new and used cars continued to firm but at a slower pace.

Core CPI most surprisingly exceeded expectations, underscoring the lagged impact of higher food and energy costs on a broad range of consumer goods and services. Within core inflation, higher services prices continued to reflect the higher costs of inputs and labor. Recreational admissions tickets rose 1.7%, daycare costs rose 0.7%, motor vehicle maintenance and repair rose 2.0%, though airline fares saw modest cooling of -1.8%.

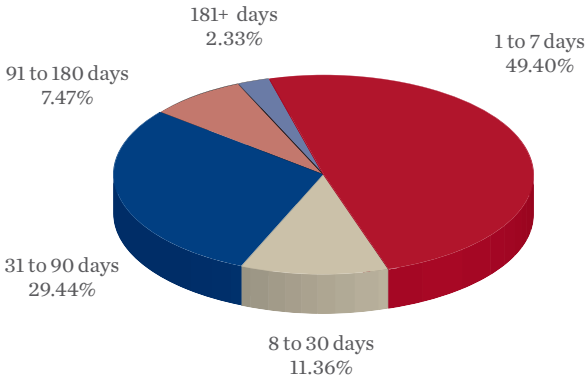
(continued page 4)

INFORMATION AT A GLANCE

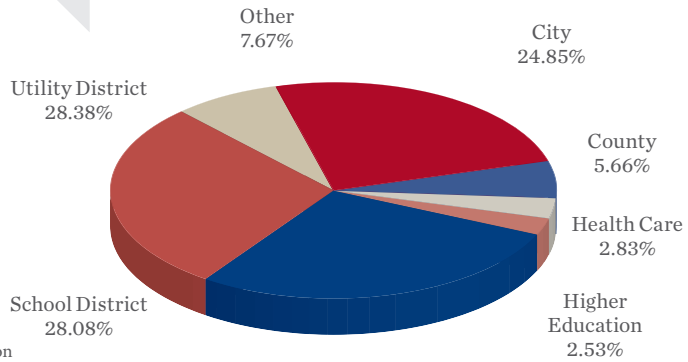
PORTFOLIO BY TYPE OF INVESTMENT AS OF JULY 31, 2022



PORTFOLIO BY MATURITY AS OF JULY 31, 2022 (1)



DISTRIBUTION OF PARTICIPANTS BY TYPE AS OF JULY 31, 2022



(1) Portfolio by Maturity is calculated using WAM (1) definition for stated maturity. See page 1 for definition

HISTORICAL PROGRAM INFORMATION

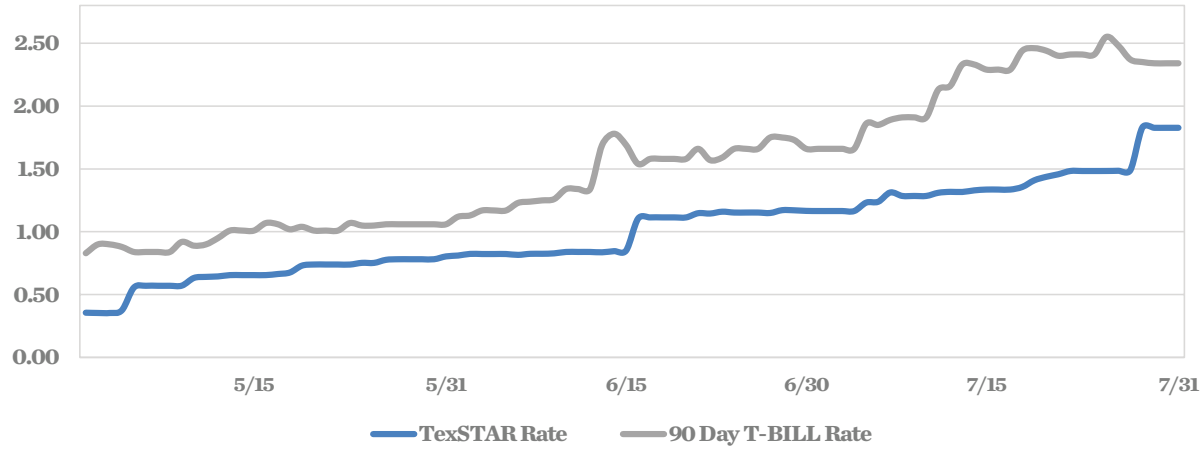
MONTH	AVERAGE RATE	BOOK VALUE	MARKET VALUE	NET ASSET VALUE	WAM (1)	WAL (2)	NUMBER OF PARTICIPANTS
Jul 22	1.4010%	$9,799,798,062.32	$9,793,880,215.07	0.999396	34	49	990
Jun 22	0.9850%	9,799,299,684.61	9,793,062,348.93	0.999363	42	57	989
May 22	0.6459%	9,701,777,049.61	9,700,243,468.41	0.999841	43	61	988
Apr 22	0.3225%	8,985,925,505.16	8,984,338,322.90	0.999818	39	60	986
Mar 22	0.1070%	9,050,970,696.95	9,050,137,013.72	0.999907	27	38	981
Feb 22	0.0104%	9,779,113,455.23	9,778,353,196.78	0.999922	26	32	979
Jan 22	0.0100%	9,399,813,099.48	9,399,092,954.95	0.999923	31	38	977
Dec 21	0.0139%	8,763,539,414.27	8,763,577,847.71	1.000011	40	52	977
Nov 21	0.0102%	8,132,746,877.26	8,133,007,416.80	1.000032	47	62	965
Oct 21	0.0100%	8,641,191,692.82	8,641,540,291.95	1.000040	41	58	963
Sep 21	0.0100%	9,019,799,096.23	9,020,390,786.23	1.000065	43	62	958
Aug 21	0.0100%	8,945,411,473.29	8,945,978,474.21	1.000063	52	74	955

PORTFOLIO ASSET SUMMARY AS OF JULY 31, 2022

	BOOK VALUE	MARKET VALUE
Uninvested Balance	$ 944,222.78	$ 944,222.78
Accrual of Interest Income	2,816,806.47	2,816,806.47
Interest and Management Fees Payable	(12,137,553.99)	(12,137,553.99)
Payable for Investment Purchased	0.00	0.00
Repurchase Agreement	4,020,389,999.60	4,020,389,999.60
Government Securities	5,787,784,587.46	5,781,866,740.21
TOTAL	**$ 9,799,798,062.32**	**$ 9,793,880,215.07**

Market value of collateral supporting the Repurchase Agreements is at least 102% of the Book Value. The portfolio is managed by J.P. Morgan Chase & Co. and the assets are safekept in a separate custodial account at the Federal Reserve Bank in the name of TexSTAR. The only source of payment to the Participants are the assets of TexSTAR. There is no secondary source of payment for the pool such as insurance or guarantee. Should you require a copy of the portfolio, please contact TexSTAR Participant Services.

TEXSTAR VERSUS 90-DAY TREASURY BILL



This material is for information purposes only. This information does not represent an offer to buy or sell a security. The above rate information is obtained from sources that are believed to be reliable; however, its accuracy or completeness may be subject to change. The TexSTAR management fee may be waived in full or in part at the discretion of the TexSTAR co-administrators and the TexSTAR rate for the period shown reflects waiver of fees. This table represents historical investment performance/return to the customer, net of fees, and is not an indication of future performance. An investment in the security is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. Although the issuer seeks to preserve the value of an investment of $1.00 per share, it is possible to lose money by investing in the security. Information about these and other program details are in the fund's Information Statement which should be read carefully before investing. The yield on the 90-Day Treasury Bill ("T-Bill Yield") is shown for comparative purposes only. When comparing the investment returns of the TexSTAR pool to the T-Bill Yield, you should know that the TexSTAR pool consists of allocations of specific diversified securities as detailed in the respective Information Statements. The T-Bill Yield is taken from Bloomberg Finance L.P. and represents the daily closing yield on the then current 90-Day T-Bill. The TexSTAR yield is calculated in accordance with regulations governing the registration of open-end management investment companies under the Investment Company Act of 1940 as promulgated from time to time by the federal Securities and Exchange Commission.

DAILY SUMMARY FOR JULY 2022

DATE	MNY MKT FUND EQUIV. [SEC Std.]	DAILY ALLOCATION FACTOR	INVESTED BALANCE	MARKET VALUE PER SHARE	WAM DAYS (1)	WAL DAYS (2)
7/1/2022	1.1640%	0.000031890	$9,783,597,668.84	0.999411	33	48
7/2/2022	1.1640%	0.000031890	$9,783,597,668.84	0.999411	33	48
7/3/2022	1.1640%	0.000031890	$9,783,597,668.84	0.999411	33	48
7/4/2022	1.1640%	0.000031890	$9,783,597,668.84	0.999411	33	48
7/5/2022	1.2309%	0.000033722	$9,796,297,417.34	0.999401	34	49
7/6/2022	1.2379%	0.000033916	$9,799,999,731.75	0.999361	33	48
7/7/2022	1.3116%	0.000035935	$9,798,982,539.93	0.999332	36	51
7/8/2022	1.2840%	0.000035179	$9,789,851,684.57	0.999294	34	49
7/9/2022	1.2840%	0.000035179	$9,789,851,684.57	0.999294	34	49
7/10/2022	1.2840%	0.000035179	$9,789,851,684.57	0.999294	34	49
7/11/2022	1.3091%	0.000035865	$9,804,392,732.53	0.999252	33	48
7/12/2022	1.3167%	0.000036073	$9,848,142,201.44	0.999265	33	48
7/13/2022	1.3156%	0.000036045	$9,782,603,547.81	0.999217	32	47
7/14/2022	1.3284%	0.000036394	$9,802,625,724.78	0.999149	32	47
7/15/2022	1.3348%	0.000036570	$9,727,321,119.80	0.999170	31	46
7/16/2022	1.3348%	0.000036570	$9,727,321,119.80	0.999170	31	46
7/17/2022	1.3348%	0.000036570	$9,727,321,119.80	0.999170	31	46
7/18/2022	1.3556%	0.000037141	$9,706,112,920.97	0.999149	32	47
7/19/2022	1.4083%	0.000038583	$9,684,781,312.63	0.999207	35	49
7/20/2022	1.4363%	0.000039351	$9,687,990,254.01	0.999206	37	52
7/21/2022	1.4565%	0.000039904	$9,986,229,433.01	0.999261	36	51
7/22/2022	1.4825%	0.000040617	$9,863,945,728.15	0.999275	36	51
7/23/2022	1.4825%	0.000040617	$9,863,945,728.15	0.999275	36	51
7/24/2022	1.4825%	0.000040617	$9,863,945,728.15	0.999275	36	51
7/25/2022	1.4828%	0.000040626	$9,900,463,939.91	0.999250	36	50
7/26/2022	1.4843%	0.000040666	$9,859,922,026.32	0.999270	35	50
7/27/2022	1.4889%	0.000040791	$9,867,214,065.91	0.999300	35	49
7/28/2022	1.8285%	0.000050097	$9,978,424,882.33	0.999357	34	48
7/29/2022	1.8262%	0.000050034	$9,799,798,062.32	0.999396	33	47
7/30/2022	1.8262%	0.000050034	$9,799,798,062.32	0.999396	33	47
7/31/2022	1.8262%	0.000050034	$9,799,798,062.32	**0.999396**	**33**	**47**
Average	**1.4010%**	**0.000038383**	**$9,805,849,135.18**		**34**	**49**

ECONOMIC COMMENTARY (cont.)

Elsewhere, consumer surveys signaled that inflation expectations are beginning to reverse course and are now trending lower. In the Conference Board survey, the mean 12-month-ahead inflation expectation cooled slightly in July, down to 7.6% from its all-time high of 7.9% last month. Likewise, the longer-running and closely watched inflation expectations in the University of Michigan survey pointed to consumer inflation expectations moderating from recent highs, with the median five-year-ahead inflation expectation declining from 3.1% in June to 2.9% in July and the median one-year-ahead inflation expectation declined from 5.3% to 5.2%. Real GDP fell 0.9% in the second quarter, marking the U.S. economy's second straight quarter of decline. Weakness was broad-based with slowdowns in inventory rebuilding, residential and non-residential construction, and capital spending. This was marginally offset by gains in consumer spending and trade; however, with higher inflation eroding Americans' purchasing power, higher mortgage rates slowing down the housing market and a higher U.S. dollar hurting exports, growth is likely to stay subdued this year.

The June employment report was stronger than expected with the economy adding 372,000 nonfarm payroll jobs, although this was slightly tempered by a 74,000 downward revision to gains in the prior two months. The unemployment rate remained at a very low 3.6% for the fourth consecutive month while wage growth moderated slightly, posting a 0.3% gain following a 0.4% advance in May. The labor force fell by 353,000, highlighting the demographic drags on labor supply, which have the potential to keep unemployment low for some time, even if job growth falters. In addition, in the job openings and labor turnover survey (JOLTS), the U.S. Department of announced that there were 10.698 million job openings at the end of June. While this is down from a peak of 11.855 million at the end of March, it still amounts to an extraordinarily high 1.8 job openings per unemployed worker. Until this number retreats substantially, job growth could remain solid, the unemployment rate could remain low and wage growth could remain relatively strong.

At its July meeting, the FOMC voted unanimously to raise the federal funds rate by 0.75% to a range of 2.25%-2.50%. This was the second consecutive increase of this size and the fourth hike this cycle. The Fed signaled "ongoing increases" would be appropriate at upcoming meetings and suggested that the Fed would be more data dependent in its approach. As evidenced by the June FOMC median dot plot repeatedly referenced by Chair Powell as the "best guide" for policy, and recent Fed speak, the committee still appears on track to raise rates to a range of 3.25%-3.50% by the end of the year. However, this does imply less dramatic increases in the next three FOMC meetings than in the last two. The dots currently include another 50 bps of tightening in 2023.

The Fed kept the door open for another 0.75% increase at its September meeting but emphasized that policy decisions will be made on a meeting-by-meeting basis and be highly data dependent, acknowledging the risk of economic data further deteriorating. With the federal funds rate now at the Committee's estimate of neutral, the Powell mentioned that "at some point it will be appropriate to slow down." The Fed chose to not make any adjustments to its quantitative tightening plan, and assets will continue to roll off its balance sheet at a pace of $47.5 billion a month ($30.0 billion in Treasuries and $17.5 billion in mortgages). The reinvestment caps on Treasuries and mortgage-backed securities (MBS) will increase this upcoming September to $60bn and 35$bn, respectively. The U.S. Treasury curve flattened and became inverted between 12-months and 10-year maturities. The three-month Treasury bill yield increased 70 bs to end the month at 2.36%; the six-month Treasury bill yield rose 37 bps to end at 2.86%, while the two-year Treasury note yield declined 7 bps to end the month at 2.89%.

Outlook

By most measures, demand in the economy is weakening, with consumer spending growth slowing, home-building slumping and the trade deficit widening in the first half of 2022. This weakness undoubtedly reflects a sharp reduction in government transfers to households, the impact of higher mortgage rates on home-building and the effects of a higher dollar on international trade. However, each of these forces impacts the economy with a lag, suggesting further challenges to growth in the months ahead. In short, despite solid job numbers, real GDP growth has been very slow in the first half of 2022 and could be slower still later in the year and in 2023, with a lagged impact in slowing job growth. While two consecutive quarters of negative GDP growth may lead some to jump to the term "recession", we are not there yet according to the definition used by the National Bureau of Economic Research (NBER), the de facto scorekeepers of U.S. recessions. NBER's definition is much broader, encompassing declines in employment, industrial production, household income and trade. Take employment as the prime example here.

(continued next page)

TexSTAR

ECONOMIC COMMENTARY (cont.)

In 2Q, we saw average nonfarm payroll growth of 375K per month while the unemployment rate held at 3.6%. The strength of a labor market seems to contradict NBER's definition. However, it will be important to monitor the labor market in 2H22 to look for any signs of deterioration and the possible start of a recession.

While the gloomy GDP print will reinforce pessimism concerning the health of the U.S. economy, it does present a slight silver lining. The growth slowdown in 1H22 shows that the Fed's aggressive hiking cycle is delivering on its intended consequences – higher rates are slowing demand and growth, which should help alleviate some inflationary pressure in 2H22. Moreover, the downward trend in the Fed's Global Supply Chain Pressure Index and the recent fall in commodity prices suggests supply chain issues are easing. Persistently above target inflation and a low unemployment rate will keep the Fed on track to bring policy rates into restrictive territory later this year, despite downside risks to growth and elevated global uncertainty. We believe the Fed will hike at least 100 bps more over the coming meetings (50bps in September, 25bp in November and 25bp in December) before reassessing the fundamental backdrop; risks are skewed to the upside if inflation does not fall in line with market expectations.

This information is an excerpt from an economic report dated July 2022 provided to TexSTAR by JP Morgan Asset Management, Inc., the investment manager of the TexSTAR pool.

TEXSTAR BOARD MEMBERS

Monte Mercer	North Central TX Council of Government	Governing Board President
David Pate	Richardson ISD	Governing Board Vice President
Anita Cothran	City of Frisco	Governing Board Treasurer
David Medanich	Hilltop Securities	Governing Board Secretary
Jennifer Novak	J.P. Morgan Asset Management	Governing Board Asst. Sec./Treas
Brett Starr	City of Irving	Advisory Board
James Mauldin	DFW Airport/Non-Participant	Advisory Board
Sandra Newby	Tarrant Regional Water Dist/Non-Participant	Advisory Board
Eric Cannon	Qualified Non-Participant	Advisory Board
Ron Whitehead	Qualified Non-Participant	Advisory Board

GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-037

AWARDING A CONSTRUCTION CONTRACT FOR THE BARTON SKYWAY RAMP RELEIF PROJECT

WHEREAS, Mobility Authority has been studying non-tolled improvements to relieve congestion and improve mobility on the MoPac corridor, including the design and construction of an auxiliary lane on southbound MoPac from the Bee Cave Road entrance ramp to the southbound Loop 360 exit ramp, an acceleration lane for the southbound Barton Skyway entrance ramp, and reconfiguration of the southbound Loop 360 exit ramp (the Barton Skyway Ramp Relief Project); and

WHEREAS, the Executive Director advertised for bid proposals on July 7, 2022, and subsequently received three responsive bids for construction of the Barton Skyway Ramp Relief Project; and

WHEREAS, Mobility Authority staff reviewed the bids in accordance with the Mobility Authority's procurement policies and determined that the apparent low bid in the amount of $6,903,147.18 was submitted by Dan Williams Company and that the bid is responsive, mathematically correct, and materially balanced; and

WHEREAS, after reviewing the staff's determination, the Executive Director recommends awarding a construction contract for the Barton Skyway Ramp Relief Project to Dan Williams Company.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors approves the award of a construction contract for the Barton Skyway Ramp Relief Project to Dan Williams Company; and

BE IT FURTHER RESOLVED, that the Executive Director is hereby authorized to negotiate and execute a contract with Dan Williams Company for the construction of the Barton Skyway Ramp Relief Project in an amount not to exceed $6,903,147.18.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August 2022.

Submitted and reviewed by:

James M. Bass
Executive Director

Approved:

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A

CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

Barton Skyway Ramp Relief Construction Project

CTRMA Contract No.: 22BSRR22701C

Bid Documents

Advertisement: July 7, 2022
Pre-Qualification Deadline: 12:00 PM July 27, 2022
Bid Date: 2:00 PM August 11, 2022

Central Texas Regional Mobility Authority

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BARTON SKYWAY RAMP RELIEF CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

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BID DOCUMENTS
CONTRACT AND CONTRACT BOND
SPECIAL PROVISIONS
SPECIAL SPECIFICATIONS
PLANS

_____

July 7, 2022

Central Texas Regional Mobility Authority

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BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

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CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

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INVITATION TO BID

Electronic proposal forms for the above project shall be submitted via the project's CivCast https://www.civcastusa.com/project/61cc77d0ce70836917b124f0/summary to the Central Texas Regional Mobility Authority (Authority), by **2:00 PM local time, August 11, 2022**. The bids will be publicly posted via the project's CivCast website within 48 hours after the bids are opened.

The contractor will have two-hundred forty-three (243) working days after the date stated in the written Notice to Proceed to substantially complete the project, and an additional twenty (20) working days achieve full completion of all work. The Authority reserves the right to make changes in the work to complete the contract, as defined in the specifications.

Upon execution of the contract, a Limited Notice to Proceed (NTP) may be issued at the sole discretion of the Authority to allow the Contractor to perform such tasks as secure materials on hand, place the field office, produce shop drawings for approval, etc. No time charges will be incurred until a Full NTP is issued.

A Full NTP will be issued no later than 180 calendar days after award for the Contractor to begin work. Time charges will begin accruing upon issuance of the Full NTP.

The complete list of quantities is located in the Bid Form. The principal items of work are as follows:

- Prepare ROW
- Excavation
- Embankment
- Flexible Base
- Flowable Backfill
- Hot Mix Asphalt
- Barricades, Signs, & Traffic Handling
- Portable Concrete Traffic Barrier
- Roadside Signs
- Overhead Signs
- Delineation & Pavement Markings
- Illumination

The Official Bid Form for this Contract will be made available to prospective bidders who have met all prequalification requirements on or before 5:00 PM local time, on July 28, 2022 via the project's CivCastUSA website https://www.civcastusa.com/project/61cc77d0ce70836917b124f0/summary.

Prequalification requirements:

- Be registered with State of Texas,
- Be fully prequalified by Texas Department of Transportation (TxDOT),
- Have a bidding capacity per TxDOT prequalification system of $6,000,000
- Submit a valid Non-Collusion Affidavit, Debarment Affidavit, Certification to Not Boycott Israel, Child Support Statement, Certification to Not Discriminate Against Firearm Entities or Firearm Trade Associations, and Certification to Not Boycott Energy Companies.

The deadline for meeting the prequalification requirements and still obtaining an Official Bid Form is July 27, 2022, at Noon.

The Authority cannot be held liable in the event a party is unable to submit a valid bid due to delay in the prequalification procedure. Securing prequalification through TxDOT and the timing thereof, shall at all times be the sole responsibility of the Prospective Bidder.

Complete Contract documents will be available on July 7, 2022 for potential bidders and others through the Authority's website (www.mobilityauthority.com) and CivCast's website https://www.civcastusa.com/project/61cc77d0ce70836917b124f0/summary.

Standard Specifications (Texas Department of Transportation "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges", November 1, 2014) which form an integral part of this Contract, are available on line at the Texas Department of Transportation (TxDOT) website (https://www.txdot.gov/business/resources/txdot-specifications.html).

The contract will be awarded in accordance with the Authority's Procurement policy. A copy of the Procurement Policy is available online at the Authority website: (https://www.mobilityauthority.com/upload/files/resources/Policy%20Code/32_Policy_Code_Novemeber_18,_2020.pdf).

For more information, please submit a question to the project team through CivCast.com.

Each bid must be accompanied by a Bid Guaranty consisting of a Bid Bond (on the form provided) in the amount of at least five percent (5%) of the Total Bid Amount. The apparent low bidder shall deliver the original sealed Bid Bond to CTRMA within five (5) calendar days of such notification.

An overall combined goal of 4.5% has been established for Disadvantaged Business Enterprises (DBE).

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY
James Bass, Executive Director
Austin, Texas

Central Texas Regional Mobility Authority

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BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

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BID DOCUMENT CHECKLIST

Prior to submitting a bid, prospective bidders should review the checklist below to ensure that the bid is accepted and not declared nonresponsive. No joint venture participants will be allowed.

Bid Document:

- Are you aware if your affiliates are bidding on the same project?
- Are you pre-qualified by TxDOT through the Confidential Questionnaire process and have a bidding capacity of $6,000,000?
- Have you submitted a valid Non-Collusion Affidavit, Debarment Affidavit Child Support Statement, Certification to Not Discriminate Against Firearm Entities or Firearm Trade Associations, and Certification to Not Boycott Energy Companies in order to receive an Official Bid Form?

Bid Document Preparation:

- Is the bid being submitted on the Official Bid Form via the CivCast website?
- Are you submitting only one bid for this project?
- Is the bid signed by your company representative or each joint venture participant?
- Have you entered prices for all bid items?
- Does the bid document contain all items included in the Official Bid Form?
- Does the bid document contain a total bid value?
- Is the bid free of any additional conditions not included in the bid document provided to you?
- Have you electronically submitted a complete and executed Bid Bond?
- Have you acknowledged each Addendum on CivCast?

Bid Bonds:

- Is the bid bond signed by the surety?
- Is the bid bond signed by the company representative?
- Is the exact name of the contractor(s) listed as the principal?
- Is the impressed surety seal affixed to the bid bond?
- Does the name on the surety seal match the name of the surety on the bond?
- Is the bond dated on or earlier than the letting date of the project?
- Is the signer for the surety listed on the power of attorney attached to the bond?
- Is the surety authorized to issue the bond?

Bid Document Submission:

- Are you aware of the time and date deadline for submission for the bid document?
- Are you submitting a complete bid document?

Barton Skyway Ramp Relief Construction Project Official Bid Form

ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY	UNIT PRICE
0100	6002	PREPARING ROW	STA	81	$7,500.00
0104	6009	REMOVING CONC (RIPRAP)	SY	162	$22.00
0104	6022	REMOVING CONC (CURB AND GUTTER)	LF	341	$7.00
0110	6001	EXCAVATION (ROADWAY)	CY	9017	$16.00
0132	6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	3736	$20.00
0132	6025	EMBANKMENT (FINAL) (DENS CONT) (TY C1)	CY	240	$40.00
0134	6001	BACKFILL (TY A)	STA	60	$500.00
0161	6017	COMPOST MANUF TOPSOIL (4")	SY	26633	$2.50
0164	6007	BROADCAST SEED (PERM) (URBAN) (CLAY)	SY	28016	$0.28
0164	6009	BROADCAST SEED (TEMP) (WARM)	SY	14008	$0.25
0164	6011	BROADCAST SEED (TEMP) (COOL)	SY	14008	$0.25
0168	6001	VEGETATIVE WATERING	MG	47	$15.00
0169	6007	SOIL RETENTION BLANKETS (CL 2) (TY G)	SY	2482	$6.50
0247	6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	2548	$75.00
0310	6001	PRIME COAT (MULTI OPTION)	GAL	1499	$4.95
0354	6049	PLANE ASPH CONC PAV (6")	SY	7579	$11.00
0354	6188	PLANE ASPH CONC PAV(MICRO-MLLING)(1")	SY	3169	$4.50
0401	6002	FLOWABLE BACKFILL (OPTION 1)	CY	516	$200.00
0402	6001	TRENCH EXCAVATION PROTECTION	LF	37	$1.95
0416	6005	DRILL SHAFT (42 IN)	LF	26	$900.00
0416	6015	DRILL SHAFT (NON - REINFORCED) (12 IN)	LF	7	$250.00
0416	6019	DRILL SHAFT (SIGN MTS) (30 IN)	LF	40	$500.00
0416	6020	DRILL SHAFT (SIGN MTS) (36 IN)	LF	60	$550.00
0416	6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	278	$450.00
0420	6066	CL C CONC (RAIL FOUNDATION)	CY	28	$700.00
0432	6001	RIPRAP (CONC)(4 IN)	CY	12.8	$900.00
0432	6002	RIPRAP (CONC)(5 IN)	CY	116	$550.00
0432	6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	4	$700.00
0432	6045	RIPRAP (MOW STRIP)(4 IN)	CY	82	$650.00
0450	6023	RAIL (TY SSTR)	LF	200	$125.00
0464	6003	RC PIPE (CL III)(18 IN)	LF	42	$200.00
0464	6008	RC PIPE (CL III)(36 IN)	LF	13	$400.00
0465	6014	INLET (COMPL)(PCO)(3FT)(LEFT)	EA	1	$6,000.00
0465	6029	INLET (COMPL)(PCU)(3FT)(NONE)	EA	3	$6,500.00
0465	6560	INL(CMP)(PAZD-CZ)(FG)(4FTX4FTX4FT)	EA	1	$7,500.00
0496	6002	REMOV STR (INLET)	EA	2	$1,000.00
0500	6001	MOBILIZATION	LS	1	$605,500.00
0502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12	$35,000.00
0506	6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	25	$30.00
0506	6011	ROCK FILTER DAMS (REMOVE)	LF	25	$25.00
0506	6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	300	$24.00
0506	6024	CONSTRUCTION EXITS (REMOVE)	SY	300	$19.00
0506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1606	$4.50
0506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1606	$1.00
0506	6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	140	$4.50
0506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	140	$1.00
0512	6089	PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR(STL)	LF	3240	$20.00
0512	6090	PTB(MOVE)(SSCB OR CSB)(TY1)OR(STL)	LF	6270	$4.00
0512	6091	PTB(REMOVE)(SSCB OR CSB)(TY1)OR(STL)	LF	3240	$5.50
0529	6007	CONC CURB & GUTTER (TY I)	LF	498	$32.00

Barton Skyway Ramp Relief Construction Project Official Bid Form

ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY	UNIT PRICE
0540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	1312.5	$30.00
0540	6008	MTL BEAM GD FEN TRANS (T101)	EA	2	$2,100.00
0540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	7	$1,500.00
0542	6001	REMOVE METAL BEAM GUARD FENCE	LF	1300	$3.75
0544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	7	$3,500.00
0544	6003	GUARDRAIL END TREATMENT (REMOVE)	EA	10	$250.00
0545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	6	$650.00
0545	6005	CRASH CUSH ATTEN (REMOVE)	EA	3	$650.00
0545	6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	3	$10,000.00
0610	6004	RELOCATE RD IL ASM (TRANS-BASE)	EA	7	$2,400.00
0610	6009	REMOVE RD IL ASM (TRANS-BASE)	EA	1	$460.00
0610	6010	REMOVE RD IL ASM (U/P)	EA	3	$310.00
0610	6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA	4	$820.00
0610	6103	REPLACE LUMINAIRE W/LED (400W EQ)	EA	16	$850.00
0610	6106	IN RD IL (U/P) (TY 2) (150W EQ) LED	EA	4	$1,400.00
0610	6212	IN RD IL (TY SA) 40T-4 (250W EQ) LED	EA	1	$4,400.00
0610	6286	IN RD IL (TY SA) 50T-8 (400W EQ) LED	EA	20	$5,000.00
0618	6023	CONDT (PVC) (SCH 40) (2")	LF	7330	$21.00
0618	6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	1230	$58.00
0618	6062	CONDT (RM) (3/4")	LF	180	$36.00
0620	6002	ELEC CONDR (NO.14) INSULATED	LF	465	$1.10
0620	6003	ELEC CONDR (NO.12) BARE	LF	210	$1.80
0620	6004	ELEC CONDR (NO.12) INSULATED	LF	420	$1.75
0620	6007	ELEC CONDR (NO.8) BARE	LF	4930	$1.90
0620	6008	ELEC CONDR (NO.8) INSULATED	LF	10495	$1.95
0620	6009	ELEC CONDR (NO.6) BARE	LF	5335	$2.30
0620	6010	ELEC CONDR (NO.6) INSULATED	LF	10670	$2.35
0620	6011	ELEC CONDR (NO.4) BARE	LF	110	$3.30
0620	6012	ELEC CONDR (NO.4) INSULATED	LF	440	$3.35
0620	6015	ELEC CONDR (NO.2) BARE	LF	130	$4.45
0620	6016	ELEC CONDR (NO.2) INSULATED	LF	780	$4.45
0620	6019	ELEC CONDR (NO.1/0) BARE	LF	1745	$6.75
0620	6020	ELEC CONDR (NO.1/0) INSULATED	LF	3490	$7.00
0624	6002	GROUND BOX TY A (122311)W/APRON	EA	9	$1,400.00
0624	6010	GROUND BOX TY D (162922)W/APRON	EA	1	$1,900.00
0624	6028	REMOVE GROUND BOX	EA	3	$170.00
0628	6002	REMOVE ELECTRICAL SERVICES	EA	1	$450.00
0628	6005	ELC SRV TY A 120/240 060(NS)SS(E)EX(O)	EA	1	$6,900.00
0628	6009	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)	EA	1	$9,800.00
0636	6002	ALUMINUM SIGNS (TY G)	SF	30	$44.00
0636	6003	ALUMINUM SIGNS (TY O)	SF	183	$26.00
0636	6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	602	$39.00
0644	6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	5	$915.00
0644	6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1	$1,095.00
0644	6076	REMOVE SM RD SN SUP&AM	EA	5	$100.00
0647	6001	INSTALL LRSS (STRUCT STEEL)	LB	211.5	$7.50
0647	6002	RELOCATE LRSA	EA	1	$3,300.00
0650	6099	INS OH SN SUP(90 FT BRDG)	EA	1	$110,000.00
0650	6119	INS OH SN SUP(110 FT BRDG)	EA	1	$160,000.00
0650	6203	RELOCATE EXISTING OVERHD SIGN SUP	EA	1	$11,700.00
0650	6204	REMOVE OVERHD SIGN SUP	EA	2	$6,300.00
0658	6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	2	$8.00

Barton Skyway Ramp Relief Construction Project Official Bid Form

ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY	UNIT PRICE
0658	6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	19	$29.30
0658	6067	INSTL DEL ASSM (D-DW)SZ 1(BRF)GF2	EA	3	$29.30
0658	6068	INSTL DEL ASSM (D-DY)SZ 1(BRF)GF2	EA	5	$29.30
0658	6080	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND	EA	2	$58.60
0658	6092	INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	EA	15	$58.60
0662	6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	2190	$0.50
0662	6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	7532	$0.50
0662	6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	962	$0.75
0662	6014	WK ZN PAV MRK NON-REMOV (W)12"(SLD)	LF	518	$3.00
0662	6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	3147	$0.40
0662	6052	WK ZN PAV MRK REMOV (REFL) TY II-C-R	EA	221	$15.00
0662	6057	WK ZN PAV MRK REMOV (TRAF BTN) TY W	LF	1000	$3.00
0662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	4673	$2.20
0662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	271	$3.00
0666	6017	REFL PAV MRK TY I (W)6"(DOT)(090MIL)	LF	96	$3.00
0666	6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	1277	$2.00
0666	6038	REFL PAV MRK TY I (W)12"(LNDP)(090MIL)	LF	593	$15.00
0666	6041	REFL PAV MRK TY I (W)12"(SLD)(090MIL)	LF	1211	$10.00
0666	6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	2	$200.00
0666	6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	2	$250.00
0666	6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	5170	$0.20
0666	6172	REFL PAV MRK TY II (W) 6" (DOT)	LF	96	$1.00
0666	6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	8266	$0.25
0666	6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1277	$0.30
0666	6179	REFL PAV MRK TY II (W) 12" (LNDP)	LF	593	$5.00
0666	6180	REFL PAV MRK TY II (W) 12" (SLD)	LF	1211	$3.00
0666	6184	REFL PAV MRK TY II (W) (ARROW)	EA	2	$30.00
0666	6192	REFL PAV MRK TY II (W) (WORD)	EA	2	$35.00
0666	6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	8255	$0.20
0666	6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	8266	$1.40
0666	6289	REF PROF PAV MRK TY I(Y)6"(SLD)(090MIL)	LF	8255	$1.35
0666	6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	5170	$1.40
0672	6010	REFL PAV MRKR TY II-C-R	EA	453	$5.85
0677	6001	ELIM EXT PAV MRK & MRKS (4")	LF	15135	$1.60
0677	6003	ELIM EXT PAV MRK & MRKS (8")	LF	817	$3.50
0677	6005	ELIM EXT PAV MRK & MRKS (12")	LF	638	$7.00
0730	6107	FULL - WIDTH MOWING	CYC	2	$1,120.00
0734	6002	LITTER REMOVAL	CYC	2	$600.00
3076	6001	D-GR HMA TY-B PG64-22	TON	5011	$120.00
3076	6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	1565	$100.00
3076	6072	D-GR HMA TY-D PG76-22 (EXEMPT)	TON	2632	$150.00
3081	6007	TOM-C PG76-22 SAC-A	TON	3055	$210.00
3084	6001	BONDING COURSE	GAL	6303	$4.50
3085	6001	UNDERSEAL COURSE	GAL	24697	$4.75
6000	6008	REMOVE CONDUCTOR	LF	9450	$0.95
6001	6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3	$10,000.00
6007	6011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	6715	$4.20
6007	6023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	2	$1,300.00
6007	6103	REMOVE FIBER OPTIC CABLE	LF	6715	$0.95
6008	6048	COMMUNICATION CABINET FOUNDATION	EA	1	$5,700.00
6010	6001	CCTV FIELD EQUIPMENT (ANALOG)	EA	2	$9,600.00
6010	6013	REMOVE CCTV FIELD EQUIPMENT	EA	2	$940.00

Barton Skyway Ramp Relief Construction Project Official Bid Form

ITEM NO.	DESC. CODE	DESCRIPTION	UNIT	QTY	UNIT PRICE
6027	6003	CONDUIT (PREPARE)	LF	9655	$2.00
6027	6008	GROUND BOX (PREPARE)	EA	26	$700.00
6027	6010	GROUND BOX W/APRON (ADJUST)	EA	1	$1,800.00
6039	6001	RELOCATE EXISTING OVERHEAD SIGNS	EA	2	$1,700.00
6064	6026	ITS POLE (40 FT)(REL)	EA	1	$2,400.00
6064	6083	ITS POLE MNT CAB (TY 2)(CONF 1)(REM)	EA	2	$310.00
6064	6084	ITS POLE MNT CAB (TY 2)(CONF 2)	EA	2	$7,200.00
6141	6001	REMOVE EXISTING IA CABINET	EA OTU	4	$470.00
6163	6003	REMOVE EXISTING CABLES (COMMUNICATION)	LF OTU	4155	$0.95
6185	6005	TMA (MOBILE OPERATION)	DAY OTU	25	$400.00
6186	6002	TMA (STATIONARY)	DAY OTU	350	$150.00
6360	9001	ETHERNET SWITCH W/ EXPANSION MODULE (FURNISH & INSTALL)	EA	1	$4,200.00
6361	9001	MPEG 4 VIDEO ENCODER (FURNISH & INSTALL)	EA	2	$2,200.00
6417	6001	ITS SYSTEM INTEGRATION	LS	1	$11,400.00
6442-RMA	9001	REMOVE AND RELOCATE DMS SYSTEM	EA	1	$41,600.00
6475	9001	HARDENED ETHERNET SWITCH TYPE 2	EA	2	$3,100.00
-	-	SAFETY	LS	1	$50,000.00
-	-	EROSION CONTROL	LS	1	$50,000.00
-	-	LAW ENFORCEMENT	LS	1	$50,000.00
-	-	KARST VOID	LS	1	$50,000.00
-	-	SCHEDULE REIMBURSEMENT	LS	1	$15,000.00
-	-	MILESTONE 1	LS	1	$25,000.00
-	-	MILESTONE 2	LS	1	$20,000.00
-	-	SUBSTANTIAL COMPLETION	LS	1	$75,000.00
-	-	CONTINGENCY ALLOWANCE	LS	1	$250,000.00

(**NOTE:** Bidders shall **not** remove this bidding form from attached documents.)

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

BID FOR BARTON SKYWAY RAMP RELIEF CONSTRUCTION CONTRACT

To the Central Texas Regional Authority
3300 N I-35, Suite 300
Austin, Texas 78705

Gentlemen:

I/we, the undersigned, declare: that no other person, firm or corporation is interested in this Bid; that I/we have carefully examined the Plans, Standard Specifications, Special Provisions, and all other documents pertaining to this Contract which form a part of this Bid as if set forth at length herein; that I/we understand that the quantities of items shown herein below are approximate only; that I/we have examined the location of the proposed work; that I/we agree to bind myself/ourselves, upon award to me/us by the Central Texas Regional Authority under this Bid, to enter into and execute a Contract, for the project named above; that I/we agree to start work on the date stated in the written Notice-to-Proceed (Special Provision 008-009-RMA), to furnish all necessary materials, provide all necessary labor, equipment, tools and plant, pay for all required insurance, bonds, permits, fees and service, and do all required work in strict compliance with the terms of all documents comprising said Contract, and to substantially complete the entire project within two-hundred forty-three (243) working days after Notice-to-Proceed; and that I/we agree to accept as full compensation for the satisfactory prosecution of this project the contractual bid amount after it is adjusted based on the terms and conditions specified in the contract.

The quantities shown in the above schedule of items are considered to be approximate only and are given as the basis for comparison of bids. The Authority may increase or decrease the amount of any item or portion of the work as may be deemed necessary or expedient. Any increase or decrease in the amount of any item or portion of work will be added or deducted from the total Contract bid price based on the terms and conditions specified in TxDOT Specification Item 4. It is understood that payment for this project will be by unit prices bid.

The cost of any work performed, materials furnished, services provided, or expenses incurred, whether or not specifically delineated in the Contract documents but which are incidental to the scope and plans, intent, and completion of this Contract, have been included in the price bid for the various items scheduled hereinabove.

Accompanying this Bid is a bid guaranty consisting of a Bid Bond (on the form provided) in the amount of at least five percent (5%) of the Official Total Bid Amount. It is hereby understood and agreed that said Bid Bond is to be forfeited as liquidated damages in the event that, on the basis of this Bid, the Authority should award this Contact to me/us and that I/we should fail to execute and deliver said Contract and the prescribed Contract Bond, together with the proof of proper insurance coverage and other necessary documents, all within fifteen (15) calendar days after award of the Contract; otherwise, said check or bond is to be returned to the undersigned.

Business Name of Bidder: Dan Williams Company

Type of Organization:
- Individual ☐
- Partnership ☐
- Corporation ☑

Address of Bidder: 9050 N. Capital of TX Hwy Bld 3 Ste 380
Austin, TX 78759

Signature of Owner, Partner or Corp. Officer: [signature]

Title: President

Date: 8-8-22

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

NON-COLLUSION AFFIDAVIT

STATE OF Texas)

COUNTY OF Travis)

I, Dan Williams, of the City of Austin, County of Travis and State of Texas, being of full age and duly sworn according to law on my oath depose and say:

That I am President (Title) of Dan Williams Company, the Bidder making the Bid submitted to the Central Texas Regional Mobility Authority, on the 11th day of August, 2022, for Contract No. 22BSRR22701C in connection with the Barton Skyway Ramp Relief Construction Project; that I executed the said Bid with full authority to do so;

The said Bidder has not, directly or indirectly, entered into any combination or arrangement with any person, firm or corporation or entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding or which would increase the cost of construction or maintenance in connection with the said Contract; that no person or selling agency has been employed or retained to solicit or secure the said Contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide full-time employees;

And that said Bidder is or has been a member of the following highway contractors' association during the preceding twelve months:

Name of Association	Location of Principal Office
AGC of Texas	300 Barton Springs Rd Austin, TX 78704

I further warrant that all statements contained in said Bid and in this Affidavit are true and correct and made with full knowledge that the said Authority relies upon the truth of the statements contained in said Bid and in this Affidavit in awarding the said Contract.

Sworn to and subscribed before me this 26th day of July, 2022.

By: _____
Person Signing Bid

Print Name: Don Williams
Title: President

Venus B Andrews
Notary Public

VENUS B ANDREWS
My Notary ID # 11662756
Expires October 2, 2023

My commission expires: Oct. 2, 2023

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

DEBARMENT AFFIDAVIT

STATE OF Texas)

COUNTY OF Travis)

I, Dan Williams, of the City of Austin, County of Travis and State of Texas, being of full age and duly sworn according to law on my oath depose and say:

That I am President (Title) of Dan Williams Company, the Bidder making the Bid submitted to the Central Texas Regional Mobility Authority, on the 11th day of August, 2022, for Contract No. 22BSRR22701C in connection with the Barton Skyway Ramp Relief Construction Project; that I executed the said Bid with full authority to do so;

The said Bidder has not been excluded or disqualified from doing business on State or Federal projects;

And that said Bidder is or has been a member of the following highway contractors' association during the preceding twelve months:

Name of Association	Location of Principal Office
AGC of Texas	300 Barton Springs Rd Austin, TX 78704

I further warrant that all statements contained in said Bid and in this Affidavit are true and correct and made with full knowledge that the said Authority relies upon the truth of the statements contained in said Bid and in this Affidavit in awarding the said Contract.

Sworn to and subscribed
before me this 26th
day of July,
2022.

By: _____
Person Signing Bid

Print Name: Dan Williams
Title: President

Venus B Andrews
Notary Public

VENUS B ANDREWS
My Notary ID # 11662756
Expires October 2, 2023

My commission expires: Oct. 2, 2022

CHILD SUPPORT STATEMENT

Under section 231.006, Family Code, the vendor or applicant certifies that the individual or business entities named in this contract, bid, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contact may be terminated, and payment may be withheld if this certification is inaccurate.

CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

CHILD SUPPORT STATEMENT FOR NEGOTIATED CONTRACTS AND GRANTS

Under Family Code, Section 231.006, Dan Williams

Certifies that Dan Williams's Company, 74-2496879,

as of 7-26-22 is eligible to receive a grant, loan or payment and acknowledges that any contract may be terminated and payment may be withheld if this certification is inaccurate.

List below the name and social security number of the individual or sole proprietor and each partner, shareholder, or owner with an ownership interest of at least 25% of the business entity submitting the bid or application. This form must be updated whenever any party obtains a 25% ownership interest in the business entity.

NAME (*please print legibly, if handwritten*)	SOCIAL SECURITY NUMBER
Dan Williams	[redacted]

Family Code, Section 231.006, specifies that a child support obligor who is more than thirty (30) days delinquent in paying child support and a business entity in which the obligor is a sole proprietor, partner, shareholder, or owner with an ownership interest of at least 25% is not eligible to receive payments from state funds under a contract to provide property, materials, or services; or receive a state-funded grant or loan.

A child support obligor or business entity ineligible to receive payments described above remains ineligible until all arrearage have been paid or the obligor is in compliance with a written repayment agreement or court order as to any existing delinquency.

Except as provided in Family Code, Section 231.302(d), a social security number is confidential and may be disclosed only for the purposes of responding to a request for information from an agency operating under the provisions of Subchapters A and D of Title IV of the federal Social Security Act (42 U.S.C. Sections 601 et seq. and 651 et seq.)

CERTIFICATION TO NOT BOYCOTT ISRAEL

Pursuant to Texas Government Code 2271.002, the Mobility Authority must include a provision requiring a written verification that the Contractor does not boycott Israel and will not boycott Israel during the term of the Contract. By signing the contract, the Contractor certifies that it does not boycott Israel and will not boycott Israel during the term of this contract.

Violation of this certification may result in action by the Mobility Authority.

Signature

7.27.22

Date

CERTIFICATION TO NOT DISCRIMINATE AGAINST FIREARM ENTITIES OR FIREARM TRADE ASSOCIATIONS

Pursuant to Texas Government Code 2274.002, the Department must include a provision requiring a written verification affirming that the Contractor:

1) Does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, as defined in Government Code 2274.001, and
2) Will not discriminate against a firearm entity or firearm trade association during the term of the contract.

This provision applies to a contract that:

1) Is with a Contractor that is not a sole proprietorship,
2) Is with a Contractor with 10 or more full-time employees, and
3) Has a value of $100,000 or more.

By signing, the Contractor certifies that it does not discriminate against a firearm entity or firearm trade association as described and will not do so during the term of this contract. "Discriminate against a firearm entity or firearm trade association" means, with respect to the entity or association, to: (1) refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association; (2) refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or (3) terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association. "Discriminate against a firearm entity or firearm trade association" does not include: (1) the established policies of a merchant, retail seller, or platform that restrict or prohibit the listing or selling of ammunition, firearms, or firearm accessories; (2) a company's refusal to engage in the trade of any goods or services, decision to refrain from continuing an existing business relationship, or decision to terminate an existing business relationship to comply with federal, state, or local law, policy, or regulations or a directive by a regulatory agency, or for any traditional business reason that is specific to the customer or potential customer and not based solely on an entity's or association's status as a firearm entity or firearm trade association.

Violation of this certification may result in action by the Department.

Signature

7-27-22
Date

CERTIFICATION TO NOT BOYCOTT ENERGY COMPANIES

Pursuant to Texas Government Code 2274.002, the Department must include a provision requiring a written verification affirming that the Contractor does not boycott energy companies, as defined in Government Code 809.001, and will not boycott energy companies during the term of the contract. This provision applies to a contract that:

1) is with a Contractor that is not a sole proprietorship,
2) is with a Contractor with 10 or more full-time employees, and
3) has a value of $100,000 or more.

By signing, the Contractor certifies that it does not boycott energy companies and will not boycott energy companies during the term of this contract. "Boycott" means taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with a company because the company: (1) engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; or (2) does business with a company described by (1).

Violation of this certification may result in action by the Department.

Signature

7.27.22
Date

Central Texas Regional Mobility Authority

_____

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

DISADVANTAGED BUSINESS ENTERPRISES REQUIREMENTS

The following goal for Disadvantaged Business Enterprises (DBE) is established:

DBE – 4.5%

Certification of DBE Goal Attainment

By signing the bid, the Bidder certifies that the above DBE goal will be met by obtaining commitments equal to or exceeding the DBE percentage or that the Bidder will provide a good faith effort to substantiate the attempt to meet the goal.

Failure to comply commitments to meet the stated goal or provide a satisfactory good faith effort will be considered a breach of the requirements of the bid. As a result, the Bid Bond of the bidder will become property of the Authority and the bidder will be excluded from rebidding on the project when it is re-advertised.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS EQUIPMENT OR SERVICES

The Federal Register Notice issued the Final Rule and states that the amendment to 2 CFR 200.216 is effective on August 13, 2020. The new 2 CFR 200.471 regulation provides clarity that the telecommunications and video surveillance costs associated with 2 CFR 200.216 are unallowable for services and equipment from these specific providers. OMB's Federal Register Notice includes the new 2 CFR 200.216 and 2 CFR 200.471 regulations.

https://www.federalregister.gov/documents/2020/08/13/2020-17468/guidance-for-grants-andagreements

Per the Federal Law referenced above, use of services, systems, or services or systems that contain components produced by any of the following manufacturers is strictly prohibited for use on this project. Therefore, for any telecommunications, CCTV, or video surveillance equipment, services or systems cannot be manufactured by, or have components manufactured by:

- Huawei Technologies Company
- ZTE Corporation (any subsidiary and affiliate of such entities),
- Hyatera Communications Corporation,
- Hangzhou Hikvision Digital Technology Company,
- Dahua Technology Company (any subsidiary and affiliate of such entities).

Violation of this prohibition will require replacement of the equipment at the contractor's expense.

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

BID BOND

KNOW ALL PERSONS MEN BY THESE PRESENTS, that Dan Williams Company, as Principal/Contractor, and Hartford Fire Insurance Company, as Surety, legally authorized to do business in the State of Texas, are held and firmly bounded unto the Central Texas Regional Mobility Authority, as Authority, in the amount of at least five percent (5%) percent of the Total Bid amount, on which the Contract is awarded lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally and firmly by these presents:

WHEREAS, the Contractor is herewith submitting its Bid for Contract No. 22BSRR22701C, entitled Barton Skyway Ramp Relief Construction Project, and

NOW, THEREFORE, the condition of this obligation is such, that if the Contractor shall be awarded the Contract upon said Bid and shall, within fifteen (15) calendar days after the date of written notice of such award, enter into and deliver a signed Contract and the prescribed Performance Bond for the faithful performance of the Contract, together with the required proof of proper insurance coverage and other necessary documents, then this obligation shall be null and void; otherwise, to remain in full force and effect, and the Contractor and Surety will pay unto the Authority the difference in money between the amount of the Total Amount written in the Bid of said Contractor and the amount for which the Authority may legally contract with another party to perform the said work, if the latter amount be in excess of the former; but in no event shall the Surety's liability exceed the penal sum hereof.

SIGNED AND SEALED this 11th day of August, 2022.

PRINCIPAL/CONTRACTOR

Dan Williams Company
Business Name

9050 N. Capital of Texas Hwy, Building 3, Suite 380
Address

Austin, TX 78759

Witness or Attest:

By: _____
Title: President

(Affix Corporate Seal Here)

SURETY:

Hartford Fire Insurance Company
Business Name

One Hartford Plaza
Address

Hartford, CT 06155

Witness or Attest:

David T. Miclette, Witness

By: _____
Stacy Owens Title: Attorney-in-Fact

(Attach evidence of Power of Attorney)

(Affix Corporate Seal Here)

POWER OF ATTORNEY

Direct Inquiries/Claims to:
THE HARTFORD
BOND, T-11
One Hartford Plaza
Hartford, Connecticut 06155
Bond.Claims@thehartford.com
call: **888-266-3488** *or fax:* **860-757-5835**

KNOW ALL PERSONS BY THESE PRESENTS THAT:

Agency Name: BOWEN MICLETTE & BRITT INS AGY LLC
Agency Code: 46-504809, 61-613558, 21-225344

- [X] **Hartford Fire Insurance Company**, a corporation duly organized under the laws of the State of Connecticut
- [X] **Hartford Casualty Insurance Company**, a corporation duly organized under the laws of the State of Indiana
- [X] **Hartford Accident and Indemnity Company**, a corporation duly organized under the laws of the State of Connecticut
- [ ] **Hartford Underwriters Insurance Company**, a corporation duly organized under the laws of the State of Connecticut
- [ ] **Twin City Fire Insurance Company**, a corporation duly organized under the laws of the State of Indiana
- [ ] **Hartford Insurance Company of Illinois**, a corporation duly organized under the laws of the State of Illinois
- [ ] **Hartford Insurance Company of the Midwest**, a corporation duly organized under the laws of the State of Indiana
- [ ] **Hartford Insurance Company of the Southeast,** a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, ***up to the amount of*** Unlimited :

David T. Miclette, Ashley Britt, Alyson Carmichael, Robert C. Davis, Tabitha Dorman, Rita G. Gulizo, Nikole Jeannette, Barry K. McCord, Susan Zapalowski, Lauren O. Moudy, Robert M. Overbey Jr., Lacey Mayfield, Stacey Bosley, Stacy Owens of Fort Smith AR, New Orleans LA and Houston, TX

Mary R. Butcher, Gail S. Barr, James J. Drew, Matthew S. Nilles, Lenita W. Wright of Maitland FL,

their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by ☒, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on May 23, 2016 the Companies have caused these presents to be signed by its Assistant Vice President and its corporate seals to be hereto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney.

Shelby Wiggins

Shelby Wiggins, Assistant Secretary

Joelle L. LaPierre

Joelle L. LaPierre, Assistant Vice President

STATE OF FLORIDA
COUNTY OF SEMINOLE } **ss.** Lake Mary

On this 20th day of May, 2021, before me personally came Joelle LaPierre, to me known, who being by me duly sworn, did depose and say: that (s)he resides in Seminole County, State of Florida; that (s)he is the Assistant Vice President of the Companies, the corporations described in and which executed the above instrument; that (s)he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that (s)he signed his/her name thereto by like authority.

NOTARY PUBLIC STATE OF FLORIDA

Jessica Ciccone

Jessica Ciccone
My Commission HH 122280
Expires June 20, 2025

I, the undersigned, Assistant Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of August 11, 2022.

Signed and sealed in Lake Mary, Florida.

Keith Dozois

Keith D. Dozois, Assistant Vice President

Claims Inquiries Notice

Hartford Fire Insurance Company
Hartford Casualty Insurance Company
Hartford Accident and Indemnity Company
Hartford Underwriters Insurance Company

Twin City Insurance Company
Hartford Insurance Company of Illinois
Hartford Insurance Company of the Midwest
Hartford Insurance Company of the Southwest

Please address inquiries regarding **Claims** for all surety and fidelity products issued by The Hartford' s underwriting companies to the following:

Phone Number:	:	888-266-3488
Fax – Claims	:	860-757-5835 or 860-221-3965
E-mail	:	bond.claims@thehartford.com
Mailing Address	:	The Hartford BOND, T-4 One Hartford Plaza Hartford, CT 06155

IMPORTANT NOTICE

To obtain information or make a complaint:
You may contact your Agent.

You may call The Hartford's Consumer Affairs toll-free telephone number for information or to make a complaint at:
1-800-451-6944

You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights, or complaints at:
1-800-252-3439

You may write the Texas Department of Insurance:
P.O. Box 149104
Austin, TX 78714-9104
Fax: (512) 490-1007
Web: *www.tdi.texas.gov*
E-mail: *ConsumerProtection@tdi.texas.gov*

PREMIUM OR CLAIM DISPUTES:
Should you have a dispute concerning your premium or about a claim, you should contact the (agent) (company) (agent or the company) first. If the dispute is not resolved, you may contact the Texas Department of Insurance.

ATTACH THIS NOTICE TO YOUR POLICY:
This notice is for information only and does not become a part or condition of the attached document.

Central Texas Regional Mobility Authority

_____

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

CONTRACT AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20__, between the Central Texas Regional Mobility Authority, 3300 N. I-35, Suite 300, Austin, Texas, 78705, hereinafter called the "Authority" and _____, or his, its or their successors, executors, administrators and assigns, hereinafter called the Contractor.

WITNESSETH, that the Contractor agrees with the Authority for the consideration herein mentioned, and at his, its or their own proper cost and expense, to do all the work and furnish all the materials, equipment, teams and labor necessary to prosecute and complete and to extinguish all liens therefore, Contract No. 22BSRR22701C, entitled Barton Skyway Ramp Relief Construction Project, in the manner and to the full extent as set forth in the Plans, Standard Specifications, Special Provisions, Bid (for the basis of award stated herein below) and other documents related to said Contract which are on file at the office of the Authority and which are hereby adopted and made part of this Agreement as completely as if incorporated herein, and to the satisfaction of the Authority or its duly authorized representative who shall have at all times full opportunity to inspect the materials to be furnished and the work to be done under this Agreement.

This Contract is awarded on the basis of the official total Bid Amount based on the unit prices bid of_____dollars and _____Cents ($_____).

In consideration of the foregoing premise, the Authority agrees to pay the Contractor for all items of work performed and materials furnished at the amount of the unit prices bid therefore in the Bid submitted for this Contract, subject to any percentage reductions in the total Contract amount that may be named in the Bid corresponding to the basis of award stated in the above paragraph, and subject to the conditions set forth in the Specifications.

The Contractor agrees as follows:

a. I/WE will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor.

b. I/WE agree it is the policy of the Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color or national origin, age or disability. Such action shall include: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and on-the-job training.

c. I/WE agree to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

d. I/WE in any solicitations or advertising for employees placed by or on behalf of itself, will state that it is an equal opportunity employer.

e. I/WE agree to adhere to all federal/state regulations including, but not limited to, American Disabilities Act, Equal Employment Opportunity, submitting certified payrolls, and participating in Contractor/Subcontractor labor standard reviews.

f. Notices and advertisements and solicitations placed in accordance with applicable state and federal law, rule or regulation, shall be deemed sufficient for the purposes of meeting the requirements of this section.

g. Contract Time - The contractor will have two-hundred sixty-three (263) working days after the date stated in the written Full Notice-to-Proceed to Fully complete the project.

h. Failure by Contractor to fulfill these requirements is a material breach of the Contract, which may result in the termination of this Contract, or such other remedy, as the Authority deems appropriate.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement the day and year written above.

Sworn to and Subscribed

before me this_____
day of _____, 20___.

_____
Notary Public

My commission expires:
_____

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

By:_____
James Bass
Executive Director

CONTRACTOR:

_____

Business Name

_____

Address

_____

Sworn to and subscribed
before me this _____
day of_____,20___.

_____

by:_____

Notary Public

Title

My commission expires:
_____

(Affix Corporate Seal Here)

INFORMATION ABOUT PROPOSER ORGANIZATION

Proposer's business address:

(No.)	(Street)	(Floor or Suite)

(City)	(State or Providence)	(ZIP or Postal Code)	(Country)

State or County of Incorporation/Formation/Organization: _____

Signature block for a corporation or limited liability company:

Company: _____

By: _____

Printed Name: _____

Title: _____

Additional Requirements:

A. If the proposer is a corporation, enter state or country of incorporation in addition to the business address. If the proposer is a partnership, enter state or country of formation. If the proposer is a limited liability company, enter state or country of organization.

B. Describe in detail the legal structure of the entity making the Bid. If the proposer is a partnership, attach full name and addresses of all partners and the equity ownership interest of each entity, provide the aforementioned incorporation, formation and organization information for each general partner and attach a letter from each general partner stating that the respective partner agrees to be held jointly and severally liable for any and all of the duties and obligations of the proposer under the Bid and under any contract arising therefrom. If the proposer is a limited liability entity, attach full names and addresses of all equity holders and other financially responsible entities and the equity ownership interest of each entity. If the proposer is a limited liability company, include an incumbency certificate executed by a Secretary thereof in the form set on the following page listing each officer with signing authority and its corresponding office. Attach evidence to the Bid and to each letter that the person signing has authority to do so.

C. With respect to authorization of execution and delivery of the Bid and the Agreements and validity thereof, if any signature is provided pursuant to a power of attorney, a copy of the power of attorney shall be provided as well as a certified copy of corporate or other appropriate resolutions authorizing said power of attorney. If the Proposer is a corporation, it shall provide evidence of corporate authorization in the form of a resolution of its governing body certified by an appropriate officer of the corporation. If the Proposer is a limited liability company, evidence of authorization would be in the form of a limited company resolution and a managing member resolution providing such authorization, certified by an appropriate officer of the managing member. If the Proposer is a partnership, evidence of authorization shall be provided for the governing body of the Proposer and for the governing bodies of each of its general partners, at all tiers, and in all cases certified by an appropriate officer.

D. The Proposer must also identify those persons authorized to enter discussions on its behalf with the Authority in connection with this Bid, the Project, and The Agreement. The Proposer shall submit with its Bid a power of attorney executed by the Proposer and each member, partner of the Proposer, appointing and designating one or more individuals to act for and bind the Proposer in all matters relating to the Bid.

INCUMBENCY CERTIFICATE

The undersigned hereby certifies to the Central Texas Regional Mobility Authority that he/she is the duly elected and acting _____ Secretary of _____ (the "Company"), and that, as such, he/she is authorized to execute this Incumbency Certificate on behalf of the Company, and further certifies that the persons named below are duly elected, qualified and acting officers of the Company, holding on the date hereof the offices set forth opposite their names.

NAME:	OFFICE:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

IN WITNESS WHEREOF, the undersigned has executed this Incumbency Certificate this _____ day of _____.

_____

_____Secretary

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

PERFORMANCE BOND

STATE OF TEXAS
COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS: That _____

_____of the City of _____

County of _____, and State of _____, as principal, and

_____
authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto the Central Texas Regional Mobility Authority (Authority), in the penal sum of

_____Dollars

($_____) for the payment whereof, the said Principal and Surety bind themselves, their heirs, administrators, executors, successors, jointly and severally, by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Authority, dated the _____day of _____, 20__ (the "Contract"), to which the said Contract, along with the Contract Documents referenced therein are hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform said Agreement and shall in all respects duly and faithfully observe and perform all and singular the covenants, conditions and agreements in and by the Contract agreed and covenanted by the Principal to be observed and performed, and according to the true intent and meaning of said Contract and the Contract Documents hereto annexed, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as amended and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it were copied at length herein.

SURETY, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work performed thereunder, or to the Contract Documents referenced therein, shall in anyway affect the obligations on this bond, and it does hereby waive notice of such change, extension of time, alteration or addition to the terms on the Agreement, or to the work to be performed thereunder.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20___.

_____	_____
PRINCIPAL	SURETY
_____	_____
SIGNATURE	SIGNATURE
_____	_____
NAME & TITLE	NAME & TITLE
_____	_____
ADDRESS	ADDRESS
_____	_____
(_____) _____	(_____) _____
PHONE NUMBER	PHONE NUMBER

The name and address of the Resident Agency of Surety is:

_____

_____

(_____) _____	_____
PHONE NUMBER	SIGNATURE OF LICENSED LOCAL RECORDING AGENT appointed to countersign on behalf of Surety (Required by Art. 21.09 of the Insurance Code)

****

I,_____, having executed Bonds
SIGNATURE

for _____ do hereby affirm I have
NAME OF SURETY

verified that said Surety is now certified with Authority from either: (a) the Secretary of the Treasury of the United States if the project funding includes Federal monies; or (b) the State of Texas if none of the project funding is from Federal sources; and further, said Surety is in no way limited or restricted from furnishing Bond in the State of Texas for the amount and under conditions stated herein.

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

PAYMENT BOND

STATE OF TEXAS
COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS: That _____

_____of the City of _____

County of _____, and State of _____, as Principal (hereinafter referred to as the "Principal"), and

_____
authorized under the laws of the State of Texas to act as Surety on bonds for principals (hereinafter referred to as the "Surety"), are held and firmly bound unto Central Texas Regional Mobility Authority, (hereinafter referred to as the "Authority"), in the penal sum of

_____Dollars

($_____) for the payment whereof, the said Principal and Surety bind themselves, their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

WHEREAS, the Principal has entered into a certain written contract with the Authority, dated the _____day of _____, 20__ (the "Contract"), to which the said Contract, along with the Contract Documents referenced therein are hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants supplying labor and material to him or a subcontractor in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as amended and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it were copied at length herein.

SURETY, for value received, stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work performed thereunder, or to the other Contract Documents accompanying the same, shall in anyway affect its obligation on this bond, and it does hereby waive notice of such change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder or to the other Contract Documents accompanying the same.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20___.

_____	_____
PRINCIPAL	SURETY
_____	_____
SIGNATURE	SIGNATURE
_____	_____
NAME & TITLE	NAME & TITLE
_____	_____
ADDRESS	ADDRESS
_____	_____
(_____) _____	(_____) _____
PHONE NUMBER	PHONE NUMBER

The name and address of the Resident Agency of Surety is:

_____

_____

(_____) _____	_____
PHONE NUMBER	SIGNATURE OF LICENSED LOCAL RECORDING AGENT appointed to countersign on behalf of Surety (Required by Art. 21.09 of the Insurance Code)

Central Texas Regional Mobility Authority

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

RECEIPT OF ADDENDA

Receipt of addendum, if issued, must be acknowledged electronically on the CivCast website.

Failure to confirm receipt of all addenda issued will result in the bid being deemed non-responsive.

Signature

8-8-22
Date

Central Texas Regional Mobility Authority

_____

BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

****

SEALS

The enclosed Specifications, Special Provisions, General Notes, and Specification Data in this document have been selected by me, or under my responsible supervision as being applicable to this project.

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

Alteration of a sealed document without proper notification to the responsible engineer is an offence under the Texas Engineering Practice Act.

GENERAL NOTES: Version: March 7, 2022

Item	Description	**Rate
**204	**Sprinkling**	
	(Dust)	30 GAL/CY
	(Item 132)	30 GAL/CY
	(Item 247)	30 GAL/CY
**210	**Rolling (Flat Wheel)**	
	(Item 247)	1 HR/200 TON
	(Item 316)	1 HR/6000 SY
**210	**Rolling (Tamping and Heavy Tamping)**	1 HR/200 CY
**210	**Rolling (Lt Pneumatic Tire)**	
	(Item 132)	1 HR/500 CY
	(Item 247)	1 HR/200 TON
	(Item 316 - Seal Coat)	1 HR/6000 SY
	(Item 316 - Two Course)	1 HR/3000 SY
247	**Flexible Base (CMP IN PLC)**	132 LB/CF
310	**Prime Coat**	0.20 GAL/SY
3076	**Dense-Graded Hot-Mix Asphalt and Superpave**	110 LB/SY/IN
3081	**Thin Overlay Mixtures (TOM)**	
	SAC B	113.0 LB/SY/IN
	SAC A	116.0LB/SY/IN
3084	**Bonding Course**	0.09 GAL/SY
3085	**UnderSeal Course**	0.20 GAL/SY
	Tack Coat	0.08 GAL/SY

** For Informational Purposes Only

GENERAL

The "Engineer" will be the Central Texas Regional Mobility Authority's (Mobility Authority) consultant identified by the Mobility Authority at the Pre-Construction Meeting.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved by the Mobility Authority.

Perform work during good weather. If work is damaged by a weather event, the Contractor is responsible for all costs associated with replacing damaged work.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

Remove and replace, at the Contractor's expense, and as directed, all defective work, which was caused by the Contractor's workforce, materials, or equipment.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Intelligent Transportation Systems (ITS) Infrastructure exist within the limits of this project and this system must remain operational throughout construction. Approximate locations of ITS Infrastructure are depicted in the plans. Contact the TxDOT Area Engineer's or Inspection Team's Office for the locations at least 48 hours before commencing any work that might affect present ITS Infrastructure. Use caution if working in these areas to avoid damaging or interfering with existing facilities. Repair any damage to this system within 8 hours of occurrence at no cost to the Mobility Authority. In the event of system damage, notify TxDOT/CTECC at (512) 974-0883 within one hour of occurrence. Failure of the Contractor to repair damage to any infrastructure that conveys any corridor information to TxDOT/CTECC will result in the Contractor being billed for the full cost of emergency repairs.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Construct all manholes/valves to final pavement elevations prior to the placement of final surface. If the manholes/valves are going to be exposed to traffic, place temporary asphalt around the manhole/valve to provide a 50:1 taper. The asphalt taper is subsidiary to the ACP work.

Supply litter barrels in enough numbers at locations as directed to control litter within the project. Consider subsidiary to pertinent Items. Use a self-contained vacuum broom to sweep the roadway and keep it free of sediment as directed. The Contractor will be responsible for any sweeping above and beyond the normal maintenance required to keep fugitive sediment off the roadway as directed by the Engineer.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Protect all areas of the right of way (ROW) that are not included in the actual limits of proposed construction areas. Exercise care to prevent damage of trees, vegetation and other natural surroundings. Areas not to be disturbed will be as directed by the Engineer. Restore any area disturbed by the Contractor's operations to a condition as good as, or better than, before the beginning of work

Coordinate and obtain approval for all work over existing roadways.

Bridge Vertical Clearance and Traffic Handling.
Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

ITEM 4 – SCOPE OF WORK
Final clean up will include the removal of excess material considered detrimental to vegetation growth along the front slope of the ditch. Materials, as specified by the Engineer, will be removed at the Contractor's expense.

ITEM 5 – CONTROL OF THE WORK
Mark and maintain 100-foot station intervals for the duration of the project for mainlanes and frontage roads only, as directed. Consider subsidiary to pertinent bid items.

Provide a 72 hour advance email notice to AUS_Locate@TxDOT.gov to request illumination, traffic signal, ITS, or toll equipment utility locates. Provide AUS_Locate@TxDOT.gov an electronic pdf of as-builts within 21 calendar days of illumination, traffic signal, ITS, or toll equipment being placed into operation. As-built shall include GPS coordinates of manholes and junction boxes. Include final version of RFI's and revised plan sheets.

Precast Alternate Proposals.
When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an

alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals using the Mobility Authority's Electronic Data Management System (EDMS), which will be established for the Project prior to commencing construction. Submittals will be addressed to the Construction, Engineering and Inspections (CE&I) Firm's Resident Engineer (RE) and additional staff, as appropriate.

Provide a complete package of information for all resubmittals. Submit each item and individual components of that item under separate cover.

Prior to submitting a RFI, meet and discuss with the Engineer and the utility inspector. Include a proposed solution, existing and proposed line elevations, and redline of proposed changes with the RFI. Make note of adjacent utilities in the RFI if it includes relocation of a line. Submit RFIs via email to the Engineer and the utility inspector.

Complete pre-testing and have the utility inspector verify prior to formal testing and inspection. Submit email to the Engineer and the utility inspector requesting a formal test and inspection 14 calendar days before the test date. Pay retest fees directly to utility owner at current rates.

Submit an email to the utility inspector identifying the lines, valves, location, and date of shut offs or limited service 21 calendar days before for all lines and 60 calendar days before for water lines 24 in. or greater. The utility owner will conduct a test shut off before actual shut off. Do not shut off power or water lines 24 in. or greater between June 1st and August 31st. Provide a verbal notification 7 calendar days and written notification 72 hours before impact to service to all customers.

Provide an electronic pdf of as-builts within 28 calendar days of a line becoming active. Include GPS coordinates of items not installed per original plans including meters, manholes, valves, bends, and fire hydrant locations in the as-builts. Include limits of encasements such as steel and flowable fill. Include final version of RFI's and revised plan sheets.

Alignment and Profile.
Unless shown in the plans, profile and alignment data for roadways being overlaid or widened are for design verification only. Provide survey and construct the roadway in accordance with the typical section. Bid items and data may be provided to adjust cross slope and super elevations.

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 5 business day notice for materials, which require inspection at the Plant.

For structures with paint containing hazardous materials, provide locations of material removal 60 days prior to begin removal. For metal elements to be removed, mechanical shear or unbolting for removal and disposal does not require paint abatement but requires 60 day advance notice.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES

Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Track all exposed soil, stockpiles, and slopes. Tracking consists of operating a tracked vehicle or equipment up and down the slope, leaving track marks perpendicular to the direction of the slope. Re-track slopes and stockpiles after each rain event or every 14 days, whichever occurs first. This work is subsidiary.

Do not park equipment where driver sight distance to businesses and side street intersections is obstructed, especially after work hours. If it is necessary to park where drivers' views are blocked, make every effort to flag traffic accordingly. Give the traveling public first priority.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Collect wastewater generated on-site by chemical toilets and transport off the recharge zone and dispose of properly.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

PSL in Edwards Aquifer Recharge and Contributing Zone.

Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL.

The Engineer will coordinate with the necessary agencies. Approval of the PSL is not guaranteed. Unapproved PSL is not a compensable impact.

Work within a USACE Jurisdictional Area.
Do not initiate activities within a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Obtain written approval from the Engineer for activities not specifically addressed in the plans. Provide a signed sketch and description of the location 60 business days prior to begin work at the location. Complete and return any forms provided by the Engineer. Approval of the work is not guaranteed. Unapproved work is not a compensable impact.

Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

Obtain written approval from the Engineer for temporary fill or crossings not specifically addressed in the plans. Provide a signed sketch of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Unapproved work is not a compensable impact.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to the Engineer and email to AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation for each phase or step of work. Notify the Engineer via email of any changes to the work start and end dates.

Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by migratory birds or bats. This work is subsidiary.

Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat and tree/brush requirements.

Law Enforcement Personnel.
Submit charge summary and invoices using the Mobility Authority forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

Back Up Alarm.
For hours 9 P to 5 A, utilize a non-intrusive, self-adjusting noise level reverse signal alarm. This is not applicable to hotmix or seal coat operations. This is subsidiary.

ITEM 8 – PROSECUTION AND PROGRESS
Working days will be charged in accordance with 8.3.1.1, "Five-Day Workweek."

Electronic versions of schedules will be saved in Primavera P6 format and delivered in both native and PDF formats.

A CPM schedule in Primavera format and a PSSR is required. Use software fully compatible with Primavera P6. The work performed and in accordance to the schedule requirement will be paid for at a price of $3,000 for the baseline schedule once it is accepted by the Engineer. An

additional $1,000 will be paid monthly for 12 months, or until Final Acceptance is achieved, whichever occurs first, on all subsequent monthly schedules once they are accepted by the Engineer. The quantity paid under this Item will not exceed the total quantity of 12 months except as modified by Change Order. Contractor will be in noncompliance with this work if the Contractor fails to provide an accepted schedule according to contract requirements within the time frame established by the Engineer. No payment will be made for the month(s) in question and the total final payment will be reduced by the number of month(s) the Contractor was in noncompliance. The remaining unpaid months of schedules less non-compliance months will be paid on final acceptance of the project, if all work is complete and accepted in accordance with Standard Specifications Article 5.12, "Final Acceptance."

Interim Milestone 1 shall begin upon the closure of the southbound entrance ramp from Bee Caves Road and end when the southbound entrance ramp from Bee Caves Road is re-opened. Interim Milestone 1 work shall be completed in 24 working days. The incentive for early completion is $5,000 per working day with a maximum of 5 working days for computing the credit. The disincentive for late completion is $3,000 per working day with no maximum for computing the disincentive.

Interim Milestone 2 shall begin upon the closure of the southbound entrance ramp from Barton Skyway and end when the southbound entrance ramp from Barton Skyway is re-opened. Interim Milestone 2 work shall be completed in 36 working days. The incentive for early completion is $5,000 per day with a maximum of 4 working days for computing the credit. The disincentive for late completion is $6,000 per working day with no maximum for computing the disincentive.

For attaining Substantial Completion, the Contractor will have 243 working days from NTP. Substantial Completion shall be as defined in Special Provision 001-001-RMA. The incentive for early Substantial Completion is $3,000 per working day with a maximum of 25 working days for computing the credit. For every day in excess of 243 working days, there will be Liquidated Damages assessed at $6,000 per working day with no maximum for computing the Liquidated Damages.

For attaining Final Acceptance, the Contractor will have 263 working days from NTP. For every day in excess of 263 working days, there will be Liquidated Damages assessed at $3,000 per working day with no maximum for computing the Liquidated Damages.

Interim Milestone and Substantial Completion early completion incentives will be paid following Final Acceptance.

Lane Closure Assessment Fee.
The monthly estimate will be deducted a fee per 15-minute interval according to the following schedule for each closure or obstruction that extends beyond the allowable closure time.

Table 1. Lane Closure Assessment (assessed per 15-minute interval)						
	Applicable Closure	**Morning Peak 5am-9am**	**Mid-Day 9am-3pm**	**Evening Peak 3pm-8pm**	**Nighttime 8pm-5am**	**Saturday/ Sunday All Day**
Loop 1 MoPac Existing Mainlanes & Frontage Roads						
SB	Shoulder	$500	$1,500	$1,500	$500	$1,000
	1 Lane	$500	$5,000	$5,000	$500	$3,000
	2 Lane	$500	$10,000	$10,000	$500	$7,000
NB	Shoulder	$1,500	$1,500	$500	$500	$1,000
	1 Lane	$5,000	$5,000	$500	$500	$3,000
	2 Lane	$10,000	$10,000	$500	$500	$7,000
All Other Approaches						
All Directions	Any	$500	$500	$500	$500	$500

For example: If the Contractor has one southbound lane of traffic closed on MoPac until Monday at 5:32 a.m., the Contractor is 32 minutes outside of the allowable lane closure period. The late charges will be accrued as follows:

1 lane closed × [$1,000 + $1,000 + $1,000] = $3,000

Emergency lane closures are not subject to lane rental charge assessments. Emergency lane closures are defined as closures caused by circumstances other than those caused by the Contractor and shall be approved by the authority.

ITEM 100 - PREPARING RIGHT OF WAY

Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.

Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas within 30 ft. of edge of pavement under construction. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 14 ft. vertical clearance under all trees. This work is subsidiary.

ITEM 105 – REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT

Existing typical is based on information available. This typical may not account for all maintenance work such as overlays or pavement repairs. A change in material type or thickness does not warrant additional payment. Payment is full compensation for removing all material to the depth specified.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation. Embankment placed over the area of MSE backfill must meet the same backfill requirements for the type specified under Item 423.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., "Compaction Methods." The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 132 – EMBANKMENT TY C
The Mobility Authority must approve all Type C embankment material before use on the project. Do not furnish shale clays. Furnish embankment with sulfate content less than 3000 ppm if treated with calcium-based chemicals or within 5 ft. of the finished subgrade elevation. Existing material from within the project limits that meets the Type C Substitute requirements may substituted for Type C but is not allowed to substitute for C1, C2, or density-controlled material. Offsite material may be used to blend with onsite material to achieve the Type C requirements. The Type C substitute may also be existing material in accordance with 132 for rock embankment. The Type C substitute material may only be placed vertically beyond 5 ft. below the finished subgrade elevation or 5 ft. beyond the edge of the subgrade.

Type C				
Percent Retained		**LL Max**	**PI Max**	**PI Min**
3"	**#4**			
0	MIN 45	55	20	6
Type C Substitute				
Percent Retained			**PI Max**	
3"	**#4**			
Max 10	10-90		25	

TY C1 and C2

Description	Percent Retained					LL Max	PI Max	PI Min
	3”	1 3/4"	3/8"	#4	#40			
Embankment (Ordinary) (TY C1)	0	0-10	-	45-75	60-85	45	20	6
Embankment (Ordinary) (TY C2)	-	-	0	30-75	50-85	55	25	8

ITEM 134 - BACKFILLING PAVEMENT EDGES
For all backfill, compact using a light pneumatic roller, install at 3:1 slope to tie into existing terrain, and apply at rate of 0.12 GAL/SY a typical erosion control material per Item 300. If seal coat is final surface, install backfill prior to placing seal coat.

For TY A backfill, furnish flexible base meeting the requirement for any type or grade, except Grade 4, in accordance with Item 247. Compressive strengths and wet ball mill for flexible base are waived for this item. In lieu of flexible base, RAP may be supplied and must be 100% passing a 2.5 in. sieve in accordance to Tex-110-E.

ITEM 161 - COMPOST
Furnish and install Erosion Control Compost. Roll ECC as specified.

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer’s specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 169 – SOIL RETENTION BLANKETS
Type A blankets containing straw fibers are not allowed. Type B and D blankets shall be a spray type blanket.

ITEM 204 – SPRINKLING
Apply water for dust control as directed. When dust control is not being maintained, cease operations until dust control is maintained. Consider subsidiary to the pertinent Items.

ITEM 216 - PROOF ROLLING
Correct and perform "Proof Rolling" retest at the Contractor's expense, to the satisfaction of the Engineer, when initial "Proof Rolling" yields a failing result.

ITEM 247 - FLEXIBLE BASE
The layer thickness will be 4 in. to 6 in. unless shown on the plans. Placing in a single layer is allowed when total thickness of base is 8 in. or less. When placed in multiple layers, compact the bottom and middle layers to at least 95% and 98% of the maximum dry density, respectively. When placed in a single layer or the final layer, compact to at least 100%.

Correction of subgrade soft spots is subsidiary.

Complete per plans the subgrade, ditches, slopes, and drainage structures prior to the placement of base.

Do not use a vibratory roller to compact base placed directly on top of a drainage structure.

ITEM 300s – SURFACE COURSES AND PAVEMENTS
Asphalt season is May 1 thru September 15. Emulsified Asphalt season is April 1 thru October 15. The latest work start date for asphalt season is August 1.

If an under seal is not provided, furnish a tack coat. Apply tack coat at 0.08 GAL/SY (residual). Apply non-tracking tack coat using manufacturer recommend rates.

ITEM 310 – PRIME COAT
Apply blotter material to all driveways and intersections. This work is subsidiary.

When Multi Option is allowed, provide MC 30, EC 30 or AE-P. MC 30 is not allowed in Travis County.

Rolling to ensure penetration is required.

ITEM 320 - EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT
Use of motor grader is allowed for placement of mixtures greater than 10 inches from the riding surface, when hot-mix is used in lieu of flexible base, or as allowed.

ITEMS 341, 344, & 3076 THRU 3082 - HOT-MIX ASPHALT PAVEMENT
Core holes may be filled with an Asphaltic patching material meeting the requirements of DMS-9203 or with SCM meeting requirements of DMS-9202.
Install transverse butt joints with 50 ft. H: 1 in. V transition from the new ACP to the existing surface. Install a butt joint with 24 in. H: 1 in. V transition from the new ACP to a driveway, pullout or intersection. Saw cut the existing pavement at the butt joints. This work is subsidiary.

Use a device to create a maximum 3H:1V notched wedge joint on all longitudinal joints of 2 in. or greater. This work is subsidiary.

Prior to milling, core the existing pavement to verify thickness. This work is subsidiary.

Ensure placement sequence to avoid excess distance of longitudinal joint lap back not to exceed one day's production rates.

Submit any proposed adjustments or changes to a JMF before production of the new JMF.

Tack every layer. Do not dilute tack coat. Apply it evenly through a distributor spray bar.

Provide a minimum transition of 10' for intersections, 10' for commercial driveways, and 6' for residential driveways unless otherwise shown on the plans.

Irregularities will require the replacement of a full lane width using an asphalt paver. Replace the entire sublot if the irregularities are greater than 40% of the sublot area.

Lime or an approved anti-stripping agent must be used when crushed gravel is utilized to meet a SAC "A" requirement.

When using RAP or RAS, include the management methods of processing, stockpiling, and testing the material in the QCP submitted for the project. If RAP and RAS are used in the same mix, the QCP must document that both of these materials have dedicated feeder bins for each recycled material. Blending of RAP and RAS in one feeder bin or in a stockpile is not permitted.

Asphalt content and binder properties of RAP and RAS stockpiles must be documented when recycled asphalt content greater than 20% is utilized.

No RAS is allowed in surface courses.

TxDOT approved warm-mix additives is required for all surface mix application when RAP is used. Dosage rates will be approved during JMF approval.

The Hamburg Wheel Test will have a minimum rut depth of 3mm.

ITEMS 3076 & 341/3078 - DENSE-GRADED HOT-MIX ASPHALT
Use the SGC for design and production testing of all mixtures. Design all Dense-Graded Type D mixtures as a surface mix, maximum 15% RAP and no RAS.

When using substitute binders, mold specimens for mix design and production at the temperature required for the substitute binder used to produce the HMA.
The Hamburg Wheel minimum number of passes for PG 64 or lower is reduced to 7,000. The Engineer may accept Hamburg Wheel test results for production and placement if no more than 1 of the 5 most recent tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

ITEM 3081 - THIN OVERLAY MIXTURES (TOM)
For SAC A, blending SAC B aggregate with an RSSM greater than the SAC A rating or 10, whichever is greater, is prohibited.

When using a Thermal Imaging System follow the Weather Condition requirements for When Not Using a Thermal Imaging System.

Produce mixture with a TxDOT approved WMA additive or process to facilitate compaction when the haul distance is greater than 40 miles or when the air temperature is 70°F and falling. WMA processes such as water or foaming processes are not allowed under these circumstances.

ITEM 354 - PLANING AND TEXTURING PAVEMENT
Contractor retains ownership of salvaged materials.

Mill and fill the work area during each shift unless otherwise shown on the plans.

Taper permanent transverse faces 50 ft. per 1 in. Taper temporary transverse faces 25 ft. per 1 in. Taper permanent longitudinal faces 6 ft. per 1 in. HMA may be used as temporary tapers. Provide minimum 1 in. butt joints at bridge ends and paving ends. This work is subsidiary.

Milled surfaces directly covered by a mat thickness of 1 in. or less shall produce a milled texture with a ridge to valley depth (RVD) no greater than 0.25 in. (6.5 mm).

Micro-milling
Micro-milling equipment may use a drum narrower than 12 ft.

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Unless shown on the plans, the following backfill will apply to cutting and restoring flexible pavement. Backfill with cement-stabilized backfill. The cement-stabilized backfill is subsidiary. Cap the backfill with Type B hot-mix to a depth equal to the adjacent hot-mix. At locations where the backfill surface is final, place 1-1/2 in. Type D for the surface. The minimum hot-mix depth will be 4 in.

Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT “CSAB” Standard. Use material in accordance with “CSAB” or Item 423, Type BS. The “CSAB” optional bond breaker materials are allowed. This work is subsidiary.

ITEM 416 - DRILLED SHAFT FOUNDATIONS
Stake all Foundations, for approval, before beginning drilling operations.

Calculate the vertical signal head clearance before placing any signal pole foundation.

For mast-arm signal and strain pole anchor bolts, set two in tension and two in compression.

Obtain approval of placement prior to placing concrete.

Remove spoils from a flood plain at the end of each work day.

ITEM 420, 425, 441, & 462 - STRUCTURES
Bridge Vertical Clearance and Traffic Handling.
Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

ITEM 420 – CONCRETE SUBSTRUCTURES
Do not use PMDF in areas where a "Free Joint" is indicated in the plans.

Check the sign plans for locations of clearance signs and brackets on structures, which will require inserts in the pre-stressed beams.

Where Retaining Walls are integral parts of the abutment header, do not place the abutment cap prior to backfilling the wall and the abutment area up to the elevation of the bottom of the abutment cap.

Mass placements are defined as placements with a least dimension greater than or equal to 5 ft., or designated elsewhere on the plans.

The "H" values shown on Bridge Layouts are estimated column heights. Calculate the actual column heights based on field conditions.

Perform work during good weather unless otherwise directed. If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by the weather, the Contractor is responsible for all costs associated with repairs/replacement.

Upon completion of the structure, stencil the National Bridge Inventory (NBI) number (structure number) using black paint and 4 in. tall numbers at 4 locations designated by TxDOT. This work is subsidiary.

Bonding agents are required at construction joints. Do not use membrane curing for structural concrete as defined in Item 421, Table 8.
Remove all loose Formwork and other Materials from the floodplain or drainage areas daily.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans or in the pay items. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.

For cement-stabilized riprap, provide Type A Grade 5 flexible base. Compressive strengths for Item 247 are waived.

SGT approach taper, paid using mow strip item, shall be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement shall be ordinary compaction and does not require placement using an asphalt paver.

ITEM 450 - RAILING
Use the elliptical tube option for rails T401, T402, and C402.

ITEM 465 – JUNCTION BOXES, MANHOLES, AND INLETS
Maintain drainage at curb inlets until the final roadway surface is placed.
For inlets not placed in roadway, construct cast-in-place reinforced concrete apron as shown in the standards. This work is subsidiary.

Backfill shall use cohesionless material per Item 400 or flowable fill if width between structure and extent of excavation is 2 ft. or less. This is subsidiary.

ITEM 496 - REMOVING STRUCTURES
Submit a demolition plan to the Engineer. Have the plan signed and sealed by a licensed professional engineer when the structure will continue to accommodate traffic after removal has begun and the removal impacts any part of the structure below the deck or riding surface. If applicable, the plan must detail requirements for meeting the U.S. Army Corps of Engineers' Section 404 Permit. The demolition plan must detail handling of roadway and waterway traffic. Waterway traffic must be maintained at all times unless a closure is approved by the Engineer.

No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1

Roadway	Limits	Allowable Closure Time
LP 1	William Cannon to Parmer Lane	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

Table 2 (Mobile Operations)

Roadway	Allowable Sun Night thru Fri Noon	Allowable Sat thru Sun Morn
Within Austin City Limits	10 A to 2 P and 7 P to 6 A	7 P to 10 A
Outside Austin City Limits	9 A to 3 P and 7 P to 7 A	6 P to 11 A
IH 35 main lanes	10 P to 5 A	9 P to 9 A
AADT over 50,000	8 P to 6 A	8 P to 10 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 7 P to 6 A. Unless stated, daytime or Friday night lane closures will not be allowed and one lane in each direction will remain open at all times for all roadways.

Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend. Closures the Sunday of the Super Bowl will not be allowed from 1 P to 11 P. No closures will be allowed on Friday and the weekends for projects within 20 miles of Formula 1 at COTA, ACL Fest, SXSW, ROT Rally, UT home football games (includes games not on a Friday or weekend), sales tax holiday, Dell Match Play (includes Thursday) or other special events that could be impacted by the construction. All lanes will be open by noon of the day before these special events.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2 hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday. For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Cover, relocate or remove existing signs that conflict with traffic control. Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to

traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify traffic control, if at any time the queue becomes greater than 20 minutes. Have a contingency plan of how modification will occur. Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Place a 28-inch cone, meeting requirements of BC (10), on top of foundations that have protruding studs. This work is subsidiary.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

ITEM 504 - FIELD OFFICE AND LABORATORY

All labs and offices will include cleaning at least once a week. The cleaning will include sweeping and mopping of floors, cleaning the toilet and lavatory, and emptying wastebaskets. Space heaters are not considered adequate heating.

Projects with HMAC, furnish a Type D structure for the Engineer's exclusive use. The structure will include high speed internet service with WIFI signal, one desk, two chairs, and one file cabinet. Provide a minimum of three 120-volt circuits with 20-amp breakers and at most two grounded convenience outlets per circuit.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS

If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

ITEM 512 – PORTABLE TRAFFIC BARRIER

In lieu of a crash cushion, place 25:1 Class C concrete transition where PTB terminates adjacent to existing concrete barrier. Installation and removal will be paid using Item 512.

Any increase in temporary barrier quantities that occur due to Contractor changes in the sequence of work or the traffic control plan will not be paid.

ITEM 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

Furnish round timber posts for guard fence. Steel posts for low fill culverts are subsidiary. Stake the locations for approval prior to installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Contractor may reuse all existing materials that are structurally sound and dent free. All reused material shall be from this project and in compliance with current standards. Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with 540.3.5. Contractor may punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. The holes shall be spaced in accordance with the latest standard and shall not be closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by Contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

ITEM 545 - CRASH CUSHION ATTENUATORS

Use a coring machine or saw cut to remove the mounting hardware/bolts from the existing pavement. Cutting the hardware flush with the surface is not allowed. Refill voids in accordance with the pavement specification. This work is subsidiary.

Install and maintain three 42 in. cones, vertical panels, or plastic drums in advance of the attenuator. Place at spacing per channelizing devices on BC (9). This work is subsidiary.

ITEM 585 - RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type B Pay Schedule 2 to evaluate ride quality of travel lanes.

Contractor may perform ride quality corrections to the existing asphalt pavement prior to the placement of the final asphalt surface. This work shall be paid under Item 354 6188.

ITEM 600s & 6000s – ITS, LIGHTING, SIGNING, MARKINGS, AND SIGNALS

Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Contractor shall provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

For signal shop contact Charles Vaughn Jr (Charles.Vaughn@txdot.gov) and Douglas Turner (Douglas.L.Turner@txdot.gov).

Use the Mobility Authority provided form to submit an electrical, illumination, and signal checklist prior to request for signal activation or a punch list.

Provide a 7 day advance email notice to the Engineer to request illumination or traffic signal punch list inspection.

Provide a 14 day advance email notice to the Engineer with signal technician contact information and signal locations prior to working or assuming operations of illumination or traffic signal.

Provide a 60 day advance email notice to the Engineer to request signal timing if timing is not provided in the plans.

Provide a 180 day advance email notice to the Engineer for equipment to be provided by the Mobility Authority.

Provide equipment that requires Mobility Authority programming, etc. to the Mobility Authority 180 day in advance.

Prior to relief of maintenance, a Test Period is required for signals and ITS equipment in accordance with Item 680.3.1.8. Response time to reported trouble calls shall be less than 2 hours. Complete repairs within 24 hours. Notify the Engineer and maintain a logbook in the controller cabinet of each trouble call. Do not clear the error log in the conflict monitor without approval.

Maintain the existing ITS equipment and HUB buildings operational during construction. ITS downtime is allowed from 12A to 4A. Downtime is restricted to one time per HUB or equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

For illumination conduit and ITS multi duct, smooth wall schedule 40 HDPE can be substituted for schedule 40 PVC. Minimum distance between HDPE joints will be 200 ft. If multi duct replaced with individual HDPE pipes, each ITS multi duct requires replacement with 4 x 1.5 in. pipes. If using individual pipes, ITS conduit spacers are not required but each set of 4 pipes shall be bound together at 5 ft. max spacing. For illumination conduit and ITS multi duct, schedule 80 bore can be replaced with an HDPE carrier pipe of adequate size to carry the proposed conduits. Stakes or other physical method shall be installed to hold down conduit prior to placement of encasement. Each LF payment of multi duct will include all 4 pipes and total quantity paid will not change due to substitution. All HDPE shall meet the material requirements of the applicable specification or be pre-qualified for Item 618.

ITEM 610 - ROADWAY ILLUMINATION ASSEMBLIES

Upon removal, contact signal shop to stockpile a maximum of 10 assemblies that meet the current TxDOT standards at the Austin District Headquarters located at 7901 North IH 35, 78753. If signal shop declines receipt of these assemblies, Contractor will be responsible for disposal.

For each assembly, paint the service, circuit, run and assembly number/letter using 3 in. tall characters and black paint. The marking shall be stacked vertically with the service on top and the assembly number/letter on the bottom. Paint 6 ft. above the roadway surface on the hand access door side of the pole or adjacent to the assembly if mounted to a structure. This work is subsidiary.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holder.

Verify voltage of existing luminaires before ordering LED replacements. As-builts show existing luminaires are 240V.

Provide 10-amp time delay fuses.

Maintain all new and existing illumination for the duration of the contract. All existing illumination will remain operational until replaced by new illumination or required to be removed due to construction.

As-builts show existing luminaire’s to be 240V. Contractor to verify voltage of existing luminaire’s before ordering LED replacements.

ITEM 618 - CONDUIT

Fit PVC and HDPE conduit terminations with bell ends.

Shift the locations of conduit and ground boxes to accommodate field conditions. Install conduit not exceeding 2 feet in any direction from a straight line. Install conduit at a minimum depth of 2 ft. below finished grade. Installation of the conduit by jacking or boring method will be at a depth of at least 1 ft. below subgrade.

Install a high tension, non-metallic pull rope in all conduit runs. Cap all empty conduit using standard weather tight conduit caps. This work is subsidiary.

Use a coring device, not a hammer drill, when drilling holes through concrete structures.

Structurally mounted junction boxes will be as shown on the plans. When used for traffic signal installations, these boxes will be 12" x 12" x 8". This work is subsidiary.

When using existing conduit, ensure that all conduits have bushings and cleaned of dirt, mud, grease, and other debris. Re-strap existing or relocated conduit per the specification. This work is subsidiary. Abandon existing underground conduit that is unusable is allowed if all conductors are removed. Replacement conduit will be paid using the existing bid items.

Concrete or flowable fill encasement is not required unless stated in bid item code.

The locations of conduit as shown are for diagrammatic purposes only and may be varied to meet local conditions, subject to approval.

Install #14 insulated tracer wire in one conduit of all communications duct banks and laterals. Install one #8 insulated equipment grounding conductor (EGC) in one conduit of all communications duct banks and laterals. The tracer wire should not be tied to any metal or EGC installed in the system. Connect #8 EGC to ground rods in duct banks and laterals as shown on TxDOT standard sheets. For ground boxes other than Ty 1 and Ty 2, install a ground rod for this connection. Furnishing and installation of ground rods and grounding connections will not be paid for separately but shall be considered subsidiary to the various bid items of the contract. EGC shall be extended to the grounding system of metal cabinets and poles served by the communication system. EGC shown above may be eliminated when power wiring is supplied through the duct bank/lateral and the power wiring includes an EGC #8 or larger that is connected to the ground rods in the ground boxes of the duct bank as shown in TxDOT standards.

ITEM 620 - ELECTRICAL CONDUCTORS
Provide 10 amp time delay fuses.

For Flashing Beacons (Item 685) and Pedestal Poles (Item 687), provide single-pole breakaway disconnects.

Install a minimum size 8 AWG equipment grounding conductor (EGC) in all conduits including loop detectors and traffic signal cables. Payment and the size of the EGC will be in accordance with standard ED (3)-14 note 12.

Permanently mark “illumination” on the luminaire conductors installed inside a traffic signal pole. Make the marks easily visible from the hand hole.

ITEM 624 – GROUND BOXES
Aggregate for fill under the box will be crushed, have a maximum size of 2 in., minimum size of ½ in., and requirements per Item 302 are waived.

ITEM 628 – ELECTRICAL SERVICES
Contact the utility company upon execution of contract and prior to the pre-construction meeting to make arrangements for all work and materials provided by the utility company. Contact AUS_Business_Services@txdot.gov for account approval and information. Accounts shall be placed in the name of TxDOT.

Contact distributionmeterservicesOPS@austinenergy.com for service disconnects.

ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES
Triangular slip bases that use set screws to secure the post will require 1 of the set screws to penetrate the post by drilling a hole in the post at the location of the screw. All set screws shall be treated with anti-seize compound.

ITEM 650 - OVERHEAD SIGN SUPPORTS
Use lengths of trusses, tower heights, and posts shown in the summaries for bidding purposes only. Verify these dimensions and vertical clearances prior to shop drawing production.

ITEM 658 – DELINEATOR AND OBJECT MARKER ASSEMBLIES
Installation and maintenance of portable CTB reflectors will be subsidiary to the barrier.

Flexible posts YFLX and WFLX must be tubular in shape. The "flat" flexible posts are not allowed.

ITEM 662 - WORK ZONE PAVEMENT MARKINGS
Notify the Engineer at least 24 hours in advance of work for this item.

Maintain removable and short-term markings daily. Remove within 48 hours after permanent striping has been completed.

Item 668 is not allowed for use as Item 662.

ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS
Notify the Engineer at least 24 hr. before beginning work.

Place longitudinal markings nightly for IH 35 main lanes or roadways with AADT greater than 100,000. Use of temporary flexible reflective roadway marker tabs is subsidiary and at the Contractor's option. Replace missing or damaged tabs nightly. If using tabs, place longitudinal markings weekly by 5 AM Friday for all weekday work and by 5 AM Monday for all weekend work. Failure to maintain tabs or place longitudinal markings by deadline will require nightly placement of longitudinal markings.

Place longitudinal markings no later than 7 calendar days after placement of the surface for roadways with AADT greater than 20,000.

When the raised portion of a profile marking is placed as a separate operation from the pavement marking, the raised portion must be placed first then covered with TY I.

When using black shadow to cover existing stripe apply a non-retroreflective angular abrasive bead drop. The marking color shall be adjusted to resemble the pavement color. If Item 677 is not used prior to placement of black shadow, scrape the top of the marking with a blade or large piece of equipment unless surface is a seal coat. The scraping of the marking is subsidiary.

ITEM 677 - ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS
Dispose of removed materials and debris at locations off the right of way.

Elimination using a pavement marking will not be allowed in lieu of methods listed in specification.

Remove pavement markings on concrete surfaces by a blasting method. Flail milling will be allowed when total quantity of removal on concrete surfaces is less than 1000 ft.

Strip seal is only method allowed on seal coat surface unless project includes placement of a new surface. If total quantity of removal on a seal coat surface is less than 2000 ft., elimination using a pavement marking is allowed if a test section is approved by the Engineer. Test section shall demonstrate the thermo marking color matches the existing pavement color.

Remove pavement markings outside the limits of the new surface by a blasting method.

Use a TRAIL or a non-retroreflective paint to cover stripe remnants that remain after elimination. The test requirements for these materials are waived. The paint color shall be adjusted to resemble the existing pavement color. Installation and maintenance is subsidiary.

ITEM 730 – ROADSIDE MOWING
Perform roadside mowing along the Roadway for the length of the project, as directed.
Complete spot mowing, as directed.

ITEM 734 - LITTER REMOVAL
Complete Litter Removal Cycles along the Roadway for the length of the project, as directed.

Complete Litter Removal Cycles prior to any mowing cycles.

Remove all litter on the right of way, within project limits.

ITEM 752 – TREE AND BRUSH REMOVAL
Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush even if Item 752 is not included as a pay item.

Flailing equipment is not allowed. Burning brush is not allowed in urban areas or on ROW. Use hand methods or other means of removal if doing work by mechanical methods is impractical.

Prior to begin tree pruning, send email confirmation to the Engineer that training and demonstration of work methods has been provided to the employees. This work is subsidiary.

Shredded vegetation may be blended, at a rate not to exceed 15 percent by volume, with Item 160 if the maximum dimension is not greater than 2 in.

ITEM 3084 – BONDING COURSE
The minimum application rates are listed in Table BC. Miscellaneous Tack is allowed for use with dense-graded Type B HMA. If a tack bid item is not provided, use bonding course item.

The target shear bond strengths are listed in Table BCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the

first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Emulsified Asphalt	0.06
TRAIL – Hot Asphalt	0.12
Spray Applied Underseal Membrane	0.10

Table BCS (For Informational Tests)

Material	Target Shear Bond Strength (Tex-249-F psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

ITEM 3085 – UNDERSEAL COURSE

The minimum application rates are listed in Table UC. The target shear bond strengths are listed in Table UCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table UC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Tier II emulsion	0.25
Seal Coat – Tier II asphalt	0.23

Table UCS

Material	Minimum Shear Strength (psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	40.0
All Other Materials	40.0

ITEM 6000s – ITS

Locate all utilities (public and private) prior to commencing work. The Contractor is responsible for any damages caused by failure to locate, preserve and protect existing utilities, whether underground, above ground, or overhead. Contact a utility notification center at 811, a minimum of 72 hours before starting any excavation. TxDOT facilities underground infrastructure including existing irrigation, storm drain, illumination, duct bank and associated conduit runs will not be identified by 811. The Contractor must locate these facilities before starting excavation.

Contact TxDOT/CTECC at (512) 974-0883 at least 120 hours (5 days) in advance of interrupting TxDOT existing ITS devices' communication with CTECC that would result in the elements being non-operational or offline. The Contractor shall make necessary arrangements to install temporary ITS to keep downtime to a minimum. This fiber optic backbone supports the entire region.

Field locate the TxDOT ITS duct bank and cables prior to starting any construction which impacts the existing duct bank. Every effort shall be made to protect the duct bank during construction. If the Contractor damages any duct bank/cable/conduit, the Contractor will be responsible for repairing or replacing it to the original condition.

Coordinate with TxDOT on configuration and installation of new ITS equipment to ensure system downtime is minimal. The Contractor shall give TxDOT 30 days advance notice before installing any new ITS equipment.

Network downtime may be no more than 4 hours and may only be scheduled for the weekend between hours of 10:00 PM and 5:00 AM on Saturday and Sunday only. The schedule must be coordinated and approved by TxDOT. If more than 4 hours of downtime is needed, alternative communication routes must be provided via wireless communication or temporary duct bank. The Contractor must also notify the representatives of NTTDATA, Traffic Division, Austin District Traffic Operations, CTRMA and Toll Division via emails 5 days prior to shut down for approval. Refer to table below for contact information.

Name	Organization	Email
Kevin Plumlee	TxDOT	Kevin.Plumlee@TXDOT.GOV
Douglas Turner	TxDOT	Douglas.L.Turner@TXDOT.GOV
Rodney Jones	TxDOT	Rodney.Jones@TXDOT.GOV
Heather Ashley-Nguyen	TxDOT	Heather.AshleyNguyen@TXDOT.GOV
Dana Glover	TxDOT	Dana.Glover@TXDOT.GOV
James Pennington	TxDOT	James.Pennington@TXDOT.GOV
Kevin Wanger	TxDOT	Kevin.Wanger@TXDOT.GOV
Cassie Jordan	TxDOT	Cassie.Jordan@TXDOT.GOV
Brian Fariello	TxDOT	Brian.Fariello@TXDOT.GOV
Ron Fuessel	TxDOT	Ron.Fuessel@TXDOT.GOV
Betty Farnham	TxDOT	Betty.Farnham@TXDOT.GOV
Richard Carruth	TxDOT	Richard.Carruth@TXDOT.GOV
Bill Wolff	SWRI	Bill.Wolff@SWRI.ORG
Lynne Randolph	SWRI	Lynne.Randolph@SWRI.ORG

Brent Becker	SWRI	Brent.Becker@SWRI.ORG
Linda Sexton	Toll Division	Linda.Sexton@TXDOT.GOV
James Jones	NTTDATA	James11.Jones@NTTDATA.COM
Brian Lyn-Cook	NTTDATA	Brian.Lyn-Cook@NTTDATA.COM
Faiza Kouloughli	NTTDATA	Faiza.Kouloughli@NTTDATA.COM
Lloyd Chance	CTRMA	LChance@CTRMA.ORG

Acceptable response time repair for fiber optic cables are:

- Major or backbone fiber optic cables
  - 2 hours if TxDOT was not notified before digging
  - 4 hours if marked by TxDOT
  - 8 hours if not marked by TxDOT after TxDOT was notified
- Minor fiber optic cables (CCTV, DMS, & RVSD)
  - 2 hours if TxDOT was not notified before digging
  - 8 hours if marked by TxDOT
  - 12 hours if not marked by TxDOT after TxDOT was notified

The Contractor shall protect and preserve the existing TxDOT infrastructure not affected by the construction.

Install communication cables and power cables in separate conduits unless otherwise shown on the plans.

Salvage and return any removed and unused TxDOT equipment to the TxDOT area office at TxDOT Austin District Headquarters, 7901 North IH-35, Austin, TX 78753. Provide at least 48 hours' notice prior to delivering materials. Coordinate with TxDOT CTECC personnel Rodney Jones (512) 585-3887 or Douglas Turner (512) 585-3601 before delivering this equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Provide 3 PCMS. Provide a replacement within 12 hours. PCMS will be available for traffic control, event notices, roadway conditions, service announcements, etc.

Place PCMS 10 calendar days prior to begin work stating "Road Work Begin Soon, Contact 832-7000 For Info".

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as "RIGHT LN CLOSED XXX FT".

ITEM 6007 – FIBER OPTIC CABLE
The proposed 12 SM FOC device connections shall be home run connection with no splices. Fiber splicing is allowed only for temporary construction connections and emergency repairs.

The Contractor, in consultation with the TxDOT's representative, shall connect and test the existing fiber optic cables. The Contractor is responsible for making all necessary arrangements and must comply with requirements mentioned in the TxDOT statewide approved Special Specification 6007 Intelligent Transportation System (ITS) Fiber Optic Cable.

Completely identify the fiber strands currently in use and take all precautions necessary to prevent damage or interruption to these fiber strands prior to starting any work involving the existing fiber optic cable.

Furnish all material and services necessary for connection of equipment to the fiber optic cable. Consider this work subsidiary to the pertinent Items.

Test the single mode fiber optic cable to be installed on this project at a wavelength of 1300 nanometers and 1550 nanometers.

Document all changes in the fiber optic cable utilization and provide detailed fiber optic cable utilization diagrams to the engineer upon completion of all changes.

Clearly label fiber assignments and ID for ITS field device on fiber distribution housing modules. Perform the post termination test as the fiber optic cable is being terminated or fusion spliced. The post termination tests check for attenuation and problems at the fusion or termination point and then overall fiber optic segment. It also determines whether the attenuation and quality of the termination meets the fiber optic specification. If the termination does not meet the specification, then repeat the termination until it meets the specification. Once the termination is acceptable, test the fiber segment for attenuation and anomalies. Once the fiber segment is acceptable, document the results and forward the to the Engineer.

When testing the fusion splices on pigtails, use a launch reel of the same type of fiber as the cable and pigtail being spliced. This is necessary to extend out the trace so that the fusion splice can be seen and documented properly.

ITEM 6008 - INTELLIGENT TRANSPORTATION SYSTEM (ITS) GROUND MOUNTED CABINET

For details of concrete maintenance pad at foundation, refer to TxDOT standard "ITS GROUND MOUNTED CABINET FOUNDATION DETAILS ITS (21)-15".

ITEM 6010 - CCTV FIELD EQUIPMENT

Provide CCTV cameras with the capability of broadcasting a minimum of 1 digital video stream and 1 analog video stream simultaneously. Provide CCTV cameras with cable that provides serial, video and ethernet cabling from camera to inside the CCTV Cabinet as specified in 2.4 Cabling. The serial and video cabling will be connected, the ethernet cabling will be terminated with a connector for future use but not connected.

Camera control cable is subsidiary to CCTV camera Item.

Include all incidental work, material, and services not expressly called for in the specifications, or not shown on the plans, which may be necessary for a complete and properly functioning system. This work is subsidiary.

Provide one each of CCTV camera, lens, housing, pan/tilt, controller, and any necessary cables and incidentals necessary to produce a usable video image in conjunction with the acceptance inspection for special specification Item 6064 "ITS Pole with Cabinet". Furnish material identical to those supplied for this project, conforming to the plans and specifications, and becoming the property of the State. This work is subsidiary.

ITEM 6027 – PREPARATION OF EXISTING CONDUITS, GROUND BOXES, OR MANHOLES

Install cable rack assemblies in existing ground boxes as needed. Secure fiber optic cable slack to cable rack assemblies.

The Contractor is responsible for damage done to existing cable during the preparation of existing conduit. The Contractor will repair or replace damage done to existing cables. The repairing or replacing of damage to existing cables will be done at the expense of the Contractor, and to the satisfaction of the Engineer.

Refer to Special Provision 6027-001 for adjustment of ground boxes.

ITEM 6064 – ITS POLE WITH CABINET

Furnish cabinet containing a fiber optic communication interface panel accommodating 12 single mode fibers.

For details of concrete riprap apron and step at pole foundation, refer to TxDOT standard “ITS POLE RIPRAP DETAILS ITS (7)-15”.

ITEM 6360 – ETHERNET SWITCH

Expansion Module small form-factor pluggable (SFP) ports, as a minimum, will be compatible with (8.0-8.3)/125-micron single mode fiber with SC connectors. Provide SFP transceivers with a minimum 10 km optical distance that are compatible with the Ethernet switch.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The Contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.

ITEM 6417 – SYSTEM INTEGRATION
Refer to Special Provision 6417-001 for the updates to the description, work methods and payment which were made to include CTECC systems. The integration of proposed RVSD and Wrong Way Vehicle Detection System will not apply to this project.

The Contractor must select, install and integrate the equipment and software as required to achieve a complete and fully operational traffic management system (TMS) as shown on the plans, as detailed in this Special Specification, and as directed.

ITEM 6442-RMA – REMOVE AND RELOCATE DYNAMIC MESSAGE SIGN SYSTEM
When requested by the Engineer, the Contractor shall provide a factory certified representative of the DMS equipment to be on-site during installation and testing.

The Contractor shall test and inspect the DMS sign and DMS cabinet thoroughly prior to removal and document any damage or operational issues and provide the report to the Engineer.

ITEM 6475 – HARDENED ETHERNET SWITCH
Provide all HES from the same manufacturer. Include licenses for all equipment, where required, for any software or hardware in the system.

Central Texas Regional Mobility Authority

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BARTON SKYWAY RAMP RELIEF
CONSTRUCTION PROJECT

CONTRACT NO. 22BSRR22701C

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SPECIFICATION LIST

PREFACE:

The "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges" of the Texas Department of Transportation, 2014, as amended and augmented by the Supplemental Specifications following, shall govern the performance of the Contract. These specifications hereby are made a part of the Contract as fully and with the same effect as if set forth at length herein.

Attention is directed to the fact that any other documents printed by the Texas Department of Transportation modifying or supplementing said "Standard Specifications", such as Standard Supplemental Specifications, Special Provisions (by the Department), Notice to Bidders, etc., do not form a part of this Contract nor govern its performance, unless specifically so-stated in the Supplemental Specifications herein contained.

Attention is directed to the use of “Proposal” in standard TxDOT documents included in this contract (Standard Specifications, Special Provisions, & Special Specifications) is equivalent to “Bid” in the Mobility Authority's documents. This shall be accounted for when working contract documents prepared by the Mobility Authority with those standards prepared by TxDOT.

Attention is directed to the use of “Department” in standard TxDOT documents included in this contract (Standard Specifications, Special Provisions, & Special Specifications) is equivalent to “Mobility Authority” in the Mobility Authority's documents.

References made to specific section numbers in these Special Provisions, or in any of the various documents which constitute the complete Contract Documents, shall, unless otherwise denoted, be construed as referenced to the corresponding section of the "Standard Specifications" issued by the Texas Department of Transportation in 2014.

CONTRACT NO.: 22-BSRR-227-01-C
HIGHWAY: MoPac
COUNTY: TRAVIS

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

GOVERNING SPECIFICATIONS AND SPECIAL PROVISIONS

(STANDARD SPECIFICATIONS, SPECIAL PROVISIONS, AND SPECIAL SPECIFICATIONS)

WHERE DISCREPANCIES OCCUR BETWEEN THE TECHNICAL SPECIFICATIONS, THE FOLLOWING DESCENDING ORDER OF PRIORITY SHALL GOVERN: (1) SPECIAL CONDITIONS, (2) SPECIAL PROVISIONS TO SPECIAL SPECIFICATIONS, (3) SPECIAL SPECIFICATIONS, (4) SPECIAL PROVISIONS, AND (5) STANDARD SPECIFICATIONS.

ALL SPECIFICATIONS AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT ARE IDENTIFIED AS FOLLOWS:

STANDARD SPECIFICATIONS: ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION NOVEMBER 1, 2014. STANDARD SPECIFICATIONS ARE INCORPORATED INTO THE CONTRACT BY REFERENCE.

ITEMS 1-9 GENERAL REQUIREMENTS AND COVENANTS

ITEM 100 PREPARING RIGHT OF WAY(103)

ITEM 104 REMOVING CONCRETE

ITEM 110 EXCAVATION(132)

ITEM 132 EMBANKMENT(100) (160) (204) (210) (216) (260) (400)

ITEM 134 BACKFILLING PAVEMENT EDGES(132) (300)

ITEM 161 COMPOST(160)

ITEM 164 SEEDING FOR EROSION CONTROL(162) (166) (168)

ITEM 168 VEGETATIVE WATERING

ITEM 169 SOIL RETENTION BLANKETS

ITEM 247 FLEXIBLE BASE(105) (204) (210) (216) (520)

ITEM 310 PRIME COAT(300) (316)

ITEM 354 PLANING AND TEXTURING PAVEMENT

ITEM 401 FLOWABLE BACKFILL(421)

ITEM 402 TRENCH EXCAVATION PROTECTION

ITEM 416 DRILLED SHAFT FOUNDATIONS(405) (420) (421) (423) (440) (448)

ITEM 420 CONCRETE SUBSTRUCTURES(400) (404) (421) (422) (426) (427) (440) (441) (448)

ITEM 432 RIPRAP(247) (420) (421) (431) (440)

ITEM 450 RAILING(420) (421) (422) (424) (440) (441) (442) (445) (446) (448) (540)

ITEM 464 REINFORCED CONCRETE PIPE(400) (402) (403) (467) (476)

ITEM 465 JUNCTION BOXES, MANHOLES, AND INLETS(400) (420) (421) (424) (440) (471)

ITEM 496 REMOVING STRUCTURES

ITEM 500 MOBILIZATION

ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING

ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS(161) (432) (556)

ITEM 512 PORTABLE CONCRETE TRAFFIC BARRIER(420) (421) (424) (440) (442)

ITEM 529 CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER(360) (420) (421) (440)

ITEM 540 METAL BEAM GUARD FENCE(421) (441) (445) (529)

ITEM 542 REMOVING METAL BEAM GUARD FENCE

ITEM 544 GUARDRAIL END TREATMENTS

ITEM 545 CRASH CUSHION ATTENUATORS(421)

ITEM 610 ROADWAY ILLUMINATION ASSEMBLIES(416) (421) (432) (441) (442) (445) (449) (614) (616) (618) (620) (622) (624) (628)

ITEM 618 CONDUIT(400) (476)

ITEM 620 ELECTRICAL CONDUCTORS(610) (628)

ITEM 624 GROUND BOXES(420) (421) (432) (440) (618) (620)

ITEM 628 ELECTRICAL SERVICES(441) (445) (449) (618) (620) (627) (656)

ITEM 636 SIGNS(643)

ITEM 644 SMALL ROADSIDE SIGN ASSEMBLIES(421) (440) (441) (442) (445) (636) (643) (656)

ITEM 647 LARGE ROADSIDE SIGN SUPPORTS AND ASSEMBLIES(416) (421) (440) (441) (442) (445) (636)

ITEM 650 OVERHEAD SIGN SUPPORTS(416) (420) (421) (441) (442) (445) (449) (618) (636) (654)

ITEM 658 DELINEATOR AND OBJECT MARKER ASSEMBLIES(445)

ITEM 662 WORK ZONE PAVEMENT MARKINGS(666) (668) (672) (677)

ITEM 666 RETROREFLECTORIZED PAVEMENT MARKINGS(316) (502) (662) (677) (678)

ITEM 672 RAISED PAVEMENT MARKERS(677) (678)

ITEM 677 ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS(300) (302) (316)

ITEM 730 ROADSIDE MOWING

ITEM 734 LITTER REMOVAL

SPECIAL PROVISIONS: SPECIAL PROVISIONS WILL GOVERN AND TAKE PRECEDENCE OVER THE SPECIFICATIONS ENUMERATED HEREON WHEREVER IN CONFLICT THEREWITH.

SPECIAL PROVISION TO ITEM 000 (000---001---RMA)

SPECIAL PROVISION TO ITEM 000 (000---002---RMA)

SPECIAL PROVISION TO ITEM 000 (000---008)

SPECIAL PROVISION TO ITEM 000 (000---009)

SPECIAL PROVISION TO ITEM 000 (000---011---RMA)

SPECIAL PROVISION TO ITEM 000 (000---659)

SPECIAL PROVISION TO ITEM 000 (000---954---RMA)

SPECIAL PROVISION TO ITEM 001 (001---001---RMA)

SPECIAL PROVISION TO ITEM 002 (002---005---RMA)

SPECIAL PROVISION TO ITEM 002 (002---011)

SPECIAL PROVISION TO ITEM 003 (003---005---RMA)

SPECIAL PROVISION TO ITEM 003 (003---011)

SPECIAL PROVISION TO ITEM 004 (004---001---RMA)

SPECIAL PROVISION TO ITEM 004 (005---001---RMA)

SPECIAL PROVISION TO ITEM 005 (005---002)

SPECIAL PROVISION TO ITEM 005 (005---003)

SPECIAL PROVISION TO ITEM 006 (006---001---RMA)

SPECIAL PROVISION TO ITEM 006 (006---012)

SPECIAL PROVISION TO ITEM 007 (007---003---RMA)

SPECIAL PROVISION TO ITEM 007 (007---004)

SPECIAL PROVISION TO ITEM 007 (007---005---RMA)

SPECIAL PROVISION TO ITEM 007 (007---011)

SPECIAL PROVISION TO ITEM 008 (008---001---RMA)

SPECIAL PROVISION TO ITEM 008 (008---002---RMA)

SPECIAL PROVISION TO ITEM 008 (008---003)

SPECIAL PROVISION TO ITEM 008 (008---009---RMA)

SPECIAL PROVISION TO ITEM 008 (008---030)

SPECIAL PROVISION TO ITEM 008 (008---033)

SPECIAL PROVISION TO ITEM 008 (008---045)

SPECIAL PROVISION TO ITEM 009 (009---001---RMA)

SPECIAL PROVISION TO ITEM 009 (009---011)

SPECIAL PROVISION TO ITEM 247 (247---003)

SPECIAL PROVISION TO ITEM 300 (300---020)

SPECIAL PROVISION TO ITEM 354 (354---004)

SPECIAL PROVISION TO ITEM 450 (450---001)

SPECIAL PROVISION TO ITEM 464 (464---001)

SPECIAL PROVISION TO ITEM 465 (465---001)

SPECIAL PROVISION TO ITEM 502 (502---008)

SPECIAL PROVISION TO ITEM 506 (506---005)

SPECIAL PROVISION TO ITEM 540 (540---001)

SPECIAL PROVISION TO ITEM 636 (636---001)

SPECIAL PROVISION TO ITEM 643 (643---001)

SPECIAL PROVISION TO ITEM 666 (666---007)

SPECIAL PROVISION TO ITEM 730 (730---003)

SPECIAL PROVISION TO SPECIAL SPECIFICATION 6027 (6027---001)

SPECIAL PROVISION TO SPECIAL SPECIFICATION 6185 (6185---002)

SPECIAL PROVISION TO SPECIAL SPECIFICATION 6417 (6417---001)

SPECIAL SPECIFICATIONS:

ITEM 3076	DENSE-GRADED HOT-MIX ASPHALT
ITEM 3081	THIN OVERLAY MIXTURES
ITEM 3084	BONDING COURSE
ITEM 3085	UNDERSEAL COURSE
ITEM 6000	ILLUMINATION MAINTENANCE
ITEM 6001	PORTABLE CHANGEABLE MESSAGE SIGN
ITEM 6005	TESTING, TRAINING, DOCUMENTATION, FINAL ACCEPTANCE, AND WARRANTY
ITEM 6007	INTELLIGENT TRANSPORTATION SYSTEM (ITS) FIBER OPTIC CABLE
ITEM 6008	INTELLIGENT TRANSPORTATION SYSTEM (ITS) GROUND MOUNTED CABINET
ITEM 6010	CLOSED CIRCUIT TELEVISION (CCTV) FIELD EQUIPMENT
ITEM 6027	PREPARATION OF EXISTING CONDUITS, GROUND BOXES, OR MANHOLES
ITEM 6039	OVERHEAD SIGNS
ITEM 6064	INTELLIGENT TRANSPORTATION SYSTEM (ITS) POLE WITH CABINET
ITEM 6141	EXISTING TRAFFIC MANAGEMENT EQUIPMENT
ITEM 6163	REMOVE EXISTING CABLES
ITEM 6185	TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)
ITEM 6360	ETHERNET SWITCH
ITEM 6361	MPEG 4 VIDEO ENCODER
ITEM 6417	SYSTEM INTEGRATION
ITEM 6442-RMA	REMOVE AND RELOCATE DYNAMIC MESSAGE SIGN SYSTEM
ITEM 6475	HARDENED ETHERNET SWITCH

GENERAL:

THE ABOVE-LISTED SPECIFICATION ITEMS ARE THOSE UNDER WHICH PAYMENT IS TO BE MADE. THESE, TOGETHER WITH SUCH OTHER PERTINENT ITEMS, IF ANY, AS MAY BE REFERRED TO IN THE ABOVE-LISTED SPECIFICATION ITEMS, AND INCLUDING THE SPECIAL PROVISIONS LISTED ABOVE, CONSTITUTE THE COMPLETE SPECIFICATIONS FOR THIS PROJECT.

Special Provision to Item 000
Schedule of Liquidated Damages

Final Acceptance Liquidated Damages (LD) in the amount of $3,000 per day will be assessed for each calendar day that Final Acceptance is not met per contractual requirements for Final Acceptance.

Project Substantial Completion Liquidated Damages (LD) in the amount of $6,000 per day will be assessed for each calendar day that Substantial Completion is not met per contractual requirements for Substantial Completion.

Special Provision to Item 000
Nondiscrimination

1. DESCRIPTION

The Contractor agrees, during the performance of the service under this Agreement, that the Contractor shall provide all services and activities required in a manner that complies with the Civil Rights Act of 1964, as amended, the Rehabilitation Act of 1973, Public Law 93-1122, Section 504, the provisions of the Americans with Disabilities Act of 1990, Public Law 101-336 (S.933], and all other federal and state laws, rules, regulations, and orders pertain to equal opportunity in employment, as if the Contractor were an entity bound to comply with these laws. The Contractor shall not discriminate against any employee or applicant for employment based on race, religion, color, sex, national origin, age or handicapped condition.

2. DEFINITION OF TERMS

Where the term “Contractor” appears in the following six nondiscrimination clauses, the term “Contractor” is understood to include all parties to Contracts or agreements with the Texas Department of Transportation.

3. NONDISCRIMINATION PROVISIONS

During the performance of this Contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

3.1. **Compliance with Regulations**. The Contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, the Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this Contract.

3.2. **Nondiscrimination**. The Contractor, with regard to the work performed by it during the Contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the Contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3.3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the Contractor's obligations under this Contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.

3.4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

3.5. **Sanctions for Noncompliance**. In the event of a Contractor's noncompliance with the Nondiscrimination provisions of this Contract, the Recipient will impose such Contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

- withholding payments to the Contractor under the Contract until the Contractor complies, and/or
- cancelling, terminating, or suspending a Contract, in whole or in part.

3.6. **Incorporation of Provisions**. The Contractor will include the provisions of paragraphs (3.1) through (3.6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

4. PERTINENT NONDISCRIMINATION AUTHORITIES:

During the performance of this Contract, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

4.1. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.

4.2. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

4.3. Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);

4.4. Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;

4.5. The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);

4.6. Airport and Airway Improvement Act of 1982, (49 U.S.C. § 4 71, Section 4 7123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

4.7. The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, subrecipients and Contractors, whether such programs or activities are Federally funded or not);

4.8. Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;

4.9. The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

4.10. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs,

policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

4.11. Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

4.12. Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U .S.C. 1681 et seq).

Special Provision to Item 000
Special Labor Provisions for State Projects

1. GENERAL

This is a "Public Works" Project, as provided under Government Code Title 10, Chapter 2258, "Prevailing Wage Rates," and is subject to the provisions of the Statute. No provisions in the Contract are intended to be in conflict with the provisions of the Statute.

The Texas Transportation Commission has ascertained and indicated in the special provisions the regular rate of per diem wages prevailing in each locality for each craft or type of worker. Apply the wage rates contained in the specifications as minimum wage rates for the Contract.

2. MINIMUM WAGES, HOURS AND CONDITIONS OF EMPLOYMENT

All workers necessary for the satisfactory completion of the work are within the purview of the Contract.

Whenever and wherever practical, give local citizens preference in the selection of labor.

Do not require any worker to lodge, board or trade at a particular place, or with a particular person as a condition of employment.

Do not charge or accept a fee of any from any person who obtains work on the project. Do not require any person who obtains work on the project to pay any fee to any other person or agency obtaining employment for the person on the project.

Do not charge for tools or equipment used in connection with the duties performed, except for loss or damage of property. Do not charge for necessary camp water.

Do not charge for any transportation furnished to any person employed on the project.

The provisions apply where work is performed by piece work, station work, etc. The minimum wage paid will be exclusive of equipment rental on any shipment which the worker or subcontractor may furnish in connection with his work.

Take responsibility for carrying out the requirements of this specification and ensure that each subcontractor working on the project complies with its provisions.

Any form of subterfuge, coercion or deduction designated to evade, reduce or discount the established minimum wage scales will be considered a violation of the Contract.

The Fair Labor Standards Acts (FLSA) established one and one-half (1-1/2) pay for overtime in excess of 40 hours worked in 1 week. Do not consider time consumed by the worker in going to and returning from the place of work as part of the hours of work. Do not require or permit any worker to work in excess of 40 hours in 1 week, unless the worker receives compensation at a rate not less than 1-1/2 times the basic rate of pay for all hours worked in excess of 40 hours in the workweek.

The general rates of per diem wages prevailing in this locality for each class and type of workers whose services are considered necessary to fulfill the Contract are indicated in the special provisions, and these rates govern as minimum wage rates on this Contract. A penalty of $60.00 per calendar day or portion of a calendar day for each worker that is paid less than the stipulated general rates of per diem wages for any work done under the Contract will be deducted. The Department, upon receipt of a complaint by a worker,

will determine within 30 days whether good cause exists to believe that the Contractor or a subcontractor has violated wage rate requirements and notify the parties involved of the findings. Make every effort to resolve the alleged violation within 14 days after notification. The next alternative is submittal to binding arbitration in accordance with the provisions of the Texas General Arbitration Act (Art. 224 et seq., Revised Statutes).

Notwithstanding any other provision of the Contract, covenant and agree that the Contractor and its subcontractors will pay each of their employees and contract labor engaged in any way in work under the Contract, a wage not less than what is generally known as the “federal minimum wage” as set out in 29 U.S.C. 206 as that Statute may be amended from time to time.

Pay any worker employed whose position is not listed in the Contract, a wage not less than the per diem wage rate established in the Contract for a worker whose duties are most nearly comparable.

3. RECORD AND INSPECTIONS

Keep copies of weekly payrolls for review. Require subcontractors to keep copies of weekly payrolls for review. Show the name, occupation, number of hours worked each day and per diem wage paid each worker together with a complete record of all deductions made from such wages. Keep records for a period of 3 years from the date of completion of the Contract.

Where the piece-work method is used, indicate on the payroll for each person involved:

- Quantity of piece work performed.
- Price paid per piece-work unit.
- Total hours employed.

The Engineer may require the Contractor to file an affidavit for each payroll certifying that payroll is a true and accurate report of the full wages due and paid to each person employed.

Post or make available to employees the prevailing wage rates from the Contract. Require subcontractors to post or make available to employees the prevailing wage rates from the Contract.

Special Provision to Item 000
Small Business Enterprise in State Funded Projects

1. DESCRIPTION

The purpose of this Special Provision is to carry out the Texas Department of Transportation's policy of ensuring that Small Business Enterprise (SBE) has an opportunity to participate in the performance of contracts. If the SBE goal is greater than zero, Article A of this Special Provision shall apply to this Contract; otherwise, Article B of this Special Provision applies. The percentage goal for SBE participation in the work to be performed under this contract will be shown in the proposal.

2. DEFINITIONS

Small Business Enterprise (SBE) is a firm (including affiliates) certified by the Department whose annual gross receipts do not exceed the U.S. Small Business Administration's size standards for 4 consecutive years. Firms certified as Historically Underutilized Businesses (HUBs) by the Texas Comptroller of Public Accounts and as Disadvantaged Business Enterprises (DBEs) by the Texas Uniform Certification Program automatically qualify as SBEs.

2.1. **Article A - SBE Goal is Greater than Zero.**

2.1.1. **Policy**. The Department is committed to providing contracting opportunities for small businesses. In this regard, it is the Department's policy to develop and maintain a program in order to facilitate contracting opportunities for small businesses. Consequently, the requirements of the Department's Small Business Enterprise Program apply to this contract as follows:

2.1.1.1. The Contractor shall make a good faith effort to meet the SBE goal for this contract.

2.1.1.2. The Contractor and any Subcontractors shall not discriminate on the basis of race, color, national origin, age, disability or sex in the award and performance of this contract. These nondiscrimination requirements shall be incorporated into any subcontract and purchase order.

2.1.1.3. After a conditional award is made to the low bidder, the Department will determine the adequacy of a Contractor's efforts to meet the contract goal, as is outlined under Section 2, "Contractor's Responsibilities." If the requirements of Section 2 are met, the contract will be forwarded to the Contractor for execution.

The Contractor's performance, during the construction period of the contract in meeting the SBE goal, will be monitored by the Department.

2.1.2. **Contractor's Responsibilities**. These requirements must be satisfied by the Contractor. A SBE Contractor may satisfy the SBE requirements by performing at least 25% of the contract work with its own organization as defined elsewhere in the contract.

2.1.2.1. The Contractor shall submit a completed SBE Commitment Agreement Form for each SBE they intend to use to satisfy the SBE goal so as to arrive in the Department's Office of Civil Rights (OCR) in Austin, Texas not later than 5:00 p.m. on the 10th business day, excluding national holidays, after the conditional award of the contract. When requested, additional time, not to exceed 7 business days, excluding national holidays, may be granted based on documentation submitted by the Contractor.

2.1.2.2. A Contractor who cannot meet the contract goal, in whole or in part, shall document the good faith efforts taken to meet the SBE goal. The Department will consider as good faith efforts all documented explanations

that are submitted and that describe a Contractor's failure to meet a SBE goal or obtain SBE participation, including:

2.1.2.2.1. Advertising in general circulation, trade association, and/or minority/women focus media concerning subcontracting opportunities,

2.1.2.2.2. Dividing the contract work into reasonable portions in accordance with standard industry practices,

2.1.2.2.3. Documenting reasons for rejection or meeting with the rejected SBE to discuss the rejection,

2.1.2.2.4. Providing qualified SBEs with adequate information about bonding, insurance, plans, specifications, scope of work, and the requirements of the contract,

2.1.2.2.5. Negotiating in good faith with qualified SBEs, not rejecting qualified SBEs who are also the lowest responsive bidder, and;

2.1.2.2.6. Using the services of available minorities and women, community organizations, contractor groups, local, state and federal business assistance offices, and other organizations that provide support services to SBEs.

2.1.2.3. The good faith effort documentation is due at the time and place specified in Subarticle 2.(a). of this Special Provision. The Director of the DBE & SBE Programs Section will evaluate the Contractor's documentation. If it is determined that the Contractor has failed to meet the good faith effort requirements, the Contractor will be given an opportunity for reconsideration by the Department.

2.1.2.4. Should the bidder to whom the contract is conditionally awarded refuse, neglect or fail to meet the SBE goal and/or demonstrate to the Department's satisfaction sufficient efforts to obtain SBE participation, the proposal guaranty filed with the bid shall become the property of the State, not as a penalty, but as liquidated damages to the Department.

2.1.2.5. The Contractor must not terminate a SBE subcontractor submitted on a commitment agreement for a contract with an assigned goal without the prior written consent of the Department.

2.1.2.6. The Contractor shall designate a SBE contact person who will administer the Contractor's SBE program and who will be responsible for submitting reports, maintaining records, and documenting good faith efforts to use SBEs.

2.1.2.7. The Contractor must inform the Department of the representative's name, title and telephone number within 10 days of beginning work.

2.1.3. **Eligibility of SBEs.**

2.1.3.1. The Department certifies the eligibility of SBEs.

2.1.3.2. The Department maintains and makes available to interested parties a directory of certified SBEs.

2.1.3.3. Only firms certified at the time of letting or at the time the commitments are submitted are eligible to be used in the information furnished by the Contractor required under Section 2.(a) above.

2.1.3.4. Certified HUBs and DBEs are eligible as SBEs.

2.1.3.5. Small Business Size Regulations and Eligibility is referenced on e-CFR (Code of Federal Regulations), Title 13 – Business Credit and Assistance, Chapter 1 – Small Business Administration, Part 121 – Small Business Size Regulations, Subpart A – Size Eligibility Provisions and Standards.

2.1.4. **Determination of SBE Participation**. SBE participation shall be counted toward meeting the SBE goal in this contract in accordance with the following:

2.1.4.1. A Contractor will receive credit for all payments actually made to a SBE for work performed and costs incurred in accordance with the contract, including all subcontracted work.

2.1.4.2. A SBE Contractor or subcontractor may not subcontract more than 75% of a contract. The SBE shall perform not less than 25% of the value of the contract work with its own organization.

2.1.4.3. A SBE may lease equipment consistent with standard industry practice. A SBE may lease equipment from the prime contractor if a rental agreement, separate from the subcontract specifying the terms of the lease arrangement, is approved by the Department prior to the SBE starting the work in accordance with the following:

2.1.4.3.1. If the equipment is of a specialized nature, the lease may include the operator. If the practice is generally acceptable with the industry, the operator may remain on the lessor's payroll. The operator of the equipment shall be subject to the full control of the SBE, for a short term, and involve a specialized piece of heavy equipment readily available at the job site.

2.1.4.3.2. For equipment that is not specialized, the SBE shall provide the operator and be responsible for all payroll and labor compliance requirements.

2.1.5. **Records and Reports**.

2.1.5.1. The Contractor shall submit monthly reports, after work begins, on SBE payments, (including payments to HUBs and DBEs). The monthly reports are to be sent to the Area Engineer's office. These reports will be due within 15 days after the end of a calendar month.

These reports will be required until all SBE subcontracting or supply activity is completed. The "SBE Progress Report" is to be used for monthly reporting. Upon completion of the contract and prior to receiving the final payment, the Contractor shall submit the "SBE Final Report" to the Office of Civil Rights and a copy to the Area Engineer. These forms may be obtained from the Office of Civil Rights and reproduced as necessary. The Department may verify the amounts being reported as paid to SBEs by requesting, on a random basis, copies of invoices and cancelled checks paid to SBEs. When the SBE goal requirement is not met, documentation supporting Good Faith Efforts, as outlined in Section 2.(b) of this Special Provision, must be submitted with the Final Report.

2.1.5.2. SBE subcontractors and/or suppliers should be identified on the monthly report by SBE certification number, name and the amount of actual payment made to each during the monthly period. **These reports are required regardless of whether or not SBE activity has occurred in the monthly reporting period.**

2.1.5.3. All such records must be retained for a period of 3 years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Department.

2.1.6. **Compliance of Contractor**. To ensure that SBE requirements of this contract are complied with, the Department will monitor the Contractor's efforts to involve SBEs during the performance of this contract. This will be accomplished by a review of monthly reports submitted by the Contractor indicating his progress in achieving the SBE contract goal and by compliance reviews conducted by the Department.

A Contractor's failure to comply with the requirements of this Special Provision shall constitute a material breach of this contract. In such a case, the Department reserves the right to employ remedies as the Department deems appropriate in the terms of the contract.

2.2. **Article B - No SBE Goal**.

2.2.1. **Policy**. It is the policy of the Department that SBEs shall have an opportunity to participate in the performance of contracts. Consequently, the requirements of the Department's Small Business Enterprise Program apply to this contract as specified in Section 2-5 of this Article.

2.2.2. **Contractor's Responsibilities**. If there is no SBE goal, the Contractor will offer SBEs an opportunity to participate in the performance of contracts and subcontracts.

2.2.3. **Prohibit Discrimination**. The Contractor and any subcontractor shall not discriminate on the basis of race, color, national origin, religion, age, disability or sex in the award and performance of contracts. These nondiscrimination requirements shall be incorporated into any subcontract and purchase order.

2.2.4. **Records and Reports**.

2.2.4.1. The Contractor shall submit reports on SBE (including HUB and DBE) payments. The reports are to be sent to the Area Engineer's office. These reports will be due annually by the 31st of August or at project completion, whichever comes first.

These reports will be required until all SBE subcontracting or supply activity is completed. The "SBE Progress Report" is to be used for reporting. Upon completion of the contract and prior to receiving the final payment, the Contractor shall submit the "SBE Final Report" to the Office of Civil Rights and a copy to the Area Engineer. These forms may be obtained from the Office of Civil Rights and reproduced as necessary. The Department may verify the amounts being reported as paid to SBEs by requesting copies of invoices and cancelled checks paid to SBEs on a random basis.

2.2.4.2. SBE subcontractors and/or suppliers should be identified on the report by SBE Certification Number, name and the amount of actual payment made.

2.2.4.3. All such records must be retained for a period of 3 years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Department.

Special Provision to Item 000
Buy America

Steel and iron products to be incorporated into the project must be of domestic origin. All manufacturing processes for steel and iron products to be incorporated into the project must take place domestically, including donated material.

Reminders:

Depending on the Steel/iron item received at the project, described below are the requirements for acceptance.

1. **Steel and Iron Items Inspected and Tested by CSTIM&P**

- The project engineer receives CST/M&P Structural Test Reports as proof of compliance with the requirements of the specification.
- CST/M&P obtains from the supplier a completed Form 1818 (D-9-USA-1), "Material Statement" with attached MTRs, certifications, galvanizing reports, etc.

2. **Steel and Iron Items Received and Sampled by the Project Engineer for Testing by CSTIM&P**

- The project engineer submits samples with the required documentation obtained from the supplier (completed Form 1818 (D-9-USA-1) with attached MTRs, certifications, galvanizing reports, etc.) to CST/M&P for testing.
- CSTM&P issues a CST/M&P General Test Report for all passing material (proof of compliance with the requirements of the specifications).

3. **Steel and Iron Items Received, Inspected, and Accepted by the Project Engineer**

- The project engineer obtains from the supplier the completed Form 1818 (D-9-USA-1) with attached MTRs, certifications, galvanizing reports, etc.
- CST/M&P assists the project engineer when requested.

4. **Steel and Iron Items Received from Regional or District Warehouse (Pretested) Stock**

- The project engineer obtains documentation verifying the material was obtained from a regional or district warehouse.
- CSTM&P, when requested to inspect and test, obtains from the supplier the completed Form 1818 (D-9-USA-1) with attached MTRs, etc.

Special Provision 000
Notice of Contractor Performance Evaluations

1. GENERAL

In accordance with Texas Transportation Code §223.012, the Engineer will evaluate Contractor performance based on quality, safety, and timeliness of the project.

2. DEFINITIONS

2.1. **Project Recovery Plan (PRP)**—a formal, enforceable plan developed by the Contractor, in consultation with the District, that documents the cause of noted quality, safety, and timeliness issues and specifies how the Contractor proposes to correct project-specific performance deficiencies.

In accordance with Title 43, Texas Administrative Code (TAC), §9.23, the District will request a PRP if the Contractor's performance on a project is below the Department's acceptable standards and will monitor the Contractor's compliance with the established plan.

2.2. **Corrective Action Plan (CAP)**—a formal, enforceable plan developed by the Contractor, and proposed for adoption by the Construction or Maintenance Division, that documents the cause of noted quality, safety, and timeliness issues and specifies how the Contractor proposes to correct statewide performance deficiencies.

In accordance with 43 TAC §9.23, the Division will request a CAP if the average of the Contractor's statewide final evaluation scores falls below the Department's acceptable standards for the review period and will monitor the Contractor's compliance with the established plan.

3. CONTRACTOR EVALUATIONS

In accordance with Title 43, Texas Administrative Code (TAC) §9.23, the Engineer will schedule evaluations at the following intervals, at minimum:

- Interim evaluations—at or within 30 days after the anniversary of the notice to proceed, for Contracts extending beyond 1 yr., and
- Final evaluation—upon project closeout.

In case of a takeover agreement, neither the Surety nor its performing Contractor will be evaluated.

In addition to regularly scheduled evaluations, the Engineer may schedule an interim evaluation at any time to formally communicate issues with quality, safety, or timeliness. Upon request, work with the Engineer to develop a PRP to document expectations for correcting deficiencies.

Comply with the PRP as directed. Failure to comply with the PRP may result in additional remedial actions available to the Engineer under Item 5, "Control of the Work." Failure to meet a PRP to the Engineer's satisfaction may result in immediate referral to the Performance Review Committee for consideration of further action against the Contractor.

The Engineer will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards or comply with a PRP, including consideration of sufficient time.

Follow the escalation ladder if there is a disagreement regarding an evaluation or disposition of a PRP. The Contractor may submit additional documentation pertaining to the dispute. The District Engineer's decision

on a Contractor's evaluation score and recommendation of action required in a PRP or follow up for non-compliance is final.

4. DIVISION OVERSIGHT

Upon request of the Construction or Maintenance Division, develop and submit for Division approval a proposed CAP to document expectations for correcting deficiencies in the performance of projects statewide.

Comply with the CAP as directed. The CAP may be modified at any time up to completion or resolution after written approval of the premise of change from the Division. Failure to meet an adopted or revised adopted CAP to the Division's satisfaction within 120 days will result in immediate referral to the Performance Review Committee for consideration of further action against the Contractor.

The Division will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards or comply with a CAP, including consideration of sufficient time and associated costs as appropriate.

5. PERFORMANCE REVIEW COMMITTEE

The Performance Review Committee, in accordance with 43 TAC §9.24, will review at minimum all final evaluations, history of compliance with PRPs, any adopted CAPs including agreed modifications, any information about events outside a Contractor's control contributing to the Contractor's performance, and any documentation submitted by the Contractor and may recommend one or more of the following actions:

- take no action,
- reduce the Contractor's bidding capacity,
- prohibit the Contractor from bidding on one or more projects,
- immediately suspend the Contractor from bidding for a specified period of time, by reducing the Contractor's bidding capacity to zero, or
- prohibit the Contractor from being awarded a Contract on which they are the apparent low bidder.

The Deputy Executive Director will determine any further action against the Contractor.

6. APPEALS PROCESS

In accordance with 43 TAC §9.25, the Contractor may appeal remedial actions determined by the Deputy Executive Director.

Special Provision 000
Certificate of Interested Parties (Form 1295)

Submit a Form 1295, "Certificate of Interested Parties," in the following instances:

- at contract execution for contracts awarded by the Mobility Authority;
- at any time there is an increase of $300,000 or more to an existing contract (change orders, extensions, and renewals); or
- at any time there is a change to the information in Form 1295, when the form was filed for an existing contract.

Form 1295 and instructions on completing and filing the form are available on the Texas Ethics Commission website.

Special Provision to Item 1
Abbreviations and Responsibilities

Item 1, "Abbreviations and Definitions," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 1. is supplemented with the following:

1.0. General Statement:

For this Contract, the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, November 1, 2014 (the "Texas Standard Specifications"), all documents referenced therein, and all manuals, bulletins, supplements, specifications, and similar materials issued by the Texas Department of Transportation ("TxDOT"), or any predecessor or successor thereto, which are applicable to this Contract, are hereby modified with respect to the terms cited below and no others are changed hereby.

> The term "State", "State of Texas", "State Highway Agency", "State Highway Department Of Texas", "State Department of Highways and Public Transportation", "Texas State Department Of Highways and Public Transportation", "Texas Department of Transportation", "Department", "Texas Turnpike Authority", "State Department of Highways and Public Transportation Commission", "Texas Department of Transportation Commission", "Texas Transportation Commission", or "State Highway Commission", shall, in the use of The Texas Standard Specifications, Special Provisions and Special Specifications and General Notes and Specification Data pertaining thereto, and required contract provisions for Federal-Aid construction contracts, for all work in connection with Central Texas Regional Mobility Authority, projects and all extensions enlargements, expansions, improvements, and rehabilitations thereto, be deemed to mean Central Texas Regional Mobility Authority, unless the context clearly indicates a contrary meaning.

Article 2, "Abbreviations," is supplemented with the following:

> CTRMA Central Texas Regional Mobility Authority

Article 3.28., "Commission", is voided and replaced by the following:

> 3.28. Commission. The Central Texas Regional Mobility Authority Board or authorized representative.

Article 3.32., "Construction Contract", is voided and replaced by the following:

> 3.32. Construction Contract. The agreement between the Central Texas Regional Mobility Authority and the Contractor establishing the obligations of the parties for furnishing of materials and performance of the work prescribed in the Contract Documents.

Article 3.45., "Debar (Debarment)", is voided and replaced by the following:

> 3.45. Debar (Debarment). Action taken by the Mobility Authority, federal government or state government pursuant to regulation that prohibits a person or company from entering into a Contract, or from participating as a subcontractor, or supplier of materials or equipment used in a highway improvement Contract as defined in Transportation Code, Chapter 223, Subchapter A.

Article 3.47., "Department", is voided and replaced by the following:

3.47. Department. Central Texas Regional Mobility Authority, unless the context clearly indicates a contrary intent and meaning.

Article 3.48., "Departmental Material Specifications", is voided and replaced by the following:

3.48. Departmental Material Specifications (DMS). Reference specifications for various materials published by the Texas Department of Transportation Construction Division.

Article 3.54., "Engineer", is hereby deleted and replaced by the following:

3.54 Engineer. The Central Texas Regional Mobility Authority Coordinator or their duly authorized representative.

Article 3.73., "Letting Official", is hereby deleted and replaced by the following:

3.73. Letting Official. An employee of the Central Texas Regional Mobility Authority empowered by the Central Texas Regional Mobility Authority to officially receive bids and close the receipt of bids at a letting.

Article 3.79., "Manual of Testing Procedures", is voided and replaced by the following:

3.79. Manual of Testing Procedures. Texas Department of Transportation manual outlining test methods and procedures maintained by the Materials and Pavements Section of the Construction Division.

Article 3.102., "Proposal Form", is voided and replaced by the following:

3.012. Proposal Form. The document issued by the Central Texas Regional Mobility Authority for a proposed Contract that includes:

- the specific locations (except for non-site-specific work) and description of the proposed work;
- an estimate of the various quantities and kinds of work to be performed or materials to be furnished;
- a schedule of items for which unit prices are requested;
- the number of working days within which the work is to be completed (or reference to the requirements); and
- the special provisions and special specifications applicable to the proposed Contract.

Article 3.108., "Referee Tests", is voided and replaced by the following:

3.108. Referee Tests. Tests requested to resolve differences between Contractor and Engineer test results. The referee laboratory is the Texas Department of Transportation Construction Division Materials and Pavement Section, or mutually agreed to 3rd party commercial laboratory.

Article 3.129., "State", is voided and replaced by the following:

3.129. State. Central Texas Regional Mobility Authority.

3.156. Mobility Authority. The Central Texas Regional Mobility Authority, an agency created under Texas Transportation Code Chapter 370 and approved by the Texas Transportation Commission, together with its members, partners, employees, agents officers, directors, shareholders, representatives, consultants, successors, and assigns. The Mobility Authority's principal office is presently located at 3300 N. I-35, Suite 300, Austin, Texas 78705.

3.157. Bid Form. The form provided by the Mobility Authority used by the bidder to submit a bid. Electronic bid forms for the project shall be submitted via the project's CivCast website.

3.158. Full Completion of all Work (or to Fully Complete all Work). The completion of all work specified under this Contract as evidenced by the Formal Acceptance thereof by the Mobility Authority.

3.159. Standards. Whenever the Plans and/or Specifications refer to "Standard Sheets" or "Design Details" such reference shall be construed to mean the set of drawings issued by the Design Divisions, Texas Department of Transportation, and entitled "Standard Sheets". Only those standards or standard drawings specifically referred to by number on the Plans or in the various Contract Documents are applicable to work on this Contract.

Whenever in the various Contract Documents term, "Department" or "State" appears, it shall be replaced by the term," Central Texas Regional Mobility Authority." Similarly, the term, "Executive Director" shall be replaced by the term, "Central Texas Regional Mobility Authority Coordinator".

Whenever in the Texas Department of Transportation Specifications and Standard Drawings the term, "Department" or "Texas Department of Transportation" appears, it shall be replaced by the term, "Central Texas Regional Mobility Authority," except in references to said Texas Department of Transportation as being the author of certain Specifications and Standard Drawings, and in reference to said Department as the agency prequalifying prospective Bidders.

Whenever in the Texas Department of Transportation Specifications and Standard Drawing the term, "District Engineer" appears, it shall be replaced by the term, "Central Texas Regional Mobility Authority Coordinator.

3.160. Substantial Completion. Substantial Completion shall be defined as occurring when all of the following conditions are met:

- All project work requiring lane or shoulder closures or obstructions is completed, and traffic is utilizing the lane arrangement as shown on the plans for the finished roadway.
- All signs, traffic control devices, and pavement markings are in their final position at this time.
- All sidewalks are opened for public use.

3.161. Provisional Award. Award given by the Mobility Authority to the Contractor after the Board of Directors approves the contract and is contingent on TxDOT approval. The Contractor is not required to provide bonds, insurance or their SBE Commitment Agreement Form.

Special Provision to Item 2
Instructions to Bidders

Item 2, "Instructions to Bidders" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 2.3., "Issuing Proposal Forms," first two sentences are replaced with the following:

Mobility Authority will issue an Official Bid Form to a prequalified Bidders. The online bid form will be made available to the prequalified bidders on the CivcastUSA website: https://www.civcastusa.com/project/61cc77d0ce70836917b124f0/summary

Prequalification requirements:

- Be registered with State of Texas,
- Be fully prequalified by Texas Department of Transportation (TxDOT),
- Have a bidding capacity per TxDOT prequalification system of $6,000,000,
- Email a valid Non-Collusion Affidavit, Debarment Affidavit, Certification to Not Boycott Israel, Certification to Not Boycott Energy Companies, Certification to Not Discriminate Against Firearm Entities or Firearm Trade Associations, and Child Support Statement to Marco.Castro@atkinsglobal.com and Zane.Reid@atkinsglobal.com and include a phone number, email address and physical address for point of contact.

Article 2.3., "Issuing Proposal Forms," is supplemented by the following:

The Department may not issue a proposal form if one or more of the following apply:

- The Contractor has been defaulted in accordance with Article 8.7., "Default of Contract" (a default for performance) on a previous Contract with the Department within the last 3 years
- The Contractor is not in compliance with Texas Government Code Sections 2155.089 and 2262.055.

Special Provision to Item 2
Instructions to Bidders

Item 2, "Instructions to Bidders," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 2.3., "Issuing Proposal Forms," is supplemented by the following:

- the Bidder or affiliate of the Bidder that was originally determined as the apparent low Bidder on a project, but was deemed nonresponsive for failure to register or participate in the Department of Homeland Security's (DHS) E-Verify system as specified in Article 2.15., "Department of Homeland Security (DHS) E-Verify System," is prohibited from rebidding that specific project.

Article 2.7., "Nonresponsive Bid," is supplemented by the following:

- the Bidder failed to participate in the Department of Homeland Security's (DHS) as specified in Article 2.15., "Department of Homeland Security (DHS) E-Verify System."

Article 2.15., "Department of Homeland Security (DHS) E-Verify System," is added.

The Department will not award a Contract to a Contractor that is not registered in the DHS E-Verify system. Remain active in E=Verify throughout the life of the contract. In addition, in accordance with paragraph six of Article 8.2, "Subcontracting," include this requirement in all subcontracts and require that subcontractors remain active in E-Verify until their work is completed.

If the apparent low Bidder does not appear on the DHS E-Verify system prior to award, the Department will notify the Contractor that they must submit documentation showing that they are compliant within 5-business days after the date the notification was sent. A Contractor who fails to comply or respond within the deadline will be declared non-responsive and the Department will execute the proposal guaranty. The proposal guaranty will become the property of the State, not as a penalty, but as liquidated damages. The Bidder forfeiting the proposal guaranty will not be considered in future proposals for the same work unless there has been a substantial change in the scope of the work.

The Department may recommend that the Commission:

- reject all bids, or
- award the Contract to the new apparent low Bidder, if the Department is able to verify the Bidder's participation in the DHS E-verify system. For the Bidder who is not registered in E-Verify, the Department will allow for one business day after notification to provide proof of registration.

If the Department is unable to verify the new apparent low Bidder's participation in the DHS E-Verify system within one calendar day:

- the new apparent low Bidder will not be deemed nonresponsive,
- the new apparent low Bidder's guaranty will not be forfeited,
- the Department will reject all bids, and
- the new apparent low Bidder will remain eligible to receive future proposals for the same project.

Special Provision to Item 3
Award and Execution of Contract

Item 3, "Award and Execution of Contract" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 1, "Award of Contract," is deleted in its entirety and replaced with the following:

The Mobility Authority will award or reject the Contract within 60 calendar days after the opening of the proposal at the sole discretion of the Mobility Authority.

Article 4.3., "Insurance," is supplemented by the following:

The Contractor shall be the named insured, and the following entities shall be additional insureds on a primary and non-contributory basis: Central Texas Regional Mobility Authority, Texas Department of Transportation.

These entities shall be additional insureds to this policy with respect to liability arising out of the acts, errors, and omissions of any member of the Contractor and Subcontractors whether occurring on or off of the site, notwithstanding any other provisions of the Contract Documents, the project policy shall not be canceled, except for non-payment of premium, fraud, material misrepresentation, or noncompliance with reasonable loss control recommendations.

The Authority Board, the Authority, Texas Department of Transportation, the State of Texas, the Commission and their respective successors, assigns, officeholders, officers, directors, commissioners, consultants and employees shall be listed as "additional insureds" with respect to any insurance for which the contractor must obtain an "additional insured" rider or amendment.

Table 2 is deleted in its entirety and replaced with the following:

Type of Insurance	Amount of Coverage
Commercial General Liability Insurance	Including products/completed operations liability and contractual liability , in the amount of $1,000,000 per occurrence for bodily injury and property damage
Business Automobile Policy	In the amount of $1,000,000 per occurrence for bodily injury and property damage
Workers' Compensation	Providing statutory benefits, and Employers Liability with limits of $1,000,000
Excess Liability Insurance	In the amount of $5,000,000 per occurrence and aggregate

Special Provision to Item 3
Award and Execution Contract

Item 3, Award and Execution of Contract," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 4.3, "Insurance." The first sentence is voided and replaced by the following:

For construction and building Contracts, submit a certificate of insurance showing coverages in accordance with Contract requirements. For routine maintenance Contracts, refer to Article 8, "Beginning of Work."

Article 8, "Beginning of Work." The first sentence is supplemented by the following:

For a routine maintenance Contract, do not begin work until a certificate of insurance showing coverages in accordance with the Contract requirements is provided and accepted.

Special Provision to Item 4
Scope of Work

Item 4, "Scope of Work," of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 4.4., "Changes in the Work," Delete the following paragraph:

> "If the changes in quantities or the alternations do not significantly change the character of the work under the Contract, the altered work will be paid for at the Contract unit price. If the changes in quantities or the alterations significantly change the character of the work, the Contract will be amended by a change order. If no unit price exists, this will be considered extra work and the Contract will be amended by a change order. Provide cost justification as requested, in an acceptable format. Payment will not be made for anticipated profits on work that is eliminated."

and replace with the following:

> "The Engineer may require deviations to the Work through a written directive. Payment for the deviations and quantity overruns will be made through the Contingency Allowance. Deviations and quantity overruns will be paid for at the unit prices submitted at the bidding stage. Deviations requiring new unit prices will be negotiated and made through the Contingency Allowance. Costs exceeding the Contingency Allowance will be addressed using the change order process.
>
> Upon completion of the Work, the total contract value will be adjusted to provide for the difference, if any, between the total amount of expenditures from the Contingency Allowance and the original amount of the Contingency Allowance. The Contractor is not entitled to all or any part of an unexpended balance of the Contingency Allowance.
>
> When changes are made that do not fall under the Contingency Allowance, the Contract will be amended by a Change Order. Provide cost justification as requested, in an acceptable format. Payment will not be made for anticipated profits on work that is eliminated."

Article 4.6., "Requests for Additional Compensation and Damages," is supplemented by the following:

> "Contractor shall not be eligible for Change Order(s) for additional compensation for additional costs, including costs for developing and executing a Recovery Schedule(s), and delay and disruption damages, or additional Days incurred directly or indirectly from the virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease known as COVID-19, including any disruptions to, and delays or interruptions in, construction of the Project in accordance with the Contract and any approved Baseline Schedule."

Special Provision to Item 5
Control of the Work

Item 5, “Control of the Work,” of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 5.12., “Final Acceptance,” is supplemented by the following:

Contractor warrants all materials and workmanship and that the work is in conformance with the Bid Documents and Plans included in this Contract for a period of one year from the date of the Certificate of Final Acceptance of the entire project. Said warranty binds Contractor to correct any work that does not conform with such Bid Documents and Plans or defects in workmanship or materials furnished under this Contract which may be discovered within said one year period. Contractor must, at its own expense, correct any such defect within 30 days after receiving written notice of such defect from Mobility Authority by repairing the same to the condition called for in the Contract. Should Contractor fail or refuse to repair such defect within said 30-day period or to provide acceptable assurances that such repair work will be completed within a reasonable time thereafter, Mobility Authority may repair or cause to be repaired any such defect by calling the Contractor’s Warranty Bond.

Special Provision to Item 5
Control of the Work

Item 5, "Control of the Work," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 5.1, "Authority of Engineer," is voided and replaced by the following.

The Engineer has the authority to observe, test, inspect, approve, and accept the work. The Engineer decides all questions about the quality and acceptability of materials, work performed, work progress, Contract interpretations, and acceptable Contract fulfillment. The Engineer has the authority to enforce and make effective these decisions.

The Engineer acts as a referee in all questions arising under the terms of the Contract. The Engineer's decisions will be final and binding.

The Engineer will pursue and document actions against the Contractor as warranted to address Contract performance issues. Contract remedies include, but are not limited to, the following:

- conducting interim performance evaluations requiring a Project Recovery Plan, in accordance with Title 43, Texas Administrative Code (TAC) §9.23,
- requiring the Contractor to remove and replace defective work, or reducing payment for defective work,
- removing an individual from the project,
- suspending the work without suspending working day charges,
- assessing standard liquidated damages to recover the Department's administrative costs, including additional project-specific liquidated damages when specified in the Contract in accordance with 43 TAC §9.22,
- withholding estimates,
- declaring the Contractor to be in default of the Contract, and
- in case of a Contractor's failure to meet a Project Recovery Plan, referring the issue directly to the Performance Review Committee for consideration of further action against the Contractor in accordance with 43 TAC §9.24.

The Engineer will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards, including consideration of sufficient time.

Follow the issue escalation ladder if there is disagreement regarding the application of Contract remedies.

Special Provision to Item 5
Control of the Work

Item 5, “Control of the Work” of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 5.4, “Coordination of Plans, Specifications, and Special Provisions,” the last sentence of the last paragraph is replaced by the following:

Failure to promptly notify the Engineer will constitute a waiver of all contract claims against the Department for misunderstandings or ambiguities that result from the errors, omissions, or discrepancies.

Special Provision to Item 6
Control of Materials

For this project, Item 6, "Control of Materials," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 1., "Source Control," is supplemented by the following:

The use of convict-produced materials is prohibited per 23 CFR 635.417.

There shall be no local preference for the purchasing of materials.

Article 4., "Sampling, Testing, and Inspection," is supplemented by the following:

Quality Control testing of all materials, construction items, or products incorporated in the work shall be performed by the Contractor according to the contract specifications at the Contractor's expense.

Quality Assurance sampling and testing for acceptance will be performed by the Mobility Authority's Construction Representative/Observer in accordance with the Quality Control (QC) / Quality Assurance (QA) program outlined in the Quality Assurance Plan (QAP). The cost of such tests will be incurred by the Mobility Authority and coordinated by the Mobility Authority's Construction Representative/Observer through funds made available to the Construction Representative/Observer under his/her agreement with the Mobility Authority for the professional services related to construction engineering and inspection on the Project.

Special Provision to Item 6
Control of Materials

Item 6, "Control of Materials" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 6.10., "Hazardous Materials," is voided and replaced by the following:

Comply with the requirements of Article 7.12., "Responsibility for Hazardous Materials."

Notify the Engineer immediately when a visual observation or odor indicates that materials on sites owned or controlled by the Department may contain hazardous materials. Except as noted herein, the Department is responsible for testing, removing, and disposing of hazardous materials not introduced by the Contractor. The Engineer may suspend work wholly or in part during the testing, removing, or disposing of hazardous materials, except in the case where hazardous materials are introduced by the Contractor.

Use materials that are free of hazardous materials. Notify the Engineer immediately if materials are suspected to contain hazardous materials. If materials delivered to the project by the Contractor are suspected to contain hazardous materials, have an approved commercial laboratory test the materials for the presence of hazardous materials as approved. Remove, remediate, and dispose of any of these materials found to contain hazardous materials. The work required to comply with this section will be at the Contractor's expense if materials are found to contain hazardous materials. Working day charges will not be suspended and extensions of working days will not be granted for activities related to handling hazardous material introduced by the Contractor. If suspected materials are not found to contain hazardous materials, the Department will reimburse the Contractor for hazardous materials testing and will adjust working day charges if the Contractor can show that this work impacted the critical path.

10.1. Painted Steel Requirements. Coatings on existing steel contain hazardous materials unless otherwise shown on the plans. Remove paint and dispose of steel coated with paint containing hazardous materials is in accordance with the following:

10.1.1. Removing Paint From Steel For contracts that are specifically for painting steel, Item 446, "Field Cleaning and Painting Steel" will be included as a pay item. Perform work in accordance with that item.

For projects where paint must be removed to allow for the dismantling of steel or to perform other work, the Department will provide for a separate contractor (third party) to remove paint containing hazardous materials prior to or during the Contract. Remove paint covering existing steel shown not to contain hazardous materials in accordance with Item 446, "Field Cleaning and Painting Steel."

10.1.2. Removal and Disposal of Painted Steel. For steel able to be dismantled by unbolting, paint removal will not be performed by the Department. The Department will remove paint, at locations shown on the plans or as agreed, for the Contractor's cutting and dismantling purposes. Utilize Department cleaned locations for dismantling when provided or provide own means of dismantling at other locations.

Painted steel to be retained by the Department will be shown on the plans. For painted steel that contains hazardous materials, dispose of the painted steel at a steel recycling or smelting facility unless otherwise shown on the plans. Maintain and make available to the Engineer invoices and other records obtained from the facility showing the received weight of the steel and the facility name. Dispose of steel that does not contain hazardous material coatings in accordance with federal, state and local regulations.

10.2. Asbestos Requirements. The plans will indicate locations or elements where asbestos containing materials (ACM) are known to be present. Where ACM is known to exist or where previously unknown ACM has been found, the Department will arrange for abatement by a separate contractor prior to or during the Contract. Notify the Engineer of proposed dates of demolition or removal of structural elements with ACM at least 60 days before beginning work to allow the Department sufficient time for abatement.

The Department of State Health Services (DSHS), Asbestos Programs Branch, is responsible for administering the requirements of the National Emissions Standards for Hazardous Air Pollutants, 40 CFR Part 61, Subpart M and the Texas Asbestos Health Protection Rules (TAHPR). Based on EPA guidance and regulatory background information, bridges are considered to be a regulated "facility" under NESHAP. Therefore, federal standards for demolition and renovation apply.

The Department is required to notify the DSHS at least 10 working days (by postmarked date) before initiating demolition or renovation of each structure or load bearing member shown on the plans. If the actual demolition or renovation date is changed or delayed, notify the Engineer in writing of the revised dates in sufficient time to allow for the Department's notification to DSHS to be postmarked at least 10 days in advance of the actual work.

Failure to provide the above information may require the temporary suspension of work under Article 8.4., "Temporary Suspension of Work or Working Day Charges," due to reasons under the control of the Contractor. The Department retains the right to determine the actual advance notice needed for the change in date to address post office business days and staff availability.

10.3. Lead Abatement. Provide traffic control as shown on the plans, and coordinate and cooperate with the third party and the Department for managing or removing hazardous materials. Work for the traffic control shown on the plans and coordination work will not be paid for directly but will be subsidiary to pertinent Items.

Special Provision to Item 7
Legal Relations and Responsibilities

Item 7, "Legal Relations and Responsibilities" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 7.3., "Laws To Be Observed", Article 7.5., "Patented Devices", Article 7.12., "Responsibility For Hazardous Materials", and Article 7.15., "Responsibility For Damage Claims", "State" is voided and replaced by "Central Texas Regional Mobility Authority and TxDOT".

Article 7.3., "Laws To Be Observed," is supplemented by the following:

By entering into Contract, the Contractor agrees to provide or make available to the Department records, including electronic records related to the Contract for a period of 3 years after the final payment. No person or entity other than TxDOT may claim third -party beneficiary status under this Contract or any of its provisions, nor may any non-party sue for personal injuries or property damage under this Contract.

Article 7.15., "Responsibility For Damage Claims," the last paragraph is deleted and not replaced.

Special Provision to Item 7
Legal Relations and Responsibilities

Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 7.7.2., "Texas Pollutant Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention Plans (SWP3)," is voided and replaced by the following:

7.2. Texas Pollution Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention Plans (SWP3).

7.2.1. Projects with less than one acre of soil disturbance including required associated project specific locations (PSL's) per TPDES GP TXR 150000.

No posting or filing will be required for soil disturbances within the right of way. Adhere to the requirements of the SWP3.

7.2.2. Projects with one acre but less than five acres of soil disturbance including required associated PSL's per TPDES GP TXR 150000.

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activity in the right of way. The Department will post a small site notice along with other requirements as defined in TPDES GP TXR 150000 as the entity of having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a Primary Operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activity in the right of way. In addition to the Department's actions, the Contractor will post a small site notice along with other requirements as defined in TPDES GP TXR 150000 as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans. The Contractor will be responsible for Implement the SWP3 for the project site in accordance with the plans and specifications, TPDES General Permit TXR150000, and as directed.

7.2.3. Projects with 5 acres or more of soil disturbance including required associated PSL's per TPDES GP TXR 150000.

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activities in the right of way. The Department will post a large site notice, file a notice of intent (NOI), notice of change (NOC), if applicable, and a notice of termination (NOT) along with other requirements per TPDES GP TXR 150000 as the entity having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a primary operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activities in the right of way. In addition to the Department's actions, the Contractor shall file a NOI, NOC, if applicable, and NOT and post a large site notice along with other requirements as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor

being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans.

Special Provision to Item 7
Legal Relations and Responsibilities

Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 7.7, "Preservation of Cultural and Natural Resources and the Environment," is supplemented by the following:

7.8 Environmental Compliance Management Plan.

During the performance of this Contract, the Contractor is responsible for complying with all requirements, goals, and objectives defined in the Environmental Compliance Management Plan. The Contactor is responsible for providing environmental training to all on-site personnel as described in the Environmental Compliance Management Plan and shall appoint a Contractor Responsible Person - Environmental (CRPE) to monitor the project site daily and produce daily monitoring reports. The CRPE will coordinate with the Mobility Authority's Environmental Compliance Manager.

The Environmental Compliance Manager is responsible for inspecting the work area to verify the Contractor is in compliance with the environmental protection requirements and to track the occurrence and repair of deficiencies in erosion and sediment control, and other best management practices (BMPs). The Environmental Compliance Manager will report deficiencies, which must be addressed by the contractor as identified in the Environmental Compliance Management Plan.

The Environmental Compliance Manager will not control or direct the construction under the construction contract. Environmental compliance management will not relieve the Contractor of sole responsibility for the means and methods of construction, or for health or safety precautions in connection with the work under the construction contract. The Environmental Compliance Manager will be available and able to advise on environmental matters and will have the authority to stop construction activity in response to emerging environmental situations or eminent failure to comply with environmental requirements. This work stoppage should generally be limited to the immediate vicinity or area affected by the event that represents an imminent danger to the environment, or as needed to enforce Contractor compliance with environmental requirements for the project. Refer to the Environmental Compliance Management Plan for additional information.

The Contractor shall maintain an open and continuous line of communication with the Mobility Authority and the Environmental Compliance Manager to discuss and address any unsafe conditions or environmentally damaging actions that arise or are identified in the course of the work.

Contractor violations to the Environmental Compliance Management Plan will be assessed as detailed in Article 8.9 of the special provisions.

Special Provision to Item 007
Legal Relations and Responsibilities

Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below.

Section 2.6., "Barricades, Signs, and Traffic Handling," the first paragraph is voided and replaced by the following:

2.6. **Barricades, Signs, and Traffic Handling.** Comply with the requirements of Item 502 "Barricades, Signs, and Traffic Handling," and as directed. Provide traffic control devices that conform to the details shown on the plans, the TMUTCD, and the Department's Compliant Work Zone Traffic Control Device List maintained by the Traffic Safety Division. When authorized or directed, provide additional signs or traffic control devices not required by the plans.

Section 2.6.1., "Contractor Responsible Person and Alternative," is voided and replaced by the following:

2.6.1. **Contractor Responsible Person and Alternative.** Designate in writing, a Contractor's Responsible Person (CRP) and an alternate to be the representative of the Contractor who is responsible for taking or directing corrective measures regarding the traffic control. The CRP or alternate must be accessible by phone 24 hr. per day and able to respond when notified. The CRP and alternate must comply with the requirements of Section 2.6.5., "Training."

Section 2.6.2, "Flaggers," the first paragraph is voided and replaced by the following:

2.6.2. **Flaggers.** Designate in writing, a flagger instructor who will serve as a flagging supervisor and is responsible for training and assuring that all flaggers are qualified to perform flagging duties. Certify to the Engineer that all flaggers will be trained and make available upon request a list of flaggers trained to perform flagging duties.

Section 2.6.5, "Training," is voided and replaced by the following:

2.6.5. **Training.** Train workers involved with the traffic control using Department-approved training as shown on the "Traffic Control Training" Material Producer List.

Coordinate enrollment, pay associated fees, and successfully complete Department-approved training or Contractor-developed training. Training is valid for the period prescribed by the provider. Except for law enforcement personnel training, refresher training is required every 4 yr. from the date of completion unless otherwise specified by the course provider. The Engineer may require training at a frequency instead of the period prescribed based on the Department's needs. Training and associated fees will not be measured or paid for directly but are considered subsidiary to pertinent Items.

Certify to the Engineer that workers involved in traffic control and other work zone personnel have been trained and make available upon request a copy of the certification of completion to the Engineer. Ensure the following is included in the certification of completion:

- name of provider and course title,
- name of participant,
- date of completion, and
- date of expiration.

Where Contractor-developed training or a Department-approved training course does not produce a certification, maintain a log of attendees. Make the log available upon request. Ensure the log is legible and includes the following:

- printed name and signature of participant,
- name and title of trainer, and
- date of training.

2.6.5.1. **Contractor-developed Training.** Develop and deliver Contractor-developed training meeting the minimum requirements established by the Department. The outline for this training must be submitted to the Engineer for approval at the preconstruction meeting. The CRP or designated alternate may deliver the training instead of the Department-approved training. The work performed and materials furnished to develop and deliver the training will not be measured or paid for directly but will be considered subsidiary to pertinent Items.

2.6.5.1.1. **Flagger Training Minimum Requirements.** A Contractor's certified flagging instructor is permitted to train other flaggers.

2.6.5.1.2. **Optional Contractor-developed Training for Other Work Zone Personnel.** For other work zone personnel, the Contractor may provide training meeting the curriculum shown below instead of Department-approved training.

Minimum curriculum for Contractor-provided training is as follows:

Contractor-developed training must provide information on the use of personnel protection equipment, occupational hazards and health risks, and other pertinent topics related to traffic management. The type and amount of training will depend on the job duties and responsibilities. Develop training applicable to the work being performed. Develop training to include the following topics.

- The Life You Save May Be Your Own (or other similar company safety motto).
- Purpose of the training.
  - It's the Law.
  - To make work zones safer for workers and motorist.
  - To understand what is needed for traffic control.
  - To save lives including your own.
- Personal and Co-Worker Safety.
  - **High Visibility Safety Apparel.** Discuss compliant requirements; inspect regularly for fading and reduced reflective properties; if night operations are required, discuss the additional and appropriate required apparel in addition to special night work risks; if moving operations are underway, discuss appropriate safety measures specific to the situation and traffic control plan.
  - **Blind Areas.** A blind area is the area around a vehicle or piece of construction equipment not visible to the operators, either by line of sight or indirectly by mirrors. Discuss the "Circle of Safety" around equipment and vehicles; use of spotters; maintain eye contact with equipment operators; and use of hand signals.
  - **Runovers and Backovers.** Remain alert at all times; keep a safe distance from traffic; avoid turning your back to traffic and if you must then use a spotter; and stay behind protective barriers, whenever possible. Note: It is not safe to sit on or lean against a concrete barrier, these barriers can deflect four plus feet when struck by a vehicle.
  - Look out for each other, warn co-workers.
  - Be courteous to motorists.
  - Do not run across active roadways.
  - Workers must obey traffic laws and drive courteously while operating vehicles in the work zones.
  - Workers must be made aware of company distracted driving policies.
- **Night Time Operations.** Focus should be placed on projects with a nighttime element.

- **Traffic Control Training.** Basics of Traffic Control.
  - Identify work zone traffic control supervisor and other appropriate persons to report issues to when they arise.
  - Emphasize that work zone traffic control devices must be in clean and in undamaged condition. If devices have been hit but not damaged, put back in their correct place and report to traffic control supervisor. If devices have been damaged, replace with new one and report to traffic control supervisor. If devices are dirty, faded or have missing or damaged reflective tape clean or replace and report to traffic control supervisor. Show examples of non-acceptable device conditions. Discuss various types of traffic control devices to be used and where spacing requirements can be found.
  - **Channelizing Devices and Barricades with Slanted Stripes.** Stripes are to slant in the direction you want traffic to stay or move to; demonstrate this with a device.
  - **Traffic Queuing.** Workers must be made aware of traffic queuing and the dangers created by it. Workers must be instructed to immediately notify the traffic control supervisor and other supervisory personnel if traffic is queuing beyond advance warning sign and devices or construction limits.
  - **Signs.** Signs must be straight and not leaning. Report problems to the traffic control supervisor or other as designated for immediate repair. Covered signs must be fully covered. If covers are damaged or out of place, report to traffic control supervisor or other as designated.

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress," of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.9., "Failure to Comply with Environmental Compliance Management Plan," is supplemented by the following

During the performance of this Contract, the Contractor is responsible for complying with all environmental law, regulations, and policies and the Environmental Compliance Management Plan. The Environmental Compliance Manager is responsible for inspecting the work area to verify the Contractor is in compliance with the environmental protection requirements and to track the occurrence and repair of deficiencies in erosion and sediment control, and other best management practices (BMPs). The Environmental Compliance Manager will report deficiencies which must be addressed by the contractor as identified in the Environmental Compliance Management Plan.

8.9.1. Environmental Violation Fees.

Monetary assessment will be made against the Contractor for any deficiencies in best management practices and other environmental violations that are not addressed within the durations identified in the Environmental Compliance Management Plan. Any deficiency not addressed within the durations identified in the Environmental Compliance Management Plan will be considered a violation and will be assessed an Environmental Violation Fee in the amount of $1,000 per calendar day until the deficiency is addressed.

8.9.2. Fee Calculation and Collection.

Environmental violation fees will be deducted from the amount due the Contractor on the monthly construction estimate, and thus retained by the Mobility Authority. The Engineer, in coordination with the Independent Environmental Compliance Manager, will determine the total number of environmental violations not addressed in accordance with the Environmental Compliance Management Plan for calculating the assessment fee.

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress," of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.5., "Project Schedules" is supplemented by the following

The progress schedule required for this project is the critical path method schedule (CPM schedule) as described herein. The Contractor shall prepare and submit for review and acceptance a cost loaded schedule of proposed working progress for the entire contract duration. The Engineer will provide a template with milestones from other contracts and non-construction activities for the Contractor to use in the development of their schedule. The Engineer shall also provide a Work Breakdown Structure (WBS) as well as the required report layouts for the Contractor to use to develop the progress schedule for this Contract.

Immediately after receipt of notice of award, the Division Engineer and the Contractor will establish a mutually agreeable date on which the preconstruction meeting will be held. The Contractor's project superintendent and other individuals representing the Contractor who are knowledgeable of the Contractor's proposed progress schedule or who will be in charge of major items of the work shall attend the preconstruction conference.

After work on the project has begun, construction conferences will be held periodically. The construction conferences are to be scheduled at times that are mutually agreeable to both the project superintendent and the Resident Engineer. It shall be the superintendent's responsibility to attend the conferences.

Section 8.5.2 "Progress Schedule" is supplemented by the following:

The Contractor shall provide a schedule that shows the various activities of Work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the Original Contract Completion Date and any interdependent milestones identified by the Engineer or required by Contract. Show the order and interdependence of activities and the sequence for accomplishing the Work. Describe all activities in sufficient detail so that the Engineer can readily identify the Work and measure the progress of each activity.

Section 8.5.3 "Schedule Format" is supplemented by the following:

The Contractor shall use a compatible version of Oracle Primavera P6 or comparable scheduling software to generate the CPM schedule. It is the Contractor's responsibility to verify with the Engineer the software and version being used for this project and shall maintain the required version for the entire contract duration. The use of Microsoft Project and Primavera Project Planner (P3) and other scheduling software is prohibited.

The progress schedule shall contain the following Administrative Identifier Information:

(1) Project Name
(2) Contract Number
(3) Date of Contract
(4) Construction Completion Date
(5) Contractor's Name
(6) Contractor's Contact Information

The CPM schedule must reflect the scope of work and include the following:

(1) Clear identification of tasks to be completed based on Section or Special Provisions included in the Project Manual and as listed in Pay Items, including subcontractor work activities.
(2) Include calculations of resources required (Cost, Labor, Equipment) for constructing all facilities within the Contract duration. Specific calculations shall be provided to show quantities, manpower / crews, and equipment to support the critical path. The Contractor shall be capable of calculating the maximum crew size anticipated if any activities become critical, so the Contractor is prepared when a critical path changes or a new path occurs.
(3) Float for each Activity.
(4) Activities for submittals (shop drawings).
(5) Punchlist activities with sufficient duration for the Engineer's inspection and acceptance before the final completion date
(6) Activities for submittal review time by the Engineer, including time range showing start and end dates.
(7) Working and shop drawing preparation, submittal, and review for acceptance.
(8) Material and equipment procurement, fabrication and delivery; identify any long lead items as separate activities.
(9) Owner furnished and/or installed materials and equipment shall be identified as separate activities.
(10) NTP / Start of construction
(11) Required phasing
(12) Maintenance of traffic requirements as required by the contract (if any)
(13) Intermediate completion dates (if any)
(14) Identified interdependent milestones (if any)
(15) Seasonal limitation/observation periods/moratoriums
(16) Beginning and end of each traffic control work area and road openings
(17) Other similar activities and project milestones established in the Contract Documents.
(18) Substantial Completion Date
(19) Final Acceptance Date
(20) All required Reports layouts as requested by the Engineer

Section 8.5.4 "Activity Format" is supplemented by the following:

Activity requirements are discussed in further detail as follows:

(1) Activity Identification (ID) - Assign each activity a unique identification number. The format for the identification number will be provided by the Engineer. All activities must begin with the same activity ID prefix as provided by the Engineer.
(2) Activity Description - Assign each activity an unambiguous descriptive word or phrase. For example, use "Excavate Area A," not "Start Excavation."
(3) Activity Codes – The Engineer will provide the activity code dictionary in the template. The Contractor will assign the appropriate codes to each activity.
(4) Activity Original Duration - Assign a planned duration in working days for each activity. Do not exceed a duration of 10 working days for any activity unless accepted by the Engineer. Each activity shall have a minimum duration of 1 working day. Do not represent the maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.
(5) Finish-to-Start Relationships - Unless allowed in writing by the Engineer, use only finish-to-start relationships with no leads or lags to link activities. All activities, except the first activity, shall have a predecessor(s). All activities, except the final activity, shall have a successor(s).
(6) Calendars – The Engineer will provide pre-defined calendars as part of the template. The Contractor shall assign these pre-defined calendars to the appropriate activities. The Contractor may create new project specific

calendars to represent their standard work schedule using the pre-defined calendars as a basis. The Contractor may not edit pre-defined calendars.

(7) Constraints – Unless allowed in writing by the Engineer, do not use constraints in the schedule.

(8) Resources – Manpower and equipment shall be reflected for all activities. Incidental costs to construction shall be equally spread out across all activities. Front loaded schedules are not allowed.

(9) The schedule shall show the total cost of performing each activity and shall include the total labor, material, equipment and general conditions.

(10) The sum of cost for all activities shall equal the total Contract.

(11) The summed value of that portion of the activities allocated to each Contract bid item shall equal the total value of the corresponding Contract bid item.

(12) The Contractor shall allocate a value for unit price or lump sum contract bid items to each activity in the schedule. No Lump sum amounts should exceed $100,000.

Section 8.5.5.2 "Critical Path Method" The first paragraph is voided and replaced by the following:

The Contractor shall submit the baseline CPM schedule in a bar chart format showing the critical path in red, using both hard copy and in electronic formats. Electronic formats shall be compatible with the Engineer's computer systems. Also, submit the following information:

(1) Written narrative – Explains the sequence of work, the controlling operations, intermediate completion dates, milestones, project phasing, anticipated work schedule and estimated resources. In addition, explain how permit requirements, submittal tracking and coordination with subcontractors, utility companies, railroads and other third party entities will be performed. The narrative shall itemize and describe the critical path (i.e. access limitations, constraints, shift work), and compare early and late date or Contract Milestone activities, and describe any critical resources.

(2) CPM Schedule in a Bar Chart Format – Include the Administrative Identifier Information discussed above on the first page of the schedule. For each activity on the chart, indicate the Activity ID, Activity Description, Original Duration, Remaining Duration, Changes to Duration, Total Float, Early Start Date, Early Finish Date, and Calendar Name. Use arrows to show the relationships among activities.

(3) Identify the critical path of the project on the bar chart. The critical path is defined as; 1) the sequence of activities that must be completed "on time" to ensure that the project finished on time. 2) the longest path of activities in the project that determines the project finish date.

(4) No more than 10% of activities may be critical or near critical. Critical Activities will have a total float equal to zero. "Near critical" is defined as float in the range of 1 to 10 working days.

(5) Six Week Look Ahead CPM Schedule in a Bar Chart Format – This schedule will have all the same requirements of the CPM schedule in bar chart format except that it shall be limited to those activities that have an early start or early finish within a six-week period of the data date.

(6) Logic Diagram – Submit a diagram in PERT chart format showing the logic of the CPM schedule.

(7) Activity ID Sort – Submit a listing of all activities included in the CPM schedule sorted by ascending Activity Identification Number.

(8) Total Float Sort – Submit a listing of all activities included in the CPM schedule sorted by increasing total float and by early start date.

(9) All float belongs to the Project and is a shared commodity between the Contractor and the Mobility Authority and is not for the exclusive use or benefit of either party. The Contractor shall notify the Engineer in writing for acceptance before using any float.

(10) Detailed Predecessor/Successor Sort – Submit a listing of all activities included in the CPM schedule indicating the activities that immediately precede and immediately succeed that activity in the schedule logic.

(11) Scheduling Statistics Report – Submit a report of CPM schedule statistics, including number of activities, number of activities on the longest path, number of started activities, number of completed activities, number of relationships, percent complete, and number and type of constraints.

(12) A resource curves / Metric tracking reports (EVM) corresponding to the milestones and work activities established above.

Section 8.5.5.2.2 "Baseline Schedule" The second paragraph is voided and replaced by the following:

The Contractor shall submit a progress schedule for the entire duration of the Contract to the Engineer 30 calendars days following the contract award date. After review of the schedule the Engineer shall schedule a Baseline CPM Schedule meeting with the Contractor to review the schedule and identify any changes or corrections. Within 7 calendar days of the CPM Schedule meeting, the Contractor shall make any necessary adjustments to address all review comments and resubmit network diagrams and reports for the Engineer's review. The complete baseline schedule shall be submitted and accepted no later than (45) forty-five days after contract award date. The complete progress schedule shall be accepted by the Engineer before any payments will be processed for the project.

Section 8.5.5.2.3 "Progress Schedule" is supplemented by the following

The Engineer may withhold pay estimates if the updated CPM schedule is not submitted as required by this section. For each updated CPM schedule, identify the actual start and finish dates for all completed activities, the actual start date and remaining duration for all activities in progress, the difference in duration of all activities since the last update and any exceptional reports associated with the update. Only accepted changes will be incorporated into the monthly progress schedule update. The schedule should represent the actual work performed and should be progressed with actuals for all the schedule activities. The final schedule will be utilized as the project actual "As Built" schedule.

Provide a written narrative that identifies any changes or shifts in the critical path and submit reasons for the changes or shifts in the critical path. Identify any changes in logic for the updated CPM schedule and submit reasons for changes to the schedule logic. In addition to the written narrative, submit the following with each updated CPM schedule:

(1) CPM Schedule in Bar Chart Format
(2) Four Week Look Ahead CPM Schedule in Bar Chart Format
(3) Logic Diagram
(4) Activity ID Sort
(5) Total Float Sort
(6) Detailed Predecessor/Successor Sort
(7) Schedule Metrics and Earned Value (Schedule, Cost, Labor) Reports

The Contractor must submit a statement that there were no changes in the schedule logic, activity durations, or calendars since the previous update in lieu of submission of items (3), (5), and (6). Acceptance of schedule updates by the Engineer does not revise the Contract Documents.

A monthly schedule update meeting shall be held each month following Notice to Proceed to review monthly schedule update submittals, critical path items and recovery schedules. The Contractor shall be represented in the meeting by the Contractor's scheduler, project manager and general superintendent. As necessary the Contractor may be also asked to attend a coordination meeting to discuss the schedule impacts to other contractors.

If the Project completion date changes or if the project schedule overrun is anticipated to exceed 5%, the Contractor shall submit a revised progress schedule to the Engineer for review and acceptance. If plan revisions are anticipated to change the sequence of construction in such a manner as will affect the progress, but not the completion date, then the Contractor may submit a revised progress schedule for review and acceptance. The Project completion date shall remain unchanged.

Section 8.5.5.3 "Notice of Potential Time Impact" is supplemented by the following

"Contractor shall not be eligible for Change Order(s) for additional compensation for additional costs, including costs for developing and executing a Recovery Schedule(s), and delay and disruption damages, or additional Days incurred directly or indirectly from the virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease known as COVID-19, including any disruptions to, and delays or interruptions in, construction of the Project in accordance with the Contract and any approved Baseline Schedule."

Section 8.5.5 "Schedule Types" is supplemented by the following:

Section 8.5.5.5 Recovery Schedule

If the progress schedule projects a finish date for the Project beyond the original Completion Date, the Contractor shall submit a revised schedule showing a plan to finish by the original Completion Date. The Mobility Authority will withhold Pay Estimates until the Engineer accepts the revised schedule. No additional compensation for developing and executing a recovery schedule(s) shall be reimbursed to the Contractor. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the Contractor.

(1) In the event Work or related construction activities shown on the Contractor's Progress Schedule fall behind schedule to the extent that dates established as contractual Completion Dates are in jeopardy, the Contractor shall prepare and submit to the Engineer, at no additional cost or time to the Mobility Authority, a Recovery Schedule showing intent to remedy delays and to regain originally scheduled time of completion of Work within a timely manner. This includes delays due to unforeseen conditions.

(2) Recovery Schedule shall be submitted in such form and detail appropriate to the delay or delays, explaining and displaying how the Contractor intends to reschedule those activities and reestablish compliance with the accepted baseline Construction Progress Schedule during the immediate subsequent pay period or as permitted by Engineer. This shall include a schedule diagram comparing the original and the revised sequence of activities, identifying all affected activities.

(3) Upon determining the requirement for a Recovery Schedule:

a. Within five (5) calendar days, the Contractor shall present to Engineer a proposed Recovery Schedule. The Recovery Schedule shall represent the Contractor's best judgment as to how to best reorganize the Work and achieve progress to comply with the accepted Construction Progress Schedule.

b. Changes to Contractor's means and methods, such as increased labor force, working hours, overtime, additional equipment and other means shall not constitute the basis for changes to the Contract Sum or Contract Time.

c. Recovery Schedule shall show remedies to bring Work back on schedule up-to-date within the immediate subsequent pay period.

d. The Recovery Schedule shall be prepared to a similar level of detail as the Construction Progress Schedule.

e. Five (5) calendar days prior to the expiration of the Recovery Schedule, Contractor shall document to the Engineer that the Work schedule has regained, or is on-track to regain, compliance with the Construction Progress Schedule.

(4) Failure to submit Recovery Schedule in a timely manner may result in Termination of the Contract for Cause as determined by the Engineer.

(5) Failure to achieve compliance with the accepted Construction Progress Schedule despite implementing Recovery Schedule may result in Termination of the Contract for Cause as determined by the Engineer.

(6) Termination of Contract For Cause: In the event Contractor defaults on the terms of the Contract, including failure to maintain the Construction Progress Schedule, Engineer will assess the level of completion of the Work achieved by the Contractor and compare amount of available funds against anticipated costs required for the Mobility Authority to complete the Work, including anticipated Liquidated Damages resulting from delay, if any. Engineer will determine amount of payment due to Contractor for Work completed prior to date of Termination of Contract for Cause, if any. In the event available funds are not sufficient for the Mobility Authority to complete the Work, the Mobility Authority will withhold such funds from the amount due the Contractor.

(7) If, in the opinion of the Engineer, the Contractor has sufficiently regained compliance with the Construction Progress Schedule, the use of the Construction Progress Schedule will be resumed. Contractor shall update and submit the Construction Progress Schedule clearly identifying Work to date and how the Contractor intends to achieve timely completion for the remainder of the Work in accordance with the Construction Documents.

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.1., "Prosecution of Work." The first sentence of the first paragraph is voided and replaced by the following:

Begin work 90 calendar days after the authorization date to begin work. Do not begin work before or after this period unless authorized in writing by the Engineer.

Special Provision to Item 8
Prosecution and Progress

Item 8, “Prosecution and Progress,” of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.1, “Prosecution of Work.” The first sentence of the first paragraph is voided and replaced by the following:

Begin work on the date stated in the written Full Notice to Proceed. Full Notice to Proceed may be deferred up to 180 days from CTRMA Board award of the contract. Do not begin work before this period unless authorized in writing by the Engineer.

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress" of the Standard Specification is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.2., "Subcontracting," is supplemented by the following paragraph, which is added as paragraph six to this article:

The Contractor certifies by signing the Contract that the Contractor will not enter into any subcontract with a subcontractor that is not registered in the Department of Homeland Security's (DHS) E-Verify system. Require that all subcontractors working on the project register and require that all subcontractors remain active in the DHS E-Verify system until their work is complete on the project.

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress" of the Standard Specifications is amended with respect to the clause cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.7.2., "Wrongful Default," is revised and replaced by the following:

If it is determined after the Contractor is declared in default, that the Contractor was not in default, the rights and obligations of all parties will be the same as if termination had been issued for the convenience of the public as provided in Article 8.8 "Termination of Contract."

Special Provision to Item 8
Prosecution and Progress

Item 8, "Prosecution and Progress," of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 8.6., "Failure to Complete Work on Time," is supplemented by the following:

8.6.1. Lane Closure Assessment Fees.

Monetary assessment, as shown on the plans, will be made against the Contractor for any lane closure or obstruction that overlaps into the peak hour traffic for each time increment defined on the plans or portion thereof, per lane, regardless of the length of lane closure or obstruction.

8.6.1.1. Definition of Terms. For this Contract, the following definitions apply:

8.6.1.1.1. Time increment. Any continuous defined increment of time period or portion thereof for a period beginning at that point when lanes are closed or obstructed by the Contractor's operations.

8.6.1.1.2. Assessment Fee. The amount shown on the proposal for each defined time increment, representing the average cost of interference and inconvenience to the road user for each lane closed or obstructed during peak hour traffic. The Engineer may allow a proportional fee assessment for closures that do not involve an entire defined time increment.

8.6.1.1.3. Closure or Obstruction. When the Contractor's operations result in a reduced lane width of the travel way or shoulder less than that specified on the plan documents.

8.6.1.1.4. Peak Hour Traffic Times. Schedule of days and times described in the General Notes, when lane closures or obstructions are not allowed.

8.6.1.2. Fee Calculation and Collection. The assessment fee will be deducted from the amount due to the Contractor on the monthly construction estimate, and thus retained by the Department. The Engineer will determine the time of overlap of lane closures or obstructions for calculating the assessment fee. The assessment fee is based on road user costs and is assessed not as a penalty, but for added expense incurred by the traveling public.

Special Provision to Item 9

Measurement and Payment

Item 9, "Measurement and Payment," of the Standard Specifications, is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 9.5., "Progress Payments," Delete this section of the Specifications in its entirety and substitute with the following:

Partial payments will be made once each month covering work performed and materials complete-in-place in accordance with the Contract. The invoice form to be submitted each month will be provided to the Contractor in Microsoft Excel format. The Contractor must be able to use Microsoft Excel to complete the invoice form. Partial payments will be made on the value of work performed based on approximate estimates prepared by the Engineer, provided, however, that no estimate shall be certified or payment made where the net amount receivable by the Contractor is less than Five-hundred Dollars ($500.00).

The Engineer will review the partial payment estimate with the Contractor's representative prior to each partial payment.

Total Contract value shall be considered to mean the original amount of the Contract, except when the Contract is increased or decreased by a supplemental agreement in which case the adjusted total shall be used.

The Mobility Authority reserves the right to withhold the payment of any partial or final estimate voucher or any sum or sums thereof from such vouchers in the event of the failure of the Contractor to promptly make payment to all persons supplying equipment, tools or materials, or for any labor used by the Contractor in the prosecution of the work provided for in the Contract, and for any other cause as determined by the Mobility Authority in its sole discretion, including overpayment on previous partial payments.

Article 9.8., "Retainage," is supplemented with the following:

The Mobility Authority shall not withhold funds from payments to be made to Contractor for the Work until such time as 95% of the Adjusted Contract Price has been paid to the Contractor. Following completion of and payment for 95% of the Adjusted Contract Price, the Mobility Authority shall withhold, the remaining 5% of the Adjusted Contract Price pursuant to the terms described below.

The remaining 5% for the Work, subject to reduction as specified below, shall be held by the Mobility Authority until Final Acceptance. At such time, and provided the Contractor is not in breach or default hereunder, the Mobility Authority shall release to Contractor all withheld in connection with the Work other than amounts applied to the payment of Losses or which the Mobility Authority deems advisable, in its sole discretion, to retain to cover any existing or threatened claims. The Contractor must further warrant, to the satisfaction of the Mobility Authority, that there are no outstanding claims or liens by any subcontractors or other parties with respect to the Work.

The prime contractor shall make full payment of amounts due to subcontractors within 10 calendar days following the satisfactory completion of the subcontractor's work. Satisfactory completion of the subcontractor's work shall be defined as approval, acceptance, and payment for the subcontractor's work by the Mobility Authority including the submittal and acceptance of all information, deliverables or other documents required by the contract.

Prior to the release of the remaining 5% by the Mobility Authority pursuant to the terms hereof, such amounts shall be held by the Mobility Authority. Upon the release of the remaining 5%, the Contractor shall not be entitled to any interest income that has accrued upon the amounts of the remaining 5% released to Contractor.

Article 9.9., "Payment Provisions for Subcontractors," is supplemented with the following:

The Mobility Authority may pursue actions against the Contractor, including withholding of estimates and suspending the work, for noncompliance with the subcontract requirements of this Section upon receipt of written notice with sufficient details showing the subcontractor has complied with contractual obligations as described in this Article.

These requirements apply to all tiers of subcontractors. Incorporate the provisions of this Article into all subcontract or material purchase agreements.

Special Provision to Item 9
Measurement and Payment

Item 9, "Measurement and Payment" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 9.7.1.4.3., "Standby Equipment Costs," is voided and replaced by the following:

7.1.4.3. **Standby Equipment Costs.** Payment for standby equipment will be made in accordance with Section 9.7.1.4., "Equipment," except that the 15% markup will not be allowed and that:

Section 7.1.4.3.1., "Contractor-Owned Equipment," is voided and replaced by the following:

7.1.4.3.1. **Contractor-Owned Equipment**. For Contractor-owned equipment:

- Standby will be paid at 50% of the monthly Equipment Watch rate after the regional and age adjustment factors have been applied. Operating costs will not be allowed. Calculate the standby rate as follows.

  Standby rate = (FHWA hourly rate - operating costs) × 50%

- If an hourly rate is needed, divide the monthly *Equipment Watch* rate by 176.
- No more than 8 hr. of standby will be paid during a 24-hr. day period, nor more than 40 hr. per week.
- Standby costs will not be allowed during periods when the equipment would have otherwise been idle.

Special Provision to Item 247
Flexible Base

Item 247, "Flexible Base" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Section 2.4., "Certification." This section is added.

Personnel certified by the Department-approved soils and base certification program must conduct all sampling, field testing, and laboratory testing required by the following:

- Section 2.1, "Aggregate,"
- Section 2.1.3.2, "Recycled Material (Including Crushed Concrete) Requirements,"
- Section 4.3, "Compaction," for measuring flexible base depth, and
- Section 4.3.2, "Density Control," for determining the roadway density and moisture content.

Supply the Engineer with a list of certified personnel and copies of their current certificates before laboratory and field testing is performed and when personnel changes are made. At any time during the project, the Engineer may perform production tests as deemed necessary in accordance with Item 5, "Control of the Work."

Section 2.5., "Reporting and Responsibilities." This section is added.

Use Department-provided templates to record and calculate all test data. Obtain the current version of the templates at http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html or from the Engineer. The Engineer and the Contractor will provide any available test results to the other party when requested. Record and electronically submit all test results and pertinent information on Department-provided templates.

Section 2.6., "Sampling." This section is added.

The Engineer will sample flexible base from stockpiles located at the production site or at the project location in accordance with Tex-400-A, Section 5.3. The Engineer will label the sample containers as "Engineer," "Contractor" or "Supplier," and "CST/M&P." Witness the sampling and take immediate possession of the sample containers labeled "Contractor" or "Supplier." The Engineer will maintain custody of the samples labeled "CST/M&P" until testing and reporting is completed.

Section 2.7., "Referee Testing." This section is added.

CST/M&P is the referee laboratory. The Contractor may request referee testing when the Engineer's test results fail to meet any of the material requirements listed in Table 1. Make the request via email within 5 working days after receiving test results from the Engineer. Submit test reports signed and sealed by a licensed professional engineer from a commercial laboratory listed on the Department's Material Producer List (MPL) of laboratories approved to perform compaction and triaxial compression testing located at http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/complabs.pdf. Submit completed test reports electronically on Department-provided templates in their original format. The referee laboratory will report test results to the Engineer within the allowable number of working days listed in Table 2 from the time the referee laboratory receives the samples. It is at the discretion of the Engineer or the referee laboratory to deny a referee request upon review of the test reports provided by the Contractor.

Table 2
Number of Allowable Working Days to Report Referee Test Results

Material Property	Test Method	Working Days
Gradation	Tex-110-E, Part I	5
Liquid Limit (Multi-Point Method)	Tex-104-E, Part I	5
Plasticity Index	Tex-106-E	5
Wet Ball Mill Value	Tex-116-E, Parts I and II	5
Wet Ball Mill, % Increase passing #40 sieve		
Compressive Strength[1]	Tex-117-E, Part II	6
Compressive Strength[2]	Tex-117-E	12

1. Moisture-Density curve provided by the District
2. Moisture-Density curve determined by the referee laboratory

Section 4.6., "Ride Quality." This section is voided and replaced by the following.

Measurement of ride quality only applies to the final travel lanes that receive a 1- or 2-course surface treatment for the final riding surface, unless otherwise shown on the plans. Measure the ride quality of the base course either before or after the application of the prime coat, as directed, and before placement of the surface treatment. Use a certified profiler operator from the Department's MPL. When requested, furnish the Engineer documentation for the person certified to operate the profiler.

Provide all profile data to the Engineer in electronic data files within 3 days of measuring the ride quality using the format specified in Tex-1001-S. The Engineer will use Department software to evaluate longitudinal profiles to determine areas requiring corrective action. Correct 0.1-mi.sections for each wheel path having an average international roughness index (IRI) value greater than 100 in. per mile to an IRI value of 100 in. per mile or less, unless otherwise shown on the plans.

Re-profile and correct sections that fail to maintain ride quality, as directed. Correct re-profiled sections until specification requirements are met, as approved. Perform this work at no additional expense to the Department.

Special Provision to Item 300
Asphalt, Oils, and Emulsions

Item 300, “Asphalt, Oils, and Emulsions” of the Standard Specifications is replaced by Special Specification 3096, “Asphalts, Oils, and Emulsions.” All Item 300 Special Provisions are no longer available, beginning with the April 2022 letting.

Special Provision to Item 354
Planing and Texturizing Pavement

Item 354 "Planing and Texturizing Pavement" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 354.2. "Equipment", is supplemented by the following:

2.4. **Micro-milling Equipment.** Use planing machine that is power-driven, self-propelled micro-milling equipment possessing the size and shape to allow traffic safe passage through areas adjacent to the work. Also, ensure the micro milling equipment will be:

- Equipped with a cutting mandrel with carbide or equivalent tipped cutting teeth designed for micro-milling bituminous pavement full lane width to close tolerances,
- Capable of removing pavement to an accuracy of 1/16 in. with a maximum tool spacing of 5/8 in.,
- Equipped with grade and slope controls operating from a string line or ski and based on mechanical or sonic operation,
- Furnished with a lighting system for night work, as necessary,
- Provided with conveyors capable of side, rear, or front loading to transfer the milled material from the roadway to a truck, and
- Equipped with a 12 ft. drum with 60 cutting teeth per ft.

Article 354.3. "Construction", is supplemented by the following:

3.5. Micro-milling. Micro-mill the designated areas and depths specified in the plans, including bridge decks, shoulders, and ramps, as required.

Mill the pavement producing a final pavement surface with transverse pattern of 0.2 in. center to center of each strike area with difference no greater than 1/16 in. between the ridge and valley (RVD) measurement of the final milled surface. Construct a uniform finish free from gouges and ridges that does not vary more than 1/8 in.in width of the cut.

Prior to commencement of the work, construct a test section that is 1,000 ft. in length with a uniformly textured surface and cross section as approved by the Engineer to demonstrate compliance with the transverse pattern, cross slope, and RVD measurement requirements. Stop milling operation and submit a written plan of action detailing proposed steps to improve operations if any of these requirements are exceeded in the test section. If approved by the Engineer, construct another 1,000 ft. test section in a different area than the initial section using the approved corrective action.

The second test section is subject to the same requirements as those required in the initial test section. Continual micro-milling is prohibited until an acceptable test section is obtained.

Ensure micro-milling methods produce a uniform finished surface and maintain a constant cross slope between pavement edges in each lane. Provide positive drainage to prevent water accumulation on the micro-milled pavement, as shown on the Plans or as directed. The cross slope must be uniform with no depressions or slope misalignments greater than 1/4 per 12 ft. exit when the slope is tested with a straightedge placed perpendicular to the center line.

Bevel back the longitudinal vertical edges greater than 2 in. produced by the removal process and left exposed to traffic. Bevel the vertical edges back at least 3 in. for each 2 in. of material removed. Use an attached mold board or other approved method.

Taper the transverse edges 10 ft. (3 m) to avoid creating a traffic hazard and to produce a smooth surface when removing material at ramp areas and ends of milled sections.

Protect with a temporary asphaltic concrete tie-in (paper joint) vertical edges at other areas such as bridge approach slabs, drainage structures, and utility appurtenances greater than 1/2 in. areas left open to transversing vehicles. Place the temporary tie-in at taper rate of at least 6 to 1 horizontal to vertical distance. Damage due to micro-milling will be repaired at the Contractor's expense and to the satisfaction of the Engineer.

Remove dust, residue, and loose milled material from the micro-milled surface. Do not allow traffic on the milled surface and do not place asphaltic concrete on the milled surface until removal is complete.

Measure the milled surface with a 10-ft. straightedge at locations determined by the Engineer for quality acceptance and acceptance of test section of milling operation. Remove and replace any areas exceeding 1/8 in. RVD, as directed at no cost to the Department.

Article 354.4. "**Measurement",** is supplemented by the following:

This Item will be measured by the square yard of surface area for each pavement type micro-milled of the depths specified. Measurement will be based on the depth shown for each bid item, within the limits shown on the plans, regardless of the number of passes required. Only one bid item for each section micro-milled will apply to any one location.

Article 354.5. "**Payment",** is supplemented by the following:

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will also be paid for at the unit price bid for "Planing and Texturing (Micro-Milling)" of the depths specified.

Special Provision to Item 450
Railing

Item 450, "Railing" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 450.3.1.2., "Fabrication," is supplemented with the following.

Fabrication plants that produce metal railing (steel and aluminum) must be approved in accordance with DMS-7395, "Metal Railing Fabrication Plant Qualification." This required approval does not include fabricators of chain link fence. The Materials and Tests Division maintains a MPL of approved fabrication plants of metal railing.

Permanently mark each metal railing post base plate, at a visible location when erected, with the fabrication plant's insignia or trademark. For fabricated rail panels, provide this permanent mark on one post base plate, per panel.

Special Provision to Item 464
Reinforced Concrete Pipe

Item 464, "Reinforced Concrete Pipe," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Section 2.1., "Fabrication." The section is voided and replaced with the following.

Fabrication plants must be approved by the Materials and Tests Division in accordance with DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures," before furnishing precast reinforced concrete pipe for Departmental projects. The Department's MPL has a list of approved reinforced concrete pipe plants.

Furnish material and fabricate reinforced concrete pipe in accordance with DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures."

Section 2.3., "Marking." The first paragraph is voided and replaced with the following.

Furnish each section of reinforced concrete pipe marked with the following information specified in DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures."

- Class or D-Load of pipe,
- ASTM designation,
- Date of manufacture,
- Pipe size,
- Name or trademark of fabricator and plant location,
- Designation "TX" for precast units fabricated per DMS-7305;
- Designated fabricator's approval stamp for each approved unit,
- Pipe to be used for jacking and boring (when applicable), and
- Designation "SR" for pipe meeting sulfate-resistant concrete plan requirements (when applicable).

Section 2.5., "Causes for Rejection." The section is voided and replaced with the following.

Individual sections of pipe may be rejected for any of the conditions stated in the Annex of DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures."

Section 2.6., "Repairs." The section is voided and replaced with the following:

Make repairs, if necessary, as stated in the Annex of DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures."

Special Provision to Item 465
Junction Boxes, Manholes, and Inlets

Item 465, "Junction Boxes, Manholes, and Inlets," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Section 2.1., "Concrete," The section is voided and replaced with the following.

Furnish concrete per DMS-7305 for formed and machine-made precast junction boxes, manholes, and inlets. Furnish Class C concrete for cast-in-place junction boxes, manholes, and inlets unless otherwise shown on the plans.

Section 3.1., "Precast Junction Boxes, Manholes, and Inlets," The section is voided and replaced with the following.

Construct formed and machine-made precast junction boxes, manholes, and inlets in accordance with DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures" and the Contract Plans, except as otherwise noted in this Item.

Multi-project fabrication plants as defined in Item 424 "Precast Concrete Structural Members (Fabrication)," that produce junction boxes, manholes, and inlets will be approved by the Materials and Tests Division in accordance with DMS-7305, "Fabrication and Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Drainage Structures." The Department's MPL has a list of approved multi-project fabrication plants.

Section 3.1.1., "Lifting Holes," The section is voided and not replaced.

Section 3.1.2., "Marking." The section is voided and replaced with the following.

Marking. Clearly mark each precast junction box, manhole, and inlet unit with the following information:

- name or trademark of fabricator and plant location;
- product designation;
- ASTM designation (if applicable);
- date of manufacture;
- designation "TX" for precast units fabricated per DMS-7305;
- designated fabricator's approval stamp for each approved unit; and
- designation "SR" for product meeting sulfate-resistant concrete plan requirements (when applicable).

Special Provision to Item 502
Barricades, Signs and Traffic Handling

Item 502, "Barricades, Signs and Traffic Handling" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 502.1., "Description," is supplemented by the following:

Temporary work-zone (TWZ) traffic control devices manufactured after December 31, 2019, must have been successfully tested to the crashworthiness requirements of the 2016 edition of the Manual for Assessing Safety Hardware (MASH). Such devices manufactured on or before this date and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives. An exception to the manufacture date applies when, based on the project's date of letting, a category of MASH-2016 compliant TWZ traffic control devices are not approved, or are not self-certified after the December 31, 2019, date. In such case, devices that meet NCHRP-350 or MASH-2009 may be used regardless of the manufacture date.

Such TWZ traffic control devices include: portable sign supports, barricades, portable traffic barriers designated exclusively for use in temporary work zones, crash cushions designated exclusively for use in temporary work zones, longitudinal channelizers, truck and trailer mounted attenuators. Category I Devices (i.e., lightweight devices) such as cones, tubular markers and drums without lights or signs attached however, may be self-certified by the vendor or provider, with documentation provided to Department or as are shown on Department's Compliant Work Zone Traffic Control Device List.

Article 502.4., "Payment," is supplemented by the following:

Truck mounted attenuators and trailer attenuators will be paid for under Special Specification, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)." Portable Changeable Message Signs will be paid for under Special Specification, "Portable Changeable Message Sign." Portable Traffic Signals will be paid for under Special Specification, "Portable Traffic Signals."

Special Provision to Item 506

Temporary Erosion, Sedimentation, and Environmental Controls

Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 506.1., "Description." The second paragraph is voided and replaced by the following.

Contractor is considered primary operator to have day-to-day operational control as defined in TPDES GP TXR150000.

1.1. For projects with soil disturbance of less than 1 acre, no submittal to TCEQ will be required but Contractor will follow SWP3. For projects with soil disturbance of 1acre to less than 5 acres a small site notice will be posted at the site. For projects with soil disturbance of 5 acres or more a Notice of Intent (NOI) is required and a large site notice posted at site. Postings will be in accordance with TPDES GP TXR150000. Postings not associated with project specific locations will be in same location as Department's postings.

1.2. Notice of Intent (NOI). Submit a NOI, if applicable, with the TCEQ under the TPDES GP TXR150000 at least 7 days prior to commencement of construction activities at the project site. Provide a signed copy to the Engineer and any other MS4 operators at the time of submittal. The Department will submit their NOI prior to contractor submission and will provide a copy for Contractor's use in completing the Contractor's NOI form.

1.3. Notice of Change (NOC). Upon concurrence of the Engineer, submit a NOC, if applicable, to the TCEQ within 14 days of discovery of a change or revision to the NOI as required by the TPDES GP TXR150000. Provide a signed copy of the NOC to the Engineer and any other MS4 operators at the time of submittal.

1.4. Notice of Termination (NOT). Upon concurrence of the Engineer, submit a NOT, if applicable, to the TCEQ within 30 days of the Engineer's approval that 70% native background vegetative cover is met or equivalent permanent stabilization have been employed in accordance with the TPDES GP TXR 150000. Provide a signed copy of the NOT to the Engineer and any other MS4 operators at the time of submittal.

Section 506.3.1, "Contractor Responsible Person Environmental (CRPE) Qualifications and Responsibilities," is supplemented by the following:

3.1. Contractor Responsible Person Environmental (CRPE) Qualifications and Responsibilities. Provide and designate in writing at the preconstruction conference a CRPE and alternate CRPE who have overall responsibility for the storm water management program. The CRPE will implement stormwater and erosion control practices; will oversee and observe stormwater control measure monitoring and management; will monitor the project site daily and produce daily monitoring reports as long as there are BMPs in place or soil disturbing activities are evident to ensure compliance with the SWP3 and TPDES General Permit TXR150000. Daily monitor reports shall be maintained and made available upon request. During time suspensions when work is not occurring or on contract non-work days, daily inspections are not required unless a rain event has occurred. The CRPE will provide recommendations on how to improve the effectiveness of control measures. Attend the Department's preconstruction conference for the project. Ensure training is completed as identified in Section 506.3.3., "Training," by all applicable personnel before employees work on the project. Document and maintain and make available upon request, a list, signed by the CRPE, of all applicable Contractor and subcontractor employees who have completed the training. Include the employee's name, the training course name, and date the employee completed the training.

Section 506.3.3., "Training," is supplemented by the following:

Training is provided by the Department at no cost to the Contractor and is valid for 3 yr. from the date of completion. The Engineer may require the following training at a frequency less than 3 yr. based on environmental needs:

- "Environmental Management System: Awareness Training for the Contractor" (English and Spanish) (Approximate running time 20 min.), and
- "Storm Water: Environmental Requirements During Construction" (English and Spanish) (Approximate running time 20 min.).

The Contractor responsible person environmental (CRPE), alternate CRPE designated for emergencies, Contractor's superintendent, Contractor, and subcontractor lead personnel involved in soil disturbing or SWP3 activities must enroll in and complete the training listed below and maintain and make available upon request the certificate of completion. Training is provided by a third party and is valid for 3 yr. from the date shown on the Certificate of Completion. Coordinate enrollment as prescribed by the Department and pay associated fees for the following training:

- "Revegetation During Construction,"
- "Construction General Permit Compliance," and
- "Construction Stage Gate Checklist (CSGC)."

Training and associated fee will not be measured or paid for directly but are subsidiary to this Item.

Special Provision to Item 540
Metal Beam Guard Fence

Item 540, "Metal Beam Guard Fence" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 540.4.7, "Measurement," is voided and replaced with the following:

> **Long Span System**. Measurement will be by each long span system, complete in place. Each long span system will be from the first CRT to the last CRT in the system.

Special Provision to Item 636
Signs

Item 636, "Signs" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Section 636.3.1, "Fabrication." is deleted.

Section 636.3.1.2, "Sheeting Application." The last sentence of the fourth paragraph is voided and replaced by the following.

Do not splice sheeting or overlay films for signs fabricated with ink or with colored transparent films.

Special Provision to Item 643
Sign Identification Decals

Item 643, "Sign Identification Decals," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 2. "Materials." The sign identification decal design shown in Figure 1 and the description for each row in Table 1 are supplemented by the following.

Texas Department of Transportation												
C	**Fabrication Date**										**T**	**1**
J	F	M	A	M	J	J	A	S	O	N	D	**2**
	201		202		203		204		205			**3**
	0	1	2	3	4	5	6	7	8	9		**4**
Sheeting MFR - Substrate												
A	B	C	D	E	F	G	H	J	K	L	M	**5**
Film MFR												
A	B	C	D	E	F	G	H	J	K	L	M	**6**
Sheeting MFR - Legend												
A	B	C	D	E	F	G	H	J	K	L	M	**7**
Installation Date												
				0	1	2	3					**8**
	0	1	2	3	4	5	6	7	8	9		**9**
J	F	M	A	M	J	J	A	S	O	N	D	**10**
	201		202		203		204		205			**11**
	0	1	2	3	4	5	6	7	8	9		**12**
Name of Sign Fabricator **Physical Address** **City, State, Zip Code**												**13**

Figure 1
Decal Design (Row numbers explained in Table 1)

Table 1
Decal Description

Row Explanation
1 – Sign fabricator
2 – Month fabricated
3 – First 3 digits of year fabricated
4 – Last digit of year fabricated
5 – Manufacturer of the sheeting applied to the substrate
6 – Film (colored transparent or non-reflective black) manufacturer
7 – Manufacturer of the sheeting for the legend
8 – Tens digit of date installed
9 - Ones digit of date installed
10 – Month installed
11 – First 3 digits of year installed
12 – Last digit of year installed
13 – Name of sign fabricator and physical location of sign shop

Special Provision to Item 666
Retroreflectorized Pavement Markings

Item 666, "Retroreflectorized Pavement Markings," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 2.3., "Glass Traffic Beads." The first paragraph is voided and replaced by the following:

Furnish drop-on glass beads in accordance with DMS-8290, "Glass Traffic Beads," or as approved. Furnish a double-drop of Type II and Type III drop-on glass beads for longitudinal pavement markings where each type bead is applied separately in equal portions (by weight), unless otherwise approved. Apply the Type III beads before applying the Type II beads. Furnish Type II beads for work zone pavement markings and transverse markings or symbols.

Section 4.3.1., "Type I Markings.," is supplemented by the following:

4.3.1.3. Spot Striping. Perform spot striping on a callout basis with a minimum callout quantity as shown on the plans.

Section 4.3.2., "Type II Markings.," is supplemented by the following:

4.3.2.1. Spot Striping. Perform spot striping on a callout basis with a minimum callout quantity as shown on the plans.

Section 4.4., "Retroreflectivity Requirements.," is voided and replaced by the following.

Type I markings for Contracts totaling more than 20,000 ft. of pavement markings must meet the following minimum retroreflectivity values for all longitudinal edgeline, centerline or no passing barrier-line, and lane line markings when measured any time after 3 days, but not later than 10 days after application.

- White markings: 250 millicandelas per square meter per lux (mcd/m^2/lx)
- Yellow markings: 175 mcd/m^2/lx

Retroreflectivity requirements for Type I markings are not required for Contracts with less than 20,000 ft. of pavement markings or Contracts with callout work, unless otherwise shown on the plans.

Section 4.5., "Retroreflectivity Measurements.," is voided and replaced by the following:

Use a mobile retroreflectometer to measure retroreflectivity for Contracts totaling more than 50,000 ft. of pavement markings, unless otherwise shown on the plans. For Contracts with less than 50,000 ft. of pavement markings, mobile or portable retroreflectometers may be used at the Contractor's discretion. Coordinate with and obtain authorization from the Engineer before starting any retroreflectivity data collection.

Section 4.5.1., "Mobile Retroreflectometer Measurements." The last paragraph is voided and replaced by the following.

Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements falls below the minimum retroreflectivity requirements. Take measurements every 0.1 miles a minimum of 10 days after this third application within that mile segment for that series of markings. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

Section 4.5.2., "Portable Retroreflectometer Measurements." The first and second paragraphs are voided and replaced by the following.

Provide portable measurement averages for every 1.0 mile unless otherwise specified or approved. Take a minimum of 20 measurements for each 1-mi. section of roadway for each series of markings (e.g., edgeline, center skip line, each line of a double line) and direction of traffic flow when using a portable reflectometer. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and measure all center skip lines in both directions). The spacing between each measurement must be at least 100 ft. The Engineer may decrease the mileage frequency for measurements if the previous measurements provide satisfactory results. The Engineer may require the original number of measurements if concerns arise.

Restripe at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the averages of these measurements fail. Take a minimum of 10 more measurements after 10 days of this second application within that mile segment for that series of markings. Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements falls below the minimum retroreflectivity requirements. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

Section 4.6. "Performance Period." The first sentence is voided and replaced by the following:

All longitudinal markings must meet the minimum retroreflectivity requirements within the time frame specified. All markings must meet all other performance requirements of this specification for at least 30 calendar days after installation.

Article 6. "Payment." The first two paragraphs are voided and replaced by the following.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pavement Sealer" of the size specified; "Retroreflectorized Pavement Markings" of the type and color specified and the shape, width, size, and thickness (Type I markings only) specified, as applicable; "Retroreflectorized Pavement Markings with Retroreflective Requirements" of the types, colors, sizes, widths, and thicknesses specified; "Retroreflectorized Profile Pavement Markings" of the various types, colors, shapes, sizes, and widths specified; or "Reflectorized Pavement Marking (Call Out)" of the shape, width, size, and thickness (Type I markings only) specified, as applicable; or "Pavement Sealer (Call Out)" of the size specified.

This price is full compensation for materials, application of pavement markings, equipment, labor, tools, and incidentals.

Special Provision to Item 730
Roadside Mowing

For this project, Item 730, "Roadside Mowing," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Article 730.4., "Measurement," is voided and replaced by the following:

This Item will be measured by the cycle or the acre.

4.1. **Strip and Full-Width Mowing.** "Strip Mowing" and "Full-Width Mowing" will be measured by the cycle.

4.2. **Spot Mowing**. "Spot Mowing" will be measured by the acre mowed. The minimum quantity per callout is three acres, unless otherwise shown on the plans.

Special Provision to Special Specification 6027

Preparation of Existing Conduits, Ground Boxes, or Manholes

Item 6027, "Preparation of Existing Conduits, Ground Boxes, or Manholes" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 1. "Description," is voided and replaced by the following:

Prepare conduits, ground boxes, or manholes; replace conduits, ground boxes, or manholes, when necessary; replace conduit fittings with junction boxes; replace damaged ground box or manholes covers; adjust ground boxes; adjust ground box or manhole covers; install pull lines in conduits; install cable racks in ground boxes or manholes.

Article 2. "Materials," The first paragraph is voided and replaced by the following:

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and to the pertinent requirements of the following Items:

- Item 432, "Riprap"
- Item 440, "Reinforcement for Concrete"
- Item 465, "Manholes and Inlets"
- Item 618, "Conduit," and
- Item 624, "Ground Boxes."

Article 3. "Construction," is supplemented by the following:

3.6. **Adjustment of Ground Boxes.** Adjust ground boxes to meet new elevation of surface as shown on the plans or as directed. Remove existing concrete apron prior to adjustment as necessary. Adjust length of conduit and conductors as needed. Backfill disturbed surface with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

Protect existing conduits and conductors inside the ground box from damage. Replace ground box, conduit, conductor or ground box cover damaged by the Contractor.

Construct concrete aprons (as required) as shown on the plans and in accordance with Item 432, "Riprap," and Item 440, Reinforcement for Concrete."

Accept ownership of any unsalvageable materials, and dispose of them in accordance with federal, state, and local regulations.

Article 4. "Measurement," is voided and replaced by the following:

This Item will be measured by the foot of conduit cleared, tested, replaced and repaired, by each cable rack, junction box, ground box, or manhole installed or prepared, by each ground box or manhole cover replaced or adjusted, and by each ground box adjusted.

Article 5. "Payment." The first paragraph is voided and replaced by the following:

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Conduit (Prepare)," "Junction Box (Install)," "Manhole (Install),"

"Ground Box (Install)," "Manhole (Prepare)," "Ground Box (Prepare)," "Cover (Replace)" of the sizes specified, "Cover (Adjust)," "Ground Box (Adjust), "Ground Box w/Apron (Adjust)" and "Cable Rack Assembly (Install)." This price is full compensation for cleaning and testing conduit, ground boxes, and manholes; furnishing and installing pull cords, ground boxes, manholes, junction boxes, and cable racks; excavating and backfilling; adjusting ground boxes and manholes covers; adjusting ground boxes and install new concrete aprons (when required); adjusting length of conduit or conductors up to 1 foot); disposal of unsalvageable material; and equipment, materials, labor, tools, and incidentals.

Conduit and conductors requiring adjustment longer than 1 foot in length as shown on the plans will be paid for under Item 618, "Conduit", Item 620 "Electrical Conductor" or Item 684, "Traffic Signal Cables" as appropriate.

Special Provision to Special Specification 6185
Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 4. "Measurement", is voided and replaced by the following:

4.1. **Truck Mounted Attenuator/Trailer Attenuator (Stationary).** This Item will be measured by the day. TMA/TAs must be set up in a work area and operational before a calendar day can be considered measureable. A day will be measured for each TMA/TA set up and operational on the worksite.

4.2. **Truck Mounted Attenuator/Trailer Attenuator (Mobile Operation).** This Item will be measured by the hour or by the day. The time begins once the TMA/TA is ready for operation at the predetermined site and stops when notified by the Engineer. When measurement by the hour is specified, a minimum of 4 hr. will be paid each day for each operating TMA/TA used in a mobile operation. When measurement by the day is specified, a day will be measured for each TMA/TA set up and operational on the worksite.

Special Provision to Special Specification 6417 System Integration

Special Specification 6417, "System Integration," is amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Article 1. DESCRIPTION is voided and replaced by the following:

Integrate all furnished equipment and software as shown on the plans, as detailed in this Special Specification, and as directed. This work includes furnishing, installing, and testing and integrating of all traffic management hardware and software into the existing Combined Transportation, Emergency & Communications Center (CTECC) system and CTECC traffic management center (TMC). The Contractor must select, install, and integrate the equipment and software as required to achieve a complete and fully operational traffic management system (TMS) as shown on the plans, as detailed in this Special Specification, and as directed.

Article 2.2. System Integration. The first paragraph is voided and replaced by the following:

Provide an integrated system that encompasses the following:

- integration of proposed Closed-Circuit TV's (CCTV), Dynamic Message Sign (DMS), (radar vehicle sensing device) RVSD, Wrong Way Driver Detection System, and peripherals;
- integration of proposed and existing fiberoptic cable supporting ITS field equipment; and
- integration of all components into the Department TMC.

Article 4. PAYMENT is voided and replaced by the following:

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "ITS System Integration." This price is full compensation for preparing, furnishing, and installing all materials, equipment, and incidentals necessary to provide an integrated system as directed by the Engineer. Items that are not specifically mentioned or addressed in this Specification but are necessary for a complete and operational system as described will be provided by the Contractor and will not be paid for directly, as they are considered incidental to this Item.

Special Specification 3076
Dense-Graded Hot-Mix Asphalt

1. DESCRIPTION

Construct a hot-mix asphalt (HMA) pavement layer composed of a compacted, dense-graded mixture of aggregate and asphalt binder mixed hot in a mixing plant. Payment adjustments will apply to HMA placed under this specification unless the HMA is deemed exempt in accordance with Section 3076.4.9.4., "Exempt Production."

2. MATERIALS

Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications.

Notify the Engineer of all material sources and before changing any material source or formulation. The Engineer will verify that the specification requirements are met when the Contractor makes a source or formulation change, and may require a new laboratory mixture design, trial batch, or both. The Engineer may sample and test project materials at any time during the project to verify specification compliance in accordance with Item 6, "Control of Materials."

2.1. **Aggregate**. Furnish aggregates from sources that conform to the requirements shown in Table 1 and as specified in this Section. Aggregate requirements in this Section, including those shown in Table 1, may be modified or eliminated when shown on the plans. Additional aggregate requirements may be specified when shown on the plans. Provide aggregate stockpiles that meet the definitions in this Section for coarse, intermediate, or fine aggregate. Aggregate from reclaimed asphalt pavement (RAP) is not required to meet Table 1 requirements unless otherwise shown on the plans. Supply aggregates that meet the definitions in Tex-100-E for crushed gravel or crushed stone. The Engineer will designate the plant or the quarry as the sampling location. Provide samples from materials produced for the project. The Engineer will establish the Surface Aggregate Classification (SAC) and perform Los Angeles abrasion, magnesium sulfate soundness, and Micro-Deval tests. Perform all other aggregate quality tests listed in Table 1. Document all test results on the mixture design report. The Engineer may perform tests on independent or split samples to verify Contractor test results. Stockpile aggregates for each source and type separately. Determine aggregate gradations for mixture design and production testing based on the washed sieve analysis given in Tex-200-F, Part II.

2.1.1. **Coarse Aggregate**. Coarse aggregate stockpiles must have no more than 20% material passing the No. 8 sieve. Aggregates from sources listed in the Department's *Bituminous Rated Source Quality Catalog* (BRSQC) are preapproved for use. Use only the rated values for hot-mix listed in the BRSQC. Rated values for surface treatment (ST) do not apply to coarse aggregate sources used in hot-mix asphalt.

For sources not listed on the Department's BRSQC:

- build an individual stockpile for each material;
- request the Department test the stockpile for specification compliance; and
- once approved, do not add material to the stockpile unless otherwise approved.

Provide aggregate from non-listed sources only when tested by the Engineer and approved before use. Allow 30 calendar days for the Engineer to sample, test, and report results for non-listed sources.

Provide coarse aggregate with at least the minimum SAC shown on the plans. SAC requirements only apply to aggregates used on the surface of travel lanes. SAC requirements apply to aggregates used on surfaces other than travel lanes when shown on the plans. The SAC for sources on the Department's *Aggregate Quality Monitoring Program* (AQMP) (Tex-499-A) is listed in the BRSQC.

2.1.1.1. **Blending Class A and Class B Aggregates**. Class B aggregate meeting all other requirements in Table 1 may be blended with a Class A aggregate to meet requirements for Class A materials, unless otherwise shown on the plans. Ensure that at least 50% by weight, or volume if required, of the material retained on the No. 4 sieve comes from the Class A aggregate source when blending Class A and B aggregates to meet a Class A requirement unless otherwise shown on the plans. Blend by volume if the bulk specific gravities of the Class A and B aggregates differ by more than 0.300. Coarse aggregate from RAP and Recycled Asphalt Shingles (RAS) will be considered as Class B aggregate for blending purposes.

The Engineer may perform tests at any time during production, when the Contractor blends Class A and B aggregates to meet a Class A requirement, to ensure that at least 50% by weight, or volume if required, of the material retained on the No. 4 sieve comes from the Class A aggregate source. The Engineer will use the Department's mix design template, when electing to verify conformance, to calculate the percent of Class A aggregate retained on the No. 4 sieve by inputting the bin percentages shown from readouts in the control room at the time of production and stockpile gradations measured at the time of production. The Engineer may determine the gradations based on either washed or dry sieve analysis from samples obtained from individual aggregate cold feed bins or aggregate stockpiles. The Engineer may perform spot checks using the gradations supplied by the Contractor on the mixture design report as an input for the template; however, a failing spot check will require confirmation with a stockpile gradation determined by the Engineer.

2.1.1.2. **Micro-Deval Abrasion**. The Engineer will perform a minimum of one Micro-Deval abrasion test in accordance with Tex-461-A for each coarse aggregate source used in the mixture design that has a Rated Source Soundness Magnesium (RSSM) loss value greater than 15 as listed in the BRSQC. The Engineer will perform testing before the start of production and may perform additional testing at any time during production. The Engineer may obtain the coarse aggregate samples from each coarse aggregate source or may require the Contractor to obtain the samples. The Engineer may waive all Micro-Deval testing based on a satisfactory test history of the same aggregate source.

The Engineer will estimate the magnesium sulfate soundness loss for each coarse aggregate source, when tested, using the following formula:

$$Mg_{est.} = (RSSM)(MD_{act.}/RSMD)$$

where:
$Mg_{est.}$ = magnesium sulfate soundness loss
$MD_{act.}$ = actual Micro-Deval percent loss
RSMD = Rated Source Micro-Deval

When the estimated magnesium sulfate soundness loss is greater than the maximum magnesium sulfate soundness loss specified, the coarse aggregate source will not be allowed for use unless otherwise approved. The Engineer will consult the Soils and Aggregates Section of the Materials and Tests Division, and additional testing may be required before granting approval.

2.1.2. **Intermediate Aggregate**. Aggregates not meeting the definition of coarse or fine aggregate will be defined as intermediate aggregate. Supply intermediate aggregates, when used that are free from organic impurities. The Engineer may test the intermediate aggregate in accordance with Tex-408-A to verify the material is free from organic impurities. Supply intermediate aggregate from coarse aggregate sources, when used that meet the requirements shown in Table 1 unless otherwise approved.

Test the stockpile if 10% or more of the stockpile is retained on the No. 4 sieve, and verify that it meets the requirements in Table 1 for crushed face count (Tex-460-A) and flat and elongated particles (Tex-280-F).

2.1.3. **Fine Aggregate**. Fine aggregates consist of manufactured sands, screenings, and field sands. Fine aggregate stockpiles must meet the gradation requirements in Table 2. Supply fine aggregates that are free from organic impurities. The Engineer may test the fine aggregate in accordance with Tex-408-A to verify the material is free from organic impurities. Unless otherwise shown on the plans, up to 10% of the total aggregate may be field sand or other uncrushed fine aggregate. Use fine aggregate, with the exception of field sand, from coarse aggregate sources that meet the requirements shown in Table 1 unless otherwise approved.

Test the stockpile if 10% or more of the stockpile is retained on the No. 4 sieve and verify that it meets the requirements in Table 1 for crushed face count (Tex-460-A) and flat and elongated particles (Tex-280-F).

Table 1
Aggregate Quality Requirements

Property	Test Method	Requirement
Coarse Aggregate		
SAC	Tex-499-A (AQMP)	As shown on the plans
Deleterious material, %, Max	Tex-217-F, Part I	1.5
Decantation, %, Max	Tex-217-F, Part II	1.5
Micro-Deval abrasion, %	Tex-461-A	Note 1
Los Angeles abrasion, %, Max	Tex-410-A	40
Magnesium sulfate soundness, 5 cycles, %, Max	Tex-411-A	30
Crushed face count,[2] %, Min	Tex-460-A, Part I	85
Flat and elongated particles @ 5:1, %, Max	Tex-280-F	10
Fine Aggregate		
Linear shrinkage, %, Max	Tex-107-E	3
Sand equivalent, %, Min	Tex-203-F	45

1. Used to estimate the magnesium sulfate soundness loss in accordance with Section 3076.2.1.1.2., "Micro-Deval Abrasion."
2. Only applies to crushed gravel.

Table 2
Gradation Requirements for Fine Aggregate

Sieve Size	% Passing by Weight or Volume
3/8"	100
#8	70–100
#200	0–30

2.2. **Mineral Filler**. Mineral filler consists of finely divided mineral matter such as agricultural lime, crusher fines, hydrated lime, or fly ash. Mineral filler is allowed unless otherwise shown on the plans. Use no more than 2% hydrated lime or fly ash unless otherwise shown on the plans. Use no more than 1% hydrated lime if a substitute binder is used unless otherwise shown on the plans or allowed. Test all mineral fillers except hydrated lime and fly ash in accordance with Tex-107-E to ensure specification compliance. The plans may require or disallow specific mineral fillers. Provide mineral filler, when used, that:

- is sufficiently dry, free-flowing, and free from clumps and foreign matter as determined by the Engineer;
- does not exceed 3% linear shrinkage when tested in accordance with Tex-107-E; and
- meets the gradation requirements in Table 3, unless otherwise shown on the plans.

Table 3
Gradation Requirements for Mineral Filler

Sieve Size	% Passing by Weight or Volume
#8	100
#200	55–100

2.3. **Baghouse Fines**. Fines collected by the baghouse or other dust-collecting equipment may be reintroduced into the mixing drum.

2.4. **Asphalt Binder**. Furnish the type and grade of performance-graded (PG) asphalt specified on the plans.

2.5. **Tack Coat**. Furnish CSS-1H, SS-1H, or a PG binder with a minimum high-temperature grade of PG 58 for tack coat binder in accordance with Item 300, "Asphalts, Oils, and Emulsions." Specialized tack coat materials listed on the Department's MPL are allowed or required when shown on the plans. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.6. **Additives**. Use the type and rate of additive specified when shown on the plans. Additives that facilitate mixing, compaction, or improve the quality of the mixture are allowed when approved. Provide the Engineer with documentation such as the bill of lading showing the quantity of additives used in the project unless otherwise directed.

2.6.1. **Lime and Liquid Antistripping Agent**. When lime or a liquid antistripping agent is used, add in accordance with Item 301, "Asphalt Antistripping Agents." Do not add lime directly into the mixing drum of any plant where lime is removed through the exhaust stream unless the plant has a baghouse or dust collection system that reintroduces the lime into the drum.

2.6.2. **Warm Mix Asphalt (WMA)**. Warm Mix Asphalt (WMA) is defined as HMA that is produced within a target temperature discharge range of 215°F and 275°F using approved WMA additives or processes from the Department's MPL.

WMA is allowed for use on all projects and is required when shown on the plans. When WMA is required, the maximum placement or target discharge temperature for WMA will be set at a value below 275°F.

Department-approved WMA additives or processes may be used to facilitate mixing and compaction of HMA produced at target discharge temperatures above 275°F; however, such mixtures will not be defined as WMA.

2.6.3. **Compaction Aid.** Compaction Aid is defined as a chemical warm mix additive that is used to produce an asphalt mixture at a discharge temperature greater than 275°F.

Compaction Aid is allowed for use on all projects and is required when shown on the plans.

2.7. **Recycled Materials**. Use of RAP and RAS is permitted unless otherwise shown on the plans. Use of RAS is restricted to only intermediate and base mixes unless otherwise shown on the plans. Do not exceed the maximum allowable percentages of RAP and RAS shown in Table 4. The allowable percentages shown in Table 4 may be decreased or increased when shown on the plans. Determine the asphalt binder content and gradation of the RAP and RAS stockpiles for mixture design purposes in accordance with Tex-236-F, Part I. The Engineer may verify the asphalt binder content of the stockpiles at any time during production. Perform other tests on RAP and RAS when shown on the plans. Asphalt binder from RAP and RAS is designated as recycled asphalt binder. Calculate and ensure that the ratio of the recycled asphalt binder to total binder does not exceed the percentages shown in Table 5 during mixture design and HMA production when RAP or RAS is used. Use a separate cold feed bin for each stockpile of RAP and RAS during HMA production.

Surface, intermediate, and base mixes referenced in Tables 4 and 5 are defined as follows:

- **Surface**. The final HMA lift placed at the top of the pavement structure or placed directly below mixtures produced in accordance with Items 316, 342, 347, or 348;
- **Intermediate**. Mixtures placed below an HMA surface mix and less than or equal to 8.0 in. from the riding surface; and
- **Base**. Mixtures placed greater than 8.0 in. from the riding surface. Unless otherwise shown on the plans, mixtures used for bond breaker are defined as base mixtures.

2.7.1. **RAP**. RAP is salvaged, milled, pulverized, broken, or crushed asphalt pavement. Fractionated RAP is defined as a stockpile that contains RAP material with a minimum of 95.0% passing the 3/8-in. or 1/2-in. sieve, before burning in the ignition oven, unless otherwise approved. The Engineer may allow the Contractor to use an alternate to the 3/8-in. or 1/2-in. screen to fractionate the RAP.

Use of Contractor-owned RAP including HMA plant waste is permitted unless otherwise shown on the plans. Department-owned RAP stockpiles are available for the Contractor's use when the stockpile locations are shown on the plans. If Department-owned RAP is available for the Contractor's use, the Contractor may use Contractor-owned fractionated RAP and replace it with an equal quantity of Department-owned RAP. Department-owned RAP generated through required work on the Contract is available for the Contractor's use when shown on the plans. Perform any necessary tests to ensure Contractor- or Department-owned RAP is appropriate for use. The Department will not perform any tests or assume any liability for the quality of the Department-owned RAP unless otherwise shown on the plans. The Contractor will retain ownership of RAP generated on the project when shown on the plans.

Do not use Department- or Contractor-owned RAP contaminated with dirt or other objectionable materials. Do not use Department- or Contractor-owned RAP if the decantation value exceeds 5% and the plasticity index is greater than 8. Test the stockpiled RAP for decantation in accordance with Tex-406-A, Part I. Determine the plasticity index in accordance with Tex-106-E if the decantation value exceeds 5%. The decantation and plasticity index requirements do not apply to RAP samples with asphalt removed by extraction or ignition.

Do not intermingle Contractor-owned RAP stockpiles with Department-owned RAP stockpiles. Remove unused Contractor-owned RAP material from the project site upon completion of the project. Return unused Department-owned RAP to the designated stockpile location.

Table 4
Maximum Allowable Amounts of RAP[1]

Maximum Allowable Fractionated RAP (%)		
Surface	**Intermediate**	**Base**
15.0	25.0	30.0

1. Must also meet the recycled binder to total binder ratio shown in Table 5.

2.7.2. **RAS**. Use of post-manufactured RAS or post-consumer RAS (tear-offs) is not permitted in surface mixtures unless otherwise shown on the plans. RAS may be used in intermediate and base mixtures unless otherwise shown on the plans. Up to 3% RAS may be used separately or as a replacement for fractionated RAP in accordance with Table 4 and Table 5. RAS is defined as processed asphalt shingle material from manufacturing of asphalt roofing shingles or from re-roofing residential structures. Post-manufactured RAS is processed manufacturer's shingle scrap by-product. Post-consumer RAS is processed shingle scrap removed from residential structures. Comply with all regulatory requirements stipulated for RAS by the TCEQ. RAS may be used separately or in conjunction with RAP.

Process the RAS by ambient grinding or granulating such that 100% of the particles pass the 3/8 in. sieve when tested in accordance with Tex-200-F, Part I. Perform a sieve analysis on processed RAS material before extraction (or ignition) of the asphalt binder.

Add sand meeting the requirements of Table 1 and Table 2 or fine RAP to RAS stockpiles if needed to keep the processed material workable. Any stockpile that contains RAS will be considered a RAS stockpile and be limited to no more than 3.0% of the HMA mixture in accordance with Table 4.

Certify compliance of the RAS with DMS-11000, "Evaluating and Using Nonhazardous Recyclable Materials Guidelines." Treat RAS as an established nonhazardous recyclable material if it has not come into contact with any hazardous materials. Use RAS from shingle sources on the Department's MPL. Remove substantially all materials before use that are not part of the shingle, such as wood, paper, metal, plastic, and felt paper. Determine the deleterious content of RAS material for mixture design purposes in accordance with Tex-217-F, Part III. Do not use RAS if deleterious materials are more than 0.5% of the stockpiled RAS unless otherwise approved. Submit a sample for approval before submitting the mixture design. The Department will perform the testing for deleterious material of RAS to determine specification compliance.

2.8. **Substitute Binders**. Unless otherwise shown on the plans, the Contractor may use a substitute PG binder listed in Table 5 instead of the PG binder originally specified, if using recycled materials, and if the substitute PG binder and mixture made with the substitute PG binder meet the following:

- the substitute binder meets the specification requirements for the substitute binder grade in accordance with Section 300.2.10., "Performance-Graded Binders;" and
- the mixture has less than 10.0 mm of rutting on the Hamburg Wheel test (Tex-242-F) after the number of passes required for the originally specified binder. Use of substitute PG binders may only be allowed at the discretion of the Engineer if the Hamburg Wheel test results are between 10.0 mm and 12.5 mm.

Table 5
Allowable Substitute PG Binders and Maximum Recycled Binder Ratios

Originally Specified PG Binder	Allowable Substitute PG Binder for Surface Mixes	Allowable Substitute PG Binder for Intermediate and Base Mixes	Maximum Ratio of Recycled Binder[1] to Total Binder (%)		
			Surface	Intermediate	Base
76-22[4,5]	70-22	70-22	10.0	20.0	25.0
70-22[2,5]	N/A	64-22	10.0	20.0	25.0
64-22[2,3]	N/A	N/A	10.0	20.0	25.0
76-28[4,5]	70-28	70-28	10.0	20.0	25.0
70-28[2,5]	N/A	64-28	10.0	20.0	25.0
64-28[2,3]	N/A	N/A	10.0	20.0	25.0

1. Combined recycled binder from RAP and RAS. RAS is not permitted in surface mixtures unless otherwise shown on the plans.
2. Binder substitution is not allowed for surface mixtures.
3. Binder substitution is not allowed for intermediate and base mixtures.
4. Use no more than 10.0% recycled binder in surface mixtures when using this originally specified PG binder.
5. Use no more than 20.0% recycled binder when using this originally specified PG binder for intermediate mixtures. Use no more than 25.0% recycled binder when using this originally specified PG binder for base mixtures.

3. EQUIPMENT

Provide required or necessary equipment in accordance with Item 320, "Equipment for Asphalt Concrete Pavement."

4. CONSTRUCTION

Produce, haul, place, and compact the specified paving mixture. In addition to tests required by the specification, Contractors may perform other QC tests as deemed necessary. At any time during the project, the Engineer may perform production and placement tests as deemed necessary in accordance with Item 5, "Control of the Work." Schedule and participate in a mandatory pre-paving meeting with the Engineer on or before the first day of paving unless otherwise shown on the plans.

4.1. **Certification**. Personnel certified by the Department-approved hot-mix asphalt certification program must conduct all mixture designs, sampling, and testing in accordance with Table 6. Supply the Engineer with a list of certified personnel and copies of their current certificates before beginning production and when personnel changes are made. Provide a mixture design developed and signed by a Level 2 certified specialist. Provide Level 1A certified specialists at the plant during production operations. Provide Level 1B certified specialists to conduct placement tests. Provide AGG101 certified specialists for aggregate testing.

Table 6
Test Methods, Test Responsibility, and Minimum Certification Levels

Test Description	Test Method	Contractor	Engineer	Level[1]
1. Aggregate and Recycled Material Testing				
Sampling	Tex-221-F	✓	✓	1A/AGG101
Dry sieve	Tex-200-F, Part I	✓	✓	1A/AGG101
Washed sieve	Tex-200-F, Part II	✓	✓	1A/AGG101
Deleterious material	Tex-217-F, Parts I & III	✓	✓	AGG101
Decantation	Tex-217-F, Part II	✓	✓	AGG101
Los Angeles abrasion	Tex-410-A		✓	TxDOT
Magnesium sulfate soundness	Tex-411-A		✓	TxDOT
Micro-Deval abrasion	Tex-461-A		✓	AGG101
Crushed face count	Tex-460-A	✓	✓	AGG101
Flat and elongated particles	Tex-280-F	✓	✓	AGG101
Linear shrinkage	Tex-107-E	✓	✓	AGG101
Sand equivalent	Tex-203-F	✓	✓	AGG101
Organic impurities	Tex-408-A	✓	✓	AGG101
2. Asphalt Binder & Tack Coat Sampling				
Asphalt binder sampling	Tex-500-C, Part II	✓	✓	1A/1B
Tack coat sampling	Tex-500-C, Part III	✓	✓	1A/1B
3. Mix Design & Verification				
Design and JMF changes	Tex-204-F	✓	✓	2
Mixing	Tex-205-F	✓	✓	2
Molding (TGC)	Tex-206-F	✓	✓	1A
Molding (SGC)	Tex-241-F	✓	✓	1A
Laboratory-molded density	Tex-207-F, Parts I & VI	✓	✓	1A
Rice gravity	Tex-227-F, Part II	✓	✓	1A
Ignition oven correction factors[2]	Tex-236-F, Part II	✓	✓	2
Indirect tensile strength	Tex-226-F	✓	✓	1A
Hamburg Wheel test	Tex-242-F	✓	✓	1A
Boil test	Tex-530-C	✓	✓	1A
4. Production Testing				
Selecting production random numbers	Tex-225-F, Part I		✓	1A
Mixture sampling	Tex-222-F	✓	✓	1A/1B
Molding (TGC)	Tex-206-F	✓	✓	1A
Molding (SGC)	Tex-241-F	✓	✓	1A
Laboratory-molded density	Tex-207-F, Parts I & VI	✓	✓	1A
Rice gravity	Tex-227-F, Part II	✓	✓	1A
Gradation & asphalt binder content[2]	Tex-236-F, Part I	✓	✓	1A
Control charts	Tex-233-F	✓	✓	1A
Moisture content	Tex-212-F, Part II	✓	✓	1A/AGG101
Hamburg Wheel test	Tex-242-F	✓	✓	1A
Micro-Deval abrasion	Tex-461-A		✓	AGG101
Boil test	Tex-530-C	✓	✓	1A
Abson recovery	Tex-211-F		✓	TxDOT
5. Placement Testing				
Selecting placement random numbers	Tex-225-F, Part II		✓	1B
Trimming roadway cores	Tex-251-F, Parts I & II	✓	✓	1A/1B
In-place air voids	Tex-207-F, Parts I & VI	✓	✓	1A
In-place density (nuclear method)	Tex-207-F, Part III	✓		1B
Establish rolling pattern	Tex-207-F, Part IV	✓		1B
Control charts	Tex-233-F	✓	✓	1A
Ride quality measurement	Tex-1001-S	✓	✓	Note 3
Segregation (density profile)	Tex-207-F, Part V	✓	✓	1B
Longitudinal joint density	Tex-207-F, Part VII	✓	✓	1B
Thermal profile	Tex-244-F	✓	✓	1B
Shear Bond Strength Test	Tex-249-F		✓	TxDOT

1. Level 1A, 1B, AGG101, and 2 are certification levels provided by the Hot Mix Asphalt Center certification program.
2. Refer to Section 3076.4.9.2.3., "Production Testing," for exceptions to using an ignition oven.
3. Profiler and operator are required to be certified at the Texas A&M Transportation Institute facility when Surface Test Type B is specified.

4.2. **Reporting and Responsibilities**. Use Department-provided templates to record and calculate all test data, including mixture design, production and placement QC/QA, control charts, thermal profiles, segregation density profiles, and longitudinal joint density. Obtain the current version of the templates at http://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html or from the Engineer. The Engineer and the Contractor will provide any available test results to the other party when requested. The maximum allowable time for the Contractor and Engineer to exchange test data is as given in Table 7 unless otherwise approved. The Engineer and the Contractor will immediately report to the other party any test result that requires suspension of production or placement, a payment adjustment less than 1.000, or that fails to meet the specification requirements. Record and electronically submit all test results and pertinent information on Department-provided templates.

Subsequent sublots placed after test results are available to the Contractor, which require suspension of operations, may be considered unauthorized work. Unauthorized work will be accepted or rejected at the discretion of the Engineer in accordance with Article 5.3., "Conformity with Plans, Specifications, and Special Provisions."

Table 7
Reporting Schedule

Description	Reported By	Reported To	To Be Reported Within
Production Quality Control			
Gradation[1]	Contractor	Engineer	1 working day of completion of the sublot
Asphalt binder content[1]			
Laboratory-molded density[2]			
Moisture content[3]			
Boil test[3]			
Production Quality Assurance			
Gradation[3]	Engineer	Contractor	1 working day of completion of the sublot
Asphalt binder content[3]			
Laboratory-molded density[1]			
Hamburg Wheel test[4]			
Boil test[3]			
Binder tests[4]			
Placement Quality Control			
In-place air voids[2]	Contractor	Engineer	1 working day of completion of the lot
Segregation[1]			
Longitudinal joint density[1]			
Thermal profile[1]			
Placement Quality Assurance			
In-place air voids[1]	Engineer	Contractor	1 working day after receiving the trimmed cores[5]
Segregation[3]			1 working day of completion of the lot
Longitudinal joint density[3]			
Thermal profile[3]			
Aging ratio[4]			
Payment adjustment summary	Engineer	Contractor	2 working days of performing all required tests and receiving Contractor test data

1. These tests are required on every sublot.
2. Optional test. When performed on split samples, report the results as soon as they become available.
3. To be performed at the frequency specified in Table 16 or as shown on the plans.
4. To be reported as soon as the results become available.
5. 2 days are allowed if cores cannot be dried to constant weight within 1 day.

The Engineer will use the Department-provided template to calculate all payment adjustment factors for the lot. Sublot samples may be discarded after the Engineer and Contractor sign off on the payment adjustment summary documentation for the lot.

Use the procedures described in Tex-233-F to plot the results of all quality control (QC) and quality assurance (QA) testing. Update the control charts as soon as test results for each sublot become available. Make the control charts readily accessible at the field laboratory. The Engineer may suspend production for failure to update control charts.

4.3. **Quality Control Plan (QCP)**. Develop and follow the QCP in detail. Obtain approval for changes to the QCP made during the project. The Engineer may suspend operations if the Contractor fails to comply with the QCP.

Submit a written QCP before the mandatory pre-paving meeting. Receive approval of the QCP before beginning production. Include the following items in the QCP:

4.3.1. **Project Personnel**. For project personnel, include:

- a list of individuals responsible for QC with authority to take corrective action;
- current contact information for each individual listed; and
- current copies of certification documents for individuals performing specified QC functions.

4.3.2. **Material Delivery and Storage**. For material delivery and storage, include:

- the sequence of material processing, delivery, and minimum quantities to assure continuous plant operations;
- aggregate stockpiling procedures to avoid contamination and segregation;
- frequency, type, and timing of aggregate stockpile testing to assure conformance of material requirements before mixture production; and
- procedure for monitoring the quality and variability of asphalt binder.

4.3.3. **Production**. For production, include:

- loader operation procedures to avoid contamination in cold bins;
- procedures for calibrating and controlling cold feeds;
- procedures to eliminate debris or oversized material;
- procedures for adding and verifying rates of each applicable mixture component (e.g., aggregate, asphalt binder, RAP, RAS, lime, liquid antistrip, WMA);
- procedures for reporting job control test results; and
- procedures to avoid segregation and drain-down in the silo.

4.3.4. **Loading and Transporting**. For loading and transporting, include:

- type and application method for release agents; and
- truck loading procedures to avoid segregation.

4.3.5. **Placement and Compaction**. For placement and compaction, include:

- proposed agenda for mandatory pre-paving meeting, including date and location;
- proposed paving plan (e.g., paving widths, joint offsets, and lift thicknesses);
- type and application method for release agents in the paver and on rollers, shovels, lutes, and other utensils;
- procedures for the transfer of mixture into the paver, while avoiding segregation and preventing material spillage;
- process to balance production, delivery, paving, and compaction to achieve continuous placement operations and good ride quality;
- paver operations (e.g., operation of wings, height of mixture in auger chamber) to avoid physical and thermal segregation and other surface irregularities; and
- procedures to construct quality longitudinal and transverse joints.

4.4. **Mixture Design**.

4.4.1. **Design Requirements**. The Contractor will design the mixture using a Superpave Gyratory Compactor (SGC). A Texas Gyratory Compactor (TGC) may be used when shown on the plans. Use the dense-graded design procedure provided in Tex-204-F. Design the mixture to meet the requirements listed in Tables 1, 2, 3, 4, 5, 8, 9, and 10.

4.4.1.1. **Design Number of Gyrations (Ndesign) When The SGC Is Used**. Design the mixture at 50 gyrations (Ndesign). Use a target laboratory-molded density of 96.0% to design the mixture; however, adjustments can be made to the Ndesign value as noted in Table 9. The Ndesign level may be reduced to at least 35 gyrations at the Contractor's discretion.

Use an approved laboratory from the Department's MPL to perform the Hamburg Wheel test, and provide results with the mixture design, or provide the laboratory mixture and request that the Department perform the Hamburg Wheel test. The Engineer will be allowed 10 working days to provide the Contractor with Hamburg Wheel test results on the laboratory mixture design.

The Engineer will provide the mixture design when shown on the plans. The Contractor may submit a new mixture design at any time during the project. The Engineer will verify and approve all mixture designs (JMF1) before the Contractor can begin production.

Provide the Engineer with a mixture design report using the Department-provided template. Include the following items in the report:

- the combined aggregate gradation, source, specific gravity, and percent of each material used;
- asphalt binder content and aggregate gradation of RAP and RAS stockpiles;
- the target laboratory-molded density (or Ndesign level when using the SGC);
- results of all applicable tests;
- the mixing and molding temperatures;
- the signature of the Level 2 person or persons that performed the design;
- the date the mixture design was performed; and
- a unique identification number for the mixture design.

Table 8
Master Gradation Limits (% Passing by Weight or Volume) and VMA Requirements

Sieve Size	B Fine Base	C Coarse Surface	D Fine Surface	F Fine Mixture
2"	–	–	–	–
1-1/2"	100.0[1]	–	–	–
1"	98.0–100.0	100.0[1]	–	–
3/4"	84.0–98.0	95.0–100.0	100.0[1]	–
1/2"	–	–	98.0–100.0	100.0[1]
3/8"	60.0–80.0	70.0–85.0	85.0–100.0	98.0–100.0
#4	40.0–60.0	43.0–63.0	50.0–70.0	70.0–90.0
#8	29.0–43.0	32.0–44.0	35.0–46.0	38.0–48.0
#30	13.0–28.0	14.0–28.0	15.0–29.0	12.0–27.0
#50	6.0–20.0	7.0–21.0	7.0–20.0	6.0–19.0
#200	2.0–7.0	2.0–7.0	2.0–7.0	2.0–7.0
Design VMA, % Minimum				
–	13.0	14.0	15.0	16.0
Production (Plant-Produced) VMA, % Minimum				
–	12.5	13.5	14.5	15.5

1. Defined as maximum sieve size. No tolerance allowed.

Table 9
Laboratory Mixture Design Properties

Mixture Property	Test Method	Requirement
Target laboratory-molded density, % (SGC)	Tex-207-F	96.0
Design gyrations (Ndesign for SGC)	Tex-241-F	50[1]
Indirect tensile strength (dry), psi	Tex-226-F	85–200[2]
Boil test[3]	Tex-530-C	–

1. Adjust within a range of 35–100 gyrations when shown on the plans or specification or when mutually agreed between the Engineer and Contractor.
2. The Engineer may allow the IDT strength to exceed 200 psi if the corresponding Hamburg Wheel rut depth is greater than 3.0 mm and less than 12.5 mm.
3. Used to establish baseline for comparison to production results. May be waived when approved.

Table 10
Hamburg Wheel Test Requirements

High-Temperature Binder Grade	Test Method	Minimum # of Passes @ 12.5 mm[1] Rut Depth, Tested @ 50°C
PG 64 or lower	Tex-242-F	10,000[2]
PG 70		15,000[3]
PG 76 or higher		20,000

1. When the rut depth at the required minimum number of passes is less than 3 mm, the Engineer may require the Contractor to increase the target laboratory-molded density (TGC) by 0.5% to no more than 97.5% or lower the Ndesign level (SGC) to at least 35 gyrations.
2. May be decreased to at least 5,000 passes when shown on the plans.
3. May be decreased to at least 10,000 passes when shown on the plans.

4.4.1.2. **Target Laboratory-Molded Density When The TGC Is Used**. Design the mixture at a 96.5% target laboratory-molded density. Increase the target laboratory-molded density to 97.0% or 97.5% at the Contractor's discretion or when shown on the plans or specification.

4.4.2. **Job-Mix Formula Approval**. The job-mix formula (JMF) is the combined aggregate gradation, target laboratory-molded density (or Ndesign level), and target asphalt percentage used to establish target values for hot-mix production. JMF1 is the original laboratory mixture design used to produce the trial batch. When WMA is used, JMF1 may be designed and submitted to the Engineer without including the WMA additive. When WMA is used, document the additive or process used and recommended rate on the JMF1 submittal. The Engineer and the Contractor will verify JMF1 based on plant-produced mixture from the trial batch unless otherwise approved. The Engineer may accept an existing mixture design previously used on a Department project and may waive the trial batch to verify JMF1. The Department may require the Contractor to reimburse the Department for verification tests if more than 2 trial batches per design are required.

4.4.2.1. **Contractor's Responsibilities**.

4.4.2.1.1. **Providing Gyratory Compactor**. Use a SGC calibrated in accordance with Tex-241-F to design the mixture in accordance with Tex-204-F, Part IV, for molding production samples. Locate the SGC, if used, at the Engineer's field laboratory and make the SGC available to the Engineer for use in molding production samples. Furnish a TGC calibrated in accordance with Tex-914-K when shown on the plans to design the mixture in accordance with Tex-204-F, Part I, for molding production samples.

4.4.2.1.2. **Gyratory Compactor Correlation Factors**. Use Tex-206-F, Part II, to perform a gyratory compactor correlation when the Engineer uses a different gyratory compactor. Apply the correlation factor to all subsequent production test results.

4.4.2.1.3. **Submitting JMF1**. Furnish a mix design report (JMF1) with representative samples of all component materials and request approval to produce the trial batch. Provide approximately 10,000 g of the design mixture if opting to have the Department perform the Hamburg Wheel test on the laboratory mixture, and request that the Department perform the test.

4.4.2.1.4. **Supplying Aggregates**. Provide approximately 40 lb. of each aggregate stockpile unless otherwise directed.

4.4.2.1.5. **Supplying Asphalt**. Provide at least 1 gal. of the asphalt material and enough quantities of any additives proposed for use.

4.4.2.1.6. **Ignition Oven Correction Factors**. Determine the aggregate and asphalt correction factors from the ignition oven in accordance with Tex-236-F, Part II. Provide correction factors that are not more than 12 months old. Provide the Engineer with split samples of the mixtures before the trial batch production, including all additives (except water), and blank samples used to determine the correction factors for the ignition oven used for QA testing during production. Correction factors established from a previously approved mixture design may be used for the current mixture design if the mixture design and ignition oven are the same as previously used, unless otherwise directed.

4.4.2.1.7. **Boil Test**. Perform the test and retain the tested sample from Tex-530-C until completion of the project or as directed. Use this sample for comparison purposes during production. The Engineer may waive the requirement for the boil test.

4.4.2.1.8. **Trial Batch Production**. Provide a plant-produced trial batch upon receiving conditional approval of JMF1 and authorization to produce a trial batch, including the WMA additive or process if applicable, for verification testing of JMF1 and development of JMF2. Produce a trial batch mixture that meets the requirements in Table 4, Table 5, and Table 11. The Engineer may accept test results from recent production of the same mixture instead of a new trial batch.

4.4.2.1.9. **Trial Batch Production Equipment**. Use only equipment and materials proposed for use on the project to produce the trial batch.

4.4.2.1.10. **Trial Batch Quantity**. Produce enough quantity of the trial batch to ensure that the mixture meets the specification requirements.

4.4.2.1.11. **Number of Trial Batches**. Produce trial batches as necessary to obtain a mixture that meets the specification requirements.

4.4.2.1.12. **Trial Batch Sampling**. Obtain a representative sample of the trial batch and split it into 3 equal portions in accordance with Tex-222-F. Label these portions as “Contractor,” “Engineer,” and “Referee.” Deliver samples to the appropriate laboratory as directed.

4.4.2.1.13. **Trial Batch Testing**. Test the trial batch to ensure the mixture produced using the proposed JMF1 meets the mixture requirements in Table 11. Ensure the trial batch mixture is also in compliance with the Hamburg Wheel requirement in Table 10. Use a Department-approved laboratory to perform the Hamburg Wheel test on the trial batch mixture or request that the Department perform the Hamburg Wheel test. The Engineer will be allowed 10 working days to provide the Contractor with Hamburg Wheel test results on the trial batch. Provide the Engineer with a copy of the trial batch test results.

4.4.2.1.14. **Development of JMF2**. Evaluate the trial batch test results after the Engineer grants full approval of JMF1 based on results from the trial batch, determine the optimum mixture proportions, and submit as JMF2. Adjust the asphalt binder content or gradation to achieve the specified target laboratory-molded density. The asphalt binder content established for JMF2 is not required to be within any tolerance of the optimum asphalt binder content established for JMF1; however, mixture produced using JMF2 must meet the voids in mineral aggregates (VMA) requirements for production shown in Table 8. If the optimum asphalt binder content for JMF2 is more than 0.5% lower than the optimum asphalt binder content for JMF1, the Engineer may perform or require the Contractor to perform Tex-226-F on Lot 1 production to confirm the indirect tensile strength does not exceed 200 psi. Verify that JMF2 meets the mixture requirements in Table 5.

4.4.2.1.15. **Mixture Production**. Use JMF2 to produce Lot 1 as described in Section 3076.4.9.3.1.1., “Lot 1 Placement,” after receiving approval for JMF2 and a passing result from the Department’s or a Department-approved

laboratory's Hamburg Wheel test on the trial batch. If desired, proceed to Lot 1 production, once JMF2 is approved, at the Contractor's risk without receiving the results from the Department's Hamburg Wheel test on the trial batch.

Notify the Engineer if electing to proceed without Hamburg Wheel test results from the trial batch. Note that the Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel test to be removed and replaced at the Contractor's expense.

4.4.2.1.16. **Development of JMF3**. Evaluate the test results from Lot 1, determine the optimum mixture proportions, and submit as JMF3 for use in Lot 2.

4.4.2.1.17. **JMF Adjustments**. If JMF adjustments are necessary to achieve the specified requirements, make the adjustments before beginning a new lot. The adjusted JMF must:

- be provided to the Engineer in writing before the start of a new lot;
- be numbered in sequence to the previous JMF;
- meet the mixture requirements in Table 4 and Table 5;
- meet the master gradation limits shown in Table 8; and
- be within the operational tolerances of JMF2 listed in Table 11.

4.4.2.1.18. **Requesting Referee Testing**. Use referee testing, if needed, in accordance with Section 3076.4.9.1., "Referee Testing," to resolve testing differences with the Engineer.

Table 11
Operational Tolerances

Description	Test Method	Allowable Difference Between Trial Batch and JMF1 Target	Allowable Difference from Current JMF Target	Allowable Difference between Contractor and Engineer[1]
Individual % retained for #8 sieve and larger	Tex-200-F or Tex-236-F	Must be Within Master Grading Limits in Table 8	±5.0[2,3]	±5.0
Individual % retained for sieves smaller than #8 and larger than #200			±3.0[2,3]	±3.0
% passing the #200 sieve			±2.0[2,3]	±1.6
Asphalt binder content, %	Tex-236-F	±0.5	±0.3[3]	±0.3
Laboratory-molded density, %	Tex-207-F	±1.0	±1.0	±1.0
In-place air voids, %		N/A	N/A	±1.0
Laboratory-molded bulk specific gravity		N/A	N/A	±0.020
VMA, %, min	Tex-204-F	Note[4]	Note[4]	N/A
Theoretical maximum specific (Rice) gravity	Tex-227-F	N/A	N/A	±0.020

1. Contractor may request referee testing only when values exceed these tolerances.
2. When within these tolerances, mixture production gradations may fall outside the master grading limits; however, the % passing the #200 will be considered out of tolerance when outside the master grading limits.
3. Only applies to mixture produced for Lot 1 and higher.
4. Test and verify that Table 8 requirements are met.

4.4.2.2. **Engineer's Responsibilities**.

4.4.2.2.1. **Gyratory Compactor**. For SGC mixtures designed in accordance with Tex-204-F, Part IV, the Engineer will use a Department SGC, calibrated in accordance with Tex-241-F, to mold samples for laboratory mixture design verification. For molding trial batch and production specimens, the Engineer will use the Contractor-provided SGC at the field laboratory or provide and use a Department SGC at an alternate location. The Engineer will make the Contractor-provided SGC in the Department field laboratory available to the Contractor for molding verification samples.

For TGC mixtures designed in accordance with Tex-204-F, Part I, the Engineer will use a Department TGC, calibrated in accordance with Tex-914-K, to mold samples for trial batch and production testing. The Engineer will make the Department TGC and the Department field laboratory available to the Contractor for molding verification samples, if requested by the Contractor.

4.4.2.2.2. **Conditional Approval of JMF1 and Authorizing Trial Batch**. The Engineer will review and verify conformance of the following information within 2 working days of receipt:

- the Contractor's mix design report (JMF1);
- the Contractor-provided Hamburg Wheel test results;
- all required materials including aggregates, asphalt, additives, and recycled materials; and
- the mixture specifications.

The Engineer will grant the Contractor conditional approval of JMF1 if the information provided on the paper copy of JMF1 indicates that the Contractor's mixture design meets the specifications. When the Contractor does not provide Hamburg Wheel test results with laboratory mixture design, 10 working days are allowed for conditional approval of JMF1. The Engineer will base full approval of JMF1 on the test results on mixture from the trial batch.

Unless waived, the Engineer will determine the Micro-Deval abrasion loss in accordance with Section 3076.2.1.1.2., "Micro-Deval Abrasion." If the Engineer's test results are pending after two working days, conditional approval of JMF1 will still be granted within two working days of receiving JMF1. When the Engineer's test results become available, they will be used for specification compliance.

After conditionally approving JMF1, including either Contractor- or Department-supplied Hamburg Wheel test results, the Contractor is authorized to produce a trial batch.

4.4.2.2.3. **Hamburg Wheel Testing of JMF1**. If the Contractor requests the option to have the Department perform the Hamburg Wheel test on the laboratory mixture, the Engineer will mold samples in accordance with Tex-242-F to verify compliance with the Hamburg Wheel test requirement in Table 10.

4.4.2.2.4. **Ignition Oven Correction Factors**. The Engineer will use the split samples provided by the Contractor to determine the aggregate and asphalt correction factors for the ignition oven used for QA testing during production in accordance with Tex-236-F, Part II. Provide correction factors that are not more than 12 months old.

4.4.2.2.5. **Testing the Trial Batch**. Within 1 full working day, the Engineer will sample and test the trial batch to ensure that the mixture meets the requirements in Table 11. If the Contractor requests the option to have the Department perform the Hamburg Wheel test on the trial batch mixture, the Engineer will mold samples in accordance with Tex-242-F to verify compliance with the Hamburg Wheel test requirement in Table 10.

The Engineer will have the option to perform the following tests on the trial batch:

- Tex-226-F, to verify that the indirect tensile strength meets the requirement shown in Table 9; and
- Tex-530-C, to retain and use for comparison purposes during production.

4.4.2.2.6. **Full Approval of JMF1**. The Engineer will grant full approval of JMF1 and authorize the Contractor to proceed with developing JMF2 if the Engineer's results for the trial batch meet the requirements in Table 11. The Engineer will notify the Contractor that an additional trial batch is required if the trial batch does not meet these requirements.

4.4.2.2.7. **Approval of JMF2**. The Engineer will approve JMF2 within one working day if the mixture meets the requirements in Table 5 and the gradation meets the master grading limits shown in Table 8. The asphalt binder content established for JMF2 is not required to be within any tolerance of the optimum asphalt binder content established for JMF1; however, mixture produced using JMF2 must meet the VMA requirements shown in Table 8. If the optimum asphalt binder content for JMF2 is more than 0.5% lower than the optimum asphalt binder content for JMF1, the Engineer may perform or require the Contractor to perform Tex-226-F on Lot 1 production to confirm the indirect tensile strength does not exceed 200 psi.

4.4.2.2.8. **Approval of Lot 1 Production**. The Engineer will authorize the Contractor to proceed with Lot 1 production (using JMF2) as soon as a passing result is achieved from the Department's or a Department-approved laboratory's Hamburg Wheel test on the trial batch. The Contractor may proceed at its own risk with Lot 1 production without the results from the Hamburg Wheel test on the trial batch.

If the Department's or Department-approved laboratory's sample from the trial batch fails the Hamburg Wheel test, the Engineer will suspend production until further Hamburg Wheel tests meet the specified values. The Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel test be removed and replaced at the Contractor's expense.

4.4.2.2.9. **Approval of JMF3 and Subsequent JMF Changes**. JMF3 and subsequent JMF changes are approved if they meet the mixture requirements shown in Table 4, Table 5, and the master grading limits shown in Table 8, and are within the operational tolerances of JMF2 shown in Table 11.

4.5. **Production Operations**. Perform a new trial batch when the plant or plant location is changed. Take corrective action and receive approval to proceed after any production suspension for noncompliance to the specification. Submit a new mix design and perform a new trial batch when the asphalt binder content of:

- any RAP stockpile used in the mix is more than 0.5% higher than the value shown on the mixture design report; or
- RAS stockpile used in the mix is more than 2.0% higher than the value shown on the mixture design report.

4.5.1. **Storage and Heating of Materials**. Do not heat the asphalt binder above the temperatures specified in Item 300, "Asphalts, Oils, and Emulsions," or outside the manufacturer's recommended values. Provide the Engineer with daily records of asphalt binder and hot-mix asphalt discharge temperatures (in legible and discernible increments) in accordance with Item 320, "Equipment for Asphalt Concrete Pavement," unless otherwise directed. Do not store mixture for a period long enough to affect the quality of the mixture, nor in any case longer than 12 hr. unless otherwise approved.

4.5.2. **Mixing and Discharge of Materials**. Notify the Engineer of the target discharge temperature and produce the mixture within 25°F of the target. Monitor the temperature of the material in the truck before shipping to ensure that it does not exceed the maximum production temperatures listed in Table 12 (or 275°F for WMA). The Department will not pay for or allow placement of any mixture produced above the maximum production temperatures listed in Table 12.

Table 12
Maximum Production Temperature

High-Temperature Binder Grade[1]	Maximum Production Temperature
PG 64	325˚F
PG 70	335˚F
PG 76	345˚F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.

Produce WMA within the target discharge temperature range of 215°F and 275°F when WMA is required. Take corrective action any time the discharge temperature of the WMA exceeds the target discharge range. The Engineer may suspend production operations if the Contractor's corrective action is not successful at controlling the production temperature within the target discharge range. Note that when WMA is produced, it may be necessary to adjust burners to ensure complete combustion such that no burner fuel residue remains in the mixture.

Control the mixing time and temperature so that substantially all moisture is removed from the mixture before discharging from the plant. Determine the moisture content, if requested, by oven-drying in accordance with

Tex-212-F, Part II, and verify that the mixture contains no more than 0.2% of moisture by weight. Obtain the sample immediately after discharging the mixture into the truck, and perform the test promptly.

4.6. **Hauling Operations**. Clean all truck beds before use to ensure that mixture is not contaminated. Use a release agent shown on the Department's MPL to coat the inside bed of the truck when necessary.

Use equipment for hauling as defined in Section 3076.4.7.3.3., "Hauling Equipment." Use other hauling equipment only when allowed.

4.7. **Placement Operations**. Collect haul tickets from each load of mixture delivered to the project and provide the Department's copy to the Engineer approximately every hour, or as directed. Use a hand-held thermal camera or infrared thermometer, when a thermal imaging system is not used, to measure and record the internal temperature of the mixture as discharged from the truck or Material Transfer Device (MTD) before or as the mix enters the paver and an approximate station number or GPS coordinates on each ticket. Calculate the daily yield and cumulative yield for the specified lift and provide to the Engineer at the end of paving operations for each day unless otherwise directed. The Engineer may suspend production if the Contractor fails to produce and provide haul tickets and yield calculations by the end of paving operations for each day.

Prepare the surface by removing raised pavement markers and objectionable material such as moisture, dirt, sand, leaves, and other loose impediments from the surface before placing mixture. Remove vegetation from pavement edges. Place the mixture to meet the typical section requirements and produce a smooth, finished surface with a uniform appearance and texture. Offset longitudinal joints of successive courses of hot-mix by at least 6 in. Place mixture so that longitudinal joints on the surface course coincide with lane lines and are not placed in the wheel path, or as directed. Ensure that all finished surfaces will drain properly. Place the mixture at the rate or thickness shown on the plans. The Engineer will use the guidelines in Table 13 to determine the compacted lift thickness of each layer when multiple lifts are required. The thickness determined is based on the rate of 110 lb./sq. yd. for each inch of pavement unless otherwise shown on the plans.

Table 13
Compacted Lift Thickness and Required Core Height

Mixture Type	Compacted Lift Thickness Guidelines		Minimum Untrimmed Core Height (in.) Eligible for Testing
	Minimum (in.)	Maximum (in.)	
B	2.50	5.00	1.75
C	2.00	4.00	1.50
D	1.50	3.00	1.25
F	1.25	2.50	1.25

4.7.1. **Weather Conditions**.

4.7.1.1. **When Using a Thermal Imaging System**. Place mixture when the roadway surface is dry and the roadway surface temperature is at or above the temperatures listed in Table 14A. The Engineer may restrict the Contractor from paving surface mixtures if the ambient temperature is likely to drop below 32°F within 12 hr. of paving. Place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable as determined by the Engineer. Provide output data from the thermal imaging system to demonstrate to the Engineer that no recurring severe thermal segregation exists in accordance with Section 3076.4.7.3.1.2., "Thermal Imaging System."

Table 14A
Minimum Pavement Surface Temperatures

High-Temperature Binder Grade[1]	Minimum Pavement Surface Temperatures (°F)	
	Subsurface Layers or Night Paving Operations	Surface Layers Placed in Daylight Operations
PG 64	35	40
PG 70	45[2]	50[2]
PG 76	45[2]	50[2]

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. Contractors may pave at temperatures 10°F lower than these values when a chemical WMA additive is used as a compaction aid in the mixture or when using WMA.

4.7.1.2. **When Not Using a Thermal Imaging System**. When using a thermal camera instead of the thermal imaging system, place mixture when the roadway surface temperature is at or above the temperatures listed in Table 14B unless otherwise approved or as shown on the plans. Measure the roadway surface temperature with a hand-held thermal camera or infrared thermometer. The Engineer may allow mixture placement to begin before the roadway surface reaches the required temperature if conditions are such that the roadway surface will reach the required temperature within 2 hr. of beginning placement operations. Place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable as determined by the Engineer. The Engineer may restrict the Contractor from paving if the ambient temperature is likely to drop below 32°F within 12 hr. of paving.

Table 14B
Minimum Pavement Surface Temperatures

High-Temperature Binder Grade[1]	Minimum Pavement Surface Temperatures (°F)	
	Subsurface Layers or Night Paving Operations	Surface Layers Placed in Daylight Operations
PG 64	45	50
PG 70	55[2]	60[2]
PG 76	60[2]	60[2]

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. Contractors may pave at temperatures 10°F lower than these values when a chemical WMA additive is used as a compaction aid in the mixture, when using WMA, or utilizing a paving process with equipment that eliminates thermal segregation. In such cases, for each sublot and in the presence of the Engineer, use a hand-held thermal camera operated in accordance with Tex-244-F to demonstrate to the satisfaction of the Engineer that the uncompacted mat has no more than 10°F of thermal segregation.

4.7.2. **Tack Coat**.

4.7.2.1. **Application.** Clean the surface before placing the tack coat. The Engineer will set the rate between 0.04 and 0.10 gal. of residual asphalt per square yard of surface area. Apply a uniform tack coat at the specified rate unless otherwise directed. Apply the tack coat in a uniform manner to avoid streaks and other irregular patterns. Apply the tack coat to all surfaces that will come in contact with the subsequent HMA placement, unless otherwise directed. Allow adequate time for emulsion to break completely before placing any material. Prevent splattering of tack coat when placed adjacent to curb, gutter, and structures. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

4.7.2.2. **Sampling.** The Engineer will obtain at least one sample of the tack coat binder per project in accordance with Tex-500-C, Part III, and test it to verify compliance with Item 300, “Asphalts, Oils, and Emulsions.” The Engineer will notify the Contractor when the sampling will occur and will witness the collection of the sample from the asphalt distributor immediately before use.

For emulsions, the Engineer may test as often as necessary to ensure the residual of the emulsion is greater than or equal to the specification requirement in Item 300, “Asphalts, Oils, and Emulsions.”

4.7.3. **Lay-Down Operations**. Use the placement temperatures in Table 15 to establish the minimum placement temperature of the mixture delivered to the paver.

Table 15
Minimum Mixture Placement Temperature

High-Temperature Binder Grade[1]	Minimum Placement Temperature (Before Entering Paver)[2,3]
PG 64	260˚F
PG 70	270˚F
PG 76	280˚F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. Minimum placement temperatures may be reduced 10°F if using a chemical WMA additive as a compaction aid.
3. When using WMA, the minimum placement temperature is 215°F.

4.7.3.1. **Thermal Profile**. Use a hand-held thermal camera or a thermal imaging system to obtain a continuous thermal profile in accordance with Tex-244-F. Thermal profiles are not applicable in areas described in Section 3076.4.9.3.1.4., "Miscellaneous Areas."

4.7.3.1.1. **Thermal Segregation**.

4.7.3.1.1.1. **Moderate**. Any areas that have a temperature differential greater than 25°F, but not exceeding 50°F, are deemed as moderate thermal segregation.

4.7.3.1.1.2. **Severe**. Any areas that have a temperature differential greater than 50°F are deemed as severe thermal segregation.

4.7.3.1.2. **Thermal Imaging System**. Review the output results when a thermal imaging system is used, and provide the automated report described in Tex-244-F to the Engineer daily unless otherwise directed. Modify the paving process as necessary to eliminate any recurring (moderate or severe) thermal segregation identified by the thermal imaging system. The Engineer may suspend paving operations if the Contractor cannot successfully modify the paving process to eliminate recurring severe thermal segregation. Density profiles are not required and not applicable when using a thermal imaging system. Provide the Engineer with electronic copies of all daily data files that can be used with the thermal imaging system software to generate temperature profile plots daily or upon completion of the project or as requested by the Engineer.

4.7.3.1.3. **Thermal Camera**. When using a thermal camera instead of the thermal imaging system, take immediate corrective action to eliminate recurring moderate thermal segregation when a hand-held thermal camera is used. Evaluate areas with moderate thermal segregation by performing density profiles in accordance with Section 3076.4.9.3.3.2., "Segregation (Density Profile)." Provide the Engineer with the thermal profile of every sublot within one working day of the completion of each lot. When requested by the Engineer, provide the thermal images generated using the thermal camera. Report the results of each thermal profile in accordance with Section 3076.4.2., "Reporting and Responsibilities." The Engineer will use a hand-held thermal camera to obtain a thermal profile at least once per project. No production or placement payment adjustments greater than 1.000 will be paid for any sublot that contains severe thermal segregation. Suspend operations and take immediate corrective action to eliminate severe thermal segregation unless otherwise directed. Resume operations when the Engineer determines that subsequent production will meet the requirements of this Section. Evaluate areas with severe thermal segregation by performing density profiles in accordance with Section 3076.4.9.3.3.2., "Segregation (Density Profile)." Remove and replace the material in any areas that have both severe thermal segregation and a failing result for Segregation (Density Profile) unless otherwise directed. The sublot in question may receive a production and placement payment adjustment greater than 1.000, if applicable, when the defective material is successfully removed and replaced.

4.7.3.2. **Windrow Operations**. Operate windrow pickup equipment so that when hot-mix is placed in windrows, substantially all the mixture deposited on the roadbed is picked up and loaded into the paver.

4.7.3.3. **Hauling Equipment**. Use belly dumps, live bottom, or end dump trucks to haul and transfer mixture; however, with exception of paving miscellaneous areas, end dump trucks are only allowed when used in conjunction with an MTD with remixing capability or when a thermal imaging system is used unless otherwise allowed.

4.7.3.4. **Screed Heaters**. Turn off screed heaters to prevent overheating of the mat if the paver stops for more than 5 min. The Engineer may evaluate the suspect area in accordance with Section 3076.4.9.3.3.4., "Recovered Asphalt Dynamic Shear Rheometer (DSR)," if the screed heater remains on for more than 5 min. while the paver is stopped.

4.8. **Compaction**. Compact the pavement uniformly to contain between 3.8% and 8.5% in-place air voids. Take immediate corrective action to bring the operation within 3.8% and 8.5% when the in-place air voids exceed the range of these tolerances. The Engineer will allow paving to resume when the proposed corrective action is likely to yield between 3.8% and 8.5% in-place air voids.

Obtain cores in areas placed under Exempt Production, as directed, at locations determined by the Engineer. The Engineer may test these cores and suspend operations or require removal and replacement if the in-place air voids are less than 2.7% or more than 9.9%. Areas defined in Section 3076.4.9.3.1.4., "Miscellaneous Areas," are not subject to in-place air void determination.

Furnish the type, size, and number of rollers required for compaction as approved. Use additional rollers as required to remove any roller marks. Use only water or an approved release agent on rollers, tamps, and other compaction equipment unless otherwise directed.

Use the control strip method shown in Tex-207-F, Part IV, on the first day of production to establish the rolling pattern that will produce the desired in-place air voids unless otherwise directed.

Use tamps to thoroughly compact the edges of the pavement along curbs, headers, and similar structures and in locations that will not allow thorough compaction with rollers. The Engineer may require rolling with a trench roller on widened areas, in trenches, and in other limited areas.

Complete all compaction operations before the pavement temperature drops below 160°F unless otherwise allowed. The Engineer may allow compaction with a light finish roller operated in static mode for pavement temperatures below 160°F.

Allow the compacted pavement to cool to 160°F or lower before opening to traffic unless otherwise directed. Sprinkle the finished mat with water or limewater, when directed, to expedite opening the roadway to traffic.

4.9. **Acceptance Plan**. Payment adjustments for the material will be in accordance with Article 3076.6., "Payment."

Sample and test the hot-mix on a lot and sublot basis. Suspend production until test results or other information indicates to the satisfaction of the Engineer that the next material produced or placed will result in payment factors of at least 1.000, if the production payment factor given in Section 3076.6.1., "Production Payment Adjustment Factors," for two consecutive lots or the placement pay factor given in Section 3076.6.2., "Placement Payment Adjustment Factors," for two consecutive lots is below 1.000.

4.9.1. **Referee Testing**. The Materials and Tests Division is the referee laboratory. The Contractor may request referee testing if a "remove and replace" condition is determined based on the Engineer's test results, or if the differences between Contractor and Engineer test results exceed the maximum allowable difference shown in Table 11 and the differences cannot be resolved. The Contractor may also request referee testing if the Engineer's test results require suspension of production and the Contractor's test results are within specification limits. Make the request within five working days after receiving test results and cores from the Engineer. Referee tests will be performed only on the sublot in question and only for the particular tests in question. Allow 10 working days from the time the referee laboratory receives the samples for test results to

be reported. The Department may require the Contractor to reimburse the Department for referee tests if more than three referee tests per project are required and the Engineer's test results are closer to the referee test results than the Contractor's test results.

The Materials and Tests Division will determine the laboratory-molded density based on the molded specific gravity and the maximum theoretical specific gravity of the referee sample. The in-place air voids will be determined based on the bulk specific gravity of the cores, as determined by the referee laboratory and the Engineer's average maximum theoretical specific gravity for the lot. With the exception of "remove and replace" conditions, referee test results are final and will establish payment adjustment factors for the sublot in question. The Contractor may decline referee testing and accept the Engineer's test results when the placement payment adjustment factor for any sublot results in a "remove and replace" condition. Placement sublots subject to be removed and replaced will be further evaluated in accordance with Section 3076.6.2.2., "Placement Sublots Subject to Removal and Replacement."

4.9.2. **Production Acceptance**.

4.9.2.1. **Production Lot**. A production lot consists of four equal sublots. The default quantity for Lot 1 is 1,000 tons; however, when requested by the Contractor, the Engineer may increase the quantity for Lot 1 to no more than 4,000 tons. The Engineer will select subsequent lot sizes based on the anticipated daily production such that approximately three to four sublots are produced each day. The lot size will be between 1,000 tons and 4,000 tons. The Engineer may change the lot size before the Contractor begins any lot.

If the optimum asphalt binder content for JMF2 is more than 0.5% lower than the optimum asphalt binder content for JMF1, the Engineer may perform or require the Contractor to perform Tex-226-F on Lot 1 to confirm the indirect tensile strength does not exceed 200 psi. Take corrective action to bring the mixture within specification compliance if the indirect tensile strength exceeds 200 psi unless otherwise directed.

4.9.2.1.1. **Incomplete Production Lots**. If a lot is begun but cannot be completed, such as on the last day of production or in other circumstances deemed appropriate, the Engineer may close the lot. Adjust the payment for the incomplete lot in accordance with Section 3076.6.1., "Production Payment Adjustment Factors." Close all lots within five working days unless otherwise allowed.

4.9.2.2. **Production Sampling**.

4.9.2.2.1. **Mixture Sampling**. Obtain hot-mix samples from trucks at the plant in accordance with Tex-222-F. The sampler will split each sample into three equal portions in accordance with Tex-200-F and label these portions as "Contractor," "Engineer," and "Referee." The Engineer will perform or witness the sample splitting and take immediate possession of the samples labeled "Engineer" and "Referee." The Engineer will maintain the custody of the samples labeled "Engineer" and "Referee" until the Department's testing is completed.

4.9.2.2.1.1. **Random Sample**. At the beginning of the project, the Engineer will select random numbers for all production sublots. Determine sample locations in accordance with Tex-225-F. Take one sample for each sublot at the randomly selected location. The Engineer will perform or witness the sampling of production sublots.

4.9.2.2.1.2. **Blind Sample**. For one sublot per lot, the Engineer will obtain and test a "blind" sample instead of the random sample collected by the Contractor. Test either the "blind" or the random sample; however, referee testing (if applicable) will be based on a comparison of results from the "blind" sample. The location of the Engineer's "blind" sample will not be disclosed to the Contractor. The Engineer's "blind" sample may be randomly selected in accordance with Tex-225-F for any sublot or selected at the discretion of the Engineer. The Engineer will use the Contractor's split sample for sublots not sampled by the Engineer.

4.9.2.2.2. **Informational Shear Bond Strength Testing.** Select one random sublot from Lot 2 or higher for shear bond strength testing. Obtain full depth cores in accordance with Tex-249-F. Label the cores with the Control Section Job (CSJ), producer of the tack coat, mix type, shot rate, lot, and sublot number and provide to the

Engineer. The Engineer will ship the cores to the Materials and Tests Division or district laboratory for shear bond strength testing. Results from these tests will not be used for specification compliance.

4.9.2.2.3. **Asphalt Binder Sampling**. Obtain a 1-qt. sample of the asphalt binder witnessed by the Engineer for each lot of mixture produced. The Contractor will notify the Engineer when the sampling will occur. Obtain the sample at approximately the same time the mixture random sample is obtained. Sample from a port located immediately upstream from the mixing drum or pug mill and upstream from the introduction of any additives in accordance with Tex-500-C, Part II. Label the can with the corresponding lot and sublot numbers, producer, producer facility location, grade, district, date sampled, and project information including highway and CSJ. The Engineer will retain these samples for one year. The Engineer may also obtain independent samples. If obtaining an independent asphalt binder sample and upon request of the Contractor, the Engineer will split a sample of the asphalt binder with the Contractor.

At least once per project, the Engineer will collect split samples of each binder grade and source used. The Engineer will submit one split sample to MTD to verify compliance with Item 300, “Asphalts, Oils, and Emulsions” and will retain the other split sample for one year.

4.9.2.3. **Production Testing**. The Contractor and Engineer must perform production tests in accordance with Table 16. The Contractor has the option to verify the Engineer’s test results on split samples provided by the Engineer. Determine compliance with operational tolerances listed in Table 11 for all sublots.

Take immediate corrective action if the Engineer’s laboratory-molded density on any sublot is less than 95.0% or greater than 97.0% to bring the mixture within these tolerances. The Engineer may suspend operations if the Contractor’s corrective actions do not produce acceptable results. The Engineer will allow production to resume when the proposed corrective action is likely to yield acceptable results.

The Engineer may allow alternate methods for determining the asphalt binder content and aggregate gradation if the aggregate mineralogy is such that Tex-236-F, Part I does not yield reliable results. Provide evidence that results from Tex-236-F, Part I are not reliable before requesting permission to use an alternate method unless otherwise directed. Use the applicable test procedure as directed if an alternate test method is allowed.

Table 16
Production and Placement Testing Frequency

Description	Test Method	Minimum Contractor Testing Frequency	Minimum Engineer Testing Frequency
Individual % retained for #8 sieve and larger	Tex-200-F or Tex-236-F	1 per sublot	1 per 12 sublots[1]
Individual % retained for sieves smaller than #8 and larger than #200			
% passing the #200 sieve			
Laboratory-molded density	Tex-207-F	N/A	1 per sublot[1]
Laboratory-molded bulk specific gravity			
In-place air voids			
VMA	Tex-204-F		
Segregation (density profile)[2]	Tex-207-F, Part V	1 per sublot	1 per project
Longitudinal joint density	Tex-207-F, Part VII		
Moisture content	Tex-212-F, Part II	When directed	
Theoretical maximum specific (Rice) gravity	Tex-227-F	N/A	1 per sublot[1]
Asphalt binder content	Tex-236-F	1 per sublot	1 per lot[1]
Hamburg Wheel test	Tex-242-F	N/A	1 per project
Recycled Asphalt Shingles (RAS)[3]	Tex-217-F, Part III	N/A	
Thermal profile[2]	Tex-244-F	1 per sublot	
Asphalt binder sampling and testing	Tex-500-C, Part II	1 per lot (sample only)[4]	
Tack coat sampling and testing	Tex-500-C, Part III	N/A	
Boil test[5]	Tex-530-C	1 per lot	
Shear Bond Strength Test[6]	Tex-249-F	1 per project (sample only)	

1. For production defined in Section 3076.4.9.4., "Exempt Production," the Engineer will test one per day if 100 tons or more are produced. For Exempt Production, no testing is required when less than 100 tons are produced.
2. Not required when a thermal imaging system is used.
3. Testing performed by the Materials and Tests Division or designated laboratory.
4. Obtain witnessed by the Engineer. The Engineer will retain these samples for one year.
5. The Engineer may reduce or waive the sampling and testing requirements based on a satisfactory test history.
6. Testing performed by the Materials and Tests Division or District for informational purposes only.

4.9.2.4. **Operational Tolerances**. Control the production process within the operational tolerances listed in Table 11. When production is suspended, the Engineer will allow production to resume when test results or other information indicates the next mixture produced will be within the operational tolerances.

4.9.2.4.1. **Gradation**. Suspend operation and take corrective action if any aggregate is retained on the maximum sieve size shown in Table 8. A sublot is defined as out of tolerance if either the Engineer's or the Contractor's test results are out of operational tolerance. Suspend production when test results for gradation exceed the operational tolerances in Table 11 for three consecutive sublots on the same sieve or four consecutive sublots on any sieve unless otherwise directed. The consecutive sublots may be from more than one lot.

4.9.2.4.2. **Asphalt Binder Content**. A sublot is defined as out of operational tolerance if either the Engineer's or the Contractor's test results exceed the values listed in Table 11. No production or placement payment adjustments greater than 1.000 will be paid for any sublot that is out of operational tolerance for asphalt binder content. Suspend production and shipment of the mixture if the Engineer's or the Contractor's asphalt binder content deviates from the current JMF by more than 0.5% for any sublot.

4.9.2.4.3. **Voids in Mineral Aggregates (VMA)**. The Engineer will determine the VMA for every sublot. For sublots when the Engineer does not determine asphalt binder content, the Engineer will use the asphalt binder content results from QC testing performed by the Contractor to determine VMA.

Take immediate corrective action if the VMA value for any sublot is less than the minimum VMA requirement for production listed in Table 8. Suspend production and shipment of the mixture if the Engineer's VMA results on two consecutive sublots are below the minimum VMA requirement for production listed in Table 8. No production or placement payment adjustments greater than 1.000 will be paid for any sublot that does not

meet the minimum VMA requirement for production listed in Table 8 based on the Engineer's VMA determination.

Suspend production and shipment of the mixture if the Engineer's VMA result is more than 0.5% below the minimum VMA requirement for production listed in Table 8. In addition to suspending production, the Engineer may require removal and replacement or may allow the sublot to be left in place without payment.

4.9.2.4.4. **Hamburg Wheel Test**. The Engineer may perform a Hamburg Wheel test at any time during production, including when the boil test indicates a change in quality from the materials submitted for JMF1. In addition to testing production samples, the Engineer may obtain cores and perform Hamburg Wheel tests on any areas of the roadway where rutting is observed. Suspend production until further Hamburg Wheel tests meet the specified values when the production or core samples fail the Hamburg Wheel test criteria in Table 10. Core samples, if taken, will be obtained from the center of the finished mat or other areas excluding the vehicle wheel paths. The Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel test to be removed and replaced at the Contractor's expense.

If the Department's or Department approved laboratory's Hamburg Wheel test results in a "remove and replace" condition, the Contractor may request that the Department confirm the results by re-testing the failing material. The Materials and Tests Division will perform the Hamburg Wheel tests and determine the final disposition of the material in question based on the Department's test results.

4.9.2.5. **Individual Loads of Hot-Mix**. The Engineer can reject individual truckloads of hot-mix. When a load of hot-mix is rejected for reasons other than temperature, contamination, or excessive uncoated particles, the Contractor may request that the rejected load be tested. Make this request within 4 hr. of rejection. The Engineer will sample and test the mixture. If test results are within the operational tolerances shown in Table 11, payment will be made for the load. If test results are not within operational tolerances, no payment will be made for the load.

4.9.3. **Placement Acceptance**.

4.9.3.1. **Placement Lot**. A placement lot consists of four placement sublots. A placement sublot consists of the area placed during a production sublot.

4.9.3.1.1. **Lot 1 Placement**. Placement payment adjustments greater than 1.000 for Lot 1 will be in accordance with Section 3076.6.2., "Placement Payment Adjustment Factors"; however, no placement adjustment less than 1.000 will be assessed for any sublot placed in Lot 1 when the in-place air voids are greater than or equal to 2.7% and less than or equal to 9.9%. Remove and replace any sublot with in-place air voids less than 2.7% or greater than 9.9%.

4.9.3.1.2. **Incomplete Placement Lots**. An incomplete placement lot consists of the area placed as described in Section 3076.4.9.2.1.1., "Incomplete Production Lots," excluding areas defined in Section 3076.4.9.3.1.4., "Miscellaneous Areas." Placement sampling is required if the random sample plan for production resulted in a sample being obtained from an incomplete production sublot.

4.9.3.1.3. **Shoulders, Ramps, Etc**. Shoulders, ramps, intersections, acceleration lanes, deceleration lanes, and turn lanes are subject to in-place air void determination and payment adjustments unless designated on the plans as not eligible for in-place air void determination. Intersections may be considered miscellaneous areas when determined by the Engineer.

4.9.3.1.4. **Miscellaneous Areas**. Miscellaneous areas include areas that typically involve significant handwork or discontinuous paving operations, such as temporary detours, driveways, mailbox turnouts, crossovers, gores, spot level-up areas, and other similar areas. Temporary detours are subject to in-place air void determination when shown on the plans. Miscellaneous areas also include level-ups and thin overlays when the layer thickness specified on the plans is less than the minimum untrimmed core height eligible for testing shown in Table 13. The specified layer thickness is based on the rate of 110 lb./sq. yd. for each inch of

pavement unless another rate is shown on the plans. When "level up" is listed as part of the item bid description code, a payment adjustment factor of 1.000 will be assigned for all placement sublots as described in Article 3076.6, "Payment." Miscellaneous areas are not eligible for random placement sampling locations. Compact miscellaneous areas in accordance with Section 3076.4.8., "Compaction." Miscellaneous areas are not subject to in-place air void determination, thermal profiles testing, segregation (density profiles), or longitudinal joint density evaluations.

4.9.3.2. **Placement Sampling**. The Engineer will select random numbers for all placement sublots at the beginning of the project. The Engineer will provide the Contractor with the placement random numbers immediately after the sublot is completed. Mark the roadway location at the completion of each sublot and record the station number. Determine one random sample location for each placement sublot in accordance with Tex-225-F. Adjust the random sample location by no more than necessary to achieve a 2-ft. clearance if the location is within 2 ft. of a joint or pavement edge.

Shoulders, ramps, intersections, acceleration lanes, deceleration lanes, and turn lanes are always eligible for selection as a random sample location; however, if a random sample location falls on one of these areas and the area is designated on the plans as not subject to in-place air void determination, cores will not be taken for the sublot and a 1.000 pay factor will be assigned to that sublot.

Provide the equipment and means to obtain and trim roadway cores on site. On-site is defined as in close proximity to where the cores are taken. Obtain the cores within one working day of the time the placement sublot is completed unless otherwise approved. Obtain two 6-in. diameter cores side-by-side from within 1 ft. of the random location provided for the placement sublot. For Type D and Type F mixtures, 4-in. diameter cores are allowed. Mark the cores for identification, measure and record the untrimmed core height, and provide the information to the Engineer. The Engineer will witness the coring operation and measurement of the core thickness. Visually inspect each core and verify that the current paving layer is bonded to the underlying layer. Take corrective action if an adequate bond does not exist between the current and underlying layer to ensure that an adequate bond will be achieved during subsequent placement operations.

Trim the cores immediately after obtaining the cores from the roadway in accordance with Tex-251-F if the core heights meet the minimum untrimmed value listed in Table 13. Trim the cores on site in the presence of the Engineer. Use a permanent marker or paint pen to record the lot and sublot numbers on each core as well as the designation as Core A or B. The Engineer may require additional information to be marked on the core and may choose to sign or initial the core. The Engineer will take custody of the cores immediately after witnessing the trimming of the cores and will retain custody of the cores until the Department's testing is completed. Before turning the trimmed cores over to the Engineer, the Contractor may wrap the trimmed cores or secure them in a manner that will reduce the risk of possible damage occurring during transport by the Engineer. After testing, the Engineer will return the cores to the Contractor.

The Engineer may have the cores transported back to the Department's laboratory at the HMA plant via the Contractor's haul truck or other designated vehicle. In such cases where the cores will be out of the Engineer's possession during transport, the Engineer will use Department-provided security bags and the Roadway Core Custody protocol located at http://www.txdot.gov/business/specifications.htm to provide a secure means and process that protects the integrity of the cores during transport.

Decide whether to include the pair of cores in the air void determination for that sublot if the core height before trimming is less than the minimum untrimmed value shown in Table 13. Trim the cores as described above before delivering to the Engineer if electing to have the cores included in the air void determination. Deliver untrimmed cores to the Engineer and inform the Engineer of the decision to not have the cores included in air void determination if electing to not have the cores included in air void determination. The placement pay factor for the sublot will be 1.000 if cores will not be included in air void determination.

Instead of the Contractor trimming the cores on site immediately after coring, the Engineer and the Contractor may mutually agree to have the trimming operations performed at an alternate location such as a field laboratory or other similar location. In such cases, the Engineer will take possession of the cores

immediately after they are obtained from the roadway and will retain custody of the cores until testing is completed. Either the Department or Contractor representative may perform trimming of the cores. The Engineer will witness all trimming operations in cases where the Contractor representative performs the trimming operation.

Dry the core holes and tack the sides and bottom immediately after obtaining the cores. Fill the hole with the same type of mixture and properly compact the mixture. Repair core holes with other methods when approved.

4.9.3.3. **Placement Testing**. Perform placement tests in accordance with Table 16. After the Engineer returns the cores, the Contractor may test the cores to verify the Engineer's test results for in-place air voids. The allowable differences between the Contractor's and Engineer's test results are listed in Table 11.

4.9.3.3.1. **In-Place Air Voids**. The Engineer will measure in-place air voids in accordance with Tex-207-F and Tex-227-F. Before drying to a constant weight, cores may be pre-dried using a CoreDry or similar vacuum device to remove excess moisture. The Engineer will average the values obtained for all sublots in the production lot to determine the theoretical maximum specific gravity. The Engineer will use the average air void content for in-place air voids.

The Engineer will use the vacuum method to seal the core if required by Tex-207-F. The Engineer will use the test results from the unsealed core to determine the placement payment adjustment factor if the sealed core yields a higher specific gravity than the unsealed core. After determining the in-place air void content, the Engineer will return the cores and provide test results to the Contractor.

4.9.3.3.2. **Segregation (Density Profile)**. Test for segregation using density profiles in accordance with Tex-207-F, Part V when using a thermal camera insead of the thermal imaging system. Density profiles are not required and are not applicable when using a thermal imaging system. Density profiles are not applicable in areas described in Section 3076.4.9.3.1.4., "Miscellaneous Areas."

Perform a minimum of one density profile per sublot. Perform additional density profiles when any of the following conditions occur, unless otherwise approved:

- the paver stops due to lack of material being delivered to the paving operations and the temperature of the uncompacted mat before the initial break down rolling is less than the temperatures shown in Table 17;
- areas that are identified by either the Contractor or the Engineer with thermal segregation;,
- any visibly segregated areas that exist.

Table 17
Mimimum Uncompacted Mat Temperature Requiring a Segregation Profile

High-Temperature Binder Grade[1]	Minimum Temperature of the Uncompacted Mat Allowed Before Initial Break Down Rolling[2,3,4]
PG 64	<250˚F
PG 70	<260˚F
PG 76	<270˚F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. Segregation profiles are required in areas with moderate and severe thermal segregation as described in Section 3076.4.7.3.1.3.
3. Minimum uncompacted mat temperature requiring a segregation profile may be reduced 10°F if using a chemical WMA additive as a compaction aid.
4. When using WMA, the minimum uncompacted mat temperature requiring a segregation profile is 215°F.

Provide the Engineer with the density profile of every sublot in the lot within one working day of the completion of each lot. Report the results of each density profile in accordance with Section 3076.4.2., "Reporting and Responsibilities."

The density profile is considered failing if it exceeds the tolerances in Table 18. No production or placement payment adjustments greater than 1.000 will be paid for any sublot that contains a failing density profile. When a hand-held thermal camera is used instead of a thermal imaging system, the Engineer will measure the density profile at least once per project. The Engineer's density profile results will be used when available. The Engineer may require the Contractor to remove and replace the area in question if the area fails the density profile and has surface irregularities as defined in Section 3076.4.9.3.3.5., "Irregularities." The sublot in question may receive a production and placement payment adjustment greater than 1.000, if applicable, when the defective material is successfully removed and replaced.

Investigate density profile failures and take corrective actions during production and placement to eliminate the segregation. Suspend production if 2 consecutive density profiles fail unless otherwise approved. Resume production after the Engineer approves changes to production or placement methods.

Table 18
Segregation (Density Profile) Acceptance Criteria

Mixture Type	Maximum Allowable Density Range (Highest to Lowest)	Maximum Allowable Density Range (Average to Lowest)
Type B	8.0 pcf	5.0 pcf
Type C, Type D & Type F	6.0 pcf	3.0 pcf

4.9.3.3.3. **Longitudinal Joint Density**.

4.9.3.3.3.1. **Informational Tests**. Perform joint density evaluations while establishing the rolling pattern and verify that the joint density is no more than 3.0 pcf below the density taken at or near the center of the mat. Adjust the rolling pattern, if needed, to achieve the desired joint density. Perform additional joint density evaluations, at least once per sublot, unless otherwise directed.

4.9.3.3.3.2. **Record Tests**. Perform a joint density evaluation for each sublot at each pavement edge that is or will become a longitudinal joint. Joint density evaluations are not applicable in areas described in Section 3076.4.9.3.1.4., "Miscellaneous Areas." Determine the joint density in accordance with Tex-207-F, Part VII. Record the joint density information and submit results on Department forms to the Engineer. The evaluation is considered failing if the joint density is more than 3.0 pcf below the density taken at the core random sample location and the correlated joint density is less than 90.0%. The Engineer will make independent joint density verification at least once per project and may make independent joint density verifications at the random sample locations. The Engineer's joint density test results will be used when available.

Provide the Engineer with the joint density of every sublot in the lot within one working day of the completion of each lot. Report the results of each joint density in accordance with Section 3076.4.2., "Reporting and Responsibilities."

Investigate joint density failures and take corrective actions during production and placement to improve the joint density. Suspend production if the evaluations on two consecutive sublots fail unless otherwise approved. Resume production after the Engineer approves changes to production or placement methods.

4.9.3.3.4. **Recovered Asphalt Dynamic Shear Rheometer (DSR)**. The Engineer may take production samples or cores from suspect areas of the project to determine recovered asphalt properties. Asphalt binders with an aging ratio greater than 3.5 do not meet the requirements for recovered asphalt properties and may be deemed defective when tested and evaluated by the Materials and Tests Division. The aging ratio is the DSR value of the extracted binder divided by the DSR value of the original unaged binder. Obtain DSR values in accordance with AASHTO T 315 at the specified high temperature performance grade of the asphalt. The Engineer may require removal and replacement of the defective material at the Contractor's expense. The asphalt binder will be recovered for testing from production samples or cores in accordance with Tex-211-F.

4.9.3.3.5. **Irregularities**. Identify and correct irregularities including segregation, rutting, raveling, flushing, fat spots, mat slippage, irregular color, irregular texture, roller marks, tears, gouges, streaks, uncoated aggregate particles, or broken aggregate particles. The Engineer may also identify irregularities, and in such cases, the Engineer will promptly notify the Contractor. If the Engineer determines that the irregularity will adversely affect pavement performance, the Engineer may require the Contractor to remove and replace (at the Contractor's expense) areas of the pavement that contain irregularities. The Engineer may also require the Contractor to remove and replace (at the Contractor's expense) areas where the mixture does not bond to the existing pavement.

If irregularities are detected, the Engineer may require the Contractor to immediately suspend operations or may allow the Contractor to continue operations for no more than one day while the Contractor is taking appropriate corrective action.

4.9.4. **Exempt Production**. The Engineer may deem the mixture as exempt production for the following conditions:

- anticipated daily production is less than 500 tons;
- total production for the project is less than 5,000 tons;
- when mutually agreed between the Engineer and the Contractor; or
- when shown on the plans.

For exempt production, the Contractor is relieved of all production and placement sampling and testing requirements, except for coring operations when required by the Engineer. The production and placement pay factors are 1.000 if the specification requirements listed below are met, all other specification requirements are met, and the Engineer performs acceptance tests for production and placement listed in Table 16 when 100 tons or more per day are produced.

- produce, haul, place, and compact the mixture in compliance with the specification and as directed;
- control mixture production to yield a laboratory-molded density that is within ±1.0% of the target laboratory-molded density as tested by the Engineer;
- compact the mixture in accordance with Section 3076.4.8., "Compaction;" and
- when a thermal imaging system is not used, the Engineer may perform segregation (density profiles) and thermal profiles in accordance with the specification.

4.9.5. **Ride Quality**. Measure ride quality in accordance with Item 585, "Ride Quality for Pavement Surfaces," unless otherwise shown on the plans.

5. MEASUREMENT

5.1. **Dense Graded Hot-Mix Asphalt.** Hot mix will be measured by the ton of composite hot-mix, which includes asphalt, aggregate, and additives. Measure the weight on scales in accordance with Item 520, "Weighing and Measuring Equipment."

5.2. **Tack Coat.** Tack coat will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume in gallons from the calibrated distributor. The Engineer will witness all strapping operations for volume determination. All tack, including emulsions, will be measured by the gallon applied.

The Engineer may allow the use of a metering device to determine asphalt volume used and application rate if the device is accurate within 1.5% of the strapped volume.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under Section 3076.5.1, "Measurement," will be paid for at the unit bid price for "Dense Graded Hot-Mix Asphalt" of the mixture type, SAC, and binder specified. These prices are full compensation for surface preparation, materials, placement, equipment, labor, tools, and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under Article 3076.5.2, "Measurement," will be paid for at the unit bid price for "Tack Coat" of the tack coat provided. These prices are full compensation for materials, placement, equipment, labor, tools, and incidentals. Payment adjustments will be applied as determined in this Item; however, a payment adjustment factor of 1.000 will be assigned for all placement sublots for "level ups" only when "level up" is listed as part of the item bid description code. A payment adjustment factor of 1.000 will be assigned to all production and placement sublots when "exempt" is listed as part of the item bid description code, and all testing requirements are met.

Payment for each sublot, including applicable payment adjustments greater than 1.000, will only be paid for sublots when the Contractor supplies the Engineer with the required documentation for production and placement QC/QA, thermal profiles, segregation density profiles, and longitudinal joint densities in accordance with Section 3076.4.2., "Reporting and Responsibilities." When a thermal imaging system is used, documentation is not required for thermal profiles or segregation density profiles on individual sublots; however, the thermal imaging system automated reports described in Tex-244-F are required.

Trial batches will not be paid for unless they are included in pavement work approved by the Department.

Payment adjustment for ride quality will be determined in accordance with Item 585, "Ride Quality for Pavement Surfaces."

6.1. **Production Payment Adjustment Factors**. The production payment adjustment factor is based on the laboratory-molded density using the Engineer's test results. The bulk specific gravities of the samples from each sublot will be divided by the Engineer's maximum theoretical specific gravity for the sublot. The individual sample densities for the sublot will be averaged to determine the production payment adjustment factor in accordance with Table 19 for each sublot, using the deviation from the target laboratory-molded density defined in Table 9. The production payment adjustment factor for completed lots will be the average of the payment adjustment factors for the four sublots sampled within that lot.

Table 19
Production Payment Adjustment Factors for Laboratory-Molded Density[1]

Absolute Deviation from Target Laboratory-Molded Density	Production Payment Adjustment Factor (Target Laboratory-Molded Density)
0.0	1.050
0.1	1.050
0.2	1.050
0.3	1.044
0.4	1.038
0.5	1.031
0.6	1.025
0.7	1.019
0.8	1.013
0.9	1.006
1.0	1.000
1.1	0.965
1.2	0.930
1.3	0.895
1.4	0.860
1.5	0.825
1.6	0.790
1.7	0.755
1.8	0.720
> 1.8	Remove and replace

1. If the Engineer's laboratory-molded density on any sublot is less than 95.0% or greater than 98.0%, take immediate corrective action to bring the mixture within these tolerances. The Engineer may suspend operations if the Contractor's corrective actions do not produce acceptable results. The Engineer will allow production to resume when the proposed corrective action is likely to yield acceptable results.

6.1.1. **Payment for Incomplete Production Lots**. Production payment adjustments for incomplete lots, described under Section 3076.4.9.2.1.1., "Incomplete Production Lots," will be calculated using the average production payment factors from all sublots sampled.

A production payment factor of 1.000 will be assigned to any lot when the random sampling plan did not result in collection of any samples within the first sublot.

6.1.2. **Production Sublots Subject to Removal and Replacement**. If after referee testing, the laboratory-molded density for any sublot results in a "remove and replace" condition as listed in Table 19, the Engineer may require removal and replacement or may allow the sublot to be left in place without payment. The Engineer may also accept the sublot in accordance with Section 3076.5.3.1., "Acceptance of Defective or Unauthorized Work." Replacement material meeting the requirements of this Item will be paid for in accordance with this Section.

6.2. **Placement Payment Adjustment Factors**. The placement payment adjustment factor is based on in-place air voids using the Engineer's test results. The bulk specific gravities of the cores from each sublot will be divided by the Engineer's average maximum theoretical specific gravity for the lot. The individual core densities for the sublot will be averaged to determine the placement payment adjustment factor in accordance with Table 20 for each sublot that requires in-place air void measurement. A placement payment adjustment factor of 1.000 will be assigned to the entire sublot when the random sample location falls in an area designated on the plans as not subject to in-place air void determination. A placement payment adjustment factor of 1.000 will be assigned to quantities placed in areas described in Section 3076.4.9.3.1.4., "Miscellaneous Areas." The placement payment adjustment factor for completed lots will be the average of the placement payment adjustment factors for up to four sublots within that lot.

Table 20
Placement Payment Adjustment Factors for In-Place Air Voids

In-Place Air Voids	Placement Pay Adjustment Factor	In-Place Air Voids	Placement Pay Adjustment Factor
< 2.7	Remove and Replace	6.4	1.042
2.7	0.710	6.5	1.040
2.8	0.740	6.6	1.038
2.9	0.770	6.7	1.036
3.0	0.800	6.8	1.034
3.1	0.830	6.9	1.032
3.2	0.860	7.0	1.030
3.3	0.890	7.1	1.028
3.4	0.920	7.2	1.026
3.5	0.950	7.3	1.024
3.6	0.980	7.4	1.022
3.7	0.998	7.5	1.020
3.8	1.002	7.6	1.018
3.9	1.006	7.7	1.016
4.0	1.010	7.8	1.014
4.1	1.014	7.9	1.012
4.2	1.018	8.0	1.010
4.3	1.022	8.1	1.008
4.4	1.026	8.2	1.006
4.5	1.030	8.3	1.004
4.6	1.034	8.4	1.002
4.7	1.038	8.5	1.000
4.8	1.042	8.6	0.998
4.9	1.046	8.7	0.996
5.0	1.050	8.8	0.994
5.1	1.050	8.9	0.992
5.2	1.050	9.0	0.990
5.3	1.050	9.1	0.960
5.4	1.050	9.2	0.930
5.5	1.050	9.3	0.900
5.6	1.050	9.4	0.870
5.7	1.050	9.5	0.840
5.8	1.050	9.6	0.810
5.9	1.050	9.7	0.780
6.0	1.050	9.8	0.750
6.1	1.048	9.9	0.720
6.2	1.046	> 9.9	Remove and Replace
6.3	1.044		

6.2.1. **Payment for Incomplete Placement Lots**. Payment adjustments for incomplete placement lots described under Section 3076.4.9.3.1.2., "Incomplete Placement Lots," will be calculated using the average of the placement payment factors from all sublots sampled and sublots where the random location falls in an area designated on the plans as not eligible for in-place air void determination.

If the random sampling plan results in production samples, but not in placement samples, the random core location and placement adjustment factor for the sublot will be determined by applying the placement random number to the length of the sublot placed.

If the random sampling plan results in placement samples, but not in production samples, no placement adjustment factor will apply for that sublot placed.

A placement payment adjustment factor of 1.000 will be assigned to any lot when the random sampling plan did not result in collection of any production samples.

6.2.2. **Placement Sublots Subject to Removal and Replacement**. If after referee testing, the placement payment adjustment factor for any sublot results in a "remove and replace" condition as listed in Table 20, the Engineer will choose the location of two cores to be taken within 3 ft. of the original failing core location. The Contractor will obtain the cores in the presence of the Engineer. The Engineer will take immediate possession of the untrimmed cores and submit the untrimmed cores to the Materials and Tests Division, where they will be trimmed if necessary and tested for bulk specific gravity within 10 working days of receipt.

The bulk specific gravity of the cores from each sublot will be divided by the Engineer's average maximum theoretical specific gravity for the lot. The individual core densities for the sublot will be averaged to determine the new payment adjustment factor of the sublot in question. If the new payment adjustment factor is 0.700 or greater, the new payment adjustment factor will apply to that sublot. If the new payment adjustment factor is less than 0.700, no payment will be made for the sublot. Remove and replace the failing sublot, or the Engineer may allow the sublot to be left in place without payment. The Engineer may also accept the sublot in accordance with Section 3076.5.3.1., "Acceptance of Defective or Unauthorized Work." Replacement material meeting the requirements of this Item will be paid for in accordance with this Section.

6.3. **Total Adjusted Pay Calculation**. Total adjusted pay (TAP) will be based on the applicable payment adjustment factors for production and placement for each lot.

$TAP = (A+B)/2$

where:
A = Bid price × production lot quantity × average payment adjustment factor for the production lot
B = Bid price × placement lot quantity × average payment adjustment factor for the placement lot + (bid price × quantity placed in miscellaneous areas × 1.000)

Production lot quantity = Quantity actually placed - quantity left in place without payment

Placement lot quantity = Quantity actually placed - quantity left in place without payment - quantity placed in miscellaneous areas

Special Specification 3081
Thin Overlay Mixtures

1. DESCRIPTION

Construct a thin surface course composed of a compacted mixture of aggregate and asphalt binder mixed hot in a mixing plant. Produce a thin overlay mixture (TOM) with a minimum lift thickness of 1/2 in. for a Type F mixture and 3/4 in. for a Type C mixture.

2. MATERIALS

Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications.

Notify the Engineer of all material sources and before changing any material source or formulation. The Engineer will verify that the specification requirements are met when the Contractor makes a source or formulation change, and may require a new laboratory mixture design, trial batch, or both. The Engineer may sample and test project materials at any time during the project to verify specification compliance in accordance with Item 6, "Control of Materials."

2.1. **Aggregate.** Furnish aggregates from sources that conform to the requirements in accordance with Table 1 and as specified in this Section. Aggregate requirements in this Section, including those shown in Table 1, may be modified or eliminated when shown on the plans. Additional aggregate requirements may be specified when shown on the plans. Provide aggregate stockpiles that meet the definitions in this Section for coarse, intermediate, or fine aggregate. Do not use reclaimed asphalt pavement (RAP) or recycled asphalt shingles (RAS). Supply aggregates that meet the definitions in accordance with Tex-100-E for crushed gravel or crushed stone. The Engineer will designate the plant or the quarry as the sampling location. Provide samples from materials produced for the project. The Engineer will establish the Surface Aggregate Classification (SAC) and perform Los Angeles abrasion, magnesium sulfate soundness, and Micro-Deval tests. Perform all other aggregate quality tests in accordance with Table 1. Document all test results on the mixture design report. The Engineer may perform tests on independent or split samples to verify Contractor test results. Stockpile aggregates for each source and type separately. Determine aggregate gradations for mixture design and production testing based on the washed sieve analysis in accordance with Tex-200-F, Part II.

2.1.1. **Coarse Aggregate.** Coarse aggregate stockpiles must have no more than 20% material passing the No. 8 sieve. Aggregates from sources listed in the Department's *Bituminous Rated Source Quality Catalog* (BRSQC) are preapproved for use. Use only the rated values for hot-mix listed in the BRSQC. Rated values for surface treatment (ST) do not apply to coarse aggregate sources used in hot-mix asphalt.

For sources not listed on the Department's BRSQC:

- build an individual stockpile for each material;
- request the Department test the stockpile for specification compliance;
- approved only when tested by the Engineer;
- once approved, do not add material to the stockpile unless otherwise approved; and
- allow 30 calendar days for the Engineer to sample, test, and report results.

2.1.1.1. **Blending Class A and Class B Aggregates.** Class B aggregate meeting all other requirements in blending Class A and B aggregates to meet a Class A requirement, ensure that at least 50% by weight, or volume if required, of all aggregates used in the mixture design retained on the No. 8 sieve comes from the Class A

aggregate source, unless otherwise shown on the plans. Blend by volume if the bulk specific gravities of the Class A and B aggregates differ by more than 0.300. Class B aggregate may be disallowed when shown on the plans.

The Engineer may perform tests at any time during production, when the Contractor blends Class A and B aggregates to meet a Class A requirement, to ensure that at least 50% by weight, or volume if required, of the material retained on the No. 8 sieve comes from the Class A aggregate source. The Engineer will use the Department's mix design template, when electing to verify conformance, to calculate the percent of Class A aggregate retained on the No. 8 sieve by inputting the bin percentages shown from readouts in the control room at the time of production and stockpile gradations measured at the time of production. The Engineer may determine the gradations based on either washed or dry sieve analysis from samples obtained from individual aggregate cold feed bins or aggregate stockpiles. The Engineer may perform spot checks using the gradations supplied by the Contractor on the mixture design report as an input for the template; however, a failing spot check will require confirmation with a stockpile gradation determined by the Engineer.

2.1.1.2. **Micro-Deval Abrasion.** The Engineer will perform a minimum of one Micro-Deval abrasion test in accordance with Tex-461-A for each coarse aggregate source used in the mixture design that has a Rated Source Soundness Magnesium (RSSM) loss value greater than 15 as listed in the BRSQC, unless otherwise directed. The Engineer will perform testing before the start of production and may perform additional testing at any time during production. The Engineer may obtain the coarse aggregate samples from each coarse aggregate source or may require the Contractor to obtain the samples. The Engineer may waive all Micro-Deval testing based on a satisfactory test history of the same aggregate source.

The Engineer will estimate the magnesium sulfate soundness loss for each coarse aggregate source, when tested, using the following formula:

$$Mg_{est.} = (RSSM)(MD_{act.}/RSMD)$$

where:
Mg_{est} = magnesium sulfate soundness loss
RSSM = Rated Source Soundness Magnesium
MD_{act} = actual Micro-Deval percent loss
RSMD = Rated Source Micro-Deval

When the estimated magnesium sulfate soundness loss is greater than the maximum magnesium sulfate soundness loss specified, the coarse aggregate source will not be allowed for use unless otherwise approved. The Engineer will consult the Soils and Aggregates Section of the Materials and Tests Division, and additional testing may be required before granting approval.

2.1.2. **Intermediate Aggregate.** Aggregates not meeting the definition of coarse or fine aggregate will be defined as intermediate aggregate. Supply intermediate aggregates, when used that are free from organic impurities. The Engineer may test the intermediate aggregate in accordance with Tex-408-A to verify the material is free from organic impurities. Supply intermediate aggregate from coarse aggregate sources, when used that meet the requirements in accordance with Table 1 unless otherwise approved.

If 10% or more of the stockpile is retained on the No. 4 sieve, verify that it meets the requirements in accordance with Table 1 for crushed face count (Tex-460-A) and flat and elongated particles (Tex-280-F).

2.1.3. **Fine Aggregate.** Fine aggregates consist of manufactured sands and screenings. Natural sands are not allowed in any mixture. Fine aggregate stockpiles must meet the fine aggregate properties in accordance with Table 1 and the gradation requirements in accordance with Table 2. Supply fine aggregates that are free from organic impurities. The Engineer may test the fine aggregate in accordance with Tex-408-A to verify the material is free from organic impurities. Use fine aggregate from coarse aggregate sources that meet the requirements in accordance with Table 1 unless otherwise approved.

If 10% or more of the stockpile is retained on the No. 4 sieve, verify that it meets the requirements in accordance with Table 1 for crushed face count (Tex-460-A) and flat and elongated particles (Tex-280-F).

Table 1
Aggregate Quality Requirements

Property	Test Method	Requirement
Coarse Aggregate		
SAC	Tex-499-A	A[1]
Deleterious material, %, Max	Tex-217-F, Part I	1.5
Decantation, %, Max	Tex-217-F, Part II	1.5
Micro-Deval abrasion, %	Tex-461-A	Note [r]
Los Angeles abrasion, %, Max	Tex-410-A	30
Magnesium sulfate soundness, 5 cycles, %, Max	Tex-411-A	20
Crushed face count,[3] %, Min	Tex-460-A, Part I	95
Flat and elongated particles @ 5:1, %, Max	Tex-280-F	10
Fine Aggregate		
Linear shrinkage, %, Max	Tex-107-E	3
Sand equivalent, %, Min	Tex-203-F	45

1. Surface Aggregate Classification of "A" is required unless otherwise shown on the plans.
2. Used to estimate the magnesium sulfate soundness loss in accordance with Section 3081.2.1.1.2., "Micro-Deval Abrasion."
3. Only applies to crushed gravel.

Table 2
Gradation Requirements for Fine Aggregate

Sieve Size	% Passing by Weight or Volume
3/8"	100
#8	70–100
#200	0–30

2.2. **Mineral Filler.** Mineral filler consists of finely divided mineral matter such as agricultural lime, crusher fines, or hydrated lime. Mineral filler is allowed unless otherwise shown on the plans. Fly ash is not permitted unless otherwise shown on the plans. Use no more than 2% hydrated lime unless otherwise shown on the plans. Test all mineral fillers except hydrated lime and fly ash in accordance with Tex-107-E to ensure specification compliance. The plans may require or disallow specific mineral fillers. Provide mineral filler, when used, that:

- is sufficiently dry, free-flowing, and free from clumps and foreign matter as determined by the Engineer;
- does not exceed 3% linear shrinkage when tested in accordance with Tex-107-E; and
- meets the gradation requirements in Table 3, unless otherwise shown on the plans.

Table 3
Gradation Requirements for Mineral Filler

Sieve Size	% Passing by Weight or Volume
#8	100
#200	55–100

2.3. **Baghouse Fines.** Fines collected by the baghouse or other dust-collecting equipment may be reintroduced into the mixing drum.

2.4. **Asphalt Binder.** Furnish performance-graded (PG) asphalt binder with a high temperature grade of PG 76 unless otherwise shown in the plans and a low temperature grade as shown on the plans, in accordance with Section 300.2.10., "Performance-Graded Binders."

2.5. **Tack Coat.** Furnish CSS-1H, SS-1H, EBL, or a PG binder with a minimum high-temperature grade of PG 58 for tack coat binder in accordance with Item 300, "Asphalts, Oils, and Emulsions." Specialized tack coat materials listed on the Department's Tracking Resistant Asphalt Interlayer (TRAIL) MPL may be allowed or required when shown on the plans. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.6. **Additives.** Provide the Engineer with documentation such as the bill of lading showing the quantity of additives used in the project unless otherwise directed.

2.6.1. **Lime and Liquid Antistripping Agent.** When lime or a liquid antistripping agent is used, add in accordance with Item 301, "Asphalt Antistripping Agents." Use no more than 1% hydrated lime when using crushed gravel. Do not add lime directly into the mixing drum of any plant where lime is removed through the exhaust stream unless the plant has a baghouse or dust collection system that reintroduces the lime into the drum.

2.6.2. **Compaction Aid.** Compaction Aid is defined as a department-approved chemical warm mix additive denoted as "chemical additive" on the Department's materials producer list (MPL) that is used to facilitate mixing and compaction of HMA.

Compaction Aid is allowed for use on all projects. Compaction aid is required when shown on the plans or as required in Section 3081.4.7.1., "Weather Conditions."

Warm mix foaming processes, denoted as "foaming process" on the Department-approved MPL, may be used to facilitate mixing and compaction of HMA; however warm mix foaming processes are not defined as a Compaction Aid.

2.7. **Recycled Materials.** Recycled materials are not allowed for use.

3. EQUIPMENT

Provide required or necessary equipment in accordance with Item 320, "Equipment for Asphalt Concrete Pavement."

4. CONSTRUCTION

Produce, haul, place, and compact the specified paving mixture. In addition to tests required by the specification, Contractors may perform other QC tests as deemed necessary. At any time during the project, the Engineer may perform production and placement tests as deemed necessary in accordance with Item 5, "Control of the Work." Schedule and participate in a mandatory pre-paving meeting with the Engineer on or before the first day of paving unless otherwise shown on the plans.

4.1. **Certification.** Personnel certified by the Department-approved hot-mix asphalt certification program must conduct all mixture designs, sampling, and testing in accordance with Table 4. Supply the Engineer with a list of certified personnel and copies of their current certificates before beginning production and when personnel changes are made. Provide a mixture design developed and signed by a Level 2 certified specialist. Provide Level 1A certified specialists at the plant during production operations. Provide Level 1B certified specialists to conduct placement tests. Provide AGG101 certified specialists for aggregate testing.

Table 4
Test Methods, Test Responsibility, and Minimum Certification Levels

Test Description	Test Method	Contractor	Engineer	Level[1]
1. Aggregate Testing				
Sampling	Tex-221-F	✓	✓	1A/AGG101
Dry sieve	Tex-200-F, Part I	✓	✓	1A/AGG101
Washed sieve	Tex-200-F, Part II	✓	✓	1A/AGG101
Deleterious material	Tex-217-F, Part I	✓	✓	AGG101
Decantation	Tex-217-F, Part II	✓	✓	AGG101
Los Angeles abrasion	Tex-410-A		✓	Department
Magnesium sulfate soundness	Tex-411-A		✓	Department
Micro-Deval abrasion	Tex-461-A		✓	AGG101
Crushed face count	Tex-460-A	✓	✓	AGG101
Flat and elongated particles	Tex-280-F	✓	✓	AGG101
Sand equivalent	Tex-203-F	✓	✓	AGG101
Organic impurities	Tex-408-A	✓	✓	AGG101
Methylene blue test	Tex-252-F		✓	Department
2. Asphalt Binder & Tack Coat Sampling				
Asphalt binder sampling	Tex-500-C, Part II	✓	✓	1A/1B
Tack coat sampling	Tex-500-C, Part III	✓	✓	1A/1B
3. Mix Design & Verification				
Design and JMF changes	Tex-204-F	✓	✓	2
Mixing	Tex-205-F	✓	✓	2
Molding (TGC)	Tex-206-F	✓	✓	1A
Molding (SGC)	Tex-241-F	✓	✓	1A
Laboratory-molded density	Tex-207-F, Parts I & VI	✓	✓	1A
Rice gravity	Tex-227-F, Part II	✓	✓	1A
Drain-down	Tex-235-F	✓	✓	1A
Ignition oven correction factors[2]	Tex-236-F, Part II	✓	✓	2
Indirect tensile strength	Tex-226-F	✓	✓	1A
Overlay test	Tex-248-F		✓	Department
Hamburg Wheel test	Tex-242-F	✓	✓	1A
Boil test[4]	Tex-530-C	✓	✓	1A
4. Production Testing				
Selecting production random numbers	Tex-225-F, Part I		✓	1A
Mixture sampling	Tex-222-F	✓	✓	1A/1B
Molding (TGC)	Tex-206-F	✓	✓	1A
Molding (SGC)	Tex-241-F	✓	✓	1A
Laboratory-molded density	Tex-207-F, Parts I & VI	✓	✓	1A
Rice gravity	Tex-227-F, Part II	✓	✓	1A
Gradation & asphalt binder content[2]	Tex-236-F, Part I	✓	✓	1A
Drain-down	Tex-235-F	✓	✓	1A
Control charts	Tex-233-F	✓	✓	1A
Moisture content	Tex-212-F, Part II	✓	✓	1A/AGG101
Hamburg Wheel test	Tex-242-F	✓	✓	1A
Overlay test	Tex-248-F	✓	✓	Department
Micro-Deval abrasion	Tex-461-A		✓	AGG101
Boil test[4]	Tex-530-C	✓	✓	1A
Abson recovery	Tex-211-F		✓	Department
5. Placement Testing				
Establish rolling pattern	Tex-207-F, Part IV	✓		1B
In-place density (nuclear method)	Tex-207-F, Part III	✓		1B
Control charts	Tex-233-F	✓	✓	1A
Ride quality measurement	Tex-1001-S	✓	✓	Note 3
Thermal profile	Tex-244-F	✓	✓	1B
Water flow test	Tex-246-F	✓	✓	1B

1. Level 1A, 1B, AGG101, and 2 are certification levels provided by the Hot Mix Asphalt Center certification program.
2. Refer to Section 3081.4.9.2.3., "Production Testing," for exceptions to using an ignition oven.
3. Profiler and operator are required to be certified at the Texas A&M Transportation Institute facility when Surface Test Type B is specified.
4. When shown on the plans.

4.2. **Reporting and Responsibilities.** Use Department-provided templates to record and calculate all test data, including mixture design, production and placement QC/QA, control charts, and thermal profiles. Obtain the current version of the templates at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/site-manager.html or from the Engineer. The Engineer and the Contractor will provide any available test results to the other party when requested. The maximum allowable time for the Contractor and Engineer to exchange test data is as given in Table 5 unless otherwise approved. The Engineer and the Contractor will immediately report to the other party any test result that requires suspension of production or placement or that fails to meet the specification requirements. Record and electronically submit all test results and pertinent information on Department-provided templates.

Subsequent sublots placed after test results are available to the Contractor, which require suspension of operations, may be considered unauthorized work. Unauthorized work will be accepted or rejected at the discretion of the Engineer in accordance with Section 5.3., "Conformity with Plans, Specifications, and Special Provisions."

Table 5
Reporting Schedule

Description	Reported By	Reported To	To Be Reported Within
Production Quality Control			
Gradation[1]	Contractor	Engineer	1 working day of completion of the sublot
Asphalt binder content[1]			
Laboratory-molded density[2]			
Moisture content[3]			
Boil test[5]			
Production Quality Assurance			
Gradation[3]	Engineer	Contractor	1 working day of completion of the sublot
Asphalt binder content[3]			
Laboratory-molded density[1]			
Hamburg Wheel test[4]			
Overlay test[4]			
Boil test[5]			
Binder tests[4]			
Placement Quality Control			
Thermal profile[1]	Contractor	Engineer	1 working day of completion of the lot
Water flow[1]			
Placement Quality Assurance			
Thermal profile[3]	Engineer	Contractor	1 working day of completion of the lot
Aging ratio[4]			
Water flow			

1. These tests are required on every sublot.
2. Optional test. When performed on split samples, report the results as soon as they become available.
3. To be performed at the frequency specified and in accordance with Table 13 or as shown on the plans.
4. To be reported as soon as the results become available.
5. When shown on the plans.

Use the procedures described in Tex-233-F to plot the results of all quality control (QC) and quality assurance (QA) testing. Update the control charts as soon as test results for each sublot become available. Make the control charts readily accessible at the field laboratory. The Engineer may suspend production for failure to update control charts.

4.3. **Quality Control Plan (QCP).** Develop and follow the QCP in detail. Obtain approval for changes to the QCP made during the project. The Engineer may suspend operations if the Contractor fails to comply with the QCP.

Submit a written QCP before the mandatory pre-paving meeting. Receive approval of the QCP before pre-paving meeting. Include the following items in the QCP:

4.3.1. **Project Personnel**. For project personnel, include:

- a list of individuals responsible for QC with authority to take corrective action;
- current contact information for each individual listed; and
- current copies of certification documents for individuals performing specified QC functions.

4.3.2. **Material Delivery and Storage.** For material delivery and storage, include:

- the sequence of material processing, delivery, and minimum quantities to assure continuous plant operations;
- aggregate stockpiling procedures to avoid contamination and segregation;
- frequency, type, and timing of aggregate stockpile testing to assure conformance of material requirements before mixture production; and
- procedure for monitoring the quality and variability of asphalt binder.

4.3.3. **Production.** For production, include:

- loader operation procedures to avoid contamination in cold bins;
- procedures for calibrating and controlling cold feeds;
- procedures to eliminate debris or oversized material;
- procedures for adding and verifying rates of each applicable mixture component (e.g., aggregate, asphalt binder, lime, liquid antistrip, compaction aid, foaming process);
- procedures for reporting job control test results; and
- procedures to avoid segregation and drain-down in the silo.

4.3.4. **Loading and Transporting.** For loading and transporting, include:

- type and application method for release agents; and
- truck loading procedures to avoid segregation.

4.3.5. **Placement and Compaction.** For placement and compaction, include:

- proposed agenda for mandatory pre-paving meeting, including date and location;
- proposed paving plan (e.g., production rate, paving widths, joint offsets, and lift thicknesses);
- type and application method for release agents in the paver and on rollers, shovels, lutes, and other utensils;
- procedures for the transfer of mixture into the paver, while avoiding physical and thermal segregation and preventing material spillage;
- process to balance production, delivery, paving, and compaction to achieve continuous placement operations and good ride quality;
- paver operations (e.g., speed, operation of wings, height of mixture in auger chamber) to avoid physical and thermal segregation and other surface irregularities; and
- procedures to construct quality longitudinal and transverse joints.

4.4. **Mixture Design.**

4.4.1. **Design Requirements.** The Contractor may design the mixture using a Texas Gyratory Compactor (TGC) or a Superpave Gyratory Compactor (SGC) unless otherwise shown on the plans. Use the typical weight design example given in Tex-204-F, Part I, when using a TGC. Use the Superpave mixture design procedure provided in Tex-204-F, Part IV, when using a SGC. Design the mixture to meet the requirements in accordance with Tables 1, 2, 3, 6, and 7.

4.4.1.1. **Target Laboratory-Molded Density When the TGC Is Used.** Design the mixture at a 97.5% target laboratory-molded density or in accordance with Table 7.

4.4.1.2. **Design Number of Gyrations (Ndesign) When the SGC Is Used.** Design the mixture at 50 gyrations (Ndesign). Use a target laboratory-molded density of 96.0% to design the mixture; however, adjustments can be made to the Ndesign value as noted in Table 7. The Ndesign level may be reduced to no less than 35 gyrations at the Contractor's discretion.

Use an approved laboratory from the Department's MPL to perform the Hamburg Wheel test, and the Department will perform the Overlay test and provide results with the mixture design, or provide the laboratory mixture and request that the Department perform the Hamburg Wheel test and Overlay test. The Engineer will be allowed 10 working days to provide the Contractor with Hamburg Wheel test and Overlay test results on the laboratory mixture design.

The Engineer will provide the mixture design when shown on the plans. The Contractor may submit a new mixture design at any time during the project. The Engineer will verify and approve all mixture designs (JMF1) before the Contractor can begin production.

Provide the Engineer with a mixture design report using the Department-provided template. Include the following items in the report:

- the combined aggregate gradation, source, specific gravity, and percent of each material used;
- the target laboratory-molded density (or Ndesign level when using the SGC);
- results of all applicable tests;
- the mixing and molding temperatures;
- the signature of the Level 2 person or persons that performed the design;
- the date the mixture design was performed; and
- a unique identification number for the mixture design.

Table 6
Master Gradation Limits (% Passing by Weight or Volume) and Volumetric Requirements

Sieve Size	Coarse (TOM-C)	Fine (TOM-F)
1/2"	100.0[1]	100.0[1]
3/8"	95.0–100.0	98.0–100.0
#4	40.0–60.0	70.0–95.0
#8	17.0–27.0	40.0–65.0
#16	5.0–27.0	20.0–45.0
#30	5.0–27.0	10.0–35.0
#50	5.0–27.0	10.0–20.0
#200	5.0–9.0	2.0–12.0
Asphalt Binder Content,[2] % Min		
-	6.0	6.5
Design VMA,[3] % Min		
-	16.0	16.5
Production (Plant-Produced) VMA,[3] % Min		
-	15.5	16.0

1. Defined as maximum sieve size. No tolerance allowed.
2. Unless otherwise shown on the plans or approved by the Engineer.
3. Voids in Mineral Aggregates (VMA).

Table 7
Mixture Design Properties

Mixture Property	Test Method	Requirement
Target laboratory-molded density, % (TGC)	Tex-207- F	97.5[1]
Design gyrations (Ndesign for SGC)	Tex-241-F	50[2]
Hamburg Wheel test, passes at 12.5 mm rut depth for PG 76 mixtures	Tex-242-F	20,000 Min
Overlay test, Critical Fracture Energy, lb.-in/sq. in	Tex-248-F	1.5 Min
Overlay test, Crack Progression Rate	Tex-248-F	0.40 Max
Drain-down, %	Tex-235-F	0.20 Max

1. Unless otherwise shown on the plans or approved by the Engineer. Laboratory-molded density requirement using the TGC may be waived when approved by the Engineer.

2. May be adjusted within the range of 35–100 gyrations when shown on the plans or specification or when mutually agreed between the Engineer and Contractor. Laboratory-molded density requirement using the SGC may be waived when approved by the Engineer.

4.4.1 **Job-Mix Formula Approval.** The job-mix formula (JMF) is the combined aggregate gradation, target laboratory-molded density (or Ndesign level), and target asphalt percentage used to establish target values for hot-mix production. JMF1 is the original laboratory mixture design used to produce the trial batch. When a compaction aid or foaming process is used, JMF1 may be designed and submitted to the Engineer without including the compaction aid or foaming process. When a compaction aid or foaming process is used, document the compaction aid or foaming process used and recommended rate on the JMF1 submittal. The Engineer and the Contractor will verify JMF1 based on plant-produced mixture from the trial batch unless otherwise approved. The Engineer may accept an existing mixture design previously used on a Department project and may waive the trial batch to verify JMF1. The Department may require the Contractor to reimburse the Department for verification tests if more than two trial batches per design are required.

4.4.2.1. **Contractor's Responsibilities.**

4.4.2.1.1. **Providing Gyratory Compactor.** Use a TGC calibrated in accordance with Tex-914-K when electing or required to design the mixture in accordance with Tex-204-F, Part I, for molding production samples. Furnish an SGC calibrated in accordance with Tex-241-F when electing or required to design the mixture in accordance with Tex-204-F, Part IV, for molding production samples. Locate the SGC if used, at the Engineer's field laboratory or make the SGC available to the Engineer for use in molding production samples.

4.4.2.1.2. **Gyratory Compactor Correlation Factors.** Use Tex-206-F, Part II, to perform a gyratory compactor correlation when the Engineer uses a different gyratory compactor. Apply the correlation factor to all subsequent production test results.

4.4.2.1.3. **Submitting JMF1.** Furnish a mix design report (JMF1) with representative samples of all component materials and request approval to produce the trial batch. Provide approximately 25 lb. of the design mixture if opting to have the Department perform the Hamburg Wheel test on the laboratory mixture, and request that the Department perform the test. Provide approximately 60 lb. of the design mixture to perform the Overlay test.

4.4.2.1.4. **Supplying Aggregates.** Provide approximately 40 lb. of each aggregate stockpile unless otherwise directed.

4.4.2.1.5. **Supplying Asphalt.** Provide at least 1 gal. of the asphalt material and enough quantities of any additives proposed for use.

4.4.2.1.6. **Ignition Oven Correction Factors.** Determine the aggregate and asphalt correction factors from the ignition oven in accordance with Tex-236-F, Part II. Provide correction factors that are not more than 12 mo. old. Provide the Engineer with split samples of the mixtures before the trial batch production, including all additives (except water), and blank samples used to determine the correction factors for the ignition oven used for QA testing during production. Correction factors established from a previously approved mixture design may be used for the current mixture design if the mixture design and ignition oven are the same as previously used and the correction factors are not more than 12 mo. old, unless otherwise directed.

4.4.2.1.7. **Boil Test.** When shown on the plans, perform the test and retain the tested sample from Tex-530-C until completion of the project or as directed. Use this sample for comparison purposes during production.

4.4.2.1.8. **Trial Batch Production.** Provide a plant-produced trial batch upon receiving conditional approval of JMF1 and authorization to produce a trial batch, including the compaction aid or foaming process, if applicable, for verification testing of JMF1 and development of JMF2. Produce a trial batch mixture that meets the requirements in accordance with Table 8. The Engineer may accept test results from recent production of the same mixture instead of a new trial batch.

4.4.2.1.9. **Trial Batch Production Equipment.** Use only equipment and materials proposed for use on the project to produce the trial batch.

4.4.2.1.10. **Trial Batch Quantity.** Produce enough quantity of the trial batch to ensure that the mixture meets the specification requirements.

4.4.2.1.11. **Number of Trial Batches.** Produce trial batches as necessary to obtain a mixture that meets the specification requirements.

4.4.2.1.12. **Trial Batch Sampling.** Obtain a representative sample of the trial batch and split it into three equal portions in accordance with Tex-222-F. Label these portions as "Contractor," "Engineer," and "Referee." Deliver samples to the appropriate laboratory as directed.

4.4.2.1.13. **Trial Batch Testing.** Test the trial batch to ensure the mixture produced using the proposed JMF1 meets the mixture requirements in accordance with Table 8. Ensure the trial batch mixture is also in compliance with the requirements in accordance with Tables 6 and 7. Use a Department-approved laboratory listed on the MPL to perform the Hamburg Wheel test on the trial batch mixture or request that the Department perform the Hamburg Wheel test. Provide approximately 25 lb. of the trial batch mixture if opting to have the Department perform the Hamburg Wheel test, and request that the Department perform the test. Obtain and provide approximately 60 lb. of trial batch mixture in sealed containers, boxes, or bags labeled with the CSJ, mixture type, lot, and sublot number in accordance with Tex-222-F for the Overlay test. The Engineer will be allowed 10 working days to provide the Contractor with Hamburg Wheel test and Overlay test results on the trial batch. Provide the Engineer with a copy of the trial batch test results.

4.4.2.1.14. **Development of JMF2.** Evaluate the trial batch test results after the Engineer grants full approval of JMF1 based on results from the trial batch, determine the optimum mixture proportions, and submit as JMF2. Adjust the asphalt binder content or gradation to achieve the specified target laboratory-molded density. The mixture produced using JMF2 must meet the requirements in accordance with Tables 6 and 7. Verify that JMF2 meets the operation tolerances of JMF1 in accordance with Table 8.

4.4.2.1.15. **Mixture Production.** Use JMF2 to produce Lot 1 after receiving approval for JMF2 and a passing result from the Department's or a Department-approved laboratory's Hamburg Wheel test and the Department's Overlay test on the trial batch. If desired, proceed to Lot 1 production, once JMF2 is approved, at the Contractor's risk without receiving the results from either the Department's Hamburg Wheel test or Overlay test on the trial batch.

Notify the Engineer if electing to proceed without Hamburg Wheel test and Overlay test results from the trial batch. Note that the Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel test or Overlay test to be removed and replaced at the Contractor's expense.

4.4.2.1.16. **Development of JMF3.** Evaluate the test results from Lot 1, determine the optimum mixture proportions, and submit as JMF3 for use in Lot 2.

4.4.2.1.17. **JMF Adjustments.** If JMF adjustments are necessary to achieve the specified requirements, make the adjustments before beginning a new lot. The adjusted JMF must:

- be provided to the Engineer in writing before the start of a new lot;
- be numbered in sequence to the previous JMF;
- meet the master gradation limits in accordance with Table 6; and
- be within the operational tolerances of JMF2 in accordance with Table 8.

4.4.2.1.18. **Requesting Referee Testing.** Use referee testing, if needed, in accordance with Section 3081.4.9.1., "Referee Testing," to resolve testing differences with the Engineer.

Table 8
Operational Tolerances

Description	Test Method	Allowable Difference between JMF2 and JMF1 Target[1]	Allowable Difference from Current JMF and JMF2[2]	Allowable Difference between Contractor and Engineer[3]
Individual % retained for #8 sieve and larger	Tex-200-F or Tex-236-F	Must be Within Master Grading Limits in accordance with Table 6	±3.0[4,5]	±5.0
Individual % retained for sieves smaller than #8 and larger than #200			±3.0[4,5]	±3.0
% passing the #200 sieve			±2.0[4,5]	±1.6
Asphalt binder content, %[6]	Tex-236-F	±0.3	±0.3[5]	±0.3
Laboratory-molded density, %	Tex-207-F	±1.0	±1.0	±1.0
Laboratory-molded bulk specific gravity		N/A	N/A	±0.020
VMA, % Min	Tex-204-F	Note 7	Note 7	N/A
Theoretical Max specific (Rice) gravity	Tex-227-F	N/A	N/A	±0.020
Drain-down, %	Tex-235-F	Note 8	Note 8	N/A

1. JMF1 is the approved laboratory mixture design used for producing the trial batch. JMF2 is the approved mixture design developed from the trial batch used to produce Lot 1.
2. Current JMF is JMF3 or higher. JMF3 is the approved mix design used to produce Lot 2.
3. Contractor may request referee testing only when values exceed these tolerances.
4. When within these tolerances, mixture production gradations may fall outside the master grading limits; however, the % passing the #200 will be considered out of tolerance when outside the master grading limits.
5. Only applies to mixture produced for Lot 1 and higher.
6. Binder content is not allowed to be outside the limits in accordance with Table 6. May be obtained from asphalt meter readouts as determined by the Engineer.
7. Verify that Table 6 requirements are met.
8. Verify that Table 7 requirements are met.

4.4.2.2. **Engineer's Responsibilities.**

4.4.2.2.1. **Gyratory Compactor.** For mixtures designed in accordance with Tex-204-F, Part I, the Engineer will use a Department TGC, calibrated in accordance with Tex-914-K, to mold samples for trial batch and production testing.

For mixtures designed in accordance with Tex-204-F, Part IV, the Engineer will use a Department SGC, calibrated in accordance with Tex-241-F, to mold samples for laboratory mixture design verification. For molding trial batch and production specimens, the Engineer will use the Contractor-provided SGC at the field laboratory or provide and use a Department SGC at an alternate location.

4.4.2.2.2. **Conditional Approval of JMF1 and Authorizing Trial Batch.** The Engineer will review and verify conformance of the following information within two working days of receipt:

- the Contractor's mix design report (JMF1);
- the Department-provided Overlay test results;
- the Contractor-provided Hamburg Wheel test results;
- all required materials including aggregates, asphalt, and additives; and
- the mixture specifications.

The Engineer will grant the Contractor conditional approval of JMF1 if the information provided on the paper copy of JMF1 indicates that the Contractor's mixture design meets the specifications. When the Contractor does not provide Hamburg Wheel test and department provided Overlay test results with laboratory mixture design, 10 working days are allowed for conditional approval of JMF1. The Engineer will base full approval of JMF1 on test results on mixture from the trial batch.

Unless waived, the Engineer will determine the Micro-Deval abrasion loss in accordance with

Section 3081.2.1.1., "Micro-Deval Abrasion." If the Engineer's test results are pending after two working days, conditional approval of JMF1 will still be granted within two working days of receiving JMF1. When the Engineer's test results become available, they will be used for specification compliance.

The Contractor is authorized to produce a trial batch after the Engineer grants conditional approval of JMF1.

4.4.2.2.3. **Hamburg Wheel and Overlay Testing of JMF1.** If the Contractor requests the option to have the Department perform the Hamburg Wheel test on the laboratory mixture, the Engineer will mold samples in accordance with Tex-242-F to verify compliance with the Hamburg Wheel test requirement in Table 7. The Engineer will perform the Overlay test and mold samples in accordance with Tex-248-F to verify compliance with the Overlay test requirements in Table 7. The Engineer will be allowed 10 working days to provide the Contractor with Hamburg Wheel and Overlay test results on the laboratory mixture design.

4.4.2.2.4. **Ignition Oven Correction Factors.** The Engineer will use the split samples provided by the Contractor to determine the aggregate and asphalt correction factors for the ignition oven used for QA testing during production in accordance with Tex-236-F, Part II. Provide correction factors that are not more than 12 mo. old.

4.4.2.2.5. **Testing the Trial Batch.** Within one full working day, the Engineer will sample and test the trial batch to ensure that the mixture meets the requirements in accordance with Table 8. The Engineer will mold samples in accordance with Tex-242-F if the Contractor requests the option to have the Department perform the Hamburg Wheel test on the trial batch mixture to verify compliance with Hamburg Wheel test requirements in Table 7. The Engineer will mold samples for the Overlay test in accordance with Tex-248-F to verify compliance with the Overlay test requirement in Table 7.

The Engineer will have the option to perform Tex-530-C on the trial batch when shown on the plans. These results may be retained and used for comparison purposes during production.

4.4.2.2.6. **Full Approval of JMF1.** The Engineer will grant full approval of JMF1 and authorize the Contractor to proceed with developing JMF2 if the Engineer's results for the trial batch meet the requirements in accordance with Tables 6 and 7. The Engineer will notify the Contractor that an additional trial batch is required if the trial batch does not meet these requirements.

4.4.2.2.7. **Approval of JMF2.** The Engineer will approve JMF2 within one working day if the mixture meets the requirements in accordance with Table 6, 7, and 8.

4.4.2.2.8. **Approval of Lot 1 Production.** The Engineer will authorize the Contractor to proceed with Lot 1 production (using JMF2) as soon as a passing result is achieved from the Department's or a Department-approved laboratory's Hamburg Wheel test and the Department's Overlay test on the trial batch. The Contractor may proceed at its own risk with Lot 1 production without the results from the Hamburg Wheel test or Overlay test on the trial batch.

If the Department's or Department-approved laboratory's sample from the trial batch fails the Hamburg Wheel test or Overlay test, the Engineer will suspend production until further Hamburg Wheel tests or Overlay tests meet the specified values. The Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel test or Overlay test to be removed and replaced at the Contractor's expense.

4.4.2.2.9. **Approval of JMF3 and Subsequent JMF Changes.** JMF3 and subsequent JMF changes are approved if they meet the master grading limits and asphalt binder content shown in Table 6 and are within the operational tolerances of JMF2 shown in accordance with Table 8.

4.5. **Production Operations.** Perform a new trial batch when the plant or plant location is changed. Take corrective action and receive approval to proceed after any production suspension for noncompliance to the specification.

4.5.1. **Storage and Heating of Materials.** Do not heat the asphalt binder above the temperatures specified in Item 300, "Asphalts, Oils, and Emulsions," or outside the manufacturer's recommended values. Provide the Engineer with daily records of asphalt binder and hot-mix asphalt discharge temperatures (in legible and discernible increments) in accordance with Item 320, "Equipment for Asphalt Concrete Pavement," unless otherwise directed. Do not store mixture for a period long enough to affect the quality of the mixture, nor in any case longer than 12 hr. unless otherwise approved.

4.5.2. **Mixing and Discharge of Materials.** Notify the Engineer of the target discharge temperature and produce the mixture within 25°F of the target. Monitor the temperature of the material in the truck before shipping to ensure that it does not exceed the maximum production temperatures in accordance with Table 9. The Department will not pay for or allow placement of any mixture produced above the maximum production temperatures listed in Table 9.

Table 9
Maximum Production Temperature

High-Temperature Binder Grade[1]	Max Production Temperature
PG 76	345°F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.

Control the mixing time and temperature so that substantially all moisture is removed from the mixture before discharging from the plant. Determine the moisture content, if requested, by oven-drying in accordance with Tex-212-F, Part II, and verify that the mixture contains no more than 0.2% of moisture by weight. Obtain the sample immediately after discharging the mixture into the truck and perform the test promptly.

4.6. **Hauling Operations.** Clean all truck beds before use to ensure that mixture is not contaminated. Use a release agent shown on the Department's MPL to coat the inside bed of the truck when necessary. Do not use diesel or any release agent not shown on the Department's MPL.

Use equipment for hauling as defined in Section 3081.4.7.3.3., "Hauling Equipment." Use other hauling equipment only when allowed.

4.7. **Placement Operations.** Collect haul tickets from each load of mixture delivered to the project and provide the Department's copy to the Engineer approximately every hour, or as directed. Use a hand-held thermal camera or infrared thermometer, when a thermal imaging system is not used, to measure and record the internal temperature of the mixture as discharged from the truck or Material Transfer Device (MTD) before or as the mix enters the paver and an approximate station number or GPS coordinates on each ticket. Calculate the daily yield and cumulative yield for the specified lift and provide to the Engineer at the end of paving operations for each day unless otherwise directed. The Engineer may suspend production if the Contractor fails to produce and provide haul tickets and yield calculations by the end of paving operations for each day.

Prepare the surface by removing raised pavement markers and objectionable material such as moisture, dirt, sand, leaves, and other loose impediments from the surface before placing mixture. Remove vegetation from pavement edges. Place the mixture to meet the typical section requirements and produce a smooth, finished surface with a uniform appearance and texture. Place mixture so that longitudinal joints on the surface course coincide within 6-in. of lane lines and are not placed in the wheel path, or as directed, and offset longitudinal joints of successive courses of hot-mix by at least 6-in. Ensure that all finished surfaces will drain properly. Place the mixture at the rate or thickness shown on the plans. The Engineer will use the guidelines in Table 10 to determine the compacted lift thickness. The thickness determined is based on the rate of 110–115 lb. per square inch. for each inch of pavement unless otherwise shown on the plans.

Table 10
Compacted Lift Thickness

Mixture Type	Compacted Lift Thickness[1]	
	Min (in.)	Max (in.)
TOM-C	0.75	1.25
TOM-F	0.5	1.00

1. Compacted target lift thickness will be specified on the plans.

4.7.1. **Weather Conditions.**

4.7.1.1. **When Using a Thermal Imaging System.** The Contractor may pave any time the roadway is dry and the roadway surface temperature is at least 60°F unless otherwise approved or as shown on the plans; however, the Engineer may restrict the Contractor from paving surface mixtures if the ambient temperature is likely to drop below 32°F within 12 hr. of paving. Place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable as determined by the Engineer. Provide output data from the thermal imaging system to demonstrate to the Engineer that no recurring severe thermal segregation exists in accordance with Section 3081.4.7.3.1.2., "Thermal Imaging System."

Produce mixture with a target discharge temperature higher than 300°F and with a compaction aid to facilitate compaction when the air temperature is 70°F and falling

4.7.1.2. **When Not Using a Thermal Imaging System.** When using a thermal camera instead the thermal imaging system, place mixture when the roadway surface temperature is at or above 70°F unless otherwise approved or as shown on the plans. Measure the roadway surface temperature with a hand-held thermal camera or infrared thermometer. Place mixtures only when weather conditions and moisture conditions of the roadway surface are suitable as determined by the Engineer. The Engineer may restrict the Contractor from paving if the air temperature is 70°F and falling.

Produce mixture with a target discharge temperature higher than 300°F and with a compaction aid to facilitate compaction when the air temperature is 70°F and falling.

4.7.2. **Tack Coat.**

4.7.2.1. **Application.** Clean the surface before placing the tack coat. The Engineer will set the rate between 0.04 and 0.10 gal. of residual asphalt per square yard of surface area, unless otherwise specified on the plans. Apply a uniform tack coat at the specified rate unless otherwise directed. Apply the tack coat in a uniform manner to avoid streaks and other irregular patterns. Apply the tack coat to all surfaces that will come in contact with the subsequent HMA placement unless otherwise directed. Apply adequate overlap of the tack coat in the longitudinal direction during placement of the mat to ensure bond of adjacent mats, unless otherwise directed. Allow adequate time for emulsion to break completely before placing any material. Prevent splattering of tack coat when placed adjacent to curb, gutter, and structures. The Engineer may suspend paving operations until there is adequate coverage. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

4.7.2.2. **Sampling.** The Engineer will obtain at least one sample of the tack coat binder per project in accordance with Tex-500-C, Part III, and test it to verify compliance with Item 300, "Asphalts, Oils, and Emulsions." The Engineer will notify the Contractor when the sampling will occur and will witness the collection of the sample from the asphalt distributor immediately before use. Label the can with the corresponding lot and sublot numbers, producer, producer facility, grade, district, date sampled, and project information including highway and CSJ. For emulsions, the Engineer may test as often as necessary to ensure the residual of the emulsion is greater than or equal to the specification requirement in Item 300, "Asphalts, Oils, and Emulsions."

4.7.3. **Lay-Down Operations.** Use the placement temperatures in accordance with Table 11 to establish the minimum placement temperature of mixture delivered to the paving operation.

Table 11
Minimum Mixture Placement Temperature

High-Temperature Binder Grade[1]	Min Placement Temperature (Before Entering Paving Operation)2,3
PG 76	280°F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. The mixture temperature must be measured using a hand-held thermal camera or infrared thermometer nearest to the point of entry of the paving operation.
3. Minimum placement temperatures may be reduced 10°F if using a compaction aid.

4.7.3.1. **Thermal Profile.** Use a hand-held thermal camera or a thermal imaging system to obtain a continuous thermal profile in accordance with Tex-244-F.

4.7.3.1.1. **Thermal Segregation.**

4.7.3.1.1.1. **Moderate.** Any areas that have a temperature differential greater than 25°F, but not exceeding 50°F.

4.7.3.1.1.2. **Severe.** Any areas that have a temperature differential greater than 50°F.

4.7.3.1.2. **Thermal Imaging System.** Review the output results when a thermal imaging system is used, and provide the report described in accordance with Tex-244-F to the Engineer daily. Modify the paving process as necessary to eliminate any recurring (moderate or severe) thermal segregation identified by the thermal imaging system.

The Engineer may suspend subsequent paving operations if the Contractor cannot successfully modify the paving process to eliminate recurring severe or moderate thermal segregation.

Provide the Engineer with electronic copies of all daily data files that can be used with the thermal imaging system software to generate temperature profile plots daily or as requested by the Engineer.

4.7.3.1.3. **Thermal Camera.** When using a thermal camera instead of the thermal imaging system, take immediate corrective action to eliminate recurring moderate thermal segregation when a hand-held thermal camera is used. Evaluate areas with moderate thermal segregation by performing water flow testing in accordance with Tex-246-F and verify the water flow is greater than 120 sec. Provide the Engineer with the thermal profile of every sublot within one working day of the completion of each lot. When requested by the Engineer, provide the electronic files generated using the thermal camera. Report the results of each thermal profile in accordance with Section 3081.4.2., "Reporting and Responsibilities." The Engineer will use a hand-held thermal camera to obtain a thermal profile at least once per project, unless the thermal imaging system is used. Suspend operations and take immediate corrective action to eliminate severe thermal segregation unless otherwise directed. Resume operations when the Engineer determines that subsequent production will meet the requirements of this Section. Evaluate areas with severe thermal segregation by performing water flow testing in accordance with Tex-246-F and verify the water flow is greater than 120 sec. Remove and replace the material in any areas that have both severe thermal segregation and a failing result for water flow test unless otherwise directed.

4.7.3.2. **Windrow Operations.** Operate windrow pickup equipment so that when hot-mix is placed in windrows, substantially all the mixture deposited on the roadbed is picked up and loaded into the paver.

4.7.3.3. **Hauling Equipment.** Use belly dumps, live bottom, or end dump trucks to haul and transfer mixture. End dump trucks are only allowed when used in conjunction with an MTD with remixing capability unless otherwise allowed.

4.7.3.4. **Screed Heaters.** Turn off screed heaters to prevent overheating of the mat if the paver stops for more than 5 min. The Engineer may evaluate the suspect area in accordance with Section 3081.4.9.3.1.1., "Recovered Asphalt Dynamic Shear Rheometer (DSR)," if the screed heater remains on for more than 5 min. while the paver is stopped.

4.8. **Compaction.** Roll the freshly placed mixture with as many steel-wheeled rollers as necessary to ensure adequate compaction without excessive breakage of the aggregate and to provide a smooth surface and uniform texture. Operate each roller in static mode for TOM-F mixtures only. Do not use pneumatic-tire rollers. Use the control strip method given in accordance with Tex-207-F, Part IV, to establish the rolling pattern. Thoroughly moisten the roller drums with a soap and water solution to prevent adhesion. Use only water or an approved release agent on rollers, tamps, and other compaction equipment unless otherwise directed.

Use tamps to thoroughly compact the edges of the pavement along curbs, headers, and similar structures and in locations that will not allow thorough compaction with rollers. The Engineer may require rolling with a trench roller on widened areas, in trenches, and in other limited areas.

Use Tex-246-F to measure water flow to verify the mixture is adequately compacted. Measure the water flow once per sublot at locations directed by the Engineer. Take additional water flow measurements when the minimum temperature of the uncompacted mat is below the temperature requirements in accordance with Table 12.

Table 12
Minimum Uncompacted Mat Temperature Requiring Additional Water Flow Measurements

High-Temperature Binder Grade[1]	Min Temperature of the Uncompacted Mat Allowed Before Initial Break Down Rolling[2, 3]
PG 76	<270˚F

1. The high-temperature binder grade refers to the high-temperature grade of the virgin asphalt binder used to produce the mixture.
2. The surface of the uncompacted mat must be measured using a hand-held thermometer or infrared thermometer.
3. Minimum uncompacted mat temperature requiring a water flow measurement may be reduced 10°F if using a compaction aid.

Use Tex-246-F to measure water flow to verify the mixture is adequately compacted at confined longitudinal joints as directed by the Engineer.

The water flow rate should be greater than 120 sec. Investigate the cause of the water flow rate test failures and take corrective actions during production and placement to ensure the water flow rate is greater than 120 sec. Suspend production if two consecutive water flow rate tests fail unless otherwise approved. Resume production after the Engineer approves changes to production or placement methods.

Complete all compaction operations before the pavement temperature drops below 180°F unless otherwise allowed. The Engineer may allow compaction with a light finish roller operated in static mode for pavement temperatures below 180°F when approved.

Allow the compacted pavement to cool to 160°F or lower before opening to traffic unless otherwise directed. Sprinkle the finished mat with water or limewater, when directed, to expedite opening the roadway to traffic.

4.9. **Acceptance Plan.** Sample and test the hot-mix asphalt on a lot and sublot basis.

4.9.1. **Referee Testing.** The Materials and Tests Division is the referee laboratory. The Contractor may request referee testing if the differences between Contractor and Engineer test results exceed the maximum allowable difference in accordance with Table 8 and the differences cannot be resolved. The Contractor may also request referee testing if the Engineer's test results require suspension of production and the Contractor's test results are within specification limits. Make the request within five working days after receiving test results from the Engineer. Referee tests will be performed only on the sublot in question and only for the particular tests in question. Allow 10 working days from the time the referee laboratory receives the samples for test results to be reported. The Department may require the Contractor to reimburse the Department for referee tests if more than three referee tests per project are required and the Engineer's test results are closer to the referee test results than the Contractor's test results.

The Materials and Tests Division will determine the laboratory-molded density based on the molded specific gravity and the maximum theoretical specific gravity of the referee sample.

4.9.2. **Production Acceptance.**

4.9.2.1. **Production Lot.** A production lot consists of four equal sublots. The default quantity for Lot 1 is 500 ton; however, when requested by the Contractor, the Engineer may increase the quantity for Lot 1 to no more than 2,000 ton. The Engineer will select subsequent lot sizes based on the anticipated daily production such that approximately three to four sublots are produced each day. The lot size will be between 500 ton and 2,000 ton. The Engineer may change the lot size before the Contractor begins any lot.

4.9.2.1.1. **Incomplete Production Lots.** If a lot is begun but cannot be completed, such as on the last day of production or in other circumstances deemed appropriate, the Engineer may close the lot. Close all lots within five working days unless otherwise allowed.

4.9.2.2. **Production Sampling.**

4.9.2.2.1. **Mixture Sampling.** Obtain hot-mix samples from trucks at the plant in accordance with Tex-222-F. The sampler will split each sample into three equal portions in accordance with Tex-200-F and label these portions as "Contractor," "Engineer," and "Referee." The Engineer will perform or witness the sample splitting and take immediate possession of the samples labeled "Engineer" and "Referee." The Engineer will maintain the custody of the samples labeled "Engineer" and "Referee" until the Department's testing is completed.

4.9.2.2.1.1. **Random Sample.** At the beginning of the project, the Engineer will select random numbers for all production sublots. Determine sample locations in accordance with Tex-225-F. Take one sample for each sublot at the randomly selected location. The Engineer will perform or witness the sampling of production sublots.

4.9.2.2.1.2. **Blind Sample.** For one sublot per lot, the Engineer will obtain and test a "blind" sample instead of the random sample collected by the Contractor. Test either the "blind" or the random sample; however, referee testing (if applicable) will be based on a comparison of results from the "blind" sample. The location of the Engineer's "blind" sample will not be disclosed to the Contractor. The Engineer's "blind" sample may be randomly selected in accordance with Tex-225-F for any sublot or selected at the discretion of the Engineer. The Engineer will use the Contractor's split sample for sublots not sampled by the Engineer.

4.9.2.2.2. **Informational Methylene Blue Testing.** During the project and at random, obtain and provide the Engineer with approximately 50 lb. of each fine aggregate and approximately 20 lb. of all mineral fillers used to produce the mixture. Label the samples with the Control Section Job (CSJ), mixture type, and approximate lot and sublot number corresponding to when the sample was taken. The Engineer will ship the samples to the Materials and Tests Division for Methylene Blue testing in accordance with Tex-252-F. Results from these tests will not be used for specification compliance.

4.9.2.2.3. **Asphalt Binder Sampling.** Obtain a 1-qt. sample of the asphalt binder witnessed by the Engineer for each lot of mixture produced. The Contractor will notify the Engineer when the sampling will occur. Obtain the sample at approximately the same time the mixture random sample is obtained. Sample from a port located immediately upstream from the mixing drum or pug mill and upstream from the introduction of any additives in accordance with Tex-500-C, Part II. Label the can with the corresponding lot and sublot numbers, producer, producer facility location, grade, district, date sampled, and project information including highway and CSJ. The Engineer will retain these samples for one year. The Engineer may also obtain independent samples. If obtaining an independent asphalt binder sample and upon request of the Contractor, the Engineer will split a sample of the asphalt binder with the Contractor.

At least once per project, the Engineer will collect split samples of each binder grade and source used. The Engineer will submit one split sample to the Materials and Tests Division to verify compliance with Item 300, "Asphalts, Oils, and Emulsions," and will retain the other split sample for 1 yr.

4.9.2.3. **Production Testing.** The Contractor and Engineer must perform production tests in accordance with Table 13. The Contractor has the option to verify the Engineer's test results on split samples provided by the Engineer. Determine compliance with operational tolerances listed in accordance with Table 8 for all sublots. Take immediate corrective action if the Engineer's laboratory-molded density on any sublot is less than 95.0% or greater than 98.0% when using the SGC or less than 96.5% or greater than 98.5% when using the TGC, to bring

the mixture within these tolerances. The Engineer may suspend operations if the Contractor's corrective actions do not produce acceptable results. The Engineer will allow production to resume when the proposed corrective action is likely to yield acceptable results.

The Engineer may allow alternate methods for determining the asphalt binder content and aggregate gradation if the aggregate mineralogy is such that Tex-236-F, Part I does not yield reliable results. Provide evidence that results from Tex-236-F, Part I are not reliable before requesting permission to use an alternate method unless otherwise directed. Use the applicable test procedure as directed if an alternate test method is allowed.

Table 13
Production and Placement Testing Frequency

Description	Test Method	Min Contractor Testing	Min Engineer Testing
Individual % retained for #8 sieve and larger	Tex-200-F or Tex-236-F	1 per sublot	1 per 12 sublots[1]
Individual % retained for sieves smaller than #8 and larger than #200			
% passing the #200 sieve			
Laboratory-molded density	Tex-207-F	N/A	1 per sublot[1]
Laboratory-molded bulk specific gravity			
VMA	Tex-204-F		
Moisture content	Tex-212-F, Part II	When directed	
Theoretical maximum specific (Rice) gravity	Tex-227-F, Part II	N/A	1 per sublot[1]
Asphalt binder content[2]	Tex-236-F, Part I	1 per sublot	1 per lot[1]
Overlay test[3]	Tex-248-F	N/A	1 per project
Hamburg Wheel test	Tex-242-F	N/A	1 per project
Thermal profile	Tex-244-F	1 per sublot[4,5,6]	1 per project[5]
Asphalt binder sampling and testing	Tex-500-C, Part II	1 per lot (sample only)[7]	1 per project
Tack coat sampling and testing	Tex-500-C, Part III	N/A	1 per project
Boil test[8]	Tex-530-C	1 per sublot[9]	1 per project
Water flow	Tex-246-F		
Methylene blue test[10]	Tex-252-F	1 per project (sample only)	

1. For production defined in Section 3081.4.9.4., "Exempt Production," the Engineer will test one per day if 100 ton or more are produced. For Exempt Production, no testing is required with less than 100 ton are produced.
2. May be obtained from asphalt flow meter readout as determined by the Engineer.
3. Testing performed by the Materials and Tests Division on sample obtained from Lot 2 or higher.
4. To be performed in the presence of the Engineer when a thermal camera is used, unless otherwise approved.
5. Not required when a thermal imaging system is used.
6. When using the thermal imaging system, the test report must include the temperature measurements taken in accordance with Tex-244-F.
7. Obtain samples witnessed by the Engineer. The Engineer will retain these samples for 1 yr.
8. When shown on the plans.
9. To be performed in the presence of the Engineer, unless otherwise directed.
10. Testing performed by the Materials and Tests Division for informational purposes only.

4.9.2.4. **Operational Tolerances.** Control the production process within the operational tolerances in accordance with Table 8. When production is suspended, the Engineer will allow production to resume when test results or other information indicates the next mixture produced will be within the operational tolerances.

4.9.2.4.1. **Gradation.** Suspend operation and take corrective action if any aggregate is retained on the maximum sieve size in accordance with Table 6. A sublot is defined as out of tolerance if either the Engineer's or the Contractor's test results are out of operational tolerance. Suspend production when test results for gradation exceed the operational tolerances in accordance with Table 8 for three consecutive sublots on the same sieve or four consecutive sublots on any sieve unless otherwise directed. The consecutive sublots may be from more than one lot.

4.9.2.4.2. **Asphalt Binder Content.** A sublot is defined as out of operational tolerance if either the Engineer's or the Contractor's test results exceed the values in accordance with Table 8. Suspend production when two or

more sublots within a lot are out of operational tolerance or below the minimum asphalt binder content specified in accordance with Table 6 unless otherwise directed. Suspend production and shipment of mixture if the Engineer's or Contractor's asphalt binder content deviates from the current JMF by more than 0.5% for any sublot or is less than the minimum asphalt content allowed in accordance with Table 6.

4.9.2.4.3. **Voids in Mineral Aggregates (VMA).** The Engineer will determine the VMA for every sublot. For sublots when the Engineer does not determine asphalt binder content, the Engineer will use the asphalt binder content results from QC testing performed by the Contractor to determine VMA.

Take immediate corrective action if the VMA value for any sublot is less than the minimum VMA requirement for production in accordance with Table 6. Suspend production and shipment of the mixture if the Engineer's VMA results on two consecutive sublots are below the minimum VMA requirement for production in accordance with Table 6.

Suspend production and shipment of the mixture if the Engineer's VMA result is more than 0.5% below the minimum VMA requirement for production in accordance with Table 6. In addition to suspending production, the Engineer may require removal and replacement or may allow the sublot to be left in place without payment.

4.9.2.4.4. **Hamburg Wheel.** The Engineer may perform a Hamburg Wheel on plant produced mixture at any time during production. In addition to testing production samples, the Engineer may obtain cores and perform the Hamburg Wheel test on any area of the roadway where rutting is observed. Suspend production until further Hamburg Wheel meet the specified values when the production or core samples fail to meet the Hamburg Wheel criteria in accordance with Table 7. Core samples, if taken, will be obtained from the center of the finished mat or other areas excluding the vehicle wheel paths. The Engineer may require up to the entire sublot of any mixture failing the Hamburg Wheel to be removed and replaced at the Contractor's expense.

If the Department's or Department-approved laboratory's Hamburg Wheel test results in a "remove and replace" condition, the Contractor may request that the Department confirm the results by re-testing the failing material. The Materials and Tests Division will perform the Hamburg Wheel and determine the final disposition of the material in question based on the Department's test results.

4.9.2.5. **Individual Loads of Hot-Mix.** The Engineer can reject individual truckloads of hot-mix. When a load of hot-mix is rejected for reasons other than temperature, contamination, or excessive uncoated particles, the Contractor may request that the rejected load be tested. Make this request within 4 hr. of rejection. The Engineer will sample and test the mixture. If test results are within the operational tolerances in accordance with Table 8, payment will be made for the load. If test results are not within operational tolerances, no payment will be made for the load.

4.9.3. **Placement Acceptance.**

4.9.3.1. **Placement Lot.** A placement lot consists of four placement sublots. A placement sublot consists of the area placed during a production sublot.

4.9.3.1.1. **Recovered Asphalt Dynamic Shear Rheometer (DSR).** The Engineer may take production samples or cores from suspect areas of the project to determine recovered asphalt properties. Asphalt binders with an aging ratio greater than 3.5 do not meet the requirements for recovered asphalt properties and may be deemed defective when tested and evaluated by the Materials and Tests Division. The aging ratio is the DSR value of the extracted binder divided by the DSR value of the original unaged binder. Obtain DSR values in accordance with AASHTO T 315 at the specified high temperature performance grade of the asphalt. The Engineer may require removal and replacement of the defective material at the Contractor's expense. The asphalt binder will be recovered for testing from production samples or cores in accordance with Tex-211-F.

4.9.3.1.2. **Irregularities.** Identify and correct irregularities including segregation, rutting, raveling, flushing, fat spots, mat slippage, irregular color, irregular texture, roller marks, tears, gouges, streaks, uncoated aggregate particles, or broken aggregate particles. The Engineer may also identify irregularities, and in such cases, the Engineer will promptly notify the Contractor. The Engineer may require the Contractor to remove and replace (at the

Contractor's expense) areas of the pavement that contain irregularities if the Engineer determines that the irregularity will adversely affect pavement performance. The Engineer may also require the Contractor to remove and replace (at the Contractor's expense) areas where the mixture does not bond to the existing pavement.

The Engineer may require the Contractor to immediately suspend operations if irregularities are detected or may allow the Contractor to continue operations for no more than one day while the Contractor is taking appropriate corrective action.

4.9.4. **Exempt Production.** When the anticipated daily production is less than 100 ton, all QC and QA sampling and testing are waived. The Engineer may deem the mixture as exempt production for the following conditions:

- anticipated daily production is more than 100 ton but less than 250 ton;
- total production for the project is less than 2,500 ton;
- when mutually agreed between the Engineer and the Contractor; or
- when shown on the plans.

For exempt production, the Contractor is relieved of all production and placement sampling and testing requirements. All other specification requirements apply, and the Engineer will perform acceptance tests for production and placement in accordance with Table 13.

For exempt production:

- produce, haul, place, and compact the mixture as directed by the Engineer; and
- control mixture production to yield a laboratory-molded density that is within ±1.0% of the target density as tested by the Engineer.

4.9.5. **Ride Quality.** Measure ride quality in accordance with Item 585, "Ride Quality for Pavement Surfaces," unless otherwise shown on the plans.

5. MEASUREMENT

5.1. **TOM Hot-Mix Asphalt.** TOM hot-mix will be measured by the ton of composite mixture, which includes asphalt, aggregate, and additives. Measure the weight on scales in accordance with Item 520, "Weighing and Measuring Equipment."

5.2. **Tack Coat.** Tack coat will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume in gallons from the calibrated distributor. The Engineer will witness all strapping operations for volume determination. All tack, including emulsions, will be measured by the gallon applied.

The Engineer may allow the use of a metering device to determine asphalt volume used and application rate if the device is accurate within 1.5% of the strapped volume.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under Section 3081.5.1., "TOM Hot-Mix Asphalt," will be paid for at the unit bid price for "Thin Overlay Mixture" of the mixture type, SAC, and binder specified. These prices are full compensation for surface preparation, removing pavement marking and markers, materials, placement, equipment, labor, tools, and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under Section 3081.5.2., "Tack Coat," will be paid for at the unit bid price for "Tack Coat" of the tack coat provided. These prices are full compensation for materials, placement, equipment, labor, tools, and incidentals.

Trial batches will not be paid for unless they are included in pavement work approved by the Department.

Payment adjustment for ride quality will be determined in accordance with Item 585, “Ride Quality for Pavement Surfaces.”

Special Specification 3084
Bonding Course

1. DESCRIPTION

Construct a bonding course where improved bonding is needed using a Tracking-Resistant Asphalt Interlayer (TRAIL) or a Spray Applied Underseal Membrane, applied before the placement of a new hot-mix asphalt concrete pavement.

2. MATERIALS

2.1. Furnish the materials for one of the following two options:

2.1.1. **TRAIL.** Furnish asphalt material described as "tack" for typical use in the TRAIL Material Producer List. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.1.2. **Spray Applied Underseal Membrane.** Furnish asphalt material meeting the requirements of Special Specification 3002, "Spray Applied Underseal Membrane." Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.2. Furnish the material for applying tack coat to all miscellaneous contact surfaces when approved by the Engineer:

2.2.1. **Miscellaneous Tack.** FurnishTRAIL asphalt, CSS-1H, SS-1H, or a PG binder with a minimum high-temperature of PG 58 for tack coat binder in accordance with Item 300, "Asphalts, Oils, and Emulsions." Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.3. **Sampling**. The Engineer will witness the collection of at least one sample of each asphalt binder per project in accordance with Tex-500-C, Part III, and test it to verify compliance with Item 300, "Asphalts, Oils, and Emulsions" or Special Specification 3002, "Spray Applied Underseal Membrane."

3. EQUIPMENT

3.1. **TRAIL.** Provide the equipment recommended by the producer.

3.2. **Spray Applied Underseal Membrane.** Provide in accordance with Special Specification 3002, "Spray Applied Underseal Membrane."

4. CONSTRUCTION

4.1. **Preparation.** Remove existing raised pavement markers. Repair any damage incurred by removal as directed. Remove dirt, dust, or other harmful material before sealing. When shown on the plans, remove vegetation and blade pavement edges. When approved by the Engineer, apply a thin, uniform coating of Miscellaneous Tack to all miscellaneous contact surfaces such as curbs, structures, and manholes. Prevent splattering of the tack coat when placed adjacent to curb, gutter, and structures.

4.2. **Test Strips.** When required by the Engineer, perform a test strip of TRAIL at a location on or near the project as directed. Allow the strip to cure for a maximum of 30 min. Drive over the test strip with equipment used during laid-down construction to simulate the effect of paving equipment. There should be no evidence of tracking or picking up of the TRAIL material on the wheels of the equipment.

4.3. **TRAIL.** Perform the following construction methods when applying a TRAIL for a bonding course:

4.3.1. **Placement.** Uniformly apply the TRAIL material to all areas where mix will be placed, including joints, at the rate shown on the plans or as directed, within 15°F of the approved temperature, and not above the maximum allowable temperature. Unless otherwise directed, uniformly apply the TRAIL material at a minimum rate specified on the plans. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions.

4.4. **Spray Applied Underseal Membrane.** Place in accordance with Special Specification 3002, "Spray Applied Underseal Membrane."

4.4.1. **Placement.** Do not allow any loose mixture onto the prepared surface before application of the membrane. Unless otherwise directed, uniformly apply the membrane to all areas where mix will be placed, including joints, at the rate shown on the plans. Unless otherwise directed, uniformly apply the membrane at the minimum rate specified on the plans. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions.

4.5. **Informational Shear Test.** Obtain one set of full depth core specimens per project in accordance with Tex-249-F within one working day of the time the lot placement is completed. The Engineer will select the core locations. Provide the cores to the Engineer in a container labeled with the Control-Section-Job (CSJ) and lot number. The district will determine the shear bond strength between the two bonded pavement layers in accordance with Tex-249-F. Results from these tests will not be used for specification compliance.

4.6. **Quality Control.** Stop application if it is not uniform due to streaking, ridging, pooling, or flowing off the roadway surface. Verify equipment condition, operating procedures, application temperature, and material properties. Determine and correct the cause of non-uniform application.

The Engineer may perform independent tests to confirm contractor compliance and may require testing differences or failing results to be resolved before resuming production.

The Engineer may stop the application and require construction of test strips at the Contractor's expense if any of the following occurs:

- Non-uniformity of application continues after corrective action;
- Evidence of tracking or picking up of the TRAIL;
- In 3 consecutive shots, application rate differs by more than 0.02 gal. per square yard from the rate directed; or
- Any shot differs by more than 0.04 gal. per square yard from the rate directed.

The Engineer will approve the test strip location. The Engineer may require additional test strips until surface treatment application meets specification requirements.

5. MEASUREMENT

5.1. **Volume**. The asphalt material, including all components, will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume from the calibrated distributor. The Engineer will witness all strapping operations for volume determination. All asphalt material, including emulsions, will be measured by the gallon applied.

The Engineer may allow the use of a metering device to determine the asphalt volume used and application rate if the device is accurate to within 1.5% of the strapped volume.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "Bonding Course." These prices are full compensation

for all materials, Miscellaneous Tack used for miscellaneous contact surfaces, equipment, labor, tools, and incidentals necessary to complete the work.

Special Specification 3085
Underseal Course

1. DESCRIPTION

Construct an underseal course where sealing of the underlying surface is needed using a Tracking-Resistant Asphalt Interlayer (TRAIL), a Spray Applied Underseal Membrane, or a single layer of Seal Coat, applied before the placement of a new hot-mix asphalt concrete pavement.

2. MATERIALS

2.1. Furnish the materials for one of the following three options:

2.1.1. **TRAIL.** Furnish asphalt material described as "seal" for typical use in the TRAIL Material Producer List.

2.1.2. **Spray Applied Underseal Membrane.** Furnish asphalt material meeting the requirements of Special Specification 3002, "Spray Applied Underseal Membrane." Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.1.3. **Seal Coat.** Furnish asphalt and aggregate materials meeting the requirements of Item 316, "Seal Coat." Use a polymer modified asphalt or emulsion and aggregate as shown on the plans. Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.2. Furnish the material for applying tack coat to all miscellaneous contact surfaces when approved by the Engineer:

2.2.1. **Miscellaneous Tack.** Furnish TRAIL asphalt, CSS-1H, SS-1H, or a PG binder with a minimum high-temperature of PG 58 for tack coat binder in accordance with Item 300, "Asphalts, Oils, and Emulsions." Do not dilute emulsified asphalts at the terminal, in the field, or at any other location before use.

2.3. **Sampling.** The Engineer will witness the collection of at least one sample of each asphalt binder per project in accordance with Tex-500-C, Part III, and test it to verify compliance with Item 300, "Asphalts, Oils, and Emulsions" or Special Specification 3002, "Spray Applied Underseal Membrane."

The Engineer will sample and test the type and grade of the aggregate as shown on the plans at the frequency listed in the Department's *Guide Schedule of Sampling and Testing* in accordance with Item 302, "Aggregates for Surface Treatments."

3. EQUIPMENT

3.1. **TRAIL.** Provide the equipment recommend by the producer.

3.2. **Spray Applied Underseal Membrane.** Provide in accordance with Special Specification 3002, "Spray Applied Underseal Membrane."

3.3. **Seal Coat.** Provide in accordance with Item 316, "Seal Coat."

4. CONSTRUCTION

4.1. **Preparation.** Remove existing raised pavement markers. Repair any damage incurred by removal as directed. Remove dirt, dust, or other harmful material before sealing. When shown on the plans, remove

vegetation and blade pavement edges. When approved by the Engineer, apply a thin, uniform coating of Miscellaneous Tack to all miscellaneous contact surfaces such as curbs, structures, and manholes. Prevent splattering of the tack coat when placed adjacent to curb, gutter, and structures.

4.2. **TRAIL.** Perform the following construction methods when applying a TRAIL for an underseal course:

4.2.1. **Placement.** Uniformly apply the TRAIL material to all areas where mix will be placed, including joints, at the rate shown on the plans or as directed, within 15°F of the approved temperature, and not above the maximum allowable temperature. Unless otherwise directed, uniformly apply the TRAIL material at the minimum rate specified on the plans. The Engineer may adjust the application rate taking into consideration the existing pavement surface conditions.

4.3. **Spray Applied Underseal Membrane.** Place in accordance with Special Specification 3002, "Spray Applied Underseal Membrane."

4.3.1. **Placement.** Do not allow any loose mixture onto the prepared surface before application of the membrane. Unless otherwise directed, uniformly apply the membrane to all areas where mix will be placed, including joints, at the rate shown on the plans. Unless otherwise directed, uniformly apply the membrane at the minimum rate specified on the plans. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions.

4.4. **Seal Coat.** Place in accordance with Item 316, "Seal Coat."

4.4.1. **Placement.** Unless otherwise directed, apply the asphalt material and aggregate at the minimum rate shown on the plans. The Engineer may adjust the application rate, taking into consideration the existing pavement surface conditions.

4.5. **Informational Shear Test.** Obtain one set of full depth core specimens per project in accordance with Tex-249-F within one working day of the time the lot placement is completed. The Engineer will select the core locations. Provide the cores to the Engineer in a container labeled with the Control-Section-Job (CSJ) and lot number. The district will determine the shear bond strength between the two bonded pavement layers in accordance with Tex-249-F. Results from these tests will not be used for specification compliance.

4.6. **Nonuniform Application.** Stop application if it is not uniform due to streaking, ridging, pooling, or flowing off the roadway surface. Verify equipment condition, operating procedures, application temperature, and material properties. Determine and correct the cause of non-uniform application.

4.7. **Test Strips.** The Engineer may perform independent tests to confirm contractor compliance and may require testing differences or failing results to be resolved before resuming production.

The Engineer may stop the application and require construction of test strips at the Contractor's expense if any of the following occurs:

- Non-uniformity of application continues after corrective action;
- Evidence of tracking or picking up of the TRAIL;
- In 3 consecutive shots, application rate differs by more than 0.03 gal. per square yard from the rate directed; or
- Any shot differs by more than 0.05 gal. per square yard from the rate directed.

The Engineer will approve the test strip location. The Engineer may require additional test strips until surface treatment application meets specification requirements.

5. MEASUREMENT

5.1. **Asphalt Material.**

5.1.1. **Volume**. The asphalt material, including all components, will be measured at the applied temperature by strapping the tank before and after road application and determining the net volume from the calibrated distributor. The Engineer will witness all strapping operations for volume determination. All asphalt material, including emulsions, will be measured by the gallon applied.

The Engineer may allow the use of a metering device to determine the asphalt volume used and application rate if the device is accurate to within 1.5% of the strapped volume.

5.2. **Aggregate.** The work performed, materials furnished, equipment, labor, tools, and incidentals will not be paid for directly but will be subsidiary.

5.3. **Quantity Adjustments.** Quantity based price adjustment factors are not applicable to compensate for over and under runs resulting from the method chosen.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Underseal Course." These prices are full compensation for surface preparation; furnishing, preparing, hauling, Miscellaneous Tack used for all miscellaneous contact surfaces, and placing materials; removing existing pavement markers and excess aggregate; rolling; cleaning up stockpiles; and equipment, labor, tools, and incidentals.

Special Specification 6000
Illumination Maintenance

1. DESCRIPTION

Maintain, install, repair, or replace the various appurtenances related to existing illumination systems.

2. LICENSES AND CERTIFICATION

Provide personnel with electrical licensing and electrical certification in accordance with Item 7, "Legal Relations and Responsibilities," and all applicable Special Provisions to Item 7, "Legal Relations and Responsibilities."

3. MATERIALS

Unless otherwise noted on the plans, the Department will furnish luminaires, luminaire poles, mast arms, anchor bolts, and transformer bases. Assume responsibility for all materials furnished by the Department. Use material furnished by the Department for this contract only.

Furnish all materials required to repair breaks or shorts in electrical conductors and cables, including, but not be limited to, all concrete, ground boxes, wire mesh, conduit, conductors, and pipe casing. Ensure materials furnished by the Contractor meet all Department standards and specification requirements.

Return unused or removed salvageable material to the Department upon completion of work and before final payment, at the location shown on the plans or as directed. Dispose of any unsalvageable material in accordance with federal, state, and local regulations.

When performing maintenance on luminaires, verify if fixtures are covered under the manufacturer's warranty. If warranty applies, coordinate with the Department and follow any necessary procedures to have the manufacturer replace or repair fixtures.

4. EQUIPMENT

Furnish all equipment, tools and machinery necessary for the proper prosecution of the work. This will include, but is not limited to, an aerial device capable of reaching, installing and erecting all overhead lights and poles, trenching machine, boring machine, underground conductor detectors, underground fault detectors and splicing tools.

Ensure equipment, tools, and machinery is at the worksite and is in good repair and operating condition before beginning work. Immediately repair or replace any equipment that may affect the quality of the work, as directed.

5. WORK METHODS

Conform to the latest edition of the National Electric Code (NEC) as adopted by the Texas Department of Licensing and Regulations, local utility requirements, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 104, "Removing Concrete"
- Item 400, "Excavation and Backfill for Structures"
- Item 416, "Drilled Shaft Foundations"

- Item 421, “Hydraulic Cement Concrete”
- Item 431, “Pneumatically Placed Concrete”
- Item 432, “Riprap”
- Item 440, “Reinforcing Steel”
- Item 476, “Jacking, Boring or Tunneling Pipe or Box”
- Item 610, “Roadway Illumination Assemblies”
- Item 613, “High Mast Illumination Poles”
- Item 614, “High Mast Illumination Assemblies”
- Item 616, “Performance Testing of Lighting Systems”
- Item 618, “Conduit”
- Item 620, “Conductors”
- Item 621, “Tray Cable”
- Item 622, “Duct Cable”
- Item 624, “Ground Boxes”
- Item 627, “Treated Timber Poles”
- Item 628, “Electrical Services”
- Item 652, “Highway Sign Lighting Fixtures”

Perform work on this contract as directed. Maintain existing roadway illumination systems as directed. Perform a monthly inspection to determine if any maintenance of the illumination system are needed and provide a detailed report to the Engineer. Provide proper maintenance or repairs within 48 hr. of notification. Submit completed maintenance log as directed. Coordinate electric power issues with local utility company.

The term “duct cable” as used herein consists of a complete assembly of conductors enclosed in a high density polyethylene duct.

Perform maintenance, installation, removal, or replacement activities located near any overhead or underground utilities using established industry and utility safety practices. Consult with the appropriate utility company before beginning such work.

Maintain, install, repair or replace the following items in accordance with the details as shown on the plans, the NEC and as directed:

5.1. **Conduit**. Install, remove, or replace conduits in accordance with Item 618, “Conduit.” Use 90° “sweep” type elbows on conduits entering a ground box or foundation.

5.2. **Electrical Conductors**. Install, remove, or replace electrical conductors in accordance with Item 620, “Electrical Conductors.”

Strap cable as required when installing or replacing conductors in aerial runs. This work is subsidiary to this Item.

5.3. **Tray Cable**. Install, remove, or replace tray cable in accordance with Item 621, “Tray Cable.”

5.4. **Duct Cable**. Install, remove, or replace duct cable in accordance with Item 622, “Duct Cable.”

5.5. **Conduit or Duct Cable Repair and Conductor Splices**. Notify the Engineer when an underground break in duct cable or conduit must be located or if a short in a conductor must be located.

Expose the break or short, install the ground box, repair the conduit or duct cable, perform the electrical splices, and backfill. Backfill in accordance with the construction methods of Item 400, “Excavation and Backfill for Structures.” New ground boxes will be paid for under, “Install Ground Box.”

When a ground box is not needed, expose the break or short, repair conduit or duct cable, remove damaged conductors, and install new conductors. Replace up to 3 ft. of conduit when repairing duct cable, regardless of the number of conduits in trench. Only one repair will be considered for payment per trench. If more than 3 ft. of conduit or duct cable needs to be replaced the additional will be paid for under "Replace Underground Conduit" or "Replace Duct Cable." Replacement of conductors will be paid for under "Install or Replace Conductor." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures."

An electrical splice will include the replacement of up to 3 ft. of conductor, regardless of the number of conductors in the conduit. Only one splice will be considered for payment per conduit. If more than 3 ft. of conductor needs to be replaced the additional will be paid for under "Install or Replace Conductor."

Above-ground conduit repairs performed in conjunction with a bid item will be considered subsidiary to the pertinent bid item. Above-ground conduit repairs not performed in conjunction with a bid item will include the replacement of up to 3 ft. of conduit per repair. If more than 3 ft. of conduit must be replaced, the additional will be paid for under "Replace Above-Ground Conduit."

5.6. **Bore Operations**. Place underground wiring under roadways by boring in accordance with the construction methods for boring as outlined in Item 476, "Jacking, Boring or Tunneling Pipe or Box." Bore a minimum of 60 in. below the roadway surface (and a minimum of 36 in. below the ditch flow-line) and extend 10 ft. outside the edge of the roadway or as directed. Placement of conduit for the length of the bore will be considered subsidiary to this bid item. Electrical conductors will be paid for under the bid item "Install or Replace Conductor."

5.7. **Install, Remove, or Replace Roadway Illumination Assembly**. Install, remove, or replace roadway illumination assemblies. This will include the base, pole, luminaire arms, luminaire, and required wiring.

5.8. **Install, Remove, or Replace Underpass Luminaire**. Install, remove, or replace underpass luminaires. This will include the luminaire, junction box, mounting hardware, and required wiring.

5.9. **Install, Remove, or Replace Induction Fluorescent Fixture**. Install, remove, or replace induction fluorescent fixture.

5.10. **Install, Remove, or Replace Luminaire**. Install, remove, or replace luminaire.

5.11. **Replace High Mast Luminaires**. Replace high mast luminaires.

5.12. **Replace Luminaire Pole**. Replace luminaire pole. Removing and reinstalling existing luminaires and arms is subsidiary to this item.

5.13. **Replace Luminaire Arms**. Replace luminaire arms.

5.14. **Maintenance of Roadway Illumination**. Maintain roadway illumination assemblies including replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.15. **Maintenance of High Mast Illumination**. Maintain high mast illumination assemblies including lowering the ring assembly and the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Re-aim the lights and clean the lenses and reflectors as directed. Clean the reflector and inside and outside of lens with an approved cleaning solution. Maintain mechanical and electrical equipment as directed.

5.16. **Maintenance of Overhead Sign Lighting**. Maintain overhead sign lighting for large signs mounted over the roadway including replacing the ballast, lamps, fuses and lamp sockets in order to properly restore the

lighting to satisfactory operation. Install in accordance with the details shown on the plans or as directed. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.17. **Maintenance of Underpass Fixtures**. Maintain HPS underpass fixtures including the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.18. **Maintenance of Induction Fluorescent Fixtures**. Maintain induction fluorescent fixtures including the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.19. **Scheduled Preventive Maintenance of Roadway Illumination Assembly**. Inspect and perform the following listed items according to the schedule provided by the Engineer:

- Inspect and maintain all foundation anchor bolts, nuts, and washers.
- Prep and touch up rust spots with cold galvanizing spray.
- Replace lamp and clean fixtures as directed.
- Replace ballast as directed.
- Level fixture.
- Inspect electrical system.
- Repair shorts or open circuits.

5.20. **Scheduled Preventive Maintenance of High Mast Assembly**. Complete and sign "Luminaire Preventive Maintenance for High Mast Lighting" reports. Fill out forms legibly and completely. List all materials used at each location.

Inspect and perform the following listed items according to the schedule provided by the Engineer:

- Inspect and fill gearbox lubrication reservoir.
- Lubricate grease fittings.
- Adjust brake mechanism to proper torque.
- Inspect cable drum.
- Inspect all wire rope and cables for deterioration or wear.
- Inspect safety lanyard.
- Lower ring and inspect mechanism.
- Inspect all foundation anchor bolts, nuts, and washers.
- Inspect welds around baseplate and ground sleeve for visible cracks.
- Prep and touch up rust spots with cold galvanizing spray.
- Replace lamps and clean fixtures as directed.
- Replace ballasts as directed.
- Replace aviation warning (obstruction) lamps as directed.
- Inspect electrical system.
- Repair short or open circuits as directed.
- Raise ring to proper position.

5.21. **Replace Electrical Services**. Replace electrical services in accordance with Item 628, "Electrical Services."

5.22. **Replace Service Pole**. Replace service poles by removing the existing service pole, installing the new pole and related electrical service equipment, installing conduit including the elbow below ground for underground service feed or the weatherhead for overhead service feed, and connecting and installing electrical service. Install in accordance with Item 628, "Electrical Services."

5.23. **Install Ground Box**. Install ground boxes in conformance with the details shown on the plans and Item 624, "Ground Boxes." When shown on the plans, provide a Class "A" concrete apron conforming to Item 421,

"Hydraulic Cement Concrete." Place ground box to line and grade as approved. All wiring connections required inside the ground box will be considered subsidiary to this bid item.

5.24. **Remove Ground Box**. Remove ground box and fill hole with approved fill to at least 6 in. below conduit level. Remove conductors from conduit back to the point of termination. Uncover enough conduit that 90° bends can be removed and conduit reconnected. Clean conduit as per Item 618, "Conduit," and pull and terminate new conductors. Conduit replaced within 5 ft. of the ground box will be subsidiary to this Item. Cleaning of conduit and pulling of conductors will be paid under "Install or Replace Conductor." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures." If more than 5 ft. of conduit or duct cable needs to be replaced the additional will be paid for under "Replace Underground Conduit" or "Replace Duct Cable."

If applicable, ground box removal includes removing the existing riprap apron.

5.25. **Install Foundation**. Install foundation for roadway illumination assemblies as shown on the plans and in accordance with the materials and construction methods outlined in Item 416, "Drilled Shaft Foundations."

5.26. **Remove Foundation**. Remove foundations in accordance with Item 610, "Roadway Illumination Assemblies," and Item 104, "Removing Concrete." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures."

5.27. **Replace Transformer Base**. Replace transformer base in accordance with the plans or as directed. The removal of the pole, mast arm, and luminaire for replacement of the transformer base only will be considered subsidiary to the pertinent bid items.

5.28. **Replace Transformer Base Cover**. Replace damaged or missing covers on existing transformer bases.

5.29. **Replace Hand Hole Cover**. Replace damaged or missing covers on existing illumination poles.

5.30. **Install Ground Rod**. The installation of ground rods will include running a properly sized copper grounding conductor to the ground connection.

5.31. **Replace Ballast**. Replace ballast for pole mounted, underpass, sign and wall pack fixtures in accordance with the details shown on the plans or as directed.

5.32. **Replace Ballast (High Mast Lighting)**. Replace ballast for high mast fixtures.

5.33. **Install or Replace Fused Disconnect**. Install or replace fused disconnect.

5.34. **Replace Lamp Socket**. Replace lamp socket for pole mounted, underpass, high mast and wall pack fixtures.

5.35. **Replace Lamp**. Replace lamps for pole mounted, underpass, sign and wall pack fixtures. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.36. **Replace Lamp (High Mast Lighting)**. Replace lamp for individual high mast fixtures. Clean the reflector and inside and outside of lens with an approved cleaning solution.

5.37. **Replace Wall Pack Luminaires**. Replace wall pack luminaires on structures, rest areas, maintenance warehouses, and other facilities.

5.38. **Replace Lens**. Replace pole mounted, underpass, sign, wall pack or high mast luminaire lenses.

5.39. **Replace Wall Pack Guard**. Replace wall pack guard.

5.40. **Replace Fuses**. Replace fuses for pole mounted, underpass, sign and wall pack fixtures, and fused disconnects.

5.41. **Replace Fuse Holders**. Replace fuse holder for pole mounted, underpass, sign and wall pack fixtures.

5.42. **Replace Breakaway Fuse Holders**. Replace breakaway fuse.

5.43. **Replace Starting Aid**. Replace starting aid for pole mounted, underpass, sign and wall pack fixtures.

5.44. **Replace Photocells and Brackets**. Replace photocells and brackets.

5.45. **Replace Control Transformer**. Replace the control transformer.

5.46. **Replace Control Circuit**. Replace the control circuit.

5.47. **Replace Aviation Warning Fixtures**. Replace the aviation warning (obstruction) fixtures.

5.48. **Replace Aviation Warning Lamp**. Replace the aviation warning (obstruction) fixture lamp

5.49. **Replace Hand-Off-Auto Switch**. Replace three position Hand-Off-Automatic control switch.

5.50. **Replace Contactor**. Replace electromagnetic contactors.

5.51. **Replace Meter Bases**. Replace meter bases according to electrical service provider's requirements.

5.52. **Replace Time Clocks**. Replace time clocks.

5.53. **Replace Breaker Panel**. Replace breaker panel.

5.54. **Install or Replace Circuit Breaker**. Install or replace circuit breakers.

5.55. **Replace Flexible Power Cable or Cord**. Replace flexible power cable or cord.

5.56. **Replace Twist Lock Connectors**. Replace twist lock connectors.

5.57. **Replace Safety Lanyard**. Replace safety lanyard.

5.58. **Raise and Lower Ring (High Mast Lighting)**. Raise and lower ring in order to perform various maintenance and repair items.

5.59. **Restrap Existing Conduit**. Restrap existing conduit in accordance with the details shown on the plans or as directed.

5.60. **Replace Missing Nuts, Washers, and Other Hardware**. Replace missing nuts washers, and other miscellaneous hardware.

5.61. **Troubleshoot for Repairs**. Troubleshoot location as directed to identify work needed for repairs.

5.62. **Project Inspections**. Inspect and review the project to determine if any items are in need of repair and provide the Engineer with a list of these items. Make repairs to those items as approved. All repairs will be paid for by their respective pay items.

5.63. **Install or Replace Safety Switch.** Install or Replace Safety Switch.

5.64. **Replace 5/16 in. Wire Rope.** Replace 5/16 in. wire rope with swaged terminals.

5.65. **Replace 3/8 in. Wire Rope.** Replace 3/8 in. wire rope with swaged terminals.

5.66. **Replace High Mast Winch.** Replace high mast winch.

5.67. **Replace Wire Rope Pulley.** Replace wire rope pulley.

5.68. **Replace Electrical Cable Pulley.** Replace electrical cable pulley.

5.69. **Install or Replace Access Hole Cover**. Replace damaged or missing access covers on existing high mast poles.

5.70. **Replace High Mast Springs.** Replace high mast spring set.

5.71. **Remove and Reinstall High Mast Pole for Repairs.** Remove and reinstall high mast pole from the foundation to perform any repairs to internal components.

6. MEASUREMENT

This Item will be measured as follows.

6.1. **Conduit**. By the foot of conduit installed, removed, or replaced. This will include the installation of all hardware necessary to attach and connect the conduit, and any excavation, backfill and compaction.

- Install Above-Ground Conduit
- Remove Above-Ground Conduit
- Replace Above-Ground Conduit
- Install Underground Conduit
- Remove Underground Conduit
- Replace Underground Conduit

6.2. **Electrical Conductors**. By the foot of electrical conductor installed, removed, or replaced.

- Install Conductor
- Remove Conductor
- Replace Conductor

6.3. **Tray Cable**. By the foot of tray cable installed, removed, or replaced.

- Install Tray Cable
- Remove Tray Cable
- Replace Tray Cable

6.4. **Duct Cable**. By the foot of duct cable installed, removed, or replaced. This will include excavation, backfill, and compaction.

- Install Duct Cable
- Remove Duct Cable
- Replace Duct Cable

6.5. **Conduit or Duct Cable Repair and Conductor Splices**.

- Install Electrical Splice. By each electrical splice installed per conduit.
- Repair Above-Ground Conduit. By each conduit location repaired. This will include the installation of all hardware necessary to attach and connect the conduit
- Repair Underground Conduit. By each conduit location repaired. This will include excavation, placement of conduit, backfill and compaction.
- Repair Underground Duct Cable. By each duct cable location repaired. This will include excavation, placement of duct cable, backfill and compaction.

6.6. **Road Bore**. By the foot of road bore. This will include conduit installed.

6.7. **Install, Remove, or Replace Roadway Illumination Assembly**. By each assembly installed, removed, or replaced. This item includes all wiring and hardware connections above the foundation.

- Install Roadway Illumination Assembly (HPS)
- Remove Roadway Illumination Assembly (HPS)
- Replace Roadway Illumination Assembly (HPS)
- Install Roadway Illumination Assembly (LED)
- Remove Roadway Illumination Assembly (LED)
- Replace Roadway Illumination Assembly (LED)

6.8. **Install, Remove, or Replace Underpass Luminaire**. By each luminaire installed, removed, or replaced.

- Install Underpass Luminaire (HPS)
- Remove Underpass Luminaire (HPS)
- Replace Underpass Luminaire (HPS)
- Install Underpass Luminaire (LED)
- Remove Underpass Luminaire (LED)
- Replace Underpass Luminaire (LED)

6.9. **Install, Remove, or Replace Induction Fluorescent Fixture**. By each fixture installed, removed, or replaced.

- Install Induction Fluorescent Fixture
- Remove Induction Fluorescent Fixture
- Replace Induction Fluorescent Fixture

6.10. **Install, Remove, or Replace Luminaire**. By each luminaire installed, removed, or replaced.

- Install Luminaire (HPS)
- Remove Luminaire (HPS)
- Replace Luminaire (HPS)
- Install Luminaire (LED)
- Remove Luminaire (LED)
- Replace Luminaire (LED)

6.11. **Replace High Mast Luminaires**. By each high mast luminaire replaced.

6.12. **Replace Luminaire Pole**. By each pole replaced.

6.13. **Replace Luminaire Arms**. By each luminaire arm replaced.

6.14. **Maintain Roadway Illumination**. By each luminaire pole maintained.

6.15. **Maintain High Mast Illumination**. By each high mast pole maintained.

6.16. **Maintain Overhead Sign Lighting**. By each sign light maintained.

6.17. **Maintain Underpass Fixture**. By each underpass fixture maintained.

6.18. **Maintain Induction Fluorescent Fixture**. By each induction fluorescent fixture maintained.

6.19. **Scheduled Preventive Maintenance (Roadway Illumination Assembly)**. By each roadway illumination pole. (Replacing lamp and ballast is subsidiary to this bid item.)

6.20. **Scheduled Preventive Maintenance (High Mast Assembly)**. By each high mast pole regardless of the number of luminaires on the ring. (Replacing lamps and ballast is subsidiary to this bid item.)

6.21. **Replace Electrical Service**. By the each electrical service replaced.

6.22. **Replace Service Pole (Timber, Steel, or Concrete)**. By each service pole replaced.

- Replace Timber Service Pole
- Replace Steel Service Pole
- Replace Concrete Service Pole

6.23. **Install Ground Box**. By each ground box installed.

- Install Ground Box
- Install Ground Box w/ Apron

6.24. **Remove Ground Box**. By each ground box removed.

6.25. **Install Foundation**. By each foundation installed.

6.26. **Remove Foundation**. By each foundation removed.

6.27. **Replace Transformer Base**. By each base replaced.

6.28. **Replace Transformer Base Cover**. By each cover replaced.

6.29. **Replace Hand Hole Cover**. By each cover replaced.

6.30. **Install Ground Rod**. By each ground rod installed.

6.31. **Replace Ballast**. By each ballast replaced.

6.32. **Replace Ballast (High Mast Lighting)**. By each high mast ballast replaced.

6.33. **Install or Replace Fused Disconnect**. By each fused disconnect installed or replaced.

- Install Fused Disconnect
- Replace Fused Disconnect

6.34. **Replace Lamp Socket**. By each lamp socket replaced for pole mounted, underpass, and wall pack fixtures.

- Replace Lamp Socket for pole mounted fixtures
- Replace Lamp Socket for underpass fixtures
- Replace Lamp Socket for wall pack fixtures
- Replace Lamp Socket for high mast fixture

6.35. **Replace Lamp**. By each lamp replaced for pole mounted, underpass, and wall pack fixtures.

- Replace Lamp for pole mounted fixtures
- Replace Lamp for underpass fixtures
- Replace Lamp for wall pack fixtures

6.36. **Replace Lamp (High Mast Lighting)**. By each lamp replaced.

6.37. **Replace Wall Pack Luminaire**. By each wall pack replaced.

6.38. **Replace Lens**. By each lens replaced

- Replace Lens for pole mounted fixture
- Replace Lens for underpass fixture
- Replace Lens for wall pack fixture

- Replace Lens for high mast fixture

6.39. **Replace Wall Pack Guard**. By each guard replaced.

6.40. **Replace Fuse**. By each fuse replaced.

6.41. **Replace Fuse Holder**. By each fuse holder replaced.

6.42. **Replace Breakaway Fuse Holder**. By each breakaway fuse holder replaced.

6.43. **Replace Starting Aid**. By each starting aid replaced.

6.44. **Replace Photocell and Bracket**. By each photocell and bracket replaced.

6.45. **Replace Control Transformer**. By each transformer replaced.

- Replace Control Transformer for High Mast
- Replace Control Transformer for Electrical Service

6.46. **Replace Control Circuit**. By each control circuit replaced.

- Replace Control Circuit for High Mast
- Replace Control Circuit for Electrical Service

6.47. **Replace Aviation Warning Fixture**. By each obstruction fixture replaced.

6.48. **Replace Aviation Warning Lamp**. By each obstruction lamp replaced.

6.49. **Replace Hand-Off-Auto Switch**. By each H-O-A control switch replaced.

6.50. **Replace Contactor**. By each electromagnetic contactor replaced.

6.51. **Replace Meter Base**. By each meter base replaced.

6.52. **Replace Time Clock**. By each time clock replaced.

6.53. **Replace Breaker Panel**. By each breaker panel replaced.

6.54. **Install or Replace Circuit Breaker**. By each circuit breaker installed or replaced.

- Install Circuit Breaker
- Replace Circuit Breaker

6.55. **Replace Flexible Power Cable or Cord**. By foot of cable or cord replaced.

6.56. **Replace Twist Lock Connector**. By each twist lock connector replaced.

6.57. **Replace Safety Lanyard**. By foot of chain replaced. Associated hardware is considered subsidiary to this item.

6.58. **Raise and Lower Ring (High Mast Lighting)**. By each ring raised and lowered (not part of scheduled preventive maintenance).

6.59. **Restrap Existing Conduit**. By each strap installed.

6.60. **Replace Missing Nuts, Washers, and Other Hardware**. By each nut, washer, or miscellaneous hardware replaced.

6.61. **Troubleshoot for Repairs**. By the man-hour of troubleshooting.

6.62. **Project Inspections**. By the month.

6.63. **Install or Replace Safety Switch.** By each safety switch installed or replaced.

- Install Safety Switch
- Replace Safety Switch

6.64. **Replace 5/16 in. Wire Rope.** By each 5/16 in. wire rope with swaged terminals replaced.

6.65. **Replace 3/8 in. Wire Rope.** By each 3/8 in. wire rope with swaged terminals replaced.

6.66. **Replace High Mast Winch.** By each winch replaced.

6.67. **Replace Wire Rope Pulley.** By each wire rope pulley replaced.

6.68. **Replace Electrical Cable Pulley.** By each electrical cable pulley replaced.

6.69. **Install or Replace Access Hole Cover**. By each access cover installed or replaced.

- Install Access Hole Cover
- Replace Access Hole Cover

6.70. **Replace High Mast Springs.** By each high mast spring set replaced.

6.71. **Remove and Reinstall High Mast Pole for Repairs.** By each high mast pole removed and reinstalled.

7. PAYMENT

The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for the various designations. This price is full compensation for furnishing all material, equipment, labor, fines, tools, and incidentals necessary to complete the work.

Lane closures will be paid for under Special Specification "Lane Closures."

Special Specification 6001
Portable Changeable Message Sign

1. DESCRIPTION

Furnish, operate, and maintain portable trailer mounted changeable message sign (PCMS) units.

2. MATERIALS

Furnish new or used material in accordance with the requirements of this Item and the details shown on the plans. Provide a self-contained PCMS unit with the following:

- Sign controller
- Changeable Message Sign
- Trailer
- Power source

Paint the exterior surfaces of the power supply housing, supports, trailer, and sign with Federal Orange No. 22246 or Federal Yellow No. 13538 of Federal Standard 595C, except paint the sign face assembly flat black.

2.1. **Sign Controller**. Provide a controller with permanent storage of a minimum of 75 pre-programmed messages. Provide an external input device for random programming and storage of a minimum of 75 additional messages. Provide a controller capable of displaying up to 3 messages sequentially. Provide a controller with adjustable display rates. Enclose sign controller equipment in a lockable enclosure.

2.2. **Changeable Message Sign**. Provide a sign capable of being elevated to at least 7 ft. above the roadway surface from the bottom of the sign. Provide a sign capable of being rotated 360° and secured against movement in any position.

Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide a minimum 18 in. character height. Provide a 5 × 7 character pixel matrix. Provide a message legibility distance of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. Provide for manual and automatic dimming light sources.

The following are descriptions for 3 screen types of PCMS:

- **Character Modular Matrix**. This screen type comprises of character blocks.
- **Continuous Line Matrix**. This screen type uses proportionally spaced fonts for each line of text.
- **Full Matrix**. This screen type uses proportionally spaced fonts, varies the height of characters, and displays simple graphics on the entire sign.

2.3. **Trailer**. Provide a 2 wheel trailer with square top fenders, 4 leveling jacks, and trailer lights. Do not exceed an overall trailer width of 96 in. Shock mount the electronics and sign assembly.

2.4. **Power Source**. Provide a diesel generator, solar powered power source, or both. Provide a backup power source as necessary.

2.5. **Cellular Telephone**. When shown on the plans, provide a cellular telephone connection to communicate with the PCMS unit remotely.

3. CONSTRUCTION

Place or relocate PCMS units as shown on the plans or as directed. The plans will show the number of PCMS units needed, for how many days, and for which construction phases.

Maintain the PCMS units in good working condition. Repair damaged or malfunctioning PCMS units as soon as possible. PCMS units will remain the property of the Contractor.

4. MEASUREMENT

This Item will be measured by each PCMS or by the day used. All PCMS units must be set up on a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each PCMS set up and operational on the worksite.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Portable Changeable Message Sign." This price is full compensation for PCMS units; set up; relocating; removing; replacement parts; batteries (when required); fuel, oil, and oil filters (when required); cellular telephone charges (when required); software; and equipment, materials, tools, labor, and incidentals.

Special Specification 6005

Testing, Training, Documentation, Final Acceptance, and Warranty

1. DESCRIPTION

Perform or furnish testing, training, documentation, final acceptance, and warranty on the applicable equipment or systems.

2. TESTING

Unless otherwise shown on the plans, perform the following tests on the applicable equipment or systems.

2.1. **Test Procedures Documentation**. Provide 5 copies of the test procedures and blank data forms 60 days prior to testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will approve test procedures prior to submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms, as well as quantitative results. Ensure the data forms are signed by an authorized representative (company official) of the equipment manufacturer. Submit 1 copy of the completed and signed data forms for acceptance or rejection of the test or equipment.

2.2. **Design Approval Test**. Conduct a Design Approval Test on randomly selected units from the prototype design manufacturing run. If only 1 design prototype is manufactured, perform this test on that unit. If supplying multiple types of the equipment, provide and test a sample of each type.

Certification from an independent testing laboratory of a successfully completed Design Approval Test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

2.2.1. **Power Service Transients**. The equipment must meet the performance requirements, specified in the parent specification, when subjected to the power service transients as specified in Section 2.2.7.2, “Transient Tests (Power Service)” of the NEMA TS 2 standard, latest edition.

2.2.2. **Temperature and Condensation**. The equipment must meet the performance requirements, specified in the parent specification, when subjected to the following conditions in the order specified below:

- Stabilize the equipment at -30°F and test as specified in Sections 2.2.7.3., “Low-Temperature Low-Voltage Tests” and 2.2.7.4., “Low-Temperature High-Voltage Tests” of the NEMA TS 2 standard, latest edition.
- Allow the equipment to warm up to room temperature in an atmosphere having relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure.
- Stabilize the equipment at 165°F and test as specified in Sections 2.2.7.5., “High-Temperature High Voltage Tests” and 2.2.7.6, “High-Temperature Low-Voltage Tests” of the NEMA TS 2 standard, latest edition.

2.2.3. **Relative Humidity**. The equipment must meet the performance requirements, specified in the parent specification, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.

2.2.4. **Vibration**. The equipment must show no degradation of mechanical structure, soldered components, or plug-in components and must operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in Section 2.2.8, “Vibration Test,” of the NEMA TS 2 standard, latest edition.

2.2.5. **Power Interruption**. The equipment must meet the performance requirements, specified in the parent specification, when subjected to nominal input voltage variations as specified in Section 2.2.10, “Power Interruption Test,” of the NEMA TS 2 standard, latest edition.

2.3. **Demonstration Test**. Conduct a Demonstration Test on applicable equipment at an approved Contractor facility. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

2.3.1. **Examination of Product**. Examine each unit carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of the parent specification.

2.3.2. **Continuity Tests**. Check the wiring to determine conformance with the requirements of the appropriate paragraphs in the parent specification.

2.3.3. **Operational Test**. Operate each unit for at least 15 min. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements of the parent specification.

2.4. **Stand-Alone Tests**. Conduct a Stand-Alone Test for each unit after installation. The test must exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test. The Department may witness all the tests.

2.5. **System Integration Test**. Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests.

2.6. **Final Acceptance Test**. Conduct a Final Acceptance Test on the complete functional system. Demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a Letter of Approval stating the first day of the Final Acceptance Test. The completion of the Final Acceptance Test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects as required in Section 2.7.5., “Consequences of Final Acceptance Test Failure.”

2.7. **Consequences of Test Failure**. If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.

2.7.1. **Consequences of Design Approval Test Failure**. If the equipment fails the Design Approval Test, correct the fault and then repeat the Design Approval Test until successfully completed.

2.7.2. **Consequences of Demonstration Test Failure**. If the equipment fails the Demonstration Test, correct the fault and then repeat the Demonstration Test until successfully completed.

2.7.3. **Consequences of Stand-Alone Test Failure**. If the equipment fails the Stand-Alone Test, correct the fault and then repeat the Demonstration Test until successfully completed.

2.7.4. **Consequence of System Integration Test Failure**. If the equipment fails the System Integration Test, correct the fault and then repeat the Systems Integration Test until successfully completed.

2.7.5. **Consequences of Final Acceptance Test Failure**. If a defect within the system is detected during the Final Acceptance Test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30 day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime in excess of 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

3. TRAINING

When required on the plans, provide a minimum of 24 hr. of instruction to 10 designated personnel in the operation and maintenance procedures of equipment or systems installed. Provide the training during installation, testing, and integration. Provide the training through practical demonstrations, seminars, and other related technical procedures.

Furnish a training session agenda, a complete set of training material (manuals and schematics), and the names and qualifications of proposed instructors for approval 60 days before the training. Provide a training location. Provide 1 copy of the course material for each person. Provide training in the following areas of interest and as shown on the plans:

- The “Hands-on” operation for each type of equipment.
- Explanation of all system commands, their function and usage.
- Required preventative maintenance procedures.
- All equipment servicing procedures.
- System “troubleshooting”/problem identification procedures.

4. DOCUMENTATION

Provide “as-built” documentation for the entire system and all of its individual components. Supply one (1) 11 in. x 17 in. reproducible copy of the wiring diagrams. Supply three (3) copies of the following in a manual for each equipment component:

- Complete and accurate schematic diagrams.
- Complete and accurate cabinet, enclosure, and building wiring diagrams.
- Complete installation procedures.
- Complete performance specifications (functional, electrical, mechanical and environmental) on the unit.
- Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.
- Pictorial of component layout on circuit board.
- Complete maintenance and trouble-shooting procedures.
- Complete stage-by-stage explanation of circuit theory and operation.
- Complete and detailed system operations manuals.

Furnish additional information as shown on the plans.

5. FINAL ACCEPTANCE

Final acceptance is made when all work is complete, the system has successfully completed all test requirements, and the Engineer, in writing, accepts all work for the work locations in the Contract in accordance with Article 5.12., “Final Acceptance.” Final acceptance relieves the Contractor from further Contract responsibilities.

6. WARRANTY

Guarantee equipment furnished and installed to perform according to the manufacturer’s published specifications. Warrant equipment against defects or failure in design, materials, and workmanship in accordance with the manufacturer’s standard warranty. Supply equipment with no less than 95% of the manufacturer’s warranty remaining on the date that equipment invoices are submitted for final payment. Any equipment with less than 95% warranty remaining will be rejected.

The Contractor will warrant or guarantee all such electronic, electrical, and mechanical equipment, materials, technical data, and products furnished and installed for a period of 1 yr. after final acceptance of the project by the Department. The Contractor’s warranty or guarantee must provide for the “on-site” repair or replacement, at the Contractor’s option, within 2 working days and at no cost to the Department.

Once the Contractor’s warranty or guarantee expires, assign to the Department any manufacturer’s standard warranty or guarantee coverage still remaining on all such electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace defective equipment, at the manufacturer’s option, at no cost to the Department.

7. MEASUREMENT AND PAYMENT

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be considered subsidiary to bid items of the Contract.

Special Specification 6007

Intelligent Transportation System (ITS) Fiber Optic Cable

1. DESCRIPTION

Furnish, install, relocate and remove Intelligent Transportation System (ITS) fiber optic cable, fiber patch panels and splice enclosures as shown on the plans.

2. MATERIALS

2.1. **General Requirements.** Provide, assemble, fabricate and install materials that are new, corrosion resistant, and in accordance with the details shown on the plans and in these Specifications.

Furnish, install, splice, and test all new fiber optic cable. Provide all splicing kits, fiber optic cable caps, connectors, moisture or water sealants, terminators, splice trays, fiber optic jumpers, pig tails, fiber patch panels, fiber interconnect housing, and accessories necessary to complete the fiber optic network. Provide all equipment necessary for installation, splicing, and testing.

2.2. **Cable Requirements.** Furnish all-dielectric, dry-filled, gel-free, loose tube fiber optic cable, with low water peak, suitable for underground conduit environments or aerial applications.

Furnish self-supporting, all-dielectric, dry-filled, gel-free, loose tube fiber optic cable, with low water peak suitable for aerial applications when not lashing to strand cable.

All fiber optic cable furnished must have a design life of 20 yr. when installed to the manufacturer's specifications.

Splice fiber optic cables in ground boxes, field cabinets, or buildings. Terminate fiber optic cables in field cabinets and buildings that comply with the details shown on the plans and in this Specification.

Provide all fiber optic cable from the same manufacturer and the manufacturer is International Organization for Standardization (ISO) 9001 certified. Ensure the cables meet or exceed United States Department of Agriculture Rural Utilities Service (RUS) CFR 1755.900, American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA) S-87-640, and Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA)-492-CAAB standard.

2.3. **Optical Requirements**.

2.3.1. **Optical Fiber.** Provide ITU G.652 single mode fiber optic cable with a core diameter of 8.3 ± 0.7 microns and a cladding diameter of 125 ± 0.7 microns. Provide optical fiber made of glass consisting of a silica core surrounded by concentric silica cladding, free of imperfections and inclusions.

2.3.2. **Core/Clad Concentricity.** Provide an offset between the center of the core and cladding less than 0.5 microns.

2.3.3. **Mode Field Diameter.** Provide single mode fiber optic cable with the effective area or Mode Field Diameter of the fiber must be 9.2 ± 0.4 µm at 1310 nm and 10.5 ± 1.0 µm at 1550 nm.

2.3.4. **Primary Coating.** Provide fiber with a coating diameter of 250 ± 15 microns.

2.3.5. **Attenuation.** Provide single mode fiber optic cable with nominal attenuation of 0.35 dB/km maximum at a wavelength of 1310 nm and nominal attenuation of 0.25 dB/km maximum at a wavelength of 1550 nm.

Attenuation at water peak must be less than 0.35 dB/km at 1383 nm.

2.3.6. **Bandwidth and Dispersion.** Provide single mode fiber optic cable with a maximum dispersion of:

- 3.2 ps/nm-km at a wavelength of 1310 nm, and
- 18 ps/nm-km at a wavelength of 1550 nm.

Zero dispersion wavelength must be between 1300 nm and 1324 nm and the zero dispersion slope at the zero dispersion wavelength must be less than 0.092 ps/($nm^2 \cdot km$).

The cutoff wavelength must be less than 1260 nm for single mode fibers specified to operate at 1310 nm. The cutoff wavelength must be less than 1480 for single mode fibers specified to operate only at 1550 nm or higher.

The macrobend attenuation per 100 turns must not exceed 0.05 dB at 1310 nm and 1550 nm.

2.3.7. **Mechanical Requirements(Tensile Strength).** Provide a cable withstanding a pulling tension of 600 lbf without increasing attenuation by more than 0.8 dB/mi when installing in underground conduit systems in accordance with EIA-455-33A. Conduct an impact test in accordance with TIA/EIA-455-25C (FOTP-25) and a compression load test in accordance with TIA/EIA-455-41A (FOTP-41).

For all-dielectric self-supporting cable (ADSS) and other self-supporting cables, meet tensile strength requirements in accordance with Section 25, Loading of Grades B and C, of National Electric Safety Code (NESC), for the maximum span and sag information as shown in the plans for aerial construction.

2.3.8. **Bend Radius.** Provide a cable withstanding a minimum bending radius of 10 times its outer diameter during operation, and 20 times its outer diameter during installation, removal and reinstallation without changing optical fiber characteristics. Test the cable in accordance with EIA-455-33A.

2.3.9. **Buffering.** Use a buffering tube or jacket with an outer diameter of 1.0 to 3.0 mm containing 12 individual fiber strands. The fibers must not adhere to the inside of the buffer tube.

2.3.10. **Color Coding.** Provide fiber and buffer tubes with a color coating applied to it by the manufacturer. Coating must not affect the optical characteristics of the fiber. Provide color configuration in accordance with TIA/EIA-598 as follows:

- 1. Blue
- 2. Orange
- 3. Green
- 4. Brown
- 5. Slate
- 6. White
- 7. Red
- 8. Black
- 9. Yellow
- 10. Violet
- 11. Rose
- 12. Aqua

3. EQUIPMENT

3.1. **Cable Type.** Provide cables with a reverse oscillation or planetary stranding structure.

Jacket construction and group configuration should separate at splice points to cut and splice 1 set of fibers while the others remain continuous. All cable jackets must have a ripcord to aid in the removal of the outer jacket. Submit cable designs for approval.

Strand loose buffer tubes around a dielectric central anti-buckling strength member. Provide dielectric aramid or fiber glass strength members with specified strength for the cable. Provide cable with a water-blocking material, which is non-hygroscopic, non-nutritive to fungus, non-conductive, non-toxic, and homogeneous. The water blocking material must comply with TIA/EIA-455-81B and 455-82B as well as TIA/EIA-455-98.

Ensure a polyethylene inner jacket is applied over the cable core, and that the entire cable is enclosed with a polyethylene outer jacket. Ensure the outer jacket contains black carbon to provide UV protection for the cable. Ensure each cable is marked with the manufacturer's name, the date of manufacture (month/year), the fiber count (example 48F SM), and sequential length markings at maximum 2 ft. increments, measured in U.S. units.

For aerial installation, provide standard fiber optic cable lashed to steel messenger cable or ADSS in accordance with the Institute of Electrical and Electronics Engineers (IEEE) 1222 Standard for Testing and Performance for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable for Use on Electric Utility Power Lines, or most current version. Provide ADSS cable in accordance with the maximum span distance, weather load rating, and allowable sag as shown on the plans. "Figure 8" self-supporting cable with integrated messenger cable within the outer jacket for aerial installation is acceptable.

3.1.1. **Cable Size.** Furnish cables with a maximum diameter not exceeding 19 mm.

3.1.2. **Environmental Requirements.** Provide cable that functions in a temperature range from -40°F to 158°F.

3.2. **Fiber Optic Accessories.**

3.2.1. **Splice Enclosures.** Furnish and install 1 of 3 types of underground splice enclosures at locations shown on the plans to accommodate the cables being spliced at that point. The types are as follows:

- Type 1: 4 cable entry ports total – 2 ports to accommodate backbone fiber of up to 144 fibers and 2 ports for drop cables of up to 48 fibers,
- Type 2: 6 cable entry ports total – 4 to accommodate backbone or arterial cables of up to 144 fibers and 2 ports for drop cables of up to 48 fibers, and
- Type 3: 8 cable entry ports total – 4 to accommodate backbone or arterial cables of up to 144 fibers and 4 ports for drop cables of up to 48 fibers.

Provide the end cap of the canister splice closure with re-enterable quick-seal cable entry ports to accommodate additional branch cables or backbone cables. Provide fiber optic splice enclosures with strain relief, splice organizers, and splice trays from the same manufacturer as the splice enclosure. Select the appropriate splice enclosure type based on the number of splices called for in the plans. Suspend all splice closures off floor of the ground box and secure to cable rack assembly on side wall of ground box.

For end of reel splicing, use a fiber optic splice enclosure sized to accommodate full cable splice in one enclosure. Fiber optic splice enclosure must be of the same manufacturer as other supplied on a project. Splice enclosure and fusion splicing required for end of reel will be incidental to the fiber optic cable.

Comply with the Telcordia Technologies' GR-711-CORE standard and all applicable NEC requirements.

Contain all optical fiber splices within a splice enclosure, providing storage for fiber splices, nonspliced fiber, and buffer tubes. Provide sufficient space inside the enclosure to prevent microbending of buffer tubes when coiled.

Ensure that the splice enclosure maintains the mechanical and environmental integrity of the fiber optic cable, encases the sheath opening in the cable, and organizes and stores optical fiber. Ensure all hinges and latching devices are stainless steel or of a non-corrosive material designed for harsh environments. Ensure that the enclosure is airtight and prevents water intrusion. Ensure that splice enclosures allow re-entry and are hermetically sealed to protect internal components from environmental hazards and foreign material such as moisture, dust, insects, and UV light.

3.2.2. **Field Rack Mount Splice Enclosures.** Provide a 19 in. EIA rack mounted splice enclosure module to hold spliced fibers as shown in the plans inside field equipment cabinets or buildings.

Splice or terminate fibers inside rack mounted fiber optic splice enclosures. Provide an enclosed unit designed to house a minimum of 4 cables, sized to accommodate at a minimum the cables shown on the plans plus future expansion.

Provide splice enclosures containing mounting brackets with a minimum of 4 cable clamps. Install cable according to manufacturer recommendations for the cable distribution panel.

3.2.3. **Fiber Patch Panels.** Provide fiber patch panels that are compatible with the fiber optic cable being terminated and color coded to match the optical fiber color scheme. Coil and protect a maintenance loop of at least 5 ft. of buffer tube inside the rack mount enclosure, patch panel, or splice tray. Allow for future splices in the event of a damaged splice or pigtail.

3.2.3.1. **Cabinet.** Terminate or splice fibers inside the compact and modular fiber patch panel in the cabinet. Provide fiber patch panel for installation inside a 19 in. EIA rack and sized appropriately to accommodate the fiber terminations shown on the plans or as directed by the Engineer. Provide each patch panel housing with pre-assembled compact modular snap-in simplex connector panel modules, each module having a minimum of 6 fiber termination/connection capabilities. Provide modules with a removable cover having 6 pre-connectorized fiber pigtails, interconnection sleeves, and dust caps installed by the manufacturer. Provide a 12 fiber or greater fusion splice tray capability housing, each tray holding 12 fusion splices as shown in the plans. Stack splice trays on a rack to permit access to individual trays without disturbing other trays. Locate splice trays in a rack within a pull-out shelf. Protect the housing with doors capable of pivoting up or down. Document the function of each terminated/spliced fiber, along with the designation of each connector on labels or charts located either on the inside or outside of the housing door. Provide labels or charts that are UV resistant design for harsh environments and used inside field equipment cabinets. Use permanent marker or method of identification that will withstand harsh environments. Provide each housing with strain relief. Terminate single mode fiber optic cable with SC connectors to the patch panels, unless otherwise shown on the plans.

Install the fiber patch panel as an integral unit as shown on the plans.

3.2.3.2. **Building.** Provide a fiber patch panel with a modular design allowing interchangeability of connector panel module housing and splice housing within the rack, as shown on the plans.

Provide the number of single mode fibers, connector panel module housings, and splice housings for the patch panel unit in the building as shown on the plans.

Provide a fiber patch panel unit, installed at a height less than 7 ft., capable of housing 8 connector panel module housings or 8 splice housings. Protect the housing with doors capable of pivoting up or down and sliding into the unit.

Provide 12 snap-in simplex connector panel modules with each connector panel module housing, each module having 6 fiber termination/connector capabilities. Use a pre-assembled compact modular unit with a removable cover for the snap-in simplex connector panel module having 6 pre-connectorized fiber pigtails, interconnection sleeves, and dust caps installed by the manufacturer. Provide each connector panel module housing with a jumper routing shelf, storing up to 5 ft. (minimum) of cable slack for each termination within the housing. Provide the fiber distribution unit with strain relief.

Provide splice enclosure with 24 fusion splice tray capabilities, each splice tray holding 12 or more fusion splices. Stack splice trays on a rack to permit access to individual trays without disturbing other trays. Locate the rack on a pull-out shelf.

Document the function of each terminated/spliced fiber, along with the designation of each connector on labels or charts located either on the inside or outside of the housing door. Provide labels or charts that are UV resistant design for harsh environments and used inside field equipment cabinets. Use permanent marker or method of identification that will withstand harsh environments. Also provide documentation of the function of each terminated or spliced fiber along with the designation of each connector on charts or

diagrams matching the fiber patch panel configuration and locate inside cabinet document drawer. Provide documentation at the conclusion of fiber terminations and splicing.

Allow terminations only in the fiber interconnect housings placed in the cabinets as shown on the plans or as directed.

3.2.4. **Splice Trays**. Use splice tray and fan-out tubing kit for handling each fiber. Provide a splice tray and 12 fiber fan-out tubing with each housing for use with the 250 microns coated fiber. The fan-out will occur within the splice tray (no splicing of the fiber required). Allow each tube to fan out each fiber for ease of connectorization. Label all fibers in splice tray on a log sheet securing it to the inside or outside of the splice tray. Provide UV resistant log sheet suitable for harsh environments, located inside field cabinets or splice enclosures. Provide fan-out tubing with 3 layers of protection consisting of fluoropolymer inner tube, a dielectric strength member, and a 2.9 mm minimum outer protective PVC orange jacketing.

3.2.5. **Jumpers.** Provide fiber optic jumper cables to cross connect the fiber patch panel to the fiber optic transmission equipment as shown on the plans or as directed. Match the core size, type, and attenuation from the cable to the simplex jumper. Use yellow jumpers and provide strain relief on the connectors. Provide fiber with a 900 micron polymer buffer, Kevlar strength member, and a PVC jacket with a maximum outer jacket of 2.4 mm in diameter.

Provide 5 ft. long jumpers, unless otherwise shown on the plans. On the patch panel end of each jumper, provide an SC connector. On the opposite end of the jumper, provide a connector that is suitable to be connected to the fiber optic transmission equipment selected. When providing jumpers for existing equipment, provide connectors suitable to be connected to patch panels and fiber optic transmission equipment in use. All jumpers must have factory terminated connectors. Field terminations of connectors is prohibited.

3.2.6. **Fiber Optic Cable Storage Device.** Furnish fiber optic cable storage device designed to store slack fiber optic cable by means of looping back from device to device on an aerial run. Furnish storage devices that are non-conductive and resistant to fading when exposed to UV sources and changes in weather. Ensure storage devices have a captive design such that fiber-optic cable will be supported when installed in the aerial rack apparatus and the minimum bending radius will not be violated. Provide stainless steel attachment hardware for securing storage devices to messenger cable and black UV resistant tie-wraps for securing fiber-optic cable to storage device. Provide tie-wraps that do not damage fiber when securing to storage device. Ensure storage devices are stackable so multiple cable configurations are possible. Ensure cable storage devices furnished are compatible with the type of aerial cable furnished and installed. Aerial cable storage devices will be considered incidental to the installation of the fiber optic cable.

4. CONSTRUCTION

Install fiber optic cable in accordance with United States Department of Agriculture Rural Utilities Service CFR 1755.900 specifications for underground and aerial plant construction without changing the optical and mechanical characteristics of the cables.

Utilize available machinery, jacking equipment, cable pulling machinery with appropriate tension monitors, splicing and testing equipment, and other miscellaneous tools to install cable, splice fibers, attach connectors and mount hardware in cabinets employed with the above “Mechanical Requirements.” Do not jerk the cable during installation. Adhere to the maximum pulling tensions of 600 lbf and bending radius of 20 times the cable diameter or as specified by the manufacturer, whichever is greater.

Use installation techniques and fixtures that provide for ease of maintenance and easy access to all components for testing and measurements. Take all precautions necessary to ensure the cable is not damaged during transport, storage, or installation. Protect as necessary the cables to prevent damage if being pulled over or around obstructions along the ground.

Where plans call for removal of existing cable to salvage or reuse elsewhere, take care to prevent damaging the existing cable during removal adhering to all of the requirements for installation that pertain to removal.

4.1. **Packaging, Shipping, and Receiving.** Ensure the completed cable is packaged for shipment on reels. Ensure the cable is wrapped in weather and temperature resistant covering. Ensure both ends of the cable are sealed to prevent the ingress of moisture.

Securely fasten each end of the cable to the reel to prevent the cable from coming loose during transit. Provide 6 ft. of accessible cable length on each end of the cable for testing. Ensure that the complete outer jacket marking is visible on these 6 ft. of cable length. Provide each cable reel with a durable weatherproof label or tag showing the Manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. Include a shipping record in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information. Ensure that all cable delivered has been manufactured within 6 mo. of the delivery date. Ensure that the minimum hub diameter of the reel is at least 30 times the diameter of the cable. Provide the cable in one continuous length per reel with no factory splices in the fiber. Provide a copy of the transmission loss test results as required by the TIA/EIA-455-61 standard, as well as results from factory tests performed prior to shipping.

4.2. **Installation in Conduit.** Install fiber optic cable in conduits in a method that does not alter the optical properties of the cable. If required, relocate existing cable to allow new fiber optic cable routing in conduits.

When pulling the cable, do not exceed the installation bending radius. Use rollers, wheels, or guides that have radii greater than the bending radius. Use a lubricating compound to minimize friction. Use fuse links and breaks to ensure that the cable tensile strength is not exceeded. Measure the pulling tension with a mechanical device and mechanism to ensure the maximum allowable pulling tension of 600 lbf is not exceeded at any time during installation.

Provide a single 1/C #14 XHHW insulated tracer wire in conduit runs where fiber optic cable is installed. Provide cable that is UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation and with a voltage rating of 600V. When more than one fiber optic cable is installed through a conduit run, only one tracer wire is required. Fuse or join tracer wires used in backbone, arterial, and drop runs, so that you have one continuous tracer wire. Terminate tracer wire at fiber optic test markers or equipment cabinets as identified in the plans for access to conduct a continuity test. Tracer wire will be paid for under Item 620, "Electrical Conductors."

Provide flat pull cord with a minimum tensile strength of 1,250 lb. in each conduit containing fiber optic cable. A traceable pull cord, with a metallic conducting material integral to the pull cord, may be substituted for a 1/C #14 tracer wire only with approval from the Department.

Seal conduit ends with a 2 part urethane after installation of fiber optic cable.

4.3. **Cable Installation between Pull Boxes and Cabinets or Buildings.** Do not break or splice a second fiber optic cable to complete a run when pulling the cable from the nearest ground box to a cabinet or building. Pull sufficient length of cable in the ground box to reach the designated cabinet or building. Pull the cable through the cabinet to coil, splice, or terminate the cable in the cabinet or building. Do not bend the cable beyond its minimum bend radius of 20 times the diameter.

Coil and tie cable inside cabinet, building, or boxes for future splicing or termination as shown in the plans. Cut off and remove the first 10 ft. of pulled or blown fiber stored. This work is incidental to this Item. Coat the open end of the coiled cable with protective coating and provide a dust cap.

4.4. **Aerial Installation.** Use pole attachment hardware and roller guides with safety clips to install aerial run cable. Maintain maximum allowable pulling tension of 600 lb. ft. during the pulling process for aerial run cable by using a mechanical device. Do not allow cable to contact the ground or other obstructions between poles during installation. Do not use a motorized vehicle to generate cable pulling forces. Use a cable suspension

clamp when attaching cable tangent to a pole. Select and place cable blocks and corner blocks so as not to exceed the cable's minimum bending radius. Do not pull cable across cable hangers. Store 100 ft. of fiber-optic cable slack, for future use, on all cable runs that are continuous without splices or where specified on the plans. Store spare fiber optic cable on fiber-optic cable storage racks of the type compatible with the aerial cable furnished. Locate spare cable storage in the middle of spans between termination points. Do not store spare fiber-optic cable over roadways, driveways or railroads.

Install standard cable on timber poles by lashing to steel messenger cable. Provide steel messenger cable in accordance with Item 625, "Zinc Coated Steel Wire Strand." Install all-dielectric self-supporting cable (ADSS) cable on timber poles using clinching clamp with cable hanger. Install aerial run cable in accordance with these specifications and as shown on the plans.

Locate aerial fiber in accordance with the NESC, Section 23, with respect to vertical clearances over the ground, between conductors carried on different supporting structures, and required separation distance of the cable from bridges, buildings, and other structures.

4.5. **Blowing Fiber Installation.** Use either the high-air speed blowing (HASB) method or the piston method. When using the HASB method, ensure that the volume of air passing through the conduit does not exceed 600 cu. ft. per min.or the conduit manufacturer's recommended air volume, whichever is more restrictive. When using the piston method, ensure that the volume of air passing through the conduit does not exceed 300 cu. ft. per min.or the conduit manufacturer's recommended air volume, whichever is more restrictive.

4.6. **Slack Cable**. Pull and store excess cable slack inside ITS ground boxes as shown on the plans. The following are minimum required lengths of slack cable, unless otherwise directed:

- ground boxes (No Splice) - 25 ft.,
- ground boxes (With Splice) - 100 ft.,
- future splice point - 100 ft., and
- cabinets - 25 ft.

Note that the slack is to be equally distributed on either side of the splice enclosure and secured to cable storage racks within the ground boxes.

Provide proper storage of slack cable, both long term and short term. Neatly bind cables to be spliced together from conduit to splice enclosure with tape. Do not over bind by pinching cable or fiber. Ground and bond the armor when installing armored fiber optic cable. Meet NEC and NESC requirements for grounding and bonding when using armored cable.

4.7. **Removal, Relocation and Reinstallation of Fiber Optic Cable.** Remove fiber optic cable from conduit as shown on plans. Use care in removing existing fiber optic cables so as not to damage them. Provide cable removal and reinstallation procedures that meet the minimum bending radius and tensile loading requirements during removal and reinstallation so that optical and mechanical characteristics of the existing cables are not degraded. Use entry guide chutes to guide the cable out of and in to existing or proposed conduit, utilizing lubricating compound where possible to minimize cable-to-conduit friction. Use corner rollers (wheels) with a radius not less than the minimum installation bending radius of cable. Dispose of removed fiber optic cable unless plans show for it to be re-used (relocated/re-installed) or salvaged and delivered to the Department. See plans for details. Test each optical fiber in the cable for performance and for loss at existing terminations or splices prior to cutting and removal. Retest following removal and following re-installation to ensure the removal and reinstallation has not affected the optical properties of the cable. Any fiber optic cable damaged by the contractor that is to be re-used shall be replaced by the contractor at no cost to the Department with new fiber optic cable meeting the approval of the Engineer. The Engineer reserves the right to reject the fiber based on the test results.

Maintain the integrity of existing cables, conduit, junction boxes and ground boxes contiguous to the section of cables to be removed. Replace or repair any cables, conduit, junction boxes or ground boxes damaged during work at the Contractor's expense. The replacement or repair method must be approved by the Engineer, prior to implementation.

4.8. **Splicing Requirements.** Fusion splice fibers as shown on the plans, in accordance with TIA/EIA-568 and TIA/EIA-758.

Use fusion splicing equipment recommended by the cable manufacturer. Clean, calibrate, and adjust the fusion splicing equipment at the start of each shift. Use splice enclosures, organizers, cable end preparation tools, and procedures compatible with the cable furnished. Employ local injection and detection techniques and auto fusion time control power monitoring to ensure proper alignment during fusion splicing.

When approaching end of shift or end of day, complete all splicing at the location. Package each spliced fiber in a protective sleeve or housing. Re-coat bare fiber with a protective 8 RTV, gel or similar substance, prior to application of the sleeve or housing.

Perform splices with losses no greater than 0.10 dB. Use an Optical Time Domain Reflectometer (OTDR) to test splices in accordance with Section 4.13.1.1. Record splice losses on a tabular form and submit for approval.

4.9. **Termination Requirements.** Provide matching connectors with 900 micron buffer fiber pigtails of sufficient length and splice the corresponding optical fibers in cabinets where the optical fibers are to be connected to terminal equipment. Buffer, strengthen, and protect pre-terminated fiber assemblies (pigtails) with dielectric aramid yarn and outer PVC jacket to reduce mishandling that can damage the fiber or connection. Pigtails must be duplex stranding with a yellow PVC outer jacket. Fiber optic pigtails must be factory terminated with SC connectors, unless otherwise shown on the plans. When providing pigtails for existing equipment, provide connectors suitable to be connected to patch panels and fiber optic transmission equipment in use.

Connectors must meet the TIA/EIA-568 and TIA/EIA-758 standards and be tested in accordance to the Telcordia/Bellcore GR-326-CORE standard. When tested according to TIA/EIA-455-171 (FOTP-171), ensure that the connectors test to an average insertion loss of less than or equal to 0.4 dB and a maximum loss of less than or equal to 0.75 dB for any mated connector. Maintain this loss characteristic for a minimum of 500 disconnections and reconnections with periodic cleanings per EIA-455-21A (FOTP-21). Qualify and accept connectors by the connector-to-connector mating using similar fibers. Ensure that the connector operating range is -40ºF to 167ºF. Provide connectors with a yellow color body or boot.

Test connections at the patch panel and splices made between cables to pigtails with the OTDR to verify acceptable losses.

Remove 5 ft. of unused optical fibers at the ends of the system from the buffer tube(s) and place coiled fibers into a splice tray. Clean the water blocking compound from all optical fibers destined for splice tray usage.

Install cable tags at all splice points identifying key features of each cable such as cable name or origin and destination and fiber count. Ensure tags are self-laminating or water resistant. Print the information onto the tags electronically or write neatly using a permanent marker. Locate tags just prior to entrance into splice enclosure.

4.10. **Mechanical Components.** Provide stainless steel external screws, nuts and locking washers. Do not use self-tapping screws unless approved. Provide corrosion resistant material parts and materials resistant to fungus growth and moisture deterioration.

4.11. **Experience Requirements**.

4.11.1. **Installing Fiber Optic Cable.** The Contractor or designated subcontractor involved in the installation of the fiber optic cable must meet the experience requirements in accordance with the following:

- minimum of 3 yr. of continuous existence offering services in the installation of fiber optic cable through an outdoor conduit system or aerial and terminating in ground boxes, field cabinets or enclosures or buildings, and

- completed a minimum of 3 projects where the personnel pulled a minimum of 5 mi. in length of fiber optic cable through an outdoor conduit system of aerial for each project. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 yr.

4.11.2. **Splicing and Testing of Fiber Optic Cable.** The Contractor or designated subcontractor involved in the splicing and testing of fiber optic cable must meet the experience requirements in accordance with the following:

4.11.2.1. **Minimum Experience**. 3 yr. continuous existence offering services in the fields of fusion splicing and testing of fiber optic cable installed through a conduit system and terminating in ground boxes, field cabinets or enclosures or buildings. Experience must include all of the following:

- termination of a minimum of 48 fibers within a fiber distribution frame,
- OTDR testing and measurement of end to end attenuation of single mode and multimode fibers,
- system troubleshooting and maintenance,
- training of personnel in system maintenance,
- use of water-tight splice enclosures, and
- fusion splicing of fiber optic cable which meet the tolerable decibel (dB) losses within the range of 0.05 dB – 0.10 dB for single mode.

4.11.2.2. **Completed Projects**. A minimum of 3 completed projects where the personnel performed fiber optic cable splicing and terminations, system testing, system troubleshooting and maintenance during the course of the project and provided training on system maintenance. Each project must have consisted of a minimum 5 mi. of fiber optic cable installed, measured by project length not linear feet of fiber installed. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 yr.

4.12. **Documentation Requirements.** Provide a minimum of 2 complete sets of fiber optic equipment submittal literature documenting compliance with the requirements of this Item including operation and maintenance manuals in hard copy format, bound, as well as an electronic version in Adobe PDF format on a CD/DVD or removable flash drive that includes the following:

- fiber optic cable literature consisting of manufacturer specification and cut sheets,
- fiber optic equipment literature consisting of manufacturer specification and cut sheets for splice enclosures, patch panels, splice trays, jumpers, cable storage devices, and fiber optic labeling devices,
- complete factory performance data documenting conformance with the performance and testing standards referenced in this Item, including pre-installation test results of the cable system,
- installation, splicing, terminating and testing plan and procedures,
- documentation of final terminated or spliced fibers, function, and equipment designation,
- OTDR calibration certificate,
- post-installation, post termination, subsystem, and final end-to-end test results,
- loss budget calculation and documentation,
- complete parts list including names of vendors,
- complete maintenance and trouble-shooting procedures, and
- proof of minimum experience and completed projects.

4.12.1. **Installation Practice**. Submit for approval electronic copy of the Contractors Installation Practices 30 working days prior to installation. Submit installation practices and procedures and a list of installation, splicing and test equipment used. Provide detailed field quality control procedures and corrective action procedures.

4.12.2. **Manufacturer's Certification.** Accompany each reel of fiber optic cable with the manufacturer's test data showing the conformance to the requirements in this Item.

4.12.3. **Test Procedures.** Submit test procedures and data forms for the pre-installation, post-installation, subsystem, final end to end test, and loss budget calculations for approval. Test procedures will require

approval before performing tests. Submit 1 copy data forms containing data and quantitative results, as well as an authorized signature. Submit a copy of the OTDR results as a hard copy or electronic copy in PDF format including all OTDR traces and clearly identifying each event (fusion splice, jumper, connector, etc.) with the measured loss identified.

4.13. **Testing.** Perform tests in accordance with testing requirements in this Item, USDA RUS CFR 1755.900, and TIA/EIA-455-61 test specifications. For all tests, provide test forms to be used that compare measured results with threshold values.

4.13.1. **Test Methods**.

4.13.1.1. **Optical Time Domain Reflectometer (OTDR) Tests.** Use the OTDR to measure fiber optic cable for overall attenuation (signal loss dB/km), fiber cable length, and identify fiber optic cable anomalies such as breaks. Perform the following 4 OTDR tests:

- pre-Installation test (Acceptance test),
- post installation test,
- post termination test, and
- final end to end test.

OTDR Settings:

- generate a file name for each OTDR scan. The file name must indicate the location or direction the test was run from, as well as the fiber number being tested,
- set the “A” cursor at the beginning of the fiber trace and set the “B” cursor at the end of the fiber trace. The distance to cursor “B” indicates the length of the fiber cable segment being measured,
- match the index of refraction to the index of the factory report,
- set the loss indicator to dB/km for the acceptance test,
- the reflectance is automatically set internally by the OTDR,
- set the pulse width at a medium range. Change the pulse width to a slow pulse width when an anomaly occurs on the fiber trace so that it can be examined closely,
- set the average at medium speed. Change the average to slow when an anomaly appears on the fiber trace to allow for closer examination of the anomaly, and
- set wavelength at 2 windows for single mode cable: 1310 nm and 1550 nm.

Provide the current OTDR calibration certificate for the device used, showing the unit has been calibrated within the last year. Show all settings on test result fiber scans.

4.13.1.2. **Pre-installation Tests.** Test and record the fiber optic cable at the site storage area prior to installation.

Conduct bi-directional OTDR tests for each fiber strand. Test each optical fiber in the cable from one end with an OTDR compatible with wavelength and fiber type. Check testing for length, point discontinuity, and approximate attenuation. Record each measurement by color, location, and type of fiber measured. Perform a measurement from the opposite end of that fiber in case a measurement cannot be made from one end. Wait for notification if loss per kilometer exceeds manufacturer’s test data by more than 0.5 dB/km or point discontinuity greater than 0.05 dB.

Perform this test within 5 days from receipt of the fiber optic cable. Test overall attenuation (dB/km), total cable length, anomalies, and cable problems. Test cable at both wavelengths (1310 nm and 1550 nm for single mode cable). Verify that the cable markings on the outer jacket are within 1% of the total cable length.

Compare factory test results with test results and return to manufacturer if test results are not identical to factory test results. If identical, document the test results. Deliver documentation for future reference.

4.13.1.3. **Post-installation Tests.** Re-test and re-record each optical fiber in the cable after installation, before termination, for loss characteristics. Test both directions of operations of the fiber.

Immediately perform the post installation test after the fiber optic cable has been installed. Test cable for overall attenuation, cable segment length, and evidence of damage or microbend with the OTDR. Replace any cable segment that is damaged during the test and document test results. Submit test results for approval.

Use the same OTDR settings for Post-Installation Tests as the Pre-Installation Tests.

4.13.1.4. **Post Termination Tests.** Perform the post termination test after the cable is terminated or spliced, including termination of fiber cable to fiber cable or fiber cable to fiber pigtail and fiber cable to patch panels. Check attenuation, fusion or termination point problems, and overall fiber cable segment. Determine if the attenuation and quality of the termination complies with these Specifications; if not, re-terminate the fiber and re-test until the Specification requirements are met. Test the fiber segment for attenuation and anomalies after termination acceptance. Document and submit test results after fiber segment acceptance.

4.13.1.5. **Subsystem Tests.** Perform network subsystem tests after integration to the fiber optic network. Test the capability of the fiber optic cable to transmit video and digital information from node to node. A node is defined as a communication cabinet, hub cabinet, surveillance cabinet, or hub building where network hub switches are located. Complete and submit approved data forms for approval.

Correct and substitute components in the subsystem if the subsystem tests fail and repeat the tests. Components may include: cable, jumper, patch panel module, or connector.

Prepare and submit a report if a component was modified as result of the subsystem test failure. Describe in the report the failure and action taken to remedy the situation.

4.13.1.6. **Final End-to-End Test.** Perform final end to end Test after fiber cable segments of the system are terminated using the OTDR and an optical Power Meter and Light Source (PMLS).

Perform the Part 1 of the final end to end test using OTDR:

- measure the overall fiber cable system length,
- measure the overall system attenuation, and
- check for anomalies.

Perform the Part 2 of the final end to end test using a PMLS:

- measure the absolute power of the fiber optic signal across all links, and
- check for anomalies.

Document and submit results after test acceptance.

4.13.2. **Loss Budget Calculation and Documentation.** Calculate the total loss budget of the system according to the following calculations and compare the actual loss in each segment of the system to the calculated budget. Submit the results for each section of fiber optic cable in tabular format reporting if the total loss is within the limits of these Specifications by noting “pass” or “fail” for each segment of fiber. A segment of fiber is defined as one that terminates at each end. Use the following calculations to determine the loss budget for each segment:

- splice loss budget = number of splices x 0.1 dB/splice,
- connector loss budget = number of connectors x 0.75 dB/connector,
- length loss budget = length of fiber optic cable (measured by OTDR) x 0.35 dB/km for 1310 nm wavelength or 0.25 dB/km for 1550 nm wavelength, and
- total Loss Budget = splice loss budget + connector loss budget + length loss budget.

Provide loss budget calculation equations on test form to be submitted as part of the documentation requirements. Provide threshold calculations described above along with measured results.

4.14. **Training.** Conduct a BISCI or IMSA certified training class (minimum of 16 hr.) for up to 10 representatives designated by the Department on procedures of installation, operations, testing, maintenance and repair of all equipment specified within this specification. Submit to the Engineer for approval, 10 copies of the training material at least 30 days before the training begins. Conduct training within the local area unless otherwise authorized by the Engineer Include the following training material:

- NESC, NEC, and ANSI/TIA 590 code compliance,
- fiber optic cable pulling and installation techniques,
- use of installation tools,
- splicing and terminating equipment and test instruments,
- trouble shooting procedures, and
- methods of recording installation and test data.

4.15. **Warranty.** Provide a warranty for all materials furnished in this Item. Ensure that the fiber optic cable, the splice enclosures, splice centers, and cable markers have a minimum of a 2 yr. manufacturer's warranty and that 95% of that warranty remains at the date of final acceptance by the Engineer. If the manufacturer's warranties for the components are for a longer period, those longer period warranties will apply. Guarantee that the materials and equipment furnished and installed for this project performs according to the manufacturer's specifications.

Ensure that the manufacturer's warranties for off-the-shelf equipment consisting of splice enclosures, splice trays, connectors, fiber jumper cables, and fiber patch panels are fully transferable from the Contractor to the Department. Ensure that these warranties require the manufacturer to furnish replacements for any off-the-shelf part or equipment found to be defective during the warranty period at no cost to the Department within 10 calendar days of notification by the Department.

Ensure that the manufacturer's warranty for fiber optic cable is fully transferable from the Contractor to the Department. Ensure that the warranty requires the manufacturer to furnish replacement fiber optic cable found to be defective during the warranty period at no cost to the Department within 45 calendar days of notification by the Department.

5. MEASUREMENT

Fiber optic cable installed, relocated and removed will be measured by the linear foot. Fiber optic splice enclosures, rack mounted splice enclosures and fiber optic patch panels will be measured by each unit installed. Splicing of Fiber Optic Cables will be measured by each fusion splice performed.

6. PAYMENT

6.1. **Furnish and Install.**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fiber Optic Cable" of the various types, and number of fibers specified. This price is full compensation for furnishing and installing all cable; for pulling through conduit or duct; aerial installation; terminating; testing; and for materials, equipment, labor, tools, documentation, warranty, training and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fiber Optic Splice Enclosure" of the various types and "Rack Mounted Splice Enclosure." This price is full compensation for furnishing and installing all enclosures whether aerial, underground, in cabinet or in building; and for materials, equipment, labor, tools, documentation, warranty, training and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fiber Optic Fusion Splice" for each fusion splice

shown on the plans and performed. This price is full compensation for splicing; testing; and for materials, equipment, labor, tools, documentation, warranty, training and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fiber Patch Panel" of the various types and sizes specified. This price is full compensation for furnishing and installing all patch panels and terminating fibers on the panel as shown on the plans; and for materials, equipment, labor, tools, documentation, warranty, training and incidentals.

Conduit will be paid for under Item 618, "Conduit" and Special Specification 6016, "ITS Multi-Duct Conduit."

Electrical conductors will be paid for under Item 620, "Electrical Conductors."

6.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "Fiber Optic Cable (Install Only)" of the various types, and number of fibers specified. This price is full compensation for installing fiber optic cable furnished by the Department; for pulling through conduit or duct; aerial installation; terminating; testing; and for materials, equipment, labor, tools, documentation, warranty, training and incidentals.

Conduit will be paid for under Item 618, "Conduit" and Special Specification 6016, "ITS Multi-Duct Conduit."

Electrical conductors will be paid for under Item 620, "Electrical Conductors."

6.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Relocate Fiber Optic Cable." This price is full compensation for relocating all cable, regardless of cable size; for pulling through conduit or duct; aerial installation; terminating; testing; and for materials, equipment, labor, tools, documentation, and incidentals.

6.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Remove Fiber Optic Cable". This price is full compensation for removing all cable for salvage, regardless of cable size; testing; returning to the Department; and for materials, equipment, labor, tools, documentation, and incidentals.

Special Specification 6008

Intelligent Transportation System (ITS) Ground Mounted Cabinet

1. DESCRIPTION

Furnish, fabricate, deliver, install, and test Intelligent Transportation System (ITS) ground mounted cabinets of the various types and sizes at locations shown on the plans, or as directed.

1.1. **ITS Ground Mounted Cabinet Application.** Provide ITS ground mounted cabinet to house ITS field equipment as shown on the plans, or as directed. ITS equipment applications inside the cabinet may include, but are not limited to:

- radar vehicle sensing device (RVSD),
- wireless Ethernet radio,
- closed circuit television (CCTV) field equipment,
- bluetooth reader,
- automatic vehicle identification (AVI),
- loop detection equipment,
- dynamic message sign (DMS) equipment,
- DMS controller,
- lane control signal (LCS) controller units,
- drop/insert multiplexor/demultiplexor,
- data fiber optic transceivers,
- modular fiber distribution housing,
- subrate data multiplexor distribution panel,
- ramp meter control panel,
- fiber optic video transmitter,
- fiber optic splice trays,
- CCTV color video compression system (CVCS),
- solar power assembly,
- Environmental Sensor Station (ESS),
- highway advisory radio (HAR),
- terminal servers,
- surge arrestors,
- hardened ethernet switches, and
- codecs.

Provide each cabinet complete with all internal components, back and side panels, terminal strips, harnesses, and connectors. Provide all mounting hardware necessary to provide for installation of equipment as described in this Specification. Typically, an ITS ground mounted cabinet may contain, but is not limited to the following:

- 19-in. EIA racks,
- adjustable shelves,
- fan and thermostat assemblies,
- cabinet lights,
- power distribution panel, (as required on the plans or as directed),
- right or left side panel (as required on the plans or as directed),

- surge protection,
- terminal strips,
- interconnect harnesses with connectors,
- laptop shelf and slide out drawer with telescoping drawer guides “door open” connection to back panel,
- ITS equipment hardware (as listed in Article 2.1), and
- all necessary installation and mounting hardware.

Ensure all cabinets are identical in size, shape and quality for each type as provisioned in the plans or as directed. Equip and configure the cabinet set-up as defined in this Specification and as detailed in the ITS ground mounted cabinet standards.

Submit details of the cabinet design and equipment layout for each cabinet to the Engineer for review and approval prior to fabrication.

Ensure the equipment, design, and construction use industry standard techniques with a minimum number of different parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Design equipment for ease of maintenance. Component parts must be readily accessible for inspection and maintenance. Tools and test instruments required for maintenance by maintenance personnel must be simple hand held tools, basic meters and oscilloscopes.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 421, “Hydraulic Cement Concrete”
- Item 440, “Reinforcing Steel”
- Item 449, “Anchor Bolts”
- Item 618, “Conduits”
- Item 620, “Electrical Conductors”
- Item 656, “Foundations for Traffic Control Devices,” and
- Item 740, “Graffiti Removal and Anti-Graffiti Coating”.

2.1. **Electrical Requirements.**

2.1.1. **Primary Input Power Interruption.** Use material that meets all the requirements in Section 2.1.4., “Power Interruption” of the National Electrical Manufacturers Association (NEMA) Standard TS2 for Traffic Control System, or most current version.

2.1.2. **Power Service Transients.** Use material that meets all the requirements in Section 2.1.6., “Transients” of the National Electrical Manufacturers Association (NEMA) Standard TS 2 for Traffic Control System, or most current version.

2.1.3. **Power Service Protection.** Ensure that equipment contains readily accessible, manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide circuit breakers or fuses sized such that no wire, component, connector, PC board or assembly is subjected to sustained current in excess of their respective design limits upon failure of any single circuit element or wiring.

2.1.4. **Power Distribution Panel.** Provide cabinets with a 120 VAC +/- 5 VAC power distribution panel. Provide the following components on the panel:

2.1.4.1. **Duplex Receptacles.** Provide two 120 VAC NEMA Type 5-15R duplex receptacles, or as shown on the plans, protected by a circuit breaker. Permanently label duplex receptacles “For Internal ITS Equipment

Only." Install duplex receptacles in an isolated location and provide a clear 1/8 in. thick removable cover made from transparent thermoplastic material to cover the duplex receptacles. Ensure this cover is installed as not to interfere with the functional operation within the cabinet and allows enough space to plug in AC adapters and any necessary equipment. Submit alternative cover material for approval as part of the documentation submittal requirement.

2.1.4.2. **Ground Fault Circuit Interrupter (GFCI) Duplex Receptacles.** Provide at least one 120 VAC NEMA Type 5-15R GFCI duplex receptacle, or as shown on the plans, protected by a circuit breaker. This GFCI duplex receptacle is intended for maintenance personnel and is not to be used to serve equipment inside the cabinet. Permanently label GFCI duplex receptacles "For Personnel Use." Install GFCI duplex receptacles in a readily accessible location.

Provide a 120 VAC, rack mountable outlet strip with 6 NEMA Type 5-15R receptacles with surge suppression. Plug outlet strip into GFCI duplex receptacle and label for personnel use.

Circuit Breakers. Determine the ampere rating, quantity, and configuration for main, accessory, spare, and equipment circuit breakers to support ITS equipment loads as shown on the plans. Provide Underwriters Laboratories (UL) 489 listed circuit breakers capable of operating in accordance with Section 2, "Environmental Standards and Test Procedures" of NEMA TS2-2003, or most current version. Provide circuit breakers with an interrupt capacity of 5,000 A. and insulation resistance of 100 megohms at 500 VDC. Provide minimum ampere rating for the following circuit types:

2.1.4.2.1. **Main Breaker.** Size the main circuit breaker such that the load of all branch circuits is less than the main circuit breaker ampere rating in accordance with the most current version of the National Electrical Code (NEC).

2.1.4.2.2. **Accessory Breaker.** Minimum 15 A. Size accessory circuit breaker to protect lighting, door switches, fans, and GFCI duplex receptacle in accordance with the most current version of the NEC.

2.1.4.2.3. **Equipment Breakers.** Minimum 15 A. Size equipment breaker to protect ITS equipment and duplex receptacles in accordance with the most current version of the NEC.

2.1.4.2.4. **Spare Equipment Breaker.** Minimum 20 A. Provide one spare equipment breaker for future use.

Furnish breakers, which are in addition to any auxiliary fuses, with the electronic equipment to protect component parts. Provide 3-terminal lightning arrestor to protect the load side of all circuit breakers. Connect the arrestor into the circuit with size 8 AWG or larger stranded copper conductors. Connect arrestor to the line filter as recommended by the manufacturer.

2.1.4.3. **Power Line Surge Protection.** Provide and install power line surge protection devices that meet the requirements of Article 2.4.1.

2.1.4.4. **Power Cable Input Junction Terminals.** Provide power distribution blocks suitable for use as a power feed and junction points for 2 and 3 wire circuits. Accommodate up to No. 4 AWG conductors on the line side of each circuit. Provide appropriate sized lugs at the junction terminals for conductors larger than a No. 4 AWG when shown on the plans.

Electrically isolate the AC neutral and equipment ground wiring from the line wiring by an insulation resistance of at least 10 megohms when measured at the AC neutral. Color code the AC neutral and equipment grounding wiring white and green respectively in accordance with the most current version of the NEC.

Utilize the back panel to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment called out on the plans. Each item of equipment including any furnished by the Department must have the cable harness properly terminated at terminal boards on the back panel. Ensure all functions available at the equipment connector are carried in the connector cable harness to the terminal blocks from the power distribution panel mounted on the left side panel of the cabinet.

2.1.5. **Right Side Panel.** When shown on the plans, for a required ITS application, provide fully wired loop input distribution panel to be mounted on the lower right inside wall when facing the front inside of the door opening of the cabinet. Provide a detailed layout for approval by the Engineer. Provide a panel with the following:

2.1.5.1. **Power Distribution.** If any 115 VAC power is needed on the right side panel, it will be obtained from the power distribution terminal board located on the left side panel, which is fed from the equipment circuit breaker located on the left side panel.

2.1.5.2. **Loop Surge Protection.** Mount surge protection for incoming loop pairs on the right side panel.

2.1.6. **Back Panel.** When shown on the plans, for a required ITS application, provide cabinet with a fully wired equipment panel to be mounted on the lower rear inside wall of the cabinet. Provide a detailed layout for approval by the Engineer. Panel to include detector terminal boards to accommodate equipment shown on the plans or as directed.

2.1.7. **Alternative Power Option.** When shown on the plans, accommodate renewable electrical power source for the design load specified in accordance with "ITS Solar Power System" Specification. Renewable electrical power source may, or may not, be integrated with public utility electrical services, as shown on the plans or as directed. Accommodate solar system components including batteries and solar charge controller.

2.1.8. **Wiring.** Ensure all cabinet wiring identified by the use of insulated pre-printed sleeving slipped over the wire before attachment of the lug or making the connection. Supply enough text on wire markers in plain words or abbreviations with sufficient level of detail so that a translating sheet will not be required to identify the type and size of wire.

Cut all wires to the proper length before assembly. Ensure no wires are doubled back to take up slack. Ensure harnesses to connectors are covered with braided cable sleeves. Secure cables with nylon cable clamps.

Provide service loops to facilitate removal and replacement of assemblies, panels, and modules. Use insulated parts and wire rated for at least 600 V. Color-code harnesses and wiring.

Route and bundle all wiring containing line voltage AC separately or shield from all low voltage, i.e., control circuits. Cover all conductors and live terminals or parts, which could be hazardous to maintenance personnel, with suitable insulating material.

Provide AC internal cabinet wiring identified in accordance with the most current version of the NEC. Provide white insulated conductors for AC common. Provide green insulated conductors for equipment ground. Provide any color different from the foregoing on other conductors in accordance with the most current version of the NEC. For equipment that requires grounding, provide ground conductors and do not use conduit for grounding. Provide No. 22 AWG or larger stranded conductors for internal cabinet wiring. Provide conductors that are UL-listed THHN in accordance with the most current version of the NEC. Ensure the insulation has at least a thickness of 10 mm. Ensure all wiring containing line voltage is at least size No. 14 AWG. No strands of any conductor may be trimmed to "fit" the wiring into the breaker or terminal block.

2.1.9. **Terminal Strips.** Provide terminal strips located on the back panel that are accessible to the extent that it is not necessary to remove the electronic equipment from the cabinet to make an inspection or connection.

Ensure terminal blocks are 2 position, multiple pole barrier type.

Provide shorting bars in each of the positions provided, along with an integral marking strip.

Arrange terminal blocks such that they will not upset the entrance, training and connection of incoming field conductors.

Identify all terminals with legends permanently affixed and attached to the terminal blocks.

Ensure not more than 3 conductors are brought to any 1 terminal screw.

Ensure no electrically energized components or connectors extend beyond the protection afforded by the barriers.

Locate all terminal blocks below the shelves.

Ensure terminals used for field connections are secure conductors by means of a No. 10-32 nickel or cadmium plated brass binder head screw.

Ensure terminals used for interwiring connections, but not for field connections, are secure conductors by means of a No. 5-32 nickel plated brass binder head screw.

Terminate all connections to and from the electronic equipment to an interwiring- type block. These blocks will act as intermediate connection points for all electronic equipment input and output.

Provide termination panels that are used to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment as shown on the plans. Provide properly terminated cable harnesses for each item, including any furnished by the Department. Provide all functions available at the equipment terminals that are carried in the connector cable harness.

2.1.10. **Cabinet Internal Grounding.** The cabinet internal ground consists of at least 1 ground bus-bar permanently affixed to the cabinet and connected to the grounding electrode.

Use bare stranded No. 4 AWG copper wire between bus-bars and between the bus-bar and grounding electrode.

Ensure each copper ground bus-bar has at least 14 connection points, each capable of securing bare conductor ranging in size from No 4 AWG to No 14 AWG.

Return AC neutral and equipment ground wiring to these bus-bars.

2.1.11. **Door Switch.** Provide a door switch meeting the following requirements:

- momentary, pin-type door switch,
- installed in the cabinet or on the door,
- connected to a terminal so that the equipment installed in the cabinet can confirm input is connected to logic ground when the cabinet door is open, and
- engage cabinet light when the door is opened.

Provide 2 momentary, pin-type door switches for each door provided with the cabinet. Wire 1 switch to turn on the cabinet lights when the door is open, and off when the door is closed. Wire the other in parallel to a terminal block to detect a cabinet intrusion condition.

2.2. **Mechanical Requirements.**

2.2.1. **Size and Construction.** Provide ITS ground mounted cabinets meeting the configuration types detailed in the ITS Ground Mounted Cabinet standards.

Table 1
Minimum Cabinet Dimensions

	Depth (in.)	Width (in.)	Height (in.)
Type 4	**30**	**24**	**66**
Type 5	**26**	**44**	**54**
Type 6	**26**	**44**	**66**

Determine the suitability of the listed cabinet configuration types for the equipment at each field location identified on the plans or as directed.

2.2.2. **Ventilation.** Provide the cabinet with vent openings to allow cooling of electronic components.

Locate louvered air intake vent openings on the lower portion of the cabinet doors and cover fully inside with a commercially available disposable 3 layer graded pleated type filter with a minimum size of 16 in. (high) x 16 in. (wide) and a thickness of 1 in. For Type 5 cabinet, provide 2 filters for each door. Securely mount so that any air entering the cabinet must pass through the filter. Ensure the cabinet opening for intake of air is large enough to accommodate filter size. Screen the exhaust to prevent entry of insects. Provide the screen openings no larger than 0.0125-sq. in.

Vent and cool the cabinet by thermostatically controlled electric fans. Provide adjustable thermostat with an adjustment range of 70 to 110°F. Provide a press-to-test switch to test the operation of the fan.

Provide at least 4 commercially available fans with a capacity of at least 110 cfm each. Provide the total free air opening of the vent large enough to prevent excessive back-pressure on the fan.

2.2.3. **Lighting.** Provide minimum 15 W fluorescent light fixtures above each door inside the cabinet, each with clear shatter proof lens. NEMA TS2 rated light-emitting diode (LED) fixtures are acceptable instead of fluorescent light fixtures. Determine the appropriate number of fixtures to achieve at least 1000 lumens to illuminate the equipment. Position the fixtures to provide illumination to the face of the equipment in the cabinet and not into a technician's eyes.

2.2.4. **Exterior Finish.** Provide cabinets with a smooth aluminum finish and the exterior in its unpainted natural color.

When shown on the plans or as directed, provide cabinets with an anti-graffiti coating in accordance with Item 740 “Graffiti Removal and Anti-Graffiti Coating.”

2.2.5. **Serial Number.** Provide the cabinets with a serial number unique to the manufacturer, preceded by an assigned 2 letter manufacturer's code. Provide at least a 0.2 in. letter height. Stamp the entire identification code and number on a metal plate riveted to the cabinet, stamp directly on the interior cabinet wall, or engrave on a metalized mylar plate that is epoxied to the cabinet on the upper right hand cabinet side wall.

2.2.6. **Modular Design.** Provide cabinets that have a modular design and allow ITS equipment to be installed in a variety of mounting configurations as detailed on the plans or as directed.

Provide Type 4 cabinets with 1 Electronic Industries Alliance (EIA) 19 in. rack cage, sized appropriately based on cabinet type inside height dimension. Provide a rack with at least 1 1RU (RU = rack unit) horizontal power strip. Provide 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment.

Provide Type 5 and Type 6 cabinets with 2 side by side EIA 19 in. racks, sized appropriately based on cabinet type inside height dimension. Provide a rack with at least of 1 1RU horizontal power strip. Provide 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment.

2.2.7. **Shelves.** Provide adjustable shelves in each cabinet as required to support the equipment as specified on the plans. Ensure shelf adjustment is at 1 RU intervals in the vertical position. Provide shelves that can be mounted to an EIA 19 in. rack cage or unistrut channel as detailed in the standards.

Provide shelves that are removable and capable of supporting the electronic equipment. Provide a minimum of 2 in. between the back and front edge of the shelf to back inside wall and door of the cabinet respectively to allow room for the equipment cables and connectors.

Provide each cabinet type with at least 1 slide out drawer with telescoping drawer guides to allow full extension from the rack frame. Provide at least 1.75 in. (high) x 16 in. (wide) x 14 in. (deep) drawer with a hinged lid to allow access to storage space.

2.3. **Surge Protective Devices (SPD).** Provide SPDs to protect electronics from lightning, transient voltage surges, and induced current. Install SPDs on all power, data, video, and any other conductive circuit.

2.3.1. **120 V or 120/240 V SPD at Service and ITS Cabinet Power Distribution Panel.** Install an SPD at the closest termination or disconnection point where the supply circuit enters the cabinet. Locate the SPD on the load side of the cabinet power distribution panel breakers and ahead of any and all electronic devices. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD and labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20kA I-nominal rating. Provide SPD rated as NEMA 4. SPD with integral EMI/RFI line filtering may be required if shown on the plans.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N, L-G, and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40kA the SPD surge current rating per mode (L-N), (L-G), (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV's operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

Ensure the SPD utilized for AC power does not dissipate any energy and does not provide any series impedance during standby operation. Return the unit to its non-shunting mode after the passage of any surge and do not allow the shunting of AC power.

2.3.2. **Parallel SPD for 120 V Equipment.** Install an SPD inside of the cabinet on the power distribution to the equipment. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20kA I-nominal rating. Provide SPD rated as NEMA 4.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40 kA the SPD surge current rating per mode (L-N) and (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV's operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

2.3.3. **Low-Voltage Power, Control, Data and Signal Systems SPD.** Install a specialized SPD on all conductive circuits including, but not limited to, data communication cables, coaxial video cables, and low-voltage power cables. Ensure that these devices comply with the functional requirements shown in Table 2 for all available modes (i.e., power L-N, N-G; data and signal center pin-to-shield, L-L, L-G, and shield-G where appropriate).

These specialized SPD must have an operating voltage matching the characteristics of the circuit. Ensure that these specialized SPD are UL 497B or UL 497C Listed, as applicable.

Provide the SPD with 3 stages of surge suppression in a Pi (π) configuration. The first stage (primary side) consists of parallel-connected Gas Discharge Tubes (GDTs). The second stage consists of a series connected resistor or inductor. The third stage (secondary side) consists of parallel-connected transorbs or silicone avalanche diodes (SADs).

Ground the SPD to the DIN rail and a wire terminal connection point. (Grounding solely through the DIN rail connection is not adequate and does not meet the performance or intent of this specification.)

Install coaxial SPDs in a manner that prevents ground loops and resulting signal deterioration. This is usually caused where the cable has different references to ground at either end and connecting SPDs at both ends that have only Pin to Shield protection completes a ground loop circuit through the Shield. SPDs having Pin to Shield protection, and separate Shield to Ground protection are acceptable to eliminate ground loops.

Table 2
SPD Minimum Requirements

Circuit Description	Maximum Continuous Operating Voltage (MCOV)	Frequency/ Bandwidth/ Data Rate	Surge Capacity	Maximum Let-Through Voltage
12 VDC	15-20 V	N/A	5 kA per mode (8x20 µs)	<150 Vpk
24 VAC	30-55 V	N/A	5 kA per mode (8x20 µs)	<175 Vpk
48 VDC	60-85 V	N/A	5 kA per mode (8x20 µs)	<200 Vpk
Coaxial Composite Video	4-8 V	Up to 1.5 GHz	10 kA per mode (8x20 µs)	<100 Vpk
RS422/RS485	8-15 V	Up to 10 Mbps	10 kA per mode (8x20 µs)	<30 Vpk
T1	13-30V	Up to 10 Mbps	10 kA per mode (8x20 µs)	<30 Vpk
Ethernet Data	7-12V	Up to 100 Mbps	3 kA per mode (10x1000 µs)	<30 Vpk

2.4. **Environmental Design Requirements.** Provide cabinets that meet the functional requirements of this Item during and after subjection to any combination of the following requirements:

- ambient temperature range of -30 to 165°F,
- temperature shock at most 30°F per hour, during which the relative humidity does not exceed 95%,
- relative humidity range at most 95% over the temperature range of 40 to 110°F, and
- operates with moisture condensation on all surfaces caused by temperature changes.

2.5. **Vibration.** Material used must show no degradation of mechanical structure, soldered components, plug in components or satisfactory operation in accordance with the manufacturer's equipment specifications after being subjected to the vibration test as described in the NEMA standard TS2, Section 2.2.8, “Vibration Test”, or the most current version.

3. FABRICATION

3.1. **Ground Mounted Cabinet.** Continuously weld all exterior seams for cabinet and doors. Fill edges to a radius of 0.03125 in. minimum. Smooth exterior welds.

Welding on aluminum cabinets are done by the gas metal arc (MIG) or gas tungsten arc (TIG) process using bare aluminum welding electrodes. Ensure electrodes conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes.

Procedures, welding machines and welding machine operators for welding on aluminum must be qualified and conform with the requirements of AWS B3.0, “Welding Procedures and Performance Qualification”, and to the practices recommended in AWS C5.6.

Construct all cabinets of welded sheet aluminum with a thickness of at least 0.125 in. meeting NEMA 3R standards. Do not allow wood, wood fiber product, or flammable products in the cabinet. Seal cabinet structure to prevent the entry of rain, dust, and dirt.

Provide a sunshield on the exterior top of the cabinet to reflect solar rays and mitigate temperature build-up inside the cabinet. Construct sunshield out of 0.125 in. thick aluminum and provide a minimum of 1.25 in. clearance above the top of cabinet secured in four locations.

Attach aluminum lifting eyes or ears to the top of the cabinet to permit lifting the cabinet with a sling. Lifting eyes may be permanently fabricated to the cabinet frame as long as they do not interfere with the construction and operation of the sunshield. Manufacturer may provide removable lifting eyes that can be removed after installation. Seal any penetrations to the cabinet exterior or sunshield after removal of lifting eyes.

Ensure cabinets conform to the requirements of ASTM designation: B209 for 5052-H32 aluminum sheet.

3.1.1. **Door.** Provide sturdy and torsionally rigid cabinet doors that overlap and substantially cover the full area of the front of the cabinet. Attach cabinet doors by a minimum of 3 heavy duty hinges or full length hinge. Provide stainless steel hinge pins.

Fabricate the doors and hinges to withstand a 100 lb. per vertical foot force applied to the outer edge of the door when open without permanent deformation or impairment of the door or cabinet body when the load is removed.

Fit the cabinet doors with Number 2 Corbin lock and aluminum or chrome plated handle with at least a 3/8 in. drive pin and a 3 point latch. Design the lock and latch so that the handle cannot be released until the lock is released. Provide a padlock of the type directed by the Engineer. Provide a locking ring for a padlock. Provide 2 keys for the door and 2 keys for the padlock with each cabinet. Locate the lock clear of the arc of the handle. Keys must be removable in the locked position only. Mount locks with 2 stainless steel machine screws. Provide cabinet doors with a catch mechanism to hold the door open at 3 positions: 90°, 120°, and 160°.

Fabricate the door and door stop mechanism to withstand a simulated wind load of 5 lb. per sq. ft. applied to both inside and outside surfaces without failure, permanent deformation, or compromising of door position.

Provide cabinets without auxiliary police doors.

Provide a gasket to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material must be of a non-absorbent material and maintain its resiliency after long term exposure to the outdoor environment.

Provide a gasket with a minimum thickness of 0.25 in. Locate the gasket in a channel provided for this purpose either on the cabinet or on the door. An “L” bracket is acceptable instead of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.

3.1.2. **Mechanical Components.** Ensure all external screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws unless specifically approved by the Engineer.

Ensure all parts are made of corrosion resistant material, such as plastic, stainless steel, aluminum or brass.

Ensure all materials used in construction are resistant to fungus growth and moisture deterioration.

Separate dissimilar metals by an inert dielectric material.

4. CONSTRUCTION

4.1. **General**. For ITS cabinets installed on a slope, ensure the cabinet primary door faces and opens to the high side of the slope and provide safety railing in accordance with the ITS ground mounted cabinet standards. Safety railing is subsidiary to this Item. Stake cabinet foundation forms and underground conduit entering the foundation before installation and secure Department approval before pouring foundation. It is understood that cabinet location may vary from the plans to accommodate field conditions.

Construct the cabinet foundation in accordance with Item 656, “Foundations for Traffic Control Devices”, unless otherwise specified by the Engineer.

Concrete maintenance pads have been integrated into the foundation design found on the ITS ground mounted cabinet standards to accommodate door configuration options.

4.2. **Mounting Hardware.** Furnish anchor bolts to mount the cabinet to the foundation. Manufacturer to determine the appropriate size anchor bolts by cabinet type and foundation size. Provide appropriate mounting plates and any other necessary hardware to mount the cabinet on a foundation.

4.3. **Installation.** Ground the cabinet as depicted in the ITS grounding standards. For retrofit scenarios, measure resistance to ground before installing cabinet in accordance with IEEE 81. Provide additional grounding rods and install additional grounding conductors as detailed in the ITS Grounding Standards to achieve less than 5 ohms resistance. Additional ground rods and grounding conductors are subsidiary to this Item.

Immediately before mounting the cabinet on the foundation, apply a bead of silicone caulk to seal the cabinet base to the foundation.

Seal any space between conduit entering the cabinet and the foundation with silicone caulk or approved sealant compound.

Install conduits as shown on the plans or as directed and in accordance with Item 618, “Conduit.” Place wiring in a neat and orderly manner grouped together with nylon tie-downs.

After wiring is installed, seal the conduits terminated in the cabinet foundation with a duct seal or other similar approved sealant inside of the ends of the conduit in the cabinet to prevent moisture, insects and critters from entering the conduits.

4.3.1. **Connection of Lead-In Cable.** Connect the detector lead-in cables, when shown on the plans or as directed, to the detector terminal blocks in the following manner:

Dress each cable into position in conformance with the approved lead-in cable position on the panel (bundle cables together and broken out by their position on the terminal boards),

Place cable as close to the terminal points as possible and left floating, and

Ground the cable shield after testing and in accordance with the detector manufacturers' specifications.

4.3.2. **Connection of Miscellaneous Cables.** Terminate connection of signal wires, sign control wires and any other wires required to complete connections for an operational system on terminal blocks.

Design the equipment for ease of maintenance. All component parts must be readily accessible for inspection and maintenance. The only tools and test instruments required for maintenance by maintenance personnel must be simple hand held tools, basic meters and oscilloscopes.

Mount cabinet plumb in all directions.

4.4. **Removal and Replacement of Curbs and Walks.** The Contractor to secure approval of the Engineer before cutting into or removing sidewalks or curbs not shown on the plans to be removed or replaced.

Restore any curbs or sidewalks after work is completed, which have been removed, to equivalent original condition and to the satisfaction of the Engineer.

All completed surfaces that are adjacent to the cabinet foundation must be level and free of trip hazards. Any difference in level of adjacent structures are to be addressed in the field and approved by the department.

4.5. **Relocation.** Before removal of the existing cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment.

Inspect the existing cabinet, with a representative from the Department, and document any evidence of structural damage before removal. Remove and deliver to the Department existing cabinets that fail structural inspection to an address to be supplied by the Department.

Remove the existing cabinet in a manner acceptable to the Engineer. Use a method that does not cause undue overstress or damage to the structure or appurtenances attached.

Remove the existing concrete foundation to a depth of at least 2 ft. below finish grade with all steel cut off. Backfill the excavation with material equal in composition and density to the surrounding area. Replace any surfacing, such as asphalt pavement, concrete riprap or brick pavers, with like material to equivalent condition as approved by the Engineer.

Supply all new anchor bolts required for the installation of the cabinet. Match bolt dimensions and lengths previously used or as shown on the plans or as directed.

4.6. **Removal.** Present the work in a neat, professional finished appearance. Maintain safe construction and operation practices. Use established industry and utility safety practices when removing cabinets near overhead or underground facilities. Consult with the appropriate utility company before beginning work.

Inspect the cabinet, with a representative from the Department, and remove any ITS equipment, associated mounting hardware, and cabling inside the cabinet before commencing work.

Before removal of the existing cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment. Remove and coil existing cabling to the nearest ITS ground box or as identified on the plans.

Carefully remove the cabinet and avoid damage or injury to surrounding objects or individuals. Deliver the cabinet to an address to be supplied by the Department.

Remove the existing foundation to a depth of 2 ft. below grade with all steel cut off. Backfill the excavation with material equal in composition and density to the surrounding area. Replace any surfacing, such as asphalt pavement, concrete riprap, or brick pavers, with like material to equivalent condition as approved by the Engineer.

4.7. **Testing.**

4.7.1. **Installation**. Unless otherwise shown on the plans, perform the following tests on cabinets supplied through this Item.

4.7.1.1. **Test Procedures Documentation**. Provide 5 copies of the test procedures to include tests identified in Article 4.9.2 through Article 4.9.4 inclusive and blank data forms to the Engineer for review and comment at least 45 days before testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of equipment for tests. Contractor to resubmit if necessary rejected test procedures for final

approval within 10 days before testing. Review time is calendar days. Conduct all tests in accordance with the approved test procedures. The Department may witness all tests.

Record test data and quantitative results on data forms. No bid item measurement or payment will be made until the Engineer has verified the test results meet the requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy performed in testing by the contractor. Furnish data forms containing the acceptable range of expected results and measured values.

4.7.1.2. **Design Approval Test**. Conduct a design approval test on 10 percent of the total number of cabinets supplied as part of the project, with at least 1 of each type of cabinet used on the project.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the Engineer. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

4.7.1.2.1. **Power Service Transients.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the power service transients as specified in NEMA TS 2, Section 2.2.7.2, “Transient Tests (Power Service)”, or most current version.

4.7.1.2.2. **Temperature and Condensation.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:

- Stabilize the equipment at -30°F and test as specified in NEMA TS2, Sections 2.2.7.3, “Low-Temperature Low-Voltage Tests” and 2.2.7.4, “Low-Temperature High-Voltage Tests”, or most current version.
- Allow the equipment to warm up to room temperature in an atmosphere with relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure.
- Stabilize the equipment at 165°F and test as specified in NEMA TS2, Sections 2.2.7.5, “High-Temperature High Voltage Tests” and 2.2.7.6, “High-Temperature Low-Voltage Tests”, or most current version.

4.7.1.2.3. **Relative Humidity.** Provide equipment that meets the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.

4.7.1.2.4. **Vibration.** Provide equipment that shows no degradation of mechanical structure, soldered components, or plug-in components and will operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in NEMA TS2, Section 2.2.8, “Vibration Test”, or most current version.

4.7.1.2.5. **Power Interruption.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to nominal input voltage variations as specified in NEMA TS2, Section 2.2.10, “Power Interruption Test”, or most current version.

4.7.1.3. **Stand-Alone Tests**. Conduct a stand-alone test for each cabinet after installation. Exercise all stand-alone (non-network) functional operations consisting of the following, at a minimum:

- 19-in. EIA rack,
- adjustable shelves,
- locking mechanism,
- fan and thermostat,
- cabinet light,
- back panel,
- circuit breakers,
- surge protection,
- grounding system,
- terminal strips,
- interconnect harnesses with connectors,
- weatherproofing, and
- "Door Open" connection to back panel.

Notify the Engineer 5 working days before conducting this test. The Engineer may witness all the tests.

4.7.1.4. **Consequences of Test Failure**. If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation before modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be cause for rejection of the unit.

Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures within 30 calendar days without additional cost or extension of the contract period.

4.7.1.4.1. **Consequences of Design Approval Test Failure.** If the equipment fails the design approval test, correct the fault within 30 days and then repeat the design approval test until successfully completed.

4.7.1.4.2. **Consequences of Demonstration Test Failure.** If the equipment fails the demonstration test, correct the fault within 30 days and then repeat the demonstration test until successfully completed.

4.7.1.4.3. **Consequences of Stand-Alone Test Failure.** If the equipment fails the stand-alone test, correct the fault and then repeat the stand-alone test until successfully completed.

4.7.2. **Relocation.**

4.7.2.1. **Pre-Test.** Conduct performance testing before removal of ITS ground mounted cabinets. Test all functional operations of the equipment, at a minimum, and document functional operations in the presence of representatives of the Contractor and the Department.

- locking mechanism,
- fan and thermostat,
- cabinet light,
- back panel,
- circuit breakers,
- surge protection system,
- grounding system, and

- "Door Open" connection to back panel.

Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data before removal and test data after installation.

4.7.2.2. **Post Test**. Testing of the ITS ground mounted cabinet is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing ITS equipment has been installed, perform the same functional operation test described under Article 4.9.2.1. Furnish test data forms containing the sequence of tests including all of the data taken and quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days before the day the tests are to begin. Obtain Engineer's approval of test procedures before submission of equipment for tests. Send at least 2 copies of the data forms to the Engineer.

The performance test results after relocation must be equal to or better than the test results before removal. Contractor is responsible to repair or replace those components within the system which failed after relocation but which passed before removal.

The Department will conduct approved ITS equipment system tests on the field equipment hardware with the central equipment. The tests will exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

4.8. **Documentation.** Submit documentation for this Item consisting of the following:

4.8.1. **Ground Mounted Cabinet.** Shop drawings should clearly detail the following for ITS ground mounted cabinets when required as shown on the plans:

- dimensions,
- shelves,
- door,
- gasket,
- door look,
- materials list,
- exterior finish,
- ventilation,
- terminal strips,
- harnesses,
- filter,
- power distribution panel,
- surge suppression,
- back panel,
- outlets,
- circuit breakers,
- power cable terminals,
- wiring diagrams,
- cabinet grounding,
- environmental parameters, and
- connectors.

Submit shop drawings, signed, sealed, and dated by a registered professional Engineer in Texas showing the fabrication, interior configuration, electrical distribution, and cabinet mounting details for each cabinet in accordance with Item 5, "Control of the Work."

Provide at least 2 complete sets of operation and maintenance manuals in hard copy format in addition to a CD/DVD or removable flash drive that includes the following:

- complete and accurate schematic diagrams,
- complete installation procedures,
- complete performance specifications (functional, electrical, mechanical and environmental) on the unit,
- complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA,
- pictorial of component layout on circuit board,
- complete maintenance and trouble-shooting procedures,
- complete stage-by-stage explanation of circuit theory and operation,
- recovery procedures for malfunction, and
- instructions for gathering maintenance assistance from manufacturer.

Identify material which is copyrighted or proprietary in nature as part of the documentation submittal. The Department will take proper provisions to secure such material and not distribute without written approval.

Provide the Department with certification documentation verifying conformance with environmental and testing requirements contained in the special specification. Certifications may be provided by the manufacturer or through independent labs.

4.9. **Warranty.** The start date of the manufacturer's standard warranty will begin when the stand-alone test plan has been approved. Any equipment with less than 95% of its warranty remaining at the beginning of the stand-alone test will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs according to the manufacturer's published specifications. Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 years or in accordance with the manufacturer's standard warranty if warranty period is greater. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace, at the manufacturer's option, defective equipment during the warranty period at no cost to the Department.

Repair or replace equipment at the Contractor's expense before beginning testing in the event of a malfunction or failure. Furnish replacement parts for all equipment within 30 days of notification of failure by the Department.

5. MEASUREMENT

This Item is measured as each unit furnished, installed, relocated, or removed as shown on the plans or as directed, excluding new conduit.

6. PAYMENT

6.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Ground Mount Cabinet" of the type and configuration specified. This price is full compensation for furnishing, fabricating, and installing ITS ground mounted cabinets as shown on the plans; for forming and setting the cabinet foundation; for furnishing and placing anchor bolts, nuts, and washers; for furnishing and placing electrical conduit in the foundation; for appropriately grounding the cabinet; and equipment, materials, labor, tools, and incidentals necessary to provide an ITS ground mounted cabinet, complete in place, and ready for the installation of ITS equipment.

New conduit will be paid for under Item 618, "Conduit" or Special Specification ITS Conduit.

6.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Ground Mount Cabinet (Install Only) of the type and configuration specified. This price is full compensation for installing ITS ground mounted cabinets furnished by the Department as shown on the plans; for forming and setting the cabinet

foundation; for furnishing and placing anchor bolts, nuts, and washers; for furnishing and placing electrical conduit in the foundation; for appropriately grounding the cabinet; and equipment, materials, labor, tools, and incidentals necessary to install an ITS ground mounted cabinet, complete in place, and ready for the installation of ITS equipment.

New conduit will be paid for under Item 618, “Conduit” or Special Specification ITS Conduit.

6.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided for under “Measurement” will be paid for at the unit price bid for “ITS Ground Mount Cabinet (Relocate)” of the type and configuration specified. This price is full compensation for removing existing ground mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; hauling and installing ITS ground mounted cabinets; for furnishing and placing anchor bolts, nuts, and washers; for appropriately grounding the cabinet; and equipment, materials, labor, tools, and incidentals necessary to relocate an existing ITS ground mounted cabinet, complete in place, and ready for the installation of ITS equipment.

New conduit will be paid for under Item 618, “Conduit” or Special Specification ITS Conduit.

6.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided for under “Measurement” will be paid for at the unit price bid for “ITS Ground Mount Cabinet (Remove)” of the type and configuration specified. This price is full compensation for removing existing ITS ground mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; loading and hauling; and equipment, materials, labor, tools, and incidentals necessary to complete the removal of existing ITS ground mounted cabinets.

Special Specification 6010
Closed Circuit Television (CCTV) Field Equipment

1. DESCRIPTION

Furnish, install, relocate, or remove closed circuit television (CCTV) field equipment at locations shown on the plans, or as directed.

2. MATERIALS

2.1. **General Requirements.** Fabricate, provide, assemble, and install materials that are new, corrosion resistant and in strict accordance with the details shown on the plans and in the specifications.

Provide CCTV field equipment that is compatible with software currently in operation in order to interface with the existing equipment and software located in the Department's Traffic Management Control (TMC) Centers across the state.

CCTV field equipment to include the following:

- color video camera units,
- camera lenses, filters, control circuits and accessories,
- camera housing,
- medium duty pan and tilt units with click and drag position control,
- camera control receivers,
- local field control unit (if required for operation),
- video and camera control and power cable connectors and assemblies,
- video, data, and power surge suppression, and
- built-in ID generator.

2.2. **Functional Requirements for Analog CCTV.** Provide color video cameras that are solid state design and that meet the following functional requirements:

2.2.1. **General.**

2.2.1.1. **Digital Signal Processing (DSP):**

- digital zoom with manual override functionality,
- auto and manual iris control,
- auto and manual exposure control with built in frame buffer,
- auto and manual focus control, and
- built-in ID generator, with white letters on black outline minimum or approved equivalent.

2.2.1.2. **Image Pickup Device.** Single chip interline transfer solid state color matrix charge-coupled device (CCD) or complementary metal-oxide semiconductor (CMOS) sensor. Provide a sensor having a minimum of 752 (H) X 480 (V) effective pixels.

2.2.1.3. **Resolution.** Greater than 350 lines vertical and greater than 460 lines horizontal, interlaced 2:1, measured per EIA-170A Standard. No discernible interlace jitter or line pairing on the viewing monitor. System limiting resolution that conforms to FCC regulations for broadcast signals.

2.2.1.4. **Frame Rate.** Adjustable frame rate frequency up to 30 frames per second.

2.2.1.5. **Encoded NTSC Video Signal Format.** Conformance to the National Television Standards Committee (NTSC) specification and produce NTSC compatible video in accordance with EIA-170A Standard, governed by the Electronic Components Association (ECA), for video output 1 V p-p composite also known as 140 IRE units per Institute of Radio Engineers (IRE). Provide up to 16 dB automatic gain control (AGC).

2.2.1.6. **Output Impedance.** 75 ohms ± 5%.

2.2.1.7. **Aspect Ratio.** Width to height aspect ratio of 4:3.

2.2.1.8. **Image Quality.** Ability to produce clear, free from distortion, usable video images of the areas, vehicles, objects, and other subjects visible from a roadside CCTV site. Ensure that video produced by the camera is true, accurate, distortion free, and free from transfer smear, oversaturation, and any other image defect that negatively impacts image quality under all lighting and weather conditions in both color and monochromatic modes.

2.2.1.9. **Over Exposure Protection.** Minimize glare and incur no permanent damage to the camera when pointed directly at strong light sources, including the sun, for brief periods of time.

2.2.1.10. **Geometric Distortion.** Zero.

2.2.1.11. **Signal to Noise Ratio (AGC Off).** 50 dB Minimum (weighted at 4.5 MHz).

2.2.1.12. **Electronic Shutter Speed.** Automatic shutter that is user selectable down to at least 1/10,000 sec.

2.2.1.13. **Electronic Image Stabilization.** User selectable on or off electronic image stabilization at 5 Hz and 10 Hz minimum.

2.2.1.14. **Day (Color) and Night (Mono).** Auto and manual switchover and iris control with user selectable modes for auto and manual control capabilities.

2.2.1.15. **Auto White Balance.** Color quality that is maintained by a continuous through the lens automatic white balance for color temperatures from 2850 K to greater than 5100 K with less than 10 IRE units unbalance.

2.2.1.16. **Inverted Operation.** Automatic or manual activation image inversion or “flip” operation when rotating through 0° or 180° vertical tilt positions.

2.2.1.17. **Mean Time Before Failure.** A minimum of 43,800 hr. or 5 yr. without mechanical malfunction or failure. Act of God failures are exempt.

2.2.2. **Lens.** Provide an integral lens assembly for each camera with the following features:

- an f/1.6 or better glass multi-coated zoom lens with variable focal lengths with a minimum 30X zoom range,
- 10X auto and manual digital zoom minimum, and
- automatic and manual focus and iris control.

Provide lenses with capabilities for remote control of the zoom, focus, and iris operations. Mechanical or electrical means provided to protect the motors from overrunning in extreme positions. Lens and controller system capable of both auto iris and remote manual iris operation. Capabilities of lens for auto and manual zoom and focus control. Motorized iris as opposed to auto iris type, for system control capability.

2.2.3. **Network Interface Requirements.** Provide equipment that is compatible with the Department’s Lonestar™ software and can be integrated into the Department’s TMC CCTV control sub-systems through NTCIP 1205 Version 1.08 or latest Department approved version, Open Network Video Interface Forum (ONVIF), or approved equal. Support Cohu, Pelco D, Pelco P protocols, or approved equal for control.

Provide equipment that is compatible with other devices using Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA)-232 or EIA-422/485 at a rate of 9600 bps.

Provide camera equipment that supports local and remote configuration and management. Configuration and management functions must include access to all user-programmed features, including but not limited to, network configuration, video settings, device monitoring, control setting, and security functions. Configuration and management is achieved through serial login, telnet login, web-based interface, or manufacturer software. Provide manufacturer software with camera for local configuration, system maintenance and management control.

2.3. **Functional Requirements for Digital CCTV.** Provide color video cameras that produce digital video in standard definition or high definition that meet the following functional requirements:

2.3.1. **General.**

2.3.1.1. **Digital Signal Processing (DSP):**

- digital zoom,
- auto and manual iris control,
- auto and manual exposure control with built in frame buffer,
- auto and manual focus control, and
- built-in ID generator, with white letters on black outline minimum or approved equivalent.

2.3.1.2. **Image Pickup Device.** 1.2 megapixel (1,200,000 pixels), or better, progressive scan digital CCD or CMOS sensor.

2.3.1.3. **Resolution.** Support the following resolutions:

- 720p (1280 x 720 pixel array),
- D1 (720 x 480 pixel array),
- CIF (352 x 240 pixel array), and
- VGA (640 x 480 pixel array) at a minimum dependent on video stream configuration.

2.3.1.4. **Frame Rate.** Allow user selectable frame rates at 30, 15, 7, 4, 2, and 1 frames per second.

2.3.1.5. **Data Rate.** Scalable from 64 kbps to 8 Mbps

2.3.1.6. **Video Stream Format.** Allow simultaneous encoding and transmission, of a minimum, two configurable digital video streams in conformance with the Moving Picture Experts Group's MPEG-4 part 10 (H.264) and Motion JPEG (MJPEG) video compression technology in accordance with the ISO and IEC requirements detailed in the ISO/IEC 14496-10 standard or most current version. Support configuration of the following at a minimum:

- H.264,
- MJPEG,
- H.264 + H.264, and
- H.264 + MJPEG.

2.3.1.7. **Video Stream.** Support both uni-cast (one-to-one) and multi-cast (one-to-many).

2.3.1.8. **Aspect Ratio.** Support width to height aspect ratio of 4:3 or 16:9 dependent on TMC monitor video format functionality.

2.3.1.9. **Image Quality.** Ensure that video produced by the camera is true, accurate, distortion free, and free from transfer smear, oversaturation, and any other image defect that negatively impacts image quality under all lighting and weather conditions in both color and monochromatic modes.

2.3.1.10. **Wide Dynamic Range (WDR).** Operation with manual override option.

2.3.1.11. **Over Exposure Protection.** Minimize glare and incur no permanent damage to the camera when pointed directly at strong light sources, including the sun, for brief periods of time.

2.3.1.12. **Geometric Distortion.** Zero.

2.3.1.13. **Signal to Noise Ratio (AGC Off).** 50 dB minimum (weighted at 4.5 MHz).

2.3.1.14. **Electronic Shutter Speed.** Automatic shutter that is user selectable down to at least 1/10,000 sec.

2.3.1.15. **Electronic Image Stabilization.** User selectable on or off electronic image stabilization at 5 Hz and 10 Hz minimum.

2.3.1.16. **Day (Color) and Night (Mono).** Auto and manual switchover and iris control with user selectable modes for auto and manual control capabilities.

2.3.1.17. **Auto White Balance.** Color quality that is maintained by a continuous through the lens automatic white balance for color temperatures from 2850 K to greater than 5100 K with less than 10 IRE units unbalance.

2.3.1.18. **Inverted Operation.** Automatic image inversion or "flip" when rotating through 0° or 180° vertical tilt positions when not an integrated unit.

2.3.1.19. **Mean Time Before Failure.** A minimum of 43,800 hr. or 5 yr. without mechanical malfunction or failure. Act of God failures are exempt.

2.3.2. **Lens.** Provide an integral lens assembly for each camera with the following features:

- an f/1.6 or better glass multi-coated zoom lens with variable focal lengths with a minimum 18X zoom range,
- 10X auto and manual digital zoom minimum, and
- automatic and manual focus and iris control.

Provide lenses with capabilities for remote control of the zoom, focus, and iris operations. Mechanical or electrical means provided to protect the motors from overrunning in extreme positions. Lens and controller system capable of both auto iris and remote manual iris operation. Capabilities of lens for auto and manual zoom and focus control. Motorized iris as opposed to auto iris type, for system control capability.

2.3.3. **Network Interface Requirements.**

Provide CCTV field equipment that can integrate with the Department's Lonestar™ software and can be integrated into the Department's TMC CCTV control sub-systems through NTCIP 1205 Version 1.08 or higher, Open Network Video Interface Forum (ONVIF), or approved equal. Support Cohu, Pelco D or Pelco P protocols, or approved equal for control.

Provide camera equipment with a Local Area Network (LAN) connection that supports the requirements detailed in the IEEE 802.3 Standard for 10/100 Ethernet connections for half-duplex or full-duplex and provide auto negotiation. Provide equipment with a minimum of 1 Ethernet port, which has a 10/100 Base-TX connection. Provide connectors that conform to EIA and TIA requirements.

Support, at a minimum, RTP, RTSP, UDP/IP, TCP/IP, IPv4, HTTP, IGMPv2, DHCP, NTP, IEEE 802.1x, Ethernet 802.3u, and Telnet.

Provide camera equipment that supports local and remote configuration and management. Configuration and management functions must include access to all user-programmed features, including but not limited to, network configuration, video settings, device monitoring, control setting, and security functions. Configuration

and management is achieved through serial login, telnet login, web-based interface, or manufacturer software. Provide manufacturer software with camera for local configuration, system maintenance and management control.

2.4. **Cable Assembly.** Provide camera power and communication cable assembly equipped with cables used for video feed, camera control including PTZ function, communications signaling, and power supply. Camera power and communication cable can be configured as a composite cable or series of isolated cables. The following cable functions may be required depending on the data and video communication interface requirements, as shown on the plans.

2.4.1. **Serial.** Provide shielded twisted pair serial based communication cable rated for outdoor use in conformance to EIA RS-232/422/485 Standards, governed by the Electronic Components Association (ECA). Provide serial based conversion hardware, if necessary, to achieve this function.

2.4.2. **Video.** Provide coaxial cable, rated for outdoor use, between the camera and the communications equipment interface that is a mid-range RG-59/U type with a solid center conductor with 100% shield coverage, with a cellular polyethylene dielectric, or a cable as recommended by the manufacturer of the CCTV field equipment.

2.4.3. **Ethernet.** Provide a shielded twisted pair (STP) Category 5E (or equivalent) at a minimum rated for outdoor use in conformance to TIA/EIA 568B Standard. Cable must not exceed an attenuation of 30 dB per 300 ft. of cable at 100 MHz.

2.4.4. **Power.** Provide 3-wire, insulated for 300 V minimum, 115 VAC or 24 VAC power cabling between the camera and the power supply. If 24 VAC power is required, provide needed power supply conversion equipment.

Power may be achieved through Power over Ethernet (PoE) through a power supply or mid-span PoE injector, to be subsidiary to the camera unit, and must conform to the IEEE 802.3af or IEEE 802.3at standard or latest revision.

Provide power and communication cable assembly the entire length of the camera support structure from the camera to the cabinet with an additional 25 ft. of slack in the cabinet. Determine the appropriate length required for each site. The cable assembly is subsidiary to the camera unit.

Provide any necessary data, video, or power conversion hardware necessary to successfully integrate the camera unit into the field equipment cabinet hardware components and onto the communications backbone.

2.5. **Video Encoding Interoperability.** Digital video encoders and decoders are necessary to convert the analog signal to digital, transport digital packets via UDP/IP over fiber optic, copper Ethernet, wireless, or leased line networks and convert the digital packets back to an analog signal for viewing on a display monitor. Video encoding and decoding equipment may be achieved through software or hardware means. Ensure camera's encoded video is interoperable with hardware and software decoders from other manufacturers. Ensure the camera's encoded video can be decoded by a minimum of two other manufacturer's software or hardware decoders that are currently in use by the Department. Contact the Department for decoders supported prior to procurement of camera unit.

2.6. **Camera Housing.** Provide camera housing assembly and hardware material that reflects sunlight.

Provide camera housing with a sunshield to reduce the solar heating of the camera. The total weight of the camera (including housing, sunshield, and all internal components) must not exceed 35 lb.

Construct viewing window in such a way that unrestricted camera views can be obtained at all camera and lens positions.

Provide gaskets at cable entry point to the camera housing to prevent moisture or dust entry.

When shown on the plans or identified in the general notes, provide heating or cooling functionality with temperature sensors to maintain internal temperatures within the manufacturer required operating temperature range.

2.7. **Pan-Tilt Unit.** Furnish and install a medium duty anodized aluminum weatherproof pan-tilt-unit at each camera site, conforming to National Electrical Manufacturer's Association (NEMA) 4X and IP-66 rating or better, when not integral to the camera unit and housing. Provide mounting adapter and required attachment hardware to install the pan-tilt-unit to the pole or mounting bracket. Identify the type of mounting bracket and bolt pattern on shop drawings.

Provide a unit capable of a minimum of 180° vertical range of movement and horizontal movement of 360°, full, continuous rotation movement.

Provide a unit that has a pan and tilt speed of 20° per second minimum and is user adjustable through the full speed range. Unit must be capable of simultaneous pan-tilt movements with variable pan-tilt positioning control allowing variable speeds that are proportional through the zoom range.

Provide pan-tilt unit with a drive accuracy and drive repeatability of less than 1° and has an automatic pre-position speed of 120° per second minimum to a user defined preset position that is user adjustable.

Provide a pan-tilt unit, when not integral to the camera housing, capable of maintaining static position and does not move by more than 1.0° in any direction in speeds greater than 35 mph.

Ensure that the pan-tilt unit has seals and gaskets to protect the motors, gears, and cables and that the seals and gaskets are resistant to ozone, ultraviolet radiation, and other pollutants inherent to all local environmental conditions.

When shown on the plans or identified in the general notes, provide pan-tilt unit with heater that conforms to NEMA 4X standard when not integral to the camera unit and housing.

2.8. **Preset Functions.** Provide a camera unit capable of storing a minimum 62 presets for pan, tilt, zoom, and focus settings.

Provide a camera unit capable of user programmable tours with a minimum of 4 tours of up to 32 presets per tour. Any tours may be programmed for panning tours.

Provide a camera unit capable of user programmable sector zones with a minimum of 8 zones allowing right and left pan limitations.

Provide a camera unit capable of user programmable privacy zones with a minimum of 8 zones. Capable of click and drag position control through software.

2.9. **Control Receivers.** Provide a camera unit with an integrated camera control receiver, unless otherwise directed, that will execute all camera and lens functions as well as forward communication of commands for the pan-tilt functions to the pan-tilt control receiver. Mount the pan-tilt control receiver inside the pan-tilt unit.

The control receiver receives the data from the camera controller, it decodes the digital command data signals transmitted through the communication transmission interface, checks for errors, and acts on valid data to drive the pan-tilt unit and the camera controls.

Local field control is achieved through compatible control software on a laptop or through local control unit hardware located inside the field cabinet that can be EIA 19 in. rack or shelf mountable. Document that the camera control receiver and pan-tilt control receiver will execute all camera, lens, and pan-tilt functions through a laptop interface or through use of the local control unit hardware. Provide local control unit hardware only when shown on the plans or identified in the general notes.

2.10. **Connectors.** Provide and install connectors that are compatible with the communications equipment interfaces identified in Article 2.3.3 and Article 2.4. Supply all mating connectors. Provide all connector pins and mating connectors that are plated to achieve good electrical connection and resistance to corrosion.

2.11. **Source ID Generator.** Use a built-in ID Generator to insert camera ID over each of the camera-generated videos.

Provide a minimum of 2 lines of alpha numeric, case specific, text supporting a minimum of 20 ASCII characters per line, with a minimum character height of 20 pixels, that is user programmable for displaying any combination of ID information consisting of camera, preset, privacy mask, low pressure warning, compass, and time and date at a minimum.

Allow user selectable location of text to be displayed on the video image at the extreme top or bottom. Text display on the side of the image display prohibited .

Automatically display the programmed ID with its associated video signal that can be turned on or off by user command.

In the event of loss of signal or video signal failure, ID Generator automatically passes through failure message to display over video.

Submit list of available text displays to the Department as part of documentation requirements.

2.12. **Cabinet Installation.** Install video communication equipment in a pole mounted equipment cabinet or in a ground mounted equipment cabinet as shown on the plans. Meet the following criteria:

Contains all the lightning protection devices for data and video.

Grounded to earth ground.

Provide connectors for all inputs and outputs for data and video and additional ports for testing video and communications. Use the external connectors for testing and for connections to communication devices.

2.13. **Surge Protection.** Provide surge protection for the camera meeting the following requirements:

- mounting adapter – Electrically bonded to mounting structure,
- pan-tilt mechanism – Electrically bonded to mounting adapter,
- camera housing – Electrically bonded to pan-tilt mechanism, and
- power and control cable surge protector – Integrated into cabinet surge protection system.

2.14. **Power Requirements.** Provide CCTV field equipment meeting all of its specified requirements when the input power is 115 VAC ± 20%, 60 Hz ± 3 Hz, and that maximum power required does not exceed 200 W including optional equipment.

Provide appropriate voltage conversion, power injectors, or other power supply hardware if the camera equipment or any camera-related ancillary devices requires operating voltages other than 115 VAC ± 20%, such as 24 VAC, 12 VDC from solar power systems, or rely on PoE. Appropriate voltage converters or injectors must accept an input voltage of 115 VAC or 12 VDC from solar power systems as shown on the plans.

2.15. **Primary Input Power Interruption.** Provide CCTV field equipment that meets all the requirements in Section 2.1.4., “Power Interruption” of the NEMA Standard TS2 for Traffic Control System, or most current version.

2.16. **Power Service Transients.** Provide CCTV Field Equipment that meets the requirements for Section 2.1.6., “Transients, Power Service” of the NEMA Standard TS2, or most current version.

2.17. **Power Service Protection.** Provide equipment that contains readily accessible, manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide circuit breakers or fuses sized appropriately such that no wire, component, connector, PC board or assembly is subjected to current loads in excess of their respective design limits upon failure of any single circuit element or wiring.

2.18. **Modular Design.** Provide CCTV field equipment hardware installed inside the cabinet that is modular in design that can be either shelf mountable or EIA 19 in. rack mountable. Clearly identify modules and assemblies with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.

2.19. **Connectors and Harnesses.** Make all external connections by means of connectors that are uniquely keyed to preclude improper hookups. Color-code and appropriately label with UV resistant material all wires to and from the connectors. Provide connecting harnesses of appropriate length and terminated with matching connectors for interconnection with the communications system equipment. Provide plated pins and mating connectors to improve conductivity and are corrosion resistant. All connectors utilizing solder type connections must have each soldered connection covered by a piece of heat shrink tubing securely shrunk to protect the connection for short circuiting.

Provide a wiring diagram detailing wire function and connector pin-out.

2.20. **Environmental Design Requirements.** Provide equipment that conforms to NEMA TS2-2003 (R2008), International Electrotechnical Commission (IEC) 60529, and NEMA 250-2008, or most current version, for the following categories:

2.20.1. **Temperature.** Provide equipment that conforms to NEMA TS2 Section 2.1.5.1, or latest revision, and meets all the specified requirements during and after being subjected to any combination of the following conditions:

- ambient temperature range of -30 to 165°F,
- temperature shock not exceeding 30°F per hour,
- relative humidity of 0 to 100%,
- moisture condensation on all exterior surfaces caused by temperature changes, and
- provisions for a heater and blower function will be required to maintain internal temperatures within the manufacturer's operating temperatures for temperature ranges internal to the camera unit not conforming to NEMA TS2 Standard 2.1.5.1.

2.20.2. **Vibration.** Provide equipment that conforms to NEMA TS2 Section 2.1.9 and Section 2.2.3, or most current version, and meets all the specified requirements during and after being subjected to a vibration of 5 to 30 Hz up to 0.5 g applied in each of three mutually perpendicular planes for 30 min.

2.20.3. **Shock.** Provide equipment that conforms to NEMA TS2 Section 2.1.10 and Section 2.2.4, or most current version, and does not yield permanent mechanical deformation or any damage that renders the unit inoperable when subjected to a shock of 10 g applied in each of three mutually perpendicular planes for 30 min.

2.20.4. **Environmental Contaminants.** Provide equipment that conforms to IEC 60529 Section 14.2.6, ormost current version, for IP 66 or greater rating when providing a pressurized unit.

Provide equipment that conforms to IEC 60529 Section 14.2.7, ormost current version, for IP 67 or greater rating when providing a non-pressurized unit.

2.20.5. **External Icing.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.6, or latest revision.

2.20.6. **Corrosion.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.10, or latest revision, when located in coastal Districts. Coastal Districts are Beaumont (BMT), Corpus Christi (CRP), Houston (HOU), Pharr (PHR), and Yoakum (YKM).

2.20.7. **Wind Rating.** Operational in adverse weather conditions and able to withstand wind loads in accordance with Department's basic wind velocity zone map standard as shown on the plans without permanent damage to mechanical and electrical equipment.

3. CONSTRUCTION

3.1. **General.** Maximize standardization and consistency by utilizing industry standard techniques in equipment design and construction, with the minimum number of parts, subassemblies, circuits, cards, and modules. Design equipment for ease of maintenance.

Provide mounting bracket assemblies or apparatus to mount equipment on the following structures as detailed in the plans or on the ITS standards:

- ITS Pole,
- overhead sign bridge or cantilever overhead sign structure ,
- retaining wall, and
- concrete column or parapet.

Provide mounting bracket design with documentation submittal for approval prior to fabrication. Include all mounting plates, screws, bolts, nuts, washers, and ancillary hardware needed to fabricate the entire mounting bracket.

3.2. **Mechanical Components.** Provide stainless steel external screws, nuts and locking washers. Self-tapping screws are not acceptable.

Provide parts that are made of corrosion resistant material; examples include: plastic, stainless steel, anodized aluminum, or brass.

Protect all materials used in construction from fungus growth and deterioration due to sustained moisture.

Separate dissimilar metals by an inert dielectric material.

3.3. **Wiring.** Provide wiring that meets the requirements of the National Electrical Code (NEC) most current version. Provide wires that are cut to proper length before assembly. It is not acceptable to "double-back" wires to take up slack inside the cabinet. Lace wires neatly with nylon lacing or plastic straps. Organize cables neatly inside the cabinet and secure cables with clamps. Provide service loops at connection points when connecting to hardware inside the cabinet. No splicing of cables or exposed wiring is allowed. Clearly label all wiring.

3.4. **Relocation of CCTV Field Equipment.** Perform the relocation in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing CCTV field equipment, with a representative from the Department, and document any evidence of damage prior to removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver to the Department, existing CCTV field equipment that fail inspection.

Prior to removal of existing CCTV field equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated.

Remove existing CCTV field equipment as shown on the plans only at such time as authorized by the Engineer.

Use care to prevent damage to any support structures. Any portion of CCTV field equipment or camera pole structure damaged or lost will be replaced by the Contractor at his expense. Contractor to document and report to the Department any existing damage to equipment prior to removal.

Make all arrangements for connection to the power supply and communication source including any permits required for the work to be done under the Contract. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 V. Meet the requirements of the NEC most current version.

3.5. **Removal of CCTV Field Equipment.** Disconnect and isolate any existing electrical power supply prior to removal of existing CCTV field equipment,

Perform removal in strict conformance with the requirements of this Specification, and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance.

Any portion of the CCTV field equipment or cabinet internal components damaged or lost will be replaced by the Contractor (with items requiring the approval of the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

3.6. **Contractor Experience Requirements.** Contractor or designated subcontractor must meet the following experience requirements:

3.6.1. **Minimum Experience.** Three years of continuous existence offering services in the installation of CCTV camera systems.

3.6.2. **Completed Projects.** Three completed projects consisting of a minimum of 5 cameras in each project where the personnel installed, tested and integrated CCTV cameras on outdoor, permanently mounted structure(s) and related camera control and transmission equipment. The completed CCTV camera system installations must have been in continuous satisfactory operation for a minimum of 1 yr.

3.6.3. **Equipment Experience.** Three projects (may be the three in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of equipment suppliers to perform specific stages of work. The Contractor will not be required to furnish equipment on this project from the supplier who furnished documentation demonstrating this experience.

Submit the names, addresses and telephone numbers of the references that can be contacted to verify the experience requirements given above.

3.7. **Documentation Requirements.** Provide a minimum of 2 complete sets of operation and maintenance manuals in bound hard copy format, as well as an electronic copy in Adobe PDF format on a CD/DVD or removable flash drive that include the following:

- complete and accurate wiring schematic diagrams,
- complete installation procedures,
- compliance matrix documenting conformance to this specification,
- complete performance specifications (Functional, electrical, mechanical and environmental) on the unit,
- complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA,

- pictorial of component layout on circuit board,
- ID Generator list of text display options,
- complete maintenance and trouble-shooting procedures,
- complete stage-by-stage explanation of circuit theory and operation,
- testing procedures and blank test forms,
- recovery procedures for malfunction,
- instructions for gathering maintenance assistance from manufacturer, and
- provide the Department with certification documentation verifying conformance with environmental and testing requirements contained in the special specification. Certifications may be provided by the manufacturer or through independent labs.

Identify material which is copyrighted or proprietary in nature as part of the documentation submittal. The Department will comply with sensitive material and secure submittal documentation and not distribute without written approval.

3.8. **Testing.**

3.8.1. **New Installations.** Unless otherwise shown on the plans, perform the following tests on the applicable equipment or systems.

3.8.1.1. **Test Procedures Documentation.** Provide 5 copies of the test procedures to include tests identified in Article 5.1.2 through Article 5.1.7 inclusive and blank data forms to the Engineer for review and comment as part of material documentation requirements for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of test procedures. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms, as well as quantitative results. No bid item measurement or payment will be made until the Engineer has verified the test results meet the minimum requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy identified during testing by the Contractor. Furnish data forms containing the acceptable range of expected results as well as the measured values.

3.8.1.2. **Design Approval Test.** Conduct a design approval test on one randomly selected unit from the prototype design manufacturing run. If only 1 design prototype is manufactured, perform this test on that unit. If supplying multiple types of the equipment, provide and test a sample of each type.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the District in which this contract is executed. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

3.8.1.2.1. **Power Service Transients.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the power service transients as specified in Section 2.2.7.2, “Transient Tests (Power Service)” of the NEMA TS2 standard, most current version.

3.8.1.2.2. **Temperature and Condensation.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:

- stabilize the equipment at -30°F and test as specified in Sections 2.2.7.3, “Low-Temperature Low-Voltage Tests” and 2.2.7.4, “Low-Temperature High-Voltage Tests” of the NEMA TS2 standard, most current version
- allow the equipment to warm up to room temperature in an atmosphere having relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure, and
- stabilize the equipment at 165°F and test as specified in Sections 2.2.7.5, “High-Temperature High Voltage Tests” and 2.2.7.6, “High-Temperature Low-Voltage Tests” of the NEMA TS2 standard, most current version.

3.8.1.2.3. **Relative Humidity.** Provide equipment that meets the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.

3.8.1.2.4. **Vibration.** Provide equipment that shows no degradation of mechanical structure, soldered components, or plug-in components and operates in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in Section 2.2.8, “Vibration Test” of the NEMA TS2 standard, most current version.

3.8.1.2.5. **Power Interruption.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to nominal input voltage variations as specified in Section 2.2.10 “Power Interruption Test” of the NEMA TS2 standard, most current version.

3.8.1.3. **Demonstration Test.** Conduct a demonstration test on applicable equipment at an approved Contractor facility. The Contractor may submit procedures and results from previous contracts in the same District as this Contract provided the materials and equipment are identical, provided results are less than 5 yr. old. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

3.8.1.3.1. **Examination of Product.** Examine each unit carefully and document that the materials, design, construction, markings and workmanship comply with the requirements of this Item.

3.8.1.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements of the appropriate paragraphs in this Item.

3.8.1.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements of this Item.

3.8.1.4. **Field Acceptance (Stand-Alone) Test.** Conduct a field acceptance test for each unit after installation as required by the Engineer in order to demonstrate compliance with the functional requirements with this Item. Exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test. The field acceptance test may consist of the following:

3.8.1.4.1. **Physical Construction.** Document physical construction is completed in accordance with the plans and specification.

3.8.1.4.2. **Electrical and Communication.** Document that all connectors for grounding, surge suppression, and electrical distribution are tightened correctly. Document all power supplies and circuits are operating under the proper voltages. Document all power and communications cables are terminated correctly, secured inside the cabinet, and fitted with appropriate connectors.

3.8.1.4.3. **Video Signal.** For analog signal format, conduct an impedance test, through a short 75 ohm coaxial cable, to an oscilloscope waveform monitor to ensure 75 ohm output impedance to conform with NTSC standards.

Through use of a digital, hand-held, battery operated meter, conduct a test and measure the following video signal characteristics, if applicable:

3.8.1.4.3.1. **Sync.** Document the amplitude of the video synchronizing pulse and check for correct video level, coaxial cable continuity, and correct termination level is 40 IRE.

3.8.1.4.3.2. **Luminance.** Document the white level and correct brightness setting is 100 IRE.

3.8.1.4.3.3. **Composite.** Document the overall amplitude of the video signal is at 140 IRE or 1 V peak to peak.

3.8.1.4.3.4. **Color Burst.** Document color burst amplitude at 40 IRE.

3.8.1.4.3.5. **Ground-loop.** Document that no ground loop exists in the video picture. Ground loop voltages in the video signal causes bars to be present on the video picture.

Document video image is present and free from over-saturation and any other image defect in both color and monochrome modes.

Document video support of unicast and multicast video transmission modes.

Document the video signal from the camera is present and of consistent quality at all connection points between the camera, the cabinet, and any video conversion hardware.

3.8.1.4.4. **Communication.** For digital camera models, document network connection to the camera through ping or telnet session from a remote PC. For analog camera models, document serial data transmission to execute control through serial ports.

3.8.1.4.5. **Pan-Tilt Mechanism.** Exercise pan, tilt, zoom, and focus in all directions and execute a minimum of 3 other unique programming commands, specified by the Department, to ensure that the communication link between the cabinet and the camera is functioning properly.

3.8.1.5. **System Integration Test.** Conduct a system integration test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests.

Provide systems integration test procedures for proper adjustment and calibration of subsystem components. Proper adjustment and calibration involves documenting settings used to meet functional requirements while providing a margin for adjustment when future conditions change. Utilize the Department control software (when available) to perform subsystem testing. At a minimum, utilize this software to verify commands and confirms, as well as, detector actuations and occupancy dwell time. The Contractor is responsible for being familiar with any existing Department equipment and software.

The failure of any one component material or equipment item in a system integration test is justification for rejecting the entire subsystem. Each subsystem component must function as a complete integrated subsystem for a minimal continuous 72 hr. period during the system integration test.

3.8.1.6. **Final Acceptance Test.** Following completion of the demonstration test, standalone test, and system integration test for all subsystems, provide completed data forms containing all of the data taken, including quantitative results for all tests, a set of “as built” working drawings, and a written request to begin a data communication and final acceptance test. Provide “as built” working drawings indicating the actual material, equipment, and construction of the various subsystem components, including established and calculated XY coordinates based on project control points provided by the Engineer, when shown on the plans. Perform field surveying and calculations under the supervision of and sealed by a licensed land surveyor.

Within 10 calendar days of the request, execute a data communications test using a Department supplied software program or Contractor supplied software approved by the Department. The data communications test may be executed by the Engineer or the Contractor with the prior approval of the Engineer. The purpose of this test is to verify that the communications plant will operate with application software provided by the State.

Perform the data communications test for a period of 72 hr. If a message error or component failure occurs anywhere in the network, resume the test once repairs are completed. All components of the communications network must operate as an integral system for the duration of the test.

A message error is defined as the occurrence of a parity error, framing error, or data error in any component of the message. The error free message rate is defined as the ratio of the number of messages in which no message error occurs to the number of messages transmitted. The error free message rate must exceed 99.99% for acceptable transmission quality, both for the system as a whole, and for each component of the network.

Provide all additional test results to the Engineer for review once a successful data communications test has been completed. If all the requirements of this specification have been satisfied, contract time will stop and all subsystems will be placed into operation and operate as a complete system for a period of 90 days.

Notify the Engineer of any defects suspected in integration or function of material or equipment. Investigate any suspected defects and correct if necessary. Provide a report of finding within 2 calendar days of notice of any suspected defects. Describe the nature of the any defects reported and any corrective action taken in the report. The integrated subsystems must operate defect free as a single complete system for a minimum of 72 continuous hours during a 30 calendar day review period. If the number of defects or frequency of failures prevents any subsystems from operating as described above, the Engineer may reject the entire subsystem(s) integration test results and resume contract time. Provide any necessary corrections and resubmit subsystem(s) integration test results and a request to begin a final acceptance test which may include “as built” plans and a data communications test.

The CCTV field equipment under this Item will not be accepted until the system, inclusive of all subsystems, has operated satisfactorily for a period of 90 days and in full compliance with the plans and specifications after approval of all submitted test results and reports.

3.8.1.7. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.

Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.

3.8.1.7.1. **Consequences of Design Approval Test Failure**. If the equipment fails the design approval test, correct the fault within 30 days and then repeat the design approval test until successfully completed.

3.8.1.7.2. **Consequences of Demonstration Test Failure.** If the equipment fails the demonstration test, correct the fault within 30 days and then repeat the demonstration test until successfully completed.

3.8.1.7.3. **Consequences of Field Acceptance (Stand-Alone) Test Failure.** If the equipment fails the stand-alone test, correct the fault within 30 days and then repeat the stand-alone test until successfully completed.

3.8.1.7.4. **Consequence of System Integration Test Failure.** If the equipment fails the system integration test, correct the fault within 30 days and then repeat the systems integration test until successfully completed.

3.8.1.7.5. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the final acceptance test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a 30 consecutive day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime in excess of 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

3.8.2. **Relocation and Removal.**

3.8.2.1. **Pre-Test.** Provide 5 copies of the test procedures to include tests of the basic functionality of the unit and blank data forms to the Engineer for review and comment as part of material documentation requirements. Functionality tests may include, but are not limited to, physical inspection of the unit and cable assemblies, lens iris and zoom control, video signal, and pan-tilt mechanism. Include the sequence of the tests in the procedures along with acceptance thresholds. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of test procedures. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Conduct basic functionality testing prior to removal of CCTV field equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.

3.8.2.2. **Post Test.** Testing of the CCTV field equipment is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, “Legal Relations and Responsibilities”, after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing CCTV field equipment has been installed, conduct approved continuity, stand alone, and equipment system tests. Furnish test data forms containing the sequence of tests including all of the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin. Obtain Engineer’s approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.

The Department will conduct approved CCTV field equipment system tests on the field equipment with the central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

3.9. **Warranty.** Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 3 yr. or in accordance with the manufacturer's standard warranty if that warranty period is greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any CCTV field equipment with less than 90% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs according to the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

CCTV field equipment will be repaired or replaced at the Contractor's expense prior to completion of the final acceptance test plan in the event of a malfunction or failure. Furnish replacement parts for all equipment within 10 days of notification of failure by the Department.

3.10. **Training.** Conduct a training class for a minimum of 24 hr., unless otherwise directed, for up to 10 representatives designated by the Department on procedures of installation, operations, programming hardware settings, IP programming, port settings, testing, maintenance, troubleshooting, and repair of all equipment specified within this specification. Submit to the Engineer for approval, 10 copies of the training material at least 30 days before the training begins. Conduct training within the local area unless otherwise authorized by the Engineer. Consider operations through Department's Lonestar software when developing training modules.

4. MEASUREMENT

This Item will be measured by each CCTV field equipment unit and mounting apparatus furnished, installed, relocated, or removed, of the types specified as shown on the plans, or as directed.

5. PAYMENT

5.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "CCTV Field Equipment (Analog)", "CCTV Field Equipment (Digital)", and "CCTV Field Controller". This price is full compensation for making fully operational CCTV field equipment including any voltage converters or injectors, cables and connectors as shown on the plans; and all documentation, testing, training, software, equipment, labor, materials, tools, and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for CCTV field equipment mounting assemblies will be paid for at the unit bid price for "CCTV Mount (Pole)", "CCTV Mount (Post)", "CCTV Mount (Wall)", "CCTV Mount (Parapet)", "CCTV Mount (Pendant)", and "CCTV Mount (Mast)". This price is full compensation for furnishing and installing mounting bracket assemblies, mounting bracket hardware; and all equipment, labor, materials, tools, equipment, and incidentals necessary to mount CCTV field equipment to mounting structures as shown on the plans.

5.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "CCTV Field Equipment (Analog) (Install Only)" and "CCTV Field Equipment (Digital) (Install Only)." This price is full compensation for making fully operational CCTV field equipment including any voltage converters or injectors, furnishing and installing additional cables and connectors as shown on the plans; and all documentation, testing, training, software, equipment, labor, materials, tools, and incidentals.

5.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for relocation of CCTV field equipment will be paid for at the unit bid price for "Relocate CCTV Field Equipment." This price is full compensation for relocating and making fully operational existing CCTV field equipment as shown on the plans; furnishing and installing additional cables or connectors as shown on the plans; for testing, delivery and storage of components designated for salvage or reuse; and all testing, training, software, equipment, labor, materials, tools, and incidentals.

5.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for removal of CCTV field equipment will be paid for at the unit bid price for "Remove CCTV Field Equipment." This price is full compensation for removing existing CCTV field equipment as shown on the plans; removal of cables and connectors; for testing, delivery and storage of components designated for salvage; and all testing training, software, equipment, labor, materials, tools, and incidentals.

Special Specification 6027

Preparation of Existing Conduits, Ground Boxes, or Manholes

1. DESCRIPTION

Prepare conduits, ground boxes, or manholes; replace conduits, ground boxes, or manholes, when necessary; replace conduit fittings with junction boxes; replace damaged ground box or manholes covers; adjust ground box or manholes covers; install pull lines in conduits; install cable racks in ground boxes or manholes.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and to the pertinent requirements of the following Items:

- Item 624, “Ground Boxes”
- Item 465, “Manholes and Inlets”

When conduit replacement is required, provide conduit meeting the requirements of Item 618, “Conduit.” Use conduit of same size and type of that being replaced or as directed.

Provide 24 in. × 24 in. × 12 in. (L × W × D) minimum size NEMA 4X junction boxes with screw covers.

Provide polyester tapes or rope pull cords with a tensile strength of at least 1200 lb.

Provide heavy duty, non-metallic, non-corrosive cable racks that can support a minimum dead load of 300 lbs. Ensure cable racks are resistant to the effects of oils, hydrocarbons, common esters, ketones, ethers, or amides. Ensure cable racks are adjustable between 8 in. and 14 in. wide. Do not provide grounding or insulators for cable racks.

3. CONSTRUCTION

Check existing conduit and ground boxes.

3.1. **Preparation of Conduit, Ground Box or Manhole**. Pull a mandrel through empty conduits. Use a mandrel with a diameter greater than 70% of the inside diameter of the conduit and 2 in. length. Repair or replace conduit runs that will not allow passage of the mandrel. Replace conduit deemed impractical to repair or remains unsuitable in accordance with Item 618, “Conduit.” Clean the conduit by pulling a rubber swab slightly larger in diameter than the conduit.

Blow compressed air through conduits that contain wires. Remove debris from the conduit by pushing a fish tape through the conduit. Do not use water to clear debris. Retest the conduit by blowing compressed air.

Install 1 pull cord in each conduit for use in installing the conductors, cables, or innerduct. Leave 1 pull cord in each conduit after the conductors, cables, or innerduct have been installed.

Remove silt and debris from ground boxes or manholes prior to installing cable.

3.2. **Installation of Ground Box or Manhole**. Furnish new ground boxes or manholes as directed. Install ground boxes or manholes as shown the plans or as directed.

Backfill disturbed surface with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

3.3. **Installation or Adjustment of Ground Box or Manhole Covers**. Remove, dispose, and install ground box or manhole covers as shown on the plans or as directed. Adjust ground box or manhole covers as shown on the plans or as directed. Adjustment may include welding, raising, or lowering.

Backfill disturbed surface with material equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

3.4. **Installation of Junction Box**. Locate conduit fittings in conduits carrying fiber optic cables. Replace the conduit fitting and associated section of conduit with a junction box. Install junction boxes as shown on the plans.

3.5. **Installation of Cable Rack Assembly**. Install cable racks to permit coiling of conductors or cables without violating the manufacturer's minimum bending radius. Install 2 cable rack supports and 4 adjustable levels on each support, at a minimum, on each wall of the ground box or manhole as shown on plans or as directed. Anchor the cable rack support permanently to the ground box wall with mechanical or powder actuated fasteners. Use fasteners with an ultimate pull out strength of at least 2500 lb. and ultimate shear strength of at least 3000 lb. Provide sufficient cable supports for the particular number of conductors or cables coiled or passing through the ground box or manhole as shown on the plans or as directed.

4. MEASUREMENT

This Item will be measured by the foot of conduit cleared, tested, replaced and repaired, by each cable rack, junction box, ground box, or manhole installed or prepared, and by each ground box or manhole cover replaced or adjusted.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Conduit (Prepare),” “Junction Box (Install),” “Manhole (Install),” “Ground Box (Install),” “Manhole (Prepare),” “Ground Box (Prepare),” “Cover (Replace)” of the sizes specified, “Cover (Adjust),” and “Cable Rack Assembly (Install).” This price is full compensation for cleaning and testing conduit, ground boxes, and manholes; furnishing and installing pull cords, ground boxes, manholes, junction boxes, and cable racks; excavating and backfilling; adjusting ground boxes and manholes covers; disposal of unsalvageable material; and equipment, materials, labor, tools, and incidentals.

Repair of existing conduit will be paid for by the Department in accordance with Article 9.7., “Payment for Extra Work and Force Account Method.”

Special Specification 6039
Overhead Signs

1. DESCRIPTION

Remove and relocate existing overhead sign from current location on overhead sign supports to new or existing overhead sign supports.

2. MATERIALS

Repair damage caused by relocation process to the requirements of this Item, and the pertinent requirements of the following Items:

- Item 445, "Galvanizing"

Reuse undamaged components when relocating an existing overhead sign. If such components are damaged during relocation or if additional components are required, furnish galvanized steel, non-corroding stainless steel, or dichromate-sealed aluminum brackets, clamps, bolts, and other hardware, in accordance with DMS-7120, "Sign Hardware."

3. CONSTRUCTION

3.1. **Relocation**. Remove existing overhead sign and relocate to new or existing overhead sign support as shown on the plans. Repair or replace damaged components as directed. Reuse existing components, unless otherwise directed. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

3.2. **Handling and Storage**. Handle and store existing signs or portions of signs removed so that they are not damaged. Store all signs off the ground and in a vertical position until erected. Prevent any damage to the various sign assembly components. Replace any portion of the sign damaged by the Contractor designated for reuse or salvage, including messages removed. Stockpile all removed sign components that will be reused or that become the property of the Department at designated locations. Accept ownership of unsalvageable materials and dispose of them in accordance with federal, state, and local regulations.

3.3. **Cleaning**. After the sign has been installed, wash the entire sign with a biodegradable cleaning solution to remove dirt, grease, oil smears, streaks, finger marks, and other foreign materials. Biodegradable cleaning solution will be acceptable to the sheeting and screen ink manufacturers.

3.4. **Inspection**. Signs will be inspected for damage after relocation and installation by both daylight and night visual inspection. Damage to the sign face that is not visible when viewed at a distance of 50 ft. will be acceptable. Replace unacceptable signs.

4. MEASUREMENT

This Item will be measured as each overhead sign relocated.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Relocate Existing Overhead Signs".

This price is full compensation for removing overhead signs; storing the components to be reused or salvaged; disposal of unsalvageable material; reinstalling existing overhead sign on new or existing overhead sign supports; loading and hauling; and equipment, materials, labor, tools, and incidentals.

Special Specification 6064

Intelligent Transportation System (ITS) Pole with Cabinet

1. DESCRIPTION

Furnish, install, relocate, or remove Intelligent Transportation System (ITS) pole structures and pole mounted cabinets of the various types and sizes at locations shown on the plans, or as directed.

1.1. **ITS Equipment Application.** At a minimum, the ITS pole structure serves as the structural support for the following ITS equipment applications:

- closed circuit television (CCTV),
- fixed video,
- microwave vehicle detector (MVD) or radar vehicle sensing device (RVSD),
- bluetooth equipment,
- wireless radio equipment,
- environmental sensor station (ESS),
- solar power system, and
- pole mounted cabinets.

Ensure the equipment, design, and construction use the latest available techniques with a minimum number of different parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Design the equipment for ease of maintenance. All component parts must be readily accessible for inspection and maintenance. The only tools and test instruments required for maintenance by maintenance personnel must be simple hand held tools, basic meters and oscilloscopes.

2. MATERIALS

Provide materials that comply with the details shown on the plans or as directed, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 416, “Drilled Shaft Foundations,”
- Item 421, “Hydraulic Cement Concrete,”
- Item 440, “Reinforcement for Concrete,”
- Item 441, “Steel Structures,”
- Item 442, “Metal for Structures,”
- Item 445, “Galvanizing,”
- Item 449, “Anchor Bolts,”
- Item 496, “Removing Structures,”
- Item 618, “Conduit,”
- Item 620, “Electrical Conductors,” and
- Item 740, “Graffiti Removal and Anti-Graffiti Coating”.

2.1. **Anchor Bolts.** Provide anchor bolts, nuts, and washers that conform with the details shown on the plans, the requirements of this Item, and in accordance with Item 449, “Anchor Bolts.”

Furnish “medium strength, mild steel” anchor bolts for anchor bolts 1 in. or less in diameter, unless otherwise shown on the plans. Furnish “alloy steel” anchor bolts for anchor bolts greater than 1 in. diameter, unless otherwise shown on the plans.

2.2. **ITS Poles.** Provide material for pole shafts that conforms to the requirements on the plans and the requirements of ASTM A1011 SS Grade 50, A572 Grade 50, A1011 HSLAS Grade 50, or A595 Grade A. Material thicknesses in excess of those stipulated under A1011 will be acceptable providing it meets all other ASTM A1011 requirements and the requirements of this specification. A595 Grade A material must have a minimum of 50 ksi yield strength adjacent to base welds after fabrication.

Fabrication plants that produce steel ITS poles must be approved in accordance with DMS-7380, “Steel Non-Bridge Member Fabrication Plant Qualification.” The Department maintains an MPL of approved ITS pole fabrication plants.

2.3. **ITS Pole Mounted Cabinet.** Provide ITS pole mounted cabinets to house ITS field equipment as shown on the plans or as directed. ITS equipment applications inside the cabinet may include, but is not limited to:

- CCTV field equipment,
- fixed video,
- radar vehicle sensing device (RVSD),
- dynamic message sign (DMS) or lane control signal (LCS) controller,
- bluetooth equipment,
- highway advisory radio (HAR),
- media conversion equipment,
- hardened ethernet switch,
- wireless radio equipment,
- environmental sensor station (ESS),
- roadway weather information system (RWIS), and
- solar power system.

Provide the cabinet with fully wired back panels, with all the necessary terminal boards, wiring, harnesses, connectors and attachment hardware for each cabinet location. Place all terminals and panel facilities on the lower portion of the cabinet walls below all shelves.

Typically, an ITS pole mounted cabinet may contain, but is not limited to, the following:

- 19-in. EIA rack,
- adjustable shelves,
- fan and thermostat,
- cabinet light,
- back panel,
- surge protection,
- terminal strips,
- interconnect harnesses with connectors,
- “Door Open” connection to back panel,
- ITS equipment hardware (as listed in Article 2.3), and
- all necessary installation and mounting hardware.

Ensure all cabinets are identical in size, shape and quality for each type as provisioned on the plans or as directed. Equip and configure the cabinet set-up as defined in this Specification and as detailed in the ITS pole with cabinet standards.

Submit details of the cabinet design and equipment layout for each cabinet to the Engineer for review and approval before fabrication.

2.4. **Electrical Requirements.**

2.4.1. **Primary Input Power Interruption.** Use material that meets all the requirements in Section 2.1.4., "Power Interruption" of the National Electrical Manufacturers Association (NEMA) Standard TS2 for traffic control system, or most current version.

2.4.2. **Power Service Transients**. Use material that meets all the requirements in Section 2.1.6., "Transients" of the NEMA Standard TS2 for traffic control system, or most current version.

2.4.3. **Power Service Protection.** Ensure that equipment contains readily accessible, manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide circuit breakers or fuses sized such that no wire, component, connector, PC board or assembly is subjected to sustained current in excess of their respective design limits upon failure of any single circuit element or wiring.

2.4.4. **Power Distribution Panel.** Provide cabinets with a 120 VAC +/- 5 VAC power distribution panel. Provide the following components on the panel:

2.4.4.1. **Duplex Receptacles**. Provide two 120 VAC NEMA Type 5-15R duplex receptacles, or as shown on the plans, protected by a circuit breaker. Permanently label duplex receptacles "For Internal ITS Equipment Only." Install duplex receptacles in an isolated location and provide a clear 1/8 in. thick removable cover made from transparent thermoplastic material to cover the duplex receptacles. Ensure this cover is installed as not to interfere with the functional operation within the cabinet and allows enough space to plug in AC adapters and any necessary equipment. Submit alternative cover material for approval as part of the documentation submittal requirement.

2.4.4.2. **Ground Fault Circuit Interrupter (GFCI) Duplex Receptacles**. Provide at least one 120 VAC NEMA Type 5-15R GFCI duplex receptacle, or as shown on the plans, protected by a circuit breaker. This GFCI duplex receptacle is intended for maintenance personnel and is not to be used to serve equipment inside the cabinet. Permanently label GFCI duplex receptacles "For Personnel Use." Install GFCI duplex receptacles in a readily accessible location.

Provide a 120 VAC, rack mountable outlet strip with 6 NEMA Type 5-15R receptacles with surge suppression. Plug outlet strip into GFCI duplex receptacle and label for personnel use.

Circuit Breakers. Determine the ampere rating, quantity, and configuration for main, accessory, spare, and equipment circuit breakers to support ITS equipment loads as shown on the plans. Provide Underwriters Laboratories (UL) 489 listed circuit breakers capable of operating in accordance with Section 2, "Environmental Standards and Test Procedures" of NEMA TS2-2003, or most current version. Provide circuit breakers with an interrupt capacity of 5,000 A. and insulation resistance of 100 megohms at 500 VDC. Provide minimum ampere rating for the following circuit types:

2.4.4.2.1. **Main Breaker**. Size the main circuit breaker such that the load of all branch circuits is less than the main circuit breaker ampere rating in accordance with the most current version of the National Electrical Code (NEC).

2.4.4.2.2. **Accessory Breaker**. Minimum 15 A. Size accessory circuit breaker to protect lighting, door switches, fans, and GFCI duplex receptacle in accordance with the most current version of the NEC.

2.4.4.2.3. **Equipment Breakers**. Minimum 15 A. Size equipment circuit breaker to protect ITS equipment and duplex receptacles in accordance with the most current version of the NEC.

2.4.4.2.4. **Spare Equipment Breaker**. Minimum 20 A. Provide one spare equipment breaker for future use.

Furnish breakers, which are in addition to any auxiliary fuses, with the electronic equipment to protect component parts. Provide 3-terminal lightning arrestor to protect the load side of all circuit breakers. Connect

the arrestor into the circuit with size 8 AWG or larger stranded copper conductors. Connect arrestor to the line filter as recommended by the manufacturer.

2.4.4.3. **Power Line Surge Protection.** Provide and install power line surge protection devices that meet the requirements of Article 2.6.

2.4.4.4. **Power Cable Input Junction Terminals.** Provide power distribution blocks suitable for use as a power feed and junction points for 2 and 3 wire circuits. Accommodate up to No. 4 AWG conductors on the line side of each circuit. Provide appropriate sized lugs at the junction terminals for conductors larger than a No. 4 AWG when shown on the plans.

Electrically isolate the AC neutral and equipment ground wiring from the line wiring by an insulation resistance of at least 10 megohms when measured at the AC neutral. Color code the AC neutral and equipment grounding wiring white and green respectively in accordance with the most current version of the NEC.

Utilize the back panel to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment called out on the plans. Each item of equipment including any furnished by the Department must have the cable harness properly terminated at terminal boards on the back panel. Ensure all functions available at the equipment connector are carried in the connector cable harness to the terminal blocks from the power distribution panel mounted on the left side panel of the cabinet.

2.4.5. **Alternative Power Option.** When shown on the plans, accommodate renewable electrical power source for the design load specified in accordance with “ITS Solar Power System” Specification. Renewable electrical power source may, or may not, be integrated with public utility electrical services, as shown on the plans or as directed. Accommodate solar system components including batteries and solar charge controller when shown on the plans.

2.4.6. **Wiring.** Ensure all cabinet wiring identified by the use of insulated pre-printed sleeving slipped over the wire before attachment of the lug or making the connection. Supply enough text on wire markers in plain words or abbreviations with sufficient level of detail so that a translating sheet will not be required to identify the type and size of wire.

Cut all wires to the proper length before assembly. Ensure no wires are doubled back to take up slack. Ensure harnesses to connectors are covered with braided cable sleeves. Secure cables with nylon cable clamps.

Provide service loops to facilitate removal and replacement of assemblies, panels and modules. Use insulated parts and wire rated for at least 600 V. Color-code harnesses and wiring.

Route and bundle all wiring containing line voltage AC separately and shield from all low voltage, i.e., control circuits. Cover all conductors and live terminals or parts, which could be hazardous to maintenance personnel, with suitable insulating material.

Provide AC internal cabinet wiring identified in accordance with the most current version of the NEC. Provide white insulated conductors for AC neutral. Provide green insulated conductors for equipment ground. Provide any color different from the foregoing on other conductors in accordance with the most current version of the NEC. For equipment that requires grounding, provide grounding conductors and do not use conduit for grounding. Provide No. 22 AWG or larger stranded conductors for internal cabinet wiring. Provide conductors that are UL-listed THHN in accordance with the most current version of the NEC. Ensure the insulation has at least a thickness of 10 mm. Ensure all wiring containing line voltage is at least size No. 14 AWG. No strands of any conductor may be trimmed to “fit” the wiring into the breaker or terminal block.

2.4.7. **Terminal Strips.** Provide terminal strips located on the back panel that are accessible to the extent that it is not necessary to remove the electronic equipment from the cabinet to make an inspection or connection.

Ensure terminal blocks are 2 position, multiple pole barrier type.

Provide shorting bars in each of the positions provided along with an integral marking strip.

Arrange terminal blocks such that they will not upset the entrance, training and connection of incoming field conductors.

Identify all terminals with legends permanently affixed and attached to the terminal blocks.

Ensure not more than 3 conductors are brought to any 1 terminal screw.

Ensure no electrically energized components or connectors extend beyond the protection afforded by the barriers.

Locate all terminal blocks below the shelves.

Ensure terminals used for field connections are secure conductors by means of a No. 10-32 nickel or cadmium plated brass binder head screw.

Ensure terminals used for interwiring connections, but not for field connections, are secure conductors by means of a No. 5-32 nickel plated brass binder head screw.

Terminate all connections to and from the electronic equipment to an interwiring type block. These blocks will act as intermediate connection points for all electronic equipment input and output.

Provide termination panels that are used to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment as shown on the plans. Provide properly terminated cable harnesses for each item including any furnished by the Department. Provide all functions available at the equipment terminals that are carried in the connector cable harness.

2.4.8. **Cabinet Internal Grounding.** The cabinet internal ground consists of at least 1 ground bus-bar permanently affixed to the cabinet and connected to the grounding electrode.

Use bare stranded No. 4 AWG copper wire between bus-bars and between the bus-bar and grounding electrode when providing multiple bus-bars.

Ensure each copper ground bus-bar has a minimum of 12 connection points, each capable of securing bare conductor ranging in size from No 4 AWG to No 14 AWG.

Return AC neutral and equipment ground wiring to these bus-bars.

2.4.9. **Door Switch.** Provide door switch meeting the following requirements:

- momentary, pin-type door switch,
- installed in the cabinet or on the door, and
- connected to a terminal so that the equipment installed in the cabinet can confirm input is connected to logic ground when the cabinet door is open.

Provide 2 momentary, pin type door switches for each door provided with the cabinet. Wire 1 switch to turn on the cabinet lights when the door is open and off when the door is closed. Wire the other in parallel to a terminal block to detect a cabinet intrusion condition.

2.5. **Mechanical Requirements.**

2.5.1. **Size and Construction.** Provide ITS pole mounted cabinets meeting the configuration types detailed in the Statewide ITS pole with cabinet standards.

Table 1
Minimum Cabinet Internal Dimensions

	Depth (in.)	Width (in.)	Height (in.)
Type 1	12[1]	24	24
Type 2	18	24	36
Type 3	20	24	41

1. Minimum dimension for cabinet provided without EIA 19 in. rack assembly. Provide 18 in. minimum depth when providing EIA 19 in. rack assembly.

Determine the suitability of the listed cabinet configuration types for the equipment at each field location identified on the plans or as desired.

2.5.2. **Ventilation.** Provide the cabinet with vent openings to allow cooling of electronic components.

Locate louvered air intake vent openings on the lower portion of the cabinet doors and covered fully on the inside with a commercially available disposable 3 layer graded pleated type filter of minimum size 6 in. (high) x 12 in. (wide) for Type 1 cabinet and 12 in. (high) x 16 in. (wide) for Type 2 and 3 cabinets. Size the louvered intake area and filter to allow maximum filtered air flow and cooling, securely mounted so that any air entering the cabinet must pass through the filter. Ensure the cabinet opening for intake of air is large enough to accommodate filter size. Screen the exhaust to prevent entry of insects. Provide the screen openings no larger than 0.0125-sq. in.

Provide a, minimum of 2, thermostatically controlled fans that are adjustable with an adjustment range of 70 to 110°F. Provide a press-to-test switch to test the operation of the fan. Provide a fan with a capacity of at least 110 cfm each.

There is no opening on the roof of the cabinet.

2.5.3. **Lighting.** Provide minimum 15 W fluorescent fixtures above each door inside the cabinet, each with clear shatter proof lens. NEMA TS2 rated light-emitting diode (LED) fixtures are acceptable instead of fluorescent light fixtures. Determine the appropriate number of fixtures to achieve at least 1000 lumens to illuminate the equipment. Position the fixtures to provide illumination to the face of the equipment in the cabinet and not into a technician's eyes.

2.5.4. **Exterior Finish.** Provide cabinets with a smooth aluminum finish and the exterior in its unpainted natural color.

When shown on the plans or as directed, provide cabinets with an anti-graffiti coating in accordance with Item 740 "Graffiti Removal and Anti-Graffiti Coating."

2.5.5. **Serial Number.** Provide the cabinets with a serial number unique to the manufacturer, preceded by an assigned 2 letter manufacturer's code. Provide at least a 0.2 in. letter height. Stamp the entire identification code and number on a metal plate which is riveted to the cabinet, stamp directly on the cabinet wall, or engrave on a metalized mylar plate that is epoxied on the upper right hand cabinet side wall.

2.5.6. **Modular Design.** Provide cabinets that have a modular design and allows ITS equipment to be installed in a variety of mounting configurations as detailed on the plans or as directed.

Provide Type 1 and Type 2 cabinets with 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment. Provide a 19 in. EIA rack assembly only when noted on the plans or in the general notes.

Provide Type 3 cabinets with an EIA 19 in. rack assembly, sized appropriately based on cabinet type inside height dimension and is accessible from either door. Provide a rack with a minimum of one 1RU (RU = rack

unit) horizontal power strip. Provide 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment.

2.5.7. **Shelves.** Provide adjustable shelves in each cabinet as required to support the equipment as specified on the plans. Ensure shelf adjustment at 1 RU intervals in the vertical position. Provide shelves that can be mounted to an EIA 19 in. rack cage or unistrut channel as detailed in the standards.

Provide shelves that are removable and capable of supporting the electronic equipment. Provide a minimum of 2 in. between the back and front edge of the shelf to back inside wall and door of the cabinet respectively to allow room for the equipment cables and connectors.

Provide each cabinet type with at least 1 slide out drawer with telescoping drawer guides to allow full extension from the rack frame. Provide at least 1.75 in. (high) x 16 in. (wide), drawer sized appropriately for the cabinet with a hinged lid to allow access to storage space.

2.5.8. **Mounting Hardware.** Provide cabinets with the appropriate “U” channel mounting brackets, stiffening plates, anchor bolts, and any other necessary hardware to mount the cabinet on the ITS pole structure. Provide mounting brackets made of 0.250 in. thick steel.

Weld cabinet mounting plates to the pole. This may be done in the field for transport reasons. Do not band the cabinet or mounting plates to the pole. Design the cabinet for pole mounting and reinforce at the points of attachment to the pole

2.6. **Surge Protective Devices (SPD).** Provide SPDs to protect electronics from lightning, transient voltage surges, and induced current. Install SPDs on all power, data, video, and any other conductive circuit.

2.6.1. **120 V or 120/240 V SPD at Service and ITS Cabinet Power Distribution Panel.** Install an SPD at the closest termination or disconnection point where the supply circuit enters the cabinet. Locate the SPD on the load side of the cabinet power distribution panel breakers and ahead of any and all electronic devices. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD and labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20 kA I-nominal rating. Provide SPD rated as NEMA 4. SPD with integral EMI/RFI line filtering may be required if shown on the plans.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N, L-G, and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40 kA the SPD surge current rating per mode (L-N), (L-G), (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV’s operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

Ensure the SPD utilized for AC power does not dissipate any energy and does not provide any series impedance during standby operation. Return the unit to its non-shunting mode after the passage of any surge and do not allow the shunting of AC power

2.6.2. **Parallel SPD for 120 V Equipment.** Install an SPD inside of the cabinet on the power distribution to the equipment. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20 kA I-nominal rating. Provide SPD rated as NEMA 4.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40 kA the SPD surge current rating per mode (L-N) and (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV's operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

2.6.3. **Low-Voltage Power, Control, Data and Signal Systems SPD.** Install a specialized SPD on all conductive circuits including, but not limited to, data communication cables, coaxial video cables, and low-voltage power cables. Ensure that these devices comply with the functional requirements shown in Table 2 for all available modes (i.e., power L-N, N-G; data and signal center pin-to-shield, L-L, L-G, and shield-G where appropriate).

These specialized SPD must have an operating voltage matching the characteristics of the circuit. Ensure that these specialized SPD are UL 497B or UL 497C Listed, as applicable.

Provide the SPD with 3 stages of surge suppression in a Pi (π) configuration. The first stage (primary side) consists of parallel-connected Gas Discharge Tubes (GDTs). The second stage consists of a series connected resistor or inductor. The third stage (secondary side) consists of parallel-connected transorbs or silicone avalanche diodes (SADs).

Ground the SPD to the DIN rail and a wire terminal connection point. (Grounding solely through the DIN rail connection is not adequate and does not meet the performance or intent of this specification.)

Install coaxial SPDs in a manner that prevents ground loops and resulting signal deterioration. This is usually caused where the cable has different references to ground at either end and connecting SPDs at both ends that have only Pin to Shield protection completes a ground loop circuit through the Shield. SPDs having Pin to Shield protection, and separate Shield to Ground protection are acceptable to eliminate ground loops.

Table 2
SPD Minimum Requirements

Circuit Description	Maximum Continuous Operating Voltage (MCOV)	Frequency/ Bandwidth/ Data Rate	Surge Capacity	Maximum Let-Through Voltage
12 VDC	15-20 V	N/A	5 kA per mode (8x20 µs)	<150 Vpk
24 VAC	30-55 V	N/A	5kA per mode (8x20 µs)	<175 Vpk
48 VDC	60-85 V	N/A	5 kA per mode (8x20 µs)	<200 Vpk
Coaxial Composite Video	4-8 V	Up to 1.5 GHz	10 kA per mode (8x20 µs)	<100 Vpk
RS422/RS485	8-15 V	Up to 10 Mbps	10 kA per mode (8x20 µs)	<30 Vpk
T1	13-30 V	Up to 10 Mbps	10 kA per mode (8x20 µs)	<30 Vpk
Ethernet Data	7-12 V	Up to 100 Mbps	3kA per mode (10x1000 µs)	<30 Vpk

2.7. **Environmental Design Requirements.** Provide cabinets that meet the functional requirements of this Item during and after subjection to any combination of the following requirements:

- ambient temperature range of -30 to 165°F,
- temperature shock not to exceed 30°F per hour, during which the relative humidity does not exceed 95%,
- relative humidity range not to exceed 95% over the temperature range of 40 to 110°F, and
- moisture condensation on all surfaces caused by temperature changes.

2.8. **Vibration.** Material used must show no degradation of mechanical structure, soldered components, plug in components or satisfactory operation in accordance with the manufacturer's equipment specifications after being subjected to the vibration test as described in the NEMA standard TS2, Section 2.2.8, “Vibration Test”, or the latest revision.

3. FABRICATION

3.1. **Anchor Bolts.** Fabricate anchor bolts, nuts, and washers in accordance with the details shown on the plans and Item 449, ”Anchor Bolts.” Galvanize these items in accordance with Item 445, “Galvanization.”

Provide 2 circular steel templates as shown on the plans conforming to ASTM A36 for each assembly. Tack weld the lower anchorage nuts to the lower template in the shop. Perform this welding with an appropriate jig to ensure that the anchor bolt is perpendicular to the template. Shipping of the anchor bolt cage in its assembled condition is not required.

3.2. **ITS Poles.** Fabricate ITS poles in accordance with the details shown on the plans, this Item, and Item 441, "Steel Structures." Alternate designs are not acceptable unless approved by the Department.

Provide properly fitting components. Provide round, octagonal (8-sided), or dodecagonal (12-sided) pole shafts tapered to the heights shown on the plans.

Permanently mark, at a visible location when erected, ITS pole base plates with the design wind speed. Locate the handholes, as shown on the plans, opposite of the direction of traffic flow.

Permanently mark, at a visible location when erected, ITS pole base plates with the fabrication plant's insignia or trademark. Place the mark on the pole base plate adjacent to the handhole access compartment.

Provide circumferential welds only at the ends of the shaft. Provide no more than 2 longitudinal seam welds in shaft sections. Grind or smooth the exterior of longitudinal seam welds to the same appearance as other shaft surfaces. Ensure 100% penetration within 6 in. of circumferential base welds and 60% minimum penetration at other locations along the longitudinal seam welds. Use a welding technique that minimizes acid entrapment during later galvanizing. Hot-dip galvanize all fabricated parts in accordance with Item 445, "Galvanizing."

Fabricate air terminal and bracket assembly to serve as a lightning arrestor in accordance with ITS pole air terminal details and IEEE standards for lightning protection. Bond air terminal with air terminal bracket via clad weld or other approved bolted connection.

3.3. **Cabinet.** Continuously weld all exterior seams for cabinet and doors. Fill edges to a radius of 0.03125 in. minimum. Smooth exterior welds.

Welding on aluminum cabinets are done by the gas metal arc (MIG) or gas tungsten arc (TIG) process using bare aluminum welding electrodes. Ensure electrodes conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes.

Procedures, welding machines and welding machine operators for welding on aluminum must be qualified and conform with the requirements of AWS B3.0, "Welding Procedures and Performance Qualification", and to the practices recommended in AWS C5.6.

Construct all cabinets of welded sheet aluminum with a thickness of at least 0.125 in. meeting NEMA 3R standards. Do not allow wood, wood fiber product, or flammable products in the cabinet. Seal cabinet structure to prevent the entry of rain, dust, and dirt.

Provide a sunshield on the exterior top of the cabinet to reflect solar rays and mitigate temperature build-up inside the cabinet. Construct sunshield out of 0.125 in. thick aluminum and provide a minimum of 1.25 in. clearance above the top of cabinet secured in four locations.

Attach aluminum lifting eyes or ears to the top of the cabinet to permit lifting the cabinet with a sling. Lifting eyes may be permanently fabricated to the cabinet frame as long as they do not interfere with the construction and operation of the sunshield. Manufacturer may provide removable lifting eyes that can be removed after installation. Seal any penetrations to the cabinet exterior or sunshield after removal of lifting eyes.

Ensure cabinets conform to the requirements of ASTM designation: B209 for 5052-H32 aluminum sheet.

3.3.1. **Door.** Provide sturdy and torsionally rigid cabinet doors that substantially cover the full area of the cabinet access opening. Attach cabinet doors by a minimum of 2 heavy duty hinges or full length hinge. Provide stainless steel hinge pins.

Fabricate the doors and hinges to withstand a 100 lb. per vertical ft. force applied to the outer edge of the door when open without permanent deformation or impairment of the door or cabinet body when the load is removed.

Fit the cabinet doors with Number 2 Corbin locks and aluminum or chrome plated handles with a minimum 3/8 in. drive pin and a 3 point latch. Design the lock and latch so that the handles cannot be released until the lock is released. Provide a locking ring for a padlock along with a padlock. Provide 2 keys for the door and 2 keys for the padlock with each cabinet. Locate the lock clear of the arc of the handle. Keys must be removable in the locked position only. Mount locks with 2 stainless steel machine screws. Provide cabinet doors with a catch mechanism to hold the door open at 2 positions: 90º and 120°.

Fabricate the door and door stop mechanism to withstand a simulated wind load of 5 lb. per sq. ft. applied to both inside and outside surfaces without failure, permanent deformation, or compromising of door position.

Provide cabinets without auxiliary police doors.

Provide a gasket to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material must be of a non-absorbent material and maintain its resiliency after long term exposure to the outdoor environment.

Provide a gasket with a minimum thickness of 0.25 in. Locate the gasket in a channel provided for this purpose either on the cabinet or on the door. An "L" bracket is acceptable instead of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.

3.3.2. **Mechanical Components.** Ensure all external screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws unless specifically approved by the Engineer.

Ensure all parts are made of corrosion resistant material, such as plastic, stainless steel, aluminum or brass.

Ensure all materials used in construction are resistant to fungus growth and moisture deterioration.

Separate dissimilar metals by an inert dielectric material.

4. CONSTRUCTION

4.1. **Installation.** Locate ITS poles as shown on the plans unless otherwise directed to secure a more desirable location or to avoid conflict with utilities. Stake the ITS pole locations for verification by the Engineer.

Use established industry and utility safety practices when working near underground or overhead utilities. Consult with the appropriate utility company before beginning such work.

Construct foundations for new ITS poles in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans." Orient anchor bolts as shown on the plans. Install conduit per Item 618, Conduit."

Identify all items of a shipment with a weatherproof tag. This tag minimally must identify manufacturer, contract number, and date and destination of shipment.

Erect poles after foundation concrete has attained its design strength as required on the plans and Item 421, "Hydraulic Cement Concrete." Coat anchor bolt threads and tighten anchor bolts in accordance with Item 449, "Anchor Bolts." Do not grout between the base plate and the foundation.

Mount the pole mounted cabinet to the backside of the ITS pole, with door either parallel or perpendicular to the roadway, away from the direction of traffic flow, as shown on the plans. Mount cabinet plumb in all directions.

For ITS pole sites located on slopes greater than 4H:1V, mount the pole mounted cabinet to the backside of the ITS pole, from the perspective parallel to the roadway with the door facing the direction of traffic flow as shown on the plans.

Install grounding conductor from cabinet and ITS pole air terminal inside a minimum 1 in. PVC conduit within the foundation. Bond grounding conductors to the primary ground rod as part of the grounding ring in accordance with the ITS grounding details.

Construct reinforced maintenance pad, when required, with Class A concrete in accordance with Item 421, “Hydraulic Cement Concrete.” Provide reinforcing steel in accordance with Item 440, “Reinforcing Steel.”

4.2. **Relocation.** Before removal of the existing pole structure or cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment and remove any ITS equipment, associated mounting brackets, pole mounted cabinet, and cabling from the pole structure. Remove existing pole structure as shown on the plans only at such time as authorized by the Engineer.

Inspect the existing pole structure, with a representative from the Department, and document any evidence of structural stress cracks or fatigue before removal. Remove and deliver to the Department, existing pole structures that fail structural inspection to an address to be supplied by the Department.

Remove the existing pole structure in a manner acceptable to the Engineer using a method that does not cause undue overstress or damage to the structure or appurtenances attached.

Use a crane of sufficient capacity to remove the pole. Disconnect and relocate the existing pole structure from and to the foundation as shown on the plans in a manner acceptable to the Engineer.

When the poles are laid down, place the poles on timber cribbing so that the poles lie reasonably straight to prevent any damage or deterioration.

Maintain safe construction and operation practices at all times. Handle the poles in such a manner during removal so as to prevent damage to the pole's exterior finish. The Contractor will be responsible for any damage to poles.

Unless otherwise shown on the plans, remove abandoned concrete foundations, including steel, to a depth of at least 2 ft. below final grade in accordance with Item 496, “Removing Structures.” Backfill the excavation with materials equal in composition and density to the surrounding area. Replace any surfacing material with similar material to an equivalent condition.

Supply all new anchor bolts required for the installation of the ITS pole structure. Match bolt dimensions and lengths previously used or as shown on the plans and as directed. Provide anchor bolts in accordance with Item 449, “Anchor Bolts.”

Move existing poles to the locations shown on the plans or as directed. Construct new foundations for relocated ITS poles in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans. Install conduit per Item 618, “Conduit.” Install existing poles on new foundations in accordance with Section 4.1, “Installation.” Do not grout between the base plate and foundation.

4.3. **Removal.** Use established industry and utility safety practices when removing poles and assemblies located near overhead or underground facilities. Consult with the appropriate utility company before beginning work.

Inspect the pole and cabinet, where included, with a representative from the Department, and remove any ITS equipment, associated mounting hardware, and cabling still attached to the pole or inside the cabinet before commencing work. Inspect the existing pole and cabinet in place, with a representative from the Department, and document any evidence of damage to the representative before removal.

Before removal of the existing pole structure or cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment. Remove and coil existing cabling to the nearest ITS ground box or as identified on the plans.

Carefully remove the cabinet from the pole structure. Avoid damage or injury to surrounding objects or individuals. Deliver the cabinet to an address to be supplied by the Department.

Carefully remove the pole from the foundation in accordance with Item 496, “Removing Structures.” Avoid damage or injury to surrounding objects or individuals. Separate the pole at the slip-fitted connections, if applicable. If the pole cannot be separated, transport the complete pole or partially separate the pole to make it transportable. Deliver the pole structure to an address to be supplied by the Department.

Unless otherwise shown on the plans, remove abandoned concrete foundations, including steel, to a depth of 2 ft. below final grade in accordance with Item 496, “Removing Structures.” Backfill the excavation with materials equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

4.4. **Testing.**

4.4.1. **Installation**. Unless otherwise shown on the plans, perform the following tests on cabinets supplied through this Item.

4.4.1.1. **Test Procedures Documentation**. Provide 5 copies of the test procedures to include tests identified in Article 4.4.2 through Article 4.4.4 inclusive and blank data forms to the Engineer for review and comment at least 45 days before testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of equipment for tests. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days before testing. Review time is calendar days. Conduct all tests in accordance with the approved test procedures. The Department may witness all tests.

Record test data on the data forms and quantitative results. No bid item measurement or payment will be made until the Engineer has verified the test results meet the requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy performed in testing by the contractor. Furnish data forms containing the acceptable range of expected results and measured values.

4.4.1.2. **Design Approval Test**. Conduct a design approval test on 10% of the total number of cabinets supplied as part of the project, with at least one of each type of cabinet used on the project.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the Engineer. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

4.4.1.2.1. **Power Service Transients**. Provide equipment that meets the performance requirements, specified in this Item, when subjected to the power service transients as specified in NEMA TS2, Section 2.2.7.2, “Transient Tests (Power Service)”, or most current version.

4.4.1.2.2. **Temperature and Condensation**. Provide equipment that meets the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:

- stabilize the equipment at -30°F and test as specified in NEMA TS2, Sections 2.2.7.3, “Low-Temperature Low-Voltage Tests” and 2.2.7.4, “Low-Temperature High-Voltage Tests”, or most current version.
- Allow the equipment to warm up to room temperature in an atmosphere with relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure.
- Stabilize the equipment at 165°F and test as specified in NEMA TS2, Sections 2.2.7.5, “High-Temperature High Voltage Tests” and 2.2.7.6, “High-Temperature Low-Voltage Tests”, or most current version.

4.4.1.2.3. **Relative Humidity**. Provide equipment that meets the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.

4.4.1.2.4. **Vibration**. Provide equipment that shows no degradation of mechanical structure, soldered components, or plug-in components and will operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in NEMA TS2, Section 2.2.8, “Vibration Test”, or most current version.

4.4.1.2.5. **Power Interruption**. Provide equipment that meets the performance requirements, specified in this Item, when subjected to nominal input voltage variations as specified in NEMA TS2, Section 2.2.10, “Power Interruption Test”, or most current version.

4.4.1.3. **Stand-Alone Tests**. Conduct a Stand-Alone Test for each cabinet after installation. Exercise all stand-alone (non-network) functional operations consisting of the following, at a minimum:

- 19-inch EIA rack,
- adjustable shelves,
- locking mechanism,
- fan and thermostat,
- cabinet light,
- back panel,
- circuit breakers,
- surge protection,
- grounding system,
- terminal strips,
- interconnect harnesses with connectors,
- cabinet attachment to pole,
- weatherproofing, and
- “Door Open” connection to back panel.

Notify the Engineer 5 working days before conducting this test. The Engineer may witness all the tests.

4.4.1.4. **Consequences of Test Failure**. If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation before modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.

Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures within 30 calendar days without additional cost or extension of the contract period.

4.4.1.4.1. **Consequences of Design Approval Test Failure**. If the equipment fails the design approval test, correct the fault within 30 days and then repeat the design approval test until successfully completed.

4.4.1.4.2. **Consequences of Stand-Alone Test Failure**. If the equipment fails the stand-alone test, correct the fault within 30 days and then repeat the stand-alone test until successfully completed.

4.4.2. **Relocation.**

4.4.2.1. **Pre-Test**. Conduct performance testing before removal of ITS pole mounted cabinet. Test the following components or equipment, at a minimum, and document functional operations in the presence of representatives of the Contractor and the Department.

- locking mechanism,
- fan and thermostat,
- cabinet light,
- back panel,
- circuit breakers,
- surge protection system,
- grounding system, and
- “Door Open” connection to back panel.

Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the State. Compare test data before removal and test data after installation.

4.4.2.2. **Post Test**. Testing of the ITS pole mounted cabinet is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, “Legal Relations and Responsibilities”, after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing ITS equipment has been installed, perform the same functional operation test described under Article 4.4.2.1. Furnish test data forms containing the sequence of tests including all of the data taken and quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days before the day the tests are to begin. Obtain Engineer’s approval of test procedures before submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

The performance test results after relocation must be equal to or better than the test results before removal. Repair or replace those components within the system which failed after relocation but which passed before removal.

The Department will conduct approved ITS equipment system tests on the field equipment hardware with the central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the contract period.

4.5. **Documentation.** Submit documentation for this Item consisting of the following:

4.5.1. **ITS Pole.** Shop drawings should clearly detail the following for the ITS poles submitted for the project:

- physical pole drawings,
- anchor bolts,
- material list,
- lightning suppression,
- weatherheads,
- cabinet Mounting attachments (when cabinet required), and
- grounding system.

4.5.2. **Pole Mounted Cabinet.** Shop drawings should clearly detail the following for ITS pole mounted cabinets when required as shown on the plans:

- dimensions,
- shelves,
- door,
- gasket,
- door look,
- materials list,
- exterior finish,
- ventilation,
- terminal strips,
- harnesses,
- filter,
- power distribution panel,
- surge suppression,
- back panel,
- outlets,
- circuit breakers,
- power cable terminals,
- wiring diagrams,
- cabinet grounding,
- environmental parameters, and
- connectors.

Submit shop drawings, signed, sealed, and dated by a registered professional Engineer in Texas showing the fabrication and erection details for each ITS pole including the ITS cabinet and mounting details in accordance with Item 5, “Control of the Work”.

Provide at least 2 complete sets of operation and maintenance manuals in hard copy format in addition to a CD/DVD or removable flash drive that include the following:

- complete and accurate schematic diagrams,
- complete installation procedures,
- complete performance specifications (functional, electrical, mechanical and environmental) on the unit,
- complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA,
- pictorial of component layout on circuit board,
- complete maintenance and trouble-shooting procedures,
- complete stage-by-stage explanation of circuit theory and operation,
- recovery procedures for malfunction, and
- instructions for gathering maintenance assistance from manufacturer.

Identify material which is copyrighted or proprietary in nature as part of the documentation submittal. The Department will take proper provisions to secure such material and not distribute without written approval.

Provide Department with certification documentation verifying conformance with environmental and testing requirements contained in the special specification. Certifications may be provided by the manufacturer or through independent labs.

4.6. **Warranty.** The start date of the manufacturer’s standard warranty will begin when the stand-alone test plan has been approved. Any equipment with less than 95% of its warranty remaining at the beginning of the stand-alone test will not be accepted by the Department. Guarantee that equipment furnished and installed

for this project performs according to the manufacturer's published specifications. Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 years or in accordance with the manufacturer's standard warranty if warranty period is greater. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace, at the manufacturer's option, defective equipment during the warranty period at no cost to the Department.

Repair or replace equipment at the Contractor's expense before beginning testing in the event of a malfunction or failure. Furnish replacement parts for all equipment within 30 days of notification of failure by the Department.

5. MEASUREMENT

This Item will be measured as each unit furnished, installed, relocated, or removed as shown on the plans, excluding new foundations and conduit.

6. PAYMENT

6.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet" of the type and configuration specified. This price is full compensation for furnishing, fabricating, and erecting ITS pole structures as shown on the plans; for furnishing, fabricating, and installing ITS pole mounted cabinets as shown on the plans; for furnishing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to provide an ITS pole structure or pole mounted cabinet complete in place and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

6.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole (Install Only)" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet (Install Only)" of the type and configuration specified. This price is full compensation for erecting ITS pole structures and installing ITS pole mounted cabinets furnished by the Department as shown on the plans; for installing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to provide an ITS pole structure or pole mounted cabinet, complete in place, and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

6.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole (Relocate)" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet (Relocate)" of the type and configuration specified. This price is full compensation for removing existing ITS pole structures or pole mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; hauling and erecting ITS pole structures; hauling and installing ITS pole mounted cabinets; furnishing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to relocate existing ITS pole structures or pole mounted cabinets, complete in place, and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

6.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided for under “Measurement” will be paid for at the unit price bid for “ITS Pole (Remove)” of the type and height specified, including COSS/OSB extension, and “ITS Pole Mount Cabinet (Remove)” of the type and configuration specified. This price is full compensation for removing existing ITS pole structures and pole mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; loading and hauling; and equipment; materials, labor, tools, and incidentals necessary to complete the removal of existing ITS pole structures and pole mounted cabinets.

Special Specification 6141
Existing Traffic Management Equipment

1. DESCRIPTION

Remove and relocate existing Intermediate Amplifier (IA) Cabinets, Communications Hubs, Camera Pole Structure and Cabinet, Lane Control Systems (LCS), Radar Vehicle Sensing Devices (RVSD), and RVSD Pole Structure and Cabinet at sites shown on plans and as specified within this specification.

2. REMOVE EXISTING IA CABINET

2.1. **Materials.** Remove the following equipment at each IA Cabinet field site as shown on the plans (includes but is not limited to):

- Intermediate Amplifier (IA) Cabinet including all internal components.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Communication Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

2.2. **Construction.** Prior to removal of the IA Cabinet, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the IA Cabinet, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to location approved by the Engineer.

Store all Communication Cabinets and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

3. RELOCATE EXISTING IA CABINET

3.1. **Materials**. Relocate the following equipment at each IA Cabinet field site shown on the plans (includes but is not limited to):

- Intermediate Amplifier (IA) Cabinet with all internal components.

Contractor is responsible for reconfiguring the Local Control Unit and for all provisioning and addressing changes required in the cabinet and at CTECC.

Construct new IA Cabinet Foundation for relocated IA Cabinet as shown in plans and as specified in this specification.

Make the relocated IA Cabinet fully operational and integrated with the CTECC system.

If plans show radar detectors to be connected to relocated IA Cabinet instead of surveillance loop detectors, remove existing digital loop vehicle detection units and deliver to location approved by the Engineer to make space for radar detector cards.

3.2. **Construction.** Perform the relocation in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation. Any portion of Communication Cabinet assembly damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600V. Meet the requirements of the National Electrical Code (NEC).

4. REMOVE EXISTING COMMUNICATIONS HUB

4.1. **Materials.** Remove the following equipment at each Communications Hub field site as shown on the plans (includes but is not limited to):

- Communications Hub with external and internal cabinets including all internal equipment components and back panels.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Communications Hub Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

4.2. **Construction**. Prior to removal of the Communications Hub, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Communications Hub, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

Store all Communications Hubs and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

5. RELOCATE EXISTING CAMERA POLE STRUCTURE AND CABINET

5.1. **Materials.** Remove and relocate existing camera pole structure and pole mounted cabinet with all internal components at locations shown on the plans and as directed by the Engineer. Unless otherwise shown on the plans, the Contractor should stake and the Engineer will verify camera pole structure location.

The following requirements are minimum. Strict compliance with these minimum requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to insure the successful completion of the work.

5.2. **Construction**. Perform the relocation in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Prior to removal of the existing camera pole structure, the Contractor must ensure that the power cables are disconnected and isolated from the electric power supply and all cables (power and communication) are disconnected from the equipment and the camera, pan/tilt assembly, CCTV equipment cabinet, RVSD equipment, and other accessories are removed from the camera pole structure. Removal of the existing camera pole structure as shown on the plans will be accomplished only at such time as authorized by the Engineer.

The existing camera pole structure must be removed in a manner acceptable to the Engineer. The method should be such that no undue overstress or damage will result to the structure or appurtenances attached. The Contractor will be responsible for any damage to the structure.

The Contractor must use a crane of sufficient capacity to remove the pole. The existing camera pole structure must be disconnected from the foundation and relocated as shown on the plans in a manner acceptable to the Engineer.

When the poles are laid down, the Contractor must place the poles on timber cribbing so that the poles lie reasonably straight to prevent any damage or deterioration. The Contractor will be responsible for any damage to the structure.

Safe construction and operation practices must be maintained at all times. The poles should be handled in such a manner during removal so as to prevent damage to the pole's exterior finish. The contractor must repair any damage to the finish of the structure in accordance with Item 445, “Galvanizing” or Item 446, “Cleaning and Painting Steel” as appropriate.

The existing concrete foundation must be removed to a depth of at least 2 ft. below finish grade with all steel cut off. The excavation must be back-filled with material equal in composition and density to the surrounding area, and by replacing any surfacing, such as asphalt pavement, concrete riprap or brick pavers, with like material to equivalent condition as approved by the Engineer.

Careful erection and aligning of the relocated camera pole structure should be considered an essential feature of the installation of the pole structure.

All anchor bolts required for the installation of the camera pole structure must be supplied by the Contractor. Bolt dimensions and lengths must be as shown in the plans and as directed by the Engineer. The new anchor bolts must conform to all requirements in Item 449, “Anchor Bolts.”

The new foundation must be constructed in accordance with Item 416, “Drilled Shaft Foundations.”

The new conduit must be constructed in accordance with Item 618, “Conduit.”

Use care to prevent damage to any support structures. Any portion of camera pole structure or cabinet damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600V. Meet the requirements of the National Electrical Code (NEC).

6. REMOVE EXISTING LANE CONTROL SYSTEM

6.1. **Materials**. Remove the following equipment at each Lane Control System field site as shown on the plans (includes but is not limited to):

- Lane Control System (LCS) heads and mounting hardware. Remove the LCS heads from the structure immediately after the system becomes non-operational.
- LCS Controller and Cabinet.
- Cabling, conduit and connectors from LCS Controller to LCS heads.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- LCS Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

6.2. **Construction.** Prior to removal of the Lane Control System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Lane Control System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to location approved by the Engineer.

Store all Lane Control System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

7. REMOVE EXISTING RADAR VEHICLE SENSING DEVICE (RVSD)

7.1. **Materials**. Equipment to be removed at each RVSD site shown on the plans (includes but is not limited to):

- RVSD including all mounting hardware.
- Conduit, cables, connectors from Device to cabinet.
- Dual Loop emulation cards (if existing).

7.2. **Construction.** Prior to removal of the RVSD, disconnect and isolate any existing electrical power supply, adhering to requirements of the National Electrical Code.

Perform removal in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the RVSD damaged or lost will be replaced by the Contractor at no cost to the Department. Store all RVSD equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to location approved by the Engineer.

8. RELOCATE EXISTING RVSD POLE STRUCTURE AND CABINET

8.1. **Materials.** Remove and relocate existing Radar Vehicle Sensing Device (RVSD) pole structure and pole mounted cabinet with all internal components at locations shown on the plans and as directed by the Engineer. Unless otherwise shown on the plans, the Contractor should stake and the Engineer will verify RVSD pole structure location.

The following requirements are minimum. Strict compliance with these minimum requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to insure the successful completion of the work.

Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated RVSD fully operational with the CTECC system.

8.2. **Construction**. Perform the relocation in strict conformance with the requirements stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Prior to removal of the existing RVSD pole structure, the Contractor must ensure that the power cables are disconnected and isolated from the electric power supply and all cables (power and communication) are disconnected from the equipment and the RVSD, RVSD cabinet, RVSD equipment, and other accessories are removed from the RVSD pole structure. Removal of the RVSD pole structure as shown on the plans must be accomplished only at such time as authorized by the Engineer.

The existing RVSD pole structure should be removed in a manner acceptable to the Engineer. The method should be such that no undue overstress or damage will result to the structure or appurtenances attached. The Contractor will be responsible for any damage to the structure.

The Contractor must use a crane of sufficient capacity to remove the pole. The existing RVSD pole structure must be disconnected from the foundation and relocated as shown on the plans in a manner acceptable to the Engineer.

When the poles are laid down, the Contractor must place the poles on timber cribbing so that the poles lie reasonably straight to prevent any damage or deterioration. The Contractor will be responsible for any damage to the structure.

Safe construction and operation practices must be maintained at all times. The poles should be handled in such a manner during removal so as to prevent damage to the pole's exterior finish. The contractor must repair any damage to the finish of the structure in accordance with Item 445, “Galvanizing” or Item 446, “Cleaning and Painting Steel” as appropriate.

The existing concrete foundation must be removed to a depth of at least 2 ft. below finish grade with all aluminum cut off. The excavation must be back-filled with material equal in composition and density to the surrounding area, and by replacing any surfacing, such as asphalt pavement, concrete riprap or brick pavers, with like material to equivalent condition as approved by the Engineer.

Careful erection and aligning of the relocated RVSD pole structure should be considered an essential feature of the installation of the pole structure.

All anchor bolts required for the installation of the RVSD pole structure must be supplied by the Contractor. Bolt dimensions and lengths must be as shown in the plans and as directed by the Engineer. The new anchor bolts must conform to all requirements in Item 449, “Anchor Bolts.”

The new foundation must be constructed in accordance with Item 416, “Drilled Shaft Foundations.”

The new conduit must be constructed in accordance with Item 618, “Conduit.”

Use care to prevent damage to any support structures. Any portion of RVSD pole structure, pole mounted cabinet, or equipment, damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600V. Meet the requirements of the National Electrical Code (NEC).

Mounting height and angle of relocated RVSD must be as recommended by manufacturer of RVSD. Connect RVSD to communication network as shown in plans.

Recalibrate the relocated RVSD for the conditions at each site (number of lanes, speeds, etc.) using radar as a control.

8.3. Provide phone numbers if necessary of new RVSD locations where new phone service communications have been established.

9. IA CABINET FOUNDATION

9.1. **Materials.** Construct new IA Cabinet Foundation for relocated IA Cabinet as shown on "Cabinet Foundation Details" layout.

9.2. **Construction**. Construct the foundation in strict conformance with the requirements stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices."

10. TESTING

10.1. **Pre-Test.** Conduct performance testing prior to removal of the equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and TxDOT. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the State. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.

10.2. **Post Test.** Testing of the TMS system is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities," after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all TMS equipment has been installed, conduct approved continuity, stand alone, and TMS equipment system tests. Furnish test data forms containing the sequence of tests including all of the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin.

Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and

turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days' notice prior to all tests to permit the Engineer or his representative to observe each test.

The State will conduct approved TMS equipment system tests on the field equipment with the CTECC central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the contract period.

11. TMS EXPERIENCE REQUIREMENTS

The Contractor or subcontractor must meet the following experience requirements prior to removal and/or relocation of TMS Equipment.

11.1. Two years continuous existence by the Contractor or the subcontractor offering services in the installation of Communications Hubs, IA Cabinets, Radar Vehicle Sensing Devices, and Closed Circuit Television cameras (CCTV).

11.2. Two completed projects for each of the following items: A minimum of 2 DMS, 5 CCTV-cameras, 1 Communications Hub, 1 IA Cabinet, and 5 Radar Vehicle Sensing Devices, where the Contractor or the subcontractor's personnel installed and tested this equipment. All components listed above need not be part of the same project, however, additional project references may be required in order to meet the minimum number of installed equipment items listed above. The DMS must have been installed outdoors, permanently mounted on structure(s) with related sign and equipment. The RVSD's must have been installed outdoors, permanently mounted with related communication equipment.

The CCTV cameras must have been installed outdoors, permanently mounted on overhead structure(s) with related camera control and transmission equipment. The completed system installations must have been in continuous satisfactory operation for a minimum of 1 yr.

Prior to removal and/or relocation of TMS equipment, furnish a statement which outlines contractor or subcontractor's qualifications on system installation experience. Information on system installation experience must include specific projects, locations, and dates for beginning and completion of installation. The statement must also include the name, telephone number, and address of a representative of the agency or business owning the system, who will be contacted by the Department. If requested by the State, demonstrate to the Engineer's satisfaction a working computerized control system with the various equipment items as described above.

Failure to meet the above requirements will be sufficient reason for not being approved for the removal and/or relocation of the TMS equipment.

If any approved subcontractors fail to complete the entire project, qualification material for other subcontractors will have to be submitted and approved before work can be continued.

Any qualification statements which do not correctly address all specified items will be rejected for the reason of insufficient data. Submit the statement 2 weeks prior to removal and/or relocation of TMS equipment to allow the Department adequate time to review and respond to the Contractor for additional information if required. Failure to submit a complete and satisfactory statement will be sufficient reason for not being approved for the removal and/or relocation work. Submit all statements required by this Special Specification to the Traffic Management Engineer.

12. MEASUREMENT

12.1. Remove Existing IA Cabinet will be measured as each IA Cabinet with all internal components removed.

12.2. Relocate Existing IA Cabinet will be measured as each IA Cabinet with all internal components relocated, tested and made fully operational with the CTECC system.

12.3. Remove Existing Communications Hub will be measured as each Communications Hub, including external and internal cabinets with all internal components including but not limited to equipment removed.

12.4. Relocate Existing Camera Pole Structure and Cabinet will be measured as each Camera Pole Structure and Pole Mounted Cabinet removed and relocated, complete in place, tested and made fully operational with the CTECC system.

The new foundation will be measured in accordance with Item 416, “Drilled Shaft Foundations.”

The new conduit will be measured in accordance with Item 618, “Conduit.”

12.5. Remove Existing Lane Control System will be measured as each Lane Control System, including field equipment to operate the Lane Control System, removed.

12.6. Remove Existing Radar Vehicle Sensing Device will be measured as each RVSD with all associated components removed.

12.7. Relocate Existing RVSD Pole Structure and Cabinet will be measured as each RVSD Pole Structure and Pole Mounted Cabinet with all associated components removed and relocated, complete in place, tested, and made fully operational with the CTECC system.

The new foundation will be measured in accordance with Item 416, “Drilled Shaft Foundations.”

The new conduit will be measured in accordance with Item 618, “Conduit.”

12.8. IA Cabinet Foundation will be measured as each foundation installed.

13. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement,” will be paid for at the unit price bid for “Remove Existing IA Cabinet,” “Relocate Existing IA Cabinet,” “Remove Existing Communications Hub,” “Relocate Existing Camera Pole Structure and Cabinet,” “Remove Existing Lane Control System,” “Remove Existing Radar Vehicle Sensing Device,” “Relocate Existing RVSD Pole Structure and Cabinet,” and “IA Cabinet Foundation.” This price is full compensation for removing and relocating as shown on the plans; for testing, delivery and storage of components designated for retention or reuse; and for all manipulations, materials, labor, tools, equipment, and incidentals.

The new foundation must be constructed, measured and paid for in accordance with Item 416, “Drilled Shaft Foundations.”

The new conduit must be constructed, measured and paid for in accordance with Item 618, “Conduit.”

Special Specification 6163
Remove Existing Cables

1. DESCRIPTION

Remove existing cables at locations shown on the plans and as directed. The type of existing cables will be as shown on the plans.

The following requirements are minimal. Strict compliance with these minimum requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to insure the successful completion of the work.

2. WORK METHODS

Remove the existing cables, as shown on the plans, only at such time as authorized by the Engineer.

Maintain the integrity of the existing cables, conduit and ground boxes contiguous to the section of cable(s) to be removed. If the cable(s), conduit and ground boxes are damaged during work, repair or replace the damaged cable(s), conduit or ground boxes at the Contractor's expense. The replacement or repair method must be approved by the Engineer prior to implementation. Maintaining the integrity of the existing cable(s), conduit and ground boxes during the work will be considered subsidiary to this Item and will not be paid for directly.

Prior to removal of the power cables, ensure that the power cables are disconnected and isolated from the electric power supply and all cables (power, communication and fiber optic, etc.) are disconnected from the equipment.

All cables removed, which are not deemed salvageable by the Engineer, become the property of the Contractor and must be removed to disposal sites off the right of way arranged for by the Contractor and approved by the Engineer or other disposed of in a manner satisfactory to the Engineer.

All cables removed, which the Engineer deems salvageable, and the removed fiber optic cable(s) become property of the Department and will be transported to, and stored at TxDOT's Traffic Management Maintenance Section, 2501 Southwest Loop 820, Fort Worth, Texas, 76133.

2.1. Removal, Handling and Storage of Fiber Optic Cables.

The existing fiber optic cables are classified to be loose tube cables. The maximum tensile loading (removal) of the cable is 600 lb. The cable is capable of withstanding a minimum bend radius of 10 in. (removal) and 5.9 in. (storage).

The fiber optic cable removal, handling and storage techniques must be such that the optical and mechanical characteristics of the cables are not degraded at the time of removal and handling. Store the fiber optic cable(s) removed by this project on an industry standard reel(s) manufactured for this purpose and approved by the Engineer.

The cable removal operation must meet the minimum bending radius requirement during the pulling and reeling operations. Use entry guide chutes to guide the cable out from the pull-box conduit ports. Use lubricating compound, where possible, to minimize cable-to-conduit friction. Corner rollers (wheels), if used, must not have radii less than the minimum removal bending radius of the cable. Use a series array of smaller wheels for accomplishing the bend if the array is specifically approved by the cable manufacturer. Measure the pulling tension continuously and ensure it does not exceed the maximum tension specified by

the manufacturer of the cable. Use fuse links and breaks to insure cable tensile strength is not being exceeded.

3. MEASUREMENT

This Item will be measured by the foot of cable removed regardless of type or number of cables. When measured, removal must include all appurtenances.

4. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Remove Existing Cables (Fiber)," or "Remove Existing Cables (Power)," or "Remove Existing Cables (Communication)." This price is full compensation for all labor, tools, equipment, transportation, and incidentals.

Special Specification 6185

Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

1. DESCRIPTION

Furnish, operate, maintain and remove upon completion of work, Truck Mounted Attenuator (TMA) or Trailer Attenuator (TA).

2. MATERIALS

Furnish, operate and maintain new or used TMAs or TAs. Assure used attenuators are in good working condition and are approved for use. A list of approved TMA/TA units can be found in the Department's Compliant Work Zone Traffic Control Devices List. The host vehicle for the TMA and TA must weigh a minimum of 19,000 lbs. Host vehicles may be ballasted to achieve the required weight. Any weight added to the host vehicle must be properly attached or contained within it so that it does not present a hazard and that proper energy dissipation occurs if the attenuator is impacted from behind by a large truck. The weight of a TA will not be considered in the weight of the host vehicle but the weight of a TMA may be included in the weight of the host vehicle. Upon request, provide either a manufacturer's curb weight or a certified scales weight ticket to the Engineer.

3. CONSTRUCTION

Place or relocate TMA/TAs as shown on the plans or as directed. The plans will show the number of TMA/TAs needed, for how many days or hours, and for which construction phases.

Maintain the TMA/TAs in good working condition. Replace damaged TMA/TAs as soon as possible.

4. MEASUREMENT

4.1. **Truck Mounted Attenuator/Trailer Attenuator (Stationary).** This Item will be measured by the each or by the day. TMA/TAs must be set up in a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each TMA/TA set up and operational on the worksite.

4.2. **Truck Mounted Attenuator/Trailer Attenuator (Mobile Operation).** This Item will be measured by the hour. The time begins once the TMA/TA is ready for operation at the predetermined site and stops when notified by the Engineer. A minimum of 4 hr. will be paid each day for each operating TMA/TA used in a mobile operation.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Truck Mounted Attenuators/Trailer Attenuators (Stationary)," or "Truck Mounted Attenuators/Trailer Attenuators (Mobile Operation)." This price is full compensation for furnishing TMA/TA: set up; relocating; removing; operating; fuel; and equipment, materials, tools, labor, and incidentals.

Special Specification 6360
Ethernet Switch

1. DESCRIPTION

Furnish, install, and test Cisco IE3000 or equivalent Ethernet Switch and Power Supply (AC) Module for IE3000.

2. MATERIALS

Provide all materials necessary for the Ethernet Switch installation. All materials provided by the Contractor must be new.

Ensure that all materials and construction methods necessary to complete the installation conform to the requirements of this Item, the plans and the pertinent requirements of the following Items:

- Item 618, “Conduit”
- Item 620, “Electrical Conductors”

3. CONSTRUCTION

3.1. Installation. Install Ethernet Switch in equipment cabinets in accordance with this Item and details and dimensions as shown on the plans or as directed. Maintain safe construction practices. Equipment must be installed in a neat and workmanlike manner.

Adjustments or additions of attachment hardware, support brackets, and appurtenances may be necessary for compatibility, as shown on the plans, or as directed. All adjustments or additional materials will not be paid for directly but will be subsidiary to this Item.

Prevent damage to all components. Any unused or removed material deemed salvageable by the Engineer will remain the property of the Department and must be delivered to a designated site. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

Stockpile all materials designated for reuse or to be retained by the Department within the project limits or at a designated location as directed.

Equipment to be installed at each CCTV, Vehicle Detector field site or HUB building shown on the plans may include, but not be limited to, the following:

- Ethernet Switch (Provided by the Contractor).
- Cabling and connectors from power source to Ethernet Switch connection point as specified by the manufacturer (Provided by the Contractor).
- Cabling and connectors from telecommunications source to Ethernet Switch connection point as specified by the Ethernet Switch manufacturer when required (Provided by the Contractor).
- Communications as shown on the plans.

Make all arrangements for connection to the power supply and telecommunications source including any required permits. Supply and install any required materials not provided by the utility companies (power or communications service provider).

3.2. Working Drawings. Before fabrication, submit 5 prints of the working drawings for attachment of each Ethernet Switch. Show the details of any additional brackets, connections, and methods of attachment.

3.3. Testing. Testing of the Ethernet Switch is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the Ethernet Switch in accordance with Item 7, “Legal Relations and Responsibilities,” after all testing is successfully completed.

After all switches have been installed, the Department will conduct approved continuity, stand alone, and Ethernet Switch tests on the installed field equipment with central, remote, and laptop equipment. A final acceptance test will be conducted to demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a letter acknowledging the final acceptance testing commencement date stating the first day of the final acceptance test. The completion of the final acceptance test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects. Assume responsibility only for test failures directly related to the work in accordance with this Item.

4. MEASURMENT

This Item will be measured as each Ethernet Switch system furnished, installed and tested.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Ethernet Switch (Furnish & Install).” This price is full compensation for furnishing and installation of Ethernet Switch; furnishing and installing any new mounting hardware; storing the Ethernet Switch when required; testing the Ethernet Switch; replacement/repair of damaged components; disposal of unsalvageable material and for all manipulations, labor, tools, working drawings, equipment, and incidentals.

Special Specification 6361
MPEG 4 Video Encoder

1. DESCRIPTION

Furnish, install, and test Teleste MPC-E1JD-FTRXXX-X-E1 or equivalent MPEG 4 Video Encoder and Power Supply.

2. MATERIALS

Provide all materials necessary for the MPEG 4 Video Encoder installation. All materials provided by the Contractor must be new.

Ensure that all materials and construction methods necessary to complete the installation conform to the requirements of this Item, the plans and the pertinent requirements of the following Items:

- Item 618, “Conduit”
- Item 620, “Electrical Conductors”

3. CONSTRUCTION

3.1. Installation. Install MPEG 4 Video Encoder in equipment cabinets in accordance with this Item and details and dimensions as shown on the plans or as directed. Maintain safe construction practices. Equipment will be installed in a neat and workmanlike manner.

Adjustments or additions of attachment hardware, support brackets, and appurtenances may be necessary for compatibility, as shown on the plans, or as directed. All adjustments or additional materials will not be paid for directly but will be subsidiary to this Item.

Prevent damage to all components. Any unused or removed material deemed salvageable by the Engineer will remain the property of the Department and must be delivered to a designated site. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

Stockpile all materials designated for reuse or to be retained by the Department within the project limits or at a designated location as directed.

Equipment to be installed at each CCTV, field site shown on the plans may include, but not be limited to, the following:

- MPEG 4 Video Encoder (provided by the Contractor)
- Cabling and connectors from power source to MPEG 4 Video Encoder connection point as specified by the manufacturer (Provided by the Contractor).
- Cabling and connectors from telecommunications source to MPEG 4 Video Encoder connection point as specified by the MPEG 4 Video Encoder manufacturer when required (Provided by the Contractor).
- Communications as shown on the plans

Make all arrangements for connection to the power supply and telecommunications source including any required permits. Supply and install any required materials not provided by the utility companies (power or communications service provider).

3.2. Working Drawings. Before fabrication submit for approval 5 prints of the working drawings for attachment of each MPEG 4 Video Encoder. Show the details of any additional brackets, connections, and methods of attachment.

3.3. Testing. Testing of the MPEG 4 Video Encoder is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the MPEG 4 Video Encoder in accordance with Item 7, "Legal Relations and Responsibilities," after all testing is successfully completed.

After all video encoders have been installed; the Department will conduct approved continuity, stand alone, and MPEG 4 Video Encoder tests on the installed field equipment with central, remote, and laptop equipment. A final acceptance test will be conducted to demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a Letter acknowledging the final acceptance testing commencement date stating the first day of the final acceptance test. The completion of the final acceptance test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects. Assume responsibility only for test failures directly related to the work in accordance with this Item.

4. MEASUREMENT

This Item will be measured as each MPEG 4 Video Encoder system furnished, installed and tested.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "MPEG 4 Video Encoder (Furnish & Install)." This price is full compensation for furnishing and installation of MPEG 4 Video Encoder; furnishing and installing any new mounting hardware; storing the MPEG 4 Video Encoder when required; testing the MPEG 4 Video Encoder; replacement/repair of damaged components; disposal of unsalvageable material and for all manipulations, labor, tools, working drawings, equipment and incidentals.

Special Specification 6417
System Integration

1. DESCRIPTION

Integrate all furnished equipment and software as shown on the plans, as detailed in this Special Specification, and as directed. This work consists of furnishing, installing, testing, and integrating of all traffic management hardware and software into the existing TransVista system and TransVista traffic management center (TMC). The Contractor must select, install and integrate the equipment and software as required to achieve a complete and fully operational traffic management system (TMS) as shown on the plans, as detailed in this Special Specification, and as directed.

2. WORK METHODS

2.1. System Equipment and Installation.

Provide, install, interconnect, test, integrate and make fully operational all the equipment and system in accordance with the National Electrical Code (NEC).

2.2. System Integration.

Provide an integrated system that encompasses the following:

- integration of proposed CCTV's, DMS, Wrong Way Driver Detection System and peripherals;
- integration of proposed and existing fiber optic cable supporting ITS field equipment; and
- integration of all components into the Department TMC.

Perform all necessary work to achieve a fully functional and operational system including all fiber optic re-routing, terminations, connections, splicing and re-assignments. Install and integrate all field, central and communications components.

2.3. Testing, Training, Documentation, Final Acceptance and Warranty.

All testing, training, documentation, final acceptance and warranty requirements must be in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance and Warranty."

3. MEASUREMENT

The complete "System Integration" designed and installed as detailed on the plans and described on the specifications will be measured as a lump sum unit.

4. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "System Integration." This price is full compensation for the preparation, furnishing, and installing all materials, equipment and incidentals necessary to provide an integrated system as directed by the Engineer. Items not specifically mentioned or addressed in this specification necessary for a complete and operational system as described will be provided by the Contractor and will not be paid for directly but is considered incidental to this Item.

Special Specification 6442-RMA
Remove and Relocate Dynamic Message Sign System

1. DESCRIPTION

Remove and relocate existing Dynamic Message Sign (DMS) System and replace existing DMS cabinet at locations shown on the plans and as directed. Unless otherwise shown on the plans, the Contractor must stake and the Engineer will verify new DMS structure location. Reinstall the existing Skyline sign and COSS structure at the new location. Install new cabinet and cabinet internal equipment with new components from Skyline.

The requirements of this Specification are minimum. Strict compliance with these minimum requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to insure the successful completion of the work.

2. CONSTRUCTION

Before removal of the existing DMS System, the Contractor must ensure that the power cables are disconnected and isolated from the electric power supply and all cables (power and communication) are disconnected from the DMS, DMS controller cabinet, and other accessories. Removal of the existing DMS System, as shown on the plans, will be accomplished only at such time as authorized.

The existing DMS, truss, walkway, controller cabinet, and structure must be removed in a manner acceptable to the Engineer. The method must be such that no undue overstress or damage will result to the structure or appurtenances attached. The Contractor will be responsible for any damage to the structure.

The Contractor must use a crane of enough capacity to remove the DMS, truss, walkway, and structure in separate lifts. Remove and store items designated for re-use or salvage at locations shown on the plans or as directed.

When the DMS components are laid down, the Contractor must place the DMS components on timber cribbing so that the components lie reasonably straight to prevent any damage or deterioration. The Contractor will be responsible for any damage to the components.

Safe construction and operation practices must be maintained at all times. The DMS System components must be handled in such a manner during removal so as to prevent damage to the components' exterior finishes. The Contractor must repair any damage to the finish of the truss, walkway, or structure in accordance with Item 445, "Galvanizing" or Item 446, "Cleaning and Painting Steel" as appropriate.

The existing concrete foundation must be removed to a depth of at least 2 ft. below finish grade with all steel cut off. The excavation must be backfilled with material equal in composition and density to the surrounding area, and by replacing any surfacing, such as asphalt pavement, concrete riprap, or brick pavers, with like material to equivalent condition as approved.

Careful erection and aligning of the relocated DMS System must be considered an essential feature of the installation of the DMS System. The existing truss to tower tension bolts must be replaced by the Contractor.

All anchor bolts required for the installation of the DMS structure must be supplied by the Contractor. Bolt dimensions and lengths must be as shown on the plans and as directed. The new anchor bolts must conform to all requirements in Item 449, "Anchor Bolts."

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The existing DMS System is a Skyline TX88S-A LED DMS model number VMSLED-L-3_18F-27X090-IRX (contractor to confirm with Skyline).

The existing Skyline DMS ground mounted controller cabinet assembly and DMS field equipment housed in the cabinet assembly will be removed and replaced with a new replacement cabinet. Existing sign face driver hardware will be replaced with new latest sign face driver hardware to support Skyline DMS controller provided. Internal equipment components supplied will match the existing or may be upgraded to more modern similar components as approved by the Engineer. The cabinet assembly provided will be a direct replacement for the Skyline DMS system and will consist of as a minimum:

- Type 4 (Configuration 2) ITS Ground Mounted Cabinet in substantial compliance with TxDOT standards ITS (20)-15 thru ITS (23)-15
- Skyline DMS Controller running the latest TXDOT approved software
- Latest Sign Face Driver Hardware to support Skyline DMS Controller and latest TXDOT approved software. (To be installed in the DMS sign housing)
- LED Power Supplies
- UPS
- Heater, thermostat, door alarm, temp sensor, load center
- 100' of Cat5e communication cable

The existing ethernet switch and fiber patch panel will be removed from the existing DMS cabinet and will be installed in the new replacement cabinet.

The existing Skyline DMS controller cabinet assembly and DMS field equipment housed in the cabinet assembly will become property of the Department. Contractor will deliver the salvaged equipment to the TxDOT Austin District headquarters, 7901 N IH-35. Provide 48hrs notice prior to delivering material.

2.1. **Final System Acceptance**. Perform a final system acceptance in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance, and Warranty."

3. MEASUREMENT

This Item will be measured as each DMS System removed and relocated.

4. PAYMENT

The work performed and materials furnished, in accordance with this Item and measured as provided under "Measurement," will be paid for at the unit price bid for "Remove and Relocate DMS System." This price is compensation for removing and relocating the existing DMS sign to its new location and furnishing and replacing sign face drivers; for removing the existing DMS cabinet and furnishing and installing a new DMS cabinet; and for furnishing and installing all new DMS cabinet internal components at its new location; for removing and relocating the existing ethernet switch and fiber patch panel to the new DMS cabinet; for all conductors of any kind, both communications and power, between the DMS cabinet and DMS sign; for all manipulations; for making operational; for testing; for removing existing foundation; for back-filling and surface replacement; for furnishing and installing anchor bolts, tension bolts, all labor, tools, equipment, storage when required, and incidentals.

"Relocating the existing sign support structure will be measured and paid for in accordance with Item 650, "Overhead Sign Supports."

The new sign foundation will be constructed, measured, and paid for in accordance with Item 416, "Drilled Shaft Foundations."

The new DMS cabinet foundation will be paid for under Item 6008, "Communication Cabinet Foundation."

The new conduit will be constructed, measured, and paid for in accordance with Item 618, "Conduit."

Special Specification 6475
Hardened Ethernet Switch

1. DESCRIPTION

Furnish and install Hardened Ethernet Switch (HES) at designated locations as shown on the plans, as detailed in accordance with these Specifications, and as directed. Provide all HES from the same manufacturer.

2. MATERIALS

2.1. **General Requirements**. Provide all new equipment in strict accordance with the details shown on the plans and in the specifications.

Provide a high-performance, modular hardened Ethernet switch to support standard Ethernet, and Fast Ethernet connectivity. Ensure dedicated bandwidth to the desktop and guarantees that each end-user receives a full 10 or 100 Mbps connection, as configured, enabling applications to operate reliably, and with low latency.

Include licenses for all equipment, where required, for any software or hardware in the system.

2.2. **Adherence to Standards**. Furnish, assemble, fabricate, or install HES under this Item that is in compliance with the following:

- IEEE 802.3, 802.3u, 10BASE-T, 100BASE-TX, 100BASE-FX;
- Auto-sensing for speed: IEEE 802.3u; and
- UL, cUL, FCC and CE.

2.3. **Functional Requirements.**

2.3.1. **Physical Design Requirements.** Ensure HES physical design conforms to the following requirements:

- for HES Type 1, provide 2 built-in 100 MB full-duplex switched multi-mode fiber ports, coupled with 6 switched 10/100 MB copper (RJ 45) ports all in 1 compact rugged unit;
- for HES Type 2, provide 4 built-in 100 MB OR 1,000 full-duplex switched single-mode fiber ports, or combination built-in ports, or combo ports to achieve full-duplex switched single-mode fiber ports, coupled with minimum 6 switched 10/100 MB copper (RJ 45) ports all in 1 compact rugged unit;
- ensure daisy-chainable for a fiber optic Ethernet network;
- designed to operate in abnormal temperature applications, and are suitable for use in harsh environments with inhospitable high and low temperatures;
- ease to install and use. Addresses of attached nodes are automatically learned and maintained, adapting the switching services to network changes and expansions;
- ensure plug-and-play installation, and operation is transparent to software;
- ensure unit has high-strength, 18-gauge steel enclosure to seal out insects, dirt, smoke, and other contaminants. Ensure steel enclosure operates as heat sinks, drawing heat away from internal components; and
- identify clearly all modules and assemblies with name, model number, serial number, or any other pertinent information required to facilitate equipment maintenance.

2.3.2. **Electrical and Mechanical Requirements.** Provide the following functionality and features.

- Parts Performance:
  - fiber, and when an auto-negotiating port is operating at 100 Mbps: Data Rate: 100 Mbps, and
  - RJ-45 auto-negotiating port is operating at 10 Mbps: Data Rate: 10 Mbps.
- Packet-Processing Between Domains:
  - filtering and forwarding rate from 100 Mbps ports: 148,800 pps max,
  - filtering and forwarding rate from 10 Mbps ports: 14,880 pps max,
  - processing type: store and forward,
  - auto-learning: 16K address table, shared for all traffic domains,
  - packet buffers: 1.0 Mb, dynamically shared on all domains, and
  - latency (not include packet time): 100 to 10 Mbps and 10 to 100: < 15 microsecond.
- Path Delay Value: 50 BT on all ports.
- Network Cable Connectors:
  - six RJ-45 shielded female ports,
  - two fiber ports. For HES Type 1 provide multi-mode. For HES Type 2 provide single-mode,
  - 100 Mbps: Category 5 UTP/STP; Fiber: 62.5/125 micron multimode fiber with SC connectors for HES Type 1. (8.0-8.3)/125 micron singlemode fiber with SC connectors for HES Type 2, and
  - 10 Mbps: Category 3, 4, 5 UTP (Auto-sensing).
- Full-duplex or Half-duplex on copper (RJ-45) switched ports:
  - all the RJ-45 ports support full or half duplex and 10/100 speed, each independently auto-negotiating, and
  - the switched fiber ports must be fixed at full-duplex only, 100 MB speed.
- Mean Time Between Failure: > 10 yr.
- LED Indicators: 1 LED for power, 3 LEDs per port for speed, link activity, full- or half-duplex.
- Power Requirements: The Hardened Ethernet Switch furnished, assembled, fabricated, or installed under this Item must meet all of its specified requirements when the input power is 115 VAC ±10%, 60 ±3 Hz.
  - AC power connector: IEC-type, male recessed at rear of power supply chassis.
    Input Voltage: 85 to 260 VAC (auto-ranging).
    Input Frequency: 47 to 63 Hz (auto-ranging).
    Power Consumption: 15 watts typical.
    Power Supply Rating: 3 amps at 5 VDC.
    Input Fuse for overload and short protection: 3 AG type, 0.5 amp.
    Power Capacity: 15 watts output, 70% min efficiency.
    Surge Protection: Over 150 joules, with clamping at 800V 50A min.
    Operating Shock and Vibration: Meets Bellcore GR-63-Core Sections 4.4.1 and 4.4.3.

  Provide equipment operations that are not affected by the transient voltages, surges, and sags normally experienced on commercial power lines. Check the local power service to determine if any special design is needed for the equipment. The extra cost, if required, must be included in the bid of this Item.

  - Wiring: Provide wiring that meets the requirements of the National Electric Code. Provide wires that are cut to proper length before assembly. Provide cable slacks to facilitate removal and replacement of assemblies, panels, and modules. Do not double-back wire to take up slack. Lace wires neatly into cable with nylon lacing or plastic straps. Secure cables with clamps. Provide service loops at connections.
  - Transient Suppression: Provide DC relays, solenoids, and holding coils that have diodes or other protection devices across the coils for transient suppression.

- Power Service Protection: Provide equipment that contains readily accessible, manually resettable, or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection.

Provide and size circuit breakers or fuses such that no wire, component, connector, PC board, or assembly must be subjected to sustained current in excess of their respective design limits upon the failure of any single circuit element or wiring.

- Fail Safe Provision: Provide equipment that is designed such that the failures of the equipment must not cause the failure of any other unit of equipment.

3. CONSTRUCTION

3.1. **General.** Provide equipment that uses the latest available techniques for design and construction with a minimum number of parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Design the equipment for ease of maintenance. Provide component parts that are readily accessible for inspection and maintenance. Provide test points that are for checking essential voltages and waveforms.

3.2. **Electronic Components.** Provide electronic components in accordance with Special Specification 6006, "Electronic Components."

3.3. **Mechanical Components.** Provide external screws, nuts, and locking washers that are stainless steel; no self-tapping screws will be used. Provide parts made of corrosion resistant material, such as plastic, stainless steel, anodized aluminum, or brass. Protect materials from fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

3.4. **Documentation Requirements.** Provide documentation in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance, and Warranty."

3.5. **Testing.** Perform testing in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance, and Warranty."

3.6. **Experience Requirements.** The Contractor or designated subcontractors involved in the installation and testing of the Ethernet equipment must, as a minimum, meet the following requirements:

- three year experience in the installation of Ethernet equipment;
- two installed systems where Ethernet switches are installed and the systems have been in continuously satisfactory operation for at least 2 yr. The Contractor must submit as proof, photographs or other supporting documents, and the names, addresses, and telephone numbers of the operating personnel who can be contacted regarding the system; and
- provide necessary documentation of subcontractor qualifications pursuant to Contract award.

3.7. **Technical Assistance.** Ensure that a manufacturer's technical representative is available on site to assist the Contractor's technical personnel at each installation site and with Ethernet equipment installation and communication system configuration.

Do not execute the initial powering up of the Ethernet equipment without the permission of the manufacturer's representative.

3.8. **Training.** Provide training in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance, and Warranty."

3.9. **Warranty.** Provide a warranty in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance, and Warranty."

4. MEASUREMENT

This Item will be measured as each unit furnished, installed, made fully functional, and tested in accordance with these Special Specifications or as directed.

5. PAYMENT

The work performed and materials furnished, in accordance with this Item and measured as provided under "Measurement," will be paid for at the unit price bid for each "Hardened Ethernet Switch Type 1," or "Hardened Ethernet Switch Type 2." This price will include all equipment described under this Item with all cables and connectors; all documentation and testing; and must also include the cost of furnishing all labor, materials, software, warranty, training, equipment, and incidentals.

GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-038

APPROVING THE FIRST AMENDMENT TO THE
BERGSTROM EXPRESSWAY (183 SOUTH) PROJECT DESIGN/BUILD CONTRACT

WHEREAS, on July 29, 2015, the Central Texas Regional Mobility Authority (Mobility Authority) and Colorado River Constructors, an unincorporated joint venture between Fluor Enterprises, Inc. and Balfour Beatty Infrastructure, Inc., entered into a design-build contract ("D/B Contract") for the development of a toll road and related roadway improvements on existing US 183 extending approximately eight (8) miles from US 290 to SH 71 in Austin, Texas (the "183 South Project"); and

WHEREAS, Colorado River Constructors has made certain claims for additional compensation and schedule relief which have been rejected by the Mobility Authority; and

WHEREAS, pursuant Section 25 of D/B Contract, Colorado River Constructors submitted the claims to a disputes board and a formal hearing was held on February 8-9, 2022; and

WHEREAS, the disputes board issued its findings and recommendations on March 8, 2022; and

WHEREAS, pursuant to the current terms of the D/B Contract, the claims must be submitted to a District Court in Austin, Texas for a judicial determination by September 7, 2022, or the disputes board's recommendations will be deemed to have been accepted by the Mobility Authority and Colorado River Constructors; and

WHEREAS, the Mobility Authority staff has negotiated the First Amendment to the D/B Contract with Colorado River Constructors in order to extend the deadline to file a lawsuit regarding the claims to October 11, 2022; and

WHEREAS, the Executive Director recommends approval of the First Amendment to the D/B contract in the form or substantially the same form attached hereto as Exhibit A.

NOW, THEREFORE, BE IT RESOLVED that the Board approves the First Amendment to the D/B Contract and hereby authorizes the Executive Director to execute the First Amendment on behalf of the Mobility Authority in the form or substantially the same form attached hereto as Exhibit A.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August 2022.

Submitted and reviewed by:

James M. Bass
Executive Director

Approved:

Robert W. Jenkins, Jr.
Chairman, Board of Directors

Exhibit A

FIRST AMENDMENT TO THE
BERGSTROM EXPRESSWAY (183 SOUTH) PROJECT DESIGN/BUILD CONTRACT

The Central Texas Regional Mobility Authority (the "Mobility Authority"), a regional mobility authority operating pursuant to Texas Transportation Code Chapter 370, and Colorado River Constructors, an unincorporated joint venture between Fluor Enterprises, Inc. and Balfour Beatty Infrastructure, Inc. ("D/B Contractor") entered into a design-build contract ("D/B Contract") dated July 29, 2015 for the development the Project as defined in the D/B Contract). Pursuant to Section 29.3 of the D/B Contract, the Parties now enter into this First Amendment to the Design/Build Contract ("First Amendment") for the purposes described herein. Capitalized terms not otherwise defined herein shall have the meanings set forth in the D/B Contract.

I. Recitals

1.01 WHEREAS, D/B Contractor submitted certain claims for additional compensation and schedule relief which have been rejected by the Mobility Authority (the "Proposed Change Order 5 Dispute").

1.02 WHEREAS, pursuant to Section 25 of the D/B Contract, D/B Contractor submitted the Proposed Change Order No. 5 Dispute to the Disputes Board and a formal hearing was held on February 8-9, 2022.

1.03 WHEREAS, the Disputes Board issued its findings and recommendations for the Proposed Change Order 5 Dispute on March 8, 2022 ("March 8 DRB Recommendations").

1.04 WHEREAS, Section 25.5.8 of the D/B Contract currently provides a six-month period following issuance of the Disputes Board's recommendations for either Party to appeal the decision back to the Disputes Board, submit the dispute to judicial resolution or settle the dispute using other methods. If the dispute has not been submitted to judicial resolution or otherwise resolved within this six-month period, the Parties are deemed to have conclusively agreed to accept the recommendation made by the Disputes Board.

1.05 WHEREAS, the Parties wish to extend the six-month deadline set forth in Section 25.5.8 of the D/B Contract by an additional month to allow more time to explore settlement of the dispute, and agree that with respect to the March 8 DRB Recommendations and the Proposed Change Order 5 Dispute, the deadline under Section 25.5.8 shall be extended until October 11, 2022.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual agreements and covenants set forth herein, the Mobility Authority and D/B Contractor hereby amend the D/B Contract as follows:

II. Amendments

2.01 From and after the effective date of the D/B Contract, Section 25.5.8 is hereby replaced with the following:

> Should the dispute remain unresolved, during the seven-month period following issuance of the Disputes Board recommendations, either Party may appeal the decision back to the Disputes Board, may submit the dispute to judicial resolution or may resort to other methods of settlement. If the dispute has not been submitted for judicial resolution by the filing of a lawsuit within such seven-month period, and there has been no agreement between the Parties for resolution of the dispute, then the Parties shall be deemed to have conclusively agreed to accept the recommendation made by the Disputes Board.
>
> If the seven-month period ends on a weekend or federal holiday, the deadline shall be the following business day.

2.02 With respect to the March 8 DRB Recommendation and the Proposed Change Order 5 Dispute, the deadline under Section 25.5.8 for either Party to file a lawsuit (thereby submitting the dispute for judicial resolution) is hereby extended through October 11, 2022.

III. General Conditions

3.01 Effect of First Amendment. The terms and conditions of the D/B Contract are incorporated by reference for all purposes. Except as specifically amended and modified by this First Amendment, the parties hereby agree that the terms and conditions of the D/B Contact remain in full force and effect as written.

3.02 Duplicate Originals. This First Amendment may be executed in duplicate originals, each of equal dignity.

3.03. Effective Date. This First Amendment will be effective as of the effective date of the D/B Contract.

IN WITNESS WHEREOF, the authorized representatives of the Mobility Authority and D/B Contractor have executed this First Amendment as of the date(s) indicated below.

[Signature Page to Follow]

D/B CONTRACTOR:

COLORADO RIVER CONSTRUCTORS
An unincorporated joint venture between Fluor Enterprises, Inc. and Balfour Beatty Infrastructure, Inc.

By: Fluor Enterprises Inc., a California corporation

By: _____

REVIEWED
LEGAL

Name: Thomas Nilsson
Title: Vice-President, Operations

By: Balfour Beatty Infrastructure, Inc., a Delaware corporation

By: _____
Name: John Rempe
Title: Executive Vice President

MOBILITY AUTHORITY:

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

A regional mobility authority operating pursuant to Texas Transportation Code, Chapter 370

By: _____
Name: James Bass
Title: Executive Director

FIRST AMENDMENT TO THE
BERGSTROM EXPRESSWAY (183 SOUTH) PROJECT DESIGN/BUILD CONTRACT

The Central Texas Regional Mobility Authority (the "Mobility Authority"), a regional mobility authority operating pursuant to Texas Transportation Code Chapter 370, and Colorado River Constructors, an unincorporated joint venture between Fluor Enterprises, Inc. and Balfour Beatty Infrastructure, Inc. ("D/B Contractor") entered into a design-build contract ("D/B Contract") dated July 29, 2015 for the development the Project as defined in the D/B Contract). Pursuant to Section 29.3 of the D/B Contract, the Parties now enter into this First Amendment to the Design/Build Contract ("First Amendment") for the purposes described herein. Capitalized terms not otherwise defined herein shall have the meanings set forth in the D/B Contract.

I. Recitals

1.01 WHEREAS, D/B Contractor submitted certain claims for additional compensation and schedule relief which have been rejected by the Mobility Authority (the "Proposed Change Order 5 Dispute").

1.02 WHEREAS, pursuant to Section 25 of the D/B Contract, D/B Contractor submitted the Proposed Change Order No. 5 Dispute to the Disputes Board and a formal hearing was held on February 8-9, 2022.

1.03 WHEREAS, the Disputes Board issued its findings and recommendations for the Proposed Change Order 5 Dispute on March 8, 2022 ("March 8 DRB Recommendations").

1.04 WHEREAS, Section 25.5.8 of the D/B Contract currently provides a six-month period following issuance of the Disputes Board's recommendations for either Party to appeal the decision back to the Disputes Board, submit the dispute to judicial resolution or settle the dispute using other methods. If the dispute has not been submitted to judicial resolution or otherwise resolved within this six-month period, the Parties are deemed to have conclusively agreed to accept the recommendation made by the Disputes Board.

1.05 WHEREAS, the Parties wish to extend the six-month deadline set forth in Section 25.5.8 of the D/B Contract by an additional month to allow more time to explore settlement of the dispute, and agree that with respect to the March 8 DRB Recommendations and the Proposed Change Order 5 Dispute, the deadline under Section 25.5.8 shall be extended until October 11, 2022.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual agreements and covenants set forth herein, the Mobility Authority and D/B Contractor hereby amend the D/B Contract as follows:

II. Amendments

2.01 From and after the effective date of the D/B Contract, Section 25.5.8 is hereby replaced with the following:

> Should the dispute remain unresolved, during the seven-month period following issuance of the Disputes Board recommendations, either Party may appeal the decision back to the Disputes Board, may submit the dispute to judicial resolution or may resort to other methods of settlement. If the dispute has not been submitted for judicial resolution by the filing of a lawsuit within such seven-month period, and there has been no agreement between the Parties for resolution of the dispute, then the Parties shall be deemed to have conclusively agreed to accept the recommendation made by the Disputes Board.
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> If the seven-month period ends on a weekend or federal holiday, the deadline shall be the following business day.

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By: Fluor Enterprises Inc., a California corporation

By: _____
Name: Thomas Nilsson
Title: Vice-President, Operations

By: Balfour Beatty Infrastructure, Inc., a Delaware corporation

By: _____
Name: John Rempe
Title: Executive Vice President

MOBILITY AUTHORITY:

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By: Fluor Enterprises Inc., a California corporation

By: _____
Name: Thomas Nilsson
Title: Vice-President, Operations

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Title: Executive Vice President

MOBILITY AUTHORITY: **CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY**

A regional mobility authority operating pursuant to Texas Transportation Code, Chapter 370

By: _____
Name: James Bass
Title: Executive Director

GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 22-039

EXECUTIVE DIRECTOR EMPLOYMENT
AGREEEMENT AMENDMENT

WHEREAS, the Central Texas Regional Mobility Authority ("CTRMA") was created pursuant to the request of Travis and Williamson Counties and in accordance with provisions of the Transportation Code and the petition and approval process established in 43 Tex. Admin. Code § 26.1, *et. seq*. (the "RMA Rules"); and

WHEREAS, the Board of Directors of the CTRMA has been constituted in accordance with the Transportation Code and the RMA Rules; and

WHEREAS, pursuant to Resolution No. 21-001, dated January 27, 2021, the Board of Directors approved the selection of James Bass for the position of Executive Director at CTRMA and authorized the Chairman to negotiate and execute an employment agreement (the "ED Agreement") incorporating the terms approved by the Board of Directors in Resolution No. 21-001; and

WHEREAS, the ED Agreement provides for an annual review of the Executive Director's performance and compensation; and

WHEREAS, the Board of Directors has reviewed the Executive Director's performance; and

WHEREAS, the Board of Directors has determined that the ED Agreement should be amended to set the deferred compensation paid to the Executive Director at ten percent of the Executive Director' base salary.

NOW THEREFORE, BE IT RESOLVED, that the Board of Directors of the CTRMA hereby approves the revisions to the amount of deferred compensation in the ED Agreement as set forth in this resolution; and

BE IT FURTHER RESOLVED, that the Board of Directors authorizes the Chairman to negotiate and execute an amendment to the ED Agreement to set the deferred compensation paid to the Executive Director at ten percent of the Executive Director's base salary to be paid on or prior to the second anniversary date of the Executive Director's employment.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 31st day of August, 2022.

Submitted and reviewed by:

C. Brian Cassidy (Aug 31, 2022 13:06 CDT)

C. Brian Cassidy,Counsel for the
Central Texas Regional Mobility Authority

Approved:

Robert W Jenkins Jr (Sep 1, 2022 09:21 CDT)

Robert W. Jenkins, Jr.
Chairman, Board of Directors